

## DIVISION 09000 – FINISHES

### 09110 ARCHITECTURAL HAND RAILS & RAILING

#### 09111 GENERAL

##### A- Description

This section covers fabricating, furnishing and installing architectural handrails and railings including special finishing.

##### B- Applicable codes and Standards

The codes and standards applicable to the work specified in this section are referenced in the relevant paragraphs. Codes and standards which are generally applicable to the work of this section are listed hereinafter:

Sponsor	Number	Subject
AISC		Manual of Steel construction, specifications for the design, Fabrication, and Erection of Structural Steel for Buildings.
AISI		Specification for the Design of Cold-Formed Steel Structural Members.
AWS	D1.1	Structural Welding Code-Steel
ICBO		Uniform Building Code (UBC)

##### C- Submittals

The following submittals are required:

- a. Detail Drawings and /or Shop Drawings
- b. Manufacturer's Data
- c. Assembly, Erection and Installation Drawings and manuals
- d. Samples

##### D- Mock-Ups

###### (01) Handrails

Prior to beginning production of handrails, furnish a full-size section with the proposed finishes, and typical attachments, together with bent section of minimum applicable radius. Upon approval, the mock-up may be used in the final work.

###### (02) Glass Railings

Prior to beginning production of glass railings, furnish a full size section, consisting of 3 glass modules, with the proposed finishes and typical attachments, together with bent section of minimum applicable radius. Upon approval the mock-up may be used in the final work.

**09112 PRODUCTS****A- Materials****(01) Aluminium Section**

Powder coated dark green colour matching with glazing.

Alloy: B.S. 1472 and B.S. 1470

**(02) Steel Pipe**

M.S. pipe with Powder coating 2½" dia as per design / drawing.

ASTM A 53, Grade A, type as selected by fabricator, Schedule 40, black unless another finish is indicated.

**(03) Brackets, Flanges, and Anchors**

Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated and / or specified.

**(04) Grout**

Non-shrink, non-ferrous grout, one of following or approved equal.

a) Crystex by L & M construction Chemicals or equal and approved.

b) Rapid setting grout similar to Upco Bostik 275 using less than full unit of powder so that mix is pour able.

**(05) Glass for Railings**

Dark green, tempered glass 12mm (1/2 in.) thick unless otherwise shown.

**(06) Sleeves**

Galvanized steel meeting ASTM A 120

**(07) Sealants and Gaskets**

Provide sealants and gaskets in the fabrication, assembly and installation of the work, which are recommended by the manufacturer to remain permanently elastic, non-shrinking non-migrating, and weather proof for the life of the building. At butt joints provide interior silicone rubber sealant. Colour at setting bed, black, unless otherwise indicated.

**(08) Clearance, Primers, and Sealers**

Type recommended by sealant or gasket manufacturer.

**B- Design Requirements.****(01) General**

Provide handrails and railings of the design shown, fabricated and installed to withstand a minimum of a 90 kg (200 lb) load applied at any point, downward or horizontally, without damage.

**(02) Load**

Uniform loads shall conform to the requirements of the ICBO "Uniform Building Code" for handrails and the following:

Load on Rail	Design Load N/m (lbf/ft)	Without Damage N/m (lbf/ft)	Without Collapse N/m (lbf/ft)
Lateral	730 (50)	1100 (75)	1825 (125)
Vertical	1460 (100)	2190 (150)	3650 (250)

**C- Railings and Handrails**

**(01) General**

Provide rails, sized as indicated.

**(02) Securing**

Secure handrails to wall with wall brackets and end fittings. Provide brackets of stainless steel or malleable iron castings as indicated with not less than 75 mm (3 in) clearance from inside of handrails to wall surface. Drill wall plate portion of the bracket for concealed anchorage. Locate brackets and incubated or if not indicated, at not more than 2.44 m (8 ft.) centers.

**(03) Wall returns**

Provide wall return fittings of flush-type, with the same projection as that specified for wall brackets. Secure wall brackets and wall return fittings to building construction as follows.

- a) For concrete and solid masonry anchorage, use bolt anchor expansion shields and machine bolts.
- b) For hollow masonry anchorage, use toggle bolts having square heads.
- c) For stud partitions, use bolts set into backing between studs as indicated. Coordinate stud installation for accurate location of backing members. 04.

**D- Fabrication**

**(01) Workmanship**

Use materials of the size and thickness indicated, or if not indicated, of the required size and thickness to produce adequate strength and durability in the finished product for the intended use, and to comply with the specified design requirements. Work to the dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use the materials indicated and/or specified for the various components of work.

**(02) Forming**

Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed corners to a radius of approximately 0.8 mm (1/32 in.) unless otherwise indicated. Vee cut far side where necessary and form bend-metal corners to the smallest radius possible without causing grain separation or otherwise impairing the work.

**(03) Welding**

Weld corners and seams continuously and in accordance with the recommendations of AWS. At exposed connections grind exposed welds smooth and flush to match and blend with adjoining surfaces.

**(04) Connections**

Form exposed connections with hairline joints, which are flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of the type indicated or, if not indicated, use Phillips flathead (countersunk) screws or bolts on bottom or concealed face.

- a) Provide anchorage, coordinated with the supporting structure. Fabricate and space anchoring devices to provide adequate support for the intended use of the work.

**(05) Non-Welded Connections**

When approved, intermediate post-to-rail connections may be made using internal pipe sleeve locks and Allen screw fasteners. Locking devices which do not produce flush, smooth, rigid, hairline joints will not be acceptable.

**(06) Welded Connection**

Cope intersections of rails posts, weld joints, and grind smooth. But weld end-to-end joints of tubing or use welding connector, at fabricator's option. Finish after welding.

- a) At connections to steel supports, weld post directly to steel supports, unless otherwise indicated.

**(07) Bent Rails**

Tubing bent at corners instead of joining shall be uniformly formed in jigs, with cross-section of tubing maintained throughout the entire bend smooth and free from surface irregularities.

**09113 EXECUTION****A- Inspection**

Examine the areas and conditions under which items are to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected.

**B- Installation****1. General**

Install handrails and railing as indicated and specified and in accordance with final shop and installation drawings and manufacturer's instructions.

2. Fastening to In-Place Construction

Provide anchorage devices and fasteners where necessary for securing the work to in-place construction; including expansion anchors for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, and other connectors as required; otherwise comply with requirements of section "Miscellaneous Metal Works".

- a) Steel Bar Railing, Handrails, and Guardrails: Attach posts to galvanized steel inserts as indicated. Provide galvanized bolts at bolted connections. Secure posts in sleeves in concrete with rapid setting grout.

3. Cutting, Fitting and Placement

Perform cutting, drilling and fitting required for the installation of the work. Set the work accurately in location, alignment and elevation, plumb, level, true, and free of rack, measured from established lines and levels. Provide temporary bracing or anchor in form work for items which are to be built into concrete, masonry, or similar construction.

4. Exposed Connections

Fit exposed connections accurately together to form tight hairline joints. Weld connections, which, are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind joints smooth and touch-up shop paint coat.

5. Field Welding

Do not field weld unless joint is not visible or weld can be finished to match finish of welded items. Comply with AWS D 1.1 for the procedures of manual shielded metal-arc welding, the appearance and quality of weld made, and the methods used in connecting welding work.

6. Adjusting

Adjust railings prior to securing in place to ensure proper matching at butting joints and correct alignment throughout their length. Space posts not more than 2.44 m (8 ft.) centres, unless otherwise indicated. Plumb posts in each direction. Except as otherwise indicated or specified, secure posts and rail ends to building construction as follows:

- a) Anchor posts in concrete by core drilling holes not less than 25mm (1 in.) greater than the greatest outside cross-sectional post dimension. Clean holes of all loose material, insert posts and fill the space between post and concrete with specified non-shrink, non-ferrous grout. Hold grout 19 mm (3/4 in.) below surface and seal with sealant as specified.
- b) Anchor posts to steel by welding directly to steel supports.

**C- Cleaning and Protection**

1. Cleaning

Maintain handrails and railings in a reasonably clean condition throughout the construction period so that they will be without evidence of deterioration or damage (other than the effects of normal weathering) at the time of final acceptance and methods of cleaning which will promote the achievement of uniform appearance and stabilized colours and textures for materials that weather or age with exposure.

2. Protection

Protect the work. Repair or replace damaged work as required by the Engineer.

3. Final Cleaning

Immediately before the time of final acceptance clean architectural handrails and railings thoroughly.

**09114 MEASUREMENT AND PAYMENT**

**A- Measurements**

All the items under this section of specifications shall be measured according to the standard method of measurement and shall be paid for at their respective units rates as entered in the Bill of Quantities and as shown on drawings in accordance with the terms and conditions of the Contracts.

**B- Rate and Payment**

The unit rate shall be full compensation for all work described under this section welding cutting and shaping to size, all paint material and painting. No separate payment shall be made for false work, any unspecified work done in fabricating workshops or yards, or other erection expenses.

\*\*\* End of section 09110 \*\*\*

**09200 PLASTERING****09201 GENERAL****A- Scope of Work**

The work covered under this section of Specifications consist of furnishing all materials, labour and performing all operations in connection with plastering/rendering complete in every respect in accordance with the requirements of the Drawings and Specifications, and as directed by the Engineer and subject to the terms and conditions of the Contract Documents.

The work carried under this section shall further conform to the requirements of ANSI A 42.2 or B.S. CP: 211 and CP: 221 and all the Standards and other documents relied therein.

**B- General**

Except as may be otherwise shown or specified, all plaster shall be cement sand plaster. Plastered ceilings and walls shall include partitions, piers, columns, pilasters, plastered jambs and other returns, reveals and backs of recesses, alcoves, and jambs and heads of windows and doors, unless otherwise specified or shown on Drawings. Plaster on walls shall be carried down to Dado, Skirting and projection bases. Plaster work shall also include all plaster work on and under all concrete surfaces to be left exposed and concrete not required Fair Faced, until and unless specified otherwise. It shall be the Contractor's responsibility to ensure that all electrical conduits, hidden or items to be embedded, ducts, pipes, brackets, doors, windows, ventilators and all other fixtures on walls, ceiling, columns or required elsewhere have been fixed in place before the plastering is started.

**09202 PRODUCTS****A- Materials**

Portland cement shall be as described in Section 3310 "Plain and Reinforced Cement Concrete".

Sand shall comply with the requirements of ASTM designation C 35, British Standard 1199, Table 1.

Water shall be clean, free from harmful amounts of deleterious matter and from any unusual proportion of dissolved salts. Sea water, tidal estuary or brackish water shall not be used.

