2-8 DOORS, WINDOWS, AND GLAZING

2-8-1 Scope of Work

(1) Extent

The work specified under this paragraph consists of all doors and window work, glazing, and finishing hardware work necessary to complete the work indicated in drawings and described in specifications.

(2) Work not included

The following items of related work are specified under other paragraphs of this specification.

1) Hardware for fixture work
2) Toilet compartments
3) Curtain rails and their hardware
4) Soundproof door and soundproof observation window

2-8-2 Manufacturing Drawings and Others

Three copies of each manufacturing drawing, hardware list, installation manual, etc., shall be submitted to the Engineer for approval.

2-8-3 Samples

Unless specifically directed by the Engineer, the contractor shall submit samples of the following materials to the Engineer for approval.

1) Clear sheet glass
2) Patterned glass
3) Putty for glazing
4) Lock
5) Hinge
6) Door stop
7) Casement window latch and arm
8) Pull plate

9) Push plate
10) Flush bolt
11) Door check

2-8-4 Types and Quality of Glass

Those panes of glass shall meet the requirements of JIS R3201, 3202, and 3203.

2-8-5 Materials for Glazing

(1) Putty

Oil putty meeting the requirements of JIS K5592 or a product approved by the Engineer shall be used.

(2) Blocks and spacers

Blocks and spacers to be used for glazing shall be ones made of neoprene, processed wood, or lead and formed to have the required dimensions. These blocks and spacers shall match the compound and sealant to be used upon glazing. The compound and sealant shall not discolour or spoil fittings.

2-8-6 Dimensions, Handling and Storage of Glass

(1) The dimensions of glass to be indicated in drawings shall be rough dimensions and actual dimensions shall be determined by measuring frameworks to be glazed or by the guaranteed dimensions of the manufacturer of the fitting. Dimensions of glass and glass holding surroundings shall be determined to provide the following minimum clearance.

1) On each of the four peripheries of the pane, a clearance equal to the thickness of one pane shall be provided.

2) The space for sealant between the pane and fixed frame or glazing bead shall be minimum 1.5mm plus dimensional errors of the pane and sash and shall be minimum 3mm, on both indoor and outdoor sides.

(2) These panes of glass shall be carried in a case for protecting them from weather conditions and breakdown. These panes of glass shall be stored at a safe place so as to minimize breakdown or damage, under instructions from the Engineer. As many panes of glass as include the number of panes which may usually be broken shall be carried in.

2-8-7 Glazing

(1) General

Putty, compound for glazing, sealant and glazing tape and gasket shall be used to effect uniform glazing with accurate cornering and chamfering. Excessive putty and compound shall be removed from the pane or sash. For the thinner, cleaner, and solvent, use recommended products. Putty, compound, and sealant shall not be cut or thinned without permission of the Engineer. Upon glazing, make good contact with the pane and frame. For wood or metal fitting, first apply primer and glazing shall not be made until the primer dries sufficiently. Putty, compound or sealant shall not be used at temperatures below 5°C and shall not be applied to wet or spoiled surfaces. After glazing a fitting, close the doors and the movable sections of the windows to fix them until putty and compound dry sufficiently. Remove excessive sealant on the pane or adjacent surfaces during the working time (within 2∿3 hours) of the materials. When it is necessary to embed blocks and spacers for glazing into putty, compound, or sealant, apply putty, etc., to the blocks and spacers to be embedded prior to glazing, fit the blocks and spacers at the required locations, and let the putty, etc., set sufficiently.

(2) Inspection of fitting and preparation

Carefully inspect the surfaces of the fitting to be glazed. Glazing shall not be made before defects and faults which may hinder proper glazing are corrected.

Before commencing glazing, the glazier shall check to determine whether the following requirements are met or not.

1) Sashes and frames are fixed securely in place and plumb with the accuracy being within 3mm of the nominal dimensions given in the approved manufacturing drawings.

2) Flat rivets, screws, bolts, nail heads, welding fillets, and other projections shall be removed from the rabbet on the frame to provide the required clearance.

3) All corners and fabrication intersection shall be sealed and sashes and frames shall be watertight.

4) The drain hole on the sill shall be bored toward the outside. The rabbet on the frame to be glazed shall have a sufficient depth and width and allow necessary overlap to be obtained for glazing.

5) Base coat shall have been applied on wood and steel sashes and exposed portions of the frame.

(3) Treatment of pane and frame

Clean the edges of the pane, rabbet, and the inner face of stop bead, elaborately, prior to applying compound or sealant. Only such products of solvent and detergent that have been recommended by the compound manufacturer may be used.

(4) Glazing

Put the pane at the center of the rabbet on the frame and set the pane so that the required clearance can be obtained around the 4 edges of the pane. Hold the pane, and provide the sealing thickness of minimum 3mm on both sides of the pane. When the dimensions of the pane are more than 1.2m, provide setting blocks at the sill and spacers on all four sides. Setting blocks shall be provided at locations 1/4 of the length of the pane from both ends of the pane.

(5) Stop bead glazing (by using putty or compound)

Unless otherwise specified for materials and method to be employed, putty shall be used in the case of wood frames and elastic compound for glazing in the case of metal frames, as follows.

1) Sufficiently fill the rabbet to mount the pane on with back putty or compound so that when the pane is put and pushed, back putty or compound shall come out to completely cover the pane in the rabbet. Setting blocks and spacers shall be provided as required. The pane shall be pushed into the required place for glazing.

2) Fix the pane by using stop beads. By providing the required clearance between the pane and frame and applying putty and compound in the rabbet, fix stop beads properly. Surplus putty or compound pushed out on both sides of the pane shall be removed. On this occasion, a slight inclination shall be given upon finishing to have a good appearance and to facilitate throating.

(6) Face putty glazing

1) Apply putty or sealant on the rabbet fitted with spacers or shims to that putty or sealant shall come out when the pane is put and pushed down.

2) Fix the pane by using glazing points in the case of wood frames and clips in the case of metal frames.

3) Apply putty on the front side of pane edge in the rabbet to form an inclined flat face from a line 1.5mm inside of the frame surface. At corners the surface of putty shall form mitred joint. Surplus putty or sealant shall be scraped off. Excessive putty on the rear side shall be shaved off.

The putty surface shall form a slight angle to slope away from the pane.

2-8-8 Wood Fittings

The dimensions and design of doors are shown in the detailed drawings. The doors shall be fabricated as indicated in detailed in shop drawings approved by the Engineer.

(1) Flush doors

1) After assembling the door frame, affix a plywood with a thickness of 4mm on both sides to make the base for painting.

2) Doors shall be edged with hardwood strips on the surrounds of the door and shall be fitted and hung to the frames.

3) Doors shall be reinforced by using solid core materials to receive locks and other hardware.

4) Windows or louvered doors shall be designed and made as indicated in drawings and shall be fitted with glazing beads or inclined slats.

(2) Framed doors

1) The stiles and rails of the frame shall be mortised and tenoned together or jointed by dowels.

2) Doors with windows shall be fitted with glazing beads with shapes and dimensions indicated in drawings.

(3) Windows shall have shapes and dimensions indicated in design drawings and shall be fabricated as detailed in approved shop drawings. Window frames shall be fixed with metal anchors or subframes. Window frames shall employ tenon joint and be assembled to be robust without warp. Sashes shall be as indicated in design drawings and detailed in approved shop drawings. Sashes shall be framed together with mortise and tenon joints, glued, wedged, and blind nailed.

Windows shall be shaped not to cause twist and distortion. Exposed surfaces shall have bases corresponding to printing bases. For insect nets for windows and doors, 1.6mm mesh stainless steel wire net with a diameter of 0.23mm shall be used unless specifically directed by the Engineer. Insect nets shall be used at locations indicated in design drawings.

2-8-9 Steel Fittings

(1) Materials

Steel materials shall be those meeting the requirements of the following standards or equivalent.

1) Hot rolled mild steel
JIS G3131 SPHC

2) Cold finished steel
Mild steel, rolled or drawn, free from scale, accurate to size or gauge, conforming to JIS G3141 SPCC.

3) Steel materials for structure
JIS G310, G3106 or 3350.

4) Stainless steel sheets
JIS G3405, SUS304 and 430

(2) Steel sheet thickness

Unless otherwise stated, steel sheet thickness shall not be less than that given in Table 2-8-1

Table 2-8-1 Thickness of Sheet Steal

Classification	Item description	Thickness(mm)
Doors	Frame in general	1.6
	Frame of hinged door having inside height of more than 1.8m	2.3
	Architrave, auxiliary frame, etc.	1.6
	Door saddle	2.3
	Rail, stile, panel plate flush plate	1.6

(3) Factory finish

For rustproofing of all steel fittings, apply the primer specified in Paragraph 2-12 "PAINTING" afterzinc chromate plating (zinc: more than 183g/m^2: both faces). The primer shall meet the specification of the paint for use on the steel in the site. The exposed portions of stainless steel shall be satin finished.

