

3.1 SPECIFICATIONS

Specification is defined as the separate contract document, consisting of information regarding the quality of materials and workmanship. The combination of drawings and specifications will completely define the structure physically and technically.

Sometimes, it may be used to describe the contents, which could not be explained clearly by drawings.

3.1.2 GENERAL SPECIFICATIONS

This gives the nature and class of the work and materials in general terms, to be used in the various parts of work, from the foundation to the superstructure. It is a short description of different parts of work specifying materials, proportions, qualities, etc., General specifications give general idea of the whole work or structure and are useful for preparing for estimate

3.1.3 DETAILED SPECIFICATIONS

These give the detailed description of the various items of work laying down the Quantities and qualities of materials, their proportions, the method of preparation workmanship and execution of work.

3.1.3.1 DETAILED SPECIFICATIONS OF EXCAVATIONS, FILLING AND BACKFILLING

Scope of Work

The scope for work covered under these specifications pertains to excavation of foundations, trenches, pits and over areas, in all sorts of soil, soft and hard rock, correct to dimensions given in the drawing including shoring, protection of existing underground utilities of any, such as water lines, electric cables etc. dewatering and shoring if necessary, stacking the useful materials as directed within the lead specified, refilling around the foundation and into the plinth with selected useful excavated earth

and disposing off the surplus earth / materials within specified lead and finishing the surface to proper levels, slopes and camber etc. all complete.

Site Clearance:

Before the earth work is started the area coming under cutting and filling shall be cleared of all obstruction, loose stones, shrubs, rank vegetation, grass, bushes and rubbish removed up to a distance of 150 meters outside the periphery of the area under clearance. This work is deemed to be included in the earthwork item rate and no separate payment will be admissible.

Roots and Vegetation clearance:

The roots of trees if any shall be removed to a minimum depth of 60 cm below ground level or a minimum of 30 cm below formation level whichever is lower and the hollows filled up with earth leveled and rammed. This work is deemed to be included in the earthwork items and no separate payment will be admissible for the work. Any material obtained from the site will be the property of the Government of India and the useful materials as decided by the Engineer-in-charge will be conveyed and properly stacked as directed within the leads specified.

Setting out and making profiles:

Masonry or concrete pillars will be erected at suitable points in the area to serve as benchmarks for the execution of the work. These benchmarks shall be connected with G.T.S. or any other permanent benchmark approved by the Engineer-in-charge. Necessary profiles with pegs, bamboos and strings or Burjis shall be made to show the correct formation levels before the work is started. The contractor shall supply labour and materials for setting out and making profiles and Burjis for the work at his own cost and the same shall be maintained during the excavation work. The Department will show grid co-ordinate or other reference points. It shall be the responsibility of the contractor to set out center lines correctly with reference to the drawings and install substantial reference marks. Checking of such alignment by the Department will not absolve the contractor from his responsibility to execute the work strictly in accordance with the drawings.

Excavation:

The contractor shall notify the Engineer-in-charge before starting excavation and

before the ground is disturbed, to enable him to take existing level for the purpose of measurements. The ground levels shall be taken at 5 to 15 metres intervals in uniformly sloping ground and at closer distance where local mounds, pits, or undulations are met with, as directed by the Engineer-in-charge. The ground levels shall be recorded in field books and plotted on plans, which shall be signed by the Contractor and the Engineer-in-charge, before the earthwork is actually started. The labour required for taking levels, shall be supplied by the Contractor at his own cost. The Contractor shall perform excavation in all types of soils, Murom, soft and hard rock, boulders etc. in foundation, over areas and in trenches to widths, lines, levels, grades and curves as shown in the drawing or lesser widths, lines, levels, grades and levels as directed by the Engineer-in-charge and per items in the schedule of quantities. The item in the schedule of quantities shall specify the excavation in trenches or over areas. For this purpose, the excavation for any depth in trenches for foundation not exceeding 1.5m in width or 10sqm. on plan shall be described as excavation in foundation trenches. Excavation exceeding 1.5m in width as well as 10sqm. on plan (excluding trenches for pipes, cables etc.) and exceeding 30cm in depth shall be described as excavation over areas. Excavation exceeding 1.5m in width as well as 10sqm. on plan but not exceeding 30cm. in depth shall be described as surface Excavation.

Classification of Earth work:

The earthwork shall be classified under the following main categories and measured separately for each category. All types of soil, murrum, boulders, Soft rock, Hard rock.

All types of Soils, Murrum, Boulders:

This includes earth, murrum, top deposits of agricultural soil, reclaimed soil, clay, sand or any combination thereof and soft and hard murrum, shingle etc. which is loose enough to be removed with spades, shovel and pick axes. Boulders not more than 0.03 cum. in volume found during the course of excavation shall also fall under this classification.

Excavation in Soft Rock:

This shall include all materials which are rock or hard conglomerate, all decomposed weathered rock, highly fissured rock, old masonry, boulders bigger than

0.03 cum, in volume but not bigger than 0.5 cum. and other varieties of soft rock which can be removed only with pick axes, crow bars, wedges and hammers with some difficulty. The mere fact that the contractor resorts to blasting and / or wedging and chiseling of reasons of his own, shall not mean the rock is classifiable as hard rock.

Excavation in Hard Rock :

This includes all rock other than soft rock mentioned in para above 1.5.1 (b) viz. soft rock, occurring in masses, boulders having approximate volume more than 0.5 cum. plain or reinforced cement concrete, which can best be removed by chiseling and wedging where blasting cannot be permitted owing to any restriction at site.

Excavation in Hard Rock by Chiseling and Wedging:

Where blasting is not permitted and if the Engineer-in-charge so desires, the excavation shall be done by chiseling and wedging or any other agreed method.

Note: All the excavated hard rock obtained shall be stacked properly and neatly within the specified lead by the contractor as directed by the Engineer-in-charge

Excavation:

The excavation under all classifications in areas in trenches or in pits shall be carried out systematically. Cutting shall be done from top to bottom and not under pinning or undercutting will be allowed. The bottom and sides of excavation shall be dressed to proper level, slopes, steps, camber etc. by removing high spots and ramming thoroughly as directed by the Engineer in-charge. All the excavation shall be carried out strictly to the dimensions given in the drawing. The width shall generally be of the width of mud mat concrete and depth as shown in drawing or as directed by the Engineer-in-charge, according to availability of the desired bearing capacity of soil below. Any excavation if taken below the specified depths and levels, the contractor shall at his own cost fill up such over cut to the specified level with cement concrete 1:4:8 in case of excavation in all types of soils and with cement concrete 1:2:4 in case of excavation soft and hard rock. After the excavation is completed, the contractor shall notify the Engineer-in-charge to that effect and no further work shall be taken up until the Engineer-in-charge has approved the depth and dimensions and also the nature of foundation materials, levels and measurements shall also be recorded prior to taking up any further work.

