

**GENERAL SPECIFICATION
FOR ARCHITECTURAL AND ID WORK**

**This document shall take precedence over CIDA Building Specification,
and shall be used in conjunction with the same.**

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1 FLOOR FINISHES

1.1 General

- The contractor is advised to refer the finishes schedule to identify the location of finishes to be applied.
- The work shall be carried out in an approved sequence with consideration to the work intervals required to be provided between each finishing layer. e.g. dry out period, curing time and etc.
- Any finish shall not be laid under unsuitable weather conditions unless adequate protection has been provided and approved by the Engineer.
- Except under unavoidable circumstances, any floor finish (Final Finish) shall not be commenced until the associated wall and ceiling finishes have been completed. However, this work sequence shall defer depending on the nature of each finish.
- Slip Resistance on surface of floor finishes

Area / Room	Minimum slip resistance (R) on floor surface per DIN 51097
Areas where the floor always keeps dry. Such as changing rooms and corridors	Class A
Shower rooms, Bathrooms	Class B
Rooftop decking and tile, Pool edges, swimming pools which people could walk across	Class C

Surface of floor finishes shall meet the minimum requirement of slip resistance at different areas/rooms as follows. Architect's discretion shall be sought where a particular available tile does not have the relevant certification.

- Bathroom floor-R11
- Bathroom wall-R 10
- Dining Rooms/Cafés - R9

- Stairs, indoor and enclosed - R11
- Outdoor stairs and semi-outdoor stairs - R 11 (or R 10 V4)
- Social facilities (e.g. toilets, changing rooms and wash rooms) - R10
- Break rooms (E.g. lunch room, staff rest room) - R9
- Work shop - R12 V8
- Kitchens/pantries - R11

Preparation of Surfaces

- The receiving surface of the final finish shall be free from oil, grease, paint, smoke stains, oxide stains and other deleterious substances. Any uneven, irregular or damaged surfaces shall be rectified in a reasonable manner adequate to receive its immediate finish.
- All fixings, conduits, pipes, sleeves, junction boxes, etc. on floors shall be correctly located and securely fixed and anchored in position before prior to commencing floor finishes.
- The surface of concrete to receive screeds shall be thoroughly roughened by picking or by other medium and cleaned of all dust and debris, and immediately before laying screeds, the surface shall be well dampened with a slurry or neat cement and water brushed on and the new paving applied while the slurry is still wet.

Protection and Curing

- All finishes containing cement laid in a plastic state shall be protected from damage and premature drying by 0.25mm thick polythene sheeting until the finish is thoroughly cured and when so required shall be well wetted to prevent premature or quick drying.
- All finished floor surface shall be adequately protected from damage with 0.25mm thick polythene sheeting on completion.

Levels

- The surface finish of floor base screeds and applied finishes shall in all cases be finished to the heights above the structural concrete slab as indicated on the Drawings.

Grading

- Where shown on drawings, floors shall be graded to floor waste outlets or at a fall gradient to be given by the Engineer.

Junction

- Where floor surface materials differ on either side of doorways without threshold, materials shall be joined under doors.

Floor Channels, Ducts, etc.

- Unless otherwise specified all floor channels, ducts, etc which occur in floors shall be finished in colour to match floor finishes. Bottoms shall be graded as required. All angles shall be coved or nosed. Finishes to mechanical equipment bases shall be so treated where exposed.
- Mat recesses shall be finished with cement sand (1:3) to a smooth surface and with edges finished as specified elsewhere.

Sleeves

- Where pipes are brought through the floors the sleeves shall finish flushed with floor finishes and the finish shall be neatly cut around sleeves inserted by the contractor and shall not finish against the pipe themselves.

1.2 Floor Hardening

Material

- The floor hardener shall be CL Crete 100 non-metallic non-colour floor hardener or approved equivalent.
- CL Crete 100 shall be hard non-metallic aggregates and shall meet the standard as set out in accordance with BS 4551:1980 of hardness Moh's scale 8.

Chemical Resistant (Not to be exposed to serious chemical attacks)

Excellent abrasion resistant

Nonskid /anti slip

Non rusting

Easy to clean

Property

Compressive Strength (BS 4551: 1980) control

Mortar : 17.5 N/mm²

CL Crete 100 : 51.0 N/mm²

Moh's Hardness : 8

Method of Application

- When the concrete has stiffened enough to prevent float blades from digging into the surface, CL Crete 100 (4kg/m² for normal traffic, 6kg/m² for heavy traffic areas) should be evenly broadcast directly onto the fresh concrete substrate. As soon as the CL Crete 100 has been broadcasted, the hardener having absorbed water from the concrete and turned darker in appearance, mechanical trowel surface to a dense uniform to fall shall begin (power float).
- The finish floor shall be free from all traffic for at least seven days before the floor can be used. The contractor shall observe and be fully responsible that no heavy traffic be allowed over the floor during the curing period.
- Application shall be strictly to manufacturer's instructions and shall only be carried out by approved applicators by the manufacturer.

1.3 Screeds

1.3.1 Materials

Sand

- To be fine or coarse classification as required.
- Where structural concrete, mass concrete, screeds, backing tiles, rendering, plastering or other finishes are to be used externally or internally, the use of sea

sand, washed sand or any other will be strictly prohibited. Manufactured Sand as per Structural Engineer's Specification may be used.

Cement and Sand Screed

- Generally, cement and sand screed shall comprise one (1) part cement and five (5) parts sand by volume. Unless otherwise specified.

Smooth Cement Rendering

- The floor finish of cement sand mortar 1:3, 12mm thick (unless otherwise specified the thickness and mixing ratio) shall be laid on the concrete surface and finished rough with wooden float or trowel to smooth as directed by the Engineer. 3mm thick setting coat shall be laid over the surface layer. This setting coat shall consist neat cement and sufficient quantity of colouring pigment of approved make mixed dry until homogeneous. The surface shall be finished smooth with steel floats as shown on the drawing or as directed. All coloured cement finishes shall be polished with floor polish of approved colour before handing over. If any expansion joint is required shall be as per the instruction the Engineer.