(4) General

Door and louvers shall be fit to have dimensions as indicated in drawings. Unless otherwise stated, the door thichness shall be 40mm. Hinged doors shall provide a clearance of 3mm at jambs and heads, 6mm at meeting stiles of pairs of doors, and 6mm at bottom, unless otherwise specified.

(5) Work

Doors, windows, grilles, and louvers shall have specified forms and appearances in order. Joints shall be made by welding or by mechanical fastenings. Jointing shall be performed with strength not to hinder the structural strength of members to be connected. Welding joint shall be made unifarmly , have surplus metal removed and exposed portions and contact surfaces finished smooth. Mechanical joints shall be such that jointed portions shall be stuck to each other and kept watertight.

(6) Sealing of door against water

The top and bottom ends of hollow doors shall be closed to be watertight, by forming part of the door construction as stated above or by welding channel steel or a proper section steel with face sheets.

(7) Preparation of hardware

All doors shall be mortised for fitting mortise type hardware, reinforced, drilled, and threaded at the factory.

In the case of a door to be fitted with surface applied hardware, the portion to put the hardware on shall be reinforced except push and facing plates. For surface applied hardware door frame shall be drilled and threaded in the construction site. Lock and mortise type hardware mounting portions shall be fitted with reinforcing steel plates. Reinforcing steel plates for surface applied hardware shall be used as required. The thickness of the reinforcing steel plates shall be as recommended by the manufacturer of the hardware and shall meet the thickness of the door but it shall be more than 3.2mm.

(8) Accessories

Necessary fasteners, clips, anchors, glazing beads, and other parts necessary for fitting windows and doors shall all be fitted. Unless otherwise specified, anchors and fasteners shall be made of hot dipped galvanized steel.

(9) Frames

Steel frames shall be fabricated from steel materials to have specified forms and dimensions. Frames shall be comlete products having monolithically worked trims and welded members, as indicated in approved manufacturing drawings.

(10) Reinforcement

Reinforcement for hardware shall be employed on the back side as required. The thickness of the reinforcing steel plates shall be as recommended by the manufacturer of the hardware and shall meet the type, shape, and dimensions of the frame.

(11) Design and fabrication

Finished products shall have high strength, high stiffness, and neat appearance, free from defects. Moulded members shall be assembled to be straight and true with corner joints being formed as required and fasteners and others to be hidden

on the back side being fitted at practical locations. Frames to be fitted on walls to be finished by plastering shall be fitted with plastering flanges and grooves as required, conforming to detailed drawings.

(12) Jointing of corners

Jointing of frames' corners by welding shall be mitered or butted joints by using continuous arc welding over the entire width and thickness. Contact surface at ends shall all be enclosed and welding on exposed surfaces shall be finished smooth and flush. For joints with bolts, use vibration proof type nuts.

(13) Provision of hardware

Frames shall be prepared at the factory for the installation of hardware. Frames shall be mortised for receiving mortised hardware, reinforced, drilled, and threaded, by using templates. Frames to receive surface applied hardware shall be furnished with reinforcing steel plates only. Cover boxes shall be fitted to the back of hardware cut outs.

(14) Position of hardware

Unless otherwise specified, hardware shall be fitted at locations specified hereunder.

(15) Structural reinforcements

When structural reinforcing materials are required on mullions, transoms, and other portions, use structural section steel as part of the framework.

(16) Wall ancors

Anchors shall be set at intervals of less than 60cm the upper and lower ends and at intermediate point on vertical frames. Frames to be fitted to concrete or masonry walls already placed shall be fixed to anchors or subframes suitable for intended purposes by using bolts.

(17) Floor anchor

Fit steel sheet floor clips with a thickness of more than 1.6mm under vertical frames, and fix frames to the floor structure. Clips shall be fitted to frames which shall be drilled to have anchor bolt holes with a diameter of 9mm.

(18) Transportation

Frames made by welded joint shall be fitted with temporary steel spreaders across bottom of the frames. On the back side spreaders may be left in place after installation. If this is not achievable, spreaders shall be removed after setting and anchoring frames. Instead of using spreaders, frames may be strapped together in pairs with heads inverted for bracing during shipment. Knock-down type frames shall be strapped together into faggots or packaged for shipment. Each frame shall have a metal or plastics tag describing where to fit, dimensions, hand of door, and other related items prior to shipment.

(19) Installation

By setting the frame to be fitted plumb at the required position and temporary fixing it securely, fix it to the anchor. Fix bottom of the frame with fastening bolts or fitting hardware driven in. Anchors for walls shall be built in walls or fixed to adjacent structures. When frames requires ceiling struts or other types of upper structure ties, these members shall be set securely to the ceiling or upper structure framework.

(20) Flush doors

Doors indicated in drawings as flush doors including those with glazed and louvered openings shall have the following construction. Flush doors shall use steel sheets of more than 1.6mm in thickness as door panels on both

sides with edges welded and finished flush. A flush door shall not have any joint or seam on the faces or edges. For door panels, interlocked channel steel or Z-shaped steel with a thickness of 2.3mm shall be provided vertically at intervals of less than 30cm and sopt welded to the door panels to reinforce the panels. On the upper and lower portions of the door continuous channels shall be welded for reinforcement. Where specifically stated, cork, fiber board, lock wool board, or asbestos filler shall be filled between reinforcing channels. Steel materials with thickness of less than 1.2mm shall not be used for moulding.

(21) Airtight doors and their frames

1) Construction

Neoprene sealant shall be applied continuously to the frame of the airtight door to be fabricated so as to prevent air leakage through the gap between the door and frame.

2) General

Doors to be fitted to the studios, control rooms, and sound lock rooms shall be soundproof doors meeting the requirements of Paragraph 2-14 "STUDIO INTERIOR WORK".

(22) Installation of doors

Doors shall be installed by technically superior and skilled workers sent from the manufacturer. Doors and windows shall be installed accurately at the required locations in conformity to the specifications of the manufacturer and approved manufacturing and fitting drawings. Frames shall be fitted with proper temporary supports not to cause twist or deformation. Cure doors and operating portions sufficiently, then close doors not to be spoiled by cement or other building materials, and fasten doors

to the frames by wires.
After installation of doors, check fittings for their operating functions and rainwaterproof functions.

(23) Mastic sealant

Apply mastic sealant recommended by the manufacturer of the door to all exterior metal to metal joints, such as door frames, mullions, and mullion covers. Surplus sealant shall be removed before it sets.

(24) Anchors

Fix door frames to masonry construction and other adjacent constructions as indicated in detailed drawings and approved manufacturing drawings. When fitting doors to masonry walls already finished, necessary anchors and fastenings shall have been set during wall work. Anchors and fastenings shall be built into, anchored or bottled to the jambs of openings and shall be fixed securely to the frames and adjacent constructions. Unless specifically indicated in drawings, anchors shall be fitted to the door head, jambs and sill at intervals not exceeding 45cm. All anchors shall have strengths capable of holding members securely.

(25) Adjustment after installation

After installation, doors and hardware shall all be adjusted to allow smooth operation, prior to commencing painter's work. Hardware and related parts shall be lubricated as required.

2-8-10 Finishing Wardware

(1) Materials

1) Finishing hardware shall be products meeting the requrements set out hereunder or products of manufacturers approved by the Engineer.

As much finishing hardware as possible shall be by the same manufacturer to maintain continuity of finish and style and to simplify maintenance and replacement.

2) Fastening to be exposed shall be finished to keep harmony with neighbouring finishing hardware.

3) Hardware shall be fitted by using template and fastening suitable for fitting to metal frames and hollow metal doors.

4) Metal frames shall use box type strike plates.

5) Nickel plated Phillips screws shall be used for the work described in this specification.

6) General requirements for locks

   a) Lock cases shall be made of steel or materials having equivalent strength and durability and shall withstands stress, abrasion, and damage with proper safety factors for use over long periods of time. The mechanical parts of locks shall be of such material and design that they also meet identical requirements and are capable of withstanding ordinary rough handling over long periods of time.

   b) Lock sets shall have both latch and dead bolts (excluding dead locks).

   c) Lock sets shall be those suitably fitted to metal and wood doors of 35∿45mm in thickness.

   d) When the dead bolt of a lock to be fitted to an entrance door is projected fully, it shall protrude at least 20mm out of the facing plate surface.

   e) Lock sets to be used for hollow metal doors shall be capable of being equipment with an expansion brace type device for preventing vibration and

looseness. This shall be fitted additionally to screws for fastening lock to the face plate.

f) Cylinder lock sets shall be such that when they are operated over 100,000 times, no visible nor detectable damage shall be caused on the mechanism, case, and key and that no visible or perceptible change shall be caused in the operation and funtions of the lock sets.

(2) Finish

Following finishing hardwares shall be of stainless steel hair-line finish.

1) Hinges for doors
2) Push plates and bars of door pulls
3) Locks and latches
4) Other hardware

(3) Flush bolts

For flush bolts for general doors, products approved by the Engineer, made of brass or bronze to have a height of 30cm and a width of 25mm, and finished by dull chrome plated finish, shall be used. When fitting a flush bolt on a door without doorsill, a proper metal socket shall be embedded on the floor.