Shoring:

Unless separately provided for in the schedule of quantities, the quoted rate for excavation shall include excavation of slopes to prevent falling in soil by providing and / or fixing, maintaining and removing of shoring, bracing etc. The contractor would be

responsible for the design of shoring for proper retaining of sides of trenches, pits etc. with due consideration to the traffic, superimposed loads etc. shoring shall be of sufficient strength to resist the pressure and ensure safety from slips and to prevent damage to work and property and injury to persons. It shall be removed as directed after items for which it is required are completed should the slips occur, the slipped materials shall be removed and slope dressed to a modified stable slope. Removal of the slipped earth will not be measured for payment.

Dewatering:

Unless specifically provided for as a separate item in the schedule of quantities, rate shall also include bailing or pumping out all water which may accumulate in the excavation during the progress of further works such as mud mat concrete, R.C. footings, shuttering etc. either due to seepage, springs, rain or any other cause and diverting surface flow by bunds or other means. Care shall be taken to ensure that the water discharged sufficiently away from the foundations keep it free from nuisance to other works in the neighborhood.

Disposal of Excavated Materials: Antiquities:

Any finds of archeological interest such as relics of antiquity, coins, fossils or other articles of value shall be delivered to the Engineer-in-charge and shall be the property of the Government.

Useful Materials:

Any material obtained from the excavation which in the opinion of the Engineer in charge is useful, shall be stacked separately in regular stacks as directed by the Engineer in charge and shall be the property of the Government. No material excavated from foundation trenches of whatever kind they may be are to be placed even temporarily nearer than about 3m from the outer edge of excavation. Discretion of the Engineer-in-charge in such cases is final. All materials excavated will remain the

property of the Department. Rate for excavation includes sorting out of the useful materials and stacking them separately as directed within the specific lead. Material suitable and useful for backfilling or their use shall be stacked in convenient place but not in such a way as to obstruct free movement of materials, workers and vehicles or encroach on the area required for constructional purposes. It shall be used to the extent required to completely backfill the structure to original ground level or other elevation shown on the plan or as directed by the Engineer-in-charge. Materials not useful in anyway shall be disposed off, leveled and compacted as directed by the Engineer-in-charge within a specified lead. The site shall be left clear of all debris and leveled on completion.

Backfilling in sides of Foundations, Plinth, Under Floor etc:

The backfilling shall be done after the concrete or masonry has fully set and shall be done in such a way as not to cause under-thrust on any part of the structure. Where suitable excavated material is to be used for backfilling, it shall be brought from the place where it was temporarily deposited and shall be used in backfilling. The scope of work for backfilling/filling in foundation, plinth, under floors etc. shall include filling for all the buildings covered under the contract. Surplus earth available from one building, if required, shall be used for backfilling/filling for other buildings also within the specified lead mentioned in the item. All timber shoring and form work left in the trenches, pits, floors etc. shall be removed after their necessity ceases and trash of any sort shall be cleared out from the excavation. All the space between foundation masonry or concrete and the sides of excavation shall be backfilled to the original surface with approved materials in layers not exceeding 150mm, in thickness, watered and well consolidated by means of rammers to at least 90% of the consolidation. Areas inaccessible to mechanical equipment such as areas adjacent to walls and columns etc. shall be tamped by hand rammer or by hand held power rammers to the required density. The backfill shall be uniform in character and free from large lumps, stones, shingle or boulders not larger than 75mm. in any direction, salt, clods, organic or other foreign materials which might rot. The backfilling in plinth and under floor shall be well consolidated by means of mechanical or hand operated rammers as specified to achieve the required density. Test to establish proper consolidation as required will be carried

out by the Department at rates specified. Two tests per 50 sqm. will be taken to ascertain the proper consolidation. The cost of tests carried out will be recovered from the contractor's bill.

Filling in Plinth and Under Floors:

After the available suitable excavated materials are exhausted as backfilling, the contractor shall notify the Engineer-in-charge of the fact and levels taken jointly with Engineer-in-charge. The earth, murrum, sand, gravel etc. or such materials suitable for filling proposed to be filled under floors and so mentioned in the item of schedule of quantities shall then be brought to site from approved locations and sources.

Earth Filling:

The earth, soft murrum etc. so brought shall be filled up in layers of 15 cm depth, each layer being well watered and consolidated by approved hand or mechanical tampers or other suitable means to achieve the required density.

Gravel or sand filling:

Gravel if required to be filled under floors, shall be single washed gravel of approved quality and of size varying from 12mm to 20mm. It shall be uniformly blended with approved type of soil and / or sand to obtain full compaction. Gravel shall be filled in specified thickness and shall be well watered and rammed entirely to the satisfaction of the Engineer-in-charge. If sand is required to be filled under floors, it shall be clean, medium grained and free from impurities. The filled in sand shall be kept flooded with water for 24 hrs. to ensure maximum consolidation shall be done by the contractor at his own cost. The surface shall then be well dressed and got approved from Engineer-in-charge before any other work is taken over the fill.

Lead and Lift:

Lead: The lead for disposal / deposition of excavated materials shall be as specified in the respective item of work. For the purpose of measurements of lead, the area to be excavated or the leads which shall be measured by the shortest straight line route on the plan and not the actual route adopted.

Lift: Lift shall be measured from ground level. Excavation up to 1.5m depth below ground level and depositing excavated material on the ground shall be included in the item of earthwork for various kinds of soil. Extra lift shall be measured in unit of 1.5m

or part thereof. Obvious lift shall only be measured that is lifts inherent in the lead due to ground slope shall not be measured, except for lead up to 250m. All excavation shall be measured in successive stages of 1.5m stating the commencing level. This shall not apply to cases where no lift is involved as in hill side cutting.