- Where the floor finish laid on matured concrete, the surface of the base shall be thoroughly and carefully prepared to ensure adequate bond between the base concrete and floor finish. This preparation shall include:

Removing of laitance on the base surface by chipping and hacking with metal tool, removing of loose concrete and dirt by washing.

Several hours before floor finish is to be laid, the base concrete shall be wetted and any excess water brushed off before grouting.

Not more than ½ hour before finish is to be laid, a neat cement grout shall be brushed in to base. The grout shall consist of water and the same cement as is used in the floor finish, mixed to the consistency of a thick fluid. Approved type of bonding agent may be used as an alternative to the grout as instructed by the Engineer.

Floor Hardener

- Shall be as per the instruction and recommendation of the Engineer. If in the case refer Floor Hardening Section.

1.3.2 Workmanship

Preparation of Surfaces

- The surface of concrete to receive screeds shall be thoroughly roughened by picking or other medium and cleaned of all dust and debris, and immediately before laying screeds, the surface shall be well dampened, a slurry or neat cement and water brushed on and the new paving applied while the slurry is still wet.

Protection of Other Trades

- Protect all other work at all times from damage by standing or mortar droppings.

Protection and Curing

- All finishes containing cement laid in a plastic state shall be protected from damage and premature drying by 0.25mm thick polythene sheeting until the finish is thoroughly cured and when so required shall be well wetted to prevent premature or quick drying.
- All finished floor surface shall be adequately protected from damage with 0.25mm thick polythene sheeting's on completion.

Levels

- The surface finish of floor base screeds and applied finishes shall in all cases be finished to the heights above the structural concrete slab as indicated on the drawings.

Grading

- Where shown on drawings, floors shall be graded to floor waste outlets or at a fall gradient to be given by the Engineer.

Sleeves

- Where pipes are brought through the floors the sleeves shall finish flushed with floor finishes and the finish shall be neatly cut around sleeves inserted by the contractor and shall not finish against the pipe themselves.

Mixing of Cement and Sand Screed

- All cement and sand screed for paving shall be mechanically mixed unless otherwise directed by the Engineer. The contractor shall make allowance for the use of additional cement necessitated by such other method of mixing directed. Only whole bags of cement shall be used in any batch of mix. The cement and sand shall be measured by volume in properly sized containers, one for each material. The materials shall be mixed

in sufficient quantities for immediate use and are not to be used after an hour has elapsed from the addition of water.

Laying of Cement Sand Screed

- Prepare the surface as specified, screed to levels, float and finish with a steel trowel unless otherwise specified, to a hard and even level surface.
- Finish work neatly at junction with walls and other surfaces.
- Screeds shall be laid in alternate panels not exceeding 10 square meters each using temporary edge strips of timber to give a clean break between panels for the full thickness of the finish.
- Cure finish by keeping damp for a minimum of fourteen days.
- The finish shall be kept free of traffic for a minimum period of seven days.

1.4 Type of finishes

1.4.1 Tile flooring

Grout and Adhesive

- Base screed for all floor tiling, marble and granite tiling work shall be gauged with 'Endstra conmix tile grout' and or approved equivalent.
- Bonding or tile setting mortar for all marble and granite tiling works shall be gauged with 'Endstra conmix tile adhesive' or approved equivalent.
- Joints between floor tiles shall be grouted with selected and approved 'Endstra Colour Grout and Joint Filler' gauged with 'Endstra Grout and Mortar Admix' or other approved equivalent.
- Kitchen floor grout should be a recommended Epoxy grout.

Floor Tiles

- Tiles for floors to the above shall be matt or polished finish homogeneous tiles as described on drawings or schedule of finishes.

Nosing Tile

- Selected tile with nosing and anti-slip grooves shall be provided to all staircases, steps as indicated on the Schedule of Finishes/Drawings and as instructed by the Engineers.

Dividing Strips

- Dividing strips between different floor finishes shall be 25 x 25 mm and 50 x 50mm Aluminium angle strip 3mm thick embedded at junction of different floor finishes and finished flush

Surface Preparation & Laying

- The sub-grade concrete or the reinforced concrete slab on which the tiles are to be bedded shall be well cleaned, wetted and mopped. Any loose concrete or cement mortar particles shall be removed by metal tool.
- The bedding for tile shall be with cement sand mortar 1:5 or as specified. The average thickness shall be 10mm. The setting bed of cement and sand screed shall be thoroughly mixed with as little water as will produce a workable mix.
- Mortar shall be spread, tamped and properly levels as required and float finished with a wooden float and allowed to stiffen sufficiently to offer a fairly rigid cushion for the tiles.
- If any falls or cross falls is required shall be properly maintained.
- After bed has set sufficiently to be worked over, tiles shall be laid with approved type adhesive as per the instructions of adhesive manufacture and the Engineer.
- Tiles shall be tamped solidly onto the bed ensuring a solid bedding free from depressions. Then joints shall be grouted by approved coloured tile pointing compound. All excess grout shall be removed and tiles thoroughly cleaned.

- Allowable variations in finished work from level and plumb, elevations, locations, slopes and alignments shall be as follows:

Floors : $\pm 3\text{mm}$ under a 3.00 meter straight edge

Joints : $\pm 1\text{mm}$ width for ceramic tiles

2mm in 1.00 meter run from true other alignments

- Floors shall be laid according to setting-out drawings as directed and approved by the Engineer.
- Floor tiles shall be laid as scheduled and required with skirting tiles to all walls and solid bases. Lay tiling over top of solid bases where exposed and with bull nosed and covered or 45-degree angled tile riser. Tiling shall laid to a true and even surface with even falls as required. No chipped, warped or defective tiles shall be laid. Where full size tile cannot be laid, these tile shall be cut(sawn) to required size, and their edge rubbed smooth to ensure straight and true joints.
- The surface of the flooring during laying shall frequently be checked with a straight edge about 2m long so as to obtain a true surface with the required slope.
- Straight edges shall be set to lines established and then reset at suitable intervals to keep joints parallel over entire area.