(4) Door stops

For door stops, products approved by the Engineer, made of brass or bronze with chrome plated finish and fitted with rubber head, shall be used.

1) Fastening devices suitable for receiving surfaces shall be incorporated.

2) When floor type door stops are not suitable, wall type door stops shall be used.

3) Door stops for outside doors shall be furnished with door holders.

(5) Key box

The contractor shall supply wood key box finished by paint and of type approved by the Engineer.

1) Key box shall have a spare space corresponding to 25% of the total number of keys.
2) All keys shall have tags and be arranged in the key box.

2-8-11 Keys

(1) Every lock shall be furnished with 3 keys. Each key has a key number and a number of letter indicating the combination, all engraved on the key.

(2) Bit key locks and cylinder locks shall respectively be master keyed and shall be supplied with 3 keys for each combination.

(3) Master keys shall be sent to the Engineer by registered mail.

2-8-12 Packing and Identification

(1) Different items of finishing hardware shall be packed in different packages together with screws, keys, special wrenches, instructions, and installation templates necessary for accurately locating, setting, adjusting, and attaching hardware.

(2) Each package shall have the description of the number of the door or window to which the hardware item is to be fitted and the item number corresponding to the hardware item given in the hardware schedule of the contractor.

(3) Upon completion of the work the contractor shall deliver all installation instructions, templates, and

adjusting tools to the Engineer.

2-8-13 Acceptance and Storage

(1) The contractor shall provide a store furnished with necessary shelves and counters for grouping finishing hardware and assembling hardware before distribution and installation. The store shall be such that can be locked.

(2) All keys shall be labeled with tags indexed, and arranged in the key box as specified.

(3) Hardware shall be inspected after being carried in to the construction site and before being mounted.

2-8-14 Mounting Position

(1) Prior to mounting hardware, the contractor shall receive approval of the Engineer for the mounting position of each part of hardware. This includes the accurate positions of all items of hardware, for example, locks, bolts, push plates, pulls and hinges.

(2) Unless otherwise stated or specified, distances from the center line of respective items of hardware to the floor surface as follows.

1) Locks for doors
   From finished floor surface to center of strike: 950mm

2) Door pulls
   From finished floor surface to center of pull : 950mm

3) Push plates
   From finished floor surface to center of push plate: 1,100mm

4) Bar type pulls
   From finished floor surface to center of the bar (or the center of the combination when more than 2 bars are used): 950mm

5) Top hinges

To meet the standard of the manufacturer. The distance between the head of frame and the center of hinge shall not exceed 250mm.

6) Bottom hinges

To meet the standard of the manufacturer. The distance between the finished floor surface and the center of hinge shall not exceed 300mm.

7) Intermediate hinges

Intermediate hinges shall be provided at intermediate points between the top and bottom hinges but in intervals not exceeding 900mm.

8) Latches

From finished floor surface to center of strike plate: 950mm

9) In the case of dead lock only

From finished floor surface to center of strike plate: 950mm

10) When a dead lock is furnished with another latch or pull

From finished floor surface to center of strike plate : 1,250mm

(3) Hardware for windows

Hardware mounting locations shall be in compliance with the standard of the manufacturer of the window.

2-8-15 Installation

(1) Hardware shall be installed accurately, fixed securely, and adjusted elaborately. Hardware shall be installed according to the instructions of the manufacturer. Take due care not to damage other items of work during installation of the hardware.

(2) Installation of hardware shall be performed properly by using boring jigs, mortising tools, and other equipment and devices intended exclusively for the installation of the hardware.

(3) When necessary, the door shall be removed and replaced to finish painting for the top and bottom portion of door.

(4) Exposed hardware shall be covered with masking tape or thick cloth until finish painting is complete.

2-8-16 Curing and Cleaning

(1) Curing of doors and windows

Doors and windows shall be handled carefully during shipment and in the construction field. Doors and windows shall be stored upright on pieces of lumber located in a dry, roofed store. After installing doors and windows, protect them against damage from other works to follow.

(2) Cleaning of metal doors and windows

Mortar chips, plaster, paints and other foreign matters on the inside and outside metal faces of doors and windows shall be removed to present neat appearances. Flashes, drip caps, etc., shall be cleaned out to hinder operation of hardware.

2-8-17 General Principles on Installation of Hardware for doors

Note: Doors having heights of more than 2.5m or widths of more than 1.2m shall be furnished with 4 hinges.

(1) Outside doors

Unless otherwise specified, the following shall apply.

Q'ty

Hinges 150mm x 110mm 6

150mm x 144mm 6

(in the case of heavy doors)

Mortise cylinder lock (made of stainless steel, with a knob and more than 64mm back sets) ..... 1 set

Flash bolt ..... 1 set

Door check ..... 1 set

Stop with holder, floor type ..... 1 set

2) Wood double swinging doors

Hinges 150mm x 110mm 6

(Heavy doors : 8 hinges)

Mortise cylinder lock ..... 1 set

Flash bolt ..... 1 set

Door check ..... 1 set

Stop with holder, floor type ..... 1 set

(2) General inside doors

Unless otherwise stated, the following shall apply.

1) Steel single swinging door

Hinges 150mm x 110mm 3

Mortise cylinder lock ..... 1 set

Door check ..... 1 set

2) Steel double swinging doors

Hinges 150mm x 110mm 6

Mortise cylinder lock ..... 1 set

Flash bolt ..... 1 set

Door check ..... 1 set

Stop with holder floor type ..... 1 set

3) Wood single swinging door

Hinges 127mm x 100mm 3

	Q'ty
Mortise cylinder lock	1 set
Door check	1 set

4) Steel inspection door (On wall)

Hinges 127mm x 100mm	2
Mortise cylinder dead lock	1 set

2-8-18 General Principles on Installation of Hardware for Window

(1) Wood single swinging window

Hinges 127mm x 100mm	3
Casement turns	1 set
Opening controler	1 set

(2) Wood top-hinged outswinging window (per window)

Hinges 75mm x 75mm	2
Casement turns	1 set
Arms	2 sets

(3) Steel single swinging screen door

Hinges 150mm x 100mm	4
Casement turns	1 set

(4) Wood single swinging screen door

Hinges 127mm x 100mm	3
Casement turns	1 set

2-9 TILING

2-9-1 Scope of Work

(1) Extent

The work specified under this paragraph consists of all tiling work and related items of work necessary to complete the work indicated in drawings and described in specifications.

1) Unless otherwise specified, back of built-in wall cabinets shall not be tiled.

2) When tile wainscot work is to be performed by the conventional cement mortar setting method, tiling shall be accomplished prior to the application of finish coat in the plastering of walls above wainscot.

(2) Type of setting bed

Conventional cement mortar bed shall be used as the setting bed in tiling.

2-9-2 Shop Drawings

Prior to the commencement of tiling, the contractor shall submit shop drawings to the Engineer for approval.

2-9-3 Samples

The contractor shall submit colour samples of wall tile and floor mosaic tile to the Engineer for approval.

2-9-4 General

Ceramic tile shall meet the requirements of JIS A5209.

2-9-5 Materials

(1) Unless specifically directed, wall tile shall be coloured or white matt glazed tile with a minimum thickness of 4.0mm and cushion edges, with nominal dimensions of 98mm x 98mm, fitted with spacer lug or shall be equivalent. Floor mosaic tile shall have a minimum thickness of 4.0mm

and nominal dimensions of 24.5mm x 24.5mm.

(2) Provide wall tile trim shapes as required trim shapes shall be identical to wall tile in type, colour, thickness and finish.

2-9-6 Materials for Tiling

(1) Portland cement
See Paragraph 2-3 "REINFORCED CONCRETE WORK."

(2) White cement
See Paragraph 2-6 "PLASTERING."

(3) Sand
See Paragraph 2-6 "PLASTERING."

(4) Water
See Paragraph 2-3 "REINFORCED CONCRETE WORK."

2-9-7 Joint Plan

When possible, lay out work so that no tile less than half size occurs. In the vertical direction on which scale is indicated, lay out work so that a height nearest to the required height can be achieved by using full-size tile. Both vertical and horizontal joints shall be kept straight.

2-9-8 Mixing and Mix Proportion

Fine aggregate shall be measured by using a gauge boxes approved by the Engineer. Cement shall be measured in one bag unit. Water shall be measured by volume. Materials shall be mixed on the basis of the applicable specifications given in Paragraph 2-3 "REINFORCING CONCRETE WORK." The mix proportion shall be as given in Table 2-9-1. Change in mix porportion shall be allowed only when written approval of the Engineer is gained in advance.

Table 2-9-1 Mixing Table

Nominal Mix	Cement (kg)	Fine Aggregate (cu.m)
1:2	750	1.00
1:4	350	1.00

2-9-9 Procedure (Wall Tile)

(1) Preparation

Concrete surfaces and masonry brick surfaces shall be cleaned and moistened immediately before applying scratch coat.

