PART 4

TECHNICAL SPECIFICATIONS FOR CIVIL WORKS

General Specifications

1.0 GENERAL

1.1 Scope
This specification applies to the Civil, Structural, Finishing and External Development Works and building works to be executed by the Contractor. It is to be read in conjunction with and subject to the general conditions of contract and in conjunction with the drawings, the schedule of rates and such other documents as may from time to time be agreed upon as comprising part of this contract. Where these specifications are not clear, relevant BIS codes and CPWD specifications shall be followed with prior permission of Project Manager.

1.2 Clearing
The contractor shall clear the site of all rubbish and old buildings remove all grass and low vegetation and remove all bush wood, trees, stumps of trees, and other vegetation only after consultation with the Project Manager as to which bushes and trees shall be saved. All disused foundations, drains or other obstructions met with during excavation shall be dug out and cleared.

1.3 Site Levels
The contractor shall carry out the survey of the site and shall establish sufficient number of grids and level marks to the satisfaction of the Project Manager, who shall decide on the basis of this information, the general level of the plot and the plinth.

1.4 Bench-marks
Prior to commencement of construction, the contractor shall in consultation with the Project Manager, establish several site datum bench-marks, their number depending on the extent of the site. The benchmarks shall be sited and constructed to be undisturbed throughout the period of construction.

1.5 Site investigation
The Project Manager might have got the soil investigation done and if so, the report will be handed over to the contractor for their scrutiny. The contractor shall however inspect the site and study the findings from the trial pits or bores in order to assess the problems involved in and methods to be adopted for excavation and earthwork. The contractor shall ascertain for himself all information concerning the sub-soil conditions, Ground water table periods and intensity of rainfall, flooding of the site and all data concerning excavation and earthwork. Any extra work required on this account, nothing will be paid extra.

1.6 Setting out the work
The contractor shall set out the works and during the progress of the building shall amend at his own cost any errors arising from inaccurate setting out.
During the execution of the work contractor must cross check his work with the drawings. The contractor shall be responsible for all the errors in this connection and shall have to rectify all defects and/or errors at his own cost, failing which the Project Manager reserves the right to get the same rectified at the risk and cost of the contractor.

1.7 Cleaning up and handing over

Upon completion of the work all, the areas should be cleaned. All floors, doors, windows, surface, etc. shall be cleaned down in a manner, which will render the work acceptable to the Project Manager. All rubbish due to any reason, shall be removed daily from the site and an area of up to ten metres on the outer boundaries of the premises will be cleaned by the contractor as a part of the contract. Upon completion of the project, the contractor shall turn over to the Project
Manager the following:
a) Written guarantee and certificates.
b) Maintenance manuals, if any, and
c) Keys.

1.8 Samples
The contractor shall submit to the Project Manager samples of all materials for approval and no work shall commence before such samples are duly approved. Samples of precast concrete panels, masonry units, building insulation, finished hardware, metal window and door frames, terrazzo flooring, kota stone, marble etc. and every other work requiring samples in the opinion of the Project Manager shall be supplied to the Project Manager, and these samples will be retained as standards of materials and workmanship. The cost of the samples shall be borne by the contractor.

Throughout this specification, types of material may be specified by manufacturers' name in order to establish standard of quality, price and performance and not for the purpose of limiting competition. Unless specifically stated otherwise, the tenderers may assume the price of 'approved equivalent' except that the burden is upon the contractor to prove such equality, in writing.

A detailed programme shall be submitted by the Contractor for the material approvals, within four weeks of the Project Manager's order to commence. The detailed programme shall include but not limited to:

Date/s of submitting the various material samples.
Date/s by which the Project Manager’s approval is required.
Date/s of placing orders on the Manufacturers/Suppliers.
Date/s of arrival of the approved material/s on to the site.

Date/s of the completion of the `Mock-ups', wherever required, and the Date/s by which the Project Manager's inspection of such `Mock-ups' should be completed and the Date/s by which the Project Manager should fully approve the said Mock-ups.

1.9 Tests
All materials and methods of tests shall conform to the latest rules, regulation and/or specifications of the following authorities where specified herein as applicable. Bureau of Indian Standards (BIS), British Standards Code of Practice (BS) in case no equivalent BIS is available. The Project Manager will have the option to have any of the materials tested and if the test results show that the materials do not conform to the specifications, such materials shall be rejected. A reasonable number of representative tests will be deemed included in the rates tendered.

1.10 Mode of Measurements
All measurements will be taken in accordance with IS 1200 latest issue unless otherwise specified.

2.0 WOOD WORKS

The Contractor shall be responsible for providing all plant, tools, materials, labour and all things necessary for the proper execution, completion and maintenance of the works.

a) Timber :-
The moisture content of the timber during manufacture, delivery to site, storage, site working, assembly, installation shall be 10 to 12 percent. Timber shall be Burma Teak Wood/ Ivory Coast Teak Wood / Champ Wood, / Red mirinti, soft or hardwood and shall be suitable for the purpose for which it is intended. It shall be seasoned or Kiln dried, absolutely free from worm holes, large loose or dead Knots or other defects which would effect strength or usability and shall be flat, straight non-splitting and dressed on all sides. It shall be matched for colours and graining. Burma Teak Wood/ Ivory Coast Teak Wood / Champ Wood / Red mirinti wherever specified in the drawings / schedule of quantities , it is Ist quality Light Grained of reasonably straight grains, light vein free of Knots and sap.
Fixing :-
The carpentry timber shall be fixed with nails, spikes, bolts screws, hangers, stirrups, anchors, ties or any other accessories which are suitable to develop the full strength of the member to which they are attached, as directed.

Carpentry timber where fixed to solid masonry or concrete shall be secured with expansion bolts or other positive methods of mechanical fastening. MS hold fast grouted in CC block shall be used to hold the door frames.
Timber - Treatment
All timber shall be protected with an organic solvent water repellent wood preservative to give a highly efficient protection against termite, spider, worm, all insects and fungus and rot attach and shall, where exposed, enhance the appearance of the timber. Colour of the product shall be such as to bring out the natural colour of the respective timbers. Fire retardant paint to timber shall be applied as per the recommendations of manufacturer and shall comply with the requirement of ISI / B.S. code and local fire requirements.

b) Plastic Laminate :-
Plastic decorative laminate sheeting shall be of the brand, catalogues number and indicated or approved. Plastic laminate shall be fire retardant to class I of BS : 476 or ISI code where specified.

c) Veneers :-
Veneer shall be of the timber species of Indian origin shown on drawings. Veneers are to be kept in sequence as they are being cut from wood and supplied as such to the site for accurate matching or figuring . The veneer shall be finished as specified and shall be equal or superior quality to that laid down in IS: 1659 - 1960 or as approved.
wherever Veneer is stated, it is mainly Teak veneer of approved quality in Indian origin unless otherwise mentioned.

d) Plywood :-
All ply wood shall be of best / high quality close grained suitable for veneering, painting or bonding plastic laminate. It shall be resin bonded and weather proof. Exposed edges shall be finished with an edge strip of solid teak wood. tongued and grooved and glued , or as detailed. The plywood of approved brand and manufacture only shall be used in the work. The thickness shall be in accordance with the drawings /schedule of quantities.

e) MDF (Medium Density Fibre Board):

For Interior Works MDF of approved make /manufacturer shall be of only EXTERIOR GRADE as per IS : 12406 -1988. It is to be contained that MDF shall be invariably used in place of Ply / Boards .so specified in the specifications of either same thickness or of higher thickness .wherever feasible The minimum thickness of MDF to be used shall be 8mm.

Wood screws are not to be used for MDF and only fully threaded parallel shank screws shall be used after drilling pilot holes. Veneering /lamination to the MDF surface shall be done by exterior grade adhesive only. Poly urethene primers shall be used for sealing the edges and painting the rear side. For specifications of various applications the MANUFACTURER USERS MANUAL shall be followed.

Adhesives :-
The adhesives used for all wood work and MDF shall be FEVICOL or approved equivalent of appropriate Grade. Manufacturer's recommendations shall be followed for adhesive other than above required for any specified / specialized work.

Joinery :- Joinery shall be carried out strictly in accordance with the drawings, Where joints are not specifically indicated recognized forms of joints shall be used. Joinery shall conform to IS Standards.

Panels shall be rendered flame retardant and to conform to local fire regulations.

The Contractor shall submit samples of all materials including samples of veneer for approval.

All materials pre-fabricated, delivered and assembled shall be in accordance with the approved sample.

The Contractor shall be responsible for protecting all items of wood-work done by him. The contractor shall replace at his own expense any damaged work caused through lack of adequate protection or care in installation or handling .

f) Flush Doors
All flush door shall be solid core as specified. It shall conform to the relevant specifications to IS: 2202 and shall be obtained from ISI approved manufacturers. The finished thickness of the shutter shall be as mentioned in the items. Face veneers shall be of the pattern and colour approved by the Architects and an approved sample shall be deposited with the Architects for reference. The solid core shall be wood laminates prepared from battens of well seasoned and treated good quality wood having straight grains.

g) Gypsum - Board :-
Gypsum -Board (Glass Fibre Reinforced Board) or Equivalent conforming to IS-2095 - 1982 and 2542-1981 shall be used . Technical detailing for fixing Gypsum-Board along with jointing compound, paper tape, primer, screws, edge bead, angle bead etc. shall be as per Manufacturers specification. Proper care is to be taken while handling, storing and cutting the Gypsum-board as per manufacturer's manual and the work shall be done in technical co-ordination /assistance with the trained staff of Manufacturer, such services being offered free by them.

h) Mirrors and Glasses :-
Mirrors shall be fabricated from best clear plate or float glass of approved quality in imported variety and shall match the International Standards. All fixed panel mirrors shall be +/- 0.30mm tolerance . The edges of mirrors shall be polished and bevelled and mitered as per IS specifications wherever, it's indicated in the drawing.

All vision glasses shall be float glass of specified thickness. The edges shall be bevelled as indicated in drawings and shall be done at approved source.

The Etching wherever specified in drawings, shall be done at approved sources as per full-scale drawing approved by the Project Manger. The etched panel shall be chemically washed /treated as per specialist specifications to have a permanent dust free surface.

The Contractor shall be responsible for protecting all mirrors and glasses fixed by him and shall replace at his own expense any broken or damaged mirror / glass caused through lack of adequate protection or care in installation or handling.

3.0 FLOORING/ CLADDING WORKS

1 General

All flooring shall be laid to the best practice known to the trade. The flooring shall be laid to the level except where slopes are called for on the drawings in which case the slopes shall be uniform and so arranged to drain in to the indicated outlets.

Particular care shall be exercised to ensure that all flooring, skirting and dado are perfectly matched for colour and finish. Sufficient extra tiles (not less than 5%) shall be cast/ordered to ensure an adequate supply of matched floor tiles. The contractor shall furnish for approval by the Project Manager, samples of each type of floor finish.

2 Tiles

All tiles shall be of thickness as per approved manufacturer as stated in the schedule of quantities. Only first quality tiles of approved colour shall be used. No cracked or warped tiles shall be used in the work. All tiles shall be required to be set in cement mortar. Prior to setting the tiles the contractor shall at his own cost, clear the whole surface and thoroughly saturate it with water. A layer of 12 to 20 mm avg. thick cement mortar shall then be applied to the surface and the tiles laid firmly over a layer of clear cement slurry. The tiles shall be set in perfect line, level and true to plumb line. The joints of tiles shall have white, coloured cement filling/tile grout. After the setting operation is completed, the contractor shall carefully remove all cement and dribbling and cure the tiled surface for atleast seven days with water.

3 Tile Dado

Tile dado where called for in the drawings, shall be minimum 6 mm thick tiles of approved manufacture. The tiles shall be free from cracks, twists, uneven edges, cracking and such other defects. The rear face of tiles shall be grooved and/or recessed to provide an adequately key for the plaster. A layer of 12mm thick rough base plaster shall be done with cement mortar 1:3 (1 cement: 3 coarse sand). The tiles shall be finally set true to plumb with rich cement slurry over a 6mm average thick cement plaster in 1:3 (1cement : 3 fine sand), the joints of tiles shall have white, coloured cement filling/tile grout. After laying the tiles shall be thoroughly washed and cleaned to the satisfaction of the Project Manager.

4 Kota Stone Flooring

The best quality stone (Green /Brown) from approved quarry, shall be laid either with rough stone or machine cut and machine polished as specified in respective items and shall be of specified thickness and of approved quality and size, free from cracks and flakes and shall be uniform in colour, with straight edges. The sides of machine cut and machine polished stones shall have perfect right and finished. The stones shall be laid on minimum thickness of 25mm thick cement mortar 1:4 (1 cement : 4 coarse sand) mix to match the total thickness of flooring of 50mm thick & joint to be fitted with cement slurry mixed with pigment to match the shade of stone. The finished stone surface including edge prepared surface thus laid shall then be polished to the required degree as approved by the Project Manager. Flooring shall be finally mirror polished and protected till the handing over of the building.

5 Marble / Granite Stone

Marble/Granite shall be the best Indian Marble/Granite to be approved by the Project Manager and a sample piece should be kept in the office of the Project Manager. The quality shall be uniform and it shall be hard and free from any discolorations, cracks, flaws, veins of foreign materials or any other defects. When marble/Granite of different colour and kinds associated, care shall be taken to see that they are of equal hardness so as to wear evenly. The marble/Granite slabs shall be machine cut true to the shape and size and machine mirror polished. Care shall be taken to cut the slabs so as to provide a pattern as indicated. Marble/Granite stone slabs for wall lining and dadoes shall be machine mirror polished edges. The wall shall be lined with the marble/Granite in courses as indicated and grain of the marble/Granite shall be arranged in pattern as per detailed drawings. The marble/Granite shall be bedded in adequate thickness of cement mortar, backing covering the full area of the marble. The wall surface shall cleaned from all dirt, mortar droppings etc. before applying the base plaster. The marble/Granite shall be fixed to the wall by S.S cramps and pins of required sizes embedded firmly in to wall by cutting hole and grouting alternately stainless steel cramps and pins as per design including fixing small stone pieces with adhesive. Fixing of cramp shall be with fastener (as approved by Project Manager) in case of RCC and in Brick Work pocket (100mmX75mmX75mm) shall be made and filled by non-shrinkage compound (as approved by Project Manager). The size and design of the cramp and fastener shall be to suite site requirement and shall be approved by the Project Manager. The load of one marble/Granite slab shall not be borne by the slab below. Joints between slabs shall be hair fine and filled with coloured cement to match the marble/Granite. The marble/Granite lining and dadoes shall be finally polished by Carborundum stone, buffing with polishing felt and cleaned with diluted oxalic acid wash.

6 Expansion and compression joints

These shall be clearly indicated on the shop drawings and formed of non-staining two parts polysulphide with polyethylene foam backing to full depth of screed in pavings.
In no instance shall expansion joints be less than 10 mm. Supporting corbels cover shall be recessed into the back of the above slab and not placed in the expansion joint. Expansion joint shall be kept completely free of all fixing materials and are to be inspected by the consultant prior to filling.

7 False flooring

The Access raised floor shall be medium grade bare panel and also point load of 3.6 KN and UDL of 1350 KN/m2; panels manufactured from steel with lightweight cementitious core in the size 600 X 600 X 35 mm.
The bottom of the panel shall be embossed in hemispherical shape to give strength and flexural rigidity. The entire panel shall be finished with electro deposition of cathodic epoxy paint on the exposed surface for lifetime protection and shall be Zinc Whisker free. All specifications must be printed on the panel side to ensure zero ambiguity.

Pedestals design shall confirm speedy assembly and removal for relocation and maintenance. Pedestal base to be permanently secured to portion on sub-floors, pedestal assembly shall provide easy adjustment of leveling and accurately aligned panel to ensure lateral resistance. It shall be designed to avoid any rattle or squeaks. It consists of 100x100x2mm thick galvanized base and head assembly consisting of 75mmx75mmx3.5mm embossed ribbed head with four holes with PVC locator for panel location and sound insulation. The panels shall be corner locked to the pedestals for complete rigidity and stability.
Pedestal shall be permanently fixed to sub floor by application of epoxy or fasteners to achieve Finished Floor Height (FFH) of 450mm
The system shall provide a minimum clear uninterrupted clearance between the bottom of the floor for electrical conduits and wiring etc.

4.0 FINISHING WORKS

1 General

1 All plaster work shall be of the best workmanship and in strict accordance with the dimensions of the drawings. All plastering shall be finished to true levels including plumbs, without imperfections, and square with adjoining work. It shall form proper foundations for finishing materials such as paint etc. Masonry and concrete surface to which plaster is to be applied shall be clean, free from efflorescence, sufficiently rough and keyed to ensure proper bond.

2 Wherever directed all joints between RCC frames and masonry walls, shall be expressed by a groove in the plaster. This groove will exactly coincide with the joint beneath. At the corners of all windows and doors or other openings and wherever instructed, 24 gauge expanded galvanized metal mesh strips 300 mm wide shall be placed diagonally to prevent plaster cracks.

3 Where grooves are not called for, the joint between concrete and masonry in filling, chasing for conduits, pipes, boxes etc. shall be covered by 24 gauge expanded galvanized metal strips, 300 mm wide installed before plastering. The contractor shall supply all necessary labour, material, tools and scaffolding necessary for the completion of the work detailed. He shall be responsible to take proper precautions to all works from damage. Any work rejected through non-compliance with the specifications or damaged work shall be removed and replaced at the expense of the contractor.

4 All chasing, installation of conduits, boxes, etc. shall be completed before any plastering is commenced on a surface. Chasing or cutting of plaster will not be permitted. Broken corners shall be cut back less than 150 mm on both sides and patched with plaster of Paris as directed. All corners shall be rounded to a radius. Contractor shall get samples of each type of plaster work approved by the Project Manager.

5 The materials used for plastering shall be proportioned by volume by means of gauge boxes.
Alternatively it may be required to proportion the materials by weight.

2 Plaster Work

1 The joints in the brick work, concrete blocks, shall be raked (as specified in respective subhead) while the masonry is green. Concrete surfaces to receive plaster shall be suitably roughened. All walls shall be washed with water and kept damp for 10 hours before plastering.

2 The plaster unless specified otherwise shall be average of 15 mm thick on walls and minimum 6 mm thick for the ceiling. The finished texture shall be as approved by the Project Manager. The mix for plaster unless otherwise specified, shall be one part cement and four parts sand, to walls and one part cement, 3 parts sand to ceiling.

3 The interior plaster shall be applied in one coat only. The surface shall be trowelled smooth to an approved surface. All plaster work shall be kept continuously wet for seven days.

4 The external plaster shall be minimum 20 mm. Preparations of walls to receive plaster work shall be the same as in internal plaster. Both layers of all external plaster shall be waterproofed with approved water proofing powder added to cement in proportion of 1.5 Kg. to 50 Kg. of cement as per the manufacturers' instruction, for both the coats under layer 12 mm thick cement plaster
1:5 (1 cement : 5 coarse sand) finished with a top layer 8mm thick cement plaster 1:6 (1 cement :6 fine sand) including making of grooves, bands, drip coarse as shown in drawing.

5 For sand faced cement plaster, the finishing coat shall be in cement mortar 1:3, sand used shall be of selected colour, properly graded and washed so as to give a grained texture. Finishing plaster coat shall be 8 mm thick, uniformly applied and surface finished with special rubbing by sponge pads and other tools and recommended by the Project Manager.

6 Rates should include grooves, bands in plaster, on RCC bands, drip coarse etc. in plaster works as per direction.

7 Rates should include providing and fixing 300mm wide chicken wire mesh with GI screw and washers at the junctions of two different materials and on all chasing for electrical & plumbing conduits, pipes etc.

3 White Washing

1 White washing with Lime

The wash shall be prepared from fresh stone lime (Narnaul/Satna or Dehradun quality). The lime shall be thoroughly slaked on the spot, mixed and stirred with sufficiency to water to make a thin cream. This shall be allowed to stand for a period of 24 hours and then shall be screened through a clean coarse cloth. 40 gm of gum dissolved in hot water, shall be added to each 10 entire delimiters of cream. The approximate quantity of water to be added in making the cream will be 5 liters of water to 1 Kg. of lime.

Indigo (Neel) up to 3 gm. per Kg. of lime dissolved in water, shall then be added and wash stirred well. Water then shall be added at the rate of about 5 liters per Kg. of lime to produce a milky solution.

2 Preparation of surface

Before white washing is started, the surface shall be thoroughly brushed free from mortar droppings and foreign-matter. Any unevenness shall be made good by applying putty made of plaster of Paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it dry.

3 Application

The white wash shall be applied with moon brushes to the specified number of coats. The operation for each coat shall consist of a stroke of the brush given from top downwards, another from bottom upwards over the first stroke, and similarly one stroke horizontally from the right and another from the left before it dries up.

4 White washing with whiting

Preparation of mix : Whiting (ground white chalk) shall be dissolved in sufficient quantity of warm and thoroughly stirred to form a thin slurry which shall then be screened through a clean coarse cloth. Two Kg. of gum and 0.4 Kg. of copper sulphate dissolved separately in hot water shall be added for every cum of the slurry which shall then be diluted with water to the consistency of milk also as to make a wash ready for use.

Other specifications described in above shall be applied in this case also.

5 Colour Washing

The mineral colours not affected by lime, shall be added to white wash. Indigo shall however, not be added. No colour wash shall be done until a sample of the colour wash of the required tint or shade has been got approved from the Project Manager. The colour shall be of even tint or shade over the whole area. A priming coat of white wash with lime or with whiting shall be applied. Three or more coats, shall then be applied on the entire surface till it represents a

smooth and uniform finish. Other specifications described in above shall apply in this case also.

6 Distempering

Dry distemper of required colour and (IS; 427 - 1965) of approved brand and manufacture shall be used. The shade shall be got approved from the Project Manager before application of the distemper. The dry distemper colour as required shall be stirred slowly in clean water using 6 decilitres (0.6 litre) of water per Kg. of distemper or as specified by the makers. Warm water shall preferably be used. It shall be allowed to stand for atleast 30 minutes (or if practicable over night) before use. The mixture shall be well stirred before and during use to maintain an even consistency. Distemper shall not be mixed in larger quantity than is actually required for one days' work.
Preparation of surface
Before new work is distempered, the surface shall be thoroughly brushed free from mortar droppings and other foreign matter and sand papered smooth. Pitting in plaster shall be made good with plaster of Paris mixed with the colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of distemper shall be applied over the patches. The patched surface shall be allowed to dry thoroughly before the regular coat of distemper is applied. A priming coat of whiting shall be applied over the prepared surface. No white washing coat shall be used as a priming coat for distemper.
Application
The treatment shall consist of a priming coat of whiting followed by the application of three or more coats of distemper till the surface shows an even colour.
Other specifications described as above shall apply in this case also.

7 Oil bound distempering

Material: Oil emulsion (oil bound) distemper (IS:428-1929) of approved brand and manufacture shall be used. The primer used shall be cement primer or distemper primer. This shall be of same manufacture as distemper. The distemper shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturer. Only sufficient quantity of distemper required for days work shall be prepared. The distemper and primer shall be brought by the contractor in sealed tins in sufficient quantities, at a time to suffice for a fortnights work. The empty tins shall not be removed from the site of work, till this item of work has been completed and passed by the Project Manager.

Preparation of surface
Before new work is distempered, the surface shall be thoroughly brushed free from mortar droppings and other foreign matter and sand papered smooth. Pitting in plaster shall be made good with plaster of Paris mixed with the colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of distemper shall be applied over the patches. The patched surface shall be allowed to dry thoroughly before the regular coat of distemper is applied.

A priming coat of approved primer shall be applied over the prepared surface. No white washing coat shall be used as a priming coat for oil bound distemper.

Application
The priming coat shall be with cement primer, as required in the description of the item and as recommended by the manufacturer.

Note:
If the wall surface plaster has not dried completely cement primer shall be applied before

distempering the walls. But if distempering is done after the wall surface is dried completely, distemper primer shall be applied.

Oil bound distemper is not recommended to be applied within six months of the completion of wall plaster.

After the primer coat has dried for atleast 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the distemper, taking care not to rule out the priming coat. All loose particles shall be dusted off after rubbing. One coat of distemper properly diluted with thinner (Water or other liquid as stipulated by the manufacture) shall be applied with brushes in horizontal strokes followed immediately by vertical ones which together constitute one coat. The subsequent coats shall be applied in the same way.

For distemper 15 cm double bristled brushes shall be used. After each days work, brushes shall be thoroughly washed in hot water with soap solution and hung down to dry. The final coat shall be done by using approved roller.

The specifications in respect of scaffolding protective measures and rute shall be as described under.

8 Cement Primer Coat

Cement primer shall be used as lease on wall finish of cement lime or lime cement plaster or asbestos cement surface before oil distemper paints are applied on them. Only approved cement primer shall be used. Primer coat shall be preferably applied by brushing and not by spraying.

Preparation of surface
The surface shall be thoroughly cleaned of dust, old white or colour wash by washing and scrubbing. The surface then be allow to dry for atleast 48 hours. It shall then be sand papered to give a smooth and even surface. Any unevenness shall be made good by applying putty, made of plaster of Paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it is dry.

Application
Cement primer shall be applied with a brush. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards. The entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks. It shall be allowed to dry for atleast 48 hours, before oil emulsion paint is applied.

9 Cement Paint
Cement paint shall be (conforming to IS:5410 - 1969) of approved brand and manufacture.

Preparation of surface
The surface shall be thoroughly cleaned of all mortar dropping, dirt, dust, alga, grease and other foreign matter by brushing and washing. The surface shall be thoroughly wetted with clean water before the cement paint is applied.

Preparation of mix
Cement paint shall be mixed in such quantities as can be used up within an hour of its mixing as otherwise the mixture will set and thicken, affecting flow and finish.

Cement paint shall be mixed with water in two stages. The first stage shall comprise of 2 parts of cement paint and one part of water stirred thoroughly and allowed to stand for 5 minutes. Care shall be taken to add the cement paint gradually to the water and not vice versa.

The second stage shall comprise of adding further one part of water to the mix and stirring thoroughly to obtain a liquid of workable and uniform consistency. In all cases the manufacturers instructions shall be followed meticulously. The lid of cement paint drums shall be kept tightly closed when not in use, as by exposure to atmosphere the cement paint rapidly becomes air set due to its hydrophobic qualities.

Application
The solution shall be applied on the clean and wetted surface with brushes or spraying machine. The solution shall be kept well stirred during the period of application. It shall be applied on the surface which is on the shady side of the building so that the direct heat of the sun on the surface is avoided. The method of application shall be as per manufacturer's specifications. The completed surface shall be watered after day's work.

Water cement paint shall not be applied on surface already treated with white wash, colour wash distemper dry or oil bound, varnishes, paints etc. It shall not be applied on gypsum, wood and metal surfaces.

10 Painting

i) Painting priming coat of wood surface
Primer for wood work shall be as specified in the description of the item. Surface to be primed shall be dry and thoroughly cleaned. All unevenness shall be rubbed down smooth with sand paper and shall be well dusted, knots, if any, shall be covered with preparation of red lead made by grinding red lead in water and mixing with strong glue sized and used hot. Appropriate wood filler material with same shade as paint shall be used where so specified. The surface treated for knotting shall be dry before primer is applied. After the primer is applied the holes and indentation on the surface shall be stopped with glaziers putty or wood putty, stopping shall not be done before the priming coat.

ii) Painting priming coat on Iron & Steel surfaces
All rust and scales shall be removed by scrapping or by brushing with steel wire brushes. Hard skin of oxide formed on the surface of wrought iron during raking which becomes loose by rushing, shall be removed. All dust and dirt shall be thoroughly wiped away from the surface.

iii) Textured paint
The textured finish to external surfaces of walls as per manufacturer's specification and approved by the Project Manager including scaffolding etc. complete.

iv) Painting priming coat on plastered surface
The surface shall ordinarily not be painted shall be applied to get correct finish until it has dried completely. Before primer is applied, holes and undulations shall be filled up with plaster of Paris and rubbed smooth.

The primer shall be applied with brushes, worked well into the surface and spread even and smooth. Painting shall be done by crossing and laying off. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first time over and then brushing alternately in opposite direction, two or three times and then finally brushing lightly in a direction at right angles to the same. In this process, no brush marks shall be left the laying off is finished. The full process of crossing and laying off will constitute one coat.

The surface to be painted shall have received the approval of the Project Manager after inspection, before painting is commended.

Application

The number of coats including the under coat shall be stipulated in the item.

a) Under Coat
One coat of specified paint of shade suited to the shade of the top coat shall be applied and allowed to dry overnight. It shall be rubbed next day with the finest grade of wet abrasive paper to ensure a smooth and even surface, free from brush marks and all loose particles dusted off.

b) Top Coat
Top coats of specified paint of desired shade shall be applied. Each coat shall be allowed to dry for not less than 24 hours and lightly rubbed down smooth with finest wet abrasion paper to get an even glossy surface. If, however, the surface is not satisfactory additional coats as required.

11 Melamine Polish

Timber works shall be finished by the application of two coats and catalyzed clear lacquer (melamine) wherever it is indicated in the drawing/specified. The finish shall be a stain semi-gloss finish and shall be carried out as follows:-

The base shall be sand papered to the desired finish and coated with a colour tings to give it shade. This shade shall be sealed with a coat of spirit finish.

After the base, first coat of melamine shall be applied evenly by spray to give as even coat to the veneer surface.

After the first coat has fully dried, the surface shall be rubbed down in the direction of the veneer grain with very fine glass paper and left completely smooth and clean before the second coat is applied.

When the second coat of melamine is fully dry, the surface shall be rubbed down in the direction of veneer grain with very wire dipped in a petroleum based wax to give lubrication.

Twenty four hours after completion of this process the melamined veneer surface shall be finished by burnishing a soft cloth to an approved finish.

12 WASHED STONE GRIT PLASTER

Scaffolding shall be as specified.

Preparation of surface shall be as specified.

Materials
Stone chippings obtained by crushing hard stone shall be free of dust and deleterious material. 10 mm nominal size stone chippings, where specified, shall pass 100% through 12.5 mm sieve
and fully retained on 6.3 mm sieve. Stone chippings shall be thoroughly washed with water and sieved
before use.

Mortar : Cement mortar for under coat and cement mortar to be mixed with stone chippings for top coat shall be as specified in 3.5.

Application of Plaster

12 mm Under Coat : Under coat of cement mortar 1:4 (1 cement : 4 coarse sand) shall be applied as specified in 13.1.3 except that the finishing, after the mortar has been brought to level with the wooden straight edge, shall be done with wooden float only. The surface shall be further roughened
by furrowing with a scratching tool. Furrowing shall be done diagonally both ways and shall be about 2 mm deep to provide a key for the top coat. The scratched lines shall not be more than 10 cm apart. The surface shall be kept wet till top coat is applied.

15 mm Top Coat : Top coat comprising cement mortar and stone chippings shall have an overall proportion of 1:0.5:2 (1 cement : 0.5 coarse sand : 2 stone chippings 10 mm nominal size) or as specified. The top coat shall be applied a day or two after the under coat has taken the initial set. The
surface of the under coat shall be cleaned and a coat of cement slurry at 2 kg of cement per sqm shall
be applied before the application of coat. The top coat shall be applied in uniform thickness on the under coat after the application of slurry and sufficiently pressed with wooden float for proper bonding with the under coat. Vacant space, if any shall be filled with the specified mix.

Finish
The top coat of plaster shall be finished to a true and plumb surface. The surface shall be tested frequently as the work proceeds with a true straight edge not less than 2.5 m long and with plumb bobs. All horizontal lines and surfaces shall be tested with a level and all jambs and corners with a
plumb bob as the work proceeds. All the corners angles and junctions shall be truly vertical or horizontal as the case may be. Rounding or chamfering of corners junctions etc. Where required
shall be true to template.

Finished surface of the top coat after the mix has taken the initial set, shall be scrubbed and washed
with suitable brushes and plain water. Scrubbing and washing shall continue till the stone chippings are
sufficiently exposed. Stone chippings which may come out while scrubbing shall be replaced using the
specified mortar mix. A sample of the washed stone grit plaster shall be got approved from the Engineer-in-Charge.

Grooves
Grooves of size 15 mm x 15 mm or as specified shall be provided as shown on the drawing or as
required by the Engineer-in-Charge. Tapered wooden battens to match the size and shape of the
grooves shall be fixed on the under coat with nails before the application of the top coat and these shall be removed carefully so that the edges of the panels of top coat are not damaged. Damage, if any, shall be made good by the contractor.

Curing
Curing shall be started 24 hours after finishing the plaster. The plaster shall be kept wet for a period
of seven days. During this period, it shall be suitably protected from all damages at the contractor’s
expense by such means as the Engineer-in-Charge may approve.

Measurements

Length and breadth shall be measured correct to the nearest cm and the area shall be calculated in sqm correct to two places of decimal.

Measurements shall be taken for the work actually done with deductions for all openings and addition for all jambs soffits and sills. However, no deduction is to be made for the grooves provided as specified

Washed stone grit plaster on circular surfaces not exceeding 6 m in radius and on external surfaces at a height greater than 10 m shall be measured separately.

Rates
The rates shall include the cost of all labour and materials involved in all the operations described
above except for providing grooves. The length of grooves shall be measured in running meters and
paid for separately.

5 MISCELLANEOUS WORKS

1 STRUCTURAL STEEL WORK

1.1 This specification covers the fabrication and transportation to site and erection on prepared foundations and structural steel work consisting of beams, columns, vertical trusses, bracings, shear connections etc.

1.2 Fabrication, erection and approval of steel structures shall be in compliance with :

These General Specifications and IS : 800 - 1984

Drawings and supplementary drawings to be supplied to the contractors during execution of the work.

1.3 Providing primer coat for steel structures. Grouting of holding-down bolt pockets and below base plates where required.

1.4 In case of conflict between the Clauses mentioned here and the Indian Standards, those expressed in this specification shall govern.

2 Scope

2.1 The fabrication and erection of the steel work consists of accomplishing of all jobs here-in enumerated including providing all labour, tools and plant all materials and consumables such as welding electrodes, bolts and nuts, oxygen and acetylene gases, oils for cleaning etc. of approved quality as per relevant IS. The work shall be executed according to the drawings, specifications, relevant codes etc. in an expeditious and workman like manner, as detailed in the specifications and the relevant Indian Standard Codes and Standard Practice and to the complete satisfaction of the Project Manager.

3 Fabrication Drawings

9.3.1 The contractor shall prepare all fabrication and erection drawings on the basis of design drawings supplied to him and submit the same in triplicate to the Project Manager for review, Project Manager shall review and comment, if any, on the same. Such review, if any, by the Project Manager, does not relieve the contractor of any of his required guarantees re-

sponsibilities. The contractor shall however be responsible to fabricate the structurals strictly conforming to specifications and reviewed drawings.

3.2 Fabrication drawings shall include the following :

- Member sizes and details
- Types and dimensions of welds and bolts
- Shapes and sizes of edge preparation for welding
- Details of shop and field joints included in assemblies.

Bill of material

- Quality of structural steels, welding electrodes, bolts, nuts and washers etc. to be used.

- Erection assemblies, identifying all transportable parts and sub-assemblies, associated with special erection instructions, if required.

- Calculations where asked for, for approval.

3.3 Connections, splices etc. other details not specifically detailed in design drawings shall be suitably given on fabrication drawings considering normal detailing practices and developing full member strengths. Where asked for calculations for the merit shall also be submitted for approval.

3.4 Any alternate design or change in section is allowed when approved in writing by the Project
Manager.

3.5 However if any variation in the scheme is found necessary later, the contractor will be supplied with revised drawings. The contractor shall incorporate these changes in his drawings at no extra cost and resubmit for review.

3.6 Project Manager review shall not absolve the contractor of his responsibility for the correctness of dimensions, adequacy of details and connections. One copy will be returned reviewed with or without comments to the contractor for necessary action. In the former case further three copies of amended drawings shall be submitted by the contractor for final review.

3.7 The contractor shall supply three prints each of the final reviewed drawings to the Project Manager within a week since final review, at no extra cost for reference and records.

3.8 The Project Manager will verify the correct interpretation of their requirements.

3.9 If any modification is made in the design drawing during the course of execution of the job, revised design drawings will be issued to the contractor. Further changes arising out of these shall be incorporated by the contractor in the fabrication drawings already prepared at no extra cost and the revised fabrication drawings shall be duly got reviewed as per the above Clauses.

4 Materials

4.1 Rolled Sections

The following grades of steel shall be used for steel structures :

Structural steel will generally be of standard quality conforming to IS: 226. Whenever welded construction is specified plates of more than 20 mm thickness will generally conform to IS: 2062.

4.2 Welding Materials

Welding electrodes shall conform to IS: 814.
Approval of welding procedures shall be as per IS: 823.

4.3 Bolts, Nuts & Washers
Bolts and nuts shall be as per IS: 1367 and tested as per IS:1608. It shall have a minimum tensile strength of 44 Kg/mm2 and minimum elongation of 23% on a gauge length of 5.65 (A-Original cross sectional area of the gauge length). Washers shall be as per IS: 2016.

4.4 All materials shall conform to their respective specifications. The use of equivalent or higher grade or alternate materials will be considered only in very special cases subject to the approval of the Project Manager in writing.

4.5 Receipt & Storing of Materials

Steel materials supplied by the contractor must be marked for identification and each lot should be accompanied by manufacturer's quality certificate, conforming chemical analysis and mechanical characteristics.
All steel parts furnished by supplier shall be checked, sorted out, straightened, and arranged by grades and qualities in stores.

Structural steel with surface defects such as pitting, cracks, laminations etc. shall be rejected if the defects exceed the allowable tolerances specified in relevant standards or as directed by the Project Manager.

Welding wire and electrodes shall be stored separately by qualities and lots inside a dry and enclosed room, in compliance with IS: 816 - 1969 and as per instructions given by the Project Manager. Electrodes shall be perfectly dry and drawn from an electrode even, if required.

Checking of quality bolts of any kind as well as storage of same shall be made conforming to relevant standards.
Each lot of electrodes, bolts, nuts, etc. shall be accompanied by manufacturer's test certificate. The contractor may use alternative materials as compared to design specification only with the written approval of the Project Manager.