Mode of Measurements:

All excavation in areas having depth more than 30cm. pits, trenches etc. shall be measured net. The dimensions for the purpose of payment shall be reckoned on the horizontal area of the excavations for the purpose of payment shall be reckoned on the horizontal area of the excavation at the base for foundations of the walls, columns, footings, rafts or other foundations, multiplied by the mean depth from the surface of ground determined by levels. Excavation for side slopes will not be paid for. Excavation in areas having depths less than 30 cm. shall be measured as surface excavation on square meter basis, mentioning the average depth of excavation. Reasonable working space beyond concrete dimension required for waterproofing and shuttering where considered necessary in the opinion of Engineer-in-charge will be allowed in execution and considered for payment for underground water tank, sump septic tank etc. Where direct measurements of rock excavation are not possible, volume of rock can be calculated on the basis of length, breadth, and depth of stacks made at site as mentioned. The net volume shall be worked out by reducing it by 40% taking the voids into consideration as 40%. Similarly to arrive at net quantity to be paid in the case of soil reduction at 20% of corresponding stack / truck measurements shall be made. The rate for excavation shall include carting and disposing and leveling the excavated materials within the specified lead. The rate shall also be inclusive of cost of all tools, plants, explosives, shoring, dewatering at various stages, labour, materials etc. to complete all the operations specified. The backfilling and consolidation in sides of foundation and in plinth with excavated material will not be paid for separately. The rate quoted for excavation shall be deemed to have been included the cost of stacking of excavated materials, conveying within the specified lead, picking of selected stacked materials, conveying it to the place of final backfill, compaction to the required proctor density etc. Payment for filling and consolidation inside the trenches, sides of foundations, plinth etc. with selected materials brought by the contractor other than

the excavated material, shall be paid for separately as per the rates in schedule of quantities which includes cost of such materials/ excavation, royalty, its conveyance within the specified lead, watering, consolidating, dressing etc. Actual quantity of consolidated filling shall be measured and paid in cubic meters up to two places of decimal. The rate quoted in cum. for items of excavation is deemed to include the necessary additional quantity of excavation involved beyond the plan dimensions of the work which may be

necessary to be carried out for carrying out the work in an engineering made, decided upon by the contractor. Therefore no extra payment will be made for any excavation done other than the required quantity as per the plan dimension indicated in the drawings. Measurements for excavation over areas shall be determined by levels or by "Dead men" or both at the discretion of the Engineer-in-charge. If however the Engineer-in-charge decided on measurement by levels, levels of site shall be jointly taken and recorded by the Engineer-in-charge or his representatives and the contractor, before commencement of the work and after completion of the work and the quantity of work done shall be computed based on these levels. The volume of earth work shall be computed based on "Simpson's formula" or any other approved method at the discretion of the Engineer-in-charge.

3.1.3.2 ANTITERMITE TREATMENT:

General:

Pre constructional anti-termite treatment is a process in which soil treatment is applied to a building in early stages of its construction. The purpose of anti-termite treatment is to provide the building with a chemical barrier against the sub-terrain termites. Anti-termite treatment being a specialized job, calls for thorough knowledge of the chemicals, soils, termite to be dealt with and the environmental conditions, in order to give effective treatment and lasting protection to the property undergoing treatment. It is therefore imperative that the works of anti-termite treatment should be got executed through specialized agencies only. The specialized agency should be preferably a member of the Indian pest control Association and shall have sufficient experience of carrying out similar works of magnitude envisaged in this tender. The pre

constructional soil treatment is required to be applied during the construction stages of the sub-structure up to plinth level. The contractor has to be watchful of the various stages of sub-structure works and arrange to carry out the soil treatment in time after proper coordination with Department and other contractors if any, working at site.

Scope:

The scope of pre constructional anti-termite treatment covers the soil treatment with approved chemicals in water emulsion in foundation trenches for columns, plinth beams, plinth filling, at junction of walls and floor, in expansion joints etc. in stages as detailed in this specifications and drawings. Unless otherwise stipulated, the anti-termite treatment will be carried out as per IS 6313 (part II) 1981 and / or as per direction of the Engineer-in-charge.

Site preparation:

In order to ensure uniform distribution of the chemical emulsion and to assist penetration, the following site preparation shall be carried out:

- a) Remove all trees, stumps, logs or roots from the building site.
- b) Remove all concrete form work if left anywhere, leveling pegs, timber off-cuts and other building debris from the area to be treated.
- c) If the soil to be treated is sandy or porous, preliminary moistening will be required to fill capillary spaces in soil in order to prevent the loss of emulsion through piping or excessive percolations.
- d) In the event of water logging of foundation, the water shall be pumped out before application of chemical emulsion and it should be applied only when the soil is absorbent.
- e) On clays and other heavy soils where penetration is likely to be slow and on sloping sites, where run-off of the treating solution is likely to occur, the surface of the soil should be scarified to a depth of 75mm at least.
- f) All sub-floor leveling and grading should be completed. All cutting trenches and excavations should be completed with backfilling in place, borrowed fill must be free from organic debris and shall be well compacted. If this is not done supplementary treatment should be made to complete the barrier.

Chemical to be used:

The effectiveness of chemical depends upon the choice of the chemical, the dosage adopted and the thoroughness of application. The chemical solutions or emulsions are required to be dispersed uniformly in the soil and to the required strength so as to form an effective chemical barrier which is lethal and repellent to termites.

Soil treatment:

One of the following chemicals in water emulsion, after approval from the Engineer in charge shall be used uniformly over the area to be treated.

Mode and Rate of Application:

The chemical emulsion as stated above will be applied uniformly by sprayers at the prescribed rates as detailed below in all the stages of the treatment.

Treatment in Foundation Trenches:

In case of normal wall load bearing structures, columns pits, wall trenches and basement, the treatment shall be at 5 litres/sqm. of surface area of the bottom and sides to a height of at least 300mm. After the foundation work, the sides shall be treated at 7.5 litres/sqm. of vertical surface of substructure on each side. After the earth filling is done, treatment shall be done by rodding the earth at 150mm centers close to wall surface and spraying the chemical with the above dose i.e. 7.5 litres/sqm. In case of framed structure, the treatment shall start at a depth of 500mm below ground level. From this depth the backfill around the columns, beams and R.C.C. basement walls shall be treated at 7.5 litres / sqm. Of the vertical and at 5 litres / sqm. for the horizontal surface at the bottom in the trenches / pits.

Treatment on Top Surfaces on Plinth Filling:

The top surface of the filled earth within plinth walls shall be treated with chemical emulsion at the rate of 5 litres/sqm. of the surface area before sub-base to floor is laid. If filled earth has been well rammed and the surface does not allow the emulsion to seep through, holes up to 50 to 75mm deep at 150 mm centers both ways shall be made with crowbars on the surface to facilitate saturation of the soil with the emulsion.

Treatment at Junction of Walls and floors:

Special care shall be taken to establish continuity of the vertical chemical barrier on the

inner wall surfaces from the finished ground level (or from level where the treatment had stopped) up to the level of the filled earth surface. To achieve this a small channel 30 X 30mm. shall be made at all the junctions of wall / column with floor (before laying sub-grade) and rod holes made in the channel up to the finished ground level at 150mm apart and the iron rod moved backward and forward to break the earth and chemical emulsion poured along the channel at 7.5 litres (or at recommended quantity per sqm. of the vertical wall / column surfaces so as to soak the soil right up to the bottom. The soil shall be tamped back into place after this operation.