(2) Buttering method

Prior to tiling, properly dampen scrtch coat. In order to show a finished tile surface, lay tile at places on scratch coat, apply setting mortar (1:4 in mix proportion) on the back of every tile, and lay tile plumb and flush following tiles already laid.

Apply sufficient amount of mortar over the whole surface on the back of each tile uniformly.

(3) When mortar setting bed is found to have sufficiently set, clean the tile face with clean water prior to grouting. Grouting shall be made by pushing mortar for pointing onto joints by trowelling or other proper method so that joints shall be finished flush and true to line. Surplus mortar shall be wiped off before setting and tile faces shall be cleaned.

(4) Thickness of wall tile finish

The finish thickness including setting mortar and tile shall be 30mm when glazed wall tile or other tile with a thickness of less than 1cm is used.

2-9-10 Procedure (Floor tile)

(1) Preparation

Same as Paragraph 2-9-9 item (1).

(2) When the tiling area is small:

Sufficiently dry mix sand and cement, lay properly dampened mortar, and set tile by using cement paste. The mix proportion of the bed mortar shall be 1:4 or so.

(3) When the tiling area is large:

Bed motor shall be finished by smoothing with a trowel observing proper water decrease in mortar and taking care for the inclination. For laying tile, pass leveling strings on the basis of the joint plan, lay tiles to become true to line and level, following tiles laid first at corners and other important points, and clean the face of tiles and bottom of joints as required.

Through joint plan, lay tiles to an area of about $2.5m^2$ for use as reference, and lay other tiles by using these tile for a scale.

(4) Prior to pointing, clean joints. Grouting shall be accomplished as soon as possible after laying tile.

Joints shall be moistened properly depending on the dryness of the joints. Pointing shall be performed by using cement paste.

2-9-11 Cleaning

Unless specifically directed by the Engineer, no acid shall be used for cleaning of tile. When the work is complete, clean tile faces by soap-suds with a brush or the like, and wash tile furfaces with water sufficiently. Metal cleaning devices or brush or abrasive shall not be used.

2-10 TERRAZZO WORK

2-10-1 Scope of Work

The work specified under this paragraph consists of all terrazzo cast in place, terrazzo block, and related items of work necessary to complete the work indicated in drawings and described in specifications.

2-10-2 Shop Drawings

(1) All shop drawings on this work shall be submitted to the Engineer for approval before commencing the work.

(2) Items to be specified in shop drawings:

Type, grade, and producer's name for variety of stone, lay-out, elevation and section, full-size profiles of joints, detailed drawings, thickness, dimensions, finish and surface treatment method, fixing method, joint compound, and necessary connections to work of other contractors.

2-10-3 Samples

The contractor shall submit samples of the following materials and built-up members to the Engineer for approval before carrying in materials or commencing the work.

1) Finish samples of terrazzo cast in place
   Size: more than 20cm x 20cm

2) Terrazzo blocks for use at skirting, coping, staircase, toilet, etc.

2-10-4 Terrazzo Block Materials and Their Producing Method

(1) General

Marble chips for terrazzo work shall be standard stones with dimensions, colours, and types approved by the Engineer. Chippings shall be 10mm as standard and shall not exceed 12mm.

(2) Producing method

1) Terrazzo blocks shall all be products of Nepal. Blocks shall be such that are processed and shaped by using accurately constructed watertight forms. The mix proportion and dimensions of these blocks are given in Table 2-10-1.

Table 2-10-1 Terrazzo Block

Total Thickness (mm)	Thickness of Facing (Minimum) (mm)	Facing Mix	Thickness of Backing (Maximum) (mm)	Backing Mix
20	6	1:2 1/2	14	1:5
25	8	1:2 1/2	17	1:5
30	10	1:2 1/2	20	1:5
60	10	1:2 1/2	50	1:5

2) Blocks are composed of a finished layer produced by mixing white cement, colour cemnt, or pigment-added white cement with granular marble chippings (at a mix proportion of 1:2-1/2) and a bed obtained by mixing Portland cement with sand (at mix proportion of 1:5).

3) Grinding shall be done wet by using #80 carborundom abrasive. Filling shall be carried out with grout of the same colour and same proportion with that used as finish material by using a wooden trowel. Surplus grout shall be wiped off with dry cloth. After leaving as it is for at least 24 hours, polish in wet condition by using #140 carborundom as abrasive.

2-10-5 Terrazzo Block Work

(1) Hardware

1) Anchors, dowels, and clamps shall be as given in Table 2-10-2. Clamps to be used for reinforcing partition heads shall be made of stainless steel (SUS 304) and

be 6mm in diameter and 60mm in effective length.

Table 2-10-2 Hardware (mm)

Hardware / Thickness of Block	Brass		
	Anchor	Dowel	Clamp
less than 40	3.5ϕ	3.5ϕ	3.5ϕ
		Length 40	-
40∿70	4.2ϕ	4.2ϕ	4.2ϕ
		Length 50	-

2) Anchor hooks shall be made of the same material as that of anchors and shall in advance be embedded in terrazzo blocks.

(2) Setting of terrazzo blocks

1) Skirtings shall be about 90cm in length. After cleaning the bed, lay terrazzo blocks true to level and plumb without uneveness by using wedges driven in, and apply back filling mortar over the whole surface for fixing.

2) For fixing terrazzo block partitions to a wall, support each block partition with hardware previously fitted and fix the partition with mortar not cause inclination or twist. Connection of the partition heads shall be made securely by using a reinforcing plate or a clamp using adhesives together. The connection of the partition with another partition shall be made securely by using a dowel and adhesives together or by using anchor bolts.

3) Joints shall in principle be closed joints with a fine chamfer. In the case of pointed joint, flash point finish shall be made by using a joint material such as a pigment matching the colour of terrazzo blocks and white cement.

4) The finished surface shall be cured by using vinyly sheet as required for protection against dust and foreign matter. Protective covers made of a synthetic resin or wood shall be used especially over external corners for protection. When the installation of terrazzo blocks is complete, clean and wash with water at a proper time. In principle, hydrochloric acid or the like shall not be used for cleaning terrazzo block surfaces. When polishing terrazzo block surfaces indoors, wipe with dry, clean cloth.

(3) Setting mortar

The mix proportion of mortar to be used for setting terrazzo blocks shall be cement 1: sand 3.

2-10-6 Cast-in-Place Terrazzo Work

(1) General

Cast-in-place terrazzo for floor finishing shall be laid directly on floor slab. In principle, its total thickness shall be 30mm and the thickness of finish coat 12mm, as standard.

(2) Joint strips

Joint strips shall be made of brass, 3mm in thickness and 25mm in height.

Joint strips shall be laid at an interval of less than 1.5m in both vertical and horizontal directions. Joint strips for boundaries between different finishes shall be made of brass of an intermediate hardness, measure 6mm in thickness and 25mm in height, and have a cross-section suitable for anchoring and straight edges. Joint strips for the boundaries shall be used at places where terrazzo floor adjoins floor with resin elastic covering.

(3) Preparation of concrete slab surface

Before placing the underbed for cast-in-place bonded terrazzo floors, clean the floor slab surfaces and remove plaster, mortar chips, oil, dust, and any other foreign matter which may prevent bonding of the underbed to the concrete slab surface. After wetting the slab surface, apply neat cement with a broom before placing the underbed.

(4) Underbed

1) Underbed mortar to receive terrazzo topping shall have a mix proportion of cement 1 : sand 4; add water and sufficiently mix to have proper hardness.

2) Placing underbed
Underbed mortar shall be spread and screed to a true, level or plumb surface so that the finishing surface shall not come less than 9mm back of the finished face of skirting and more than 12mm below the finished level for the floor, except as indicated otherwise.

(5) Placing joint strips

While the underbed mortar is plastic, fit joint strips promptly and accurately at the required height. Where joints intersect, fit joint strips so that they can be jointed tight. Joint strips for finish boundaries shall be places so that the synthetic resin elastic floor shall come on a level with the adjacent terrazzo finishing surface. When a joint strip is placed at a door, set the joint strip to come under the center of the door.

(6) Terrazzo finish coat

1) Mixing proportion

Terrazzo finish coat shall be prepared by a mixing proportion of white Portland cement 1:marble chips 3. When directed by the Engineer, add mineral colour pigment.

2) Application

When the underbed mortar has set sufficiently to withstand rolling, apply finish coat, but within one day after placing the underbed. Sufficiently wetting the underbed and wiping off surplus water, apply neat cement using cement and pigment with a colour identical to that of the finish coat with a broom or the like immediately before the finish coat and then apply terrazzo finish coat of the required thickness. Finish coat shall be uniform in composition and the same marble chips (that appear on surface) shall be used for entire thickness.
Place base mortar with a trowel by using proper forms. Roll the floor with a heavy roller until surplus cement paste and water shall be pressed out. Finish the surface level with a trowel so that joint strips shall appear on a levels with finishing surface.