Metal lathing used as background for plastering should not weigh less than five (5) lbs/sq. yard for sanded plaster and (3) lbs/sq. yard for light weight gypsum plasters and shall comply with B.S. 1369 Metal Lathing (steel) for Plastering.

Galvanized wire netting where required to provide a mechanical key, 22 SWG galvanized wire netting of mesh not greater than 2" and complying with BS 1485, Galvanized Wire Netting, shall be used.

**09203 EXECUTION****A- Proportioning of Plaster**

All plaster shall be Portland Cement plaster, except otherwise noted all coats of which shall be mixed in the proportions by volume as indicated on Drawings.

Volume batching shall be done by proper gauge boxes.

**B- Mixing**

Plaster ingredients in the specified proportions shall be thoroughly mixed by Mechanical means.

All coats of plaster in liquid retaining structures shall be waterproofed by the addition of an Approved compound in liquid or solid form used at an Approved dose. The waterproofing compound shall be commercially pure with no oils or other ingredients, which may be detrimental to the cement.

**C- Care of Tools and Plant**

All tools shall be cleaned by scrapping and washing at the end of each day's work, or between uses with different materials. Metal tools shall be cleaned and if necessary greased after each operation. All tools shall be examined and thoroughly cleaned before plastering is begun.

**D- Mechanical Mixer**

Plaster mix shall be mixed for two or three minutes, after which the batch shall be discharged and not left in the mixer. When the mixer is not in continues use, it shall be washed out after every mix as soon as the batch is discharged. When in continuous use the mixer shall be washed out about four times a day.

**E- Cleanliness and Protection**

Cleanliness is essential in carrying out plaster work. Adequate protection shall be given to all existing work and fittings which are liable to be damaged not only in the areas of plastering operations but in the approaches thereto by covering up with boards, dust sheets etc. as necessary. This is particularly important when mechanical methods of application are used.

On completion, all works affected by plastering operations shall be left clean. Special care will be taken when removing set plaster from glass to avoid damaging the surface.

**F- Fixing Applied Back Grounds**

Metal lathing shall weigh not less than five (5) lbs/sq. yard for sanded plaster and shall be protected by black bitumen paint or be galvanized.

All metal lathing shall be of 3/4" or 1" mesh and be fixed with the long way of the mesh across the supports. Metal lathing with stiffening ribs shall be fixed with the ribs uppermost towards and across the supports. If the supports are more than 14" apart, the gauge of metal shall be increased above that normally used to give sufficient stiffening.

The standards in various sheets shall all slope in one direction; in vertical work, they shall slope inwards and downwards from the plaster face.

Metal lathing minimum 8" wide to be fixed at the junction of RCC elements and block/brick work shall be fixed by galvanized nails or staples at 4" centres. End laps shall not be less than 1" when laps occur in the bearers and not less than 2" when the laps occur between bearers. They shall not occur at angles or grooves and shall preferably occur only at supports. The sheets shall be lapped and securely tied together with 11 SWG galvanized tie wire. The metal lathing shall not be provided on plaster on outer side of walls. Instead grooves shall be given.

Side laps shall not be less than 1" and wired together with similar gauge tie wire at 16" centre. Metal lathing shall be as tight as possible, this is best achieved by nailing the sheet in the centre and then working towards each end. Ends of wiring for fastening shall be bent inwards and not towards the plaster coat.

After erection all cut edges and damaged metal lathing, staples or nail heads shall be given a protective coat of bitumen paint.

**G- Back Grounds**

1. Characteristics of the Background

The back ground shall not have received any prior treatment such as painting or impregnation which is incompatible with adequate bond.

2. Preparation of Background

Preparatory Treatment: The preparatory treatment as necessitated for the application of plastering systems shall be as per British Standard Code of Practice and/or in accordance with the Engineer's instructions.

3. Treatment of Mixed Background

Where plastering is to be continued across back grounds of different classes, expanded metal shall be fixed across the junction to minimize cracking due to differential movements. Where small width of one material is involved e.g. concrete column dividing block panels, the column width shall be bridged completely by fixing expanded metal over building paper into the material abutting the concrete in order to isolate the plaster from any movement of the column.

**H- Application of the Various Coats**

**(01) General**

The work shall not be started until the back ground is in a proper state as specified, and suitable weather conditions prevail. As far as practicable, it is important that a newly rendered surface shall be prevented from drying out too rapidly, although protection from the sun and wind or spraying with water, may only be necessary in hot and dry weather. In sunny weather, the work shall be carried out in the shade whenever possible, following the sun, as the day passes.

Under coat shall be allowed to dry out for as long as possible before the subsequent coat is applied. It is desirable to wait at least twenty four (24) hours even in the hot dry weather. Before applying any subsequent coat, the preceding coat shall be brushed down to remove any dirt and loose particles and, if of a porous nature and very dry, shall be wetted.

When rendering on metal lathing or expanded metal, back rendering, wherever it can be applied, shall be done when the first under coat on the face is hard enough to permit. The work shall then be allowed to dry as completely as possible before applying further coats, in order to prevent cracking.

When specified plaster thickness is 3/4" or more plaster shall be applied in three (3) coats on lath and 3 or 2 coats on masonry and concrete surfaces as per ANSI A 42.1 paragraphs 3.4, 3.5 and 3.6. Unless otherwise indicated on the Drawings or directed otherwise, the plastering shall be carried down to the skirting of the floor.

**(02) Undercoat**

This may be applied either by laying on with or throwing from the trowel. The surface to receive the under coat shall be thoroughly cleaned and evenly dampened before the plastering begins.

The undercoat shall be as uniformly thick as possible and in no case shall be more than 1/2" thick in anyone trowel laying. After it has been left long enough to set firm, the surface shall be combed or scratched. care being taken to leave the scratch marks sufficiently deep to provide a key for the following coat but not so deep as to penetrate the rendering.

It shall be applied with sufficient pressure to fill the raked out joints in block/brick work to prevent air pockets and to secure a good bond. It shall be kept moist with fog spray for two (2) days and then be allowed to dry out.

**(03) Finishing Coat**

Finishing coat shall not be applied until the undercoat has been cured for seven (7) days. Just before application of the finish coat, the under coat shall again be wetted evenly with fog spray.

It shall not be less than 1/4" or more than 3/8" thick and shall be applied with a laying trowel and finished with a wood, felt, cork, or other suitably faced float. A steel trowel shall not be used and over working shall be avoided. Water shall not be applied to the surface of the finishing coat whilst working up, but patches showing signs of premature drying may be patted with a damp float.

It shall be kept moist with a fog spray for at least two days and thereafter shall be protected against rapid drying until properly and thoroughly cured.

**I- Water Proof Plaster for Water Retaining Structures**

All surfaces continuously exposed to wet conditions shall be given water proofing treatment.

The water proofing treatment shall be done in plaster by using water proofing cement compound (PUDLO) especially made for such purpose. It shall be applied as plaster in two successive layers of 3/4" each on all surfaces. The plaster shall be made by mixing the waterproofing compound in the cement sand mix of 1: 4 by volume according to the Manufacturer's instructions. Water proofing compound shall be supplied in sealed containers only. Only water proofing compound duly approved by the Engineer shall be allowed for use. Minimum five (5) lbs of water proofing compound shall be used for each bag of cement in preparation of water proof plaster. In water tanks, all corners, vertical as well as horizontal shall have triangular cant strips 6"x6" size in mortar 1 :4. The surface to receive water proofing treatment shall be made rough by hacking and chiselling the concrete lightly to give a rough surface for bonding. After the surface has been made rough, metal lath (diamond mesh) shall be nailed to the entire surface in an approved manner. The first layer of water proofing plaster 3/4" thick shall then be applied and its surface shall be made rough by the use of a brush or other suitable instrument. The first layer shall be allowed to cure for a minimum of forty eight (48) hours before the second layer of water proofing plaster with metal lath as in first layer is applied. The second layer of plaster shall also be 3/4" thick and its surface shall be trowel finished by means of steel trowel to give a smooth and even surface from the inside. The plaster shall be cured for a minimum of fourteen (14) days after laying of second layer of water proofing plaster. Water proofing plaster work shall not be started until all pipes have been installed by the Contractor. Any damage or leak discovered in the tank shall be repaired by the Contractor at his own cost.

**J- Sampling of Plaster**

Samples may be taken by the Engineer at any time from plaster work in place for testing.

**K- Patching**

Plaster containing cracks, blisters, pits, checks, or discolouration will not be accepted. Such plaster shall be removed and replaced with plaster conforming to this Specification with the approval of the Engineer.

**09204 MEASUREMENT AND PAYMENT****A- Measurement**

All plaster work shall be measured and paid for the actual work executed in accordance with the standard methods of measurements as Approved by the Engineer and paid for at the unit rates entered in the Bills of Quantities appended hereto and in accordance with the terms and conditions of the Contract.

**B- Rate and Payment**

The unit rate shall include the cost of furnishing all the materials, labour, scaffolding, appliances, tools and performing all operations in accordance with the specifications, drawings and instructions of the Engineer. The cost of plastering shall be deemed to be inclusive of groves, metal lathing, mesh and preparation of surfaces. The rate quoted shall be taken as full compensation for all services and materials to be provided for finishing the work and in connection thereto.

\*\*\* End of Section 09200\*\*\*

**09310 CERAMIC & PORCELAIN TILE WORKS****09311 GENERAL****A- Scope of work**

The work covered under this section comprises of providing and laying glazed ceramic and fine Porcelain tiles of approved quality size and pattern wherever required or shown on the drawings or mentioned in the Bill of Quantities.

**B- Submittals**

The following submittals are required:

- Detail Drawings and/or Shop Drawings
- Manufacturer's Data
- Manufacturer's Standard Colour Charts
- Certificates of Compliance

**09312 PRODUCTS****A- Materials****(01) Tiles**

Except as otherwise specified the following British Standards and Code of Practice shall be applicable to materials and fixing methods for ceramic tile work: -

- i) British Standard 1281: "Glazed Ceramic Tiles and Tile Fittings for internal wall"
- ii) British Standard C.P. 212: for fixing methods and workmanship.
- iii) Fine Porcelain tiles (polished) Grade – I fully vitrified Grannitto of Al Khaleej Ceramics UAE or equivalent (ISO 9001 certified).

**(02) Joint Filler**

Joint Filler shall be white Portland Cement grout which shall bond to dry tile, shall be non-shrinking, stain resistant, permanent in colour, and shall not inhabit fungus and bacterial growth. It shall be odourless non-toxic, of smooth consistency for easy preparation and neat, rapid installation, and shall contain non-metallic material. Grout shall be water resistant and shall not wash out under water.