Samples

- Samples of each type and colour of floor tiles for approval shall be submitted in a one (1) meter square plywood backing, grouted as specified.

Maintenance Stock

- The required quantity of each type of tiles for maintenance stock shall be handed over to the Employer prior to the handing over of project completion.

Ordering of Materials

- All approved tiles shall be obtained from the same manufacturer or supplier and shall be from the same shipment. The contractor shall include the wastage and maintenance stock of tiles when ordering the materials.

- Product data relating to manufacturer's specifications, and installation instructions for each type of proposed tiles shall be submitted to the Engineer for information.

Product Handling

- All tiles, shall be delivered to the job site by the approved supplier in their sealed original packing clearly labelled with the manufacturer's name and brand designation, referenced specification number, type, class and rating as applicable.
- The Engineer or his representative shall have the right to reject any materials which are found not in their sealed original packing.
- Store products in an approved dry area, protect from contact with soil and exposure to the elements. Keep products dry at all times.
- Handle products in a manner that will prevent breakage of containers and damage to products.

Acid Washing

- Tiles shall not be washed with acid. Cleaning agent other than acid may be used subject to the approval of the Engineer.

Protection and Cleaning

- All completed works and work in progress shall be adequately covered and protected to void any damage until the handing over the Work. Clean down and leave all work in good condition on completion.

1.4.2 Semi-Rough cement finish.

- After that on the surface of the newly laid fresh mortar of cement, sand & water, Portland cement mixed well with clean water to get thick flexible flowing cement slurry is poured on the surface and smoothen by steel trowel by hand to get evenly leveled surface finish in between "rough" and "smooth" status, accepted by Engineer.

1.4.3 Smooth Cement rendered floor.

- On the surface of the newly laid fresh mortar of cement, sand & water, Portland cement mixed well with clean water to get thick flexible flowing cement slurry is poured on the surface and smoothen by steel trowel by hand to get smooth evenly leveled finish accepted by Engineer.

1.4.4 Vanity counters

- Vanity counters shall consist of polished granite slabs and fronts, 20mm thick, laid on a mortar bedding or fixed with dowels to pre-cast concrete substructure.
- Laying, fixing and finishing of the granite shall generally be as specified elsewhere in this Article.
- 20mm thick (Unless otherwise specified by the Engineer) approved colour continuous granite slabs shall be used unless otherwise instructed by the Engineer.

2 WALL & CEILING FINISHES

2.1 General

- Refer to the Schedule of Finishes for the location of the various types of finishes required on ceiling and walls.
- The following clauses describe the materials and workmanship requirements and the application of the various finishes.
- All areas to receive finishes shall be kept free from oil, grease, paint, smoke stains, oxide stains and other deleterious substances.
- All temporary holes and faults in alignments etc. of all trades shall be rectified by the various trades as the work progresses.
- All fixings, conduits, pipes, sleeves, junction boxes etc. shall be correctly located and securely fixed and anchored in position before the wall and ceiling finishing work shall commence.

- The work shall be carried out in an approved sequence to allow all following trades to comply with the time schedule, e.g. a time allowance shall be made for a sufficient drying out period of rendered surfaces to allow for the application of paint or other applied finishes.
- All rendering work shall be carried out by competent and experienced tradesmen and with approved equipment
- The contractor shall comply with all relevant Codes of Practice and shall generally satisfy himself that all surfaces to be finished are in a satisfactory condition and have imperfect and unsatisfactory backgrounds rectified before commencing work

2.2 Plastering

Admixtures

All the admixtures shall be approved by the Engineer prior to use.

Nails

- Nails shall be galvanized wire nails complying with BS 1202 Part 1.

Surface Preparation

- All joints of brickwork are to be thoroughly raked out and loose particles of mortar, etc. brushed off and an application of acrylic resin shall be applied in accordance with the manufacturer's instruction to form a key for plaster or screeds.

Truing of Surfaces/Dubbing Out

- All finishes to walls or ceilings shall be brought to true and even and flat surfaces by means of screeds and the surfaces trued off with a straight edge before troweling or floating.
- Where applied to uneven surfaces the undercoat to finishing's of any type shall be dubbed out as required. The thickness shown or given shall be exclusive of any key and any necessary dubbing.
- For external renders the dubbing out of the surface shall be applied as follows;

For areas not larger than one meter square on plan and not thicker than 8mm at any point dubbing out or levelling shall be carried out using the same mix as the render to be applied, with or without bonding code as specified for the render, in a single coat application, trowelled and then scratched to form a key.

Where the area exceeds one meter square or 8 mm in depth reinforcement consisting of 1.5mm by 1.5mm stainless steel or approved galvanized welded mesh with wires at 25mm centers shall be shot fixed to the backing concrete. The mesh shall be applied with the horizontal wires outwards and fixed through 30mm diameter stainless steel washers at 300mm center to center in each direction. The mesh shall be spaced from the background such that it lies in the center of the layer levelling render or dubbing out. The levelling render shall then be applied as described above.

Continuity and Finish

- All plastering shall be carried into all recesses, returns and the like. The finish coat of plastering to any one shall be completed in one operation.
- All work shall be completed perfectly flat, plumb, even, straight and hard and uniform in surface texture, free from cracks, blisters, watermarks, mortar droppings, stains and other imperfections and with all arises straight and true.
- Any making good to plaster including setting coats is to be executed by cutting back the work to a neat rectangle with indent edges to form a dovetail and finished with the face of the surrounding work in the same materials and manner as the original work. All unevenness in the finished surface is to be rubbed down to a true face.

Expanded Metal Lath

- Expanded metal lath shall be 'Expamet' or other equal and approved and of the following types;

For use in 300mm strips for strengthening cement render where shown on the drawings and at expansion joints, Expamet BB263 or equivalent. The strips are to be cut so that the maximum stiffness is obtained across the strip. The strip is to be fixed to the concrete or brick at one edge and at the center, at not more than 300mm centers.

For general screed reinforcing use Expamet BB263 or equivalent.

For reinforcement of brick or concrete block walls, 'Expamet' or equivalent strip reinforcing in width 12mm less than the width of the wall, laid in courses at 450mm center to center vertically.