(7) Curing

Cure terrazzo surface by keeping it damp for at least 6 days after placing. Curing shall be made by using soil-proofed strengthened kraft paper, plastic sheet, curing mat, sand, or a clean curing agent approved by the Engineer.

(8) Surface finishing

After curing, rough and finish grinding by using water and a proper polishing sand corresponding to the extent of the finish. For rough grinding, use No. 24 polishing sand. For finish grinding, use No. 80 polishing sand. Exercise care not to grind down the surface of the joint strips. Where machine grinding is not achievable, grind by hand.

By applying creamy cement paste to the portion to be ground after initial grinding, fill all voids. For the cement paste, use one identical in kind and colour tone with the cement used for finish coat. Paste shall be kept applied on the surface to be ground for at least 2 days and until finish grind is performed. Finish grinding shall be so accomplished that the surface shall have same texture as approved samples. The finished surface shall correspond to samples approved and have marble chips appearing on the surface by about 70%. Terrazzo finish shall be accomplished to be level and plumb without involving any error exceeding 3mm between any two adjacent joint strips. While grinding, protect walls, floor, and other portions adjacent to terrazzo floor from being soiled by grinding work.

2-11 METAL WORK

2-11-1 Scope of Work

(1) Extent

The work specified under this paragraph consists of all metal work and other items of related work necessary to complete the work indicated in drawings and described in specifications.

(2) Work not included

The following items of related work are described and stipulated in other paragraphs of this specification.

a) Access doors and panels
b) Anchors, bolts, sleeves, supports, metal connectors and miscellaneous hardware necessary for work specified in other paragraphs, except those specified herein.
c) Hardware except those specified herein
d) Metal doors and frames
e) Structural steel work not specified herein
f) Shape steel inside hollow metal, aluminum or stainless steel frames
g) Metal roof and related work
h) Joint strips other than specified herein

2-11-2 Shop Drawings

Submit shop drawings on all metal work to the Engineer for approval. The approval for the drawings shall be obtained prior to the commencement of fabrication. The shop drawing shall indicate fabrication, assembly, and erection details. They shall illustrate also the dimensions of all members, fastenings, supports and anchors, patterns, clearances, and all necessary connections with other work.

2-11-3 Samples

Submit 2 samples of each of the following materials to the Engineer for approval. Approval shall be achieved prior to carrying in to the construction field or the commencement of fabrication.

2-11-4 Materials

Materials used for metal work shall be suitable to the construction and functions of each hardware. Materials for each hardware shall be approved by the Engineer prior to carrying in to the construction field or commencement of fabrication.

2-11-5 Fabrication and Installation

(1) Metal surfaces shall be clean and free from mill scale, flake rust and rust pitting and shall be well formed and finished to required shapes and sizes. Permanent connections shall be welded or riveted. Welds and rivets on surfaces to be exposed after installation shall be finished flush and smooth. Avoid using screws and bolts as much as possible, but when using them, they shall be screwed up tight with their heads countersunk and their threads nicked to prevent loosening.

(2) Castings shall be of uniform quality, free from blowholes, porosity, hard spots, shrinkage distortion or other defects. Castings shall conform to the dimension specified with a tolerance of ±3mm (allowable errors), except in the dimensions the allowable errors of covers and openings to receive covers shall be limited to ±1.5mm. The surfaces of castings shall be processed to be sufficiently clean and smooth by an approved method such as shot blast. Covers and others on roads and footways shall have horizontal bearing surfaces which have been machine processed and finished. Likewise, the bearing or contact surfaces

for other joints shall be machine processed when specifically directed or necessary.

(3) Fastenings shall be concealed as much as practicable. Metal materials shall have ample thicknesses and structure of members and supports shall be sufficiently strong and solid. Joints to be exposed to weather shall be formed not to allow water to enter. Provide holes and connections for other related work.

(4) Materials for metal work to be performed for other related work shall be carried in to the construction field and set in place at appropriate time.

(5) Painting and protective coating

All ferrous metal surfaces, excluding stainless steel, galvanized surfaces, and castings to be left unpainted, shall be sufficiently cleaned and given two coats of red lead or zinc chromate rustproof paint. Anchors that are built into masonry shall be coated with asphalt paint unless specified to be galvanized. Hardware to be embedded in concrete shall be left unpainted unless specified or noted otherwise. Where hot-dip galvanized or zinc-coated metal is specified or shown, it shall not be shop coated unless specifically required. Castings that are to be lefted unpainted shall be cleaned and coated with coal-tar.

(6) Zinc coating

1) Types of zinc coating on steel are given in Table 2-11-1

Table 2-11-1 Types of Zinc Coating

	Classification	
Method of surface treatment	A	Hot-dipped zinc coating shall comply with JIS (Hot-dipped zinc coating) Type 2, H8641
	B	Chromating treated after electrical zinc coating by JIS (Electrical zinc coating) Type 2, H8610
	C	Galvanized steel sheet with surface treated

a) The amount of zinc coated on steel by Hot-dipped zinc coating shall be as indicated in Type B in Table 2-11-2.

Table 2-11-2 Coat Weight of Hot-Dipped Zinc (g/sq.m)

Classification	A	B	C
Weight of zinc to be coated on one side	More than 500	More than 350	More than 250

b) The type of electrical zinc coating to be employed shall be Type B given in Table 2-11-3

Table 2-11-3 Types of Electrical Zinc Coating

Classification	Type and Class	Thickness of Coat(μ)
A	JIS H8610 (Electrical zinc coating), Type 2, upper than Class 5	More than 20
B	JIS H8610 (Electrical zinc coating), Type 2, upper than Class 4	More than 13
C	JIS H8610 (Electrical zinc coating), Type 2, upper than Class 3	More than 8

c) Galvanized steel sheets with furfaces treated shall be as follows.

i) Nominal coat weight of zinc shall be more than 180g/m^2 for both sides.

ii) Chemical treatment by phosphate or chromic acid shall be made on galvanized surfaces on continuous line.

2) For the thickness measurement of zinc coats, an electric film thickness tester may be employed.

3) Testing of zinc coated surfaces shall be made as follows, with its application as specifically noted.

a) Zinc coat weight test of hot-dipped zinc coating shall be performed as per the weight method or antimony chloride method (indirect method) specified in JIS H0401 (Hot-dipped zinc coating test method) and uniformity test by the uniformity test method specified therein.

b) Anti-corrosion test of electrical zinc coating shall be based on JIS Z2371.

2-11-6 Lightweight Steel-Frame Ceiling

(1) Materials

1) Ceiling joist, double ceiling joist, and channels shall be such that are obtained by rolling galvanized steel sheets with treated surfaces as mentioned in Paragraph 2-11-5, item (6) and shall have nominal zinc coat weight of 180g/m^2 for both sides, unless otherwise noted.

2) The types of ceiling joists shall be as given in Table 2-11-4, and special forms of ceiling joist shall be such that have undergone slit processing for nailing. Unless otherwise specified, general forms of Type B shall be used.

Table 2-11-4 Types of Ceiling Joists, etc. (mm)

Classification	A	B
	General Form	General Form Special Form
Ceiling joist	Height. Width. Thickness More than 25 x 25 x 0.5 More than 22 x 22 x 0.7	Height. Width. Thickness More than 19 x 25 x 0.5 More than 22 x 22 x 0.5
Ceiling joist, double type	More than 25 x 50 x 0.5 More than 22 x 44 0.7	More than 19 x 50 x 0.5 More than 22 x 47 x 0.5
Channel	More than [-38 x 12 x 1.6	More than [-38 x 12 x 1.2

3) Hangers for channels and clips shall be such that have been galvanized to the extent to which ceiling joist shall be galvanized.

4) Inserts shall be made of steel and hanger bolts shall be 9mm in nominal diameter and rustproofed treated.

5) Bracinings for reinforcement shall be rust proofed ones.

(2) Installation

1) Channels and inserts shall be installed at intervals of about 900mm, and surroundings they shall be installed within 150mm from the edge.

2) Inserts shall be arranged upon assembling forms.

3) The top of each hanger bolt shall be fitted to an embedded insert in the case of reinforced concrete construction and the bottom shall be furnished with a channel hanger. Connection of ceiling joists with channels shall be made by clipping.

4) Interval of ceiling joist

a) General form

i) When there is a backing, ceiling joists shall be placed at intervals of 360mm.

ii) When finishing material is to be applied without backing or wall paper or painting base is to be applied, intervals shall be less than 455/2mm.

b) Special forms

Ceiling joists of special forms shall be laid at intervals of less than 225mm.

5) When ceiling joists are to butt against walls and ceiling joists are to be provided with no backing, ⊐ type or ⊏ type galvanized steel sheet of more than 0.5mm in thickness shall be put in or attached to the ends of ceiling joists. When ceiling joists run in parallel to a wall, double ceiling joists shall be employed as the end ceiling joists.