4.6 Material Tests
The contractor shall be required to produce manufacturer's quality certificates for the materials supplied by the contractor. Notwithstanding the manufacturer's certificates, the Project Manager may ask for testing of materials in approved test houses. The test results shall satisfy the requirements of the relevant Indian Standards.
Whenever quality certificates are missing or incomplete or when material quality differs from standard specifications the contractor shall conduct all appropriate tests as directed by the Project Manager at no extra cost.

Materials for which test certificates are not available or for which test results do not tally with relevant standard specifications, shall not be used.

5 Fabrication

Fabrication shall be in accordance with IS: 800 Section V in addition to the following: Fabrication shall be done as per approved fabrication drawings adhering strictly to work points and work lines on the same. The connections shall be welded or bolted as per design drawings. Work shall also include fabricating built up sections.

Any defective material used shall be replaced by the contractor at his own expense, care being taken to prevent any damage to the structure during removal.

All the fabricated and delivered items shall be suitably packed to be protected from any damage during transportation and handling. Any damage caused at any time shall be made good by the Contractor at his own cost.

Any faulty fabrication pointed out at any stage of work shall be made good by the contractor at his own cost.

5.1 Preparation of Materials

Prior to release for fabrication, all rolled sections warped beyond allowable limit shall be pressed or rolled straight and freed from twists, taking care that an uniform pressure is applied.

Minor warping, corrugations etc. in rolled sections shall be rectified by cold working.
The sections shall be straightened by hot working where the Project Manager so direct and shall cooled slowly after straightening.

Warped members like plates and flats may be used as such only if wave like deformation does not exceed L/1000 but limited to 10 mm (L-Length).

Surface of members that are to be jointed by lap or fillet welding or bolting shall be even so that there is no gap between overlapping surfaces.

5.2 Marking

Marking of members shall be made on horizontal pads, of an appropriate racks or supports in order to ensure horizontal and straight placement of such members.
Marking accuracy shall be atleast + 1 mm.

5.3 Cutting

Members shall be cut mechanically (by saw or shear or by oxyacetylene flame).

All sharp, rough, or broken edges, and all edges of joints which are subjected to tensile or oscillating stresses, shall be ground.
No electric metal arc cutting shall be allowed.

All edges cut by oxyacetylene process shall be cleaned of impurities prior to assembly. Cutting tolerances shall be as follows :
a) For members connected at both ends + 1 mm. b) Elsewhere + 3 mm.

The edge preparation for welding of members more than 12 mm thick shall be done by flame cutting and grinding. Cut faces shall not have cracks or be rough.

Edge preparation shall be as per IS : 823 - 1964.

5.4 Drilling

Bolts holes shall be drilled.

Drilling shall be made to the diameter specified in drawings.

No enlarging of holes filling, by mandrolling or oxyacetylene flame shall be allowed.

Allowed variations for holes (out-of-roundness, eccentricity, plumb-line deviation) shall be as per IS:800.

- Maximum deviation for spacing of two holes on the same axis shall be + 1 mm.

- Two perpendicular diameters of any oval hole shall not differ by more than 1 mm.

Drilling faults in holes may be rectified by reaming the holes to the next upper diameter, provided that spacing of new hole centres and distance of hole centres to the edges of members are not less than allowed and that the increase of hole diameter does not impair the structural strength. Hole reaming shall be allowed if the number of faulty holes does not exceed 15% of the total number of holes for one joint.

5.6 Preparation of Members for Welding

Assembly of structural members shall be made with proper jigs and fixtures to ensure correct positioning of members (angles, axes nodes etc.)

Sharp edges, rust of cut edges, notches, irregularities and fissures due to faulty cutting shall be chipped or ground or filled over the length of the affected area, deep enough to remove faults completely.

Edge preparation for welding shall be carefully and accurately made so as to facilitate a good joint.

Generally no special edge preparation shall be required for members under 8 mm thick.

Edge preparation (bevelling) denotes cutting of the same so as to result in V, X K or U seam shapes as per IS: 823.

The members to be assembled shall be clean and dry on the welding edges. Under no circumstances shall wet, greasy, rust or dirt covered parts be assembled. Joints shall be kept free from any foreign matter likely to get in to the gaps between members to be welded.

Before assembly the edges to be welded as well as adjacent areas extending for atleast 20 mm shall be cleaned (until metallic polish is achieved).

When assembling members, proper care shall be taken of welding shrinkage and distortions, as the drawing dimensions cover finished dimensions of the structure.

The elements shall be got checked and approved by the Project Manager or their authorised representative before assembly.

The permissible tolerances for assembly of members preparatory to welding shall be as per IS: 823-1964.

After the assemble has been checked, temporary tack welding in position shall be done by electric welding, keeping in view finished dimensions of the structure.

5.7 Welding procedures

Welding shall be carried out only by fully trained and experienced welders as tested and approved by the Project Manager. Any test carried out either by the Project Manager of their representative or the inspectors shall constitute a right by them for such tests and the cost involved thereon shall be borne by the contractor himself.

Qualification tests for welders as well as tests for approval of electrodes will be carried out as per IS: 823. The nature of test for performance qualification of welders shall be commensurate with the quality of welding required on this job as judged by the Project Manager.

The steel structures shall be automatically, semi-automatically or manually welded.

Welding shall begin only after the checks mentioned in Clause 5.1 to 5.6 have been carried out.

The welder shall mark with his identification mark on each element welded by him.
When welding is carried out in open air, steps shall be taken to protect the face of welding against wind or rain. The electrodes, wire and parts being welded shall be dry.

Before beginning the welding operation, each joint shall be checked to ensure that the parts to be welded are clean and root gaps provided as per IS: 823.

For continuing the welding of seems discontinued due to some reason, the end of the discontinued seem shall be melted in order to obtain a good continuity. Before resuming the welding operation, the groove as well as the adjacent parts shall be well cleaned for a length of approx. 50 mm.

For single butt welds (in V, 1/2 V or U) and double butt welds (in K, double U etc.) the rewelding of the root is mandatory but only the metal deposit on the root has been cleaned by back gouging or chipping.

The welding seams shall be left to cool slowly. The contractor shall not be allowed to cool the welds quickly by any other method.

For multi-layer welding, before welding the following layer, the formerly welded layer shall be cleaned metal bright by light chipping and wire brushing. Backing strips shall not be allowed.

The order and method of welding shall be so that -

- No unacceptable deformation appears in the welded parts.

- Due margin is provided to compensate for contraction due to welding in order to avoid any high permanent stresses.

The defects in welds must be rectified according to IS: 823 and as per instruction of Project Manager.

5.8 Weld Inspection

The weld seams shall satisfy the following:

- shall correspond to design shapes and dimensions.

- shall not have any defects such as cracks, incomplete penetration and fusion, under-cuts, rough surfaces, burns, blow holes and porosity etc. beyond permissible limits.

During the welding operation and approval of finished elements, inspections and tests shall be made.

The mechanical characteristics of the welded joints shall be as in IS: 823.

5.9 Preparation of Members for Bolting

The members shall be assembled for bolting with proper jigs and fixtures to sustain the assemblies without deformation and bending.

Before assembly, all sharp edges, shavings, rust dirt, etc. shall be removed.

Before assembly, the contacting surfaces of the members shall be cleaned and given a coat of primer as per IS: 2074.

The members which are bolt assembled shall be set according to drawings and temporarily fastened with erection bolts (minimum 4 pieces) to check the coaxiality of the holes.

The members shall be finally bolted after the deviations have been corrected, after which there shall not be gaps.

Before assembly, the members shall be checked and got approved by the Project Manager.

The difference in thickness of the sections that are butt assembled shall not be more than 3% or maximum 0.8 mm whichever is less. If the difference is larger, it shall be corrected by grinding or filling.

Reaming of holes to final diameter or cleaning of these shall be done only after the parts have been check assembled.

As each hole is finished to final dimensions (reamed if necessary) it shall be set and bolted up. Erection bolts shall not be removed before other bolts are set.

5.10 Bolting up

Final bolting of the members shall be done after the defects have been rectified and approval of joints obtained.

The bolts shall be tightened starting from the centre of joint towards the edge.

5.11 Planing of Ends

Planing of ends of members like column ends shall be done by grinding when so specified in the design.

Planing of butt welded members shall be done after these have been assembled, the spare edges shall be removed with grinding machines or files.

The following tolerances shall be permitted on member that have been planed.

- On the length of the member having both ends planed, maximum + 2 mm with respect to design.

- Level differences of planed surfaces, maximum 0.3 mm.

- Deviation between planed surface and member's axis maximum 1/1500.

5.12 Holes for Field Joints

Holes for field joints shall be drilled in the shop to final diameters and tested in the shop, with trial assemblies.

When three-dimensional assembly is not possible in the shop, the holes for field joints may be drilled in shop and reamed on site after erection, on approval by the Project Manager.

For bolted steel structures, trial assembly in shop is mandatory. The tolerance for spacing of holes shall be + 1 mm.

5.13 Tolerances

All tolerances regarding dimensions, geometrical shapes and sections of steel structures, shall be as per Annexure B, if not specified in the drawing.

5.14 Marking for Identification

All elements and members prior to despatch for erection shall be shop marked. The members shall be visibly marked with a weather proof light coloured paint. The size and thickness of the numbers shall be chosen as to facilitate the indentification of members. For the small members that are delivered in bundles or crates, the required marking shall be done on small metal tags securely tied to the bundle, while the crates shall be marked directly. Each bundle or crate shall be packed with members for one and the same assembly; in the same bundle or crate, general utility members such as bolts, quests etc. may be packed. All bill of materials showing weight, quality and dimension of contents shall be placed in the crates. The members shall be marked with a durable paint, in a visible location, preferably at one end of the member so that these may be easily checked during storage and erection. All members shall be marked in the shop before inspection and acceptance. When the member is being painted, the marking area shall not be painted but bordered with white paint. The marking and job symbol shall be registered in all shop delivery documents (transportation, for erection etc.)

5.15 Shop Test Pre-assembly

For steel structures that have the same type of welding the shop test pre-assembly shall be performed on one out of every 10 members minimum. For bolted steel structures, shop test pre-assembly is mandatory for all elements as well as for the entire structure in conformity with Clause 5.12.

6 Shop Inspection and Approval

6.1 General

The Project Manager or their representative shall have free access at all responsible times to the contractors fabrication shop and shall be afforded all reasonable facilities for satisfying himself that the fabrication is being undertaken in accordance with drawings and specifications.

Technical approval of the steel structure in the shop by the Project Manager is mandatory.

The contractor shall not limit the number and kinds of tests, final as well as intermediate once, or extra tests required by the Project Manager.

The contractor shall furnish necessary tools, gauges, instruments etc. and technical non-technical personnel for shop tests by the Project Manager, free of cost.

6.2 Shop Acceptance

The Project Manager shall inspect and approve at the following stages : The following approvals may given in shop :

- Intermediate approvals of work that cannot be inspected later.

- Partial approvals

- Final approvals

Intermediate approval of work shall be given when a part of the work is preformed later:
- Cannot be inspected later

- Inspection would be difficult to perform and results would not be satisfactory.

Partial approval in the shop is given on members and assemblies of steel structures before the primer coat is applied and includes :

- Approval of materials
- Approval of field joints
- Approval of parts with planed surfaces
- Test erection
- Approval of members
- Approval of markings
- Inspections and approvals of special features, like Rollers, loading platform mechanism etc.

During the partial approval, intermediate approvals as well as all former approvals, shall be taken in to consideration.

6.3 Final approval in the Shop

The final approval refers to all elements and assemblies of the steel structures, with shop primer coat, ready for delivery from shop to be loaded for transportation, or stored.
The final approval comprises of :

- Partial approvals
- Approval of shop primer coat
- Approval of mode of loading and transport
- Approval of storage (for materials stored)

7 Painting and Delivery

7.1 Preparation of parts for shop painting

Painting shall consist of providing one coat of red oxide zinc chromate primer to steel members before despatch from shop.

Primer coat shall not be applied unless:

- Surface have been wire brushed, cleaned of dust, oil, rust etc.

- Erection gaps between members, spots that cannot be painted or where moisture or other aggressive agents may penetrate, have been filled with an approved type of oil and putty.

- The surface to be painted are completely dry.

-The parts where water of aggressive agents may collect (during transportation, storage, erection and operation) are filled with putty and provided with holes for drainage of water.

- Members and parts have been inspected and accepted

- Welds have been accepted.

The following are not to be painted or protected by any other product:

- Surface which are in the vicinity of joints to be welded at site.

- Surfaces bearing markings

- Other surfaces indicated in the design.

The following shall be given a coat of hot oil or any approved resistant lubricant only.

- Planed surfaces
- Holes for links

The surfaces that are to be embedded or in contact with the concrete shall be given a cost of cement wash.

The surfaces which are in contact with the ground, gravel or brick work and subject to moisture, shall be given bituminous coat.

The other surfaces shall be given a primer coating.

Special attention shall be given to locations not easily accessible, where water can collect and which after assembly and erection cannot be inspected, painted and maintained. Holes shall be provided for water drainage and in accessible box type sections shall be hermetically sealed by welds.

If specified elsewhere, in the schedule of quantities, the contractor shall paint further coats of red-oxide after erection and placing in position of the steel structures.

7.2 Packing, transportation, delivery

After final shop acceptance and marking, the item shall be packed and loaded for transportation.
Packing must be adequate to protect item against warping during loading and unloading. Proper lifting devices shall be used for loading, in order to protect items against warping. Slender projecting parts shall be braced with additional steel bars, before loading, for protection against warping during transportation.

Loading and transportation shall be done in compliance with transportation rules.
If certain parts cannot be transported in the lengths stipulated in the design, the position and type of additional splice joints shall be approved by the Project Manager.
Items must be carefully loaded on platforms of transportation means to prevent warping, bending or falling during transportation.
The small parts such as fish-plates, quests etc. shall be securely tied with wire to their respective parts.
Bolts, nuts and washers shall be packed and transported in crates.
The parts shall be delivered in the order stipulated by the Project Manager and shall be accompanied by document showing:

- Quality and quantity of structure or members
- Position of member in the structure
- Particulars of structure
- Identification number job symbol.

8 Field Erection

8.1 The erection work shall be permitted only after the foundation or other structure over which the steel work will be erected is approved and is ready for erection.

8.2 The contractor shall satisfy himself about the levels, alignment etc. for the foundations well in advance, before starting the erection. Minor chipping etc. shall be carried out by the contractor on his expense.

8.3 Any faulty erection done by the contractor shall be made good at his own cost.

8.4 Approval by the Project Manager or their representatives at any stage of work does not relieve the contractor of any of his required guarantees of the contract.

8.5 Storage and preparation of parts prior to erection

The storage place for steel parts shall be prepared in advance and got approved by the Project Manager before the steel structures start arriving from the shop.

A platform shall be provided by the Contractor near the erection site for preliminary erection work.

The contractor shall make the following verifications upon receipt of material at site.

- for quality certificates regarding materials and workmanship according to these general specifications and drawings.
- Whether parts received are complete without defects due to transportation, loading and unloading and defects, if any, are well within the admissible limit.

For the above work sufficient space must be allotted in the storage area. Steps shall be taken to prevent warping of items during unloading.
The parts shall be unloaded, stored and stored so as to be easily identified.

The parts shall be stored according to construction symbol and markings so that these may be taken out in order or erection.

The parts shall be at least 150 mm clear from ground on wooden or steel blocks for protection against direct contact with ground and to permit drainage of water.

If rectification of members like straightening etc. are required, these shall be done in a special place allotted which shall be adequately equipped.

The parts shall be clean when delivered for erection.

8.6 Erection & Tolerances

Erection in general shall be carried out as required and approved by the Project Manager. Positioning and levelling of the structure, alignment and plumbing of the stanchion and fixing every member of the structure shall be in accordance with the relevant drawings and to the complete satisfaction of the Project Manager.

The following checks and inspection shall be carried out before during and after erection.

- damage during transportation
- accuracy of alignment of structures
- erection according to drawings and specifications
- progress and workmanship.

In case there be any deviations regarding positions of foundations or anchor bolts, which would lead to erection deviations, the Project Manager shall be informed immediately. Minor rectifications in foundations, orientation of bolts holes etc. shall be carried out as part of the work, at no extra cost.

The various parts of the steel structure shall be so erected so to ensure stability against inherent weight, wind and erection stresses.

The structure shall be anchored and final erection joints completed after plan and elevation positions of the structural members have been verified with corresponding drawings and approved by the Project Manager.

The bolted joints shall be tightened so that the entire surface of the bolt heads and nuts shall rest on the member. For parts with sloping surfaces tapered washers shall be used.

9 Final acceptance and handing over the structure

9.1 At acceptance, the contractor shall submit the following documents:
- Shop and erection drawings - either in tracings or reproducible.
- 4 copies of each of the following:
- shop acceptance documents
- quality certificate for structurals, plates, etc. (electrodes, welding wire, bolts, nuts, washers etc.)
- List of certified welders who worked on erection of structures.
- acceptance and intermediate control procedure of erection operations.

9.2 Approval by the Project Manager at any stage of work does not relieve the contractor of any of his required guarantees of the contract.

10 Method of Payments

10.1 Payment for steel work shall be made on basis of admissible weight of the structure accepted, the weight being determined as described in such Clause 9.10.2 below :

The rate for supply, fabrication and erection, shall include cost of all handling and transportation to Owner's store/site o work where supply and fabrication only are involved, trimming, straightening, edge preparation, preparation and getting reviewed of fabrication drawings, and providing one or more coat of Red-oxide zinc chromate primer as specified in the schedule of quantity.

In the case, Owner supplies materials the rate shall include cost of steel materials taking delivery of the materials, from owner's store all handling and rehandling, loading and unloading, transport to site or work, returning of surplus materials to owner's stores etc. complete as well as the cost of all handling and transport, scaffolding, temporary supports, tools and tackles, touching up primer coat, grouting etc.

10.2 The actual lengths installed shall be measured and the weight of structural material/plate shall be calculated wherever necessary on the basis of IS handbook. If sections are different from IS section, then manufacturers handbook shall be adopted. No allowance in weights shall be made for rolling tolerance.

10.3 Sections built out of plates, structural shall be paid on the actual weight incorporated except for gussets which will be paid on the weight of the smallest rectangle enclosing the shape. No deductions shall be made for skew cuts in rolled steel sections.

10.4 Welds, bolts, nuts, washers, etc. shall not be measured. Rate for structural steel work shall be deemed to include the same.

10.5 No other payment either for temporary works connected with this contract or for any other item such as welds, shims, pacing plates etc. shall be made. Such item shall be deemed to have been allowed for in the rate quoted for steel work.

11 Grouting of Pockets

11.1 Grouting of pockets and under base plates will be done only after the steel work has been levelled and plumbed and the bases of stranchions are supported by steel shims. The space below the base plate and pockets shall be thoroughly cleaned.

11.2 The mortar used for grouting shall not be leaner than 1:2 (1 cement : 2 sand) (grade 300 in case of concrete) and shall be mixed to the minimum consistency required. It shall be poured under suitable head and tamped until the space has been completely filled.

12 Tolerances allowed in the erection of plant building without cranes

The maximum tolerances for line and level of the steel work shall be + 3.00 mm on any part of the structure. The structure shall not be out of plumb more than 3.5 mm on each 10 M. section of height and not more than 7.0 mm per 30 M. section.

These tolerances shall apply to all parts of the structure unless the drawings issued for erection purposes state otherwise.

13 Rolling Shutters

Rolling shutters shall be in extruded MS sections, of approved make, type and finish. These shutters shall be complete with locking arrangements, hoods, guides, pulling devices, springs and other accessories. Wherever specified, mechanical device shall be fixed for easy operation of the shutters. (Rolling shutters as per CPWD Specification Volume -1, Clause No. 10.8, Page No. 564).

14 Steel Door / Window

Hot rolled steel sections for fabrication of steel doors, windows, ventilators and fixed lights shall conform to IS : 7452. Shapes weights and designations of hot rolled sections shall be as per IS : 7452. Appendix 'D' of Chapter 10 (CPWD specification 2000) indicates the purpose or the situation where the sections are normally used. Tolerance in thickness of the sections shall be +0.2mm including provisions of lugs or anchoring strips, both for RCC and Brickwork backing.

14.1 The steel doors and windows shall be according to the specified sizes and design. The size of doors and windows shall be calculated, so as to allow 1.25 cm clearance on all the four sides of opening to allow for easy fitting of doors windows and ventilators into opening. The actual sizes of doors, windows and ventilators shall not vary by more than +1.5mm from those given in the drawing.

14.2 Fabrication

14.2.1 Frames

Both the fixed and opening frames shall be made of sections which have been cut to length and metered. The corner of fixed and opening frames shall be welded to form a solid fused welded joint conforming to the requirements given below. All frames shall be square and flat. The process of welding adopted shall be flash butt welding. The section for glazing shall be tennoned and riveted into the frames and where they intersect the vertical tie shall be broached and horizontal tee threads through it, and the intersection closed by hydraulic pressure.

Requirements of welded joints

i) Visual Inspection Test

When two opposite corners of the frame are cut, paint removed and inspected, the joint shall conform to the following:

a) Welds should have been made all along the place of meeting the members and tack welding shall not be permitted.
b) Welds should have been properly grounded and
c) Complete cross section of the corner shall be checked up to see that the joint is completely solid and there are no cavaties visible.

ii) Micro and Macro Examinations

From the two opposite corners obtained for visual test, the flanges of the sections shall be cut with the help of the sections shall be cut with the help of a saw. The cut surface of the remaining portions shall be polished, etched and examined. The polished and etched faces of the weld and the base metal shall be free from cracks and reasonably free from under cutting, overlaps, gross porosity and entrapped slag.

iii) The fillet weld in the remaining portion of the joint shall be fractured by hammering. The fractured surfaces shall be free from slag inclusion porosity, crack penetration defects and fusion defects.

14.2.2 Door

The hinges shall be of 50mm projecting type, Non projecting type hinges may also be used if approved by the Project Manager. The hinge pin shall be of electro-galvanized steel or alu-

minium alloy of suitable thickness and size. Door handles shall be approved by the Project Manager. A suitable latch lock for door openable both from inside and outside shall be provided.

In the case of double doors, the first closing leaf shall be the left hand leaf locking at the door from the push side. The first closing shutter shall have a concealed steel bolt at top and bottom. The bolts shall be so constructed as not to work loose or drop by its own weight.

Single and double shutter door may be provided with a three way bolting device. Where the device is provided in the case of double shutters, concealed brass or steel bolts shall not be provided.

14.2.3 Windows

a) For fixed windows, the frames shall be fabricated as per relevant CPWD specification 2000.
b) Side hung windows.

For fixing steel hinges, slots shall be cut in the fixed frame and hinges inserted inside and welded to the frame at the back . The hinges shall be of projecting type with thickness not less than 3.15 mm and length not less than 65mm and width not more than 25mm. Non-projecting type hinges may also be allowed if approved by the Project Manager. The diameter of hinge pins shall not be less than 6mm. The hinge pin and washer shall be of galvanized steel or aluminum alloy of suitable thickness.

For fixing hinges to inside frame, the method described above may be adopted but the weld shall be cleaned, or the holes made in the inside frame and hinge riveted.

The handle of side hung shutters shall be pressed brass, cast brass, aluminum or steel protected against rusting and shall be mounted on a steel plate. Thickness of handle shall not be less than 3 mm incase of steel or brass and 3.5mm in case of aluminum. The handle plate shall be welded, screwed and/or riveted to the opening frame in such a manner that it should be fixed before the shutter is glazed and should not be easily removable after glazing.

The handle shall have a two point nose which shall engage with a brass or aluminium alloy striking plate on the fixed frame in a slightly opened position as well as closed position. The boss of handle shall incorporate a friction device to prevent the handle shall incorporate a friction device to prevent the handle from dropping under its own weight and the assembly shall be so designed that the rotation of the handle may not cause it to unscrew from the pin.

The height of the handle plate in each type of standard windows will be as specified. Otherwise it shall be at a height of 3/8 of the height of shutter, from its bottom. The strike plate shall be so designed and fixed in such a position in relation to the handle that with the later bearing against its stop, there shall be adequately tight fit between the casement and outer frames.

In case where no friction type hinges are provided, the window shall be fitted with peg stays which shall be either of black oxidised steel, pressed or cast brass or as specified, 300mm long with steel peg and locking brackets. The pegs stay shall have three holes to open the side hung casement in three different angles. The peg stay shall be of minimum thickness 2mm in case of brass or aluminium and 1.25mm in case of steel. Where specified friction hinges shall be provided. Side hung shutters fitted with friction hinges shall not be provided with a peg stay.

If specified, side hung shutters maybe fitted with an internal removable fly proof screen in a 1.25mm thick sheet steel frame to the outer frame of the shutter by brass turn buckless at the jambs, and brass tuds at the sill to allow the screen being readily removed. The windows with removable fly proof screen shall be fitted with a through – the – screen level operator at the sill level to permit the operation of the shutter through an angle of 90^0 without having to remove the fly proof screen. The lever shall permit keeping the shutter open in minimum three different position.

14.2.4 Ventilators

a) Top Hung Ventilators

The steel butt hinges for top hung ventilators shall be riveted to the fixed frame or welded to it at the back after cutting a slot in it. Hinges to the opening frame shall be riveted or welded.

Top hung ventilators shall be provided with a peg stay with three holes which when closed shall be held tightly by the locking bracket. The locking bracket shall either be fitted to the fixed frames or to the window.

b) Centre Hung Ventilators

Central hung ventilators shall be hung on two pairs of brass or aluminium cup pivots as specified, riveted to the inner and outer frames of ventilators to permit the ventilator shutter to swing to an angle of approx. 85o. The opening portion of the ventilators shall be so balanced that it remains open at any desired angle under normal weather conditions.

15 Glazing

15.1 Specifications as described shall apply. The glass panes shall have square corners and straight edges. The glass panes shall be so cut that it fits slightly loose in the frames. In doors, windows, clerestory windows of bath, WC and lavatories frosted glass panes shall be used.

15.2 Glazing shall be provided on the outside of the frame unless otherwise specified. Putty of approved make conforming to IS:419 shall be used for fixing glass panes. Putty shall be applied between glass panes and glazing bars. Putty shall then be applied over the glass pane, which shall stop 2 to 3 mm from the sight line of the back rebate to enable the painting to be done upto the sight line to seal the edge of the putty to the glass. The oozed out putty shall be cleaned and from putty cut to straight line. Quantity of putty shall not be less than 185 gm/meter of glass perimeter. Putty shall be painted within 2 to 3 weeks, after glazing is fixed to avoid its cracking.

Note: Putty may be prepared by mixing one part of the white lead with three parts of finely powdered chalk and then adding boiled linseed oil to the mixture to from a stiff paste and adding varnish to the past at the rate of 1 litre of varnish to the paste at the rate of 1 litre of varnish to 18 kg of paste.

15.3 Minimum Six glazing clips to be provided per glass pane of all types. In case of doors, windows and ventilators without horizontal glazing bars, the glazing clips may be spaced, according to the slots, in the vertical members provided the spacing does not exceed 30cm otherwise the spacing shall be 30cm.

Note: Where large size glass panes are required to be used or where the door window is located in heavily exposed situation, holes for glazing clips have to be drilled prior to fabrication and cannot be done at any later stages.

15.4 Where specially stipulated, fixing of glass panes may be done with metal or wooden beading instead of mere putty. Where beading are proposed to be used, the manufacturers shall be intimated in advance to drill holes for hard screws. Usually beads shall be fixed with screws spaced not more than 10 cm from each corner and the intermediate not more than 20 cm apart. When glass panes are fixed with wooden or metal beading having mitred joints, a thin layer of putty shall be applied between glass panes and sash bars and also between glass panes and the beading.

Where metal beading is specified extra payment shall be made on this account.

16 T-Iron / Angle Iron Doors Frames

T-iron / Angle Iron doors, frames shall be manufactured from uniform mild steel tee section/ angle section. The steel shall be of approved grade. The frames shall be got fabricated in approved workshop as approved by the Project Manager. Provisions of lugs or anchoring strips, both for RCC and Brickwork backing.

16.1 The sizes of door frames shall be as per drawing or as decided by the Project Manager. MS tie bar of 10mm dia shall be welded at bottom of the frame. The size of doors shall be calculated so as to allow 12.5mm clearance on all sizes to allow an easy fittings in opening. The actual size of doors, windows and ventilators shall not vary by more than +/- 2mm than those shown in the drawing.

The size of T-section / Angle section used for manufacture of doors, windows and ventilators shall not be less than those specified in IS:1038. Unless otherwise directed by the Project Manager.

16.2 Fabrications

The frame shall be constructed in section which has been cut to length and metered. The corners of the frames shall be butt welded to form a true and right angle. All frames shall be square and flat.

The T-section / Angle section shall be miter joined and continuously butt welded all along.

16.3 Fittings

Requisite number of holes shall be made in the frame for fixing of fittings. Detailed arrangements of fixing fittings shall be as shown. All fittings shall be fillet welded to T-iron / Angle iron frame all along the periphery of contact.

Butt hinges shall be fixed to the frame as below:

i) MS flat of size 100mm x 25mm x 6mm will be welded with fillet weld all along the periphery of contact on the rear side of the web of T-iron / Angle iron to receive the hinges. Requisite number of holes shall be made in T-iron / Angle iron frame and MS flat for fixing of hinges with counter sunk steel screws as shown.

ii) An alternate method of fixing butt hinges can be adopted by fillet welding the hinge to the T- iron / Angle iron frame on three sides. No welding shall be done along the hinge pin to allow free movement of butt hinges as shown.

16.4 Fixing Procedure

Fixing procedure for T-iron / Angle iron doors, windows and ventilator frames in masonry opening shall be as shown in the drawing.

17 Gypsum Board False Ceiling

17.1 Products Gypsum Board

A General : Provide gypsum board of types indicated in maximum lengths available to minimise end to end joints.

1. Thickness : Gypsum board in thickness indicated, in 12.5mm thickness to comply with ASTMC 840 for application system and support spacing indicated.

17.1.2 Trim Accessories

A Cornerbead and Edge Trim for Interior Installation : G.I. corner beads, edge trim and control joints which comply with ASTM C 1047 to be provided as per requirements and drawings.

17.1.3 Gypsum Board Joint treatment Materials

A General : Materials complying with ASTM C 475, ASTM C 840 and recommendations of manufacturer or both gypsum board and joint treatment materials for the application indicated.

B Joint Tape: Paper-reinforcing tape.

C Setting Type Joint Compounds: Factory – Pre-packaged, job-mixed, chemical hardening powder products formulated for uses indicated.

17.2 Execution

17.2.1 Installation of G.I. Steel Framing

A Hangers to be secured to structural support by connecting directly to structure where possible, otherwise to be connected to cast-in concrete inserts or other anchorage devices fasteners as required.

B Hangers are not to be connected or suspended from steel framing from ducts, pipes or conduits.

C To keep hangers and braces 50mm clear of ducts, pipes and conduits.

D To install suspended steel framing components in size and at spacing indicated but not less than that required by referenced steel framing installation standard.

E Installation Tolerances : To install steel framing components for suspended ceilings so that cross furring members or grid suspension members are level to within 3mm in 4M as measured both lengthwise on each member and transversely between parallel members.

F Wire-tie or clip furring members to main runners and to other structural supports as indicated.

G Grid Suspension System: Perimeter wall track or angle not to touch where grid suspension system meets vertical surfaces, suspended from structure above. Mechanically join main beam and cross furring members to each other and butt-cut to fit into wall track. Wall track to be free moving from vertical wall surfaces.

H For exterior soffits to provide cross-bracing and additional framing indicated or required to resist wind uplift.I for isolated ceilings to hold perimeter 12mm away from adjacent partitions to prevent flanking. The openings are to be sealed with compressible weather strip type edge seal to allow vertical movement.

17.2.2 Application and finishing of Gypsum Board, General

A Gypsum Board Application and Finishing Standard: shall be to comply with ASTM C 840.

B To install sound attenuation blankets where indicated, prior to gypsum board unless readily installed after board has been installed.

C To locate exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 600mm in alternate courses of board.

D To install ceiling boards across traming in the manner which minimize the number of end-butt joints, and which avoids end joints central area of each ceiling. Stagger end joints at least 600mm.

E To attach gypsum board to supplementary framing and blocking provided for additional support at openings and cutouts.

18 Armstrong False Ceiling

18.1 Armstrong Acoustical Suspended Ceiling System shall be done as detailed below:

18.2 TILES:

Mineral Fiber Acoustical Tiles with crisp finely granulated surface shall be of Armstrong (Regular edge/Micro) suitable for grids of specified sizes as per specifications below:-

Type	: Prima Dune Plus /Prima Fine Fissured
Humidity Resistance	: RH 95
Fire Performance	: Class 0 /class 1 (BS - 476) Noise Reduction
Coefficient (NRC)	: 0.50 (Average)
Sound Attenuation	: 34 dB
Light Reflectance	: 85%
Thermal Conductivity ('K' Value)	: 0.052 - 0.057 w/m c
Acoustical Punchers	: 24000 (10mm deep)

18.3 SUSPENSION SYSTEM

Suspension system shall be Armstrong Prelude XL / TL Trulok F24 exposed grid T- section. Flanges exposed face shall be powder-coated colour white.

Suspension system (Hot Dipped galvanized steel) sections consisting of the following members:

a) Main Runner - Main Runner shall be T-shaped section with single rotary stitching made from 0.33mm thick GS sheet and of size 24mm x 38mm and 3.60mm long.

b) Cross Runner

i) Cross Runner T-shaped with double rotary stitching made from 0.25mm thick GS sheet and of size 24mm x 30mm and 1.20m long.

ii) Cross Runner T-shaped section made from 0.25mm thick GS sheet and of size 24mm x 25mm and 0.60m long.

c) Perimeter Section - Perimeter wall angle made from 0.45m thick GS sheet and of size 22mm x 22mm and 3.00m long, colour white.

19 MIRROR

The mirror shall be of superior glass with edges rounded off or beveled, as specified. It shall be free from flaws, specks or bubbles. The size of the mirror shall be 60 x 45 cm unless specified otherwise and its thickness shall not be less than 5.5 mm. It shall be uniformly silver plated at the back and shall be free from silvering defects. Silvering shall have a protective uniform covering of red lead paint. Where beveled edge mirrors of 5.5 mm thickness are not available, fancy looking mirrors with PVC beading/border or aluminium beading or stainless steel beading/border based on manufacture's specifications be provided nothing extra shall be paid on this account. Backing of mirrors shall be provided with environmentally friendly material other than asbestos cement sheet.

INSTALLATION OF MIRROR

Fixing

The mirror shall be mounted on backing with environmentally friendly material other than asbestos cement sheet shall be fixed in position by means of 4 C.P. brass screws and C.P. brass washers, over rubber washers and wooden plugs firmly embedded in walls. C.P. brass clamps with C.P. brass screws may be an alternative method of fixing, where so directed. Unless specified otherwise the longer side shall be fixed horizontally.

Measurements

Mirror shall be measured in SQM.

Rate

Rate shall include the cost of all the materials and labour involved in all the operations described

above.

LIST OF APPROVED MAKES OF MATERIALS

S.No.	ITEM	BRAND
1	Grey Cement (43 grade OPC)	Ambuja, ACC, Ultratech,
2	Structural Steel	SAIL/ TISCO
3	Wire Cut Bricks	Jindal, Pioneer
4	M.S. Pipe, Tubes, Bar, Flats, Angle, Tee Sections	SAIL/ TISCO
5	Concrete admixture	Fosroc/ Cico.
6	Structural Sealant	Wacker, Dow Corning, GE
7	Polysulphide Sealant	Pidilite, Chemetall-Rai
8	Bitumen Impregnated Board	Shalitex or approved equivalent
9	Polyethylene back up rod	Supreme Ind. Ltd. Or approved equivalent
10	PVC water stops	Fixopan/ Sintex
11	White Cement	Birla, J.K
12	Water Proofing Compound	CICO/ Pidilite/ Laticrete or approved equivalent
13	White washing lime	Dehradun (Source)
14	Paints / (Putty)	Asian Paints, ICI, Nerolac / (Birla, Jk)
15	Water proof cement paint	Snowcem India Ltd.
16	Fire Retardant paint	Viper or approved equivalent
17	Wax Polish	Mansion or approved equivalent
18	Epoxy	Forsroc/ Laticrete/ Cico.

19	Glass	Saint Gobian, Asahi, Modi Guard or approved equivalent
20	Toughened Glass	Saint Gobain, Asahi, GSC, Hindustan Safety Glass
21	Mirror	Saint gobain, Modi Guard or approved equivalent
22	Waterproof ply	Century, Green
23	Commercial ply	Century, Green
24	Veneer	Century, Green
25	Laminate	Merino, Century
26	Cement Bonded Board	BISON' by NCL or approved equivalent
27	Grid False ceiling	Armstrong or equivalent
28	EPDM	Fire Stone
29	Extruded Polystyrene	STP or approved equivalent
30	Hessian Based Felt	BITUMAT' or approved equivalent
31	Eucalyptus Timber for Door Frames	Shakti or as approved by the Architect
32	Flush Door Shutter	Archid, Century, Legend, Duro or approved equivalent
33	Door Hardware	Hafele, Godrej, Dorset, Brassage or equivalent
34	Chequered Precast Cement Concrete Tiles	NITCO/ Unitile or approved equivalent
35	Tiles	Asian, Kajaria, Orient or approved equivalent
36	PVC strips	Fixopan or approved equivalent
37	Geotextile Fabric	Netlon/ Ca Polyteck Pvt. Ltd. Or approved equivalent
38	UPVC Pipe	Finolex Industries Ltd. Or approved equivalent

39	Steel Fire Door	Shakti Met/ Promat or approved equivalent
40	Non Metallic Fire Door	Navir/ Promat or approved equivalent
41	Particle Board	Century, Novopan, Merino, Bajaj Ecotec
42	MDF	NUWUD MDF grade I as per IS 12406/ Green Panelmax/ Bajaj Ecotec/ Duratuff
43	Screws, Nails etc.	Nettlefold or approved equivalent
44	Pre-Laminated Board	Merino/ Green
45	Welding rod	ADVANI or approved equivalent
46	Fire Door Hardware	Briton or approved equivalent
47	Night Latche	Godrej or approved equivalent
48	Cupboard/ Wardrobe/ Drawer Lock	Godrej or approved equivalent
49	Hardner or acid resistant Coating	Fosroc/ Roffe
50	Acid resistant tiles	Granamite, Spartex
51	Tin oxide polishing	Surie Polex or as approved by the Architect
52	Smooth Glazed ceramic tiles	Somany/ Kajaria/ Orient
53	Carpet Tiles	Modulyss or equivalent
54	XPS	Supreme or equivalent

LIST OF CODES

The materials and workmanship shall be in accordance with the requirement of the appropriate IS code wherever applicable together with any building regulations or byelaws governing the works.