- All metal lathing is to be fixed as taut as possible with largest dimension of the mesh running between supports and with stiffening ribs uppermost in the same direction. Cut ends are to be turned away from the plastered surface.
- End laps are to be not less than 25mm when the lap occurs at the bearer and otherwise not less than 50mm. Side laps are to be not less than 25mm. All laps are to be securely wired together with 18 gauge soft galvanized binding wire at intervals of not more than 75mm.

Junctions

- Where plaster and backings are applied to surfaces of different materials which abut each other (e.g. concrete and brick wall) other than at soffits, the joint shall be covered with a 200mm wide strip of expanded metal lath. Where an intermediate column, beam or stiffener is 250mm wide or under the joints on either side shall be covered with a single 400mm wide strip of expanded metal lath. All expanded metal lath shall be placed in position and pinned not more than 600mm centers spacing.

Mixing

- The ingredients for all plasters and screeds shall be accurately gauged in approved boxes and mixed on proper watertight boarded platforms. Mixes shall be used up within one hour of the final contact of the cement with water.
- All mixes remaining after this period must be discarded and must not be re-tempered for use.
- Internal and External Plain Face Plaster
- Plain face plaster shall be 12.5 mm thick unless otherwise described. Plaster shall comprise 1:5 cement and sand.
- All walls, fittings, cupboards and cabinets shall be rendered behind
- The substrate to receive plaster shall be properly prepared as specified under the surface preparation.
-

Plastering for Exposed Concrete Soffit

- Exposed concrete soffit and places where false ceiling is not required etc. Shall be plastered with 5mm thick of one (1) part cement and three (3) parts sand or skim coat with approved plasticizer.

Workmanship

- All concrete surfaces shall be hacked and joints of brickwork raked out to a minimum depth of 13mm to form a proper key. Rendering on walls generally shall be taken to include flush surfaces of lintel etc. in same.
- Clean all surfaces with heavy wire brush to remove all dust, dirt or loose rust from metal work. All pipe conduits, etc. shall be correctly chased in and well anchored and of sufficient depth to permit satisfactory concealment without surface blemish to rendering. All temporary grounds and screeds shall be fixed and sufficient thickness shall be allowed to finish on correct plane
- All permanent grounds and fixing plugs shall be correctly located and fixed, all expanded metal wrappings, etc. shall be securely fixed over lintels, joints between different materials, banks of conduits, pipes, expansion joints where applicable and other similar conditions before rendering
- Render coats shall be applied with sufficient pressure to thoroughly fill all voids, chippings chasings, rakings, etc. and of thickness 12mm nominal, 10mm minimum, 20mm maximum in one operation screed off
- Heavily cross scratch render coats before initial set to provide mechanical key
- All coats shall be fog sprayed before commencing succeeding coats
- All surfaces shall be finished flat, even, straight, level and plumb hard and true and free from cracks, stains, blisters, water marks, and other imperfections. All angles shall be straight and true and all curved surfaces even and true to radius with small veer joints formed straight and regular at all junctions with other materials
- Where practical, each coat in one plane shall be finished in one operation

Backing Coat

- Backing coat for all tiling and other applied finishes unless otherwise specified shall be cement and sand (1:3) and minimum 12.5mm thick and shall comply with B.S. 5980 : Type 1 class A gauged with “Laticrete 3701 Grout and Mortar Admix” or approved equivalent and shall have the following characteristics;

<i>Setting Bed</i>	:	<i>1840 kg/m</i>
<i>Bond Coat</i>	:	<i>1630 kg/m</i>
<i>Water Absorption</i>	:	<i>4% max</i>
<i>Compressive Strength</i>	:	<i>210kg/cm² min</i>
<i>Bond Strength</i>	:	<i>35kg/cm² min</i>

- Backing coat for marble wall tiling work (without the use of mechanical anchors) shall be white cement and wash river sand (1:3) and minimum 13mm thick and shall comply with B.S. 5980 : Type 1 class A gauged with “Laticrete 4237 Thin Set Mortar Additive” or approved equivalent.

Joints

- Joint between wall tiles shall be grouted with approved ‘Laticrete colour Grout and Joint Filler’ gauged with ‘Laticrete 3701 Grout and Mortar Admix’ or other approved equivalent and shall have the following characteristics:

<i>Density</i>	:	<i>1840 kg/m</i>
<i>Water Absorption</i>	:	<i>4% max</i>
<i>Compressive Strength</i>	:	<i>245 kg/cm² min</i>
<i>Bond Strength</i>	:	<i>50 kg/cm² min</i>
<i>Colour</i>	:	<i>To be Selected by the Engineer</i>

- All joints between plumbing or other built-in fixture shall be made with light coloured mastic non-oil migrating caulking compound.

3 Suspended Ceilings

3.1 General

- The contractor shall submit samples of the ceiling for approval by the Engineer. Ceiling tiles and sheet shall be delivered in original, unopened packages with the manufacturer’s name and contents clearly indicated. They shall be stored in a safe enclosed area and protect from damage until ready for use.

- Shop drawings detailing the method of installation shall be submitted to the Engineer for approval before any installation commenced.
- No ceiling shall be installed until the building is weather tight, wet trades have finished and services above the ceiling are completed. Before, during and after installation maintain temperature and humidity at levels similar to those, which will prevail after the building is occupied.
- The ceiling works shall include everything necessary for an incidental to the execution and completion of the ceiling system as shown on drawings and as specified herein.
- The contractor shall be responsible for and shall liaise and co- ordinate with the work in other services such as air-conditioning, lighting etc. in determining the location and schedule for cutting, fitting and making good openings in the ceiling. This item, together with the cost of bracing framing for the opening is deemed to be included in the rates for ceiling works.
- The contractor shall maintain and provide sufficient protection for the completed ceiling until handing over at practical completion. Until such time, the contractor shall be responsible for and shall replace and / or make good any soils, dents or defacements to the finished work at his own cost.