6) Openings indicated in design drawings shall be reinforced as follows.

a) When ceiling joists are cut to provide openings for lighting fixture or duct outlet, the opening shall be reinforced by using the same material as that of the ceiling joist or channel.

b) Opening portions of ceiling access door designed to pass men shall be reinforced with the same material as that of the channels.

7) Ceiling joists shall not be projected over 150mm out of channels.

8) Pendent walls

When adjoining ceilings are not on a level on boundaries between pendent walls and partition walls or the like, reinforcing bracings using the same material as channels or with dimensions of 30 x 30 x 3(mm) shall be applied.

9) When height of plenum area above ceiling excced 1.5m, reinforcement by bracing shall be effected by using round steel bar.

10) Welded portions or portions cut by welding shall be coated by rustproofing paint.

2-11-7 Indoor Manholes

(1) Materials

Manhole frame and cover shall be cast iron coated by coal-tar baked coating overall surfaces, shall provide ample strength against externally applied pressure, and shall be of complete waterproof type. The dimensions and locations of manhole frame and cover to be set shall be as indicated in drawings.

(2) Installation

The frames of manholes shall be fitted by the mounting-before-concrete-placing method when waterproofing and smell-proofing are required and by the mounting-after-concrete method in other cases.

2-11-8 Floor Trenches

(1) Materials

1) Floor trenches in the power room, engine generator room, etc., shall be as shown in drawings. Frames of trench shall be made of steel and cover plates shall be checkered steel plates of 4.5mm thick with both sides finished by SOP. Cover plates of more

than 500mm wide shall be furnished with angle steel reinforcement. Cover plates shall be 600mm long as standard and more than one notch shall be provided for every three cover plates.

2) Steel floor trenches

In studios, sub-control and master control rooms, steel frames and steel cover plates shall be provided as indicated in drawings. The cover plates shall be made through bending process, and have the same sur face finish (vinyle asbestos tiles) as the floor with steel edgings. The cover plate shall be 300mm wide and more than one notch shall be provided for every three plates as standard.

(2) Installation

Trench frames shall be held in place and level without twist and fixed securely by welding anchors to joint bars at 500mm pitch. After welding anchors, mortar shall be applied to the outside of frames for fixing.

2-11-9 Roof Drain

(1) Materials

The roof drains shall be made of cast iron and the entire surface shall be coated with coal-tar and mounted on the roof coated with water-proof mortar. The dimension of roof drain and way of attachment shall be performed in accordance with the design drawing.

(2) Way of Construction

The main body shall be attached in advance according to the pre-attachment method, and the rest shall be attached according to the post-attachment method.

2-11-10 Shielding of Transmitting Station against Radio Wave

(1) Portions to shield

The details of each portion are indicated in the design drawings.

1) External shielding : Roof, external wall and metalic fittings, etc.

2) Internal shielding : Tuning unit room, console room and rooms relative to studio of Pokhara transmitting station.

(2) Materials

1) Copper lath (0.4mm thick, 18mm mesh, expanded)
2) Copper woven net (wire diameter 0.26mm, 1.6mm mesh)
3) Copper plate (0.5mm thick)
4) Copper band (0.4mm thick x 50mm wide, 0.6mm thick x 500mm wide, and 1.0mm thick x 500mm wide)
5) Galvanized steel sheet (0.3mm thick)
6) Copper wire (annealed copper wire 2mm diameter, annealed copper stranded wire 22mm^2 and 60mm^2)
7) Others (Copper tubular terminals, attachment hooks made of copper plate to attach copper lath, accessories etc.)

(3) Installation

(1) General

a) Attachment of copper lath to floor, wall, foundation-slab and roof etc. shall be performed by the copper hook placed at 300mm lengthwise and breadthwise spacing.

b) The joints of each copper lath shall be made by overlapping, the overlapped portion must be woven with annealed copper wire of 2mm diameter, and respectively soldered at 150mm spacing.

c) The edges of the copper lath, copper net and the copper lath surrounding the metalic fittings etc., shall be woven with a 2mm diameter annealed copper wire, and soldered at 150mm spacing.

b) With regard to the metalic fitting frames for shielding, a 2mm diameter annealed copper wire shall be soldered onto the annealed copper wire surrounding the frame mentioned in Item c), at 300mm spacing, and connected to the copper-tubular terminals which are attached to the fitting frame.

e) With regard to the roof drain and the metalic mountings of the vertical roof drain the two 2mm diameter annealed copper wires which are soldered onto the lath shall be connected to it by soldering.

f) For the connection of the copper lath of the external wall to the buried main earth line ($22mm^2$ annealed copper stranded wire) surrounding the building, a 2mm diameter annealed copper wire (300mm spacing) shall be used, and a margin is to be left in considering the sinking.

g) For the shielding of the end rail of the eaves and external porch ceiling, copper lath shall be used.

h) The joint portions between annealed copper wires shall be overlapped over a length of 50mm and soldered together.

(2) Internal shielding

a) The lath of the internal shielding shall be connected to the copper lath of the external wall by using the 2mm diameter annealed copper wire (300mm spacing) thrusted in the building frame, and the copper band (diameter indicated in the drawing) buried in the floor.

b) For the shielding of wall and ceiling of tuning unit room, copper lath shall be used,and for the floor and plinth a copper plate 0.5mm thick shall be used. The attachment of copper plate shall be performed by burying a hard-wooden-chip cement-plate (25mm thick, 500mm wide) in the floor mortar at 300mm spacing, in lattice form, and rivet the copper plate onto it by copper tacks. In addition, the joints of copper plates shall be clasped and the circumference are to be completely soldered.

c) The earth of the tuning unit room shall be connected to the deep-buried earth plate indicated in the drawings with an annealed copper stranded wire (3 - 60mm^2), in addition to Item a). It is to be noted that the connection work of the deep-buried earth plate to the main earth line surrounding the steel tower foundation is included in the "Work for Steel Tower and Foundation". The method to joint the both ends of the aforementioned annealed copper stranded wires, to the deep buried earth plate surrounding the floor and copper plate above floor shall be performed by untwisting each stranded wires, and solder each untwisted wire one after another.

d) The sound studio in Pokhara transmitting station

Between the studio and sound lock room, and the transmitter equipment room, in addition to the copper lath, a 0.3mm thick galvanized steel sheet shall be attached and jointed with clasps and soldered, to shield the high voltage transformer flux. In order to avoid incomplete contact of copper lath and steel plate on the wall, mortar shall be coated on the copper lath stretching, and then the steel plate shall be attached to it with concrete tacks. For the ceiling portion, a

galvanized sheet shall be attached to the light-steel bar. The edges of these steel plates and copper laths shall be connected with 2mm diameter annealed copper wire (300mm spacing).

(3) Others

a) In addition to the method indicated in Item 1) - (d), on the frame under the attachment frame of the bawl type insulator, 10 lines of 2mm diameter annealed copper wire, shall be attached at 50mm spacing, and connected to the buried main earth line surrounding the building.

b) In addition to the copper lath indicated in the design drawings, the shielding of the roof shall be performed at the joint portion of precoated galvanized steel sheet. At the end portion of the eaves, solder the copper lath attached to the end rail and threading hanger of roofing material, with a copper band (0.4mm thick and 30mm wide) and furthermore, after providing clasp to this threading hanger, cap and long plate, solder at 150mm spacing.
It is to be noted that at the ridge portion where the hanger becomes discontinuous, connect them mutually with the aforementioned copper band and also clasps all joints including the ridge rapping plate, and solder them so that the roof plates will be unified.

c) For earthing of steel frame of roof truss, the $22mm^2$ annealed stranded copper wire which are attached by copper tubular terminals to each anchor bolt (3mm spacing) of the H type steel beam surrounding the roof, shall be connected to copper laths of the external wall indicated in the design drawing.

d) For shielding of fence surrounding the water-tank of the engine generator dummy load, connect two 2mm diameter annealed copper wires to each fence pole with copper tubular terminals, and then connect them to the surrounding main earth line.

e) Earthing for the 18-high tower pole shall be performed in accordance with design drawings.

2-12 PAINTING

2-12-1 Scope of Work

(1) Extent

The work specified under this paragraph consists of all painting and related items of work necessary to complete the work indicated in drawings and described in specifications.

(2) Work not included

The following items of work are not included herein and stipulated in other paragraphs of this specification.

1) Shop painting of metal work
2) Finish work at shop
3) Caulking
4) Painting and finishing work of mechanical, electrical, and piping work
5) Painting in tower work

2-12-2 Samples and Colours

(1) The contractor shall submit to the Engineer a set of colour cards which shows all colours to be painted and shall prepare under instructions from the Engineer a colour schedule which shows colours to be used at differrent places. Then the contractor shall prepare 2 examples of each colour and each type of finish on hardboards or steel plates to measure 15cm x 30cm. Preparation of the samples of painting shall be made at the construction field and after obtaining the approval of the Engineer for colours and finish, the contractor shall carry in paints to be employed.