Treatment for Expansion Joints:

The soil beneath the expansion joints shall receive special attention when the treatment under 2.5.1 above is in progress. This treatment shall be supplemented by treating through the expansion joint after sub-grade has been laid at the rate of 2 litres per metre length of expansion joint.

Precautions during Treatment:

1. Utmost care shall be taken to see that the chemical barrier is complete and continuous. Each part of the area shall receive the prescribed dosage of chemical emulsion.
2. The treatment should not be carried out when it is raining or when the soil is wet with rain or sub-soil water.
3. Once formed, the treated soil barrier shall not be disturbed. If by chance, treated soil barriers are disturbed, immediate steps shall be taken to restore the continuity and completeness of the barrier system.

Precautions for Health Hazards and Safety Measures:

All the chemicals mentioned above are poisonous and hazardous to health. These chemicals can have an adverse effect upon health when absorbed through the skin, inhaled as vapours or spray mist or swallowed. Persons handling or using these chemicals should be warned of these dangers and advised that absorption through the skin is the most likely source of accidental poisoning. They should be cautioned to observe carefully all the safety precautions particularly when handling these chemicals in the form of concentrates. These chemicals are usually brought to the site in the form

of emulsion concentrates. The containers should be clearly labeled and should be stored carefully out of the reach of children and pets animal. They should be kept securely locked. Particular care should be taken to prevent skin contact with concentrates. Prolonged exposure to dilute emulsion should also be avoided. Workers should wear clean clothing and should wash thoroughly with soap and water especially before eating. In the event of severe contamination, clothing should be removed at once and the skin washed with soap and water. If chemicals splash into the eyes they shall be flushed with plenty of water and immediate medical attention should be sought.

The concentrates are oil solutions and present a fire hazard owing to the use of petroleum solvents. Flames should not be allowed during mixing. Care should be taken in the application of chemicals / soil toxicants to see that they are not allowed to contaminate wells or springs and other sources of drinking water.

Guarantee :

The contractor has to furnish the guarantee for 10 (ten) years from the date of completion of work, starting that in case of reappearance of termites within the building area due to defective materials or workmanship or due to any other reasons, the contractor will carry out the necessary post constructional treatment to keep the entire area free from termite, once again, without any extra cost to the Department during the guarantee period.

Mode of measurement:

The payment will be made on the basis of plinth area measurements at ground floor only for all the stages of treatment in sqm. correct to two places of decimals. Rate includes the cost of materials, labour and all tools, plants, sprayers required for complete operation.

3.1.3.3 HARD CORE / SOLING UNDER FLOORS / FOUNDATIONS:

Scope of work:

The work covered under this specification includes all type of soling work either by bricks or by rubble stones laid under floors / foundations, hand packed, complete as per specification mentioned below and applicable drawings.

Rubble Stone Soling:

The rubble stone shall be of best variety of black trap / granite / basalt or other approved variety of stone available locally. The stone shall be hard, durable free from defects and of required size and shall be approved by the Engineer-in-charge.

Preparation of Surface:

The bed on which rubble soling is to be laid shall be cleared of all loose materials, leveled, watered and compacted and got approved by the Engineer-in-charge before laying rubble soling. Cable or pipe trenches if shown in the drawing and as required by the Engineer-in-charge shall be got done before the soling is started.

Workmanship:

Over the prepared surface, the stone shall be set as closely as possible and well packed and firmly set. The stones shall be of full height and shall be laid so as to have their bases of the largest area resting on the sub-grade. Soling shall be laid in one layer of 230mm or 150mm depth or specified thickness of soling with a tolerance of 25mm. After packing the stones properly in position, the interstices between them shall be carefully filled with quarry spoils or stone chips of larger size possible to obtain a hard, compact surface. Spreading of loose spoils or stone chips is prohibited. The entire surface shall be examined for any protrusions and the same shall be knocked off by a hammer and all interstices shall be filled with approved murrum. Excess murrum if any over the surfaces shall be removed. Unless otherwise specified, the murrum shall be supplied by the contractor at his own cost from the selected area. The surfaces shall then be watered and consolidated with mechanical or sufficiently heavy wooden tampers and log-rammers as approved by the Engineer. After compaction, the Engineer-in-charge to give the required slope or level and dense sub-base and the surface shall present clean look. Adequate care shall be taken by the contractor while laying and compacting the rubble soling to see that concrete surfaces in contact with soling are not damaged.

Mode of Measurement:

The quoted rate shall be per square meter of the soling of specified thickness. The linear dimension shall be measured up to two places of decimals of a meter and are worked out

correct to the two places of decimals of a square meter. Plan areas of soling work actually done limiting to the dimensions as per drawings shall be measured for payment. The rates shall include all the materials labour, transport etc. and no extra payment shall be made for work done at different levels. The rate shall also include the cost of preparation of surface, all materials and labour, watering, consolidation etc. all complete

3.1.3.4 REINFORCED CONCRETE AND ALLIED WORKS:

Scope:

This specification covers the general requirements for concrete jobs, using on-site production facilities including requirements in regard to the quantity, handling, storage of ingredients, proportioning, batching, mixing and testing of concrete and also requirements in regard to the quality. This also covers the transportation of concrete from the mixer to the place of final deposit and the placing, consolidation, curing, protecting, repairing and finishing of concrete. After award of the work, if so desired by the contractor, he / they may be allowed by the Engineer-in-charge till the designed mix is obtained, to carry out the reinforced concrete work in foundation and plinth as per equivalent nominal mix against the specified design mix concrete as per IS Codes. However, all other specification for design mix shall govern for nominal mix also and nothing extra shall be paid for use of extra cement on this account whether the cement is supplied by the Department or procured by the contractor.

Cement Concrete (Plain and Reinforced):

The quality of materials and method and control of manufacture and transportation of all concrete work in respect of mix, where reinforced or otherwise, shall conform to the applicable portions of these specifications. The Engineer-in-charge shall have the right to inspect the sources of materials, the layout and operation of procurement and storage of materials, the concrete batching and mixing equipments and the quality control system. Such an inspection shall be arranged by the contractor and the Engineer-in-charge's approval shall be obtained prior to starting the concrete work.

Materials for Standard Concrete:

The ingredients to be used in the manufacture of standard concrete shall consist solely of a standard type Portland cement, clean sand, natural coarse aggregate, clean water, ice and admixtures if specially called for as per drawings or schedule of quantities.