**(03) Adhesives**

Adhesives for ceramic tiling as specified in the British Code of Practice C.P.212 or Dry Bond Floor and wall thin set mortar as manufactured by approved manufacturer.

**B- Samples and Tests**

The samples shall be furnished in sizes and colours and adequate in number for testing in the laboratory as and when ordered by the Engineer.

**C- Shop Drawings**

The Contractor shall prepare shop drawings on the basis of drawings produced by the Engineer for all the ceramic tile work to be carried out on the project. These drawings will show clearly the sizes, method of fixing, jointing and the anchorage to

be used in the process and the Contractor shall get approval in writing from the Engineer well in time before the actual start of the work.

**09313**

**EXECUTION**

**A- Construction Requirements**

**(01) In Cement Sand Mortar**

Surfaces to receive the ceramic tiling shall be clean and free of dirt, dust, oil, grease or other objectionable matter. Setting beds and tile shall be installed with their respective surfaces to true planes, level or pitched to offsets as required by the drawings, so that the surface of the completed tiling work will be at the elevations and grades shown. Retempering of mortar will not be permitted. Tiles shall be laid out from the centre lines of each space outward and adjustments made along walls, partitions and borders, if any, so as to symmetrize the pattern with a minimum of cut tiles.

Joint between tiles shall be of uniform width and the same as the tile installed. Fractional changes in dimensions without varying the uniformity of joint widths shall be permitted. Tile shall be cut with a suitable cutting tool and rough edges shall be rubbed smooth. Cut-tile misfits shall be laid to the straight edges. Straight edges shall be accurately set to the lines established and reset at suitable intervals to keep the joints parallel over the entire area.

Over the existing bed a topping of 2-1/2" thick 3000 psi concrete shall be laid. Scratch coats for application as foundation coats shall be not less than 1/2" thick and shall be composed by volume of 1 part Grey Portland Cement to 3 parts dry sand, mixed with the minimum amount of water necessary to produce a workable mass. Mortar for scratch coats shall be used within one hour after mixing and retempering will not be permitted. Scratch coats shall be applied in sufficient quantity and with sufficient pressure to cover the entire area and to form good keys, shall be deeply scoured or scratched and cross-scratched, shall be protected and kept moist during the curing period. Scratch coats shall be thoroughly damp-cured, and an interval of not less than 24 nor more than 48 hours shall be permitted between application of scratch coats and application of float coats.

Float coats shall be composed by volume of 1 part Grey Portland cement to 2 parts dry sand, mixed with a minimum amount of water necessary to produce a workable mass. Float coats shall be applied in sufficient quantity to entire area and to form a good key shall be brought out flush with the temporary screeds or guide strips so placed as to give a true even surface at the proper distance from the finish suitable for reception of tiles.

Joints shall be straight, level perpendicular and of even width throughout. Vertical joints shall be maintained plumb for the entire height of the tile work. Each tile shall be brought to true level and plane by uniformly applied pressure under a straight edge or rubber faced block. Tiles that are out of true plane or misplaced shall be removed and reset. Damaged or defective tile shall be replaced. The tile shall be installed as follows:-

Wall tile shall be set by troweling a skim coat of neat white Portland cement on the float coat or by applying a skim coat to the back of each tile unit and immediately floating the tile into place. After tile has set remove mortar using a minimum of water. Replace damage tiles.

After the tiles have been thoroughly set, joints shall be grouted full with a plastic mix of neat, white cement immediately after a suitable area of tile has been set. The joints shall be struck flush and excess mortar shall be cut off and wiped from the mortar

joints after grout has been cleaned from the surface shall be roughened at once and filled flush with the tile edge, before the mortar begins to harden. Tile skirting and coves shall be solidly backed with mortar.

**(02) In Thin Set Mortar**

Tiles laid in Thin Set Mortar shall be applied as per details shown on drawings and shall consist of a 3000 psi concrete base of specified thickness. Tiles shall be set by troweling a skin coat of tile unit to Dry Bond Mortar on the base coat and combed with a notched edge of trowel. Back butter each tile unit to ensure 100% mortar coverage and float the tile into place, tapping the tile to ensure maximum bond strength. All other installation requirements shall be as per specifications mentioned above.

**09314 MEASUREMENT AND PAYMENT**

**A- Measurement**

The measurement shall be made in Sq. Ft. of the actual surfaces completed and approved.

**B- Rate and Payment**

The payment shall be made at the unit rates per Sq.Ft. stated in the Bill of Quantities.

Such payment shall constitute full compensation for all materials, equipment labour including all incidentals, necessary to complete the work. The cost of PCC base & pigment is included in the cost of tile work.

\*\*\* End of Section 09310 \*\*\*

**09320 SPLIT TILE WORK****09321 GENERAL****A- Scope of Work**

The work included in this Section shall comprises of fixing in position split tiles of the following kinds wherever shown on the drawings and/or mentioned in the Bill of Quantities.

- Glazed
- Rough Glazed
- Double Rough Glazed
- Un-Glazed

**09322 PRODUCTS****A- Materials****(01) Tiles**

Split Tiles shall be of manufactured by National Tiles and Ceramic Limited or approved equivalent and shall conform to German Standard specified DIN-18166.

**(02) Adhesive/Joint Filler**

The adhesive and joint filler shall be Dry Bond Thin Set Mortar as manufactured by M/s. Shabbir Tiles & Ceramics Limited in collaboration with Laticrete International Inc. U.S.A. or approved equivalent.

**B- Samples and Tests**

The tile samples shall be furnished in sizes and colours, adequate in number for testing in the laboratory as and when ordered by the Engineer.

**09323 EXECUTION****A- Construction Requirements****(01) Tile Base**

Tile base for floors shall be 1-1/2" thick P .C. C. of 3000 PSI and for steps 1-1/2" thick P.C.C of 3000 PSI, and for walls 1-1/2" thick cement sand mortar (1:3) the surface of the base shall be clean and free of dirt, dust, oil, grease or other objectionable matter. The base surface shall be level and true both horizontally and vertically. To form good key with the bedding mortar of tiles the base shall be scoured or scratched and crosshatched.

**(02) Laying, Jointing and Grouting of Tiles**

The split tiles of the kind indicated in drawings and or BOQ, shall be laid in bond (Thin Set) mortar and grouted with the same material, over the tile base as specified in the preceding para.

Split tiles on walls and columns shall be fixed and grouted in Dry Bond Mortar over rough cast base plaster of cement sand as specified.

Joints shall be straight, level, perpendicular, and of even width throughout. Vertical joints shall be maintained plumb for the entire height of the tile work. Each tile shall be brought to true level and plane by uniformly applied pressure under a straight edge or rubber faced block. Tiles that are out of true plane or misplaced shall be removed and reset. Damaged or defective tile shall be replaced.

**09324 MEASUREMENT AND PAYMENT**

**A- Measurement**

The measurement shall be made in Sq. Ft. of the actual surfaces completed and approved

**B- Rate and Payment**

The payment shall be made at the unit rates per Sq. Ft. as stated in the Bill of Quantities and shall include P. C.C. base/CS Plaster.

Such payment shall constitute full compensation for all materials. Equipments, labour including all incidentals, necessary to complete the work.

\*\*\* End of Section 09320 \*\*\*

**09380 TAXILA STONE TILES****09381 GENERAL****A- Scope of Work**

The work covered under this section of specifications, consist of providing all material, labour, plant, equipment, appliances and performing all operations required for installation and providing of Taxila Stone tiles including finishing, at the podium including steps, complete in all respect and strictly in accordance with this section of the specifications and the applicable drawings.

**B- Submittals**

The Contractor shall submit manufacturer's specifications and other product data for each type of Taxila Stone tiles required including instructions for handling, storage, installation and production.

Shop drawings shall be submitted showing sizes, dimensions, sections and profiles of slab and tile units, arrangement and provisions for jointing, anchoring, fastening and supports and other necessary fixing details. Indicate locations, layouts and pattern arrangements for stone of each type and colour.

Submit three range samples 1¼" thick 9"x9" in size of each type of stone tiles showing colour grade, finishing and texture for approval of the Engineer.

**C- Delivery, storage and Handling**

Materials shall be protected from damage during loading, delivery and storage, Non-standing materials for blocking and packing shall be used. Stack the stone tiles at Site in accordance with manufacturer's recommendations and as required to prevent staining, scratching, etching or breakage.

**09382 PRODUCTS****A- General**

Obtain each stone tiles type from a single quarry and ensure consistent colour range and texture throughout the work.

Providing stone tiles for continuous areas, intersecting planes, to provide continuous matching units.

Provide stone tiles of type, colour and finish for each area of use as approved by the Engineer.

Provide stone tiles of thickness shown, machine cut with chisel marks on exposed surfaces and saw-cut back surfaces, which will be concealed in finished work.

**B- Type**

All stone tiles are to be selected and approved by the Engineer for quality, colour and texture.

**C- Beds and Backings**

Where applicable mortar beds and backing mixed and proportioned by volume shall be as follows:

Ordinary Portland Cement Grey 1 part and Sand 4 parts.

**D- Podium, Steps**

Where specified on the drawing or as directed by the Engineer proprietary adhesives, joint grouts and sealants; suitable types as required and recommended for specific application; colour match joint grout and sealants to colour of stone shall be used.

**09383 EXECUTION****A- Paving on Podium and steps**

Apply cement slurry coat surfaces of substrate immediately prior to placing setting bed. Limit area of application to avoid premature drying out.

Install setting bed to thickness required and set stone tiles units before initial set occurs. Apply a thin layer of real cement paste to bottom of each unit; set, tamp, and level units immediately. Set units in pattern required, with uniform joint widths.

Point joints as soon as possible after initial set. Force grout into joints; strike flush and tool slightly concave.

Remove mortar and grout from surface while still moist and as the work progresses.

**B- Repair and Cleaning**

Remove and replace stone tiles units which are broken, chipped, stained or otherwise damaged. Where directed, remove and replace units which do not match adjoining stone work or is not in line and levels as shown on drawings. Provide new matching units, install and point joints to eliminate evidence of replacement. Repoint defective and unsatisfactory joints to provide neat, uniform appearance.

**C- Protection**

Provide covers, boards, supports and all other necessary materials to protect finished work from collapse, deterioration, discoloration or damage during installation and until contract completion.

**09384 Measurement and Payment****A- General**

Except otherwise specified herein or else where in the Contract Documents, no measurement and payment will be made for the under mentioned specified works related to the relevant items of the Bill of Quantities. The cost thereof shall be deemed to have been included in the quoted unit rate of the respective items of the Bill of Quantities.