(2) The contractor shall submit a list of materials to be used for approval. Prior to commencing painting work, the contractor shall paint and finish one room or section or anything necessary for embodying the colour schedule as

an examples, in which proposed colours, finished texture, materials and finishing methods shall be applied.
After approval by the Engineer, the room or items thus prepared as examples shall be referred to as the standard for similar work throughout the painting work.

2-12-3 Materials

(1) General

1) Paints, varnishes, stains, fillers, etc., shall be used with the Engineer's approval.

2) For such painting materials as turpentine oil, thinner, polishing compound, etc., products of the highest class so labeled on their vessels for identification.

3) All paints shall be enclosed in sealed vessels at the manufacturer and carried in. Each label on these vessels shall have the description of the name of manufacturer, type of paint, colour, directions for dilution, etc.
Those types of materials other than specified or approved shall not be carried in. Paints shall be stirred sufficiently and shall not have caused deposition, solidification, or concentration in their vessels. By stirring in advance the paint to be used with a spatula or the like, consistency shall be obtained to provide excellent workability.

4) Storage of materials

a) All paints and tools for painting shall be stored at a specified place or places.

b) Floors and walls shall be protected not to be damaged or influenced by painting.

c) Necessary measures shall be taken to minimize the occurrence of fire.

d) The place or places used for the storage of paints shall be kept cleaned with its surface finish being equivalent to that of other places having the same features.

2-12-4 General

(1) Prior to the commencement of painting work, inspect all surfaces to be painted or finished.

a) Prior to commencing painting work, clean up all sections concerned.

b) All surfaces to be painted shall be dry.

c) All surfaces shall be free from foreign matters before painting or finish.

d) Wood portions to be finished by clear coat shall have been finished to the extent of applying sandpaper lightly.

e) Intervals between coats shall be determined properly depending on the types of materials to be employed and weather condition.

(2) Hardware, accessories, nameplates, lighting fixtures, shop finished products and other similar articles shall be dismounted or protected by some means or other. After completion of painting of each section, all dismounted articles shall be remounted in place. Dismounting, remounting, and protection shall be made by skilled workers.

(3) Doors shall be removed for painting their tops and bottoms.

2-12-5 Surface Treatment

(1) General

1) Surfaces to be painted shall be clean, dry, and sufficiently protected against moisture.

2) Surfaces to be painted shall be level and smooth and shall form complete surfaces.

3) Surfaces to be painted shall be free from any foreign matter which may adversely affect adhesion or appearance.

(2) Wood portions

1) Wood portions shall be finished by sandpaper to even and smooth surfaces and then be cleaned by a vacuum cleaner.

2) Knots, resin pitches, and sapwood shall all be coated with shellac varnish.

3) After primer dries up, apply putty to nail holes, cracks and joints.

(3) Concrete and mortar surfaces

Fill all small holes on concrete and masonry surfaces to obtain uniform texture over the entire surfaces.

(4) Ferrous surfaces

1) Remove dirt and grease with mineral thinners.

2) Remove rust, mill scale and defective paint to obtain sound surface or texture, by using scraper, sandpaper, or wire brush as required. When necessary, grind off shoulders at edges of sound paint so that mottle shall not be caused by flow.

3) Touch up all spots having shop coats damaged with specified rust resisting paint.

2-12-6 Colours

Colours shall be in compliance with the colour control samples approved by the Engineer. The colour schedule will be prepared by the Engineer prior to the commencement of the work. Prepare the colour control samples on the basis of the colour schedule and submit these samples to the Engineer for approval.

2-12-7 Schedule of Painting

The schedule of painting shall be as given in Table 2-12-1.

Table 2-12-1 Schedule of Painting

a) Ready Mixed Paint (Synthetic Resin, Long Oil Type) ..... SOP

(Ferrous Metal Surfaces)

Pretreatment	Etching Primer	0.18kg/sq.m
Under Coat (2 coats)	Anticorrosive Paint, Lead-Zinc Chromate or lead Cyanamide	0.11kg/sq.m
Touch up	do.	
Middle Coat	Ready Mixed Paint, (middle coat type)	0.08kg/sq.m
Top Coat	Ready Mixed Paint	o.o8kg/sq.m

Note: Etching primer is to be applied on zinc-coated surfaces.

b) Ready Mixed Paint (Synthetic Resin, Long Oil Type) ..... SOP

(Wooden surfaces)

Sealer	Shellac Varnish	
Under Coat	Ready Mixed Paint (Under coat type, white)	0.09kg/sq.m
Putty	Putty, vinyl Resin	
Middle Coat	Ready Mixed Paint	0.08kg/sq.m
Top Coat	do.	0.08kg/sq.m

(Continued)

c) Synthetic Resin Emulsion Paint ..... A-EMP

(Cement and Sand Plaster, Concrete, Asbestos Cement Board/Sheet, etc.)

Under Coat	Sealer, Emulsion	0.11kg/sq.m
Putty	Sutty, Emulsion	
Middle Coat	Synthetic Resion Emulsion Paint	0.10kg/sq.m
Top Coat	do.	0.10kg/sq.m

Note: For exterior surfaces and for indoor damp places paint for exterior use shall be applied.

d) Lacquer Clear CL

(Wooden surfaces)

Under Coat	Lacquer Wood Sealer	0.08kg/sq.m
Filler	Wood Filler	
Middle Coat	Lacquer Sanding Sealer	0.12kg/sq.m
Top Coat (2 coats)	Lacquer Clear	0.15kg/sq.m

(Surfaces of Woodboard Ceiling)

Under Coat	Lacquer Wood Sealer	0.08kg/sq.m
Filler	Wood Filler	
Top Coat	Lacquer Clear	0.15kg/sq.m

e) Stain ..... OS

(Wooden Surfaces)

Stain (2 coats) Stain, Oil Type

2-12-8 Application

General

1) Paing with a brush unless specifically directed or approved by the Engineer.

2) Each coat shall be applied uniformly without leaving brush marks or holding.

3) Each coat shall be flowed on smoothly and free from sags and runs.

4) The rate of application shall be as given in Table 7-13-1. Each coat shall be accomplished without involving holidays or skips, gaps, pinholes, etc.

5) Paint enclosed in a vessel may be thinned according to the directions of the manufacturer immediately before using it.

6) The number of coat or the number of finishing coats shall be increased if necessary for obtaining uniform colour and appearance.

7) When part of the wall painted is damaged or faulty, do not correct partially but repaint the whole wall.

8) The minimum dry time shall be as recommended by the manufacturer. Before a coat dries up, the succeeding coat shall not be applied.

9) Before applying a coat, sand with abrasive paper of a proper No. to the coat.

10) Painting of portions adjoining other members or portions with different colours of paint shall be accomplished smooth and sharp without overlapping boundaries.

11) Portions to be glazed shall be coated with a primer prior to glazing.

2-12-9 Curing

(1) Portions other than those to be painted shall be protected against damage, soil, etc., by painting materials or tools.

(2) Furniture and other movable objects, equipment, appliances, accessories, etc., shall be relocated for protection and, after completion of work at the area concerned be restored to the initial positions.

(3) All works of which finish has been completed shall be protected by a hanging screen with proper size but without any hole or the like.

2-12-10 Cleaning

Upon completion of the work, remove all paint attached on the surfaces of fittings, glass, furniture, fixtures, hardwares, etc. Cleaning shall be effected elaborately without scratching or marring the finished surface.

2-13 INTERIOR FINISH WORK

2-13-1 Scope of Work

The work specified under this paragraph consists of all interior finish work and related items of work necessary to complete the work indicated in drawings and described in specifications.

2-13-2 Shop Drawings

Shop drawings and manufacturing drawings on all interior finish work shall be submitted to the Engineer for approval. The approval shall be obtained prior to starting the fabrication.

2-13-3 Samples

The samples of each of the following materials and products shall be submitted to the Engineer for approval. The approval shall be gained prior to carrying in the material or commencing the fabrication.

1) All interior finish material described in this paragraph.
2) Others directed by the Engineer.

2-13-4 Materials and Method

When any material or method stipulated in other paragraphs of this specification is applicable to work specified in this paragraph, the provision of that paragraph shall be applied to the work.

2-13-5 Vinyle Asbestos Tile

(1) Scope of Work

The scope of work and the sections of work shall be as indicated in the drawing. Distribution shop drawings, etc., shall be submitted to the Engineer for approval prior to starting the work. Shop drawings, etc., shall specify the types of materials, patterns, colours, details of work connection with other work, and all other related items.

(2) Dimensions and shape

Vinyle asbestos tile shall be 2.0mm in thickness and 303mm x 303mm or 304.8 x 304.8mm (nominal 30cm x 30cm) each.

(3) Application

Vinyl asbestos tile shall be applied, as indicated in shop drawings, to the dimensions and shapes of door sills, column corners, and floor trenches and shall be cut or jointed not to cause gaps.

(4) Adhesives

Polyvinyl acetate adhesives shall be used, which shall be applied uniformly over the bed to be stuck on the whole surface without causing unevenness and non-uniformity. After application of tile, wipe off surplus adhesives that has come out, push down tile surfaces by rolling or other proper method so that air shall not remain on the adhered surfaces, and protect vinyl tile until the adhesives set under instructions from the Engineer.