Ceiling Materials

- The suspension system shall be an exposed system and shall comprise inserts (or other approved devices for fixing hangers) hangers and channel suspension system as grid and perimeter trim. Concealed channels shall be galvanized finish.
- The suspended ceilings shall be fixed to manufacturer's recommendation and set out accurately to avoid undulations with straight joint parallel to walls. (According to Engineer's recommendation). The ceiling shall be set out according to the setting out drawings as issued by the Engineer during constructions, cutting tiles accurately at perimeter and around obstructions, protecting finished ceiling from damage and cleaning exposed surfaces in accordance with manufacturer's instructions.

Proprietary Ceilings

- All Proprietary ceilings shall be inclusive of all suspension, Aluminium framings, trimmings, angles etc. in strict accordance with the manufacturer's instructions. All vertical ceiling surfaces shall be properly framed and subject to the approval of the

Engineer. All ends, and perimeter of the ceiling area shall have proprietary angle trimming in accordance with the manufacturer's instructions.

- The contractor shall submit shop drawings, for each type of ceiling specified, allow for a mock-up of 25m² for the approval of the Engineer.

Recessed Openings

- Where A/C diffuser grilles, return air-grilles, recessed light fittings, access openings etc occur, provide recessed opening in suspended ceilings including all additional frames to suit. These shall be included in the rates for the ceiling.

Ceiling, Program Schedule

- The contractor shall co-ordinate with the ceiling specialists to ensure that installed suspended ceilings are not unnecessarily taken down, altered or damaged due to the omission of work in the ceiling space.

3.2 Ceiling Systems

3.2.1 Concealed Gypsum Board Ceiling

- The works include supply and installation of Gypsum Board Ceiling which incorporates a fully concealed metal fixing grid. Complete with all necessary hardware, fittings and accessories. Board joints are not visible and all gaps are filled with gypsum jointing compound. The job also includes providing access
- Panels, cutting of spot lights, luminaires, speaker, etc.
- Gypsum Board Sheets reinforced with glass fiber and laminated with paper board at both sides. Sheets in size 4' x 8' in thickness ½" (or 3/8") screwed on steel stud system. The steel stud frame consisting of main furring channel at every 2' and cross channel at every 4'. Both main and cross channels are attached though jaw clip.
- Screws will be corrosion proof SS or either Chromised or Cynated.

- The gaps will be initially filled with joining gypsum plaster compound and then taped by self-adhesive glass fiber mesh of width 2 inch covered with proper jointing compound.

Fibrous Plaster Board Ceiling

General Composition

- Fibrous plaster ceiling shall be from an approved fibrous plaster manufacturer. Fibrous plaster shall consist of Gypsum Plaster reinforced with strands of Fiberglass

Manufacture

- Suppliers of fibrous plaster shall be required to produce confirmation that materials supplied to projects are produced by a recognized manufacturer to the compliance with the relevant ISO Codes or equivalent.
- Water and moisture resistant ceilings shall be calcium silicate board.

Cornice

- Unless otherwise stated, all cornices shall be manufactured to the same specification as the fibrous plaster slab.

Fire Hazard Properties

- Test results by approved lab are to be produced indicating that the fibrous plaster materials supplied have qualified for Fire Resistance rating in compliance with the relevant codes.

Workmanship

- Installation of Gypsum Board ceiling, and calcium silicate board ceiling are to be carried out by competent and experienced tradesmen strictly to manufacturer's instructions and approved methods.

Metal Suspension System

- The contractor shall design, supply and install metal suspension system fixed below and at right angle to hangers by means of galvanized metal joist straps.
- Hangers to be suspended at maximum 1500mm centers by means of 22 gauges x 25mm galvanized metal straps power fixed to concrete soffit.
- Perimeters to have 75mm x 50mm wall platter at joist ends power fixed to wall at approximately 600mm centers.

Workmanship

- Installation of Gypsum Board ceiling, and calcium silicate board ceiling are to be carried out by competent and experienced tradesmen strictly to manufacturer's instructions and approved methods.

Shop- drawings

- Shop -drawings showing detail installation procedures of the ceiling are to be provided by the contractor for approval by the Engineer before commencement of works.

Warranty

- The contractor shall furnish a warranty of five (5) years against material and workmanship defects for the whole works. The contractor shall be responsible for arranging and procuring the said guarantee and this guarantee shall be a joint guarantee of the contractor and sub-contractor in favor of the employer

3.2.2 Metal Ceilings

- Metal tile ceilings shall be of size 600x600 mm made of min. 0.6mm thick painted Aluminium (or min. 0.5 mm zinc powder coated steel.) with backed polyester paint finish. The system shall be composed of flush galvanized steel clip profile with cross reinforcement. The tiles shall be out of non-perforated sheets, factory manufactured and coted.
- The contractor shall propose a suitable ceiling system within the above parameters where shall be approved by the Engineer.

- The contractor shall ensure that the correct levels and heights are been maintained thought-out and after installation.

4 PAINTING

4.1 General

- The contractor shall submit and obtain approval from the Engineer against the followings listed, prior to commencing any work related to this work tread.

Technical Data sheets

Method statements

Colour approvals

Samples as required

Materials

Paints

- Paints generally for the Works shall be AkzoNobel (formerly Imperial Chemical Industries – ICI) or equivalent paints and each type is to be the best quality produced within each range. The mixing of paints of different types will not be permitted.
- All materials used in the preparation of surfaces for painting and all undercoats shall be those recommended by the manufacturer of the finish coat for that finish.

Colours

- Colour shall be selected and approved by the Engineer and if in the case special mixing or milling is required shall be done as per the manufacturers specifications and any additional cost in connection with special mixing or milling shall be claimed separately.
- The contractor shall provide and keep colour chips of selected/approved colours on site for comparison purpose. The colours which do not match with the selected/approved samples will be rejected.

Application

Plaster Surfaces

- Pasted surfaces, Concrete surfaces, Dry walls and the like shall be painted using either a brush or roller.
- Steel surface and the like, shall be painted using a brush, roller or spray machine
- Timber surfaces and the like, shall be painted by using a brush, rug or spray machine.
- However the contractor shall have to obtain the Engineer's prior concern for the method of application of each work item depending on the required final finish.