The following list is included for guidance only and the omission from the list does not relieve the contractor from compliance there with:

IS 1200	:	Mode of measurement.

IS 269 IS 3812, 1981	:	Ordinary Portland cement. Fly ash for use as pozzolana and admixtures,
IS 2386	:	Method of test for aggregate for concrete.
IS 516	:	Method of test for strength of concrete
		Coarse and fine aggregate from natural sources for concrete.
IS 1077, 1970	:	Method of test for Bricks.
IS 456	:	Code of practice for plain and reinforced concrete.
IS 1597	:	Code of practice for construction of stone masonry.
IS 1597 PART 1	:	Code of practice for construction of rubble stone masonry.
IS 1130	:	Marble (blocks, slabs and tiles)
IS 287	:	Recommendation for maximum permissible moisture contents of Timber used
IS 1141	:	Code of practice for seasoning of timber.
IS 6313 PART 2	:	Anti-termite measures in buildings, pre-constructional chemical treatment
IS 2571	:	Code of practice for laying in situ cement concrete flooring
IS : 226	:	Structural Steel (Standard Quality)
IS : 451	:	Technical Supply Conditions for Wood Screws
IS : 800	:	Code of Practice for Use of Structural Steel in General Building
IS : 806	:	Code of Practice for Use of Steel Tubes in General Building
IS : 813	:	Scheme of Symbols for Welding
IS : 814	:	Covered Electrodes for Metal Arc Welding of (part I & II) Struc-
IS : 816	:	Code of Practice for Use of Metal Arc Welding for General Con-struction in Mild
IS : 822	:	Code of Practice for Inspection of Welds
IS : 961	:	Structural Steel (High Tensile)
IS 73	:	Paving bitumen.
IS 702	:	Industrial Bitumen
IS 1322	:	Bitumen felts for waterproofing and damp proofing.
IS 1609	:	Code of practice for laying damp proof treatment using bitumen
IS 13711 & 13712	:	Ceramic tiles
IS 13630 Part 1 to	:	Testing for Ceramic tiles
IS 104	:	Specification for ready mixed painted, brushing, zinc chrome,
IS 137	:	Ready mixed paint, brushing, matt or egg-shell flat, finishing, interior to Indian
IS 5410	:	Cement paint, colour as required.
IS 6241	:	Method of test for determination of stripping value of road ag-
IS 2720	:	Density test of aggregate.

List of Makes – Electrical

1	11 KV CABLES	M/S POLYCAB HAVELL'S FINOLEX KEI
2	1.1 KV CABLES	FINOLEX POLYCAB HAVELL'S/KEI GEMSCAB KEI
3	CABLE GLANDS (SINGLE/DOUBLE COMPRESSION)	STEPWELL COMET BALGIA SMI
4	LUGS	DOWELLS CRIMPING TYPE (BILLER INDIA PVT. LTD.) HAX (BRASS COPPER ALLOY INDIA LTD.)
5	TERMINALS	ELMEX WAGA PHOENIX
6	CABLE TRAY	SLOTCO STEELWAYS MEM
7	MS CONDUIT AND ACCESSORIES	B.E.C AKG
8	PVC CONDUIT AND ACCESSORIES	B.E.C AKG POLYPACK PRECISION

9	PVC INSULATED COPPER CONDUCTOR WIRES 650/1100 VOLTS GRADE FRLSH	FINOLEX EON LAPP KABEL BONTON POLYCAB R.R. KABLE
10	DISTRIBUTION BOARDS (POWER COATED WITH DOUBLESHUTTER) ELCB/ RCCB/ MCB/RCBO	LEGRAND HAGAR SCHNEIDER ABB SIEMENS
11	ANCHOR FASTNER	HILTI FISHER
12	WELDING RODS	ADVANI
13	PAINTS	ICI/ASIAN SHALIMAR
14	INDUSTRIAL SOCKET OUTLETS	NEPTUNE (BALS) CLIPSAL
15	SWITCHES AND SOCKETS OUTLETS	PHILIPS (ELITE) CRABTREE (ATHENA) SIEMENS WIPRO (STYLUS PLUS) LEGRAND (ARTEOR)
16	TELEPHONE/TV CABLE	DELTON POLYCAB SKYTON
17	CO – AXIAL CABLES	SKYTONE COMSCOPE TRISCOPE
18	EXHAUST FANS/CEILING FAN	CROMPTON/USHA HAVELLS KHAITAN
	PANELS	

19	LT PANELS	TRICOLITE ADLEC AMBIT NEPTUNE **CPRI APPROVED**
20	AIR CIRCUIT BREAKER	SCHNEIDER (MVS) ABB (E MAX) L & T (OMEGA) SIEMENS (WL) GE (INTELLIGUARD)
21	MCCB	SCHNEIDER MG NSX ABB (EMAX) L & T (DSINE) SIEMENS 3 VL
22	POWER & AUXILIARY CONTACTOR	SCHNEIDER (T SYS) ABB
23	TIMERS	SCHNEIDER ABB/SIEMENS GIC
24	APFC RELAY (MICROPROCESSOR BASED)	EPCOS DUCATI CONZERV
25	SYNCHRONIZING/AMF RELAY	DEIF WOODWARD
26	TVSS	OBO ZOTUP
27	PLC	ALLEN BRADLEY SCHNEIDER SIEMENS MISTUBSHI
28	CURRENT TRANSFORMER	G & M AE KAPPA

		PRAGATI NEWTEK
29	POTENTIAL TRANSFORMER	G & M AE KAPPA PRAGATI
30	INDICATING LAMP (LED TYPE)	ESBEE SCHNEIDER SIEMENS VAISHNO
31	PUSH BUTTON (SPRING RETURN)	ESBEE SCHNEIDER SIEMENS VAISHNO
32	DIGITAL MULTI FUNCTION METER	SCHNEIDER-CONZERV SECURE SOCOMEC
33	SELECTOR SWITCH	KAYCEE L & T SIEMENS SALZER
34	TERMINAL BLOCKS	ELMAX CONNECTWELL PHEONIX WAGO
35	ANNUNCIATER	MINILEC ALAN
36	BATTERY CHARGER/POWER PACK	MAHAMAI VOLSTAT AE ALAN
	UNIT SUBSTATION	
		MADHU

37	UNIT SUBSTATION	AMBIT SUDHIR
38	VCB – 11 KV	ABB-VMAX SCHNEIDER–EVOLIS SIEMENS 3AH5
39	11KV / 415 VOLT OIL TYPE TRANSFORMER WITH AUTOMATIC OLTC	ABB SCHNEIDER SUDHIR VIDYUT KOTSON RECON
40	CURRENT TRANSFORMER	ECS PRAGATI KALPA AE
41	POTENTIAL TRANSFORMER	ECS PRAGATI KALPA/AE
42	ELECTRONIC DIGITAL METER WITH LED DISPLAY	SCHNEIDER – CONZERV L & T SECURE
43	PROTECTIVE RELAY (NUMERICAL) (O/C, E/F, REF, DIFF)	SCHNEIDER SIEMENS ABB
44	POWER & AUXILIARY CONTACTOR	SCHNEIDER (T SYS) ABB
45	AUXILIARY RELAY	OMRON/ABB SCHNEIDER
46	OVER LOAD RELAY	SCHNEIDER ABB SIEMENS ABB
47	TIMERS	SCHNEIDER ABB

47	TIMERS	SIEMENS GIC
48	INDICATING LAMP (LED TYPE)	ESBEE SCHNEIDER SIEMENS VAISHNO
49	PUSH BUTTON (SPRING RETURN)	ESBEE SCHNEIDER SIEMENS VAISHNO
50	SELECTOR SWITCH	KAYCEE L & T SIEMENS SALZER
51	TERMINAL BLOCKS	ELMAX CONNECTWELL PHEONIX WAGO
52	ANNUNCIATER	MINILEC ALAN
53	BATTERY CHARGER/POWER PACK	MAHAMAI VOLSTAT AE ALAN

2.0 PARTICULAR TECHNICAL SPECIFICATIONS

1 INTRODUCTION

CDRI, New Delhi has taken 2 floors (4th and 5th floors) in Shriram Bharatiya Kala Kendra, Copernicus Marg, New Delhi for office which is already furnished and wants to have this renovated as per their requirements.

The office shall have Cabins, Meeting Rooms, Conference Rooms, Library and Open Halls for Workstations, Lounge and activity area.

The existing office is already air conditioned with couple of Hi wall & 2 Cassette type Split Units. Some of these units are about 1 year old and are in good condition.

It is proposed to air condition the renovated floor with combination of old (existing) Split units and new VRF / VRV units. It is also proposed to provide TFA units for providing fresh air to these air conditioned areas. Details of air conditioning areas are mentioned in Table 1 Basis of Design enclosed.

All the toilets shall be mechanically ventilated.

1.1 Scope

The scope of this tender shall cover complete HVAC System of Office for CDRI, New Delhi. The contractor shall carry out and complete the said work in every respect in accordance further with this contract and under the directions of and to the satisfaction of the Engineers-In-Charge. The Engineers-In-Charge may in His discretion and from time to time issuing and/or written instructions, details, directions and explanations which are hereunder collectively referred to as “Engineers In Charge” instruction in regard to :-

A) The variation or modification of the design, quality or quantity of works or omission or substitution of any work.

B) Any discrepancy in the drawings or between the schedule of quantities and/or drawing and/or specifications.

C) The removal and/or re-execution of any works executed by the contractor.

D) The dismissal from the works of any person employed there upon.

E) The amending and making good of any defects. The contractor shall forth with comply with and duly execute any work comprised in such Engineers-In-Charge instructions provided always that verbal instructions, directions and explanations given to the contractor or his representative upon the works by the Engineers-In-Charge shall if involving a variation, be confirmed in writing by the contractor within 14 days. And if not dissented from in writing within a further 7 days by the Engineers-In-Charge, such shall be deemed to be the Engineers-In-charge instructions within the scope of the contract.

1.2 Codes and Standards:

Following Codes and Standards shall be used

Regulations and Standards

- National Building Code of India (NBC) 2016
- Air Moving and Conditioning Association Inc. USA (AMCA)

- Air-Conditioning and Refrigeration Institute (ARI)
- American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)
- Indian Society of Heating, Refrigeration and Air-Conditioning Engineers (ISHRAE)
- Heating and Ventilation Contractors Association (HVCA)
- International Organisation for Standardization (ISO)
- Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
- Air filters as per ASHRAE 52.1-1992 and 52.2-2007
- Indoor Air Quality as per ASHRAE 62.1-2016

Design Manual & Hand Book

- ASHRAE Fundamental, Applications, Refrigeration & Equipment.
- Carrier System Design Manual

1.3 Broad Concept of HVAC Services:

The HVAC Systems for the proposed office renovation have been conceptualized based on the Architectural drawings and relevant ASHRAE and other design standards. All services shall be concealed / on surface and suitable vertical shafts, floor cutouts and floor fill in service areas shall be provided throughout the building. Conservation of energy, optimization of resources, eco-friendliness and State of the art technology shall be the key factors in the design concept to ensure least downtime and reduce maintenance hassles.

It is proposed to install combination of old (existing) aircooled Split airconditioners & new air cooled VRF / VRV System in whole offices. Indoor units will be Duct able units / AHUs, Cassette / Hi wall type units, etc. Broadly the areas are shown in Table - 1 Basis of Design.

1.4 Energy conservation features:

Air – conditioning & ventilation system design shall be well equipped with energy conservation features to reduce energy consumption and operating costs where economically feasible, generally as follows:

a. High EER (Low IKW / TR) VRV System.

b. Energy efficient motors for large ventilation fans.

c. Selection of highly efficient fans for ventilation system.

2 BASIS OF DESIGN (AIR CONDITIONING):

2.1 Site Location:

Site Location : **New Delhi**

2.2 Outdoor Design Conditions:

Following outside conditions are considered:

Summer

Dry Bulb Temperature : **110** Deg F (**43.3** Deg. C)

Mean Coincident Wet Bulb Temperature : **75** Deg F (**23.9** Deg. C)

Monsoon

Dry Bulb Temperature (Mean Coincident) : **95** Deg F (**35.0** Deg. C)

Wet Bulb Temperature : **83** Deg.F (**28.3** Deg. C)

Winter

Dry Bulb Temperature : **45** Deg.F (**7.2** Deg. C)

Mean coincident Wet Bulb Temperature : **41** Deg F (**5.0** Deg. C)

2.3 **Inside Design Conditions:**

Summer / Monsoon

Dry Bulb Temperature : **73 +/- 4** Deg.F (**23 +/- 2** Deg. C)

Relative Humidity (RH) : Not exceeding 60% (without control)

2.4 **Occupancy**:

Occupancy has been considered as shown in architectural drawings & Table 1 enclosed.

2.5 **Lighting & Equipment Heat**:

Lighting in offices and other areas has been considered as 8 Watts / Sq metre (0.8 Watts / Sq ft).

Equipment heat as considered is shown in Table 1 enclosed.

2.6 **Fresh air**:

Fresh air quantities considered for air conditioned areas in accordance with ASHRAE Handbook – HVAC Application 2007 / ASHRAE Standard 62.1 / 2007. Area wise Fresh Air has been shown in Table 1 enclosed.

2.7 **Construction**:

Roof exposed to outside weather of air conditioned areas is assumed to be insulated with 50 mm thick expanded polystrene or equivalent insulation.

3 SYSTEM DESCRIPTION:

3.1 Area wise proposed system

All enclosed rooms like Cabins, Meeting Rooms, etc shall be air conditioned with dedicated existing Hi wall / Cassette type Split units. Balance areas shall be provided with VRF / VRV system. It is also proposed to provide treated fresh air units for both the floors.

Details of units are shown in Table 1 & Bill of Quantities.

Contractor shall do his own load calculations to confirm the adequacy of equipments proposed.

Air distribution of ductable units shall be thru GSS ducting, aluminum Grilles / diffusers, etc.

4 MECHANICAL VENTILATION:

Mechanical ventilation shall be designed on the following basis

Toilet(Private)	Exhaust 50 CFM per toilet minimum

Toilet(Public)	Exhaust 50 CFM per toilet / Urinal minimum

4.1 **General**

Mechanical ventilation system comprising Ventilation Fans Units, air distribution ductworks, and supply and exhausts grilles, air intake and exhaust louvers, etc. will be provided to serve the basement. All toilets shall be ventilated with Inline Fans.

4.2 Toilets Ventilation

Each floor shall have dedicated Toilet Exhaust Inline fan with ducting system:

Mechanical exhaust will be provided for the toilets based on the design criteria as stated. The exhaust air will be make-up by conditioned air from adjacent area or other air-conditioned areas.

5 MAKES OF EQUIPMENTS & MATERIALS:

The makes of equipments approved for the HVAC work are given in Table 2 enclosed.

TABLE 1 - BASIS OF DESIGN AIRCONDITIONING

S.NO	DESCRIPTION	AREA - (SQFT)	TOTAL OCCUPANCY	EQUIPMENT HEAT KW	FRESH AIR	SUMMER REF. LOAD	MONSOON REF. LOAD	SUMMER AIR QUANTITY	PROPOSED TYPE OF IDU	IDU CAPACITY TR	QUANTITY
		SQFT	Nos.	KW	CFM	TR	TR	CFM		TR	Nos.
	FOURTH FLOOR										
1	Reception & Waiting	149	4	0.20	40	1.01	0.92	455	Hi wall Split (Existing)	1.80	1
2	Director Cabin 1	152	4	0.30	40	0.96	0.89	424	Hi wall Split (Existing)	1.80	1
3	Director Cabin 2	170	4	0.30	40	1.23	1.10	581	Hi wall Split (Existing)	1.80	1
4	Staff Area	60	3	0.00	30	0.55	0.54	222	Hi wall Split (Existing)	1.00	1
5	Conference Room 1	505	18	0.80	180	3.09	3.19	1208	Cassette (Existing)	3.80	1
6	Conference Room 2	279	12	0.60	120	2.30	2.31	941	Cassette (Existing)	3.80	1
7	Lounge & Activity	1948	55	5.00	550	9.65	10.51	3815	Ducted (VRF)	6.36	2
	Fourth Floor - Sub Total	**3263**	**100**	**7.2**	**1000**	**18.8**	**19.4**	**7646**			
	TFA Unit for Fourth Floor									2.56	2

	FIFTH FLOOR										
8	Library	113	4	0.20	40	0.95	0.89	418	Hi wall Split (Existing)	1.50	1
9	Meeting Room 1	166	6	0.30	60	1.17	1.17	481	Hi wall Split (Existing)	1.80	1
10	Meeting Room 2	137	6	0.30	60	1.29	1.24	553	Hi wall Split (Existing)	1.80	1
11	Director General Cabin	499	12	0.60	120	3.06	2.81	1381	Hi wall Split (Existing)	1.80	2
12	Cabin	170	4	0.30	40	1.34	1.18	645	Hi wall Split (Existing)	1.80	1
13	Director Cabin 1	175	4	0.30	40	1.28	1.21	608	Hi wall Split (Existing)	1.80	1
14	Director Cabin 2	148	4	0.30	40	1.22	1.08	576	Hi wall Split (Existing)	1.80	1
15	Lounge & Activity	1814	40	4.00	400	8.27	8.58	3490	Ducted (VRF)	6.36	2
	Fifth Floor - Sub Total	**3221**	**80**	**6.3**	**800**	**18.6**	**18.2**	**8151**			
	TFA Unit for Fifth Floor									2.56	2
	FOR NEW VRF SYSTEM IT IS PROPOSED TO PROVIDE 2 NOS. HIGH EFFICIENCY VRF ODUS OF 20 HP (EACH HAVING 2X10 HP UNITS)										

Table -2 List of Approved Makes									
1	**Preamble:**								
1.01	Only approved makes for different materials / equipment, as given below, shall be used for execution of the works. No other makes shall be accepted.								
1.02	Any make listed below, but not meeting the specifications, shall not be acceptable.								
1.03	The contractor shall submit two makes, out of the makes listed below, meeting the specifications in total, for the approval of the client. The client/consultant shall have the choice of accepting any one of the two proposals made by the contractor.								
1.04	In case, none of the approved makes is able to conform to the specifications in total, the contractor shall propose to the client all the approved makes furnishing the deviations from the specifications for each make. It will be the sole discretion of the client, in such case, to accept any of the approved makes. Such discretion of the client will be binding and obligatory on the part of the contractor without any financial implication.								
1.05	For the items whose make is not specified, the contractor shall submit two makes, of his own choice, meeting the specifications in total, for the approval of the client. The client/consultant shall have the choice of accepting any one of the two proposals made by the contractor.								
2	**Approved Makes - Equipment:**								
2.01	VRV/VRF Outdoor / Indoor Units		Mitsubishi		Daikin		Toshiba		
2.02	Air Handling Units i/c Cooling Coil		Zeco		Waves		Edgetech		
	Centrifugal Fan for AHU		Nicotra		Comefri		Kruger		
	Filters for AHU		Thermadyne		Purolator				
2.03	Split AC Units		Mitsubishi		Daikin		Hitachi / Carrier		
2.04	Centrifugal Inline Fans		Systemaire		Nicotra		Caryaire		
2.05	Motors		ABB		Crompton		Siemens / Bharat Bijlee		
3	**Approved Makes - Piping Works:**								
3.1	Copper Refrigerant Piping		Mandiv		Rajco				
4	**Approved Makes - Ducting Works:**								
4.1	GI Sheets		Tata		SAIL		Jindal / Bhushan		
4.2	Grilles, Diffusers, Louvers, Dampers, Fire Dampers, Fire & Smoke Dampers, Laminar Flow Diffusers		Caryaire		Ravistar		Mapro		
4.3	Factory Fabricated ducts		Rolastar		Zeco		Ductofab		
4.4	Elliptical /Oval ducts		GP Spira		Waves				
4.5	Preinsulated duct panels		Greenfoam		Equivalent				
4.6	Duct Flexible Connectors		Resistoflex		Durodyne		Navaire		
4.7	Cross Talk Silencer / Attenuators		Caryaire		Ravistar		Cosmos		
4.8	Air Purification System		Pureaire		Aerate		Honeywell / Magneto		
4.9	VAV Units		Honeywell		Johnson Control		Siemens		
5	**Approved Makes - Insulation Works:**								
5.1	Expanded Polystyrene		Beardsell		Styrene Packing		Indian Packaging		
5.2	Fibreglass Insulation		UP Twiga		Owens Corning				

5.3	Nitrile Rubber		Armaflex		Superlon		K flex	
5.4	Insulation Hangers		Lloyd		Bestoplast		Durodyne	
6	**Approved Makes - Controls:**							
6.1	Thermostats, Sensors, Controllers, Humidistats, Water Flow Switch, Air Flow Switch		Johnson		Honeywell		Siemens	
6.2	Actuators for Dampers, Fire Dampers, Fire & Smoke Dampers		Siemens		Belimo		Joventa	
7	**Approved Makes - Electrical Works:**							
7.1	Air Circuit Breakers, Starters, Push Buttons, Contactors, MCCBs, Switch Fuse Units, HRC Fuses, Fuse Base, Indication Lamps		L&T		Siemens		GE	
7.2	MCBs		L&T		Siemens		Havells	
7.3	Single Phase Preventors		L&T		Siemens		Minilec	
7.4	Current Transformers		AE		Kappa			
7.5	Rotary Switches, Selector Switches		L&T		Siemens		Kaycee	
7.6	Analog Ammeters & Voltmeters		L&T		AE			
7.7	Power Cables		Skytone		Grandlay		Havells	
			Gloster		Ecko			
7.8	Control Cables, PVC Insulated Wires		National		Skytone		Finolex	
7.9	Timers & Time Delay Relays		L&T		Siemens		BCH	
7.10	Terminal Blocks		Elmex					
7.11	Power & Control Panels		KEPL		Tricolite		Trident	
8	**Approved Makes - Miscellaneous:**							
8.1	Vibration Isolators		Resistoflex		Dunlop			
8.2	Paints		ICI		Nerolac		Asian	

GENERAL TECHNICAL SPECIFICATIONS

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1. TECHNICAL SPECIFICATION:

1.1. Variable Refrigerant Flow System:

1.1.1. **Scope :**
The scope of this section comprises the supply, erection, testing and commissioning of Variable Refrigerant Flow / Volume System conforming to these specifications and in accordance with the requirements of Drawings and Schedule of quantities.

1.1.2. **Type :**
Unit shall be air cooled, variable refrigerant volume air conditioner consisting of one outdoor unit and multiple indoor units. Each indoor unit having capability to cool independently for the requirement of the rooms. All indoor units shall be provided with isolation valves so that a particular unit can be isolated and removed for servicing, while system keeps functioning in normal way.

It shall be possible to connect multiple indoor unit on one refrigerant circuit as shown in the drawings or as indicated in schedule of quantities. The indoor units on any circuit can be of different type and also controlled individually. Following type of indoor units shall be connected to the system:

- Ceiling mounted ductable type.
- Wall mounted Hi-Wall type.

Compressor installed in outdoor unit shall be equipped with capacity control mechanism, and capable of changing the rotating speed / mass flow rate of refrigerant by scroll engaging / dis engaging mechanism to follow variations in cooling. Outdoor unit shall be suitable for mix-match connection of all type of indoor units.
The refrigerant piping between indoor units and out door units shall be extended upto
165 m with maximum 50 m level difference without any oil traps. Oil recovery system shall
be managed without disturbance to normal operation cycle of the system / compressor.
Both indoor unit and outdoor unit shall be factory assembled, tested and filled with first charge of refrigerant before delivery at site.

1.1.3. **Out Door Unit :**
The outdoor unit shall be factory assembled, weather proof casing constructed from heavy gauge mild steel panels with powder coated finish.
All outdoor units above 5 HP rating shall have minimum two number scroll compressors.

In case of outdoor units with multiple compressor, the operation shall not be disrupted with failure of any compressor.
The noise level shall not be more than
horizontally 1m away and 1.5 m above ground level.
The outdoor unit shall be modular in design with possible future expansions. The unit shall be provided with microprocessor control panel.

1.1.4. **Compressor :**
The compressor shall be high efficiency scroll type and capable for capacity controlling. It shall change the speed / refrigerant mass flow rate in accordance to the variation in cooling load requirement. Refrigerant mass flow rate can be changed by speed modulation of compressor / mechanical control system. System shall incorporate liquid sub-cooling mechanism with liquid injection at intermediate pressure.

The inverter if used, shall be IGBT (insulated gate bipolar transistor) type for efficient and quiet operation. All outdoor units shall have multiple steps of capacity control to meet load fluctuation

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and indoor unit individual control. All parts of compressor shall be sufficiently lubricated. Forced lubrication may also be employed. Oil heater shall be provided in the compressor casing.

1.1.5. **Heat Exchanger:**
The Heat Exchanger shall be constructed with copper tubes mechanically bonded to aluminium fins to form a cross fan coil and larger surface area.

The fins shall have anticorrosion treatment for Heat Exchanger Coil. The treatment shall be suitable for areas of high pollution, moisture and salt laden air.
The casings, fans, motors etc. shall also be with anticorrosion treatment as a standard features.

The unit shall be provided with necessary number of direct driven low noise level propeller type fans arranged for vertical / horizontal discharge. Each fan shall have a safety guard.

1.1.6. **Refrigerant Circuit:**
The Refrigerant Circuit shall include an liquid receiver /accumulator, liquid & gas shut off valves and a solenoid valve. All necessary safety devices shall be provided to ensure the safety operation of the system.

1.1.7. **Safety Devices:**
All necessary safety devices shall be provided to ensure safe operation of the system.

Following safety devices shall be part of the outdoor unit : high pressure switch, low pressure switch, fuse, crankcase heater, fusible plug, over current protection for inverter, and short recycling guard timer.

1.1.8. **Piping:**
All connections of Refrigerant piping shall be in high grade Copper of Refrigeration quality with Eddy Current Testing and material test Certificates.
All connections, tees, reducers etc. shall be standard make fittings.
Insulation of cold lines shall be carried out with Armaflex / K-Flex insulation sheets and tubes of appropriate thickness so that condensation does not occur.
For individual Piping 50 / 100 mm wide Aluminium Tape shall be used at joints of Piping with Bands for identification.
For outdoor piping, the finish shall be woven GRP Mat finished with coloured Epoxy paints to withstand outside ambient conditions and UV Radiation.

1.1.9. **Oil Recovery System:**
Unit shall be equipped with an oil recovery system to ensure stable operation with long refrigerant piping.
System shall be designed for proper oil return to compressor along with the distribution of oil to individual compressor.
The refrigerant piping shall be extended upped 100 M with 50-M level difference without oil traps.

1.1.10. **Indoor Units:**

Units shall be factory assembled, wired, piped and tested.

Units shall have DX coils with copper tubes and bonded aluminium fins for highly efficient heat transfer.
Units shall have Centrifugal fans for adequate amount of Air circulation and low Noise. Units shall have inlet filters, which are easily cleanable and replaceable.
All components of Units are easily accessible for connection, repairs and maintenance. Units shall have very low noise.

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All units with Factory manufactured Units, Grills shall have auto swing feature for proper Air distribution.
All unit shall be controlled by electronic Expansion Valves only.

All units mounted inside the ceiling shall have fans capable of sustaining duct connections, and special filters if necessary.

Visible indoor units shall have wireless remotes. Price of the same shall be included in cost of unit by default.

Concealed indoor units shall have sensor mounted on supply air grilles / diffusers which can be controlled with wireless remotes.

Anticorrosion treatment for avoiding corrosion of coils shall be provided.

All units shall have adequate insulation or Lining to avoid condensation.
Cooling coil and refrigeration parameters shall be designed in such a way that supply air temperature shall not be less than 14C or 10C above room dew point temp, whichever is more. Contractor shall guarantee inside conditions with selected supply air temperature.

1.1.11. **Ceiling Mounted Cassette Type Unit (Multi-Flow Type) :**
The unit shall be ceiling mounted type. The unit shall include pre-filter, fan section and DX-coil section. The housing of the unit shall be powder coated galvanised steel. The body shall be light in weight and shall be possible to suspend from four corners.

Unit shall have a external attractive panel for supply and return air. Unit shall have four way supply air grilles on sides and return air grille in centre.

Each unit shall have high lift drain pump, fresh air intake provision (if specified), low gas level detection system and very low operating sound.

1.1.12. **Ceiling Mounted Ductable Type Unit:**
Unit shall be suitable for ceiling mounted type. The unit shall include pre filter, fan section & DX-coil section. The housing of unit shall be light weight powder coated galvanised steel. The unit shall have high static fan for ductable arrangement.

1.1.13. **High Wall Mounted Units:**
The units shall be high wall mounted type. The unit shall include pre-filter, fan section & DX-coil section. The housing of unit shall be light weight powder coated galvanised steel.

Unit shall have an attractive external casing for supply and return air.

1.1.14. **Floor Mounted Units :**
The unit shall be suitable for floor mounting. The unit shall include, prefilter fan section, DX. Coil section. The housing of unit shall be light weight powder coated galvanised / anodised aluminium panels. Unit shall have an attractive external casing with supply & return air grilles.

1.2. Double Skin Air Handling Units

Scope

The scope of this section comprises the supply, erection, testing and commissioning of double skin, sectionalized construction air handling units, conforming to these Specifications and in accordance with requirements of drawings and of the Schedule of Quantities. The units shall be floor mounted horizontal/vertical type & ceiling suspended type as indicated in the Schedule of Quantities.

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Type

The air handling units shall be double skin construction, draw-thru type comprising of various sections such as mixing box, (wherever the return air is ducted), filter section, coil section and fan section, as shown on drawings and included in schedule of quantities.

Capacity

The air handling capacities, maximum motor horse power and static pressure shall be as shown on Drawings and in Schedule of Quantities.

Casing & Drain Pan

Double skinned sandwiched panels shall be 23 mm / 46 mm thick made of galvanized steel, pressure injected with foam insulation (density 40 kg/m^3) with K factor not exceeding 0.02 Watt/Mc shall be fixed to 1.5 mm thick aluminium alloy twin box section structural framework with stainless steel screws. Outer sheet of panels shall be made of galvanized pre-plasticized /pre-coated sheet of 24 gauge/ 0.63 mm thick, and inner sheet of 24 Gauge/0.63mm thick plain G.I.Sheet.

The entire framework shall be mounted on an aluminium alloy or galvanized steel (depending on size) channel base as per manufacturer's recommendation. The panels shall be sealed to the framework by heavy duty `O' ring gaskets held captive in the framed extrusion. All panels shall be detachable or hinged. Hinges shall be made of die cast aluminium with stainless steel pivots, handles shall be made of hard nylon and be operational from both inside and outside of the unit. Units supplied with various sections shall be suitable for onsite assembly with continuous foam gasket. All fixing and gaskets shall be concealed.

Units shall have hinged, quick opening access door in the fan section and also in filter section where filters are not accessible from outside. Access doors shall be double skin type.

Condensate drain pan shall be fabricated from 18 gauge stainless steel sheet with all corners welded. It shall be isolated from bottom floor panel through 25 mm heavy duty TF expanded polystyrene or urethane foam.

Thermal Break Profile

AHU's such as TFA units, AHU with mixing box having return air ducted shall be provided with thermal break profile as indicated in schedule of quantities. Also these AHU's shall be provided with 46 mm thick panel.

Mixing Box Section

AHU's requiring mixing boxes as specified in Schedule of Quantities shall be complete with fresh and return air dampers.

Damper

Dampers shall be opposed blade type. Blades shall be made of double skinned aerofoil aluminium sections with integral gasket and assembled within a rigid extruded aluminium alloy frame. All linkages and supporting spindles shall be made of aluminium or nylon, turning in teflon bushes. Manual dampers shall be provided with a bakelite knob for locking the damper blades in position. Linkages shall be extended wherever specified for motorized operation. Damper frames shall be sectionalized to minimize blade warping. Air leakage through dampers

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when in the closed position shall not exceed 1.5% of the maximum design air volume flow rate at the maximum design air total pressure.

Motor And Drive

Fan motors shall be energy efficient *(EFF-1)* and shall be 415±10% volts, 50 cycles, three phase, totally enclosed fan-cooled class F, with IP-55 protection. Motors shall be especially designed for quiet operation and motor speed shall not exceed 1440 rpm. Drive to fan shall be provided through belt-drive arrangement. Belts shall be of the oil-resistant type.

Fan Section

Fans shall be centrifugal, forward inclined blades (static pressures upto 70 mm Wg) and backward inclined blades (static pressure above 70 mm Wg). Fans driven by variable frequency drive shall be backward inclined irrespective of static pressure value. Plug fans can also be used. Fans shall be selected for minimum efficiency of 75%. Fan casing shall be made of galvanized steel sheet. Fan wheels shall be made of galvanized steel. Fan shaft shall be grounded C40 carbon steel and supported in self-aligning plummer block operating less than 75% of first critical speed, grease lubricated bearings. Fan wheels and pulleys shall be individually tested and precision balanced dynamically. Fan motor assembly shall be statically and dynamically balanced to G6.3 grade as per relevant ISO/AMCA standard. Computerized fan selection print outs shall be submitted along with the offer. Fans shall be AMCA certified. Fan outlet velocity shall not exceed 9.2 m/s (1800 FPM)

Motors shall be mounted inside the AHU casing on slide rails for easy belt tensioning, and be TEFC, class `F' insulation. Motors shall drive heavy duty V-belt, constant pitch, drive selected at 110% of motor horsepower. Motor speed shall not be more than 1440 RPM.

Both fan and motors assemblies shall be mounted on a deep section aluminium alloy or galvanized steel (depending on size) base frame.

Spring Isolators shall be provided for isolating the fan & motor assembly from the AHU casing for capacities 6000 cfm & above. Flame retardant, waterproof silicone rubber impregnated flexible connection shall be provided at the fan discharge.

Cooling Coil Section

DX coils shall be as per requirement of VRF / VRV manufacturer and shall have 12.5 to 15 mm dia (O.D) tubes minimum 0.4 mm thick with sine wave aluminium fins firmly bonded to copper tubes assembled in zinc coated steel frame. Face and surface areas shall be such as to ensure rated capacity from each unit and such that the air velocity across the coil shall not exceed 2.54 meters/second (500 FPM). The coil shall be pitched in the unit casing for proper drainage. The coil shall have copper header with supply & return connections protruding out of AHU casing by minimum 150 mm and fitted with dielectric coupling for connection with MS pipes. Each coil shall be factory-tested at 21kg per sq.m air pressure under water. Tube shall be hydraulically / mechanically expanded for minimum thermal contact resistance with fins. Fin spacing shall be 4 - 5 fins per cm. (13 FPI).

All AHU's shall be provided with minimum 4 Row Cooling Coil or as specified in the Schedule of Quantities, whichever is higher. All TFA AHU's shall be provided with minimum 6 row cooling coil.

Computerized cooling coil selection output shall be submitted. Coil rating shall be as per ARI-410/2006.

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Filter Section

AHU's Pre-Filter section shall be synthetic fibre type with efficiency of 90% down to 10 micron particle size. Filter shall have anodized aluminium frame.

Accessories

Each air handling unit shall be provided with manual air vent at high point in the cooling coil and drain plug in the bottom of the coil for Chilled water coil. In addition, the accessories may be required at air handling units, their detailed specifications are given in individual sections, & quantities separately identified in schedule of Quantities.

Painting

Shop coats of paint that have become marred during shipment or erection shall be cleaned off with mineral spirits, wire brushed and spot primed over the affected areas, then coated with paint to match the finish over the adjoining shop painted surface.

Performance Data

Air handling unit shall be selected for the lowest operating noise level of the equipment. Fan performance rating and power consumption data, with operating points clearly indicated shall be submitted and verified at the time of testing and commissioning of the installation.

Testing

Cooling capacity of various air handling unit models be computed from the measurements of air flow and dry and wet bulb temperatures of air entering and leaving the coil. Flow measurements shall be by an anemometer and temperature measurements by accurately calibrated mercury- in-glass thermometers. Computed results shall conform to \ the specified capacities and quoted ratings. Power consumption shall be computed from measurements of incoming voltage and input current.

1.3. Ventilation & Exhaust Fans:

This specification is to be read in conjunction with the drawings, particular technical specification and schedule of quantities enclosed. The ventilation application includes cabinet type supply and exhaust air fans, propeller type wall exhaust air fans, centrifugal fans which are briefly described below in this specification:

1.3.1. Propeller Fans:

Propeller type of fans shall be of approved make. Fan shall be of the broad type, ring or diaphragm mounted and the capacity shown in the schedule of equipment. Fans shall be provided with gravity type louvers unless otherwise stated. Roof extractors shall be complete with propeller fans, dampers and dome. Fan drive shall be single phase or three phase motors as indicated in the schedule of equipment and shall be complete with starter.

1.3.2. Inline Fans:

Centrifugal Inline Fans shall be installed in wall or ceiling position horizontal or vertical installation. The rectangular fan shall be SISW made of galvanized steel. Motor of TEFC squirrel

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cage induction with minimum IP-44 degree of protection. Fan and motor assembly shall be housed in 22G galvanized sheet steel casing. The fan & motor assembly shall be accessible through an access door provided in the casing. The door shall be fixed to the casing using proper gaskets to make the casing leak proof. The fan shall be provided with flanges at both ends for easy connections. The fan shall be connected to the ducts/walls using duct flexible connectors. Necessary accessories include speed regulator complete with wiring for fan.