- a) Finishing washing, repair, cleaning and protection of stone tiles in position.
- b) Proprietary adhesives, joint grouts for fixing stone tiles where specified on the drawings or directed by the Engineer.

- c) Cement concrete setting beds and backings for stone tiles.
- d) Preparation of concrete substrate for laying sand stone tiles.

**B- Measurement**

Measurement of acceptably completed works of Taxila Stone Tiles will be made on the basis on net actual area in Sft laid in position as shown on the drawings or as directed by the Engineer.

**C- Payment**

Payment will be made for acceptable measured quantity of Taxila Stone Tiles on the basis of unit rate per Sft quoted in the Bill of Quantities.

\*\*\* End of Section .9380 \*\*\*

**09410 TERRAZZO WORK****09411 GENERAL****A- Scope of Work**

The work under this section consists of making terrazzo floor in conformity with British Standard Code of Practice CP 204. In situ flooring Part-I, "General" and Part-3, 'Terrazzo Flooring' as applicable to the work shown on the drawings and specified in the Bill of Quantities including terrazzo skirting, terrazzo (Dado) and terrazzo on stairs.

**B- Submittals**

The following submittals are required:

- Detail Drawings and/or Shop Drawings
- Quality Assurances
- Manufacturer's Standard Colour Charts
- Certificates of Compliance 09412 PRODUCTS

**09412 PRODUCTS****A- Material Requirements**

Cement, Sand, Aggregate for concrete and Water shall conform to relevant specifications.

Marble Chips shall be crushed marble, and shall be best quality white, it shall have an abrasive hardness of not less than 16 and the size shall vary from No.4 to 8. (Refer ASTM C 241 and National Bureau of Standards Report BM/S98).

Dividing Strips shall be brass or aluminium (3mm) conforming to the requirements of the B.S. "Cold Rolled Brass Sheets or aluminium strips" or glass strips 5mm thick and 1-1/2" (38mm) deep or marble strips as called for on the drawings or Bill of Quantities.

**B- Samples**

All materials used for Terrazzo work as well as samples for terrazzo floor shall be approved by the Engineer and the same type of material will be used throughout the work. If the Engineer requires the material to be tested, the Contractor will do so at his own cost from a laboratory approved by the Engineer.

**09413 EXECUTION****A- Construction Requirements in Situ Terrazzo Flooring**

The floor shall consist of a wearing surface of consistency and net thickness as specified in Bill of Quantities, laid over 2-1/4" thick Pcc 3000 Psi concrete base of the specified thickness. The thickness specified for wearing surface shall be that obtained after grinding and polishing, 3000 PSI concrete shall be mixed and laid in the manner specified for cement concrete floor, using a minimum quantity of water for workability.

The cement concrete shall be levelled with a trowel and straight edge, consolidated and finished with steel trowels to an even but rough surface. The top layer of cement marble chips mixed in the proportion of 1:2 (1 White cement and 2 marble chips) shall be laid over it within 24 hours. The cement and marble chips must be mixed dry in such quantities as are sufficient for a unit of one specified shade. Water shall be added in only such quantities as can be mixed thoroughly and consumed in less than 30 minutes, the quantity of water being the minimum for workability. Mixing must be done on water tight platform and any mix not used within 30 minutes shall be discarded and removed from site. A layer of cement and marble chipping mixture should be well trowelled into the surface of the base concrete before filling to the top level of the screeds. The layer should be well compacted and all voids shall be filled in. A layer of neat cement, of the specified colour shall then be well trowelled into the surface leaving a plain smooth surface.

Floors shall be laid in panels of about 4.0'x4'-0 (1.2 X 1.2 meter) or of size as shown on the drawings. Dividing strips of aluminium/brass/glass/marble as specified shall be provided and fixed to exact levels making an allowance for grinding. Aluminium strips shall not be less than 3mm thick and of width equal to the total thickness of cement concrete base and Terrazzo Topping.

Three days after laying, the top layer must be evenly and smoothly machine ground with Carborundum blocks of coarse, medium and fine grades so as to ensure that all marble chippings are evenly exposed all over the surface. If marble chips are not evenly exposed the Contractor shall pull down the surface and relay it at his own cost. After the first grinding, the floor shall be thoroughly grouted with the same cement and colour composition as specified for the terrazzo mix. The grout shall be of the consistency of thick cream and shall be brushed over the floor to eliminate all impressions and thoroughly fill the surface for final grinding. Not less than 72 hours after application, the grouting coat shall be removed by grinding with fine grade abrasive stones. The surface after grinding shall be left un-disturbed and cured for 2 or 3 weeks, after which it shall be cleaned of dirt and dust by rubbing gently with pumice stone or washing soda in sufficient water. Three days after the surface has been cleaned it shall be rubbed hard with 1 : 10 solution of oxalic acid using felt. The surface shall then be cleaned and washed with plenty of water. After the surface has dried a final gloss shall be given by polishing the surface to the satisfaction of the Engineer. The walls and all surfaces of the finished works of other trades shall be properly protected from damage and spoiling during the process of grinding and washing of the terrazzo. After the finish grinding has been completed and the surface treatment applied, the terrazzo work shall be covered and protected with material approved by the Engineer until completion of the work of all other trades.

**B- Terrazzo Dado and Skirting**

The marble chips and cement shall conform to specification for floor. Mixing shall be done in the same manner and proportion. The plastered surface over which the dado/skirting is to be applied shall be well roughened and watered. Cement mortar of specified ratio shall then be plastered over this well roughened surface to indicated thickness. Before the base course has set the layer of terrazzo mixture (of the specifications for flooring) shall be well trowelled into the surface of the base to a thickness which after grinding shall result in the finished thickness as per Bill of Quantities. A layer of neat cement of the specified colour shall then be well trowelled into the surface leaving a plain smooth surface. After the period specified for floors above, the Contractor shall start finishing as for floors specified above. Terrazzo skirting shall be provided around all terrazzo floors unless shown otherwise. Skirting and dado shall be straight, level and in plumb. Intersections at floors shall be straight and flush.

**C- Terrazzo on Stairs**

The stair risers and treads shall be finished according to exact sizes including the terrazzo topping making allowance for grinding of terrazzo. The nosing shall be flush with the terrazzo toppings, and shall be protected by aluminium angles as specified or shown on Drawings. The angles shall be firmly secured, by means of counter-sunk brass screws and cast together with the step.

**09414 MEASUREMENT AND PAYMENT****A- Measurement**

Work for floor and dado shall be measured in Sq. Ft. of wall and floor area, skirting shall be measured in Lin. Ft./M.

**B- Rate and Payment**

The rate for all items of work under this section shall cover the cost of furnishing all materials, labour, scaffolding framework laying, curing, grinding, polishing, finishing and appliances at site and performing all operations at any height in accordance with drawings, Bill of Quantities and as specified. The rate shall include the cost of base concrete, furnishing & installing metal fixings, dividing strips for floors, dados, nosing, angles aluminium U-channels and screws for stairs etc., and providing all assistance to other trades for built in items to the satisfaction of the Engineer.

\*\*\* End of Section 09410 \*\*\*

**09510        **SUSPENDED CEILING******09511        **GENERAL******A-        Scope of work**

The work covered under this Section of the Specifications comprises furnishing of all labour, plant, equipment, appliances and materials and performing all operations in carrying out and in connection with the furnishing, fabricating and fixing of Suspended Ceiling and all related items, such, as suspension system, fastenings, rawl plugs, and other items supplied and customarily built in and/or installed in strict accordance with the instructions of the Engineer.

**B-        Applicable Code and Standards**

Sponsor	Number	Subject
ASTM	C 635	Suspension System for Acoustical Tile and Lay-in Panel Ceilings.
ASTM	C 636	Installation of Suspension System for Acoustical Tile and Lay-in Panels.

**C-        Submittals**

The following submittals are required:

- a) Detail Drawings and/or Shop Drawings
- b) Assembly, Erection, and Installation Drawings and Manuals.
- c) Samples
  - i) Ceiling panels showing the panels and the support system, 600mm x 600 mm (24 in. x 24 in.).
  - ii) Each type of exposed moulding, 300 mm (12 in.) long.
- d) Manufacturer's Data
- e) Manufacturer's Standard Colour Charts

**D-        Mock-Up**

Prior to be beginning production of the ceiling system, furnish a full-size section of the system with the proposed finishes and typical attachment. Upon approval the mock-up may be used in the final work. Size of mock-up shall be at least 1.83 m (6 ft.) square and large enough to exhibit typical joint, edge, corner, and end conditions.

**09512        **PRODUCTS******A-        Material**

Following types of Suspended Ceilings are specified in the Schedule of Finishes and the Bill of Quantities.

- i) Aluminium plain/perforated tile ceiling 1'x1', 1'x4' and 2'x2', Powder coated in colour suspension system in the same colour, DAMPA / HUNTER DUGLAS / Thermac or approved superior.

- ii) Same as above but with metallic finish.
- iii) Aluminium strip ceiling in metallic finish DAMPA 100 / HUNTER DUGLAS / Thermac or approved Superior.
- iv) Laminated Gypsum Board Ceiling aluminium foil backing including revealed G. I suspension system with groove, Thai Gypsum Product or approved superior.
- v) Plain Gypsum Board ceiling with aluminium foil backing with suspension system in aluminium, Thai Gypsum Product or approved superior.

**B- Suspension System Materials**

**(01) General**

- a) Standard: Comply with requirements of ASTM C 635, as applicable to the suspended ceilings system.
  - Structural Classification: Heavy-duty system, unless otherwise shown
  - Exterior Applications: Provide a rigid suspension system capable of meeting the specified design requirements. All steel used in exterior work shall comply with ASTM A 36, galvanized in accordance with ASTM A 123, G. 90 coating.
- b) Coordination of Components: Provide suspension system which is coordinated with the indicated limitations and requirements for hanging from structure and supporting light fixtures, HVAC components, and similar work shown to be supported by or located in suspended ceilings. Include the necessary components for a complete suspension system including (as applicable) inserts, anchors, hangers, carrying channels, access members, edge moulding, splices, clips, fasteners, tie wires, and similar members, devices and accessories
- c) Corrosion Protection: Provide finishes as specified but not less than required by ASTM C 635 for normal use environments. For exterior applications, provide finishes on all components as recommended by the manufacturer for exterior use in a moist coastal climate.
- d) Attachment Devices and Concrete Inserts: Type recommended by suspension system, manufacturer, sized for pull-out resistance of not less than five times the hanger design load for the structural classification indicated (ASTM C 635, Table 1, Direct-Hung). For wire-type inserts, provide units of not less than 4.1 mm (8 gauge) galvanized wire construction. Devices with sharp edges, which could cut the hanger wire, shall not be acceptable.
- e) Hanger Wire: Carbon steel wire, ASTM A 641, soft temper, prestretched, Class 1 coating. Provide wire sized so that stress at three times hanger design load (ASTM C 635, Table 1 Direct Hung) will be less than yield stress of wire, but provide not less than 2.6 mm (12 gauge) wire.
- f) Carrying Channels: Hot rolled or cold-rolled steel or aluminium channels for support of ceiling with maximum deflection of 1/360 of span; but in no case more than required by governing regulations or for fire resistance ratings. Channels shall have protruding tabs designed to hold the panels and allow a uniform space of approximately 19 mm (3/4 in.) between panels.