Storage

- All materials for painting shall be delivered to Site in the original sealed containers supplied by the manufacturers and shall be carefully stored to minimize exposure to high temperatures in accordance with manufacturer's instructions.
- The contractor shall make sure that all products are in suitable condition at the time for application. Any expired material shall be disposed from site immediately.

Workmanship

Commencement of Work

- Interior decoration shall not be commenced before the work of all trades has been substantially completed and the areas concerned shall be thoroughly cleaned out. Clean conditions shall be maintained during execution of interior decoration.

Conditions of Base

- Paint shall not be applied on structurally or superficially damp surfaces and all surfaces shall be free from condensation, dust and any extraneous matter before application.
- Any unsuitable surface to receive painting and/or any uneven surfaces of plastered surfaces shall be pre-rectified up to the Engineer's satisfaction.

Preparation of Surfaces

Preparation of Concrete Surfaces

- Concrete surfaces to be painted shall be thoroughly washed down to remove all traces of mould oil or any other materials harmful to paint.
- The surfaces shall be rubbed down with a carborundum stone or cleaned by equivalent method, to remove loose particles, nibs, efflorescence, etc. Suspicious areas shall be left for 48 hours to determine whether pink efflorescence occurs.
- All holes and imperfections shall be made good with cement paste as directed.

Preparation of Plastered Surface

- Surfaces for painting and acrylic coating shall be well cleaned and dry. Any efflorescence shall be removed by first wiping with a dry coarse cloth and then with a damp cloth. The surface shall then be left for forty eight hours to ascertain if further efflorescence occurs and no paint shall be applied until efflorescence has ceased. All new plastered surfaces for acrylic coating shall be cured for a minimum of 23 days.
- Surfaces shall be thoroughly cleaned of mortar or other splashes. Any damage to the plaster shall be made good to match the adjacent surfaces and the surface brushed clean of dust and dirt.
- The surfaces shall be cleaned to remove dust, dirt, plaster splashes, oil, grease and all foreign matters.
- Cracks and other imperfections shall be cut out and made good with suitable fillers. Such patching work shall be allowed to dry out thoroughly before painting or polyurethane coating.

Preparation of Iron and Steel Surfaces

- Refer to Structural Steelwork section of specification for preparation and finish of factory primed iron or steel.
- The surfaces of iron/steel shall be cleaned before application of the paint by chipping, scraping and wire brushing of the surfaces to remove rust, loose scale, welding slag and spatter.
- All dust and dirt shall be thoroughly wiped off the surface.
- Where specified, other methods of cleaning with oxy-Acetylene or butane gas, blast cleaning and chemical cleaning followed by brushing, shall be carried out to the instructions of Engineer.
- In the case of surface which have already been primed defects in the primer, rust and loose scales shall be removed to expose the bare metal and the patched primed to match the existing primed surface. If the primed surface is satisfactory, dirt and grease shall be removed and the surface given a light rubbing.

Preparation Wood Surfaces

- Refer to wood work section of specification for preparation and finish of wood surfaces.
- At the time of painting, the moisture content of timber shall not exceed that appropriate to its use.
- Large, loose knots and other-gross defects shall be cut out and the holes plugged with sound wood.
- All heads of screws and nails shall have been set at 3 mm below the surface and filled with hard stopping.
- The surface shall be sand papered to a smooth and even finish and all projections, tool marks and other irregularities smoothed off. Resinous knots shall be treated with an approved quality shellac knotting conforming to BS 1366. Where resinous or oil exuding wood are to be painted, the entire area shall be treated with shellac knotting and allowed to set hard.

Removal of Ironmongery

- All ironmongery and removable accessories attached to wood or steel shall be removed before commencing of painting.
- Such removed items shall be re-fixed to working order after completion of the painting works.

Inspection and Approval

- Surface to be painted shall be prior inspected and approved by the Engineer for commencing painting works.
- This procedure shall be repeated prior to the commencement of each paint coat.

Protection

- Before commencing of painting, adjoining structures and areas which should not be painted or have already been painted shall be properly covered and protected.
- Any material which is marked, stained or mechanically damaged shall be cleaned and made good to the approval of the Engineer.
- If the Engineer in his opinion considers that the aforesaid remedial work is not up to satisfaction, the affected area or structure shall be redone to meet the required work quality.

4.2 Painting Systems

4.2.1 Emulsion Paint

Smooth Surface Finishes

- Internal Dry Areas – Plastered Surfaces

Apply leveling components (putty) and wall filler to get a smooth surface, apply one coat of sealer and apply two coats of internal emulsion paint of approved colour.

- Internal Dry Areas – Dry Wall Partitions and Suspended Ceilings

Apply wall filler to get smooth surface, apply one coat of sealer and apply two coats of internal emulsion paint of approved colour to internal areas.

- Internal Wet Areas – Plastered Surfaces

Apply leveling components (putty) and wall filler to get smooth surface, and apply two coats of interior anti-bacterial, anti-fungal, washable paint of approved colour to internal areas.

- **Internal Wet Areas – Dry Wall Partitions and Suspended Ceilings**

Apply wall filler to get smooth surface, and apply two coats of interior anti-bacterial, anti-fungal, washable paint of approved colour to internal areas.

Semi Rough and Rough Surface Finishes

- **Internal Dry Areas – Plastered Surfaces**

Apply one coat of sealer and apply two coats of internal emulsion paint of approved colour to internal areas.

- **Internal Wet Areas – Plastered Surfaces**

Apply one coat of sealer and apply two coats of interior anti-bacterial, anti-fungal, washable paint of approved colour internal areas.

- **External Areas – Plastered Surfaces**

Apply one coat of weather proof primer or sealer on semi rough surface, apply two coats of weatherproof emulsion paint of approved colour to external areas.

Texture Surface Finishes

- **External Areas – Plastered Surfaces**

Apply one coat of weather proof primer or sealer on semi rough surface, apply one coat of base texture coat, apply one coat of main texture coat and apply two coats of protective clear topcoats.