1.3.3. **Axial Flow Fans:**

Axial flow fans shall be direct or belt driven. Casing, Impeller, Motor, Motor mount, Coupling for direct driven fans, Drive set & V-Belts for belt driven fans, vibration isolators, support brackets welded to the casing etc are the major components of axial flow fan. The casing Fabricated out of mild steel sheets with flanges at both ends, completely welded construction with motor mounting plate at least 15 mm thick with inspection door with handle and gaskets and finish: Synthetic enamel painted or Epoxy painted or Zinc sprayed painted. Impeller made of die cast aluminium, aerofoil design blades with adjustable pitch angle. Testing as per IS 3588. Accessories for the fan are as follows:

- Matching flanges at inlet and outlet (to be supplied by fan manufacturer)
- Louver shutters
- Wall cowl and bird screen, if required by the application
- Volume control damper at inlet or outlet
- Inlet cone, if required
- Outlet cone for static regain, if required

1.3.4. **Foundation:**

The concrete foundation required for the fans and cushy foot mountings shall be provided with all foundations bolts, base-plate etc. Also ensure that all the above accessories are laced securely in proper position while the foundation in cast. Wherever the fans are to be suspended form the ceiling or mounted on the wall, the contractor shall include supply and fixing of all the material that may be required to complete the installation in all respects. Vibration eliminations shall be provided with an efficiency of not less than 80%. Fan belt and outlet connections shall be by means of flexible canvas connections. Fan belt drive shall be complete with bolts, belt sheaves and suitable belt guard. For all high temperature exhaust, flexible connections at the fan inlet and outlet shall be of double asbestos cloth.

1.3.5. **Test:**

Fan shall be tested for the performance and the test results for air volume and static pressure at fan supply shall be furnished.

1.3.6. **Painting:**

On completion of erection and testing, fans shall be painted with 2 coats of an appropriate paint of approved colour.

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1.4. Sheet Metal Works:

This specification is to be read in conjunction with the drawings, particular technical specification and schedule of quantities enclosed. For ducting with GSS material the following points are to be considered for fabrication:

- Shall conform to IS-277 with latest amendments
- Produced by Hot Dip Galvanizing process.
- Galvanizing: Light coating of zinc with nominal coverage of 120 gm/Sqm of surface area.
- Lock forming quality, non-oiled, regular spangle & without any water marks
- Thickness tolerances: as allowed by BIS.
- Samples from each lot shall be tested from an independent laboratory by the contractor for thickness and galvanizing, at his cost, and the material shall be accepted only after the report confirms that the material conforms to the specifications.

GSS Ducting:			
Larger Dimension of the duct - mm	**GI Sheet Thickness**	**Transverse Joints**	**Structural Steel Bracing**
0 to 400	24 G (0.63 mm)	C - Cleat Slip Joints	None
401 to 750	24 G (0.63 mm)	25 x 25 x 3 Steel Angles	None
601 to 1000	22 G (0.80 mm)	25 x 25 x 3 Steel Angles	30 x 30 x 4 Angle Bracing @ 1250 mm Centres
1001 to 1500	22 G (0.80 mm)	30 x 30 x 4 Steel Angles	40 x 40 x 4 Angle Bracing @ 1250 mm Centres
1501 to 2000	20 G (1.00 mm)	40 x 40 x 4 Steel Angles	40 x 40 x 4 Angle Bracing @ 1250 mm Centres
2001 to 2250	20 G (1.00 mm)	50 x 50 x 5 Steel Angles	50 x 50 x 6 Angle Bracing @ 800 mm Centres
2251 & above	18 G (1.25 mm)	50 x 50 x 5 Steel Angles	50 x 50 x 6 Angle Bracing @ 625 mm Centres

Aluminium Ducting:			
Larger Dimension of the duct - mm	**Aluminium Sheet Thickness**	**Transverse Joints**	**Bracing**
0 to 400	0.71 mm	C - Cleat Slip Joints	None

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401 to 750	0.71 mm	25 x 25 x 2 Stainless Steel Angles	None
601 to 1000	0.90 mm	25 x 25 x 2 Stainless Steel Angles	30 x 30 x 2.5 Stainless Steel Angle Bracing @ 1250 mm Centres
1001 to 1500	0.90 mm	30 x 30 x 2.5 Stainless Steel Angles	40 x 40 x 2.5 Stainless Steel Angle Bracing @ 1250 mm Centres
1501 to 2000	1.20 mm	40 x 40 x 2.5 Stainless Steel Angles	40 x 40 x 2.5 Stainless Steel Angle Bracing @ 1250 mm Centres
2001 to 2250	1.20 mm	50 x 50 x 3 Stainless Steel Angles	50 x 50 x 3 Stainless Steel Angle Bracing @ 800 mm Centres
2251 & above	1.50 mm	50 x 50 x 3 Stainless Steel Angles	50 x 50 x 3 Stainless Steel Angle Bracing @ 625 mm Centres

1.4.1. **Procedure:**

All ducts shall be machine made on lock former with Pittsburgh longitudinal seam. Round exposed ducts shall be die-formed with spiral joints. The fittings for such ducts shall also be die-formed. All drawings shall indicate the internal dimensions of the duct. The ducts shall be fabricated in size bigger than the sizes indicated on the drawings to incorporate the thickness of acoustic insulation, wherever applicable. Ducts shall be straight and smooth from inside. The joints shall be neatly finished. All longitudinal and transverse joints shall be sealed using approved quality silicon sealant. Ducts and accessories, with in the false ceiling and / or boxing but visible from the space shall be provided with mat black finish paint. Changes in the dimensions and shape of ducts shall be gradual. Vanes shall be provided in all the bends so as to avoid any air turbulence. All sheets shall be cross-broken to provide rigidity to the ducts. All ducts shall be adequately supported and braced to keep the ducts true to shape and to prevent buckling, vibrations or breathing. All duct plenums shall be fabricated out of 18G (GSS) or 16G (Aluminium) sheets and shall be suitably braced. The plenums shall be complete with access doors (of minimum size 450 x 450), as required, for cleaning and maintenance. Angle flanges and bracing shall be fixed to the ducts using aluminium / GI rivets of 3 mm dia nominal size fixed at 75 mm centre to centre. The rivet heads shall be inside towards the duct sheets and riveting to be done from out side. Both side self adhesive neoprene rubber gasket (minimum 3 mm thick) shall be used between the flanges for the complete sealing.

1.4.2. **Supports:**

Supports for horizontal GSS ducts, the supports shall be provided at a maximum spacing of 2400 mm and shall be made of following components:

- RCC expansion fasteners
- Full threaded GI rods
- Structural steel bearing members

1.4.3. **The sizing of the above referred members of MOC – GSS shall be as under:**

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- For ducts up to size 1500 mm: 10 mm dia expansion fasteners, 10 mm dia GI threaded rods and 40 x 40 x 4 mm (minimum) bearing angle.
- For ducts of size 1501 to 2000 mm: 10 mm dia expansion fasteners, 10 mm dia GI threaded rods and 50 x 50 x 5 mm (minimum) bearing angle.
- For ducts of size 2001 to 3000 mm: 12 mm dia expansion fasteners, 12 mm dia GI threaded rods and 50 x 50 x 6 mm (minimum) bearing angle.

1.4.4. **Fabrication of GSS Duct**

- All structural steel used for the supports, flanges, bracing etc. shall be treated with two coats of red oxide primer and two coats of approved shade of enamel paint.
- All nuts/bolts used for fabrication and/or installation shall be of galvanized steel.
- All cut edges, welded portions, drilled areas etc. shall be painted with red oxide primer and then with enamel paint.

1.4.4A Preinsulated Duct System

Factory Fabricated Boxed Ducting

(Using Sandwiched Panels of Polyurethane Foam between Aluminum Foils)
The duct shall be fabricated out of sandwiched panels made up of CFC Free Poly Urethane / Poly IsocynuRate Foam between Aluminium Foils as per the parameters given below

Duct Materials Specifications

The duct shall be fabricated out of sandwiched panels made up of aluminum foils on both sides and in between sandwiched with PUR/PIR foam. Insulating foam material shall be Expanded Rigid Polyisocyanurate Foam having closed cell content not less than 95%, CFC/ HCFC free, Non-Toxic, Non-Combustible, Zero Ozone Depletion, Zero Global Warming Potential and Non Ignitable as per the parameters given below:

Physical Characteristics of the panels shall be as follows::

Thickness of Panels	Air-conditioned Areas	Plenums	Exposed to weather
	20 Mm	30 mm	30 mm
Thickness of Aluminum	80/80 Microns	80/200 Microns	80/200 microns
Density of the Foam- Minimum	45 kg/m³	50 kg/m³	50 kg/m³
Finishing of Aluminum	Embossed	Embossed	Embossed Embossed Embossed Embossed

Internal Areas(Airconditioned Space not Exposed to Sunlight) :

20mm Thick Panel Irrespective of Duct size. Stiffening should be provided for the duct size only above 1100mm.

Plenum (AHU/Plant Room) :

All Plenum Boxes and ducts should be made of 30mm Thick Panel irrespective of duct size. All Stiffening should be given as prescribed by the Panel Manufacturer.

External Areas (Exposed to Weather/Direct Sunlight):

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All ducts should be made of 30mm irrespective of duct size. All Stiffening should be given as prescribed by the Panel Manufacturer.

The **Panel Strength** should have :

Compressive Strength of minimum 220 Kpa as per ASTM 1621
Flexural Strength of 1170 KPa as per ASTM C203

Water Absorption Level of less than 0.15%. after 24 hours of immersion as per ASTM C209
The said panel material should be test certified for **Fire Properties** by competent authority:

It should be certified for 'for Class 'O' according to BS 476 Part 6& 7 by Authorized International Fire Testing Laboratories i.e. 'WARRINGTON FIRE LABORATORIES, UK

It should be certified for similar Fire properties by Authorized Indian fire test laboratories i.e. C.B.R.I, Roorkee
For Flame Spread Index it should be certified for Class "A" certification as per 'ASTM E84' by relevant international authorities

For Smoke Developed Index , it should be certified for Class "A" certification as per 'ASTM E84' and similar safety codes by relevant international authorities
1) Toxicity Index shall not exceed 5.7 according to 'NES 713' by international fire testing laboratories i.e. 'WARRINGTON FIRE LABORATORIES, UK

The Manufacturer may have **Additional Certification** from other competent authorities which may add to their advantage like :
1) Fire Mideast Product Listing (MPL) and
2) Factory Production Control Certificate (FPC)

The Panel Manufacturer should additionally comply with following Quality and Operational Standards for not only panels but accessories also :
1) OHSAS-1800:2007 for Occupational Health and Safety Management System

2) ISO 9001:2008 for Quality Management System

3) ISO 14001:2004 for Environmental Management System

Anti Rodent

Panel material should be anti rodent type. i.e. it should be unpleasant for rodents (i.e. rats , mice) habitation. The foam should contain amine catalysts causing an unpleasant smell which deters rodents from biting thru or nesting in foams. The panels should have been certified for this property by competent international agency like 'Bayer' .

Pressure Range:

No relevant modification of insulation, chemical or physical characteristics of the panels to be measurable, when conveying air up to the pressure of 1000 Pascal for 20 mm thick panels and 1750 Pascal for 30 mm thick panels.

Thermal insulation characteristics :

Thermal insulation characteristics shall be as follows:
- Physiologically and Chemically inert and insoluble,

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- Vermin proof,
- Fungus proof,
- Non-Metabolisable.
- Thermal Conductivity: 0.02 W/mK or better as per ASTM C518
- Water Absorption shall be less than 0.5% by 24 hours immersion test.

Temperature Range:

No relevant reduction of insulation, chemical or physical characteristics of the panels to be measurable, when conveying air in the temperature range of –35 Deg C to +110 Deg C.

Extended Warranty on Insulation Characteristics :

Original Panel Manufacturer should offer 5-years Warranty for the Insulation material Characteristics.

1.4.5. **Volume control dampers for balancing purpose:**

- Shall be provided at the junction of each branch and the main duct.
- Shall be made of 16 G GI or aluminium flanged casing and 20 G GI or aluminium double skinned aerofoil blades.
- Shall be with approved lever operation and locking mechanism.
- The ends of the operating lever shall be clearly marked with open and close positions.
- The dampers shall be of opposed blade configuration.
- The blades shall be with polished steel pins moving in nylon bushes.
- The width of the blades shall not exceed 225 mm.
- Adequate precautions shall be taken, especially for clean areas, during the manufacturing and installation of dampers, to avoid any leakage through the dampers.

1.4.6. **Volume control damper for isolation purpose:**

- Shall be provided at the inlet and outlet of the equipment and/or duct to be isolated.
- The construction of the dampers shall be same as above except that additionally, side seals and seals at top and bottom shall be provided to further prevent leakage when the damper is in closed position.
- It should be possible at site to remove the operating lever of the damper and fix an electrical actuator to make the damper automatic instead of manual.

1.4.7. **Extruded aluminium discreet grilles:**

- Shall be made of extruded aluminium construction frame and blades.
- Shall have horizontal fixed blades angled at 15 degree for vertical mounting and at 0 degree for horizontal mounting.
- The grilles shall be with 20 mm wide flanges all around.
- The grilles shall be with concealed fixing arrangement.
- The grilles shall be supplied in powder-coated finish to a colour approved by the architect/ consultant.
- The grilles with dampers shall be provided with black mat finish 20 G GI construction dampers at the back of the grille.

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- The damper shall be of the same make as the grille.
- The damper shall be supplied fixed to the grille and shall not be supplied loose.
- It shall be possible to operate the damper from the face of grille without having to remove the grille.
- All grilles shall be provided with approved quality gasket at its back for airtight installation.

1.4.8. **Mild steel discreet grilles:**

- Shall be made of 18 G Mild steel frames and 20 G mild steel blades.
- Shall have front horizontal and rear vertical adjustable blades.
- The grilles shall be with 20 mm wide flanges all around.
- The grilles shall be with concealed fixing arrangement.
- The grilles shall be supplied in powder-coated finish to a colour approved by the architect/ consultant.
- The grilles with dampers shall be provided with black mat finish 20 G GI construction dampers at the back of the grille.
- The damper shall be of the same make as the grille.
- The damper shall be supplied fixed to the grille and shall not be supplied loose.
- It shall be possible to operate the damper from the face of grille without having to remove the grille.
- All grilles shall be provided with approved quality gasket at its back for airtight installation.

1.4.9. **Extruded aluminium discreet diffuser:**

- Shall be made of extruded aluminium construction frame and blades.
- Shall have fixed distribution grids, removable core, square or rectangular type with anti-smudge rings.
- The throw of the diffusers shall be 1, 2, 3 or 4 way as per the approved shop drawings.
- The diffusers shall be with concealed fixing arrangement.
- The diffusers shall be supplied in powder-coated finish to a colour approved by the architect/ consultant.
- The diffusers with dampers shall be provided with black mat finish 20 G GI construction dampers at the back of the diffuser.
- The damper shall be of the same make as the diffuser.
- The damper shall be supplied fixed to the diffuser and shall not be supplied loose.
- All diffusers shall be provided with approved quality gasket at its back for airtight installation.

1.4.10. **Mild steel discreet diffuser:**

- Shall be made of 18 G Mild steel frames and 20 G mild steel blades.
- Shall have fixed distribution grids, removable core, square or rectangular type with anti-smudge rings.
- The throw of the diffusers shall be 1, 2, 3 or 4 way as per the approved shop drawings.
- The diffusers shall be with concealed fixing arrangement.
- The diffusers shall be supplied in powder-coated finish to a colour approved by the architect/ consultant.
- The diffusers with dampers shall be provided with black mat finish extruded 20 G GI construction dampers at the back of the diffuser.
- The damper shall be of the same make as the diffuser.
- The damper shall be supplied fixed to the diffuser and shall not be supplied loose.
- All diffusers shall be provided with approved quality gasket at its back for airtight installation.

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1.4.11. **Extruded aluminium linear grilles:**

- Shall be made of extruded aluminium construction frame and blades.
- Shall have horizontal fixed blades angled at 15 degree for vertical mounting and at 0 degree for horizontal mounting.
- The grilles shall be with 20 mm wide flanges on both sides.
- Wherever required by the architect, the ends of the linear grilles shall be provided with end pieces having flanges on 3 sides or with 90 degree metered pieces.
- The grilles shall be with removable core and with concealed fixing arrangement.
- The grilles shall be supplied in powder-coated finish to a colour approved by the architect/ consultant.
- The collar dampers for the supply portion of the linear grilles shall be with black mat finish and shall be of extruded aluminium construction.
- The damper shall be of the same make as the grille.
- It shall be possible to operate the damper from the face of grille without having to remove the grille.
- All grilles shall be provided with approved quality gasket at its back for airtight installation.

1.4.12. **Extruded aluminium jet diffuser:**

- Shall be made of extruded aluminium construction frame and blades.
- Shall have 50 mm wide slots and air diffusing adjustable vanes.
- The diffusers shall be with 20 mm wide flanges on both sides.
- Wherever required by the architect, the ends of the linear diffusers shall be provided with end pieces having flanges on 3 sides or with 90 degree metered pieces.
- The diffusers shall be with concealed fixing arrangement.
- The diffusers shall be supplied in powder-coated finish to a colour approved by the architect/ consultant.
- Hit and miss type aluminium dampers shall be provided for the supply portion of the linear diffusers. These dampers shall be with black mat finish.
- The damper shall be of the same make as the grille.
- All diffusers shall be provided with approved quality gasket at its back for airtight installation.

1.4.13. **Fresh air and exhaust air louvers:**

- Shall be made of extruded aluminium construction frame and blades.
- Shall have horizontal fixed blades angled so as to prevent entry of rainwater.
- On the back of the louvers, an expanded aluminium mesh shall be provided to act as bird screen.
- The louvers shall be with minimum 20 mm wide flanges all around.
- The louvers shall be with concealed fixing arrangement.
- The louvers shall be supplied in powder-coated finish to a colour approved by the architect/ consultant.
- The louvers with dampers shall be provided with black mat finish 20 G GI construction dampers at the back of the louver.
- The damper shall be of the same make as the louver.
- The sample of louver shall be got approved from the client / consultant for its application and appearance.
- All louvers shall be provided with approved quality gasket at its back for airtight installation.

1.4.14. **Access Doors:**

- The duct access doors shall be provided at all key locations, for maintenance purposes.

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- The access doors may be hinged type or bolted type, as dictated by the site conditions and as approved by the client / consultants.
- The access doors shall be factory fabricated and shall be of approved make only.
- The access door shall be treated as part of ducting work only and shall not be measured separately and thus shall not be paid for separately.
- The access doors shall be double skin insulated type made of 20 G GI or 18 G aluminium sheets with 50 mm thick fibreglass insulation filled in between.
- The access doors shall be complete with required neoprene rubber gasket to make the installation leak proof.
- The access doors shall be provided with necessary handles for easy handling.
- The sizes of access doors shall be as large as practical.

1.4.15. **Testing & balancing:**

- All ducts for clean spaces shall be leak tested using smoke test.
- The entire air distribution system shall be air balanced using calibrated instruments.
- All dampers shall be marked with permanent markers to indicate their balanced positions.

1.4.16. **Fire & smoke damper motor operated type:**

All supply and return air ducts crossing the AHU room walls and floor slabs shall have fire dampers. The damper should be CBRI approved with a minimum rating of 90 minutes and should be multi leaf type with minimum 1.6 mm thick galvanized sheet steel casing and blades. The blade bearings should comprise of chrome plated spindles in self lubricated bronze bushes. Stop seals at top and bottom of the damper and metallic compression seal at side to prevent smoke leakage in case of fire. The dampers shall be provided with 1.6 mm thick x 400 mm long sleeve made of galvanized sheet steel. The accessories for the fire & smoke damper include the following:

- Factory fitted installation frame designed to allow expansion of fire damper in case of fire.
- The installation frame shall be installed centrally with in the wall / slab thickness.
- In case of very thick walls or slabs, the centre line of the installation frame shall be at least 50 mm away from the nearest face of wall / slab.

Spring return motor / actuator shall have the following features and functions:

- In built thermal trip for ambient air temperature outside the duct.
- In built thermal trip for air temperature inside the duct.
- In built spring return action.
- Actuator to close automatically on power failure and open automatically on restoration of power supply.
- Actuation on receiving the signal either from heat/smoke detector or duct mounted electronic temperature detector or fire alarm / smoke detection system
- On actuation, the dampers shall close.
- Fire dampers shall also close on rise of air temperature in the duct.
- The actuator shall be factory mounted on the damper shaft and the complete assembly shall be factory tested for operation and integrity.
- The control panel shall also be mounted on the damper casing it self.

The fire & smoke damper panel shall have the following features:

- Protected against surge currents / short circuits through glass fuse
- Provision to make the damper open (exhaust air) or shut (supply / return air) on receiving the signal.

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- Volt free contact to switch on (exhaust air) or switch off (supply air & return air) the connected fans.
- Volt free contact for remote alarm condition indication.
- Supplied with remote control for periodic testing. Remote control to have Power, Damper & Alarm indication lamps and in built sharp audio alarm.

Installation procedure for fire & smoke damper:

- The dampers shall be installed as per the manufacturer's recommendations
- The dampers shall be installed using the retaining angle frames, on both sides of the wall / slab, attached to the sleeve.
- The ducts shall be terminated on the sleeves and shall not be connected to the dampers.
- The duct and sleeve connections shall be breakaway type slip joints.
- All cables and wires used to connect the fire dampers shall be fire retardant low smoke (FRLS) type.
- An insulated access door shall be provided near each fire damper for periodic maintenance and inspection. The access door shall be as large as possible subject to a maximum size of 600 x 600
- Control panel suitable for 230 V, 1 phase, 50 Hz AC power supply.
- Electronic temperature sensor
- Smoke/heat detector

1.4.17. **Fire damper fusible link type:**

All supply and return air ducts crossing the AHU room walls and floor slabs shall have fire dampers. The damper should be CBRI approved with a minimum rating of 90 minutes and should be multi leaf type with minimum 1.6 mm thick galvanized sheet steel casing and blades. The blade bearings should comprise of chrome plated spindles in self lubricated bronze bushes. Stop seals at top and bottom of the damper and metallic compression seal at side to prevent smoke leakage in case of fire. The dampers shall be provided with 1.6 mm thick x 400 mm long sleeve made of galvanized sheet steel. The accessories for the fire damper include the following:

- Factory fitted installation frame designed to allow expansion of fire damper in case of fire.
- The installation frame shall be installed centrally with in the wall / slab thickness.
- In case of very thick walls or slabs, the center line of the installation frame shall be at least 50 mm away from the nearest face of wall / slab.
- Fusible link (UL stamped) rated for around 72 degree C.

The fire damper shall be kept in open position using high tensile stainless springs in tension and the fusible link. In case of rise of temperature, at the location of the fusible link, the link should melt and the force of the springs should close the damper.

Installation procedure for fire damper:

- The dampers shall be installed using the retaining angle frames, on both sides of the wall / slab, attached to the sleeve.
- The ducts shall be terminated on the sleeves and shall not be connected to the dampers.
- The duct and sleeve connections shall be breakaway type slip joints.
- All cables and wires used to connect the fire dampers shall be fire retardant low smoke (FRLS) type.
- An insulated access door shall be provided near each fire damper for periodic maintenance and inspection. The access door shall be as large as possible subject to a maximum size of 600 x 600.

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1.5. Thermal Insulation of Ducts

This specification is to be read in conjunction with the drawings, particular technical specification and schedule of quantities enclosed.

1.5.1. Material (Nitrile Rubber):

- Closed Cell Elastomeric Rubber
- With self adhesive backing with a peel off cover
- Thermal Conductivity: Not exceeding 0.038 W/m K at 10 degree C mean temperature
- Operating Temperature Range: - 10 degree C to + 60 degree C
- Moisture Resistance Factor: Not less than 4000, as per DIN 52 615
- Fire Performance: Minimum Class 1 as per BS 476 Part 7
- Approvals: Material shall be approved by Chief Fire Officer
- Thickness: Minimum 10 mm for ducts in conditioned spaces & minimum 15 mm for ducts in unconditioned spaces
- Each lot of material shall be supplied with manufacturer's test certificate.
- Samples from each lot shall be got tested by the contractor at his cost for the thickness and thermal conductivity.

1.5.2. Procedure for insulation with nitrile rubber:

- Clean the surfaces of the ducts to be insulated so as to remove any dust, oil, grease etc.
- Apply a thin layer of Fevicol adhesive SR-998 or approved equal each on the duct surface and on the back of the insulation material.
- When the adhesive is tack dry, fix the insulation sheets on to the ducts pressing the material firmly to allow a good bond formation. The material shall be fixed under compression without any stretching.
- Seal all longitudinal and transverse joints with 50 mm wide x 3 mm thick self adhesive tape to be supplied by the insulation manufacturer. The tape shall be of the same material as insulation and shall be as per manufacturer's recommendations.
- To provide mechanical strength to the insulation exposed to eye viz. In AC plant room, AHU rooms, Fan Rooms etc., the insulation shall be covered with fiberglass fabric followed by one coat of fireproof epoxy or acrylic compound.
- After the curing of the above-referred coat, second coat of fireproof epoxy or acrylic compound shall be applied.

1.5.3. Material (Fibre Glass):

- Fibre Glass Resin Bonded
- Density: 24 Kg/cum. (minimum) with factory applied aluminium foil facing
- Thermal conductivity: not exceeding 0.034 Kcal/(Hr - Sqm - Deg. C/m) at 20 Deg. C mean temperature
- Thickness: As specified in the Bill of Quantities

1.5.4. Procedure for insulation with Fibre Glass:

- Clean the surfaces of the ducts to be insulated so as to remove any dust, oil, grease etc.
- Cut the insulation material slabs/rolls to the required sizes.
- Apply a thin layer of Fevicol adhesive SR-998 or approved equal on the duct surface.
- Fix the insulation material tightly on to the duct surfaces securing the same using the PVC straps at 400 mm centres.

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- Seal all longitudinal and transverse joints using 50 mm wide transparent BOPP self adhesive tape.

1.6. Insulation & Treatment Drain Water Piping Systems

This specification is to be read in conjunction with the drawings, particular technical specification and schedule of quantities enclosed.

1.6.1. **Materials (Thermal insulation of overhead pipes – with plaster finish):**

- Expanded Polystyrene
- Density: 20 Kg/cum. (minimum)
- Thermal conductivity: not exceeding 0.034 Kcal/(Hr - Sqm - Deg. C/m) at 20 Deg. C mean temperature
- Quality: Treated for Fire (TF)
- Thickness: 25 mm for pipe sizes 10 mm to 40 mm, 50 mm for pipe sizes 50 mm to 150 mm, 75 mm for pipe sizes 200 mm to 400 mm & 100 mm for pipe sizes above 400 mm

1.6.2. **Procedure for thermal insulation of over head pipes with plaster finish:**

- Insulation shall be carried out only after the piping system has been successfully pressure tested.
- Brush & clean the surfaces of the pipes to be insulated so as to remove any dust, oil, grease etc.
- Apply two coats of red oxide primer on all the surfaces of the pipes.
- Apply a layer of adhesive each on the pipe surface and on the back of the insulation material.
- Pre-moulded two halves of pipe sections of the insulation material shall be placed and fixed on the pipes with joints tightly butted together. For pipe sizes, for which the pipe sections are normally not available, insulation slabs may be used for forming the gussets with adequate precautions of sealing the joints.
- Seal all longitudinal and transverse joints with the adhesive.
- The insulation shall be continuous over the entire run of the piping including fittings and valves.
- Cover the insulation with 2 layers of heavy grade polyethene vapour barrier.
- Hold the insulation and polyethene in position using PVC straps at 400 mm centres.
- Cover with 0.63 mm GI chicken wire mesh held in position with 24G GI lace wire.
- Cover the surfaces with 2 layers of 7 mm thick each sand cement plaster finished with 2 coats of synthetic enamel paint of approved colour shade.

1.7. Sound Attenuators

This specification is to be read in conjunction with the drawings, particular technical specification and schedule of quantities enclosed.

1.7.1. **Casing:**

- Fabricated out of 0.75 mm (minimum guaranteed thickness without any negative tolerance) galvanized sheet steel
- All joints sealed with mastic
- Duly reinforced and stiffened with galvanized structural steel
- Provided with galvanized angle iron flanges

1.7.2. **Acoustic Baffles:**

- Acoustic fill: Inert, non-hygroscopic, vermin proof fiberglass of adequate density
- Covered with acoustically transparent polyester

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- Covered with 0.55 mm (minimum guaranteed thickness without any negative tolerance) perforated aluminium sheet
- Fixed on to the casing with self tapping stainless steel screws

1.7.3. **Testing & Rating:**

- As per ACMA / BS4718

1.7.4. **Selections:**

- The manufacturer shall furnish the detailed selection for each application and confirm the acoustical and aerodynamic performance of the attenuator proposed.
- The maximum pressure drop across the attenuator shall not exceed 4 mm WG.

1.8. Duct Acoustic Lining

This specification is to be read in conjunction with the drawings, particular technical specification and schedule of quantities enclosed.

1.8.1. **Hat Channels:**

- 20x25x25x25x20 mm (for 25 mm thick acoustic insulation)
- 20x50x25x50x20 mm (for 50 mm thick acoustic insulation)
- Fabricated out of galvanized steel sheets of minimum guaranteed thickness of 0.76 mm (negative tolerance on thickness is not allowed)

1.8.2. **Fibre Glass Insulation:**

- Resin bonded
- Density: 32 Kg/cum.
- Thermal conductivity: not exceeding 0.034 Kcal/(Hr - Sqm - Deg. C/m) at 32 Deg. C mean temperature
- Thickness: 25 mm or 50 mm as mentioned in Bill of Quantities

1.8.3. **Adhesive:**

- Fevicol SR-998 or equivalent

1.8.4. **Perforated Sheet:**

- 0.6 mm thick aluminium (minimum guaranteed thickness - without any negative tolerance)

1.8.5. **Fibre Glass Tissue:**

- Sample and make/model approval shall be obtained by the contractor

1.8.6. **Procedure:**

Clean the surfaces of the ducts to be acoustically insulated so as to remove any dust, oil, grease etc. Fix hat channels to form a grid of 600 x 600, on to the duct surfaces using galvanized steel screws with screw heads on the outer surface of the ducts. The hollow portion of the channels shall be filled in with the fiberglass material to be used for duct acoustic insulation, before fixing the channels on the duct surfaces. Cut the fiberglass slabs to form panel sizes of 600x600 mm. Apply a coat of cold adhesive on the surfaces of the ducts. Fix the insulation panels of size

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600x600 on to the duct surfaces with joints tightly butted together. Cover the surfaces of the fiberglass with fiberglass tissue. Cover the insulation with perforated aluminium sheet using brass screws and brass cup washers. The perforated sheet shall have 20 to 30% perforations.

1.8.7. **Procedure for lining in small ducts:**

The following procedure shall be applicable instead of the procedure described under 7.18.6 above, for the small size ducts where it is practically not possible to fix GI channel frame work the maximum size of the duct to be considered is 550 x 550 mm:

Clean the surfaces of the ducts to be acoustically insulated so as to remove any dust, oil, grease etc. Cut the fiberglass slabs to form panels of suitable sizes. Apply a coat of cold adhesive on the surfaces of the ducts. Fix the insulation panels on to the duct surfaces with joints tightly butted together. Cover the insulation with perforated aluminium sheet using flat head GI bolts, nuts and washers. The flat head of GI bolts shall be on the outer surface of the duct. The perforated sheet shall have 20 to 30% perforations.

1.9. Electrical Works

Supply, erection, testing and commissioning of Electrical Panels, Control Panels, Wiring and Earthing of all HVAC equipment, components & accessories and controls to these specifications and in accordance with the requirements of drawings and schedule of quantities. All Electrical works shall conform to these specifications, local Rules, Indian Electricity Act, Regulations of Fire Insurance Companies and relevant BIS codes.

1.9.1. **Moulded Case Circuit Breakers:**

- Duty: Motor
- Type: Current Limiting
- Quick make/break switching mechanism - preferably double break contact system
- Arc extinguishing device
- Tripping unit
- Casing: Compact, high strength, heat resistant, flame retardant, insulating moulded case
- Over Load Adjustment: Fixed or variable, as per manufacturer's standard
- Number of Poles: 3 or 4 as specified else where
- Rating (63A to 800A): As per manufacturer’s recommendations
- Operating Voltage: 415 V, 3 Phase, 50 Hz AC
- Short circuit breaking capacity: 50 KA, if not specified else where.
- Accessories: Rotary operating mechanism suitable for door interlocking, interlock defeat facility and with mechanical on/off /trip indications
- Standards: IS 13497-2/IEC60947-2
- Certification: CPRI or equivalent

1.9.2. **Power Cables:**

- Grade: Medium Voltage, 1.1 KV Grade
- Insulation: PVC
- Armoured: Yes, GI steel strips or wires
- Overall Sheathing: PVC
- Cable Type: PVC
- Conductor: High conductivity aluminium
- Confirming To: BIS Standards
- Marking: ISI marking
- Approved by: Fire Insurance

GENERAL TECHNICAL SPECIFICATIONS

1.9.3. **Control Cables:**

- Grade: Medium Voltage, 1.1 KV Grade
- Insulation: PVC
- Armoured: Yes, GI steel strips or wires
- Overall Sheathing: PVC
- Cable Type: PVC
- Conductor: High conductivity electrolytic grade annealed copper
- Confirming to: BIS Standards
- Marking: ISI marking
- Approved by: Fire Insurance

1.9.4. **Power and Control Wire Cables (Single Core, Flexible type) in conduits**

- Grade: Medium Voltage, 1.1 KV Grade
- Insulation: PVC
- Armoured: No
- Overall Sheathing: Unsheathed
- Cable Type: PVC
- Conductor: High conductivity electrolytic grade annealed copper, multi-stranded
- Confirming To: IS 694
- Marking: ISI marking
- Approved by: Fire Insurance

1.9.5. **Miniature Circuit Breakers (1 to 63A):**

- Conforming to: IEC 898/ IS8828
- Type: Quick make and break, current limiting type (Class 3), Tripping curve “B”
- Operating voltage: 415V, 3 phase, 50 Hz or 240V, 1 Phase, 50 Hz AC
- Over current and short circuit protection: Magnetic thermal release
- Breaking capacity: 10 KA
- Mounting: DIN Rail Mounting
- Power loss per pole: Should be less than values permitted by IEC/BIS.
- Casing: Heat resistant, high strength modular type
- Degree of protection: IP-20 (Minimum) for terminals
- Multi pole MCB’s: To have common trip bar independent of external operating handle

1.9.6. **Earth Leakage / Residual Current Circuit Breakers (25 to 125A):**

- Type: Residual current operated
- Operating voltage: 415V, 3 phase, 50 Hz (for 4 pole) or 240V, 1 Phase, 50 Hz AC (for 2 pole)
- Release: Electro - mechanical operating without any auxiliary source of power supply
- Sensitivity: 30 mA non-adjustable
- Mounting: DIN Rail mounting
- Casing: Heat resistant, high strength type
- Degree of protection: IP-20 (Minimum) for terminals

1.9.7. **Air Circuit Breakers:**

- Type: Sheet metal enclosed, flush front, electrical/ manual draw out type
- Trip free manual (for manual draw out ACB) / Motorized (for electrical draw out type) type with mechanical on, off and trip indications
- Auxiliary contacts in trip circuit shall close before the main contacts have closed & vice versa.

GENERAL TECHNICAL SPECIFICATIONS

- All other contacts shall close simultaneously with the main contacts
- No. of poles: 3 or 4, as specified else where.
- Construction: Modular
- Protections to be provided by ACB: Short circuit, Overload and Earth fault protection through microprocessor based control unit and with adjustable settings

1.9.8. **Release:**

Microprocessor based with 8-bit micro computer for over current protections:

- Overload / long time protection
- Short circuit / short time protection with intentional delay
- Instantaneous protection with no intentional delay
- Ground fault protection
- True RMS sensing
- Release sampling: At the rate of 16 times per cycle to monitor the actual load current wave form, true RMS value and the harmonics
- The release shall have thermal memory to register the thermal stresses caused by overload so as to reduce the tripping time in case of subsequent overloads.
- The release shall have variable independent settings for pick up current and for time delays for Pick up currents – (Long time, Short time, Instantaneous, Ground Fault) and Time Delay: (Long time, Short time, Instantaneous, Ground Fault)
- For changing the settings, separate rotary knobs shall be provided.
- The release shall draw its power from the current transformers of the ACB only and no separate external/auxiliary power supply shall be required.
- Through a flux shift device acting directly on the beaker trip rod.
- Under Voltage and Over Voltage Protections shall be provided for all ACBs, if specified in schedule and/or BOQ, and shall be suitable for 90% (under voltage) and 110% (over voltage).
- Short circuit withstand value shall be minimum 50 KA
- Operation shall be without need to open the compartment door, with operating handle and mechanical trip push button at the front of panel and integral with the breaker
- Contacts shall be silver plated copper with provision of contact wear inspection indicating life of contacts
- All current carrying parts shall be silver plated
- Suitable arcing contacts with proper arc chutes shall be provided to protect main contacts.
- Double insulation (Class-II) with moving and fixed contacts totally enclosed

1.9.9. **Cradle:**

- Movement: On steel / ball rollers and not on flat surfaces

No. of positions of breaker on cradle: Four, as described below:

- Service: Main isolating and control contacts engaged.
- Test: Main isolating contact isolated, control contacts engaged
- Isolated: Main isolating and control contacts isolated.
- Maintenance: Breaker fully outside the panel, ready for maintenance
- Auxiliary Contacts: Minimum 6 NO & 6 NC auxiliary contacts (rated for 5A) on each breaker, accessible from the front.