Cement :

Unless otherwise specified or called for by the Engineer-in-charge, cement shall be ordinary Portland cement in 50 kg bags. The use of bulk cement will be permitted only with the approval of the Engineer-in-charge. Changing of brands or type of cement within the same structure will not be permitted. Ordinary Portland cement (OPC) 43 grade manufactured as per I.S. specifications of reputed brands like ACC / Ultratech / Zuari / Coramendel or any other brands as approved by the Engineer-in-charge from time to time shall be procured and used on the work. Joint account of cement consumed at site for everyday for items of work carried shall be maintained by the Contractor for verification to ensure effective control on quality of cement used in the work.

A certified report attesting to the conformity of the cement to IS specifications by the cement manufacturer's chemist shall be furnished to the Engineer-in-charge, if demanded. In case the cement is required to be arranged by the Contractor, the Contractor will have to make his own arrangement for the storage of adequate quantity of cement. Cement in bulk may be stored in bins or silos which will provide complete protection from dampness, contamination and minimize caking and false set. Cement bags shall be stored in a dry enclosed shed (storage under tarpaulins will not be permitted), well away from the outer walls and insulated from the floor to avoid contact with moisture from ground and so arranged as to provide ready access. Damaged or reclaimed or partly set cement will not be permitted to be used and shall be removed from the site. The storage bins and storage arrangements shall be such that there is no dead storage. Not more than 12 bags shall be stacked in any tier. The storage arrangement shall be got approved by the Engineer-in-charge.

Consignments in cement shall be stored as received and shall be consumed in the order of their delivery. Contractor shall establish cement/concrete/soil testing laboratories at site of work with qualified person to handle the laboratory. Every consignment of cement procured shall accompany test certificate from the company indicating lot No etc. Sample shall be taken for each lot and sent to Standard Approved Material Testing

Laboratory for physical and chemical analysis. The cost of testing shall be borne by the Contractor. Cement held in store for a period of 90 (ninety) days or longer shall be retested before use in work. Should at any time the Engineer-in-charge have reasons to consider that any cement is defective, then irrespective of its origin and / or manufacturer's test certificate, such cement shall be tested immediately at a National Test Laboratory / Departmental Laboratory or such approved laboratory, and until the results of such tests are found satisfactory, it shall not be used in any work.

Aggregates:

"Aggregate" in general designates both fine and coarse inert materials used in the manufacture of concrete. "Fine Aggregate" is aggregate most of which passes through 4.75 mm I.S. sieve. "Coarse Aggregate" is aggregate most of which is retained on 4.75 mm I.S. sieve. All fine and coarse aggregates proposed for use in the work shall be subject to the Engineer-in-charge's approval and after specific materials have been accepted, the source of supply of such materials shall not be changed without prior approval of the Engineer-in-charge. Aggregates shall, except as noted above, consist of natural sand, crushed stone and gravel from a source known to produce satisfactory aggregate for concrete and shall be chemically inert, strong, hard, durable against weathering, of limited porosity and free from deleterious materials that may cause corrosion to the reinforcement or may impair the strength and / or durability of concrete. The grading of aggregates shall be such as to produce a dense concrete and shall be based on the "mix design" and preliminary test on concrete specified hereinafter.

Sampling and Testing:

Sampling of the aggregates for mix design and determination of suitability shall be taken under the supervision of the Engineer-in-charge and delivered to the laboratory, well in advance of the scheduled placing of concrete. Record of tests which have been made on proposed aggregates and on concrete made from this source of aggregates shall be furnished to the Engineer-in-charge in advance of the work or use, in determining suitability of the proposed aggregate.

Storage of aggregates:

All coarse and fine aggregates shall be stacked separately in stock pile in the material yard near the work site in bins properly constructed to avoid inter mixing of different aggregates. Contamination with foreign materials and earth during storage and while heaping the materials shall be avoided. The aggregate must be of specified quality not only at the time of receiving at site but also at the time of loading into mixer. Rakers shall be used for lifting the coarse aggregate from bins or stock piles. Coarse aggregate shall be piled in layers not exceeding 1.00 meters in height to prevent conning or segregation. Each layer shall cover the entire area of the stock pile before succeeding layers are started. Aggregates that have become segregated shall be rejected. Rejected materials after remixing may be accepted, if subsequent tests demonstrate conformity with required gradation.

Specific Gravity:

Aggregates having a specific gravity below 2.6 (saturated surface dry basis) shall not be used without special permission of the Engineer-in-charge.

Fine Aggregate:

Fine aggregate except as noted above, and for other than light weight concrete shall consist of natural or crushed sand conforming to IS 383. The sand shall be clean, sharp, hard, strong and durable and shall be free from dust, vegetable substances, adherent coating, clay, loam, alkali, organic matter mica, salt or other deleterious substances which can be injurious to the setting qualities / strength / durability of concrete.

Screening and Washing:

Sand shall be prepared for use by such screening or washing or both as necessary, to remove all objectionable foreign matter while separating the sand grains to the required size fractions. Sand with silt content more than 3 percent will not be permitted to be used unless same is washed and silt content is brought within 3% by weight.

GRADATION: Unless otherwise directed or approved, the grading of sand shall be within the limit indicated hereunder:-

Where the grading falls outside the limits of any particular grading zone of sieves, other than 600 micron (IS) sieve by not more than 5% it shall be regarded as falling within that grading zone. This tolerance shall not be applied to percentage passing the 600

micron (IS) sieve or to percentage passing any other sieve size on the coarser limit of grading zone I or the finer limit of grading zone IV. Fine aggregates conforming to Grading zone IV shall not be used unless mix designs and preliminary tests have shown its suitability for producing concrete of specified strength and workability.

Fineness Modulus:

The sand shall have a fineness modulus of not less than 2.2 or more than 3.2 the fineness modulus is determined by adding the cumulative. Percentages retained on the following IS sieve sizes (4.75 mm, 2.36 mm, 1.18mm, 600 micron, 300 micron and 150micron) and dividing the sum by 100.

Coarse Aggregate:

Coarse aggregate for concrete except as noted above and for other than light weight concrete shall conform to IS 383. This shall consist of natural or crushed stone and gravel, and shall be clean and free from elongated, flaky or laminated pieces, adhering coatings, clay lumps, coal residue, clinkers, sag, alkali, mica, organic matter or other deleterious matter. The coarse aggregate and fine aggregate shall be tested from time to time as required by the Engineer-in-charge to ascertain its suitability for use in construction and the charges for testing aggregate shall be born by the contractor as specified herein after.