4.2.2 Enamel Paint

Matt Surface Finishes

- **Dry Enclosed Areas – Cast Iron or Steel Surfaces**

Apply one coat of Anticorrosive primer (Zinc phosphate Yellow or Red) and Apply Two coats of enamel Paint of Approved colour to steel surface.

Dry Enclosed Areas – Galvanized Iron Surfaces

Apply one coat of GI adhesion promoter and Apply Anticorrosive primer (Zinc phosphate Yellow or Red) and Apply Two coats of enamel Paint of Approved colour and Paint.

- **Dry Enclosed Areas – Timber Surfaces**

Apply putty to get an even surface and Apply One coat of wood Stain (of Approved stain), one coat of solvent based sanding sealer (Aluminium sealer) and two coats of solvent based enamel paint of approved colour.

- **Wet or Exposed Areas – Cast Iron or Steel Surfaces**

One shop cot of red chromate paint on all surfaces except surfaces embedded in concrete, surface to be welded or connection surfaces of friction type connections. The paint shall be of approved quality Sigma or approved quality painting system approved the Engineer for moderate whether conditions.

- **Wet or Exposed Areas – Galvanized Iron Surfaces**

Apply one coat of GI adhesion promoter and one shop cot of red chromate paint on all surfaces except surfaces embedded in concrete, surface to be welded or connection surfaces of friction type connections. The paint shall be of approved quality Sigma or approved quality painting system approved the Engineer for moderate whether conditions.

4.2.3 Water-based Paint

Water base Surface Finishes

- **Wet or Exposed Areas – Timber Surfaces**

Apply putty to get an even surface and Apply One coat of wood Stain (of Approved stain), one coat of water based sand

5 ALUMINIUM WORKS - DOORS, WINDOWS AND PARTITIONS

5.1 Aluminium Doors and Windows

- All windows, doors, etc., shall be fabricated in accordance with British Standard 4315
- The windows and doors installation shall be entirely watertight to the structure and shall include all bedding and fixing materials including all necessary flashing, weather stripping, insulation etc.

Glass

- Glass panels in windows shall be minimum 12mm thick clear toughened glass, unless other vice specified in detail drawings.
- However, the contractor shall propose alternative glass thicknesses for each window panel to comply with the requirement.

Materials

- The Aluminium sections for mullions, frames transoms, heads and sills all other Aluminium metalwork shall comply with the following British Standards or guaranteed proprietary equivalents.

BS 1161: 1972 Specification for Aluminum alloy sections for structural purposes.

BS 1470: 1972 Wrought Aluminum and Aluminum alloys - plate, sheet and strips.

BS 1474: 1972 - Ditto - bars, extruded round tube and sections. On wrought Aluminium for external Engineer applications.

Powder Coating

- Powder coating on Aluminium shall be of thickness not less than 80 micron and conform to the requirements of AAMA 605.2.90, or shall conform to Qualicoat Class 2 or better.
- The contractor shall prepare three (3) samples of size 200mm x 150mm Aluminium sheet in each of the recommended colours for selection of one or more by the architect. All samples shall be securely identified. In order to reduce problems of matching and maintenance, non-metallic satin finishes would be preferable, but the contractor's proposal will be given due consideration.
- The final colours of the coating and the degree of the gloss shall be selected by the architect very probably, but not necessarily, from the proposals made by the contractor.

- The coating system, including materials and application, shall conform to the requirements and recommendations of the paint manufacturer and to the following

A cleaning (Pre-treatment) system which shall remove organic and inorganic surface oils, grease, residual oxides etc...

Chemical conversion consisting the following:

Alkali cleaning with mild etching

Thorough water rinse

Acid de-oxidation

Thorough water rinse

Amorphous chrome phosphate conversion coating

Acidulated final rinse

- The conversion coating shall correspond to a density of 600-900 mg/sq.m, or as required to achieve Qualicoat Class 2 performance or equivalent.
- The above process shall be followed immediately by the application of the finishing coats without permitting any handling or intermediate storage of the pre-treated metal.
 - The finishing coats shall consist of shop- applied, recommended inhibitive primer, colour coat and abrasion-resistant clear top-coat, oven-backed separately according to the paint manufacturer's instruction. Application shall be by conventional air or electrostatic spray. Minimum thickness of the coats shall be as given below, or as required to achieve Qualicoat Class 2 performance:

Primer 15 micron

Colour coat 30 micron

Clear top coat 20 micron

Colour Matching

- The completed work shall present a substantially uniform appearance in regard to colour and texture and shall be a satisfactory match with identical samples or colour patches held by the Engineer and approved by the architect.

Delivery and Packing

- The contractor shall ensure that all components are suitably packed to ensure protection against handling or other damage during delivery to the site. All Aluminium components shall be covered by special protective coatings comprising 'Fablon' 'Sellotape 214' or other equal suitable material fixed

with non-damaging and non-reactive adhesive. The contractor shall state in his tender the type of protection proposed, complete with samples and reference to previous uses.

Assembly

- As far as possible, all Aluminium shall be formed, fabricated, cut, drilled, tapped, fitted or otherwise in the contractor's workshops. Where it is not practicable to deliver fully assembled components, the windows and doors shall be delivered ready for assembly to the extent practical for field erection and in a secure and workman like manner to meet the requirements of his specification and to ensure a neat weather tight construction.

Deflection and Loading

- All frames shall be designed to withstand wind loading in accordance with the requirements of British Standard Institute Code of Practice for the design of Buildings. Chapter V Loading Part 2, wind loads B.S.C. P3: Chapter V: Part 2 1972. Wind load requirements for the design and testing shall be a basic wind speed of 35 m/s.
- Members shall be designed so that deflection arising from wind and static loads shall not adversely affect the strength or appearance of the member or affect the adjacent finishing materials.