Safeties:

- Safety Shutters
- It should not be possible to interchange two ACBs of two different thermal ratings
- Provision of positive earth connections between fixed and moving parts.
- Earthing bolts shall be provided on the cradle.
- Arc chute covers, wherever necessary

GENERAL TECHNICAL SPECIFICATIONS

- Accessories: If specifically asked for else where, Separate IDMT relay shall be provided in addition to the release and safeties described above for all incoming and outgoing ACBs (excluding bus couplers)

1.9.10. **Current Transformers:**

- Type: Tape wound
- Wiring: Secondary terminal to be wired to a suitable terminal block for easy access for testing and connections
- Protection CTs: 5P10
- Measurement CTs: I
- CT ratio: Primary side as per requirement to 5A secondary
- VA burden: As required by duty conditions

1.9.11. **Starters:**

- Each motor shall be provided with a starter of suitable rating
- The starter shall be selected as per starter manufacturer' s recommendations.
- The starter shall be DOL type up to and including motors of 10 HP rating.
- The starter shall be Star Delta type for motor from 12.5 HP rating to 75 HP rating.
- The starters for motors above 75 HP rating shall be as recommended by motor or equipment manufacturer

1.9.12. **Contactors:**

- Body: High strength thermoplastic body with arc shield for quick fire extinguishing
- Tips: Silver alloy
- Operation Duty: Continuous
- Magnet system: Laminated yoke and armature suitable to operate without hum or chatter
- No. of contacts: 3 main & minimum 2 No & 2 NC auxiliary contacts
- Type: Air breaks type, suitable for making and breaking at minimum power factor of 0.35
- Coil Voltage: 230 V+10%, 1 phase, 50 Hz AC
- Coil Insulation: Class E
- Coil Type: tape wound, vacuum impregnated, housed in thermostatic bobbin
- Coil Suitable for tropical conditions

1.9.13. **Thermal Overload Relay:**

- With built in single phase preventor
- Operation based on differential system of protection for protection against three phase overload, single phasing and unbalanced voltage
- Reset Type: Field selectable Manual or Automatic
- Ambient temperature compensation shall be integral feature of relay to compensate for ambient temperature variation from -5 to +55 degree C
- Type: three element, positive acting, ambient temperature compensated, time lagged, adjustable setting type
- Connections: Direct type for motors up to & including 35 HP and Current transformer operated for motors above 35 HP

1.9.14. **Time Delay Relays:**

- Field Adjustable Time Type
- Time Range: as required by the duty conditions
- Voltage: 230V, 1 phase, 50 Hz AC
- Electronic Type

GENERAL TECHNICAL SPECIFICATIONS

- Auxiliary Contacts: As required

1.9.15. **Indicating Lamps:**

- Low Wattage type, backed up by fuses of rating suitable for duty conditions

1.9.16. **Voltmeters:**

- Size: 96 x 96 or 144 x 144 as specified else where
- Flush Mounted Type
- Digital or Analog Display
- Range: 0 to 500 V
- Least Count: 1 V for Digital & As per Manufacturer’s standards for Analog
- Complete with Selector switch

1.9.17. **Ammeters:**

- Size: 96 x 96 or 144 x 144 as specified else where
- Flush Mounted Type
- Digital or Analog Display
- Range: As required by duty conditions
- Least Count: 0 .1 A for Digital & As per Manufacturer’s standards for Analog
- Complete with current transformers and Selector switch

1.9.18. **Push Button Stations:**

- Application: Manual Starting and Stopping of Motors / equipment
- Comprising of: panel Box, start push button, Stop push button, Necessary relays and terminals
- The stop push button shall be mushroom head, red in colour and shall be stay put type in motor/equipment stop position

1.9.19. **Conduits & Accessories:**

- Type: Screwed GI
- Wall Thickness: 16 G up to 32 mm dia and 14 G above 32 mm dia
- Marking: ISI marked & Manufacturer's label marking
- Conduit accessories: threaded type
- Joints: Secured tight to ensure earthing continuity

1.9.20. **Cable Trays:**

- Type: Ladder type made out of perforated MS painted angles
- Thickness: 2 mm
- Depth: Minimum 40 mm

1.9.21. **Electrical Panels:**

Construction shall be with 2 mm thick sheet steel, folded and braced, as required, Seam welded joints, Panels and covers properly fitted and square with the frame, Holes in the panel shall be correctly positioned, Self threaded screws are not allowed, Multi-tiered & multi- compartmented with each compartment feeding only one equipment, Panel doors shall be interlocked with main feeder breaker in on position, All voltmeters and indication lamps shall be wired through MCBs or control fuses, Meters and indication instrument shall be plug type, All current transformer connections shall be through test terminal block, Powder coated finish to RAL-7035 after treating the panels using 7-tank process.

GENERAL TECHNICAL SPECIFICATIONS

- General: CPRI approved
- Power supply: 415V, 3 phase, 50 Hz, 4 wire AC or 230V, 1 phase, 50 Hz, 2 wire AC
- Type: Sheet steel cabinet, dead front, totally enclosed, completely dust and vermin proof, with hinged doors and neoprene gaskets
- Mounting: Floor or Wall, as required by site conditions
- Location: Indoor or Outdoor, as required by the site conditions
- Degree of Protection: Minimum IP-52 for indoor application, Minimum IP-55 for outdoor application
- Rupturing capacity: 31 MVA minimum.
- Base Channel: Minimum ISMC 75 base channel duly painted with red oxide primer and black enamel paint shall be provided for floor mounted panels
- Minimum 250 mm clear space shall be provided between the floor of the panel (for floor mounted panels) and the lowest switchgear compartment.
- Minimum 25 mm between phase to earth and phase to phase
- Cable Entry: Top or Bottom, as required by the site conditions.
- Removable Gland Plates shall be provided with suitable numbers of holes as required by the cables or conduits entering the panel and shall not be powder coated so as to ensure positive earthing.
- Name Plates shall be stainless steel with black engravings and fixed by using rivets, screwed. Adhesive fixing is not acceptable
- Circuit Diagrams: Shall be provided inside the panels using pockets fixed on the door(s) of the panel
- Shrouds: Shall be provided to cover all live parts and terminals so as to protect accidental touch to these live parts
- Bus Bar and Interconnections shall be made of high conductivity electrolytic grade aluminium of rectangular cross section, suitable for rated current and rupturing capacity without overheating, extendible on both sides, insulated with heat shrinkable sleeves, colour coded, supported on glass fibre reinforced thermosetting plastic insulated supports, without the need of any drilling for supporting, shall be installed in separate bus bar chambers, all connection shall be done using the bolts. Additional cross section area shall be added at the location of holes to compensate for whole area. Manufacturer shall submit detailed bus bar calculations to prove the adequacy of bus bar sizing. In any case, the bus bar size shall not be less than 1 Sqmm/A.
- Cable compartments should be adequately sized to accommodate and allow easy clamping of wires.
- All components inside the panel shall be distinctly marked indicating its service
- All cables, wires, terminal blocks etc. shall be provided with ferrules/ markers, as required
- All power wiring inside the panels shall be colour coded.
- Suitable grade rubber mats shall be provided in front of all the electrical power and control panels. The mats shall cover entire length of the panel. Where panels require back access for maintenance, rubber mats shall be provided on the rear side of the panels, as well.
- The floor-mounted panels shall be installed on minimum 75 mm high PCC plinth duly plastered but without any angle iron edge protection. The edges shall be protected against damage by chamfering the same.
- Switchgear ratings given in the specifications and BOQ are for normal indoor application. Wherever it is asked for that the panels shall be suitable for outdoor application, all the switchgears shall be suitably de-rated for ambient temperature of 50 degree C, as per manufacturer’s recommendations.

1.9.22. **Installation of electrical components:**

- Cable laying shall conform to IS-1255 for installation
- Cable tray supports: shall be made of MS painted rods of adequate size and MS painted structural steel
- Installation shall allow future cable withdrawal and replacement

GENERAL TECHNICAL SPECIFICATIONS

- Only one tier of cables per cable tray is allowed.
- Cables shall be suitably spaced to minimize losses in the current carrying capacity.
- Cables shall be secured to the supporting arrangement using Galvanized saddles, galvanized hardware and/or UV resistant PVC cable ties. Cable bending radius shall conform to IS-1255 and shall not exceed 12 times the diameter of cable
- Cables laid across the roads having vehicular traffic shall be laid through RCC Hume pipe as per IS-1255
- Minimum control wire/cable size: 1.5 sqmm
- Cable sizes given below are minimum required sizes. The contractor shall calculate cable sizes giving due considerations to the proper de-rating factor.
- Isolators: An electrical isolator or push button station shall be provided near each equipment/ motor (if not integral part of motor/equipment) where motor/equipment is separated from the power supply panel by a partition barrier or wall or ceiling. This shall be treated to be mandatory, at no extra cost to the Owner, whether specified in specifications and/or BOQ or not.

- Minimum Power Cables & Wires Sizes (for motor starters):
- Up to 2.2 KW: 1 x 3 C x 6 Sqmm Aluminium or 4 Sqmm Copper
- 3.7 & 5.5 KW: 1 x 3 C x 10 Sqmm Aluminium or 6 Sqmm Copper
- 7.5 KW: 2 x 3 C x 6 Sqmm Aluminium or 4 Sqmm Copper
- 9.3 & 11 KW: 2 x 3 C x 10 Sqmm Aluminium
- 15 KW: 2 x 3 C x 16 Sqmm Aluminium
- 18.5 & 22.5 KW: 2 x 3 C x 25 Sqmm Aluminium
- 26 & 30 KW: 2 x 3 C x 35 Sqmm Aluminium
- 33.5 & 37 KW: 2 x 3 C x 50 Sqmm Aluminium
- 45 KW: 2 x 3 C x 70 Sqmm Aluminium
- 55 KW: 2 x 3 C x 95 Sqmm Aluminium
- Above 55 KW: As per equipment/ motor / starter manufacturer's recommendations

- Minimum Power Cables & Wires Sizes (for non motor duty):
- Up to 2.2 KW: 1 x 3/3.5/4 C x 6 Sqmm Aluminium or 4 Sqmm Copper
- 3.7 & 5.5 KW: 1 x 3/3.5/4 C x 10 Sqmm Aluminium or 6 Sqmm Copper
- 7.5 KW: 1 x 3/3.5/4 C x 10 Sqmm Aluminium or 6 Sqmm Copper
- 9.3 & 11 KW: 1 x 3/3.5/4 C x 10 Sqmm Aluminium
- 15 KW: 1 x 3/3.5/4 C x 16 Sqmm Aluminium
- 18.5 & 22.5 KW: 1 x 3/3.5/4 C x 25 Sqmm Aluminium
- 26 & 30 KW: 1 x 3/3.5/4 C x 35 Sqmm Aluminium
- 33.5 & 37 KW: 1 x 3/3.5/4 C x 50 Sqmm Aluminium
- 45 KW: 1 x 3/3.5/4 C x 70 Sqmm Aluminium
- 55 KW: 1 x 3/3.5/4 C x 95 Sqmm Aluminium
- 67.5 & 75 KW: 1 x 3/3.5/4 C x 150 Sqmm Aluminium
- 90 KW: 1 x 3/3.5/4 C x 185 Sqmm Aluminium
- 110 KW: 1 x 3/3.5/4 C x 240 Sqmm Aluminium
- 111 to 185 KW: 2 x 3/3.5/4 C x 240 Sqmm Aluminium
- 186 to 300 KW: 3 x 3/3.5/4 C x 240 Sqmm Aluminium
- 301 to 450 KW: 3 x 3/3.5/4 C x 400 Sqmm Aluminium

- Earthing:
- Shall conform to relevant BIS codes, local electricity regulations etc.
- Material: Copper wires and strips
- Overlapping at joints: minimum 75 mm
- Straight joints: Brass riveted and brazed
- Termination of wires: using sweated lugs bolted to the equipment body after degreasing, removal of oil, paint etc. to ensure earthing continuity
- The electrical resistance measured between earth connection at main switchboard and any other point on the completed installation shall not exceed 1 ohm.

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- Minimum Earthing Sizes: The earthing sizes indicated below are of copper conductor. However, in case the particular technical specifications or the BOQ calls for GI earthing, the equivalent GI earthing sizes shall be used.
- Single phase metal clad switches & control panels: 3 mm dia copper wire
- Motors up to 7.5 KW rating: 2 x 3 mm dia copper wires
- 9.3 to 30 KW motors: 2 x 4 mm dia copper wires
- 37 to 55 KW motors: 2 x 6 mm dia copper wires
- Motors above 55 KW rating: 2 x 25 mm x 3 mm copper strips
- 3 phase switches and control panels up to 50 A rating: 2 x 3 mm dia copper wires
- 3 phase switches and control panels from 63 A to 100 A rating: 2 x 4 mm dia copper wires
- 3 phase switches and control panels from 125 A to 200 A rating: 2 x 6 mm dia copper wires
- 3 phase switches and control panels from above 200 A rating: 2 x 25 mm x 3 mm copper strips

1.9.23. **Cable Jointing:**

- The cable lengths shall be delivered or cut so as to avoid any joints in the cables.
- Where straight joints in cables are unavoidable, the use and location of such joints shall be got approved from the consultants/client.
- Cable joint boxes shall be of appropriate size, suitable for cable being installed and shall be of make to be approved by the consultant/client.
- All cable joints shall be made and filling in of compound shall be done as per the manufacturer's recommendations. All straight joints shall be done in epoxy-moulded boxes with epoxy resin. All terminal leads of conductors shall be heavy soldered for a minimum length of 50 mm.
- All cables to be joined shall be tested for continuity and insulation resistance before jointing commences.
- The cable seals shall not be removed till all preparations for jointing are completed. Joints shall be finished on the day of commencement only. The conductors shall be properly insulated with high voltage insulation tape and by using spreaders of approved size and pattern. The joints shall be completely filled with epoxy compound and topped to ensure that the box is completely filled.

1.9.24. **Cable Makers & Cable Tags:**

- All underground cables and cable joints shall be marked on surface by markers manufactured as per BIS.
- Approved CI cable markers shall be provided at every road crossing.
- CI plates engraved with cable size and service shall be tied to the cable at regular distance of 5 m.
- Cable tags shall be made of 2 mm thick aluminium sheet, cut to circular size of 32 mm dia with 2.5 mm hole at top for clamping to the cable.
- Cable size, designation & service shall be engraved on the cable tags and the tags shall be tied to the cables using approved piano wires or PVC ties at regular distance of 5 m.

1.9.25. **Cable Termination:**

Cable termination shall comprise of double compression mechanical gland made of brass with tinned nickel plating and having 3-piece pattern to grip inner and outer PVC sheaths as well as the armour of the cable. The lugs shall be soldering less type installed using approved crimping tool. The water tightness of the terminal boxes shall be achieved, where required, by filling the joints with flame retarding, non-dripping plastic compound as per BIS. Open ends of the cables shall always be kept sealed during installation using self-adhesive non-hygroscopic tape over wax water seal.

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1.9.26. **Guidelines:**

Where cables pass through holes in metal work, adequate precautions shall be taken to prevent abrasion of the cable against sharp edges. Where cables pass through walls, ceilings, floors etc., it shall run through PVC pipe sleeves and the ends shall be sealed water tight with fire mastic sealant. Extra low voltage cables / wires shall be run in separate trays / conduits / paths away from high voltage cables / wires to prevent any inductive voltage in them. Metal sheaths, armours of cables, cable trays, metal conduits, ducts, trunking etc. shall also be effectively bonded to the earthing system.

For underground cables the vertical distance between two layers of cables shall not be less than 350 mm. The horizontal distance between two cables shall be at least one cable diameter. The minimum depth of cable trench shall be 750 mm below the ground level. The top layer of cables shall be at least 600 mm below the ground level. Bottom of the trench shall be well compacted and a fine sand bed of 100 mm shall be laid before laying the cables. The cable layer shall be covered with 150 mm thick fine sand layer and then with 150 mm thick compacted soil. Then the above procedure shall be applied for second layer of cables. Top layer of sand shall be covered with concrete tiles or burnt bricks covering all the cables and projecting at least 100mm on either side of cables.

For cables in built up trenches the cables shall be laid on structural steel brackets or cable trays etc. and shall not be laid loose. The cables may be clamped to the walls of the trench with a minimum clearance of 100 mm between wall and the cable. The minimum vertical distance between 2 cables shall be 150 mm. For brackets, the maximum distance between 2 brackets shall not exceed 500 mm.

1.9.27. **Submissions:**

- Detailed panel wiring & GA drawings along with bill of material
- Cabling routing drawings
- Control & power cabling schematics
- Cable schedules
- Voltage drop & cable sizing calculations
- As built drawings, after completion of installation

1.9.28. **Testing:**

Before equipment commissioning, the entire electrical installation shall be tested as per relevant BIS codes. The entire electrical installation shall be got approved from the Electrical inspector of local regulatory authorities, by the HVAC contractor, at no extra cost. The inspection certificate shall be submitted by the HVAC contractor to the Owner/Consultants for reference and records.

1.10. Controls

These specifications are to be read in conjunction with the drawings, particular technical specification and schedule of quantities enclosed.

1.10.1. **Room Mounted Temperature Sensor:**

- Type: Passive
- Range: 0 to 50 degree C
- Sensor Element: Nickel 1000 ohm resistance at 0 degree C compatible with controller being provided.
- Connection: 2-wire
- Degree of Protection: Minimum IP-20
- Mounting: Wall

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- Appearance: Aesthetically good looking. Sample to be approved by client/ consultant.
- Accessories: Box for mounting on wall, chasing of walls & repairing of the same, conduits, wiring, earthing, housing cover (if required), transformer (if required), adapter plate (if required) etc. and any other item required for its installation & operation.

1.10.2. **Room Mounted Temperature Sensor with Set Point Adjuster:**

- Type: Passive
- Range: 0 to 50 degree C
- Sensor Element: Nickel 1000 ohm resistance at 0 degree C compatible with controller being provided.
- Connection: 3-wire
- Degree of Protection: Minimum IP-20
- Mounting: Wall
- Set point adjustment: Through a knob on the fascia of the sensor
- Appearance: Aesthetically good looking. Sample to be approved by client/ consultant/ architect.
- Accessories: Box for mounting on wall, chasing of walls & repairing of the same, conduits, wiring, earthing, housing cover (if required), transformer (if required), adapter plate (if required) etc. and any other item required for its installation & operation.

1.10.3. **Duct Mounted Temperature Sensor:**

- Type: Passive
- Range: 0 to 50 degree C
- Sensor Element: Nickel 1000 ohm resistance at 0 degree C compatible with controller being provided.
- Connection: 3-wire
- Degree of Protection: Minimum IP-20
- Mounting: Mounted in the duct, the sensor shall be complete with extended probe of approximately 100 mm length projecting inside the duct.
- Set point adjustment: Through a knob on the fascia of the sensor
- Accessories: Clips & mounting flanges for duct mounting, chasing of walls & repairing of the same, conduits, wiring, earthing, housing cover (if required), adapter plate (if required) etc. and any other item required for its installation & operation.

1.10.4. **Controls:**

- Operating Voltage: 24V/230V, 1 phase, 50 Hz AC
- The controller shall have provision of accepting required number and types of digital (switching) inputs and analog (proportional) inputs, as required
- The controller shall provide necessary number and types of digital and analog outputs, as required by the application.
- The controller shall have an in built display for the display of various parameters viz. Actual conditions of input signals, set points, programming parameters, operating mode etc.
- Electronic, Programmable through the display screen and push buttons provided on the fascia of the controller.
- The controller shall be mounted on the door of starter control panel of the equipment being controlled by it. The door of the panel shall have a cut-out such that the display screen can be seen and push buttons of the controller can be operated without opening the door.
- Housing/Cover for mounting on panel door, wiring, earthing, housing cover (if required), transformer (if required), etc. and any other item required for its installation & operation.

- 3-speed control of the fan motor of the fan coil unit through a switch on the fascia of the thermostat.

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- On-off control of the fan motor of the fan coil unit through a switch on the fascia of the thermostat.
- On-off switch may be combined with the speed control switch so as to have one common Off-High-Medium-Low switch.
- Appearance: Aesthetically good looking. Sample to be approved by client/ consultant.
- Accessories: Box for mounting on wall, chasing of walls & repairing of the same, conduits, wiring, earthing, housing cover (if required), transformer (if required), adapter plate (if required) etc. and any other item required for its installation & operation.

1.10.5. **Electronic Thermometer:**

- Type: Electronic Digital
- Display: 3.5 Digit LCD
- Circuits: Solid state integrated
- Indications: Unit On indication, Low Battery Indication (for battery operated units only)
- Resolution: 0.1 Degree C
- Sensor: Electronic RTD or as per manufacturer's recommendations complete with air well
- Operating Voltage: 24V/230V, 1 phase, 50 Hz AC or 9 V DC Battery
- The display unit shall be mounted in an attractive sheet metal cabinet to the approval of the client.
- The unit shall have minimum IP-44 degree of protection.
- Appearance: Aesthetically good looking. Sample to be approved by client/ consultant.
- Accessories: Box/housing for mounting, chasing of walls & repairing of the same, conduits, power wiring, control wiring from sensor to the display unit, transmitters (if required), compensatory devices for large distances between the sensor and display unit, earthing, housing cover (if required), transformer (if required), adapter plate (if required) etc. and any other item required for its installation & operation.

2. Mode of Measurement:

The following mode of measurements shall be applicable for this contract.

2.1. Sheet Metal Works:

- Ducts shall be measured on the basis of external surface area of ducts. The measurements of ducts shall be taken prior to the application of the insulation. The external surface area of the ducts shall be calculated by measuring the perimeter of the duct and multiplying with the length of the duct.
- For tapered pieces, the perimeters at the two ends of the duct piece shall be averaged out and the average perimeter shall be multiplied with the length of the duct piece.
- For special pieces such as bends, tees, reducers, branches and collars, the measurement shall be carried out in a manner similar to as described above using the averaging and centre line method.
- The nominal cross sectional neck area of the item, perpendicular to the direction of the airflow, shall be measured and paid for.
- Flexible connector measurement shall be made as for a duct piece, i.e. multiplying the perimeter with the length of the connector piece.
- Nothing extra and/or no separate measurement shall be payable for vanes, splitters, deflectors, wastage, flanges, gaskets, stiffeners, supports, nuts/bolts, hangers, gaskets between support & duct, vibration isolators quadrants for splitters, etc.

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2.2. Insulation Works:

- Piping Insulation shall be measured in meters along the centre line of the installed insulated piping including all pipe fittings, flanges (with gaskets, nuts, bolts), unions, bends, elbows, tees, reducers, inspection pieces, expansion loops etc. These above listed accessories shall form part of piping length along the centreline of the installed piping. No special or extra measurement shall be paid for these fittings.
- Insulation item shall include all accessories and finishes required by the specifications. No separate measurement shall be made for any of these items.
- Ducting insulation shall be measured on the basis of duct surface area
- However, nothing extra shall be paid on account of bulging of insulation at any location due to inherent properties of the insulation material.
- Nothing extra / no special measurement shall be made for insulation of bends, transformation pieces, tap off, elbows, reducers etc. shall be made. Insulation of these fittings shall be treated as for standard duct insulation.
- Insulation item shall include all accessories and finishes required by the specifications. No separate measurement shall be made for any of these items.
- Acoustic insulation for ducts & rooms shall be measured on the basis of surface area of bare ducts / bare room walls / ceiling.
- Insulation of all valves & strainers, unless forming pat of the equipment, shall be separately counted and paid for as per individual unit rates.
- No measurement for insulation of any equipment and / or tank shall be made. This shall be deemed to be a part of equipment / tank.
- Nothing extra and/or no separate measurement shall be payable for wastage, supports, hangers, structural steel, wooden planks/ blocks, clamps, nuts/bolts, insulation of maintenance flanges etc.

2.3. Electrical Work:

- All cables shall be measured in meters on lug-to-lug basis. Noting extra shall be paid on account of wastage. Cable Trays/ Raceways, glands, lugs / thimbles, ferrules, markers, joints etc. shall form part of cable measurement only and nothing extra shall be payable on these accounts.
- No extra measurement for indicating lamps, Voltmeter, Ammeter, Kilowatt meter, etc. shall be made as the same shall be treated as part of equipment only.
- No extra measurement for local electrical isolators and / or push button stations shall be made and these items are deemed to be part the equipment being catered to by these items.

3. Testing and Commissioning

3.1. General

The contractor must perform all inspection and tests of the system as a whole and of components individually as required, under the supervision of the Project Manager, in accordance with the provisions of the applicable ASHRAE standards or approved equal in addition to furnish necessary test certificates from manufacturers.

The system shall then be commissioned, tested and balanced to fulfill the intent and purpose for which it is designed.

In addition continuous Run Tests shall be carried out during peak weather condition.

Compressors/Condensers/Evaporators etc.

GENERAL TECHNICAL SPECIFICATIONS

Hydraulic test for various components and assembled equipments at 1.5 times design pressure or double the operating pressure, whichever is higher.

Pneumatic leak test after assemblies at design pressure

Static and dynamic balancing on electronic precision machine for rotating parts, links, impeller/ crank shaft assemblies etc.

Testing of oil passages in compressor at 1.5 times pump discharge pressure.

Pressure drop test for condenser, chiller and evaporator.

For compressor assembly, electronic leak, air running test, pneumatic test with dry nitrogen and leak test in water.

Instruments and Controls

Visual examination.

Special Note

Vendor to note that above procedure is to be followed in addition to the specifications attached with the tender.

Associated Works at Site.

All electrical items will be subjected to inspection at any stage during manufacturing activity. Routine electrical test as per relevant codes. Inspection of manufacturer's test certificates.

Inspection of raw materials to be used for fabrication and assembly and inspection of manufacturer's certificates.

Inspection of welding including welders qualification as desired by inspection engineers. Inspection of fabricated items.

Pressure testing of pipe fittings used for the refrigerant and water and other services.

Checking of electrical circuits (power & controls) and checking functioning of controls of refrigerant systems and other circuits of air conditioning plant.

Checking of calibration of controls and instrumentation

Checking of assemblies or electrical control panel, instruments panels, local panels (dimensional and functional) annunciator panels etc.

Inspection of complete electrical installation at site.

Performance testing of complete A.C. Plant as per specifications.

3.2. Contractors Responsibility

GENERAL TECHNICAL SPECIFICATIONS

The above inspection procedure is given for general guidance and information of contractor. The inspection of project manager/consultant is strictly not limited to these.

The inspection engineer of project manager/consultant will have full right, to have detailed inspection at any stage right from placement of order to completion of project, as and when desired by inspection engineer.

Co-ordination of inspection agency of project manager/consultant with his factory/sub-vendor's factory/erection site will be the sole responsibility of successful Contractor, subsequent to placement of order for complete air conditioning plant (Low side), covered under these technical specifications.

3.3. Duct Work

All branches and outlets shall be tested for air quantity, and the total of the air quantities shall be within plus five percent (5%) of fan capacity.

Fire dampers, volume dampers and splitter dampers shall be tested for proper operation.

3.4. Electrical Equipment

All electrical equipment shall be cleaned and adjusted on site before application of power.

The following tests shall be carried out:

Cables and Wires continuity tests.

Insulation resistance tests, phase to phase and phase to earth, on all circuits and equipment, using a 500 Volts meggar. The meggar reading shall be not less than one megaohm.

Earth resistance between conduit system and earth must not exceed half (1/2) CMH.

Phasing out and phase rotation tests.

Operating tests on all protective relays to prove their correct operation before energising the main equipment.

Operating tests on all starters, circuit breakers etc.

3.5. Plant Audit & Certification work

The work of plant audit & certification shall be done by an approved outside agency.

The whole system balancing shall be tested with microprocessor based Hi-tech instruments with an accuracy of ± 0.5%.

The instrument shall be capable of storing data and then down loading into a PC. The agency shall provide a minimum but not limited to the following instruments.

Microprocessor based enthalpy calculation meter to measure dB and WB temperature, RH and dew point.

Velocicalc meter to measure air volume and air velocity.

Pitot tube.

GENERAL TECHNICAL SPECIFICATIONS

Electronic Rotary Vane Anemometer.

Accubalance Flow Measuring Hood.

The outside agency shall analyse all the data and shall be responsible for the capacity and performance audit and certification of the plant.

The successful Bidder shall be responsible to provide necessary sockets and connections for fixing of the Testing Instruments, probes etc.

3.6. Commissioning of the System

The system shall be commissioned by adopting the following procedure.

The installation as a whole shall be balanced and tested upon completion, and all relevant information, including the following shall be submitted to the Project Manager.

Air volume passing through each unit, duct, grilles, and apertures.

Static pressure in each air duct.

Electrical current readings, in amperes of full and average load running and starting, together with name plate current of each electrical motor.

Continuous recording over a specified period, of ambient wet and dry bulb temperatures under varying degrees of internal heat loads and use and occupation, in each zone of each part of the building.

Daily records should be maintained of hourly readings, taken under varying degrees of internal heat load and use and occupation, of wet and dry bulb temperatures, upstream “On-Coil” of each cooling coil. Also suction temperatures and pressures for each refrigerating unit. The current and voltage drawn by each machine.

Any other readings shall be taken which may subsequently be specified by the Project Manager.

3.7. Air Balancing

All air handling/ ventilation equipments, duct work and outlets shall be adjusted and balanced to deliver the specified air quantities, at each inlet and outlet as indicated on the drawings.

If these air quantities cannot be delivered without exceeding the speed range of the pulley or the available horse power, the Project Manager shall be notified, before proceeding with the balancing of air distribution system.

A proper record shall be maintained as per Test Proforma given else where.

3.8. Miscellaneous

The above tests and procedures are mentioned herein, for general guidance and information only, but not by way of limitation to the provisions of conditions of contract and specification.

The date of commencement of all tests listed above, shall be subject to the approval of the Project Manager and In accordance with the requirements of this specification.

GENERAL TECHNICAL SPECIFICATIONS

The contractor shall supply the skilled staff and all necessary instruments and carry out any test of any kind on a piece of equipment, apparatus, part of system or on a complete system, if the Project Manager requests such a test for determining specified or guaranteed data, as given in the specification or on the drawings.

Any damage resulting from the tests shall be repaired and/or damaged material replaced, to the satisfaction of the Project Manager.

In the event of any repair or any adjustment having to be made, other than normal running adjustment, the tests shall be void and shall be recommenced after the adjustment or repairs have been completed.

The contractor must inform the Project Manager when such tests are to be made, giving sufficient notice, in order that the Project Manager or his nominated representative may be present.

Complete records of all tests must be kept and 3 copies of these and location drawings must be furnished to the Project Manager.

The contractor may be required to repeat the test as required, should the Ambient conditions at the time, do not give, in the opinion of the Project Manager, sufficient and suitable indication of the effect and performance of the installation as a whole or of any part, as required.

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GENERAL TECHNICAL SPECIFICATIONS

4. Test Performa

S.No.	Item	Unit	Test Result
1.	**Conditions**		
1.1	Ambient conditions		
	-Temp. D.B.	°C	
	-Temp. W.B.	°C	
	-R.H.	%	
1.2.	Inside conditions		
	-Temp. D.B.	°C	
	-Temp. W.B.	°C	
	-R.H.	%	
2.	**Compressor**		
2.1	Speed	RPM	
2.2	Refrigerant suction pressure	Kg/cm^2	
2.3	Refrigerant discharge pressure	Kg/cm^2	
2.4	Oil Pressure	Kg/cm^2	
3.	**Compressor Motor**		
3.1	Speed	RPM	
3.2	Voltage	Volts	
3.3	Current at		
3.3.1	100 %	Amps.	
3.3.2	90 %	Amps.	
3.3.3	80 %	Amps.	
3.3.4	70 %	Amps.	
3.3.5	60 %	Amps.	
3.3.6	50 %	Amps.	
3.3.7	40 %	Amps.	
3.3.8	30 %	Amps.	
3.3.9	20 %	Amps.	
4.	**Condenser**		
4.1	Air Temperature -Entering	°C	
4.2	Air temperature. -Leaving	°C	

GENERAL TECHNICAL SPECIFICATIONS

5. **Outside air intakes**

5.1 Face area SQM
5.2 Air quantity CUBM/HR

6. Room conditions at design conditions

6.1 Temperature °C (DB; WB)
(A Nos. of readings shall be taken and averaged)

7. **Controls**
Report on test and functioning of all controls.

Notes :

A. **Test instruments**

1. All instruments for testing shall be provided by the air conditioning contractor/Testing agencies. A brief list is given for guidance.
2. Electronic thermometers used for measurement of temperature of water/ refrigerant shall have graduations of 0.1ºC and shall be got calibrated from N.P.l. or any recognized test house before hand.
3. Thermometers used in the psychrometers shall have graduations of 0.2.ºC and shall be calibrated as at (2.) above.
4. Pressure gauges shall also be got calibrated before hand from a recognized test houses.
5. Vibration Levels:
   At compressor shaft
   Vertical Plane
   Horizontal Plane
   At Motor Shaft
   Vertical Plane
   Horizontal Plane

6. Air flow rates shall be measured in the supply duct using pilot tube.

7. **Tolerance**

7.1 The test data shall be within ± 3% of the specified data, to fulfill the tender requirements.

7.2. For the purpose of system capacity, the refrigeration tonnage obtained from the main refrigeration plant will be accepted. If due to any reason, internal load mentioned in the tender specifications is not available, psychrometric computations for actual load conditions will be done and the plant, if found satisfactory, will be accepted.

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GENERAL TECHNICAL SPECIFICATIONS

GENERAL TECHNICAL SPECIFICATIONS

5. SAFETY CODES

1. IS 659 : (Reaffirmed 1991)
Safety code for air conditioning (revised) (Amendment 1).

2. IS 660 : (Reaffirmed 1991)
Safety code of mechanical refrigeration. (revised).

3. IS 3233 : 1965 (Reaffirmed 1992)
Glossary of terms for safety and relief valves and their parts.

4. IS 12992 : 1993, Part I, 1990 Part II
Safety relief valves.

5. IS 954 : 1989
Functional requirements for carbon dioxide tender for fire brigade use. (2nd revision)

6. IS 1641 : 1988 (reaffirmed 1993)
Code of practice for fire safety of buildings (general) : General principles of fire grading and classification. (1st revision)

7. IS 1642 : 1989
Code of practice for fire safety of buildings. (general) : Details of construction (1st revision) (1645 supersedes 1642)

8. IS 1643 : 1988 (Reaffirmed 1993)
Code of practice for fire safety of buildings (general : Exposure hazard (1st revision)

9. IS 1644 : 1998 (Reaffirmed 1993)
Code of practice for fire safety of buildings (general) : Requirements and personal hazard.

10. IS 1646 : 1982 (Reaffirmed 1990)
Code of practice for fire safety of buildings (general) : Electrical installation (1st revision)

11. IS 3786 : 1983 (Reaffirmed 1991)
Methods for computation of frequency and severity rates for industrial injuries and classification of industrial accidents. (1st revision)

12. IS 3808 : 1979 (Reaffirmed 1990)
Method of test for non combustibility of building materials (1st revision)

13. IS 5311 : 1969 (Reaffirmed 1990)
Code of safety for carbon tetra chloride.

GENERAL TECHNICAL SPECIFICATIONS

14. IS 6382 : 1984 (Reaffirmed 1990)
Code of practice for design and installation of fixed carbon dioxide for fire extinguishing system (1st revision)

15. IS 7969 : 1975 (Reaffirmed 1991)
Safety code for handling and storage of building materials
(Amendment 1)

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4.0 SCHEDULE OF TECHNICAL DATA

(To be filled by the tenderer)

1 VRF / Split Unit

A. General:

a) Manufacturer

b) Type of Unit-Horizontal or vertical

c) Overall Dimensions (mm)

d) Weight

e) Approximate noise level (db)

f) Refrigerant

g) Compressor Type

h) Motor HP

B. Condenser :

a) No of Fans

b) Motor HP

c) Weight

d) Overall Size

e) Type of Tubes

C. Controller :

a) Type

D. Filter Section :

a) Type

b) Gross filter area (Sq. m)

c) Velocity through filter (M.P.S.)

d) Pressure Drop through Filter when new (mm. W.G)

e) Efficiency

2 Air Handling Units (Double Skin) Sectional CS TFAU
(Use separate sheet for details of each AHU)

Manufacturer	
Type	(Horizontal/Vertical)
Operating Weight	KGS
Overall Dimension	MxMxM
Dimension of Coils	MxM
Finned Area	Sqm
Material of coil Header	Steel/Copper
No. of Rows	Nos
Fins per cm	Nos.
Type of fins- Plate/vertical	
No. of circuits	Nos.
Water velocity in tubes	M/s
Tube Material	
Tube Dia.	MM
Thickness of tubes	MM
Fin material	
Water pressure drop	M
Air quantity	CUBM/HR
Make of Fan	--
Fan outlet velocity	M/s
No. of fans	Nos.
Dia of fans	MM
Fan speed	RPM

Total static pressure	MM WG
Whether both Balancing Carried out-static and dynamic	Yes/No
Motor Output	KW
Type of motor	--
Type of air filters & efficiency	--
Velocity across filters	M/s
Material and thickness of sheet	
Internal	MM
External	MM
Material and th. of Insulation	MM
External finish	Yes/No

3. <u>Fan Section</u>

Make and Model	--
Type	--
Confirming to :	
Air Inlet	Single/double
Air Quantity at design speed	CUBM/HR
Outlet velocity	M/Sec.
Static Pressure	MMWG
Velocity Pressure	MMWG
Total Pressure	MMWG
Wheel Diameter	MM
Rated RPM	RPM
Rated KW of Motor	KW
Motor Conforming to:	
Motor speed	RPM

Type of Motor	
Whether Balanced	
Statically	Yes/No
Dynamically	Yes/No
Noise Levels of complete unit.	Db
Material of Construction :	
-Impellor Housing	--
Type of Belts.	--
Type of Pulley	--
Bearings:	
- TYPE	--
- MAKE	--
Overall Dimensions.	MM
Accessories offered.	--

4 **<u>Ventilation & Exhaust Fans (Axial Flow / Inline Fan)</u> :**

a) Manufacturer

b) Fan discharge position (horizontal or vertical)

c) Speed (r. p .m)

d) Fan dia (mm)

e) C.M..H.

f) Motor (KW)

g) Static pressure (mm W.G.)

h) Balance (Static and/ or dynamic)

5 **<u>Insulation</u> :**

a) Manufacturer

b) Material

c) "K" Value at 10 deg. C. mean temp.

6 **Electric Motors :**

a) Name of Manufacturer
b) Type of Motor & Frame reference
c) Rated out put (KW)
d) Range of working voltage
e) No. of phases & Phase connections
f) Nominal frequency
g) Rated speed (R.P.M)
h) Rated current (Amps.)
i) Class of Insulation
j) Temp. Rise with cooling air at 40 deg. C.
k) efficiency & power factor at 100%m, 75%, 50% & 25%

7 **Controls :**

a) Manufacturer
b) Thermostat Type
c) Humidistat type

8 **Switch Gears**

A. Circuit Breakers

a) Manufacturer
b) Symmetrical short circuit (capacity at 415 V)
c) Normal current (amps)
d) O/L trips
e) E/L trip

TECHNICAL SPECIFICATIONS

SECTION-01: BASIS OF DESIGN

1. BASIS OF DESIGN

1.1 The Plumbing, Sanitary, Drainage & Fire Protection System for the project is designed keeping in view the following.

1.2 Requirement of adequate and equal pressure availability of hot and cold water lines in all Toilets, Kitchen etc.

1.3 Adequate storage of water in under ground raw + treated domestic water tanks.

1.4 Provision of fire fighting appurtenance such as sprinklers, fire hydrants, hose reel, and portable extinguishers.

The execution of works and materials used shall be as per the latest relevant I.S. specifications.