Screening and Washing:

Crushed rock shall be screened and / or washed for the removal of dirt or dust coating, if so demanded by Engineer-in-charge.

Water:

Water used for both mixing and curing shall be free from injurious amount of deleterious materials; potable waters are generally satisfactory for mixing and curing concrete. In case of doubt, the suitability of water for making concrete shall be ascertained by the compressive strength and initial setting time test specified in IS 456. The sample of water taken for testing shall be typical of the water proposed to be used for concreting, due account being paid to seasonal variation. The samples shall not receive any treatment before testing other than that envisaged in the regular supply of water proposed for use in concrete. The sample shall be stored in a clean container

previously rinsed out with similar water. Average 28 days compressive strength of at least three 150mm concrete cubes prepared with water proposed to be used shall not be less than 90% of the average strength of three similar concrete cubes prepared with distilled water. The initial setting time of test block made with the appropriate test cement and the water proposed to be used shall not be less than 30 minutes and shall not differ by more than (+) 30 minutes from the initial setting time of control test block prepared with the appropriate test cement and distilled water. The test blocks shall be prepared and tested in accordance with the requirements of IS 4031. Where water can be shown to contain an excess of acid, alkali, sugar or salt, Engineer-in-charge may refuse to permit its use. As a guide, the following concentrations represent the maximum permissible values.

Limits of acidity:

To neutralize 200ml sample of water, using phenolphthalein as an indicator, it should not require more than 2ml of 0.1 normal NaOH. The details of test shall be as given in IS 3025.

Limits of alkalinity:

To neutralize 200ml sample of water, using methyl orange as an indicator, it should not require more than 10ml of 0.1 normal HCL. The details of test shall be as given in IS 3025.

3.1.3.5 FORMWORK

General:

The form work shall consist of shores, bracings, sides of beams and columns, bottom of slabs etc, including ties, anchors, hangers, inserts etc. complete which shall be properly designed and planned for the work. The false work shall be so constructed that up and down vertical adjustment can be made smoothly. Wedges may be used at the top or bottom of timber shores, but not at both ends, to facilitate vertical adjustment and dismantling of form work.

Design of FormWork

The design and engineering of form work as well as its construction shall be the responsibility of Contractor. The drawings and calculations for the design of the form work shall be submitted well in advance to the Engineer-in-charge for approval before proceeding with work, at no extra cost to the Department. Engineer-in-charge's approval shall not however, relieve Contractor of the full responsibility for the design and construction for the form work. The design shall take into account all the loads vertical as well as lateral that the forms will be carrying including live and vibration loadings.

Tolerances:

Tolerances are specified permissible variation from lines, grade or dimensions given in drawings. No tolerances specified for horizontal or vertical buildings lines or footings. Unless otherwise specified, the following tolerances will be permitted.

Tolerances for R.C. Buildings:

i) Variation from the plumb:

- a) In the line and surfaces of columns, piers, walls and in buttresses: 5 mm per 2.5m, but not more than 25 mm.
- b) For exposed corner columns and other conspicuous lines In any bay or 5 m, maximum : (+) 5 mm In 10 m or more: (+) 10mm

ii) Variation from the level or from the grades indicated on the drawings.

- a) In slab soffits, ceilings, beam soffits and in arches.
- b) In 2.5m (+) 5mm In any bay or 5m maximum (+) 8 mm In 10 or more (+) 15mm
- c) For exposed lintels, sills, parapets, horizontal grooves and conspicuous lines

iii) Variation of the linear building lines from established position in plan and related position of columns, walls and partitions. In any bay or 5m maximum (+) 10 mm In 10 or more (+) 20mm

iv) Variation in the sizes and locations of sleeves, openings in walls and floors except in the case of and for anchor bolts : (+) 5mm

v) Variation in cross sectional dimensions of columns and beams and in the thickness of slabs and walls: (+) 10 mm/(-) 5mm

vi) Footing :

- a) Variation in dimensions in plan (+) 50mm/(-) 5mm.
 - b) Misplacement or eccentricity: 2% of footing within the direction of misplacement but not more than 50mm.
 - c) Reduction in thickness (-) 5% of specified thickness subject to maximum of 50mm.
- vii) Variation in steps:

- a) In a flight of stairs Rise (+) 3.0 mm Tread (+) 5.0 mm
- b) Consecutive steps Rise (+) 1.5 mm Tread (+) 3.0 mm

3.1.3.6 STEEL REINFORCEMENT

Steel reinforcement bars, if supplied or arranged by contractor, shall be either plain round mild steel bars grade as per IS 432 (part-I) or medium tensile steel bars as per IS 452 (part-I) or hot rolled mild steel and medium tensile steel deformed bars as per IS 1139 or cold twisted steel bars and hot weld strength deformed bars as per IS 1786, as shown and specified on the drawings. Wire mesh or fabric shall be in accordance with IS 1566. Substitution of reinforcement will not be permitted except upon written approval from Engineer-in-charge.

Storage :

The reinforcement steel shall not be kept in direct contact with ground but stacked on top of an arrangement of timber sleepers or the like. Reinforcement steel shall be with cement wash before stacking to prevent scale and rust. Fabricated reinforcement shall be carefully stock to prevent damage, distortion, corrosion and deteriorations.

Quality :

All steel shall be grade I quality unless specifically permitted by the Engineer-in-charge. No rolled material will be accepted. If demanded by the Engineer-in-charge, Contractor shall submit the manufacturer's test certificate for steel. Random tests on steel supplied by contractor may be performed by Department as per relevant Indian Standards. All costs incidental to such tests shall be at contractor's expense. Steel not conforming to specifications shall be rejected. All reinforcement shall be clean, free from grease, oil, paint, dirt, loose mill, scale dust, bituminous materials or any other

substances that will destroy or reduce the bond. All rods shall be thoroughly cleaned before being fabricated. Pitted and defective rods shall not be used. All bars shall be rigidly held in position before concreting. No welding of rods to obtain continuity shall be allowed unless approved by the Engineer-in-charge. If welding is approved, the work shall be carried as per 2751, according to best modern practices and as directed by the Engineer-in-charge in all cases of important connections, tests shall be made to prove that the joints are of the full strength of bars welded. Special specifications, as specified by the Engineer-in-charge, shall be adhered to in the welding of cold worked reinforcing bars and bars other than mild steel.

Laps :

Laps and splices for reinforcement shall be shown in the drawings. Splices, in adjacent bars shall be staggered and the locations of all splices, except those specified on the drawing shall be approved by the Engineer-in-charge. The bars shall not be lapped unless the length required exceeds the maximum available length of bars at site.