Corner Joints

- All open-able windows sash corners, shall be mitred, angle reinforced, mechanically staked and epoxy bonded. Frames with compatible extrusions, shall be mitred, angle reinforced, mechanically stacked and epoxy bonded. Frames with incompatible extrusions shall be mortised and tenoned.
- A permanent water tight shall be made to the junction of the side frame members with all horizontal members.
- Joints shall be made by welding or by concealed mechanical connectors. No corner fastening devices such as pins, screws, bolts or pressure indentation shall be visible on vertical exposed faces of sash, members, when the windows are in place. Water-tight joints shall be made at the junction of the sill and side frame members.
- Windows design shall be such that water will not be trapped on the window sill on the exterior or interior of any frame, except where special provision is made for the removal of condensate.

Weather seals, Weatherproofing, Thermal Break and Soundproofing

- The contractor shall form all weather stripping for all fixed and opening Aluminium windows. All weather strips shall be of good quality material which is compatible with Aluminium.
- Frames shall be fixed in structural openings using appropriate fixing lugs, properly bolted to the structure and to the frames, as required.

Fixing

- The contractor will be responsible for checking on site all dimensional properties relating to the structural openings.
- The contractor shall only proceed with the fabrication of the Aluminium sections when he is completely satisfied that the structural openings are within the permissible tolerances acceptable for the installation of the Aluminium framing.

Tolerances

- The tolerance for windows on overall dimensions shall not be greater than +1.5mm.
- The tolerances for the location of centre lines of mullions and transoms etc. shall be +1.5mm except where transoms or mullion from part of a continuous strip where the tolerance shall not be greater than +0.4mm.

Expansion and Contraction

- The design of the windows shall be such that expansion and contraction take place freely in the plane or the member or frame, and under no circumstances shall provision for expansion be allowed by making use of slotted fixing holes in brackets to allow sliding movement between the brackets and the building structure.
- Provision shall be made for horizontal and vertical expansion joints to be made independent of one from the other unless specially noted to the contrary. Provision is also to be made to prevent water penetration and air infiltration at such joints.

Ironmongery

- All ironmongery shall satisfactorily perform the functions for which intended and shall be securely attached to windows, panels and/or units. Such components should be of Aluminium, die-cast alloy or other non-corrosive materials compatible with Aluminium. Plated or coated materials not compatible with Aluminium and which could cause electrolytic action are not acceptable.

- Provision shall be made for hinges, locks, catches, handles, latches, opening devices, stays, pulls, lifts, required for efficient use and operation. All hinges shall be stainless steel.
- There shall be no Aluminium to Aluminium contact between ironmongery or unit members which are required to move relative to one another and at the same time remain in contact.

Cleanliness

- The contractor shall ensure that marks or other blemishes, for which he is responsible, are removed from the installed units as the work proceeds, so that stains do not set.

Protection

- The contractor shall ensure that Aluminium and glazing work is protected at all times from damage or from handling marks.
- If disfiguring damage is apparent on Aluminium surfaces, or parts thereof, it shall be the responsibility of the contractor to make good or replace such damage.
- Aluminium windows shall not be used as means of access or for supporting stagings, trestles or other load bearing equipment.
- On completion the protective film shall be removed from the Aluminium members and the whole cleaned.

Guarantees

- Colours shall be guaranteed to last for a minimum period of ten (10) years.
- Notwithstanding maintenance requirements of the work the contractor shall further be required to provide a written guarantee against the workmanship, materials, installation, and operation for a period of five (5) years from the date of completion of the Contract. This guarantee shall also include for a guarantee against water penetration between the window and the structure.

Sample for Testing

- The contractor shall provide and arrange for the supply and delivery of a sample of a typical window unit, full height, but half width, to an independent testing authority for testing. The unit shall be in all respects similar to windows to be installed on the works, and the sample shall be installed in a

structure provided by others in exact, the manner that windows will be installed in the works. The contractor shall allow for all necessary adjustments during the course of the testing.

- Such further testing as required in this specification shall be carried out, if required by the Engineer by an approved recognized testing authority, in the presence of the testing officer, and the Engineer or in the presence of their authorized representatives and any work subsequently carried out under this Contract shall be in accordance with the samples so tested, and approved by the Engineer.
- If the contractor has had similar components to those mentioned in this specification, tested and passed by a competent authority as mentioned above, he may re-submit the results of such previous testing in lieu of manufacturing a sample for testing purposes. The Engineer reserves the right to reject or approve such previous testing and shall, if he deems necessary, order for an additional test.
- Samples units submitted for testing shall be accompanied by properly identified drawings relating directly to the sample.

Control Sample

- Sample window and door units, as required shall be lodged with the Engineer as control standards, before 2 weeks of commencement of work, on Aluminium doors, windows and partitions.

Testing

- The following tests may be required at the discretion of the Engineer.

Coating Thickness

- The coating thickness shall be measured using an eddy current instrument as specified in BS 3978 : 1966, or ASTM B244 of the Aluminium Association of America's Method for 'Measuring, Thickness of Coating of Aluminium.

Coating Weight

- As ASTM B 157.

Staining

- The Aluminium Association of America's 'Stain Test for Anodic Coatings of Aluminium'.

Hardness

- Hardness tests shall comply to testing with an 'Eagle Turquoise' pencil, grade 2H, pushing forward about 6mm at an angle of 45 using pressure, without breaking the lead; if the hardness of the film is satisfactory, the film will not rupture.

Resistance to sulphur dioxide

- The film shall comply to BS 1615:1961: the finish shall show no blistering, softening or lack of adhesion and there shall be no corrosion creep under the coating.

Accelerated Exposure

- The surface finish shall comply to BS 3900: 1966 Part F, under the effects of the Erickson apparatus exposed for 2000 hours in a weather meter.
- The allowable defects shall be very slight chalking and change of colour, together with the normal water and carbon are dust staining.

Air Infiltration

- As BS 4315.

Leakage Tests

- The window installation including all glazing shall be capable of withstanding conditions of test pressures 300 N/mm², 30mm Hg.
- Under these conditions when the outside surface of the window is completely covered with a film of water, there shall be no leakage of water whatsoever from the outside to the inside of the window; and the installation as a whole shall be completely waterproof.
- The contractor shall provide details on how to provide such tests as to prove that the fixed and pivoted windows are water tight.