The extension of work shall in stick compliance to the Enviromental Clearance granted by MoEF, Govt. of India & NOC issued by Fire Department.

Wherever reference has been made to Indian Standard or any other specifications, the same shall mean to refer to the latest specification irrespective of any particular edition of such specification being mentioned in the specifications below or Schedule of Quantities.

2. CONCEPT OF THE SYSTEM

The following services are envisaged for the Complex.

2.1 Water Treatment System for meeting the domestic water quality requirement with chemical parameters in acceptable limits as per SP:35(S & T) 1987 which is considered safe for human consumption.

2.2 Domestic water supply through Gravity System for making water available at the residual pressure 1.5 to 2.0 kg / sq.cm.

2.3 Sewage and Sullage collection system based on IS:1742 and applicable standards for domestic drainage.

2.4 Fire Fighting system for the Complex comprising of Hydrant, Hose Reels, Sprinklers and portable fire extinguishers.

3. WATER STORAGE & DISTRIBUTION SYSTEM

3.1 **Water Requirement**

The water requirement for the project is proposed to be based on the provisions of IS:1172 and prevalent practice.

3.2 **Source of Water**

It is expected that part of the daily domestic water requirement for the

3.3 **Water Storage**

The static storage for Fire Protection is at present sized for 25 KL. The total water storage in raw & domestic water tanks is of 50 ltrs capacity.

3.4 **Water Quality**

Domestic Water Requirement: The total domestic water shall be passed through basic water treatment plant and further specialized treatment shall be done based on the water analysis report and requirement. The basic water treatment plant shall comprise of MG filter, Softener and Hypo dosing.

Disinfected Water: It is proposed to provide localized UV units for water consumption points for direct consumption in Kitchen / Pantry.

3.5 **Water Distribution**

The water distribution for hot and cold water supply for the Complex shall be designed on principle of zoning to ensure availability of adequate residual head at user outlet. Provision of pressure reducing station and non-return valve shall be made for effective and efficient water distribution in the Complex. Design is such that the hot and cold-water pressure and flow shall be fairly equal to avoid reversal of flow from one service to another. Variable speed hydropematic system shall be provided fully equipped with pre-charged, non-toxic food grade bladder. Separate direct connection from header shall be taken for water requirement of Kitchen etc., and for hot water mixing tank connection. Zoning of cold and hot water supply for floors at lower and higher levels shall be provided.

3.6 **Appurtenant**

Following components shall be included in the water supply system for efficient functioning:

i. Automatic air vent at each of the high point.

ii. Drain valve at each of the low point.

iii. Pressure Release valve where abnormally high pressure is to be reduced.

iv. Water Hammer Arrestors (as required).

v. Flow meter.

vi. Pressure Gauge.

viii Anchor block / thrust block.

4. SEWAGE, SULLAGE AND STORM WATER

The soil and waste shall be carried down in separate independently vented pipes. Two pipe drainage systems shall be adopted as per NBC (Part-IX). Provision of ASP vertical vent shall also be made for hygiene, safety consideration and to avoid foul

smell entering through trapped gully in WC. Provision of grease trap shall be made for waste water from Kitchen.

4.1. **Design Limitations**

The system is designed considering the following:

a. High thrust developed at soil & water pipe connections.
b. Termination of vent cowl at terrace level.
c. Provision of adequate slope for horizontal header pipes for achieving self-cleaning velocity in the pipes.
d. Provision of cleanout plug.

5. WORKMANSHIP

The workmanship shall be best of its kind and shall conform to the specifications, as below or Indian Standard Specifications in every respect or latest trade practices and shall be subject to approval of the Owner's Site Representative. All materials and/or Workmanship which in the opinion of the Owner's Site Representative / Architect / Consultant is defective or unsuitable shall be removed immediately from the site and shall be substituted with proper materials and/or workmanship forthwith.

6. MATERIALS

All materials shall be best of their kind and shall conform to the latest Indian Standards.

All materials shall be of approved quality as per samples and origins approved by the Owner's Site Representative / Architect / Consultants.

As and when required by the Owner's Site Representative / Consultant, the contractor shall arrange to test the materials and/or portions of works at his own cost to prove their soundness and efficiency. If after tests any materials, work or portions or work are found defective or unsound by the Owner's Site Representative / Consultant, the contractor shall remove the defective material from the site, pull down and re-execute the works at his own cost to the satisfaction of the Owner's Site Representative / Consultant. To prove that the materials used are as specified the contractor shall furnish the Owner's Site Representative with original vouchers on demand.

SECTION-02: SANITARY FIXTURES & FITTINGS

1. SCOPE

The scope of this section consists of but is not necessarily limited to supply, installation, testing and commissioning of following items:

a. Sanitary appliances and fixtures for toilets.
b. Chromium plated brass fittings
c. Stainless steel sinks
d. Accessories e.g. towel rods, toilet paper holders, soap dish, liquid soap dispensers, towel rails, coat hooks etc.
e. Hand driers, drinking water fountains etc.

Whether specifically mentioned or not the Contractor shall provide for all appliances and fixtures all fixing devices, nuts, bolts, screws, hangers as required.

All exposed pipes within toilets and near appliances/fixtures shall be of chromium plated brass or copper unless otherwise specified.

2 GENERAL REQUIREMENT

Sanitary appliances and fixtures for toilets, chromium plated brass fittings, stainless steel sinks, bathroom accessories like towel rods, toilet paper holders, soap dish, liquid soap dispensers, towel rails coat hooks etc and mirrors, hand driers, drinking water fountains etc as listed in the relevant items in the Schedule of Quantities shall be procured by the contractor. The rates shall be inclusive of accessories (in such case) required for installation.

All appliances, fixtures and fittings shall be provided with all such accessories as are required to complete the item in working condition whether specifically mentioned or not in the Schedule of Quantities, specifications, drawings. Accessories shall include proper fixing arrangements, brackets, nuts, bolts, washers, screws and required connection pieces.

The sanitary fixtures and fittings shall be installed at the correct assigned position as shown on the drawings and as directed by the Architect / Owner's Site Representative and shall fully meet with the aesthetic and symmetrical requirements as demanded by the Architect / Interior Designer

All fixtures and accessories shall be fixed in accordance with a set pattern matching the tiles or interior finish as per Architect requirements. Wherever necessary, the fittings shall be centered to dimensions and pattern as called for.

Fixing screws shall be half round head chromium plated (CP) brass screws, with CP brass washers unless otherwise specified.

Fixtures shall be installed by skilled workman with appropriate tools according to the best trade practice.

All appliances, fittings and fixtures shall be fixed in a neat workmanlike manner true to level and to heights shown on the drawings and in accordance with the manufacturers recommendations. Care shall be taken to fix all inlet and outlet pipes at correct positions. Faulty locations shall be made good and any damage to the

finished floor, tiling, plaster, paint, insulation or terrace shall be made good by the Contractor at his own cost. Fixtures shall be mounted rigid, plumb and true to alignment.

All materials shall be rust proofed; materials in direct or indirect contact shall be compatible to prevent electrolytic or chemical (bimetallic) corrosion.

Wall flanges shall be provided on all walls, floors, columns etc. wherever supply and disposal pipes pierce through them. These wall caps shall be or chromium plated brass fittings and the receiving pipes and shall be large enough to cover the punctures properly.

Sanitary appliances, subject to the type of appliance and specific requirements, shall be fixed in accordance with the relevant standards and the following:

i. Contractor shall, during the entire period of installation and afterwards protect the appliances by providing suitable cover or any other protection so as to absolutely prevent any damage to the appliances until handing over (The original protective wrapping shall be left in position for as long as possible)

ii. The appliances shall be placed in correct position or marked out in order that pipe work can be fixed or partially fixed first.

iii. The appliance shall be fixed in a manner such that it will facilitate subsequent removal if necessary.

iv. The appliance shall be securely fixed. Manufacturer's brackets and fixing methods shall be used wherever possible. Compatible rust-proofed fixings shall be used. Fixing shall be done in a manner that minimize noise transmission.

v. Appliances shall not be bedded (e.g. WC pans, pedestal units) in thick strong mortar that could crack the unit (e.g. ceramic unit)

vi. Pipe connections shall be made with demountable unions. Pipe work shall not be fixed in a manner that it supports or partially supports and appliance.

viii. Appliances shall be fixed true to level firmly fixed to anchor or supports provided by the manufacturer and additional anchors or supports where necessary.

Sizes of sanitary fixtures given in the Specifications or in the Schedule of Quantities are for identification with reference to the catalogues of make considered. Dimensions of similar models of other makes may very within $\pm$ 10% and the same shall be provided and no claim for extra payment shall be entertained NOR shall any payment be deducted on this account.

The contractor shall fix all plumbing fittings such as water faucets, shower fittings, mixing valves etc. in accordance with manufacturer’s instructions and connect to piping system. The contractor shall supply all fixing materials such as screws, rawl plugs, unions, collars, compression fittings etc., as required.

Joints / gaps between all sanitary appliances / fixtures and the floor / walls shall be caulked with an approved mildew resistant sealant, having antifungal properties, of

colour and shade to match that of the appliances / fixture and the floor / wall to the extent possible.

2.1 Water Closet

Water Closet shall be wash down or symphonic wash down type floor or wall mounted set, as shown in the drawings, designed for low volume flushing from 5-7 litres of water, flushed by means of a porcelain flushing cistern or an exposed or concealed type (as detailed in the drawings or as directed by the Owner's Site Representative) 32 mm size CP brass flush valve with regulator valve. Flush pipe / bend shall be connected to the WC by means of a suitable rubber adaptor. Wall hung WC shall be supported by CI floor mounted chair which shall be fixed in a manner as approved by the Owners Site Representative.

Each WC set shall be provided with approved quality of seat, rubber buffers and chromium plated hinges. Seat shall be so fixed that it remains absolutely stationary in vertical position without falling down on the WC.

Each WC shall be provided with 110 mm dia (OD) PVC Pan connector connecting the ceramic outlet of WC to CI pipe.

2.2 Urinals

Urinals shall be lipped type half stall with glazed vitreous China of size as called for in the Bill of Quantities.

Half stall urinals shall be provided with 15mm dia CP spreader, 32mm dia CP domical waste and CP cast brass bottle trap with pipe and wall flange and shall be fixed to wall by CI brackets, CI wall clips and CP brass screws as recommended by manufacturer complete as directed by the Owner's Site Representative.

Flushing for urinals shall be by means of no hand operation, infrared electric flush valve with complete kit of plumbing, electrical and electronic items, infrared photo cells, solenoid valve transformer and electrical connection. The automatic flush sensor plate shall be flush and press fitted and be of high quality mirror polish finish. Each urinal shall be provided with one flush valve unit.

Flush pipes shall be GI pipes concealed in wall chase but with chromium plated bends at inlet and outlet.

Urinal Partitions

Urinal partitions shall be white glazed vitreous china of size specified in the Schedule of Quantities.

Porcelain partitions shall be fixed at proper heights with CP brass bolts, anchor fasteners and MS clips as recommended by the manufacturer and directed by the Owner's Site Representative.

2.3 Cisterns / Flush Valve

Low level flushing cistern (exposed or concealed) shall be provided for WC in specified toilets. Contractor shall install cistern in accordance to the manufacturer's specification to the satisfaction of the Owner Site Representative. Provision of flush valve shall be made for Public / Staff toilets.

2.4 Bidets

Every pedestal bidet shall be secured to the floor using stainless steel or non-ferrous fixing screws. Provision shall be made in the floor to receive the fixing screws.

Wall hung bidet pan shall be fixed with stainless steel bolts and nuts or other approved means to an underground support frame such that no strain is transmitted to the bidet pan connection or any other part of the plumbing system. The support frame, depending on the design, shall be either fully or partially fixed within the structure of the building.

Every bidet shall be provided with a spray nozzle fixed above the spill over level of the bidet pan.
Every bidet shall be provided with a fitting trap of at least 40 mm in diameter. The connection by means of a bidet trap of at least 75 mm in diameter shall be made directly to an individual branch drain line or to a discharge pipe on the upper story level.

2.5 Bath Tub

Bath tub shall be white enameled cast iron, pressed steel, acrylic, built-up marble (polymarble) or of any other material as specified in the Schedule of Quantities.

Each bath tub shall be provided with 40 mm dia (lever operated pop-up brass waste if required) waste with 32 mm CP overflow assembly with brass P tap with cleaning eye.

Bath tubs shall be fixed true to level firmly fixed to anchor or supports provided by the manufacturer. Edges touching the walls shall be thoroughly sealed. The fixing shall be perfectly done with hold fasts or bathtubs with PCC and plaster done so that the wall behind does not tend to get damp or patchy.

Contractor shall during the entire period of installation and afterwards protect the bath tub by providing suitable cover over the entire bath tub by providing suitable sheet protection to prevent any damage to the bath tub until completion of the works.

2.6. Wash Basin

Wash basins shall be white glazed vitreous china of size, shape and type specified in the Schedule of Quantities.

Each basin shall be provided with painted MS angle or CI brackets and clips and the basin securely fixed to wall/counter slab. Placing of basins over the brackets without secure fixing shall not be accepted. The MS angle shall be provided with two coats of red oxide primer and two coats of synthetic enamel paint of make , brand and colour as approved by the Owner’s Site Representative. The cost of fixing the basin shall be inclusive of supply and installation of brackets as described above.

Each basin shall be provided with 32mm dia CP waste with overflow, pop-up waste or rubber plug and CP brass chain as specified in the Schedule of Quantities.

Each basin shall be provided with hot and cold water mixing fitting or as specified in the Schedule of Quantities.

2.7. Sinks

Sinks shall be stainless steel or any other material as specified in the Schedule of Quantities.

Each sink shall be provided with painted MS or CI brackets and clips and securely fixed. Counter top sinks shall be fixed with suitable painted angle iron brackets or clips as recommended by the manufacturer. Each sink shall be provided with 40mm dia CP waste and rubber plug with CP brass chain as given in the Schedule of Quantities. The MS angle shall be provided with two coats of red oxide primer and two coats of synthetic enamel paint of make, brand and colour as approved by the Owner's site representative.

Sanitary fittings for sinks shall be deck mounted or wall mounted CP swivel faucets with or without hot and cold water mixing fittings as specified in the Schedule of Quantities. Installation of fittings shall be measured and paid for separately.

2.8. Shower Set

Shower set shall comprise of two CP brass concealed stop cocks, four/five way auto-diverter, adjustable type over-head shower with CP shower arm , all with CP wall flanges of approved quality all as specified in the Schedule of Quantities. Bath spout, hand showers and pop up wastes shall also be provided wherever, specified. Wall flanges shall be kept clear off the finished wall. Wall flanges embedded in the finishing shall not be accepted.

2.9 Flow Control Device

Approved / rated flow control fitment in brass body, chrome outer cover, rated for flow / discharge of the fixture.

2.10. Toilet Paper Holder

Toilet paper holder shall be white glazed vitreous china or chrome plated of size, shape and type specified in the Schedule of Quantities.

Porcelain toilet paper holder shall be fixed in walls and set in cement mortar 1:2 (1 cement : 2 coarse sand) and fixed in relation to the tiling work.

The latter (chrome) shall be fixed by means of screws/capping having finish similar to the toilet paper holder in wall/temper partitions with raw l plugs or nylon sleeves. When fixed on timber partition, it shall be fixed on a solid wooden base member provided by the Owner's Site Representative.

2.11. Towel Rail

Towel rail shall be chromium plated brass or of stainless steel or powder coated brass of size, shape and type specified in the Schedule of Quantities.

Towel rail shall be fixed with screws/capping having finish similar to the towel rail in wall with rawl plugs or nylon sleeves and shall include cutting and making good as required or directed by the Owner's Site Representative.

2.12 Janitor's Sink

Janitor's sink shall be stainless steel, single bowl type of size as called for in the Schedule of Quantities , provided with painted R.S. or CI brackets and clips and securely fixed. Each sink shall be provided with 40mm dia CP waste. Fixing shall be as directed by the Owner's Site Representative.

The supply fittings for Janitor's sink shall be wall mounted type of size as mentioned in Schedule of Quantities.

2.13 Drinking Water Fountain

Drinking water fountain shall be well mounting type made of vitreous china, stainless steel or any other material as given in the Schedule of Quantities.

The drinking water fountain shall be with anti-squirt bubble less, self closing valve type with automatic volume regulator.

The drinking water fountain shall be provided with an anti-splash back and integral strainer with 32mm or 40mm cast brass trap.

2.14 Liquid Soap Dispenser

Liquid Soap Dispenser shall be wall/counter mounted suitable for dispensing liquid soaps, lotions, detergents. The cover shall lock to body with concealed locking arrangement, opened only be key provided.

Liquid soap dispenser body and shank shall be of high impact resistance material. The piston and spout shall be stainless steel with 1 litre capacity polyethylene container.

The valve shall operate with less than 2.27 Kg (5 lbs) of force.

2.15 Hand Drier

The hand drier shall be no touch operating type with solid state time delay to allow user to keep hand in any position.

The hand drier shall be fully hygienic, rated for continuous repeat use (CRU).

The rating of hand drier shall be such that time required to dry a pair of hands up to wrists is approximately 30 seconds.

The hand drier shall be of wall mounting type suitable for 230 V, single phase, 50 Hz, AC power supply.

3. TOILETS FOR THE DISABLED

Where specified, in washroom facilities designed to accommodate physically disabled, accessories shall be provided as directed by the Owner's Site Representative.

Stainless steel garb brass of required size suitable for concealed or exposed mounting and opened non-slip gripping surface shall be provided in all washroom. The flushing cistern/valve shall be provided with chromium plated long handles.

4. MOCKUP AND TRIAL ASSEMBLY

The installation of the Sanitary fixtures and fittings shall be as per the shop drawings approved by the Architect/Consultant.

The contractor shall have to assemble at least one set of each type of sanitary fixtures and fittings in order to determine precisely the required supply and disposal connections. Relevant instructions from manufacturers shall be followed as applicable. This trial assembly shall be developed to determine the location of puncture holes, holding devices etc. which will be required for final installation of all sanitary fixtures and fittings. The above assembly shall be subject to final approval by the Architect / Interior Designer.

The fixtures in the trial assembly can be re-used for final installation without any additional payments for fixing or dismantling of the fixtures.

5. SUPPORTING AND FIXING DEVICES

The contractor shall provide all the necessary supporting and fixing devices to install the sanitary fixtures and fittings securely in position. The fixing devices shall be rigidly anchored into the building structure. The devices shall be rust resistant and shall be so fixed that they do not present an unsightly appearance in the final assembly. Where the location demands, the Architect may instruct the contractor to provide chromium plated or other similarly finished fixing devices. In such circumstances the contractor shall arrange to supply the fixing devices and shall be installed complete with appropriate vibration isolating pads, washers and gaskets.

6. FINAL INSTALLATION

The contractor shall install all sanitary fixtures and fittings in their final position in accordance with approved trial assemblies and as shown on drawings. The installation shall be complete with all supply and waste connections. The connection between building and piping system and the sanitary fixtures shall be through proper unions and flanges to facilitate removal/replacement of sanitary fixtures without disturbing the built in piping system. All unions and flanges shall match in appearance with other exposed fittings.

Fixtures shall be mounted rigid, plumb and to alignment. The outlets of water closet pans and similar appliances shall be examined to ensure that outlet ends are butting on the receiving pipes before making the joints. It shall be ensured that the receiving pipes are clear of obstruction. When fixtures are being mounted, attention shall be paid to the possibility of movement and settlement by other causes. Overflows shall be made to ensure that necessary anchoring devices have been provided for supporting water closets, wash basins, sinks and other appliances.

7. PROTECTION AGAINST DAMAGE

The contractor shall take every precaution to protect all sanitary fixtures against damage, misuse, cracking, staining, breakage and pilferage by providing proper wrapping and locking arrangement till the completion of the installation. At the time of handing over, the contractor shall clean, disinfect and polish all the fixtures and fittings. Any fixtures and fittings found damaged, cracked chipped stained or scratched shall be removed and new fixtures and fittings free from defects shall be installed at his own cost to complete the work.

8. MEASUREMENT

8.1. Rate for fixing only of sanitary fixtures accessories, CP fittings shall etc. include all items, and operations stated in the respective specifications and bill of quantities and nothing extra is payable.

8.2 Rates for all items under specifications para above shall be inclusive of cutting holes and chases and making good the same, CP screws, nuts, bolts and any fixing arrangements required and recommended by manufacturers, testing and commissioning and making good to the satisfaction of the Owner's Site Representative.

9. TESTING

All appliances, fixtures and fittings shall be tested before and after installation. Water seals of all appliances shall be tested. The contractor shall block the ends of waste and ventilation pipes and shall conduct an air test.

SECTION-03: WATER SUPPLY (COLD & HOT)

1. SCOPE

The scope of this section comprises the supply, installation, testing and commissioning of piping network for water supply for internal & external services as follows:

a Bore well / Municipal / Tanker Water supply.

b. Domestic Water Supply.

c. Washing

d. Connection to various mechanical equipments to be supplied and installed by the other specialist contractors.

The Contractor shall make all necessary application and arrangements for his work to be inspected by the Local Authorities.

The Contractor shall be solely responsible for obtaining the Authorities approval of his works prior to the handing over of the complete water supply / distribution installation to the Owner.

2. PIPING MATERIALS

The piping system shall consist of copper pipes confirming to BS 2871, class 1, table X, half hard for domestic plumbing and fittings shall confirm to BS 864 Part-II

The piping system shall also consist of CPVC SDR 11.0 piping from 15 mm to 50 mm & Schedule 40 from 65 mm to 150 mm for cold water supply & schedule 80 from 65 mm to 150 mm for hot water supply.

The piping system shall also consist of heavy class galvanized iron pipes and fittings conforming to IS:1239. The sizes and makes is specified in the Schedule of Quantities.

For any internal works, the CPVC pipes / copper pipes / galvanized iron pipes and fittings shall be embedded in the wall chase or run on the floor/ceiling unless otherwise specified. No unsightly exposed runs shall be permitted.

A. CPVC Pipes & Fittings

The pipes shall be CPVC (Chlorinated Poly Vinyl Chloride) material for hot & cold water supply piping system with pipes as per CTs SDR -11 at a working pressure of 320 PSI at 23 deg C and 80 PSI at 82 deg.C, using solvent welded CPVC fittings i.e. Tees, Elbows, Couples, Unions, Reducers, Brushing etc. including transition fittings (connection between CPVC & Metal pipes / GI) i.e. Brass adapters (both Male & Female threaded and all conforming to ASTM D-2846 with only CPVC solvent cement conforming to ASTM F-493, with clamps / structural metal supports as required /directed at site including cutting chases & fitting the same with cement concrete / cement mortar as required, including painting of the exposed pipes with one coat of desired shade of enamel paint. All termination points for installation of faucets shall have brass termination fittings. Installation shall be to the satisfaction of

manufacturer & Project Manager. Pipes from 65 mm to 150 mm dia shall be Schedule 40 for CWC & Schedule 80 for HWS / HWR.

i. Joining Pipes & Fittings

a. Cutting:

Pipes shall be cut either with a wheel type plastic pipe cutting or hacksaw blade and care shall be taken to make a square cut which provides optimal bonding area within a joint.

b. Deburring / Beveling:

Burrs and fittings should be removed from the outside and inside of pipe with a pocket knife or file otherwise burrs and fittings may prevent proper contact between pipe and fittings during assembly.

c. Fitting preparation:

A clean dry rag/cloth should be used to wipe dirt and moisture from the fitting sockets and tubing end. The tubing should make contact with the socket wall 1/3 or 2/3 of the way into the fitting socket.

d. Solvent Cement Application:

Only CPVC solvent cement confirming to ASTM-F493 should be used for joining pipe with fittings. An even coat of solvent cement should be applied on the pipe end and a thin coat inside the fitting socket, otherwise too much of cement solvent can cause clogged water ways.

e. Assembly:

After applying the solvent cement on both pipe and fitting socket, pipe should be inserted into the fitting socket within 30 seconds, and rotating the pipe ¼ to ½ turn while inserting so as to ensure even distribution of solvent cement with the joint. The assembled system should be held for 10 seconds (approximately) in order to allow the joint to set up.

An even bead of cement should be evident around the joint and if this bead is not continues remake the joint to avoid potential leaks.

Set & Cure times:

Solvent cement set and cure times shall be strictly adhered to as per the below mentioned table.

Minimum Core prior to pressure testing at 150 PSI

Ambient Temperature during Core period	**Pipe Size**	
	½ " - 1"	**1.¼" - 2"**
Above 15 deg. C	1 Hr	2 Hrs
4-15 deg.C	2 Hrs	4 Hrs

Below 4 deg C	4 Hrs	8 Hrs

Special care shall be exercised when assembling flow guard systems in extremely low temperature (below 4°C) or extremely high temperature (above 45°C) In extremely hot temperatures, make sure that both surfaces to be joined are till wet with cement solvent when putting them together.

f. Testing

Once an installation is completed and cored as per above mentioned recommendations, the system should be hydrostatically pressure tested at 150 psi(10 Bar) for one hour. During pressure testing, the system should be fitted with water and if a leak is found, the joint should be cut out and replacing the same with new one by using couplers.

ii. **Transition of Flow guard CPVC to Metals**

When making a transition connection to metal threads, special Brass / plastic transition fitting (Male and female adapters) should be used. Plastic threaded connections should not be over torqued Hard tight puts one half turn should be adequate.

iii. **Threaded Sealants**

Teflon tape shall be used to make threaded connections leak proof.

iv. **Solvent Cement**

Only CPVC solvent cement conforming to ASTMF 493 should be used for joining pipe with fittings and valves. Flow guard CPVC cement solvent have a minimum shelf life of 1 year. Aged cement solvent will often change colour or being to thicken and become gelatinous or jelly like and when this happens, the cement should not be used. The cement solvent should be used within 30 days after opening the company's seal and tightly close the seal after using in order to avoid its freezing. The freezed cement solvent should be discarded immediately and fresh one should be used. The CPVC solvent cement usage should be adhered to as given in table below

Diameter of pipe in inch (flow guard)	½"	¾"	1"	¼"	1½"	2"
Approx. nos. of joints which can be mode per litre of solvent cement.	200 Nos	180 Nos	150 Nos	130 Nos	100 Nos	70 Nos

v. **Hangers and supports**

For Horizontal runs, support should be given at 3 foot (90 cm) intervals for diameters of one inch and below and at 4 foot (1.2m) intervals for larger sizes.

Hangers should not have rough or sharp edges which come in contact with the tubing.

Supports should be as per the below mentioned table:

Size of Pipe	21°C	49°C	71°C	82°C
Inch	Ft.	Ft.	Ft.	Ft.
½"	5.5	4.5	3.0	2.5
¾"	5.5	5.0	3.0	2.5
1"	6.0	5.5	3.5	3.0
1¼"	6.5	6.0	3.5	3.5
1½"	7.0	6.0	3.5	3.5
2"	7.0	6.5	4.0	3.5

SCHEDULE - 40

Recommended Support spacing (in feet)

Nom. Pipe Size		Temperature °C					
(In)	(mm)	23	38	49	60	71	82
2 ½	65	7 ½	7	7	6 ½	6	3 ½
3	80	8	7	7	7	6	3 ½
4	100	8 ½	7 ½	7 ½	7	6 ½	4
6	150	9 ½	8	8	7 ½	7	4 ½
8	200	9 ½	8	8	7 ½	7	5

SCHEDULE - 80

Recommended Support spacing (in feet)

Nom. Pipe Size		Temperature °C					
(In)	(mm)	23	38	49	60	71	82
2 ½	65	8	7 ½	7 ½	6 ½	4 ½	4
3	80	8	8	7 ½	7	4 ½	4
4	100	9	9	8 ½	7 ½	5	4 ½
6	150	10	9 ½	9	8	5 ½	5

B. <u>Galvanised Iron Pipes & Fittings</u>

The pipes shall be galvanised mild steel welded (ERW) or (HFW) screwed and socketed conforming to the requirements of IS:1239. The Galvanising shall conform to IS:4736, the zinc coating shall be uniform, adherent reasonably smooth and free from such imperfections as flux, ash and drop inclusions, bare patches, black spots, pimples, lumpiness, runs, rust strains, bulky white deposits and blisters. The pipes and sockets shall be cleanly finished, well galvanised in and out and free from cracks, surface flaws

laminations and other defects. All screw threads shall be clean and well cut. The ends shall be cut cleanly, and square with the axis of the pipe.

The fittings shall be malleable iron and comply with all the requirements of the pipes. The sizes of pipes and fitting is specified in the schedule of quantities.

Laying And Jointing Of GI Pipes

The galvanised pipes and fittings shall run in wall chase or ceiling or as specified. The fixing shall be done by means of standard pattern holder bat clamps keeping the pipes about 1.5 cm clear of the wall where to be laid on surface. Where it is specified to conceal the pipes, chasing may be adopted for pipes fixed in the shafts, ducts etc. there should be sufficient space to work on the pipes with the usual tools. As far as possible, pipes may be buried for short distances provided adequate protection is given against damage and where so required special care to be taken at joints. Where directed by the Owner's Site Representative, pipe sleeves shall be fixed at a place the pipe is passing through a wall or floor for reception of the pipe and allow freedom for expansion and contraction and other movements. In case of pipe is embedded in walls or floors it shall be painted with anticorrosive bitumastic paints of approved quality. Under the floors the pipes shall be laid in layer of sand filling.

Galvanised iron pipes shall be jointed with threaded and socket joints, using threaded fittings. Care shall be taken to remove any burr from the end of the pipes after threading. Teflon tape, White lead or an equivalent jointing compound of proprietary make shall be used, according to the manufacturer's instructions, with a grommet of a few strands of fine yarn while tightening. Compounds containing red lead shall not be used because of the danger of contamination of water. Any threads exposed after jointing shall be painted with bituminous paint to prevent corrosion.

3. PIPING INSTALLATION SUPPORT (VALID FOR GI / COPPER PIPING ONLY)

Tender drawings indicate schematically the size and location of pipes. The Contractor, on the award of the work, shall prepare detailed working drawings, showing the cross-sections, longitudinal sections, details of fittings, locations of isolating and control valves, drain and air valves, and all pipe supports. He must keep in view the specific openings in buildings and other structure through which pipes are designed to pass.

Piping shall be properly supported on, or suspended from , on stands, clamps, hangers as specified and as required. The Contractor shall adequately design all the brackets, saddles, anchor, clamps and hangers, and be responsible for their structural stability.

Pipe work and fittings shall be supported by hangers or brackets so as to permit free expansion and contraction. All accessories and ancillaries of support system such as brackets, saddles, clamps, hangers etc. shall be hot dip galvanized after fabrication. Further to permit free movement of common piping, support shall be from a common hanger bar, fabricated from galvanised steel sections.

Pipe hangers shall be provided at the following maximum spacings:

Pipe Dia (mm)	Hanger Rod Dia (mm)	Spacing between Supports (m)

Up to 25	6	2
32 to 50	10	2.7
80 to 100	12	2.7
125 to 150	16	3.6
200 to 300	19	5.3

Insulated piping shall be supported in such a manner as not to put undue pressure on the insulation. 14 gauge metal sheet shall be provided between the insulation and the clamp, saddle or roller, extending atleast 15 cm. on both sides of the clamps, saddles or roller.

All pipe work shall be carried out in a proper workman like manner, causing minimum disturbance to the existing services, buildings, roads and structure. The entire piping work shall be organized in consultation with other agencies work, so that area can be carried out in one stretch.

Cut-outs in the floor slab for installing the various pipes area are indicated in the drawings. Contractor shall carefully examine the cut-outs provided and clearly point out wherever the cut-outs shown in the drawings, do not meet with the requirements.

Pipe sleeves, larger diameter than pipes, shall be provided wherever pipes pass through walls and slab and annular space filled with fiberglass and finished with retainer rings.

The contractor shall make sure that the clamps, brackets, saddles and hangers provided for pipe supports are adequate or as specified / approved by Consultants. Piping layout shall take due care for expansion and contraction in pipes and include expansion joints where required.

All pipes shall be accurately cut to the required sizes in accordance with relevant BIS codes and burrs removed before laying. Open ends of the piping shall be closed as the pipe is installed to avoid entrance of foreign matter. Where reducers are to be made in horizontal runs, eccentric reduces shall be used for the piping to drain freely. In other locations, concentric reduces may be used.

All buried pipes for CWS shall be cleaned and coated with two coats of bitumen and then wrapped with two layers of 400-micron polythene sheet coating.

Automatic air valves shall be provided at all high points in the piping system for venting. All valves shall be of 15mm pipe size and shall be associated with an equal size isolation ball valve. Automatic air valves shall also be provided on hot water risers.

Discharge from the air valves shall be piped through a galvanized steel pipe to the nearest drain or sump. All pipes shall be pitched towards drain points.

Pressure gauges shall be provided as shown on the approved drawings and include in Bill of Quantities. Care shall be taken to protect pressure gauges during pressure testing.

Temperature gauge as specified shall be provided at the hot water supply and return and as shown on drawings and included in Bill of Quantities.

4. FERRULES

The ferrules for connection with main shall generally conform to IS:2692. It shall be of non-ferrous materials with a bell mouth cover and shall be of nominal bore as specified. The ferrule shall be fitted with a screw and plug or valve capable of completely shutting of the water supply to the communication pipe, as and when required.

4.1 Fixing Ferrules

For fixing ferrule in cast iron mains, the empty main shall be drilled and tapped at 45 deg to the vertical and the ferrule screwed in. The ferrule must be so fitted that no portion of the shank shall be left projecting within the main into which it is fitted.

5. WATER METERS

Water meters of approved make and design shall be supplied for installation at locations as shown. The water meters shall meet with the approval of local supply authorities. Suitable valves and chambers or wall meter box to house the meters shall also the be provided along with the meters.

The meters shall conform to Indian Standard IS:779 and IS:2373. Calibration certificate shall be obtained and submitted for each water meter.

Provision shall also be made to lock the water meter. The provision shall be such that the lock is conveniently operated from the top. Where the provision is designed for use in conjunction with padlocks, the hole provided for padlocks shall be a diameter not less than 4mm.

5.1 Installation Of Water Meter And Stop Cock

The G.I. lines shall be cut to the required lengths at the position where the meter and stop cock are required to be fixed. Suitable fittings shall be attached to the pipes. The meter and stop cock shall be fixed in a position by means of connecting pipes, jam nut and socket etc. The stop cock shall be fixed near the inlet of the water meter. The paper disc inserted in the ripples of the meter shall be removed. And the meter installed exactly horizontal or vertical in the flow line in the direction shown by the arrow cast on the body of the meter. Care shall be taken that the factory seal of the meter is not disturbed. Wherever the meter shall be fixed to a newly fitted pipe line, the pipe line shall have to be completely washed before fitting the meter.

6. TESTING

The Contractor shall notify the Architect three days in advance of any test so that the Architect can witness the tests if he so wishes.

All water supply system shall be tested to hydrostatic pressure test of at least one and a half (1.5) times the maximum pressure but not less than 10Kg/Sq.cm for a

period of not less than 8 hours. All leaks and defects in joints revealed during the testing shall be rectified and got approved at site by retest. Piping required subsequent to the above pressure test shall be retested in the same manner.

System may be tested in sections and such sections shall be entirely retested on completion.

The Contractor shall make sure that proper noiseless circulation of fluid is achieved through the entire piping network of the system concerned. In case of improper circulation, the contractor shall rectify the defective connections. He shall bear all expenses for carrying out the above rectifications including the tearing up and refinishing of floors and walls as required.

In addition to the sectional testing carried out during the construction, contractor shall test the entire installation after connections to the overhead tanks or pumping system or mains. He shall rectify all leakages and shall replace all defective materials in the system. Any damage done due to carelessness, open or burst pipes or failure of fittings, to the building, furniture and fixtures shall be made good by the contractor during the defects liability period without any cost.

After commissioning of the water supply system, contractor shall test each valve by closing and opening it a number of times to observe if it is working efficiently. Valves which do not effectively operate shall be replaced by new ones at no extra cost and the same shall be tested as above.

A test register shall be maintained and all entries shall be signed and dated by Contractor(s) and Owner’s site representative.

7. DISINFECTION OF PIPING SYSTEM AND STORAGE TANKS

Before commissioning the water supply system, the contractor shall arrange to disinfect the entire system as described in the succeeding paragraph.

The water storage tanks and pipes shall first be filled with water and thoroughly flushed out. The storage tanks shall then be filled with water again and disinfecting chemical containing chlorine added gradually while tanks are being filled to ensure thorough mixing. Sufficient chemical shall be used to give water a dose of 50 parts of chlorine to one million parts of water.

If ordinary bleaching powder is used, the proportions will be 150 gm of power to 1000 liters of water. The power shall be mixed with water in the storage tank. If a proprietary brand of chemical is used, the proportions shall be specified by the manufacturer. When the storage tanks is full, the supply shall be stopped and all the taps on the distributing pipes are opened successively working progressively away from the storage tank. Each tap shall be closed when the water discharged begins to smell of chlorine. The storage tank shall then be filled up with water from supply pipe and added with more disinfecting chemical in the recommended proportions. The storage tank and pipe shall then remain charged at least for three hours. Finally the tank and pipes shall be thoroughly flushed out before any water is used for domestic purpose.

The pipe work shall be thoroughly flushed before supply is restored.

8. STERILIZATION OF MAIN

After the pipe work has been tested and approved, but before it is coupled, it shall be sterilized with a solution of chloride of lime.

9. CUTTING CHASES IN MASONARY WALLS

Cold water distribution pipes to fixtures and equipment exposed to view in the bathrooms, kitchens, and sanitary compartments shall be chased into walls or floors or placed in wall cavities. The Contractor shall be responsible for cutting all notches, chases, and recesses in walls and floors and only a diamond cutter shall be used. The maximum size of conduit or pipe permitted to be concealed in floor slabs shall be 32 mm diameter unless otherwise approved by the Architect.

The chases upto 7.5 x 7.5 cm shall be made in the walls for housing GI pipes etc. These shall be provided in correct positions as shown in the drawings or directed by the Architects. Chases shall be made by chiselling out the masonry to proper line and depth. After the pipes etc are fixed in chases, the chases shall be filled with cement mortar 1:2:4 or as may be specified, and made flush with the masonry surface. The concrete surface shall be roughened with wire brush to provide a key for plastering.