Bending :

All bars shall be accurately bent according to the sizes and shapes shown on the detailed working drawings/ bar bending schedules. They shall be bent gradually by machine or other approved means. Reinforcing bars shall not be straightened and re-bent in a manner that will injure the materials. Bars containing cracks or splits shall be rejected. They shall be bent cold, except bars of over 25mm in diameter which may be bent hot if specifically approved by the Engineer-in-charge.

Bars bent hot shall not be heated beyond cherry red colour (not exceeding 645°C) and after bending shall be allowed to cool slowly without quenching. Bars incorrectly bent shall be used only if the means used for straightening and rebending be such as shall not, in the opinion of the Engineer-in-charge injure the material. NO reinforcement bar shall be bent when in position in the work without approval, whether or not it is partially embedded in hardened concrete. Bars having links or bends other than those required by design shall not be used.

Bending at Construction Joints :

Where reinforcement bars are bent aside at construction joints and afterwards bent back into their original position, care should be taken to ensure that no time the radius of the

bend is less than 4 bar diameters for plain mild steel or 6 bar diameters for deformed bars. Care shall also be taken when bending back bars to ensure that the concrete around the bar is not damaged.

Fixing / Placing and Tolerance on Placing :

Reinforcement shall be accurately fixed by any approved means maintain in the correct position as shown in the drawings by the use of blocks, spacer and chairs as per IS 2502 to prevent displacement during placing and compaction of concrete. Bar intended to be in contact at crossing point shall be securely bound together at all such points with number 16 gauge annealed soft iron wire. The vertical distances required between successive layers of bars in beams or similar members shall be maintained by the provision of mild steel spacer bars at such intervals that the main bars do not perceptibly sag between adjacent spacer bars.

Tolerance on placing of reinforcement :

Unless otherwise specified by the Engineer-in-charge, reinforcement shall be placed within the following tolerances:

Tolerance in spacing

- a) For effective depth, 200 mm or less + 10 mm
- b) For effective depth, more than 200 mm + 15 mm

Cover to Reinforcement :

The cover shall in no case be reduced by more than one third of specified cover or 5 mm whichever is less. Unless indicated otherwise on the drawings, clear concrete cover for reinforcement (exclusive of plaster or other decorative finish shall be as follows) :

- a) At each end of reinforcing bar not less than 25 mm, nor less than twice the diameter of such bar.
- b) For a longitudinal reinforcing bar not less than 25 mm, nor more than 40 mm, nor less than the diameter of such bar. In the case of column of maximum dimensions of 200 mm or under, whose reinforcing bars do not exceed 12 mm, a cover of 25 mm may be used.
- c) For longitudinal reinforcing bar in a beam, not less than 25 mm nor less than the diameter of such bar and.
- d) For tensile, compressive, shear, or other reinforcement in a slab, not less than 25 mm,

nor less than the diameter of such bar and.

e) For any other reinforcement not less than 15mm, nor less than the diameter of such bar.

f) Increased cover thickness may be provided when surfaces of concrete members are exposed to the action of harmful chemicals (as in the case of concrete in contact with earth faces contaminated with such chemicals), acid, vapour, saline, railways) etc. and such increase of cover may be between 15mm and 50 mm beyond the figures given in (a to e) above as may be specified by the Engineer-in-charge.

g) For reinforced concrete members, totally immersed in sea water the cover shall be 40mm, more than specified (a to e) above.

h) For reinforced concrete members, periodically immersed in sea water or subject to sea spray, the cover of concrete shall be 50 mm more than that specified (a to e) above.

i) For concrete of grade M25 and above, the additional thickness of cover specified in (f), (g) and (h) above may be reduced to half. In all such cases the cover should not exceed 75mm.

j) Protection to reinforcement in case of concrete exposed to harmful surroundings may also be given by providing a dense impermeable concrete with approved protective coating as specified on the drawings. In such case, the extra cover, mentioned in (h) and (i) above, may be reduced by the Engineer-in-charge, to those shown on the drawing.

k) The correct cover shall be maintained by cement mortar briquettes or other approved means. Reinforcement for footings, grade beams and slabs on sub grade shall be supported on precise concrete blocks as approved by the Engineer-in-charge. The use of pebbles or stones shall be permitted.

l) The minimum clear distance between reinforcing bars shall be in accordance with IS 456.

3.1.3.7 STRUCTURAL STEEL

Scope of Work :

The work covered by this specification consists of furnishing and erecting of structural steel complete in strict accordance with this specifications and the applicable drawings.

Materials :

All structural steel shall be of standard sections as marked on the drawings and shall be free of scale, blisters, laminations, cracked edges and defects of any sort. If the structural steel is not supplied by the Department and the Contractor is required to bring such steel, the Contractor shall furnish duplicate copies of all mill orders and / or also the test report received from the mills, to satisfy the Engineer-in-charge. All structural steel and electrodes shall comply in all respects with relevant I.S.S. for structural steel.

Workmanship :

All workmanship shall be of first class quality in every respect to get greatest accuracy to ensure that all parts will fit together properly on erection. All ends shall be cut true to planes. They must fit the abutting surfaces closely. All stiffeners shall fit tightly at both ends. All holes in plates and section between 12mm and 20 mm thick shall be punched to such diameter that 3mm of metal is left all around the hole to be cleaned out to correct size by reamer. The base connection shall be provided as shown on drawings and the greatest accuracy of workmanship shall be ensured to provide the best connections. Figured dimensions on the drawings shall be taken.

Erection and Marking :

Erection and fabrication shall be according to IS 800-1984 section –11. During erection, the work shall be securely braced and fastened temporarily to provide safety for all erection stresses etc. No permanent welding shall be done until proper alignment has been obtained. Any part which do not fit accurately or which are not in accordance with the drawings and specifications shall be liable to rejection and if rejected, shall be at once be made good. Engineer-in-charge shall have full liberty at all reasonable times to enter the contractor's premises for the purpose of inspecting the work and no work shall be taken down, painted or dispatched until it has been inspected and passed. The contractor shall supply free of charge all labour and tools required for testing of work.

Delivery at Site :

The contractor shall deliver the component parts of the steel work in an undamaged state at the site of the works and the Engineer-in-charge shall be entitled to refuse acceptance of any portion which has been bent or otherwise damaged before actual delivery on work. **Shop**

Drawing :

The shop drawings of structural steel based on contract drawings shall be submitted to the Engineer-in-charge. The necessary information for fabrication, erection, painting of structure etc. must be furnished immediately after acceptance of the tender.