## g) Carriers:

Carriers shall be formed from aluminium alloy 3005-H26 or equivalent, minimum 1.0 mm (0.039 in.) thick.

- Carriers shall be hat section members minimum 29 mm (1 1/8 in.) deep and formed with protruding ears to allow space between panels and to provide a firm grip for the panels. Carriers shall be designed for snap on installation and removal of panels without the use of tools.
- Provide holes in carriers at regular intervals to accommodate wire hangers. Provide carrier splices, minimum 150 mm (6 in.) long, with matching holes.

**(02) Edge Mouldings**

- a) General: Unless otherwise shown, provide manufacturer's standard units of the metal and shapes recommended for the application indicated.
- b) Provide recessed mouldings for support at edges of ceiling, at walls, and partitions, as indicated on the drawings.

**09513 EXECUTION****A- Installation**

All ceilings shall be straight and perfectly horizontal, hung true and plumb, to the satisfaction of the Engineer.

**(01) General**

- a) Install ceiling as shown and in accordance with manufacturer's instructions and final installation drawings, Comply with governing regulations and industry standards applicable to the work.
- b) Ceiling Pattern: Arrange and orient panels as shown by the reflected ceiling plans to produce the ceiling patterns shown.
- c) Reinforcing: Provide and install reinforcing or supports where shown and as required to support mechanical and electrical items installed in the ceiling. See mechanical and electrical drawings for items installed in the ceiling.

**(02) Suspended Ceiling Installation**

- a) General: Comply with ASTM C 636 as applicable to ceilings except to the extent more stringent requirements are indicated or required for compliance with governing regulations.
- b) Suspension systems shall be supported from overhead construction in a rigid and permanent manner, capable of carrying all imposed loads, including the weight of electrical and mechanical fixtures. Deflection shall not exceed 1/360 of the span of any member. Where ceilings cannot be suspended directly from structure due to mechanical ducts, piping, or other interferences, furnish and install trapeze supports as required. Do not support ceilings from mechanical, electrical, or plumbing work.
- Secure to structural steel and steel joists, including intermediate framing members, by attaching to metal clips designed for the type of member involved or, where possible, by looping and wire-tying directly to members.

- Secure to concrete by wire tying to cast-in-place hanger wires or hanger inserts, or by wire tying to eye bolts inserted into concrete anchorage devices of the type, which will not melt or deteriorate and weaken at elevated temperature. Do not use lead-shield type anchors. Anchors or power-driven devices shall be kept at a sufficient distance from concrete edges so that precast will not be damaged.
- Up through a 4.8 mm (3/16 in.) diameter hole driven through the flat bottom of flutes, back through a second hole a minimum 50 mm (2 in.) from first hole, and wire tying immediately under the deck. Do not use openings in metal decking which acts as permanent formwork.
- Hanger wires supporting fixtures shall be capable of supporting four times the weight of the fixture.
- Space hanger wires along each suspension system member, unless otherwise shown, and provide a hanger wire not more than 150 mm (6 inch) from each end of each member. Space hangers as required to limit deflection to 1/360 of the so-an of any member.
- Space carriers at maximum 1.22 m (4 ft.) intervals, unless otherwise shown. Install carrier splices at abutting ends of carriers for rigidly.
- c) Cope intersecting members so that faces are flush.
- d) Install edge mouldings of the type shown at edges of each ceiling area.
  - Sealant bed: Apply continuous ribbon of acoustical sealant on back of vertical leg before fastening to vertical surface. Locate so that sealant will not be exposed after installation is completed.
  - Secure mouldings to building construction by fastening through holes drilled in vertical leg. Space holes not more than 75 mm (3 inch) from each end and not more than 400 mm (16 inch) centres, between end holes. Draw-up fasteners for tight set against vertical surfaces.
  - Miter or cope corners of mouldings accurately to provide hairline joints.
  - Level mouldings with ceiling suspension system, to a tolerance of 3 mm in 3 m (1/8 inch in 10 ft.)
- e) Do not kink or bend suspension system hangers as a means of levelling.
- f) Install panels in coordination with suspension system. Align panel straight spacing unless otherwise indicated. Stagger end joints in adjacent runs a minimum of 300 mm (12 in.), and stagger end joints a minimum of 600 mm (24 inch) in every third run to provide random end joint spacing throughout. Snap ceiling panels over protruding ears of carriers. Install interior splice members. Scribe and cut for accurate fit at borders and around work which penetrates ceilings.
- g) Install access units.
- h) Install end plugs as required to conceal edges which would otherwise be exposed to view after completion of the work.
- i) Install filler strips in all exterior work
- j) Lay acoustical installation across top of interior ceiling panels and between the carriers. Provide tight joints between insulation. Tape top surface of end joints

between adjoining installation. Omit installation above mechanical diffusers, grilles, registers, lighting fixtures, access units, and exterior soffits. Hold insulation back 75 mm (3 in.) from return air slots.

**B- Coordination**

All necessary coordination shall be extended to other contractors at the Site. Special coordination shall have to be undertaken with the installation of luminaries and air devices especially HVAC ducts, piping etc. their compatibility with the Ceiling Systems.

**C- Tools & Equipment**

The Contractor shall provide all tools and equipment for his work and safety equipment required for the job.

**D- Samples**

Samples of all major components such as profiles, runners, hangers etc. accompanied by manufacturer's literature must be submitted for the approval of the Engineer sufficiently in advance of the start of this portion of the Works in order that the completion of the Works in not delayed.

**E- Quality:**

The Contractor shall ensure that the materials and components are of adequate strength and quality in keeping with the required applications. The Contractor shall provide guarantees against sagging, deshaping, discolouration, and misalignment etc. of profiles or suspension system or any component thereof. All guarantees/warranties normally provided by the manufacturer shall be provided in favour of the Employer.

**F- Job site Conditions:**

- a) Installation of ceiling shall not commence until all wet work such as concrete, plastering, terrazzo, marble etc. has completely dried out and all dust producing work such as grinding of terrazzo, marble etc. has been completed.
- b) Installation of ceiling shall not commence until the building has been closed to effects of weather and suitable ventilation is provided. These conditions shall be maintained prior to, during and after installation.
- c) The materials and components for the ceiling shall be delivered at the Site in manufacturer's unopened packages, and shall be opened only when the materials/components are ready to be installed. The packages shall be opened prior to this only if authorized by the Engineer.

**09514 MEASUREMENT AND PAYMENT****A- Measurement**

Measurement of acceptably completed work shall be made according to the units in the Bill of Quantities. The area of luminaries, air devices and other fixtures and installations shall not be deducted.

**B- Payment**

The unit rate shall include the cost of furnishing all the materials, labour, scaffolding, appliances, tools and performing all operations in accordance with the specifications, drawings and instructions of the specifications, drawings and instructions of the Engineer for satisfactory completion and finishing of the work. No extra payment shall be made for making provisions, for suspension systems and frames for light fittings and fixtures, ducts, diffusers adhesive etc. protection and maintenance of work as specified and the rates shall be deemed to be inclusive of all such costs and charges. No extra payment shall be paid for the maintenance materials as specified.

\*\*\* End of section 09510 \*\*\*

**09600 GRANITE WORK OVER FLOOR / WALL****09601 GENERAL****A- Description**

The work included under this section shall comprise of providing and fixing granite slabs in floor, walls, skirting at locations shown on the drawings.

**B- Related documents**

All work performed under the requirements of this section shall be subject to the conditions set forth under "Contractual Conditions", and shall comply with all requirements contained under Division 1, "General Requirements" as far as applicable to this portion of the work.

Applicable portions of other sections of these Specifications are hereby included by reference to establish minimum quality standards and shall become a part of this section as if written out in full herein.

**C- System****(01) Typical Granite Fixing**

- a) Setting: Dry Bond mortar bed (STILE) as per manufacturer specifications.

**D- Submittals**

1. General

Refer to "Schedule of Require Submittals", section of Division 01000, and other sections referenced therein for special Instructions relating to submittals.

2. Shop Drawings

Shop drawings to clearly identify every panel for detail and to be numbered

**E- Samples**

Submit for approval three samples 200mm x 300mm (8 inch x 12 inch) taken from stock proposed for shipment of each colour or texture of stone. Select samples to show range of colour.

Submit sample and lay panels 1.2m x 2.4m (4 ft. x 8 ft.) showing pattern, jointing and texture of proposed stone wall and flooring.

**09602 PRODUCTS****A- Granite**

- a) Approved samples are on file and available for reference at the office of the Engineer.
- b) Select granite from available stock at the quarries as may be necessary to ensure supplying and installing granite with uniformity in the selected colours, quality and texture through out and matching the approved samples.

- c) Granite Colour: Special attention will be given to colours of proposed granite and any variations from colour of approved reference samples unless specifically accepted as within allowable range will be cause for rejection.

**B- Fixing Materials**

- a) Portland Cement: ASTM C 150, Type II or Type V; meet test requirements specified in section 03300; same brand from same lot for all work; white where specified.
- b) Sand: ASTM C 144 or ASTM C 404, Size 2; clean, sharp, 100% natural dry sand with not less than 98 % retained on 0.15 mm (No.100) sieves.
- c) Water: Clean, free from injurious amounts of oils, acids, alkalis, organic materials, or other deleterious substances.
- d) Admixtures: Secure approval of the Engineer for any admixture proposed for use in mortar. Admixtures containing calcium chloride or antifreeze agents will not be accepted.
- e) Dry Bond Mortar: As manufactured by Shabbir Tiles and ceramic limited or equivalent.
- f) Stainless Steel anchorage device: As shown on the drawings or as directed by the Engineer or any other system proposed by the Contractor and approved by the Engineer.

**C- Mortar**

Mix materials thoroughly and accurately to a uniform consistency in a mechanical mixer. Add water in quantities to produce a consistent workable, stiff mortar. Discard mortar, which has been allowed to set more than 1/2 hour before use.