Where pipes pass through beams or structural walls, subject to the approval of the Structural Consulting Engineer, the Contractor shall ensure that sizes and locations of openings required are formed in when the relevant beams or walls are cast.

10. VALVES

All valves (gate, globe, check, safety) shall be of gun metal suitable for the particular service as specified. All valves shall be of the particular duty and design as specified. Valves shall either be of screwed type or flanged type, as specified, with suitable flanges and non-corrosive bolts and gaskets. Tail pieces as required shall be supplied along with valves. Gate, globe and check valves shall conform to Indian Standard IS:776 and non-return valves and swing check type reflux to IS:5312.

Sluice valves, where specified shall be flanged sluice valves of cast iron body. The spindle, valve seat and wedge nuts shall be gunmetal. They shall generally have non-rising spindle and shall be of the particular duty and design as specified. The valves shall be supplied with suitable flanges, non-corrosive bolts and asbestos fibre gaskets. Sluice valves shall conform to Indian standard IS:780 and IS:2906.

Ball valves with floats to be fixed in storage tanks shall consist of cast brass lever arm having copper balls (26 SWG) screwed to the arm integrally. The copper ball shall have bronze welded seams. The closing/opening mechanism incorporating the piston and cylinder shall be non-corrosive metal and include washers. The size and construction of ball valves and float shall be suitable for desired working pressure operating the supply system. Where called for brass valves shall be supplied with brass hexagonal back nuts to secure them to the tanks and a socket to connect to supply pipe.

Globe valves on Hot-water line shall be union bonnet with stem/disc and body seat ring of SS. Suitable for temperature upto 80° C.

S.No	Type of Valve	Size	Construction	Ends

a.	Isolating Valve	15 mm to 50 mm 65 mm and above	Gun Metal Gun Metal	Screwed Flanged
b.	Sluice Valve & Butterfly Valve	65 mm and above	Cast Iron	Flanged
c.	G.M. non return valve	15 mm to 50 mm 65 mm above	Gun Metal Gun Metal	Screwed Flanged
d.	Flap Type – Non return valve	65 mm and above	Cast Iron	Flanged

All valves shall be suitable for the working pressure involved.

10.1 Pressure Reducing Valve Set

Each pressure reducing valve set shall be complete with pressure reducing or pressure regulating valve, isolating valves, pressure gauges on inlet and outlet, pressure relief valve on outlet and filter on inlet.

Each pressure reducing valve shall contain loading neoprene diaphragm and a full floating, self aligning, ignition resistant seat and shall be of the single stage, pressure reduction type with provision for manually adjusting the delivery pressure. The valve shall fail safe to the low pressure.

Valves shall be capable of operating at the maintaining automatically the respective delivery pressure and flow rates as indicated and shall not be liable to creep. Valves shall also be capable of maintaining the pre-set down stream pressure under static condition.

The filter on each inlet to a pressure reducing valve shall be of replaceable porous sintered metal type.

10.2 Pressure Relief Valves

Each pressure relief valve shall be of the fully enclosed type and fitted with hand easing gear.

Each pressure relief valve in a pressure reducing station shall have a flow capacity equal to that of the pressure reducing valve.

Pressure relief valves in locations other than reducing stations shall have flow capacities equal to that of the associated equipment.

10.3 Pressure Gauge

The pressure gauge shall be constructed of die cast aluminium and stove enamelled. It shall be weather proof with an IP 55 enclosure. It shall be a stainless steel Bourden tube type pressure gauge with a scale range from 0 to 16 Kg / cm square and shall be constructed as per IS:3524. Each pressure gauge shall have a siphon tube connection. The shut off arrangement shall be by Ball Valve.

Calibration certificate shall be obtained and submitted for each pressure gauge.

11. WATER FITTINGS

Unless otherwise specified all Gunmetal fittings such as gate, globe, check & safety valves shall be fitted in pipe line in workman like manner. Necessary unions shall be provided on both ends of the valves for easy replacement. The joints between fittings and pipes shall be leak-proof when tested to desired pressure rating. The defective fittings and joints shall be replaced or redone.

SECTION-04::INTERNAL DRAINAGE (SOIL, WASTE, VENT & RAIN WATER PIPES)

1. SCOPE

The scope of this section comprises the supply, installation, testing and commissioning of internal drainage services.

Work under this section shall consist of furnishing all labour, materials, equipments and appliances necessary and required to completely install all soil, waste, vent and rainwater pipes and fittings as required by the drawings, and given in the schedule of quantities.

2. BASIC PIPING SYSTEM

Soil, waste and vent pipes in shafts, ducts and in concealed areas i.e. false ceilings etc. shall consist of cast iron pipes & fittings as called for. In general wastes and vents smaller than and upto 50mm dia shall be of heavy class GI.

The soil pipes shall be circular with a minimum diameter of 100mm. Pipes shall be fixed by means of stout GI clamps in two sections, bolted together, built into the walls, wedged and neatly jointed as directed and approved by the Owner's site representative / Architect. All bends, branches, swan neck and other parts shall conform to the requirement and standards as described for the pipes. Pipes shall be rested against the walls on suitable wooden cradles. Local authority regulations applicable to the installations shall be strictly followed.

Where indicated, the soil pipes shall be continued upwards without any diminution in its diameter, without any bend or angle to the height shown in the drawings. Joints throughout shall be made with molten lead as described under jointing of cast iron pipes. Soil pipes shall be painted as provided under `painting'. The soil pipes shall be covered on top with cast iron terminal outlets as directed and approved. All vertical soil pipes shall be firmly fixed to the walls with properly fixed clamps, and shall as far as possible be kept 50mm clear of wall. Waste pipes and fittings shall be of cast iron or galvanised mild steel pipes. Pipes shall be fixed, jointed and painted as described in installation of soil, waste & vent pipes.

Every waste pipe shall discharge above the grating of properly trapped gully. The contractor will ensure that this requirement is adequately met with. Wherever floor traps are provided, it shall be ensured that atleast one wash is connected to such floor traps to avoid drying of water seal in the trap. Ventilating pipes shall be of cast iron or galvanised mild steel pipes, conforming to the requirements laid down earlier. Anti-syphon vent pipes/relief vent pipes where called for on the drawings shall be of

cast iron or galvanised mild steel pipes as specified. The pipes shall be of the diameter shown on the drawings.

All traps on branch soil and waste pipes shall also be ventilated at a point not less than 75mm or more than 300mm from their highest part and on the side nearest to the soil pipe or waste pipes.

Access doors for fittings and clean outs shall be so located that they are easily accessible for repair and maintenance. Any access panel required in the civil structure, false ceiling or marble cladding etc. shall be clearly reported to the Owner in the form of shop drawings so that other agencies are instructed to provide the same.

All the fittings used for connections between soil, waste and ventilation pipes and branch pipes shall be made by using pipe fittings with inspection doors for cleaning. The doors shall be provided with 3mm thick rubber insertion packing and when closed and bolted shall be air and water tight.

Where soil, waste and ventilating pipes are accommodated in shafts ducts, adequate access to cleaning eyes shall be provided.

Head (starting point) of drains and sewage / waste water sumps (as and where applicable) having a length of greater than 4 m upto it connection to the main drain or manhole shall be provided with a 80 / 100 mm vent pipe.

3. PIPING MATERIALS

3.1 UPVC Pipes and Fittings

The pipes shall be round and shall be supplied in straight lengths with socketed ends. The internal and external surfaces of pipes shall be smooth, clean, free from groovings and other defects. The ends shall be cleanly cut and square with the axis of the pipe. The pipes shall be designed by external diameter and shall conform to IS:4985-1981. The pipes shall be of Class-III; 6 Kg/sqm pressure rating.

Fittings

Fittings shall be of the same make as that of pipes, injection moulded and shall conform to Indian Standard.

Laying and Jointing

The pipes shall be laid and clamped to wooden plugs fixed above the surface of the wall. Alternatively plastic clamps of suitable designs shall be preferred. Provision shall be made for the effect of thermal movement by not gripping or disturbing the pipe at supports between the anchors for suspended pipes. The supports shall allow the repeated movements to take place without abrasion.

Jointing for UPVC pipes shall be made by means of solvent cement for horizontal lines and ‘O’ rubber ring for vertical line. The type of joint shall be used as per site conditions / direction of the Owner’s site representative. Where UPVC pipes are to be used for rain water pipes, the pipe shall be finished with GI adopter for insertion in the RCC slab for a water proof joint complete as directed by Owner’s site representative.

Supports

UPVC pipes require supports at close intervals. Recommended support spacing for unplasticised PVC pipes is 1400 mm for pipes 50 mm dia and above. Pipes shall be aligned properly before fixing them on the wooden plugs with clamps. Even if the wooden plugs are fixed using a plumb line, pipe shall also be checked for its alignment before clamping, piping shall be properly supported on, or suspended from clamps, hangers as specified and as required. The Contractor shall adequately design all the brackets, saddles, anchors, clamps and hangers and be responsible for their structural sufficiency. Pipe supports shall be primer coated with rust preventive paint.

Repairs

While temporary or emergency repairs may be made to the damaged pipes, permanent repairs shall be made by replacement of the damaged section. If any split or chip out occur in the wall of the pipe, a short piece of pipe of sufficient length to cover the damaged portion of the pipe is cut. The sleeve is cut longitudinally and heated sufficiently to soften it so that it may be slipped over the damaged hard pipe.

4. PIPES HANGERS, SUPPORTS, CLAMPS ETC.

All vertical pipes shall be fixed by galvanized clamps and galvanized angle brackets truly vertical. Branch pipes shall be connected to the stack at the same angle as that of the fittings. No collars shall be used on vertical stacks. Each stack shall be terminated at top with a cowl (terminal guard).

Horizontal pipes running along ceiling shall be fixed on galvanized structural adjustable clamps of special design shown on the drawings or as directed. Horizontal pipes shall be laid to uniform slope and the clamps adjusted to the proper levels so that the pipes fully reset on them.

Contractor shall provide all sleeves, openings, hangers, inserts during the construction. He shall provide all necessary information to the building contractor for making such provisions in the structure as necessary. All damages shall be made good to restore the surfaces.

All pipes clamps, supports and hangers shall be galvanized. Factory made prefabricated clamps shall be preferred. Contractor may fabricate the clamps of special nature and galvanize them after fabrication but before installation. All nuts, bolts, washers and other fasteners shall be factory galvanized.

Clamps shall be of approved design and fabricated from MS flats (which shall be galvanized after fabrication) of thickness and sizes as per drawings or contractor’s shop drawings. Clamps shall be fixed in accordance to manufacturer’s details/shop drawings to be submitted by the contractors.

When required to be fixed on RCC columns, walls or beam they shall be fixed with approved type of galvanized expansion anchor fasteners (Dash fasteners) of approved design and size according to load.

Structural clamps e.g.. trapeze or cluster hangers shall be fabricated by electro-welding from MS structural members e.g. rods, angles, channels flats as per contractors shop drawings shall be galvanized after fabrication. All nuts, bolts and washers shall be galvanized.

Galvanized slotted angle/channel of approved sizes supports on walls shall be provided wherever shown on shop drawings. Angles/channels shall be fixed to brick walls with bolts embedded in cement concrete blocks and to RCC walls with anchor fasteners mentioned above. The spacing of support bolts on support members fixed horizontally shall not exceed 1 m.

5. INSTALLATION OF SOIL, WASTE & VENT PIPES

Soil, waste & vent pipes in shafts under the floors / suspended below slab shall consist of cast iron pipes as described earlier. Waste pipes from bottle trap to floor/ urinal traps for wash basin, urinal and sink shall be GI pipes and fittings.

All Horizontal pipes running below the slab and along the ceiling, shall be fixed on structural adjustable clamps, sturdy hangers of the design as called for in the drawings. The pipes shall be laid in uniform slope and proper levels. All vertical pipes shall be truly vertical fixed by means of stout clamps in two sections, bolted together, built into the walls, wedged and neatly jointed. The branch pipes shall be connected to the stack at the same angle as that of fittings. All connections between soil, waste and ventilating pipes and branch pipes shall be made by using pipe fittings with inspection doors for cleaning. Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts. Where the horizontal run off the pipe is long or where the pipes cross over building expansion joints etc. suitable allowance shall be provided for any movements in the pipes by means of expansion joint etc. such that any such movement does not damage the installation in any way.

All cast iron pipes and fittings shall be jointed with drip seal / Best Quality pig lead free from impurities confirming to IS 27.

Before jointing, the interior of the socket and exterior of the spigots shall be thoroughly cleaned and dried. The spigot end shall be inserted into the socket right up to the back of the socket and carefully centered by two or three laps of threaded spun yarn, twisted into ropes of uniform thickness, well caulked into the back of the socket. No piece of yarn shall be shorter than the circumference of the pipe. The jointed pipe line shall be at required levels and alignment. The reminder of the socket is left for the lead caulking. Where the gasket has been tightly held, a jointing ring shall be placed round the barrel against the face of the socket. Molten Lead shall be poured to the remainder of the socket.

The depth of the lead joints for the cast iron pipes shall be 45mm for the pipes upto 100mm dia and 50mm for the pipes beyond 100mm dia respectively.
The joint shall not be covered till the pipe line has been tested under pressure. Rest of pipe line shall be covered so as to prevent the expansion and contraction due to variation in temperature.

Rainwater Pipes

All open terraces shall be drained by rain water down takes. Rainwater down takes are separate and independent of the soil and waste system and will discharge into the underground storm water drainage system of the complex. Rainwater in open courtyards shall be collected in catch basins and connected to the Storm Water Drains.

Any dry weather flow from waste appliances, e.g. AHU's pump rooms, waste water sumps shall connected to sewers after traps and not in the storm water drainage systems.

Balcony / Planter drainage

Wherever required, all balconies, terraces, planters and other frontal landscape areas will be drained by vertical down takes or other type of drainage system shown on the drawings and directed by the Project Manager.

6. TRAPS

6.1 Floor Traps

Floor traps where specified shall be siphon type full before P or S type cast iron having a minimum 50 mm deep seal. The trap and waste pipes when buried below ground shall be set and encased in cement concrete blocks firmly supported on firm ground or when installed on a sunken RCC structural slab. The blocks shall be in 1:2:4 mix (1 cement : 2 coarse sand : 4 stone aggregate 20 mm nominal size).

Contractor shall provide all necessary shuttering and centering for the blocks. Size of the block shall be 30 x 30 cms of the required depth.

6.2 Floor Trap Inlet /Hopper

Bath room traps and connection shall ensure free and silent flow of discharging water. Where specified, contractor shall provide a special type of floor inlet fitting fabricated from GI pipe, with one, two or three inlet sockets welded on side to connect the waste pipe. All joint between waste hopper and CI inlet socket shall be drip seal/Lead Caulked. Inlet shall be connected to a CI "P" trap. Floor trap inlet and the traps shall be set in cement concrete blocks where burried in floors without extra charge. Floor trap for the shower cubicle shall suit site and as per the approval of Owner's site representative. All fabricated hopper shall be hot dip galvanized.

6.3 Floor Trap Grating

Floor and urinal traps shall be provided with 100 – 150 mm square or round stainless steel gratings, with frame and rim of approved design and shape or as specified in the schedule of quantities approved by the Owner's site representative.

6.4 Cleanout Plugs

Floor Clean Out Plug

Clean out plug for soil, waste or rain water pipes laid under floors shall be provided near pipe junctions bends, tees, "Y" and on straight runs at such intervals as required as per site conditions. Cleanout plugs shall terminate flush with the floor level. They shall be threaded and provided with key holes for opening. Cleanout plugs shall be cast brass suitable for the pipe dia. With screwed to a GI socket. The socket shall be drip seal joined/ Lead Caulked to the drain pipes.

Cleanout on Drainage Pipes

Cleanout plugs shall be provided on head of each drain and in between at locations indicated on plans or directed by Owner's site representative. Cleanout plugs shall be of size matching the full bore of the pipe but no exceeding 150 mm dia CO plugs on

drains of greater diameters shall be 150 mm dia. Fixed with a suitable reducing adapter.

Floor cleanout plugs shall be cast brass.

Cleanouts provided at ceiling level pipe shall be fixed to a CI flanged tail piece. The cleanout doors shall be specially fabricated from light weight galvanized sheets and angles with hinged type doors with fly nuts, gasket etc. as per drawing.

7. PIPE SLEEVES

Pipe sleeves, next larger diameter than pipes shall be provided wherever pipes pass through walls & slabs and annular space filled with fiberglass & finished with retainer rings. All pipes shall be accurately cut to the required sizes in accordance with relevant BIS codes and burrs removed before laying. Open ends of the pipe shall be closed as the pipe is installed to avoid entrance of foreign matter.

8. PIPE PROTECTION

Cast iron soil and waste pipes under floor in sunken slabs and in wall chases (when cut specially for the pipe) shall be encased in cement concrete 1:2:4 mix (1 cement : 2 coarse sand : 4 stone aggregate of 12 mm size) 10 cm bed and around. When pipes are running well above the structural slabs, the encased pipes shall be supported with suitable cement concrete pillars of required height and size at intervals directed by the Project Manager.

9. CUTTING AND MAKING GOOD

Pipes shall be fixed and tested as building proceeds. The contractor shall provide all necessary holes, cutouts and chases in structural members as building work proceeds. Wherever holes are cut or left originally they shall be made good with cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 stone aggregate 20 mm nominal size) or cement mortar 1:2 (1 cement : 2 coarse sand). Cured and the surface restored to original condition.

10. PAINTING

Soil, waste, vent and rain water pipes in exposed location, in shafts and pipe space shall be painted with two or more coats of ready mix oil paint to give an even shade. Before painting all dust and extraneous matter shall be removed. Paint shall be of approved quality and shade. Where directed by the Owner's site representative pipes shall be painted in accordance with approved pipe colour code. Pipe in chase shall be painted with two coats of bitumen paint, covered with polythene tape and a final coat of bitumen paint. Exposed pipes shall be painted with synthetic enamel paint after removing dust and extraneous matter. C.I. Soil and waste pipes below ground and covered in cement concrete shall not be painted.

11. TESTING

Testing shall be done in accordance with IS:1172 and IS:5329 except as may be modified herein under.

Entire drainage system shall be tested for water tightness and smoke tightness during and after completion of the installation. No portion of the system shall remain

untested. Contractor must have adequate number of expandable rubber bellow plugs, manometers, smoke testing machines, pipe and fitting work tests,

All materials obtained and used on site must have manufacturer's hydraulic test certificate for each batch of materials used on the site.

Before use at site all CI pipes shall be tested by filling up with water for at least 30 minutes. After filling, pipes shall be struck with a hammer and inspected for blow holes and cracks. All defective pipes shall be rejected and removed from the site within 48 hours. Pipes with minor sweating may be accepted at the discretion of the Project Manager.

Soil and waste pipes shall be tested in sections after installation, by filling up the stack with water. All openings and connections shall be suitably plugged as approved by the Project Manager. The total head in the stack shall be 4.5 m at the highest point of the section under test. The period of test shall be minimum for 30 minutes or as directed by the Project Manager. If any leakage is visible, the defective part of the work shall be cut out and made good.

On completion of the work the entire installation shall be tested by smoke testing machine. The test shall be conducted after the plumbing fixtures are installed and all traps have water seal or by plugging the outlets with bellow plugs. Apply dense smoke keeping the top of stack open and observe for leakages. Rectify or replace defective sections.

After the installation is fully complete, it should be tested by flushing the toilets, running atleast 20% of all taps simultaneously and ensuring that the entire system is self draining, has no leakages, blockages etc. rectify and replace where required.

A test register shall be maintained and all entries shall be signed and dated by the Contractor and the Project Manager or his representative.

All pipes in wall chase or meant to be encased or burried shall be hydro tested before the chase in plastered or the pipe encased or burried.

SECTION-5 :: FIRE PROTECTION SYSTEM

1. SCOPE

The scope of this section consists of but is not necessarily limited to supply, installation, testing and commissioning of the fire protection system. The philosophy of the system is as follows :

a. The Fire Suppression System shall comprise the Fire Hydrants System, the Sprinkler System (Wet type), Hand Appliances.

c. The Hydrant System and the Sprinkler System, under normal conditions, shall be lowest pressurized by means of the electric motor driven Jockey Pump.

d. The Hydrant System shall be provided with two pump sets, one of which will be diesel engine driven and the other electric motor driven.

e. The Sprinkler System shall be provided with an electric motor driven pump set.

f. The piping and valve connections shall be done so that the water from the discharge of the Hydrant Pump sets is able to supply water, automatically to the Sprinkler System whenever, the Sprinkler Pump is unable to maintain the pressure or fails and not vice versa.

g. The starting and stopping of the Jockey pump shall be automatic based on the pressure switches at preset low and high pressure.

h. The electric motor driven Hydrant Pump starts automatically at a preset pressure by means of a pressure switch. As soon as the Hydrant Pump starts, the Jockey Pump Stops. If for any reason the electric motor driven Hydrant Pump does not start at the preset pressure or is unable to maintain the pressure, the diesel engine driven Hydrant Pump starts at the preset pressure.

i. The Hydrant Pump, whether electric motor driven or the diesel engine driven shall be stopped only manually.

j. The Sprinkler Pump shall be started automatically at a preset pressure but shall be stopped only manually.

k. Contractor shall ensure that all false ceiling voids greater than 800 mm are provided with sprinklers.

l. Contractor shall ensure Hydro Testing for the complete system.

m The Contractor shall obtain the necessary approval of the drawings and the schemes from the local authority / TAC as called for. The contractor shall also take care of any other requirement so that insurance cover can be obtained, if required at minimum premium at a later date.

n. The contractor shall design and after approval of Project Manager display near each staircase landing at floor levels, a glass covered framed floor plan

clearly showing the locations of all landing valves, hose reels, hand appliances, as well as the DO's and DON'T's for the personnel and the exit direction in case of an emergency. The dimensions of the floor plan, its scale, lettering size, colour scheme etc shall be as directed by the Project Manager.

2. PIPE WORK

2.1 GENERAL REQUIREMENTS

All materials shall be of the best quality conforming to the specifications and subject to the approval of the Consultants.

Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.

Pipes shall be securely fixed to walls and ceilings by suitable clamps and supports (galvanised after fabrication) at intervals specified. Only approved type of anchor fasteners shall be used for RCC slabs and walls / floors etc.

Valves and other appurtenances shall be so located that they are easily accessible for operations, repairs and maintenance.

Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workman like manner.

Pipe accessories such as gauges, meters, control devices, etc. shall have the same working pressure rating as the associated pipe work. All pipe work shall be free from burrs, rust and scale and shall be cleaned before installation. All personnel engaged on welding operations must possess a certificate of competence issued by an acceptable / recognized authority.

2.2 PIPING

Pipes of following types are to be used:

Mild steel black pipes as per IS:1239 heavy grade (for pipes of sizes 150 mm N.B. and below) suitably lagged on the outside to prevent soil corrosion. M.S. pipes buried below ground shall also be suitably be lagged with 2 layers of 400-micron polythene sheet over 2 coats of bitumen.

Steel pipelines upto 150 mm dia shall be as per IS: 1239, Part-II (heavy grade) while pipelines above 150 mm dia shall be as per I.S.:3589.

All pipe clamps and supports shall be fabricated from MS steel sections and shall be factory galvanised before use at site. Welding of galvanised clamps and supports shall not be permitted.

Pipes shall be hung by means of expandable anchor fastener of approved make and design. The hangers and clamps shall be fastened by means of galvanised nuts and bolts. The size/diameter of the anchor fastener and the clamps shall be suitable to carry the weight of water filled pipe and dead load normally encountered.

Hangers and supports shall be thoroughly galvanised after fabrication. The selection and design of the hanger & support shall be capable of carrying the sum of all concurrently acting loads. They shall be designed to provide the required supporting

effects and allow pipeline movements as necessary. All guides, anchor braces, dampener, expansion joint and structural steel to be attached to the building/structure trenches etc. shall be provided. Hangers and components for all piping shall be approved by the Consultants.

The piping system shall be tested for leakages at 2 times the operating pressure or 1.5 time shut-off pressure, which ever is highest including testing for water hammer effects.

Flanged joints shall be used for connections for vessels, equipment, flanged valves and also on two straight lengths of pipelines of strategic points to facilitate erection and subsequent maintenance work.

For pipes under ground installation the pipes shall be buried at least one meter below ground level and shall have 230 mm x 230 mm masonry or concrete supports at least 300 mm high at 3m intervals. Masonry work to have plain cement concrete foundation (1 cement: 4 coarse sand : 8 stone aggregate) of size 380x380x75 thick resting on firm soil.

Mains below ground level shall be supported at regular intervals not exceeding 3.0 metres and shall be laid at least 2.0 metre away from the building.

2.3 PIPING INSTALLATION & SUPPORT

Tender drawings indicate schematically the size and location of pipes. The Contractor, on the award of the work, shall prepare detailed working drawings, showing the cross-sections, longitudinal sections, details of fittings, locations of isolating and control valves, drain and air valves, and all pipe supports. He must keep in view the specific openings in buildings and other structure through which pipes are designed to pass.

Piping shall be properly supported on , or suspended from , on stands, clamps, hangers as specified and as required. The Contractor shall adequately design all the brackets, saddles, anchor, clamps and hangers, and be responsible for their structural stability.

Pipe work and fittings shall be supported by hangers or brackets so as to permit free expansion and contraction. Risers shall be supported at each floor with Galvanised steel clamps. To permit free movement of common piping support shall be from a common hanger bar fabricated from Galvanised steel sections.

Pipe hangers shall be provided at the following maximum spacings:

Pipe Dia (mm)	Hanger Rod Dia (mm)	Spacing between Supports (m)
Up to 25	6	2
32 to 50	6	2.5
65 to 80	8	2.5

80 to 100	10	2.5
125 to 150	10	3.0
200 to 300	12	3.5

The end of the steel rods shall be threaded and not welded to the threaded bolt.

All pipe work shall be carried out in a proper workman like manner, causing minimum disturbance to the existing services, buildings, roads and structure. The entire piping work shall be organized in consultation with other agencies work, so that area can be carried out in one stretch.

Cut-outs in the floor slab for installing the various pipes area are indicated in the drawings. Contractor shall carefully examine the cut-outs provided and clearly point out wherever the cut-outs shown in the drawings, do not meet with the requirements.

Pipe sleeves, larger diameter than pipes, shall be provided wherever pipes pass through walls and slab and annular space filled with fibreglass and finished with retainer rings.

The contractor shall make sure that the clamps, brackets, saddles and hangers provided for pipe supports are adequate or as specified / approved by Consultants. Piping layout shall take due care for expansion and contraction in pipes and include expansion joints where required.

All pipes shall be accurately cut to the required sizes in accordance with relevant BIS codes and burrs removed before laying. Open ends of the piping shall be closed as the pipe is installed to avoid entrance of foreign matter. Where reducers are to be made in horizontal runs, eccentric reduces shall be used for the piping to drain freely. In other locations, concentric reduces may be used.

Automatic air valves shall be provided at all high points in the piping system for venting. All valves shall be of 15mm pipe size and shall be associated with an equal size gate valves. Automatic air valves shall be provided on hot water risers.

Discharge from the air valves shall be piped through a pipe to the nearest drain or sump. All pipes shall be pitched towards drain points.

Pressure gauges shall be provided as shown on the approved drawings. Care shall be taken to protect pressure gauges during pressure testing.

2.4 PIPE FITTINGS

Pipe fittings mean tees, elbows, couplings, unions, flanges, reducers etc and all such connecting devices that are needed to complete the piping work in its totality.

Ductile Iron / Cast Iron / Forged steel screwed type fitting shall be used for pipes of 50 mm dia & below.

Fabricated fittings shall not be permitted for pipes diameters 50mm and below.

Fabricated fittings used on pipe size 65 mm & above shall be fabricated , welded in workshops. They shall be inspected by Project Manager before dispatch from the workshop. The welding procedures of the workshop should have been approved by the rules for sprinkler system and applicable to hydrant and sprinkler system. For “T” connection, pipes shall be drilled and reamed. Cutting by gas or electrical welding shall not be permitted.

2.5 PROCEDURE FOR PYPKOTE / COATEK APPLICATION

A) Surface Preparation - The pipe surface shall be cleaned by a wire brush.

B) Application of Primer - Pypkote / Coatek primer is to be applied on pipes immediately after cleaning. This is to prevent any further accumulation of rust on the pipe. This is a cold applied primer and is applied by brush.

C) Application of Pypkote / Coatek 4 mm Tape - After the primer is applied on the pipe, it is allowed to dry for about 30 min. till it becomes touch dry. Before adhering the tape to the pipe, it is advisable to gently heat the primer coated pipe by a run of LPG torch. Remove the bottom polyethylene from the tape & then heat bottom surface of the tape by LPG torch or any heat source & start wrapping the tape to the pipe by heating the primer coated pipe & by removing the bottom polyethylene from the tape before wrapping better adhesion between the tape & pipe is obtained. Overlaps are maintained with a minimum of 12.5 mm.

D) Tape coating of weld joints - The tape is applied over the weld joints after the necessary welding & testing methods of the joints is completed. The procedure for application of tape shall be the same as bare pipe procedure. Overlaps on each side of the weld joints shall be 50 mm.

E) A final coat of White wash with water based cement paint is done immediately over the entire coated pipe.

2.6 JOINTING

2.6.1 Welded Joints :

Joints between MS pipes and fittings shall be made with the pipes and fittings having “V” groove and welded with electrical resistance welding in an approved manner. But welding without “V” groove shall not be permitted.

All joints in the pipe line with screwed fittings shall be seal welded after testing and the weld plus the adjoining portion shall be given two coats of zinc rich primer.

2.6.2 Flanged joints (65 mm dia and above)

Flanged joints with flanges conforming to IS: 6392 shall be provided on

a. Straight runs at intervals not exceeding 25-30m on pipe lines of 50 mm dia and above and as directed by the Project Manager.

b. For jointing all types of valves, appurtenances, pumps, connections with other type of pipes, to water tanks and other places necessary and as required for good engineering practice and as shown/noted on the drawings.

c. Flanges shall be with GI bolts and nuts and 3mm insertion gasket of natural rubber conforming to IS: 11149.

2.6.3 **Unions (upto 50 mm dia)**

Approved type of dismountable unions shall be provided on pipe lines of 40 mm dia and smaller dia, in locations similar to those specified for flanges.

3. AIR VESSEL

The air vessel shall be provided to compensate for slight loss of pressure in the system and to provide an air cushion for counter-acting pressure, surges, whenever the pumping sets come into operation. Air vessel shall conform to IS:3844. It shall be normally half full of water, when the system is in normal operation. Air vessel shall be fabricated with 8 mm thick M.S. plate with dished ends and suitable supporting legs. It shall be provided with one 100 mm dia flanged connection from pump, one 25 mm drain with valve, one water level gauge and 25 mm sockets for pressure switches. The air vessel shall be tested to pressure for 12 hours at 2 times the operating pressure or 1.5 times the shut-off.

4. AIR CUSHION TANK

Every wet riser shall be provided with an air cushion tank at its top most point. The air cushion shall be provided with an automatic air release cock, 20 mm dia drain pipe, drain valve and shut off valve.

5. FIRE BRIGADE CONNECTION

The storage tank shall be provided with a 150 mm fire brigade pumping connection to discharge at least 2275 litres / minute into it. This connection shall not be taken directly into the side of the storage tank, but arranged to discharge not less than 150 mm above the top edge of the tank such that the water flow can be seen. The connection shall be fitted with stop valve in a position approved by the Project Manager. An overflow connection discharging to a drain point shall be provided from the storage tank.

The fire brigade connection shall be fitted with four numbers of 63mm instantaneous inlets in a glass fronted wall box at a suitable position at street level, so located as to make the inlets accessible from the outside of the building. The size of the wall box shall be adequate to allow hose to be connected to the inlets, even if the door cannot be opened and the glass has to be broken. Each box shall have fall of 25mm towards the front at its base and shall be glassed with wired glass with ”FIRE BRIGADE INLET” painted on the inner face of the glass in 50 mm size block letter. Each such box shall be provided with a steel hammer with chain for breaking the glass.

In addition to the emergency fire brigade connection to the storage tank, a 150mm common connection shall be taken from the four 63mm instantaneous inlets direct to hydrant main so that the fire brigade may pump to the hydrants in the even of the hydrant pumps being out of commission. The connection shall be fitted with a sluice valve and reflux valve. Location of these valve shall be as per the approval of the Project Manager.

Two way collecting head with two numbers 63 mm instantaneous type inlets shall be connected to the sprinkler header. All other details shall be as described above.

6. SYSTEM DRAINAGE

The system shall be provided with suitable drainage arrangement with drain valves complete with all accessories.

7. VALVE CHAMBERS

Provision of suitable brick masonry chambers in cement mortar 1:5 (1 cement: 5 coarse sand) on cement concrete foundations 150 mm thick 1:5:10 mix (1 cement:5 fine sand : 10 graded stone aggregate 20 mm nominal size) with 15 mm thick cement plaster inside and outside finished with a plaster inside and outside finished with a floated coat of neat cement inside with cast iron surface box approved by fire brigade including excavation, back-filling complete shall be made.

8. VALVES

8.1 SLUICE VALVES

Sluice valves shall be double flanged valves with cast iron body. The spindle, wall seat and wedge nuts shall be of bronze. They shall generally have non-rising spindle and shall be of the particular duty and design called for.

The valves shall be supplied with suitable flanges, non- corrosive bolts and asbestos fibre gaskets. Sluice valves shall conform to Indian Standard IS : 780-1969 and IS : 2906 .

8.2 BUTTERFLY VALVE

The butterfly valve shall be suitable for waterworks and rated for 300 P.S.I

The body shall be of cast iron to IS:210 in circular shape and of high strength to take the water pressure. The disc shall be heavy duty cast iron with anti corrosive epoxy or nickel coating.

The valve seat shall be of high grade elastomer or nitrile rubber. The valve is closed position shall have complete contact between the seat and the disc throughout the perimeter. The elastomer rubber shall have a long life and shall not give away on continuous applied water pressure. The shaft shall be EN 8 grade carbon steel.

The valve shall be fitted between two flanges on either side of pipe flanges. The valve edge rubber shall be projected outside such that they are wedged within the pipe flanges to prevent leakages.

8.3 BALL VALVE

The ball valve shall be made forged brass and suitable for test pressure of pipe line. The valve shall be internally threaded to receive pipe connections.

The ball shall be made from brass and machined to perfect round shape and subsequently chrome plated. The seat of the valve body-bonnet gasket and gland packing shall be of Teflon.

The handle shall be provided with PVC jacket. The handle shall also indicate the direction of ‘open’ and ‘closed’ situations. The gap between the ball and the teflon packing shall be sealed to prevent water seeping.

The handle shall also be provided with a lug to keep the movement of the ball valve within 90°. The lever shall be operated smoothly and without application of any unnecessary force.

8.4 GUN METAL VALVES

Gun metal Valves shall be used for smaller dia pipes, and for threaded connections. The Valves shall bear certification as per IS:778

The body and bonnet shall be of gun metal to IS:318. The stem gland and gland nut shall be of forged brass to IS:6912. The hand wheel shall be of cast iron to IS:210.

The Hand wheel shall be of high quality finish to avoid hand abrasions. Movement shall also be easy. The spindle shall be non rising type.

8.5 NON-RETURN VALVE

Non-Return valves shall be cast iron double flanged with cast iron body and gunmetal internal parts conforming to IS:5312.

8.6 PRESSURE RELIEF VALVE

Each System shall be provided with a Pressure Relief Valves. The Valve shall be spring actuated and set to operate as per field requirement. The Valve shall be constructed of bronze and provided with an open discharge orifice for releasing the water. The Valve shall be open lift type.

9. PRESSURE SWITCH

The pressure switches shall be employed for starting and shutting down operation of pumps automatically, dictated by line pressure. The Pressure Switch shall be diaphragm type. The housing shall be die cast aluminium, with SS 316 movement, pressure element and socket. The set pressure shall be adjustable.

The Switch shall be suitable for consistent and repeated operations without change in values. It shall be provided with IP:55 water and environment protection.

10. PRESSURE GAUGE

Pressure gauge shall be provided near all individual connections of the hydrant system with isolation valves and near each flow switch assembly of the sprinkler system. Pressure gauge shall be 50 mm dia gunmetal bourdon type with gunmetal isolation ball valve, tapping and connecting pipe and nipple. The gauge shall be installed at appropriate height for easy readability.

11. PAINTING

All Hydrant and Sprinkler pipes shall be painted with post office red colour paint. All M S pipes shall first be cleaned thoroughly before application of primer coat. After application of primer coat two coats of enamel paint shall be applied. Each coat shall

be given minimum 24 hours drying time. No thinners shall be used. Wherever required all pipe headers shall be worded indicating the direction of the pipe and its purpose such as "TO RISER NO.1" etc.

Painting shall be expertly applied, the paint shall not over run on surfaces not requiring painting such as walls, surfaces etc. Nuts and bolts shall be painted black, while valves shall be painted blue.

12. EXCAVATION

Excavation for pipe lines shall be in open trenches to levels and grades shown on the drawings or as required at site. Pipe lines shall be burried with a minimum cover of 1 meter or as shown on drawings.

Wherever required Contractor shall support all trenches or adjoining structures with adequate timber supports, shoring and strutting.

On completion of testing in the presence of the Project Manager and pipe protection, trenches shall be backfilled in 150 mm layers and consolidated.

Contractor shall dispose off all surplus earth as directed by the Project Manager.

13. ANCHOR / THRUST BLOCK

Contractor shall provide suitably designed anchor blocks in cement concrete/steel support to cater to the excess thrust due to work hammer and high pressure

Thrust blocks shall be provided at all bends, tees and such other location as determined by the Project Manager.

Exact location, design, size and mix of the concrete blocks/steel support shall be as shown on the drawings or as directed by the Project Manager prior to execution of work.

14. FIRE HYDRANTS

14.1 EXTERNAL HYDRANTS

a. Contractor shall provide external hydrants. The hydrants shall be controlled by a cast iron sluice valve. Hydrants shall have instantaneous type 63mm dia outlets. The hydrants shall be double outlet conforming to IS:908 with CI duck foot bend and flanged riser or required height to bring the hydrant to correct level above ground.

b. Contractor shall provide for each external fire hydrant two numbers of 63mm dia. 15 m long controlled percolation hose pipe with gunmetal male and female instantaneous type couplings machine wound with GI wire (hose to IS:636 type certification) , gunmetal branch pipe with nozzle to IS:903. This shall be measured and paid for separately.

c. Each external hydrant hose cabinet shall be provided with a drain in the bottom plate.

d. Each external hydrant hose cabinet containing items as above shall also be provided with a nozzle spanner and a Fireman's Axe. This shall be measured and paid for separately.

e. Each hose cabinet shall be conspicuously painted with the letters "FIRE HOSE".