(5) Surface finish

When the adhesive is osberved to have set, clean the surface with warm water or neutral detergent and water, and after the surface has dried sufficiently, finish with water-soluble wax. The wax shall be such as specified by the manufacturer.

(6) Inspection of bed

Prior to application of tile, inspect the bed for normality. Application shall not be commenced before defects are corrected. The allowable error of the bed surface shall be within ±3mm in any of 2m distance and within ±1.5mm in any 30cm distance. When unevennes exceeding the above range is caused, correction of unevenness shall be made by using bed material and adhesives set out in this specification.

(7) Temperature keeping and curing

The portion to be worked shall be kept above 15°C for more than 24 hours before the work and for more than 48 hours after the work. Portions on which application has completed shall be cured until the adhesive sets sufficiently. Curing shall be made by using thick curing paper in general and by using plywood or the like when the floor may be damaged by workers to pass by during the construction work.

2-13-6 Soft Vinyl Skirting

(1) Scope of Work

The scope of work shall be as shown in drawings.

(2) Dimensions and shape

Each soft skirting shall measure 75mm high, 2mm thick, and 2m long. Chamfering at the top shall about 3mm in curvature and that at the bottom about 5mm in curvature.

(3) Bed

Sufficiently inspect floor and wall to which skirting shall be applied, correct unevenness, and clean. The allowable error shall be as specified in Paragraph 2-13-5, Item (6).

(4) Application

Apply sufficient amount of adhesives uniformly on the wall and back of the skirting, then stick, and elaborately push down the skirting with a hand roller. The adhesives shall be as specified in Paragraph 2-13-5, Item (4).

(5) Bending treatment of external corner's skirting

Skirting material for external corners shall be formed by pushing it at a corner to be bent while heating the back of the portion to be bent by a hair drier or blowtorch.

(6) Surface finish

When adhesive is observed to have set sufficiently, clean the surface with warm water or neutral detergent and, after sufficiently drying the surface, finish it with water-soluble wax. The wax shall be such that has been specified by the manufacturer.

(7) Temperature keeping and curing

As per Paragraph 2-13-5, Item(7)

2-13-7 Wood skirting

(1) Scope of Work

As shown in drawings.

(2) Dimensions and shape

Hardwood of 150mm or 180mm high according to drawings and 25mm thick.

(3) Bed

When the bed is wood, apply a machine planer. When the bed is mortar, use wood brick at 450mm pitch and apply a machine planer on the surface.

(4) Application

Skirting for internal corners shall be fixed by miter joint and skirting for external corners by face miter joint. Put the soffit of skirting on floor boards, apply brackets or wedges and, after proper alignment, apply nails with broken heads.

(5) Finish

Hardwoods shall be planned, cleaned, and sandpapered before being fixed. Joints, holes, and cracks shall be filled with putty and made flush. After thus preparing the bed, colour with oil stain. With wood sealer, apply one base coat, 2 intermediate coats and sandpaper.

Then, apply clear lacquer by spraying or SOP according to drawings so as to finish. After this, cure carefully.

2-13-8 Cemented excelsier boards

(1) Scope of work

Cemented excelsier boards shall be laid on the ceiling of the machine room, etc., for the purposes of sound absorption and heat insulation, as indicated in drawings.

(2) Dimensions and shape

Each cemented excelsier board shall be 25mm in thickness and shall meet the requirements of JIS A5404.

(3) Laying

Prepare distribution shop drawings, and submit them to the Engineer for approval. Put basic marking on forms as indicated in drawings, and lay cemented excelsier boards according to the basic marking not to cause gaps on joints. Nail the boards, but not on corners, to such extent that shall not cause warp by arranging bars or placing concrete.

(4) Finish

Cemented excelsier boards need not be finished to maintain sound absorbing capability. However, boards shall be selected for coordination in colour and texture upon being laid on forms and only cleaning for removing cement paste shall be made after removing forms. When a board involves check, break, etc., remove the board and mount a normal board by using adhesives and special fittings together under instructions from the Engineer.

2-13-9 Gypsum Boards

(1) Scope of work

Gypsum boards shall be used as indicated in drawings for obtaining a smooth bed for finish and sound insulation effect.

(2) Dimensions and shape

Gypsum boards shall meet the requirement of JIS A6901. Each board shall measure 910mm x 1,820mm x 9 mm (thick).

(3) Bed and fixing

When wood bed is used, boards shall be fixed by galvanized or chrome plated flat head steel nails. When suspended steel frames are used for receiving members, boards shall be fixed by the specification of the manufacturer of steel frames. Cutting shall be made accurately by an electric cutter. Although gypsum boards are used mainly as bed materials, distribution shop drawings shall be prepared and submitted to the Engineer for approval prior to commencing the work.

Fittings on the surrounds shall be set more than 10mm inside the edges of the board and at intervals of 90∿100mm, and fitting on each member receiving the board shall be set to line at equal intervals of 120∿m50mm.

2-13-10 Asbestos Boards

(1) Scope of work

Asbestos boards shall be laid as indicated in drawings.

(2) Dimensions and shape

Each asbestos board shall be 6mm thick and meet the requrement of JIS A5410. High-quality asbestos boards made in Nepal shall be used.

(3) Bed and fixing

Hardware shall be as specified in JIS A5410, Table 19-8-2, unless otherwise stated.

Cutting of boards shall be made by a saw for slates or a rotary cutter. Holes for sticking shall be bored by a drill to have a size a little larger than the hardware dimensions and counter sink shall be provided when necessary. To be fixed by Phillips flat head screws. Hole for sticking shall be located 18mm from the edge. Unevenness which may be caused upon fixing shall be sandpapered to obtain a level surface. Soil or stain if found after laying boards shall be removed by sandpaper.

2-13-11 Miscellaneous Works

(1) Curtain rails

Ready-made stainless steel curtain rails to be supplied with runners and other accessories shall be used. Samples shall be submitted to the Engineer for approval.

(2) Sink

Ready-made sink shall be provided in the kitchen as shown in drawings. The sink shall measure 1,800mm wide, 600mm deep and 850mm high, approximately, including a cock talbe measuring 600mm wide, 600mm deep, and 700mm high, approximately.

Space for piping and flushing board shall be 100mm, in width, as indicated in drawings. The catalogue and test data of the sink and gas table shall be submitted to the Engineer for approval. The sink top shall be covered with SUS 304 and sink shall be furnished with swinging front doors. A suspended cabinet in the upper portion shall also be included in the set, which shall be made of polyester plywood and also furnished with swinging front doors as is the case with the sink. Lay out shall be nearly as indicated in drawings.

(3) Receptionist's Counter

The dimensions and shape of the receptionist's counter shall be as indicated in drawings. The structure of counter shall be of brick masonry and terrazzo blocks shall be used for the counter top, for both studio centre and transmitting stations. And a wooden window shall be installed on each counter.

(4) Corner beads of ceiling

When either wall or ceiling or both are made of boards as indicated in drawings, corner beads of ceiling shall be provided by using a synthetic resin press out member. Samples shall be submitted to the Engineer for approval in advance.

(5) Provide caulking materials for flashing and sound insulation, as indicated in drawings.
Caulking material composed mainly of polysulfide resin shall be used unless otherwise specified. Samples, catalogues and test data shall be submitted to the Engineer for approval in advance.

(6) Expansion joint

Expansion joint shall be provided in a section of Kathmandu Studio Center, as indicated in design drawings.

1) Foamed polystylene sheets (JIS A5911) of 50mm thick shall be laid for the floor portions under concrete slabs so as to have no contact with structure and which shall be furnished with a aluminum ready-made product or caulking material as indicated in drawings.

2) Wall portions shall be treated as the floor portion.

3) Expansion joint shall be provided on part of the equipment foundation of the equipment room, as indicated in drawings. By laying formed polystylene sheets (JIS A5911) between the foundation and structure indulation between them shall be obtained and the expansion joint shall be finished by using asphalt compound. For the expansion joint cover to be used on part of the floor and external walls, ready-made product using aluminum pressed-out material, which can follow deformation of 50mm in the horizontal direction and 9.5mm in vertical direction, shall be used.

(7) Name plates for buildings

Name plate (750mm wide x 350mm high) for Kathmandu Studio Center and the same (600mm wide x 275mm high) for each transmitting station shall be prepared and fixed on the wall appointed in each entrance hall.

The plate shall be made of bronze plated brass, and characters made of the same materials shall be layed out on the plate.

The dimensions and number of character shall be as designated by the Engineer. The approval for the full-size drawings shall be gained prior to the commencement of manufacture.

(8) Room name plates

About 70 sheets of room name plates shall be provided for the studio center and the transmitting stations.

These plates shall be fixed on appointed walls of corridors using brackets. The plate shall be milk-white plastic plate with room name on both sides by characters engraved and filled with specified coloured enamel

The plastic plate shall be ready-made.