**09603 EXECUTION**

**A- Preparation**

Clean sub-base to remove dirt, dust, debris and loose particles. Saturate concrete sub base with clean water before placing setting bed. About one hour prior to placing setting bed remove surface water and dry it.

Apply slush coat of cement grout over surface of concrete sub-base about 15 minutes prior to placing setting bed. Limit area of slush coat to avoid drying out prior to placement of setting bed and apply by trowel or brush. Do not exceed 1.6 mm (1 /16 in.) thickness for cement such coat.

**B- Layout and Finish**

Except where otherwise indicated, make joints as follows:

- a) Veneers, Vertical Surfaces: 2 mm (1/8 inch).
- b) Paving and Steps: Not to exceed 2 mm (1/8 inch).
- c) Hold Joints at intersection with other materials, openings: 12 mm (1/2 in.)

**C- Cutting Stone**

Do all necessary cutting to accommodate work of other trades as indicated on the drawings and to meet job conditions. Do all cutting at the finishing shop where practicable. Hold same tolerances for field cutting as specified for shop cutting.

**D- Granite Stair, Treads, Copings**

Fabricate stair treads from cubic stock as detailed, with joints and profiles indicated on the drawings.

**E- Installation****1. Setting**

- Place setting bed to approximately one half total thickness.  
Bring setting bed to proper level.
- Grout back of each stone with Dry Bond Mortar. Set stone while still wet and tamp with mallet as necessary to produce complete bond at proper level.
- Set and level each unit immediately in pattern shown, true to surface and with uniform joints. Do not set large areas and level or move after initial set.

Fill joints, except at expansion and control joints, with grout mixture consisting of one part pigmented white cement to two-part granite dust brought to proper consistency. Hold joint level with surface and compact by tooling to obtain densest possible fill in all joints.

**2. Expansion Joint**

- a) Form expansion joints as indicated on the drawing and as directed by the Engineer.
- b) Edge Joints: Locate 12mm (1/2 in) wide joints at perimeters, or at intersection with other materials, at walls and at planters, columns, pool, similar items projecting above flooring.

**3. Protection and Curing**

- a) Cure grout by maintaining in a moist condition for seven days.
- b) Remove grout spillage from face of stone as work progresses.
- c) Do not permit traffic on horizontal stone surfaces during setting of units and for at least 24 hours after final grouting of joints.

**4. Stainless Steel Anchorage Device**

Where height is more than storey height (10 Ft.), install slabs with the help of "Stainless Steel Anchorage System" as shown on the drawing. For further detail refer to Section 9950.

**F- Cleaning and Pointing**

Thoroughly clean all masonry, working from the top down using clean water, detergent, and fibre brushes to remove all dirt, mortar, stains, and similar soil. Rinse surface with clean water.

As the cleaning progresses, examine the wall surface to locate cracks, holes or other defects in mortar joints. Fill and point all such cracks or holes with mortar to match texture of adjacent surface. Replace damaged units.

Cleaning with wire brushes will not be permitted.

**G- Protection and Maintenance**

The Contractor shall be responsible for protection and maintenance of all granite during the process of completion and till the expiry of maintenance period set forth in the Contract. The completed works or parts thereof shall be protected by the Contractor against any damage. The works shall be handed over to the Engineer in perfect condition. If any damage is incurred then the Contractor shall remove and/or replace the same as directed by the Engineer at no additional costs to the Employer. The Contractor shall exercise all care to protect the works at no additional cost to the Employer.

**09604 MEASUREMENT AND PAYMENT**

**A- Measurement**

The granite tile work under this Section shall be measured and paid for as quoted against the respective item of work in the Bill of Quantities. Measurement shall be made in sq. ft/m of the actual surfaces completed and approved by the Engineer.

**B- Rate and Payment**

The rate for granite tile work shall cover the cost of furnishing all materials, Base, mortar bed and grouting, dry bond, including anchorage devices, labour, scaffolding, appliances, tools and plants and performing all operations in accordance with specification, drawings and instructions of the Engineer for satisfactory completion and finishing of the work.

No separate payment shall be made for polishing or for producing samples of materials and workmanships, tests to be carried out, protection and maintenance of granite work as specified and the rates for construction items shall be deemed to be inclusive of all such costs and charges including making and filling of expansion and edge joints. No extra payment shall be made for dismantling work determined by the Engineer to be faulty and subsequently made good.

\*\*\* End of Section 09600 \*\*\*

**09700 TEXTURED WALL COATING****09701 GENERAL****A- Scope of Work**

The work covered under this section consists of furnishing all labour, materials, equipment and performing all operations in connection with the work to complete external or internal wall coating work on well cured smooth plastered surface. The work shall be of generally 2mm thickness of coating.

**B- Submittals**

The contractor shall submit manufacturer specifications and product data and submit 3 (three) samples of product indicating the pattern and color selected by the Engineer.

**09702 PRODUCT****A- Acrylic Based Wall Coating (Sand Tex)**

The composition of this product shall consist of imported natural quartz, pigments at high temperature, acrylic resins in water emulsion, anti-fungus and anti-bacterial additives.

**B- Mixing**

The coating shall be readily mixed to a uniform consistency and presence of fine aggregate shall be apparent but there shall be no sign of caking, granulation or hardening of the material in the container.

**C- Application**

The coating shall be applied to the well cured even surface of the base coat (plaster), not less than 2mm or as approved by the Engineer. It shall compose of acrylic resins specially graded natural marble chips of different colours, viscosity setting agents additives against bacteria, fungi and other harmful insects using water as solvent. It shall be applied with a stainless steel trowel and after the application has been worked over, smoothen out the application, compact until uniform surface is achieved.

Apply coating on large surfaces by dividing surface into panels with tape to avoid irregular joints.

**D- Cleaning Up**

Remove protective materials and any other material from adjacent surface.

**09703 WARRANTY**

The contractor shall provide manufacturer warranty (3 years) against any defect during or after execution of work.

**09704 MEASUREMENT AND PAYMENT**

**A- Measurement**

Measurement of acceptably completed works of coating to surfaces will be made on the bases of net actual area in Sft coated as shown on the drawings or as directed by the Engineer.

**B- Payment**

Payment will be made for acceptable measured quantity of coating to surfaces on the basis of unit rate per Sft quoted in the Bill of Quantities and shall constitute full compensation for all the works related to the items.

\*\*\* End of Section 09700 \*\*\*

**09710 CEMENT / GRANOLITHIC FLOORING****09711 GENERAL****A- Description**

This section covers the furnishing of all labour, material and equipment in accordance with the laying of hardened cement concrete floors as per drawings.

**B- Applicable codes and Standards**

The standard and codes applicable to only a portion of the work specified in this section are referenced in the relevant parts or clauses. Standards and codes, which are generally applicable to the work of this section, are listed hereinafter.

BS British Standards Institute

BS 12 Ordinary Portland Cement

BS 882 Sand

**C- Submittals**

The following submittals are required:

- Detail Drawing and / or Shop Drawings.

**09712 PRODUCT****A- Materials**

1. Cement

Cement shall be ordinary Portland cement conforming to BS 12 or as specified in Section 3300, Concrete.

2. Sand

All fine sand shall be obtained from approved sources; the grading shall conform to B. S. Grading Zone 1 and 2 of which the gradation limits are as follows:

Percent (by weight) passing

B.S. Sieve	Grading Zone 1	Grading Zone 2
3/8" (9.53mm)	100	100
3/16" (4.765 mm)	90-100	90-100
No. 7	60-95	75-100
No. 14	30-70	55-90
No.25	15-34	35-59
No. 52	5-20	8-30
No. 100	0-10	0-10

### 3- Coarse Aggregate

Coarse aggregates shall be crushed gravel or crushed stone having angular or rounded shape and shall have granular or crystalline or smooth surface free from friable, flaky and laminated pieces, mica and shale. It shall not contain matter injurious to concrete. All coarse aggregate shall conform to BSS No. 882 and shall be graded as follows:

B.S. Sieve	% passing by weight
1" (25.40 mm)	100
3/4" (19.05 mm)	90-100
3/8" (9.53 mm)	20-25
3/16" (4.765 mm)	0-10

The aggregate shall be stored on properly constructed paving or bins as approved by the Engineer.

There shall be a physical partition between the stockpiles of coarse and fine aggregates. If required aggregates shall be washed and screened to the satisfaction of the Engineer. Sieve analysis of all the aggregates to be used in the works shall be carried out as and when required by the Engineer. All material shall be subject to the approval of the Engineer.

Any aggregates not found to be of the specified / approved standards shall be rejected by the Engineer and all such rejected material shall have to be removed from site without delay.

Floors, sub-base or base constructed with rejected aggregates shall be dismantled and rebuilt at the expense of the contractor.

### 4. Water

Water used for mixing concrete, curing or any other operation of the works specified herein shall be fresh, clean and free from organic or inorganic matters in solutions or suspension. Only water of the approved quality shall be used for all construction purposes by buffing, as specified. The preservative material shall not discolour the flooring not leave a tacky or sticky finished film of the surface after buffing.

## 09713 EXECUTION

### A- Cement Concrete Flooring

The material for cement concrete flooring shall be same as already specified.

#### 1. Composition of Concrete

Concrete shall be composed of Portland cement, sand, coarse aggregates and water, all well mixed and brought to the proper consistency. The proportions of the various ingredients shall be determined on the basis of the required compressive strength of the class of concrete. Tests shall be made

of samples of the aggregates and the resulting concrete. The mix proportions and appropriate water-cement ratio will be adjusted on the basis of required workability, density, impermeability, durability and required strength.

2. **Mixing Concrete**

The concrete ingredients shall be mixed in a batch mixer for not less than 1 1/2 minutes after all ingredients, except the full amount of water, are in the mixer. The Engineer reserves the right to increase the mixing time when the charging and mixing operations fail to produce a concrete batch of the specified quality. The operations shall be controlled in a manner that the ingredients are uniformly mixed and the consistency is uniform throughout. The concrete shall be uniform in composition and consistency from batch to batch except water shall be added prior to, during and following the mixer of water to maintain the required concrete consistency. The concrete of variable consistency will not be permitted.

3. **Ferrous Floor Hardener**

Ferrous Floor hardener is a composition of high grade iron filings and dust of high grade steel with a further composition of calcium chloride and an emulsified base. It shall be mixed in cement as per manufacturer's specifications.

The base course of the floor shall be a layer of concrete of the required grade and thickness laid in panels of the sizes as indicated on the drawings and approved by the Engineer.