Painting :

Painting should be strictly according to IS. 1477-1971 (Part-I-Pretreatment) and IS 1477-1971 (part-II painting). Painting should be carried out on dry surfaces free from dust, scale etc. The paint shall be approved by the Engineer-in-charge. Once coat of shop paint (red lead) shall be applied on steel, except where it is to be encased in concrete or where surfaces are to be field welded.

Welding :

Welding shall be in accordance with IS. 816-1969, IS 819-1957, IS 1024-1979, IS 1261-1959, IS 1323-1982 and IS 9595-1980 as appropriate. For welding of any particular type of joint, welders shall give evidence of having satisfactorily completed appropriate test as described in any of IS 817-1966, IS 1393-1961, IS 7307 (part-I) – 1974, IS 7310 (part-I) 1974 and IS 7318 (part-I) 1974 as relevant.

Welding Consumables:

Covered electrodes shall conform to IS 814 (part-I) – 1974 and IS 814 (part-II)- 1974 or IS 1395-1982 as appropriate. Filler rods and wires for gas welding shall conform to IS 1278-1972. The bar wire electrodes for submerged arc welding shall conform to IS 7280-1974. The combination of arc and flash shall satisfy the requirements of IS 3613-1974. The filler rods and bare electrodes for gas shielded metal arc welding shall conform to IS 6419-1971 and IS 6560-1972 as appropriate.

Type of Welding :

Shielded metal arc welding (direct or alternating current) or Oxyacetylene welding may be used. Field welding may be used. Field welding shall be by D.C.

3.1.3.8 DAMP PROOF COURSE

Scope of work:

The work covered under this specification consists of supplying and laying plain cement concrete or cement plaster 1:3 as damp proof course with or without waterproofing admixture with this specification and applicable drawings.

Workmanship :

Surface to receive damp proof course shall be cleaned and carefully wiped to remove alldust, laitance etc. and shall be approved by the Engineer-in-charge Damp proof course shown shall be cement concrete as per proportion indicated in the schedule or cementplaster in the ratio CM 1:3. Approved water proofing compound @ 2% by weight of cement or asdirected by the manufacturer shall be mixed in cement mortar for this concrete or plaster. Thedamp proof course shall be laid to the full width of the walls and the edges shall be straight, evenand truly vertical. Wooden forms shall be used to obtain good edges. No masonry work shall becommenced on freshly laid damp proof course unless it is cured for48hours of its laying by curing of damp proof course shall be continued along with the masonrywork. Specification for cement, sand, aggregate and water shall be as described herein before forconcrete works / cement plaster.

Mode of measurement :

The work shall be measured in sqm. area actually laid limited to sites as shown indrawing. The rate shall include cost of all the materials, labour etc. and scaffolding (if any).

3.1.3.9BRICKWORK**Scope of work:**

The work covered under this specification pertains to procurement of best quality locallyavailable bricks and workmanship of building walls of various thickness. In strict compliance withthe specifications and applicable drawings.

Materials :

Brick shall be best quality locally available bricks and shall be got approved by the Engineer-in-charge before incorporation in the work. The nominal size of bricks (F.P.S) shall be22.9 X 11.4 X7cm (9" X 4 1/2 X 2 3/4"). Permissible tolerance on dimensions shall be +3mm. in length and + 1.5 mm in width / thickness. The contractor shall get approved the sampleand source of bricks from Engineerin- charge before procurement on large scale and shallmaintain the same for the entire work. In case the size of bricks used in the work found lesser thanthe specified one for the whole lot : Extra cement consumed due to more number of joints and dueto additional thickness of plaster than

the specified in the tender to match with adjoining columns and beams, shall be to contractor's account. If the plastering to be done is more than the specified thickness to bring the plaster surface to perfect line, level and plumb with adjoining columns, beams walls etc., the contractor shall be responsible to provide and fix chicken wire mesh to receive more thickness of plaster at his own cost and nothing extra will be paid on this account.

In case the size of bricks used in the work, found more than the permissible, the contractor shall chip out the exposed edges of bricks upto the required level of wall to receive specified thickness of plaster at no extra cost. Bricks shall generally conform to IS 1077-1970. In any case minimum crushing strength shall not be less than 35 kg/sq.cm and water absorption shall not be more than 25% by weight. The Engineer-in-charge shall have the right to reject bricks obtained from any field where the soil have an appreciable quantity of sulphates and chlorides. The specifications for cement, sand and water shall be same as described hereinbefore under cement concrete. Bricks shall be thoroughly soaked in water before using till the bubbles ceases. No half or quarter brick shall be used except as closer. The closers shall be cut to required size and used near the end of the walls. The walls shall be raised truly to plumb. The type of bond to be adopted shall be decided by the Engineer-in-charge, but vertical joints shall be laid staggered.

Workmanship :

Four courses of brick work with four joints should not exceed by more than 40mm the same bricks piled one over the other without mortar. Brick work shall not be raised more than 10 courses a day unless otherwise approved by the Engineer-in-charge. The brick work shall be kept wet for at least 7 days. Brick work shall be uniformly raised around and no part shall be raised more than 1.0 meter above another at any time. All joints shall be thoroughly flushed with mortar of mix as specified in the schedule of quantities, at every courses. Care shall be taken to see that the bricks are bedded effectively and all joints completely filled to the full depth. The joints of brick work to be plastered shall be raked out to a depth not less than 10mm as the work proceeds. The surface of brick work shall be cleaned down and wiped properly before the mortar sets.

The adhesion between the brick masonry surface and the concrete surface of columns, beams, chajjas, lintels etc. should be proper by ensuring that the concrete surface coming in contact with brick masonry is backed / chipped / keyed, cleaned and cement slurry is applied so that a proper bond is achieved between the two dissimilar materials. It is responsibility of the contractors to ensure that there will not be any cracks / fissure anywhere in the brick masonry. In case the cracks appear subsequently in those areas, they should be made good by cement grouting or epoxy putty grouting/ poly sulphide compound grouting or as per standard modern specifications/methods with the prior approval of the Engineer-in-charge, at the cost of the contractor. All the courses shall be laid truly horizontal and all vertical joints shall be truly vertical. Specified mortar of good and approved quality shall be used. Lime shall not be used where reinforcement is provided in brick work. The mortar should completely cover the bed and sides of the bricks. Proper care should be taken to obtain uniform mortar joint throughout the construction. The walls should be raised uniformly in proper, approved bond. In construction of the wall, first of all two end corners are carefully laid to line and level and then it between portion is built, with a cord stretching along the headers or stretchers held in position at the ends. This helps in keeping the alignment of the courses and maintaining them in level. Similarly all other courses are building.