After the cement concrete bed has been cured, as directed by the Engineer, it shall be roughened and well watered before floor finishing is laid. The floor shall compose of cement concrete of required grade and shall be laid in panels to the required thickness as shown on the drawings and/or directed by the Engineer. The concrete after laying will be thoroughly rammed and mortar worked up to the top and smoothed with a steel trowel. The edge of each panel into which the floor is divided should be defined by glass strips of the approved width and of a depth equal to the depth of floor concrete. Completed floor portions as finished shall be covered with thoroughly damp empty gunny bags or a layer of sand, as directed by the Engineer.

**B- Dado/Skirting**

The plaster on the portion of the wall to be provided with skirting or dado shall be left in a rough state by brooming or by using wire brushes of approved type so as to provide a bond between this base plaster and the dado or skirting. The surface of the wall shall be cleaned of all foreign matter and shall be thoroughly wetted to control the suction. Only so much mix shall be mixed with water that could be utilized within 30 minutes. This mix of cement sand shall be applied to the wall and trowelled hard to a smooth surface, proper in line both vertical and horizontal. Finishing for the cement sand skirting shall conform to specifications for plasterwork.

**09714 MEASUREMENT AND PAYMENT**

**A- Measurement**

The measurement for Cement Concrete floor shall be made in Sq. Ft/Sq. m. of the actual surfaces completed and approved. Cement sand skirting shall be measured in Lin. Ft./M.

**B- Rate and Payment**

The payment for floor shall be made at the unit rate stated in the Bill of Quantities and shall constitute full compensation for all materials, labour and equipment, including all incidentals necessary to complete the work.

\*\*\* End of section 09710 \*\*\*

**09910 PAINTING AND POLISHING****09911 GENERAL****A- Scope of Work**

The work covered by this section of Specifications consists of furnishing all labour, painting and polishing equipment, scaffolding, protective covering and materials, including that classified in particular as "Paint" hereinafter; and painting in performing as such, all plastered wall and ceiling surfaces, including soffits, sides of beams, etc. and the painting and polishing of all exposed interior metal work; miscellaneous and ornamental iron, steel and sheet metal and all wood work. The work under this section shall further conform to the requirements of British Standard Code of Practice CP: 231: 1966, "Painting of Building" and all the British Standards relied therein or bearing relevance.

**B- Submittals**

The following submittals are required:

- Quality Assurances
- Material, formula, application instructions
- Manufacturer's Data Colour Samples
- Test Reports

**C- General**

Where the word or term Paint and Polish is used or referred to 'as such' throughout the Specifications, it shall be interpreted to mean and include the surface finish treatment consisting of any, all or some of the following items:

Sealers, primers, fillers, body and final coats, emulsions, varnish, shellac, stain or enamels, as more specifically defined hereinafter as to kind and quality and function for various surfaces and finishes.

All paint, polish and accessory material incorporated in or forming a part thereof shall be subject to the approval and selection for colour, tint, finish etc. by the Engineer.

In connection with the Engineer's determination of colour or tint of any particular surface, the depth of any colour or tint selected or required shall in no instance be a subject for an additional cost or charge to the Employer.

Painting of wood, except if specified otherwise and for plaster surfaces shall be three-(03) coat work in addition to the shop protection coats.

All paints shall be as manufactured locally and approved by the Engineer and shall be brought to the Site in sealed containers and used without any admixture or adulteration except where recommended in the Manufacturer's printed instructions.

**09912 PRODUCTS****A- Materials**

The basic materials entering into the compounding and/or manufacture of all paints, varnishes, shellac and other finish treatments shall be of the best grade and quality of

their respective kinds for the intended purposes. They shall be the products or formulas of recognized and reputable Manufacturers of known reliability and integrity, subject to the approval of the Engineer.

The Engineer reserves the right to select and/or accept only the best grades of standard products, which in his opinion will provide a finish or recognized performance and characteristic suitable for their respective surfaces.

All materials shall be delivered to the premises in their original unbroken containers or packages and bear the Manufacturer's name, label and brand, and formula and be mixed and applied in accordance with his directions and/or instructions. The mixing of all paint or other covering finish treatments shall be done in the premises when required and as approved by the Engineer.

Paints shall be well-ground, shall not settle badly, cake or thicken in the container, shall be readily broken up with a paddle to a smooth consistency and shall show easy brushing properties. The paint shall be suitable for spraying when thinned with not more than twelve (12) percent by volume of mineral spirits.

Paints shall be lime-proof where used on concrete blocks, concrete or plaster.

Unless specified or directed otherwise, distemper shall be Paintex vinyl emulsion (ICI) or SPD (Berger), colour wash shall mean coloured chalk applied with gum at the rate of five (5) pound per bag of chalk, and snow-cem shall be Durocem or superior. Synthetic enamel paint shall be of approved manufacturer. Vinyl Emulsion paint shall be Robbialac, Dulux, or superior approved by the Engineer.

**B- Protective Paints to be Applied**

Unless otherwise specified all exterior and interior ferrous metal except reinforcing steel, bolts, rough hardware and metals with nonferrous coatings shall be given a shop coat of protective paint of approved quality. Surface to be painted shall be thoroughly cleaned of scale, dirt and rust by the use of steel scrapers, wire brushes and blast or other equally suitable tools or methods. Oil and grease shall be removed with benzene or other suitable solvent. Paint shall be kept well stirred whilst it is being applied.

No paint shall be used after it has caked or hardened. Paint shall be well worked into all joints and corners; paint shall not be applied to damp surfaces nor when the temperature is below 40<sup>0</sup>F.

**C- Sample and Test**

Samples of each type of paint and each colour proposed for use shall be submitted to the Engineer and Approval thereof received before the material, represented by the sample, is used on the Project, Samples shall consist of one pint and three displays of each type and colour of paint applied to wood strips 2" by 6", Wood used for display stains, shall be the same kind as that on which the stain is ultimately to be applied. In addition to the submission of samples, the Contractor shall submit authenticated reports of tests of the materials proposed for use as required by the Engineer,

**09913 EXECUTION**

**A- Preparation of Surface and Application of Paint**

**(01) General**

Hardware, accessories, plates, lighting fixtures and similar items in place shall be removed prior to painting operations or shall be otherwise protected. All surfaces to

be painted shall be clean, smooth, dry and free from dust, grit and other objectionable materials. All work shall be done in a workmanlike manner, leaving the finished surfaces free from drips, ridges, waves, laps and brush marks. Except if specified or required, cement water paints shall be applied under dry and dust free conditions and shall not be applied when the temperature is below 40°F nor when a temperature drop of 20°F or more is forecast. All primer and intermediate coats of paint shall be unscrapped and completely integral at the time of application of each succeeding coat. Each coat of paint shall have a slight variation of colour to distinguish it from the preceding coat. Sufficient time shall be allowed between coats to ensure proper drying. Paints shall be thoroughly stirred and kept at a uniform consistency during the application and shall not be timed in excess of the printed directions of the Manufacturer. Paint containers shall not be opened until required for use. Paint shall preferably be applied by the spray /brush/ roller or as directed by the Engineer. Floors, roofs and other adjacent work shall be properly protected by drop cloths or other coverings.

**(02) Concrete and Masonry**

Concrete and masonry surfaces to be painted shall be prepared by removing all dirt, dust, oil and grease for good adhesion.

Surfaces to be painted with cement water paint shall be thoroughly dampened with a fine spray of water before application of the paint. The interval between coats of cement-water paint shall be not less than twenty four (24) hours, and the first coat of cement-water paint shall be slightly dampened before application of the second coat. The paint shall be applied with a stiff brush, and thoroughly worked into the surface to seal all pores, cracks and voids. The paint shall be cured by wetting the surface between coats, and at intervals for a period of not less than two (2) days after the application of the finish coat. Nails and similar exposed metal occurring in concrete or masonry surfaces shall be coated with shell or oil paint before the cement water paint is applied. Masonry surface to be painted with oil base paint shall be free from alkali and shall be thoroughly dry before paint is applied.

**(03) Metal Work**

Shop primed metal work shall be kept clean and free from corrosion following installation. Surfaces shall be retouched prior to finish painting, using the same type of paint as the priming coat.

**(04) Plaster Work**

Plaster shall be at least two (2) months old (or less if allowed by the Engineer) and shall be thoroughly dry, clean, and free from grit, loose plaster, and surface irregularities before paint is applied. Cracks and holes shall be repaired with patching plaster such as plaster of Paris properly keyed to the existing plaster. All plaster surfaces shall be tested for the presence of Alkali, which if present, shall be removed with a solution of Zinc Sulphate mixed in the proportion of 2-1/2 to 3 pounds to a gallon of water. After drying, the precipitate shall be removed by brushing. Plaster patches shall be worked to match the appearance of the adjoining plaster.

**(05) Wood Work**

Small dry seasoned knots shall be thoroughly cleaned and scraped and shall be given a thin coat of orange shellac varnish before the priming coat is applied. Large, open, unseasoned knots and all beads or streaks of pitch shall be heated by a blowtorch and then scrapped off, or if the pitch is still soft, it shall be removed with mineral or denatured alcohol. Resulting voids, if any, shall be filled with putty. Nails

shall be set. Painting shall proceed only when in the opinion of the Engineer the wood is satisfactorily dry.

a) Priming

All mill work specified to be painted, shall be primed in the shop before delivery to the job.

b) Puttying and Glazing

After the priming coat has been applied, nail holes, cracks, and other depressions waviness shall be filled flush with putty, coloured to match the finish coat and sand papered smooth. Putty shall be dry before subsequent painting.

Glazed doors shall be given one coat of primer before glazing. A minimum of two subsequent coats of paint shall be applied and the surface finished to the entire satisfaction of the Engineer.

**B- Schedule of Paint Finishes**

1. Chalk/Colour Wash

Three coats of approved quality shall be applied to all ceilings and other places as directed.

2. Distemper

Three coats of approved washable oil bound distemper shall be applied to internal wall or at locations as directed by the Engineer as per Manufacturer's instructions and direction. The distemper shall be of required shade and shall be the product of a reputable Manufacturer subject to the approval of the Engineer.

3. Emulsion Paint to Plastered Surfaces

The plastered surfaces required to be painted with emulsion paint shall be painted with ready made approved paint of the kind. The paint shall be applied in coats strictly according to Manufacturer's instructions after preparing base. The paint may preferably be applied by spray or roller method of application unless permitted otherwise by the Engineer.

4. Enamel Paint to Plastered Surfaces

The plastered surfaces required to be painted with enamel paint shall be painted with ready-made approved paint of the kind. The paint shall be applied in 2 coats strictly according to manufacturer's instructions after preparing base. The painted surfaces shall finally exhibit glossy /matt finish as approved. This will also apply to metal/wood work or wherever required by the Engineer.

5. White Wash/Colour Wash

Concrete, concrete block and plaster shall be painted where required with three (3) coats or white/colour wash.

The lime should be slaked at Site with an excess of water to the consistency of paste/cream and should remain under water for forty eight (48) hours. The mixture shall then be strained through coarse cloth and gum water added (having 60 gramme gum to one (1) pint of water).

Colour washing shall be prepared as for white wash and colour added. The colouring matter is to be boiled and gum added to it and strained into white wash.

6. Painting to Wood Work

Wood work required to be painted shall be painted with approved synthetic enamel paint as follows.

After surface preparation as specified apply one coat of wood primer.

After wood primer has thoroughly dried, apply (2) synthetic enamel paint coats of approved manufacturer directly from containers strictly according to the Manufacturer's instructions.

7. Painting on Metal Work

All metal work shall have, one coat of anti-corrosive red oxide primer in addition to the two coats of enamel paint.

**C- Buried Piping**

All steel piping and all exposed threads of galvanized piping, where run in or through concrete or masonry, or buried under ground, shall be given one (1) coat of approved asphalt varnish where specified.

**D- Samples**

Prior to the start of the application of any paint and/or finish treatment otherwise, the Contractor shall apply samples of the required finish treatments to specific representative wall and ceiling surfaces or other areas or surfaces where indicated by the Engineer. The sizes of the sample paint finishes shall be as determined by the Engineer.

**E- Protection**

Contractor shall protect all the work against damage or injury by his employees, or by the materials tools or utensils used in connection with the work of this Contract. Any and all work damaged as a result of the execution of this Contract shall be repaired at the Contractor's expense, or if in the opinion of the Engineer it cannot be properly repaired it shall be replaced with new work by the Contractor without additional compensation therefore beyond the Contract amount. At all times, the general and liberal use of drop cloths shall be a primary requirement for protection purposes.

**F- Touching up**

At the completion of all Work specified herein all painted work shall be touched up and restored where damaged or defaced and the entire Work left free from blemishes to the complete satisfaction of the Engineer.

**G- Cleaning**

The Contractor shall clean all paint, spots, daubs, oil and stains, entirely from all floors, wood-work, glass, hardware, metal work and all similar items upon completion and level the work in perfectly clean condition in every respect to the entire satisfaction of the Engineer.

All cloth and cotton waste, which might constitute a fire hazard shall be placed in metal containers or destroyed at the end of each work day. Upon completion of all work all staging, scaffolding, and containers shall be removed from the Site or destroyed in a manner satisfactory to the Engineer.

**H- Polishing Deodar Wood Doors and Frames**

## i) Wax Polish

Surfaces to be Wax Polished shall be rubbed down to a smooth surface filled as necessary, dusted off and rubbed over with mineral oil well rubbed in with a circular motion. The surface afterwards being wiped dry. After an interval of at least 48 hours wax polish shall be applied in two coats and shall be polished to an approved finish.

## ii) Lacquer Polish

Same as above but lacquer polish.

**09914 MEASUREMENT AND PAYMENT****A- Measurement**

The painting and finishing on all surfaces, other than timber steel and piping works and plant and equipment works which shall be deemed to be inclusive of painting and finishing in their own items of work shall be measured in accordance with the standard method of measurement and paid for at the unit rates entered in the Bill of Quantities, appended to the Contract and in accordance with the terms and conditions of the Contract. Where separate quantities, they shall be taken to have been already included in the rate of items to be finished and painted.

**B- Rate & Payment**

The payment shall be made at the unit rates as stated in the Bill of Quantities. Such payment shall constitute full compensation for all materials, equipment, labour scaffolding including all incidental, necessary to complete the work.

\*\*\* End of Section 09910 \*\*\*

**09950 GRANITE WORK OVER FACE****09951 GENERAL****A- Description**

The work under this section consists of furnishing all labour, materials, equipment, incidentals and operations to complete all external surface rendering/Granite Work on Masonry, Concrete or any other surfaces as shown on the drawings.

**B- Related documents**

All work performed under the requirements of this section shall be subject to the conditions set forth under "Contractual Conditions", and shall comply with all requirements contained under Division 01000, "General Requirements" as far as applicable to this portion of the work.

Applicable portions of other sections of these Specifications are hereby included by reference to establish minimum quality standards and shall become a part of this section as if written out in full herein.

**C- Typical Granite Fixing**

Stainless Steel Anchorage System as shown on the drawing.

**D- Submittals**

## 1. General

Refer to "Schedule of Required Submittals", section of Division 01000, and other sections referenced therein for special instructions relating to submittals.

## 2. Shop Drawings

Shop drawings to clearly identify every panel for detail and to be numbered.

**E- Samples**

Submit for approval three samples 300mm x 300mm (12 inch x 12 inch) taken from stock proposed for shipment of each colour or texture of stone. Select samples to show range of colour.

Submit sample and lay panels 4.8m X 4.8m (16 ft. x 16 ft.) showing pattern, jointing and texture of proposed stone wall.

**09952 PRODUCTS****A- Granite**

a) Approved samples are on file and available for reference at the office of the Engineer.

b) Select granite from available stock at the quarry as may be necessary to ensure supplying and installing granite which is uniform in colour, quality and texture through out and matching the approved samples.

c) Granite Colour: Special attention will be given to colour of proposed granite and any variations from colour of approved reference samples unless specifically accepted as within allowable range will be cause for rejection.

**B- Anchorage Material**

Stainless Steel Anchorage system by an approved manufacturer. Stainless Steel conforming to ASTM A 167 type 302 or 304.

**C- Fabrication**1. General

Fabrication as shown and as detailed on final drawings and in compliance with the recommendations of the applicable marble association. Provide holes and sinkages cut or drilled for anchors, fasteners and supports as shown and as necessary to secure Granite in place. Cut and back-check as required for proper fit and clearance. Shape beds to fit supports. Provide reinforcing backing as required for adequate strength, firmly adhered in place.

Provide necessary "Expandable Bolt", stainless steel "L-Anchor", stainless steel "Clip", and other miscellaneous steel items. For fixing Granite units to other supporting and adjacent units provide anchors vertically @ 2' c/c and horizontally @2' c/c.

2. Contiguous

Provide chases, reveals, openings and similar spaces and features as required for contiguous work, coordinate with drawings and final shop drawings showing contiguous work.

3. Cutting

Cut to shape and dimensions shown on final shop drawings, maintaining fabrication tolerances specified.

- a) Dress joints (bed and vertical) straight and at 90 degree angle to face, unless otherwise shown or specified.
- b) Joint Width: Cut to provide joint widths 2.0 mm (1/16 in.) or as shown on final shop drawings.

4. Thickness

Provide stone of the thickness shown.

**D- Fabrication Tolerances**1. Dimensional Tolerances

Fabricate granite units in accordance with the following dimensional tolerances, unless otherwise shown.

- Length or width 1 mm (1/16 in).
- Thickness (depth) 1 mm (1/16 in.)
- Horizontal and vertical alignment (deviation from straight lines parallel to centre line) 1 mm (1 /16 in.) per 3 m (10 ft) of length
- Out of square (differences in length of two diagonal measurements). 1 mm (1 /16 in.) per 3m (10 ft) length

09953

**EXECUTION****A- Inspection and Preparation**1. General

Do not use Granite units with chips, cracks stains, or other defects which might be visible in the finished work.

## 2. Preparation

Clean stone before setting by thoroughly scrubbing with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh fillers or abrasives.

**B- Installation**

## 1. Setting Stone

Employ skilled stone setters at the site.

## 2. Contiguous Work

Provide chases, reveals, openings and other spaces as shown or required for contiguous work.

## 3. Setting

Set Granite in accordance with drawings and final shop drawings. Provide anchors, supports, fasteners and other attachments shown or necessary to secure granite in place. Shim and adjust accessories as required from proper setting of granite.

**C- Erection**

## 1. General

Installation shall be in accordance with reviewed shop drawings. Each unit, piece, or panel shall be set in position assigned on the reviewed shop drawings, carefully plumbed and aligned and securely anchored to the structural backing as detailed.

- a) For items penetrating stone units that cannot be located accurately before panel fabrication, drill stone in the field with a diamond core drill and cover the opening with an escutcheon of approved material and finish.

## 2. Erection Process

All units shall be erected level, plumb, square and true within the allowable tolerances. They shall be positioned so that cumulative dimensional error is not allowed. Horizontal and vertical joints shall be correctly aligned and maintained. Each unit shall be securely fastened in place as indicated on the reviewed shop drawings. Adjustments or changes in connections, which could involve additional stresses in the products or connections, will not be permitted without approval. Units shall be erected in a sequence indicated on the shop drawings.

3. Installation Tolerances

Install stone without exceeding the following tolerance limits:

- a) Variations from plumb: 1 mm (1/16 in.) in any run.
- b) Variations from level or elevations: 1 mm (1/16 in.) in any run.
- c) Offsets in alignment of adjacent members at any joints: 0.75 mm (1/32 in.) maximum.
- d) Regardless of the above tolerances, placement of erected units shall be visually accurate. Granite units shall not be perceptibly out of alignment at vertical or horizontal joints. Any face, which shows an undulating or irregular surface even though it may within the limit given, will not be accepted.

**D- Adjust and Clean**

1. Replacement

Remove and replace Granite units, which are broken, chipped, stained or otherwise damaged. Where directed, remove and replace units, which do not match adjoining work. Provide new matching units; install as specified and point-up joints to eliminate evidence of replacement. Repoint defective and unsatisfactory joints as required to provide a neat, uniform appearance.

2. Cleaning

Clean Granite work after completion of work, using clean water and stiff bristle brushes. Do not use wire brushes, acid type cleaning agents or other cleaning compounds with caustic or harsh fillers.

3. Protection

Take precautions as required to protect the stone work from collapse, deterioration, discoloration and damage during construction.

**09954 MEASUREMENT AND PAYMENT**

**A- Measurement**

The measurement of Granite work covered under this Section shall be made in sq. ft/m of the actual surfaces completed and approved. Deductions will be made for all opening for doors, windows, ventilators etc.

**B- Rate and Payment**

The rate for Granite under these specifications shall cover the cost of furnishing all materials, labour, scaffolding, laying, curing, grinding, polishing, finishing, cleaning and appliances at Site and performing all operations at any height in accordance with the drawings, Bill of Quantities and as specified.

\*\*\* End of Division 09000 \*\*\*