14.2 **Internal Hydrants**

a. Contractor shall provide on each landing and other locations as shown on the drawings double headed gunmetal landing valve with 100 mm dia inlet as per IS:5290, with shut off valves having cast iron wheels as shown on the drawings. Landing valve shall have flanged inlet and instantaneous type outlets as shown on the drawings.

b. Instantaneous outlets for fire hydrants shall be standard pattern and suitable for fire hoses.

c. Contractor shall provide for each internal fire hydrant station two numbers of 63 mm dia. 15 m long rubberized fabric lined hose pipes with gunmetal male and female instantaneous type coupling machine would with GI wire (hose to IS:636 type 2 and couplings to IS:903 with IS certification), fire hose reel, gunmetal branch pipe with nozzle to IS:903. This shall be measured and paid for separately.

d. Contractor shall provide standard fire hose reels of 20mm dia high pressure dunlop rubber hose 36 m long with gunmetal nozzle, all mounted on a circular hose reel of heavy duty mild steel construction having cast iron brackets. Hose reel shall be connected directly to the wet riser with an isolating valve. Hose reel shall conform to IS:884 and shall be mounted vertically . This shall be measured and paid for separately.

e. Each internal hydrant hose cabinet shall be provided with a drain in the bottom plate. The drain point shall be lead away to the nearest general drain.

f. Each internal hydrant hose cabinet containing items as above shall also be provided with a nozzle spanner and a Fireman's Axe. The cabinet shall be recessed in the wall as directed. This shall be measured and paid for separately.

g. Each hose cabinet shall be conspicuously painted with the letters "FIRE HOSE".

14.3 **Hose Reel**

Hose reel shall conform to IS : 884, heavy duty, 20 mm dia length shall be 36 metre long fitted with gun metal chromium plated nozzle, mild steel pressed reel drum which can swing upto 170 degree with wall brackets of cast iron finished with red and black enamel complete.

14.4 **Fire Hose**

All hose pipes shall be of 63 mm diameter RRL/ CP as required, conforming to IS : 636 or IS : 8423. The hose shall be provided with copper alloy delivery coupling. The hose shall be capable of withstanding a bursting pressure of 35.7 Kg/Sq.cm without

undue leakage or sweating. Hose shall be provided with instantaneous spring-lock, type couplings.

14.5 **Branch Pipe, Nozzle**

Branch pipes shall be of gun metal with loaded tin bronze ring at the discharge and to receive the nozzle and provided at the other with a leaded tin bronze ring to fit into the instantaneous coupling. Nozzle shall be of spray type of diameter of not less than 16 mm and not more than 25 mm. Nozzle shall be of loaded tin bronze branch pipe and nozzle shall be of instantaneous pattern conforming to Indian Standard - 903.

14.6 **Hose Cabinet**

Hose cabinet shall be provided for all internal and external fire hydrants. Hose cabinets shall be fabricated from 16 gauge MS powder coated sheet of fully welded construction with hinged double front door partially glazed (3 mm glass panel) with locking arrangement, stove enamelled fire red paint (shade No. 536 of IS:5) with “FIRE HOSE” written on it prominently (size as given in the schedule of quantities). Cabinet surfaces in contact with the walls shall not be powder coated but instead given two coats of anti-corrosive bitumastic paint.

14.7 **Internal Hose Cabinet**

Hose cabinet shall be of glass fronted with hinged door & lock. The cabinet shall be made of 16 gauge thick MS sheet and spray painted to shade No. 536 of IS:5. The hose cabinet shall be of size to accommodate the following:

i. Landing Valves (Single/double headed)

ii. Hose pipe

iii. Hose reel (36.5 mtr.)

iv. Branch pipes, nozzles (2 sets)

v. Fire man's axe and hand appliances

14.8 **External Hose Cabinet**

The hose cabinet shall be of size to accommodate the following:

i. Single/Double headed yard hydrant valve

ii. Hose pipe (2 length of 15 m)

iii. Branch pipes, nozzles (2 sets)

iv. Fire man's axe

15. SPRINKLER SYSTEM

15.1. **GENERAL SPECIFICATION**

The scope of work shall include supply, commissioning, testing of the system as a whole. The sprinkler heads are to be fixed into heavy quality black steel pipes,

conforming to IS 1239 or any other approved specification. The size of pipe will vary from 20 mm to 150mm to suit the hydraulics of the system. The System shall conform to CFO Rules for the installation of sprinkler systems in general for 'Ordinary Hazard' category-in respect of design, density and spacing of sprinkler heads.

Reduction in pipe sizes shall not be made by use of bushings. All piping shall be done by means of welding, screwed & flanged jointing as per codes.

Due care shall be taken that sprinklers are not applied with paint at the time of applying paint to piping and fittings.

All control, drain, test and alarm valves shall be provided with signs to identify their purposes, functions, direction of flow the satisfaction of the Consultants.

15.2. QUARTZOID BULB AUTOMATIC SPRINKLER

Sprinkler heads shall be made of brass/quartzoid bulb sufficiently strong, in compression to withstand any pressure, surge or hammer likely to occur in the system. The yoke & body shall be made of high quality gun metal brass with arms streamlined to ensure minimum interference with the spread of water. The deflector of suitable design shall be fitted to give even distribution of water over the area commanded by the sprinkler.

The bulb shall contain a liquid having a freezing point below any natural climatic figure and a high coefficient of expansion. The temperature rating of the sprinkler shall be stamped on the deflector & the colour of the liquid filled in the bulb shall be according to the temperature rating as per HFPA standard. The sprinkler heads shall be of type & quality approved by the local fire brigade authority. The inlet shall be screwed.

The sprinklers shall have 15mm nominal size of the orifice for ordinary hazard.

The orifice size shall be marked on the body or the deflector of the sprinkler.

Metal guards for protection of sprinkler against accidental or mechanical damage shall be provided as desired by the Project Manager.

Contractor shall submit detailed submittal and discharge spray pattern for the Sprinkler for the approval of consultant.

15.2.1 Operating Temperature

The Operating temperature at which the quartzoid bulb of the sprinkler head shall actuate, shall be 68 degree C or as specifically mentioned.

15.2.2 Sprinkler Installation

Sprinkler heads shall be located in positions shown on the drawings. While slight relocation may result from building construction features or interference from other services, the maximum spacing between sprinkler heads and coverage area shall not exceed those stipulated in the TAC regulations and the NFPA 13-1994 Rules.

Allowance shall be made for such relocations within a radius of 1500 mm of the indicated positions without additional cost. The Fire Protection Services Trade shall co-ordinate with the ceiling Trade to set out the sprinkler locations to suit the site location of the unit grid. In

general, all sprinklers shall be located at the centre of the ceiling unit and a provision of about 10% more sprinklers and pipe work than required in TAC and NFPA Rules shall be included in this sub-contract. Chrome plated wire mesh guards shall be used to protect the sprinkler heads which are liable to accidental or mechanical **(at no extra cost)** damage.

15.3. **FLOW REQUIREMENTS**

The flow requirement for sprinkler heads shall be specifically approved for the designated area of installation.

15.4. **ORIFICE PLATES**

For restricting pressure at lower levels in the sprinkler system, orifice plates of appropriate sizes shall be fitted at different floor levels, at the branching points from Riser Main.

The Diameter of such orifice shall not be less than 50% of the dia of pipe into which it is to be fitted, which shall not be less than 50mm dia. These orifice plates must be of stainless steel with plain central hole without burrs, and the thickness shall be 3mm for pipe size upto 80 mm, 6 mm for pipes from 80 to 125 mm dia and 9 mm for pipes greater than 125 mm dia. Such orifice plate must have a projecting identification tag.

The orifice plate shall fitted not less than two pipe internal diameters down stream of the outlet from any elbow or brand.

Contractor shall submit the design and identify location on drawing before installation.

15.5 **INSTALLATION CONTROL VALVES**

Each installation shall be provided with a set of installation control valves comprising:-

a. An Alarm Valve.

b. A Water Motor Alarm & Gong.

c. Installation valves shall be installed on the sprinkler circuits as shown on the drawings.

d. Contractor shall submit detailed shop drawings showing the exact location, details of installation of the valves/alarm in all respects.

e. Installation valve shall comprise of a cast iron body with gunmetal trim, and double seated clapper check valves, pressure gauges, test valve and orifice assembly and drain valve with pressure gauges, turbine water gong including all accessories necessary and required and as supplied by original equipment manufacturer and required for full and satisfactory performance of the system. A cast iron isolation valve with lock and chain at the inlet of the installation valve shall be provided.

15.6 **INSPECTION AND TEST VALVE ASSEMBLY**

Inspection and testing of the automatic starting of the sprinkler system shall be done by providing an assembly consisting of gunmetal valves, gunmetal sight glass, bye-pass valve and orifice assembly as per approved drawing.

15.7 **FLOW SWITCH**

Flow switch shall have a paddle made of flexible and sturdy material of the width to fit within the pipe bore. The terminal box shall be mounted over the paddle/ pipe through a connecting socket. The Switch shall be potential free in either N O or N C position as required. The switch shall be able to trip and make / break contact on the operation of a single sprinkler head. The terminal box shall have connections for wiring to the Annunciation Panel. The flow switch shall have connections for wiring the seat shall be of S.S to the Annunciation Panel. The flow switch shall have IP: 55 protection.

The flow switch work at a triggering threshold bandwidth (flow rate) of 4 to 10 GPM. Further, it shall have a 'Retard' to compensate for line leakage or intermitted flows.

15.8 **THE MAIN STOP VALVE**

These shall be of cast iron body of requisite size. When closed, these will shut off supply of water to the installation.

A location plate must be fixed on the outside or an external wall, as near to the main stop valve as possible, bearing the following words on raised letters or other approved type letter.

i **Sprinkler Stop Valve Inside :** The word `sprinkler stop valve' shall be in letters of at least 35mm and the word "INSIDE" at least25mm in height. The words shall be painted white on black back ground.

ii All stop valves shall be right handed i.e. they shall be so constructed that in order to shut the valve the spindle shall turn from left to right. There shall be an indicator which will show whether the valve is open or shut.

15.9 **PIPES FOR DRAINAGE:**

Sprinkler pipes shall be so installed that the system can be thoroughly drained. As far as possible all pipes shall be arranged to drain to the installation drain valve as shown in the drawing for ordinary hazard system.

In the case of basement & other areas where sprinkler pipe-work is below the installation drain valve & in other trapped points in the system, auxiliary valves of the following sizes shall be provided.

-20 mm valves for pipes upto 50mm dia.
-25 mm valves for 80mm dia pipe.
-50 mm valves for pipes larger than 80mm dia.

15.10 **SYSTEM DESIGN**

The entire sprinkler installation shall be designed to make it a hydraulically balanced system. The pressure requirement at typical floors shall be designed between 2.5 bar and 3.5 bar.

16. HAND HELD FIRE EXTINGUISHERS

16.1 HAND APPLIANCES

16.1.1 Scope

Work under this section shall consist of furnishing all labour, materials, appliances and equipment necessary and required to install fire extinguishing hand appliances as per relevant specification of various authorities.

Without restricting to the generality of the foregoing, the work shall consists of the following:

Installation of fully charged and tested fire extinguishing hand appliances of A B C powder type as required and specified in the drawings and schedule of rates.

16.2 GENERAL REQUIREMENTS

Hand appliances shall be installed in easily accessible locations with the brackets fixed to the wall by suitable anchor fasteners.

Each appliance shall be provided with an inspection card indicating the date of inspection, testing, change of charge and other relevant data.

All appliances shall be fixed in a true workmanlike manner truly vertical and at correct locations.

Distribution / installation of fire extinguisher to be in accordance to IS:2190.

16.3 MEASUREMENT

Fire extinguishers shall be counted in numbers and include installation of all necessary items required as given in the specifications.

16.4. ABC TYPE DRY POWDER EXTINGUISHER

The Extinguisher shall be filled with ABC grade 40, Mono Ammonium Phosphate 40% from any approved manufacturer.

The capacity of the extinguisher when filled with Dry Chemical Powder (First filling) as per IS 4308, Part II, shall be 5 Kg +/-2% or 10 Kg +/- 3%.

The distribution of fire extinguishers to be as per IS 2190 – 1992.

It shall be operated upright, with a squeeze grip valve to control discharge. The plunger neck shall have a safety clip, fitted with a pin, to prevent accidental discharge. It shall be pressurised with Dry Nitrogen, as expellant. The Nitrogen to be charged at a pressure of 15 Kg/cm^2

Body shall be of mild steel conforming to relevant IS Standards. The neck ring shall be also mild steel and welded to the body. The discharge valve body, shall be forged brass or leaded bronze, while the spindle, spring and siphon tube shall be of brass. The nozzle shall be of brass, while the hose shall be braided nylon. The body shall be cylindrical in shape, with the dish and dome welded to it. Sufficient space for Nitrogen gas shall be provided inside the body, above the powder filling.

The Neck Ring shall be externally threaded - the threading portion being 1.6 cm. The filler opening in the neck ring shall not less than 50 mm. Discharge nozzle shall be screwed to the hose. The design of the nozzle shall meet the performance requirement, so as to discharge at least 85% of contents upto a throw of 4 mtrs, continuously, at least for 15 seconds. The hose, forming part of discharge nozzle, shall be 500 mm long, with 10 mm dia internally for 5 Kg capacity and 12 mm for 10 Kg capacity. It shall have a pressure gauge fitted to the valve assembly or the cylinder to indicate pressure available inside. The extinguisher shall be treated with anti-corrosive paint, and it shall be labelled with words ABC 2.5 cm long, within a triangle of 5 cm on each face. The extinguisher body and valve assembly shall withstand internal pressure of 30 Kg/cm^2 for a minimum period of 2 minutes. The pressure gauge shall be imported and suited for the purpose.

16.5 **WATER TYPE EXTINGUISHER (Gas Pressure Type)**

The Extinguishing medium shall be primarily water stored under normal pressure, the discharge being affected by release of Carbon Dioxide Gas from a 120 gms cylinder.

The capacity of Extinguisher, when filled upto the indicated level, shall be 9 ltr +/- 5%

The skin thickness of the Cylinder shall be minimum 4.0 mm, fabricated from Mild Steel sheet, welded as required, with dish and dome, being of same thickness, and of size not exceeding the diameter of body. The diameter of body to be not less than 150 mm and not exceeding 200 mm. The neck shall be externally threaded upto a minimum depth of 16 mm, and leaded tin bronze.

The cap shall be of leaded tin bronze, and screwed on the body upto a minimum of 1.6 cm depth, with parallel screw thread to match the neck ring. The siphon tube to be of brass or G.I. and the strainer of Brass. The cartridge holder, knob, discharge fittings and plunger to be of Brass/Leaded tin bronze, and plunger of stainless steel, spring of stainless steel. The cap to have handle fixed to it. The discharge hose shall be braided nylon, of 10 mm dia and 600 mm long, with a nozzle of brass fitted at end.

The extinguisher shall be treated for anti-corrosion internally and externally, and externally painted with Fire Red paint. The paint shall be stove enamelled/powder coated. The cartridge shall be as per IS, and have 60 gm net carbon dioxide gas for expelling. The extinguisher, body and cap shall be treated to an internal hydraulic pressure of 25 Kg/cm2. It shall have external marking with letter A, of 2.5 cm height, in block letters within a triangle of 5 cm each side. The extinguisher shall be upright in operation, with the body placed on ground and discharge tube with nozzle held in one hand to give a throw of not less than 6 mtr, and continue so for atleast 60 secs. The extinguisher body shall be clearly marked with ISI stamp (IS 940).

16.6 **CARBON DIOXIDE EXTINGUISHER**

The Carbon Dioxide Extinguisher shall be as per IS: 2878

The body shall be constructed of seamless tube conforming to IS:7285 and having a convex dome and flat base. Its dia shall be maximum 140 mm, and the overall height shall not exceed 720 mm.

The discharge mechanism shall be through a control valve conforming to IS:3224. The internal syphon tube shall be of copper aluminium conforming to relevant specifications.

Hose Pipe shall be high pressure braided Rubber hose with a minimum burst pressure of 140 Kg/cm2 and shall be approximately 1.0 meter in length having internal dia of 10 mm. The discharge horn shall be of high quality unbreakable plastic with gradually expanding shape, to convert liquid carbon dioxide into gas form. The hand grip of Discharge horn shall be insulated with Rubber of appropriate thickness.

The gas shall be conforming to IS:307 and shall be stored at about 85 Kg/cm2. The expansion ratio between stored liquid carbon dioxide to expanded gas shall be 1:9 times and the total discharge time (effective) shall be minimum 10 secs and maximum 25 secs.

The extinguisher shall fulfill the following test pressures:
Cylinder: 236 Kg/cm2
Control Valve: 125 Kg/cm2

Burst Pressure of Hose: 140 Kg/cm2 minimum

It shall be an Upright type. The cylinder, including the control valve and high pressure Discharge Hose must comply with relevant Statutory Regulations, and be approved by Chief Controller of Explosives, Nagpur and also bear IS marking.

The Extinguisher including components shall be IS marked.

PLUMBING LIST OF MAKES

Sr. No.	Item	Make
1	Vitreous China Sanitary ware	PARRYWARE/ HINDWARE / KOHLER
2	Concealed Cistern	SCHELL/ GEBRIT/ KOHLER
3	Plastic W.C. seats Covers	PARRYWARE/ HINDWARE / KOHLER
4	Stainless Steel Sinks	JAYNA/ STAR/ VIJAY / PLATO
5	C.P. Fittings & Accessories	SCHELL / JAQUAR/ KOHLER / PLATO
6	Rubber Insulation	ARMAFLEX/ VIDEOFLEX
7	Flow-guard CPVC pipes/fittings	FINOLEX/ ASHIRWAD / ASTRAL / AKG
8	G.I. Pipes /M.S. Pipes IS 1239/3589	JINDAL HISSAR / PRAKASH SURYA
9	S S. Pipes	JINDAL / VIEGA
9	G.I. Fittings (Malleable cast iron)	DRP-M/UNIK /ZOLOTO / SS
10	Soil, Waste & Rain water pipes & Fittings – CI 3989	NECO /KAPILANS/SKF
11	Upvc pipes & Fittings .	FINOLEX/ ASHIRWAD / ASTRAL / AKG
12	S.S. Hinged Grating	CHILLY/JAYNA/VIJAY
13	Check Valves (Dual Slim type)	DRP /ZOLOTO/SANT/AIP
14	Butterfly Valve	DRP /AIP/SANT/ZOLOTO
15	Ball valves (15 to 40mm)	DRP/ SANT /AIP/ZOLOTO
16	Gate Valve	DRP/ AIP/SANT/ZOLOTO
17	Gunmetal valve (full way valve) Class-I	DRP/ LEADER/ZOLOTO/SANT
18	C.I. double flanged sluice valve	KIRLOSKAR/ SHIVA-DURGA
19	Diaphragm Valve	As approved by water treatment manufacturer’s
20	Foot Valve	DRP/ ZOLOTO/SANT
21	Pressure Reducing Valve (PRVs)	DRP/ZOLOTO/SANT
22	Stoneware Pipes & Gully - IS 651	Locally ISI approved
23	RCC Pipes IS 458	Locally ISI approved
24	C.I. Manhole cover & frame IS 1726	NECO/KAPILANS /RIF
25	FRP Manhole & Drain COVERS ETC	Thermodrain / Pooja
26	Anti corrosive tape for pipe protection	PYPKOTE/MAKPOLYKOTE

	28	Garden Irrigation System	JAIN/HARVEL
	29	Anticorrosive Bitumastic Paint	ISI
	30	Epoxy Paint	ISI
	31	Hydro-Pneumatic System	
	I	Pumps	DP-HOLAND/GRUNDFOSS/ WILLO/KSB
	Ii	PLC	AS PER MANUFACTURERS SPEC'S
	Iii	Pressure Vessel	AS PER MANUFACTURERS SPEC'S
	Iv	Pressure Sensor	AS PER MANUFACTURERS SPEC'S
	32	Clear Water Pumps	DP-HOLAND/GRUNDFOSS/WILLO/KSB
	33	Submersible Drainage Pumps	DP-HOLAND/GRUNDFOSS/WILLO /KSB
	34	Filter/Softener	Netsol Water Solutions/ BRISANZIA /ION EXCHANGE/PENTAIR
	35	PH Meter	VATS/ HANNA (italy)
	36	Water Meter	kaycee/ kent
	37	Electrical Switchgear & Starters	L&T OR EQUIVALENT
	38	Cable Trays	SLOTCO OR EQUIVALENT
	39	1100 Volt Grade XLPE Cables	ISI
	40	PVC Insulated Copper Wires	ISI
	41	Lugs (Tinned Copper)	EQUIVALENT
	42	Power Aux. Contactors	EQUIVALENT
	43	Vibration Eliminator Pads & Connections	RESISTOFLEX
	44	Suction Strainer/Pot Strainer	VENUS/LEADER/EMARALD/ZOLOTO
	45	Meters, Indication Lamp	ENERCON OR EQUIVALENT
	46	Forged Steel Fittings	DRP /VS / ZOLOTO/SS
	47	Pressure Gauge	FIEBIG/GURU
	48	Measuring Instruments	EQUIVALENT
	49	Electrical Panels	IMPACT ENGINEERS/ELEGANT
	50	Air Admittance valves	STUDOR/Mc ALPINE
	64	Automatic Air Vent	DANFOSS/ IBP
	65	Water level indicator & controller	ITAL/ TECHNIKA
	66	Pipe Clamps / Hangers / Support	CAMRY/ CHILLY
	67	Clamps & Support	CAMRY/ CHILLY
	68	Paint	SHALIMAR/ ASIAN
	69	Solar Water Heater	INTER SOLAR/ SOLARIZER/ SOLAHART
	70	STP and ETP Plant	Kavya Water Technologies/BRISANZIA /ION EXCHANGE

PROJECT – Interior and allied MEP works at CDRI Secretariat, Sriram Bhartiya Kala Kendra, Copernicus Marg, New Delhi

ARCHITECT – SHiFt, Studio For Habitat Futures

B.O.Q. — BILL OF QUANTITIES

Summary of Cost

S. No.	DESCRIPTION	AMOUNT(Rs.)
1	Civil, Finishing, and Furniture Works	₹ 0
2	Electrical, LV Works, and Equiptments	₹ 0
3	HVAC Works	₹ 0
4	Plumbing Works	₹ 0
5	Fire Fighting Works	₹ 0
	GRAND TOTAL	**₹ 0**

Sno.	Notes
1	All items of work under this Contract shall be executed strictly to fulfill the requirements laid down in the specifications, which shall include type of material, methods of installation, approved shop drawings and the relevant standards.
2	The rate for each item of work in the Schedule of Quantities shall, unless expressly stated otherwise, shall also include the following:
a.	All fixing materials, scaffolding, accessories, appliances, tools, plants, equipment, transport, labour and incidentals required in preparation of and in the full and entire execution, installation and completion of the work called for in the item as per Specifications and Drawings.
b.	Wastage on materials and labour.
c.	Loading, transporting, unloading, handling/ double handling, hoisting to all levels, setting, fitting and fixing in position, protecting, disposal of debris and all other labour necessary in and for the full and entire execution and to fully complete the job in accordance with the contract documents, good practice and recognised principles.
d.	Liabilities, obligations and risks arising out of Conditions of Contract.
e.	All requirements of specifications, whether such requirements are mentioned in the item or not. The specifications and drawings where available, are to be read as complimentary to and part of the Schedule of Quantities and any work called for in one shall be taken as required for all.
f.	In the event of conflict between schedule of quantities and other documents including the specifications, the most stringent shall apply and the interpretation of the architect shall be final and binding.
3	The unit rate for each equipment or materials shall include cost in Rupees for equipment and material including the excise duty, forwarding, freight and insurance upto Contractor’s store at site, storage, installation, testing, commissioning and other works required.
4	The rates shall be exclusive of GST. Applicable GST to be paid separately over and above
5	The quantities given in this schedule are provisional, the Owner reserves the right to increase or decrease the quantities or to totally omit any items of work and the Contractor shall not be entitled to claim any extras or damages on these grounds. These variations shall be peRmitted until such time Contractors shop drawings are approved.
6	This schedule shall be fully priced and the extensions and totals duly checked. The rates for all items shall be filled in INR.
7	No alteration whatsoever is to be made to the text or quantities of this Schedule unless such alteration is authorized in writing by the Consultants. Any such alterations, notes or additions shall unless authorized in writing be disregarded when tender doCuments are considered.
8	In the event of an error occurring in the amount column of the Schedule, as a result of wrong extension of the unit rate and quantity, the unit rate quoted by the tenderer shall be regarded as firm and the extensions shall be amended on the basis of the rates.
9	Any error in totaling in the amount column and in carrying forwarded totals shall be corrected. Any error, in description or in quantity, or comission of items from this schedule shall not vitiate this contract but shall be corrected and deemed to be a variation required by the Consultants.
10	Incase of change in base rate during construction due to change in selected item, rate will be recalculated as per the new base rate.

Civil, Finishing, and Furniture Works						
	SUMMARY				**AMOUNT**	
1	**DEMOLITION WORKS**				₹ 0	
2	**CONCRETE WORKS/RCC Works**				₹ 0	
3	**BRICK WORK**				₹ 0	
4	**WATERPROOFING**				₹ 0	
5	**STONE/TILE WORKS**				₹ 0	
6	**WOODEN AND BAMBOO WORKS**				₹ 0	
7	**ALUMINIUM and UPVC WORKS**				₹ 0	
8	**FINISHING WORKS**				₹ 0	
9	**FURNITURE AND FURNISHING**				₹ 0	
10	**MISCELLANEOUS**				₹ 0	
	TOTAL				**₹ 0**	

S.No.	DESCRIPTION OF ITEMS	UNIT	QUANTITY	RATE	AMOUNT	DETAIL
1	**DEMOLITION WORKS**					
	Please Note: All rates to be inclusive of disposal of malba as per NDMC guidelines and norms					
A	Dismantling R.C.C. work, and disposing malba	**cum**	2.03		₹ 0	
B	Dismantling cement flooring (including terrazzo flooring) and subflooring and disposing malba	**cum**	RO			
C	Dismantling of floor tiles and wall tiles and sub base (if required) including removal of malba	**sqm**	743.22		₹ 0	
D	Dismantling of internal and external plaster from walls, ceilings including removal of malba.	**sqm**	99.00		₹ 0	
E	Dismantling of exisiting roofing and terracing including removal of malba.	**sqm**	RO			
F	Dismantling of exisiting brickwork including plaster/ wall tiles if any and removal of malba	**cum**	48.00		₹ 0	
H	Dismantling of exisiting doors, window frames, shutters, dry wall, false ceiling, and partition walls and stacking of reusable material for owner and disposal of non usable material.	**sqm**	378.30		₹ 0	
I	Cost of saleable scrap deducted from Bill	**LS**				
	TOTAL CARRIED TO SUMMARY				**₹ 0**	
2	**CONCRETE WORKS/RCC Works**					
A	**CEMENT CONCRETE SCREEDING :-** Providing and laying M-15 cement concrete screeding for flooring, tamped, spaded , trowelled as directed laid to water levels or proper slopes as directed with necessary shuttering, curing etc, complete at all heights and levels.	**cum**	5.00		₹ 0	
B	Providing, laying compacting and curing plain cement concrete upto 4" th. in under floors and including cost of all materials, labour, machineries tools and tackles and processes all complete.					
	With 1:3:6 (1 cement : 3 coarse sand : graded crushed stone coarse aggregate 1 in. and down)	**cum**	3.13		₹ 0	
C	Providing and laying RCC in Suspended floors, roofs, balconies, shelves/ counters, stair waist slabs, folded plate stairs and landings, lintel and floor beams, girders (deep beams), transfer beam, slab, column heads, RCC bands, cantilever projections, slab of tank, ramp, platform etc.					
	M20	**cum**	RO			
	M25	**cum**	2.25		₹ 0	
D	Ribbed tor steel reinforcement for R.C.C. work including straightening, cutting, bending, binding and placing in position complete.	**Kg**	391.69		₹ 0	
E	Centering and Shuttering including strutting and propping and removal of formwork for:					
1	Lintels, beams, plinth beams, girders and beam cantelevers.	**sqm**	30.00		₹ 0	
2	Suspended floors, roofs, landings, balconies	**sqm**	RO			
3	Chajjas, weather shades and corbells including edges	**sqm**	RO			
	TOTAL CARRIED TO SUMMARY				**₹ 0**	
3	**BRICK WORK**					
A	Half Brick work with common burnt clay modular bricks of class designation including placing 2 Nos 6mm dia. M.S. bars at every third course, scaffolding, curing, complete as per specification and drawing or directed by Project in charge. (Quoted rate to include Cost of M.S. bars and RCC lintel band to be provided all around at 7')					
1	Cement mortar 1:4 (1 cement : 4 coarse sand)	**sqm**	165.00		₹ 0	
B	Providing and laying on sunken areas broken **light weight concrete blocks** of approximately 600 kg per cum, density laid, consolidated, finished smooth, including finishing & grouting the top layer	**cum**	7.50		₹ 0	

	TOTAL CARRIED TO SUMMARY				**₹ 0**	
4	**WATERPROOFING**					
A	**Tapecrete Waterproofing**					
	Providing, applying & testing water proofing treatment of RCC sunken / roof slab (toilet, water tank etc.) comprising of the following operations. Cleaning RCC surfaces and plastering of RCC/Brick walls with 12 mm cement mortar 1:4 (1 cement : 4 coarse sand) mixed with CICO admixture as per manufacturer's as required with making corner fillet (Gola) 25 x 25mm size at the junction of walls and slab by cement sand mortar 1:4 mixed with Acrylic base polymeric compound. Pipe joints sealing specifications. Three coats of tapecrete - (first layer of tapecrete to be @ 0.253 kg/Sqm, the second & third layer to be @ 0.126 kg/Sqm) each admixed with grey cement over a coat of neat cement slurry admixed with chemical CH-9 and sealing all corners, joints, junction or pipes and masonry etc. with Epoxy putty all complete as per manufacuter's specification and drawing. 12 mm thick protective plaster 1:4 (1 cement : 4 coarse sand) over treated surface etc. complete. (Quoted rate to include grouting of RCC surface for any cracks/ fissures).	**sqm**	50.00		₹ 0	
B	Providing and laying **APP (Atactic Polypropylene Polymer)** modified prefabricated five layer 3 mm thick water proofing membrane, black finished reinforced with non-woven polyester matt consisting of a coat of bitumen primer for bitumen membrane @ 0.40 litre/sqm by the same membrane manufacture of density at 25°C, 0.87-0.89 kg/ litre and viscocity 70-160 cps. Over the primer coat the layer of membrane shall be laid using Butane Torch and sealing all joints etc, and preparing the surface complete. The vital physical and chemical parameters of the membrane shall be as under : Joint strength in longitudinal and transverse direction at 23°C as 650/ 450N/5cm. Tear strength in longitudinal and transverse direction as 300/250N. Softening point of membrane not less than 150°C. Cold flexibility shall be upto -2°C when tested in accordance with ASTM, D - 5147. The laying of membrane shall be got done through the authorised applicator of the manufacturer of membrane :					
	on horizontal surface with 3 mm thick AAP membrane	**sqm**	RO			
	on vertical surface surface with 3 mm thick AAP membrane	**sqm**	RO			
C	Providing and applying **fibre reinforced elastomeric liquid water proofing membrane** with resilient acrylic polymers having Sun Reflectivity Index (SRI) of 105 on top of concrete roof in three coats @10.76 litre/ 10 sqm. One coat of self-priming of elastomeric waterproofing liquid (dilution with water in the ratio of 3:1) and two coats of undiluted elastomeric waterproofing liquid (dry film thickness of complete application/system not less than 500 microns). The operation shall be carried out aft	**Sqm**	69.13		₹ 0	
	TOTAL CARRIED TO SUMMARY				**₹ 0**	
5	**STONE/TILE WORKS**					
A	**Counter Tops**					
	Providing and laying counters tops over wooden cabinet/counter laid and jointed with chemical. Single piece to be used. Including cost of nosing/ moulding, rubbing, polishing as well as protecting the flooring with 20 mm thick plaster of paris over 100 micron PVC Film complete in all aspect. Price to also include making appropriate holes for taps and wash basin drain pipe.					
1	Z black granite (base rate 200 Rs/Sft)	**sqm**	12.66		₹ 0	
1.1	Extra for cutting inlayed/under sink	**Nos**	5.00		₹ 0	
B	**Stone Flooring/Skirting/Dado/Partition**					
1	Providing and fixing **Stone slab flooring** on old existing terrazzo flooring, over 5 - 10 mm (average) thick chemical base laid over and jointed with grey cement slurry mixed with pigment to match the shade of the slab, including rubbing and mirror/diamond polishing. Please note any discolouration due to using of chemical will not be accepted					
1.1	Golden Kota 15-20 mm thick 550mm x 550mm (base rate 50 Rs/Sft)	**sqm**	RO			
1.2	Grey Kota 15-20mm thick 550mm x 550 mm (base rate 30 Rs/Sft)	**sqm**	390.00		₹ 0	
1.3	Jaisalmer Stone 16 mm thick (base rate 100Rs/Sft)	**sqm**	210.00		₹ 0	
1.4	Kaddapa Stone 16mm thick (base rate 40 Rs/Sft)	**sqm**	RO			
2	Extra for **intricate/details Stone patterns and inlay** (Base rate 500/Sft). Please note this will not include borders greater than 50mm thick, they will be taken as /sqm rates of the stone.	**sqm**	25.00		₹ 0	
3	Providing and fixing **Brass inlay** in flooring, including cutting the surface to insert the brass plate/flat and fixing with araldite. Basic rate of brass 300Rs/Kg	**Kg**	25.00		₹ 0	
4	Providing and laying of **stone in skirting/cladding/ dado/ jamb/ soffit/ cill** of unifoRm thickness, size, shade and pattern as approved by Architect with thick chemical base laid over and jointed with grey cement slurry mixed with pigment to match the shade of the slab, including rubbing and mirror/diamond polishing. Please note any discolouration due to using of chemical will not be accepted					
4.1	Golden Kota 15-20 mm thick 550mm x 550mm (base rate 50 Rs/Sft)	**sqm**	RO			
4.2	Grey Kota 15-20mm thick 550mm x 550 mm (base rate 30 Rs/Sft)	**sqm**	19.20		₹ 0	
4.3	Jaisalmer Stone 16 mm thick (base rate 140Rs/Sft)	**sqm**	12.80		₹ 0	
4.4	Kaddapa Stone 16mm thick (base rate 40 Rs/Sft)	**sqm**	RO			

5	Providing and fixing **stone in partition for urinals,** 375 mm wide stone slabs including 25 mm inserted into the wall, as per design, fixed with chemical and cement mortar, jointed with grey cement slurry mixed with pigment to match the shade of the slabs, including rubbing and mirror polishing on both side and visible edge complete. including providing pencil to hide joint and chamfering the edge & polishing the same etc. complete					
5.1	Z black granite (base rate 200 Rs/Sft)	**sqm**	RO			
C	**Tiles Flooring, Skirting, and Dado**					
1	Providing and laying of **tile flooring** of approved make, shade and pattern as approved by Architect laid over 20mm average thick bed of cement mortar 1:4 (1 cement : 4 coarse sand),grooves using 2/ 3mm PVC spacers and epoxy grouted with tile groute of matching shade of tile including cutting, grouting the joints with tile grout (Bal grout) and pigment to match the shade of tile including cutting, etc. complete in all respects as per pattern and drawing.					
1.1	With Vitrified Tile of 600 x 600mm (Basic Rate @ Rs 50/sft.)	**sqm**	50.00		₹ 0	
1.2	With Vitrified Tiles 600 x 1200 (Basic Rate @ Rs 100/sft)	**sqm**	RO			
1.3	With commercial tile (basic rate @ Rs25/sft)	**sqm**	RO			
2	Providing and laying **tile in skirting** 100mm height, laid over 12mm thick cement mortar 1:3 (1cement : 3 coarse sand), providing grooves using 2/ 3mm PVC spacers and grouted with tile groute (Bal grout) of matching shade of tile including cutting, grouting the joints with tile grout and matching pigment curing etc. complete in all respects as per drawing.					
2.1	With Vitrified Tile of 600 x 600mm (Basic Rate @ Rs 50/sft.)	**rmt**	RO			
2.2	With Vitrified Tiles 600 x 1200 (Basic Rate @ Rs 100/sft)	**rmt**	RO			
2.3	With commercial tile (basic rate @ Rs25/sft)	**rmt**	RO			
3	Providing and laying of **tiles in cladding/ dado/ jamb/ soffit/ cill** of unifoRm thickness, size, shade and pattern as approved by Architect laid with rich cement slurry over a bedding plaster of 6mm (avg.) thick cement mortar 1:3 (1 cement : 3 fine sand) including the cost of, providing grooves using 2/ 3mm PVC spacers and grouted with tile groute (Bal grout) of matching shade of tile, cutting, curing etc. complete in all respects. Please note: Dado tiling to be done in a way that to avoid smaller widths in the corners. This can be confirmed with the architect.					
3.1	With Vitrified Tile of 600 x 600mm (Basic Rate @ Rs 50/sft.)	**sqm**	153.00		₹ 0	
3.2	With Vitrified Tiles 600 x 1200 (Basic Rate @ Rs 100/sft)	**sqm**	RO			
3.3	With commercial tile (basic rate @ Rs25/sft)	**sqm**	RO			
D	**False Flooring**					
1	The Access raised floor shall be medium grade bare panel of vinyl flooring antistatic finish and also point load of 3.6 KN and UDL of 1350 KN/m2; panels manufactured from steel with lightweight wooden/cementitious core in the size 600 X 600 X 35 mm. The bottom of the panel shall be embossed in hemispherical shape to give strength and flexural rigidity. The entire panel shall be finished with electrodeposition of cathodic epoxy paint on the exposed surface for lifetime protection and shall be Zinc Whisker free. Pedestals design shall confiRm speedy assembly and removal for relocation and maintenance. Pedestal base to be peRmanently secured to portion on sub-floors, pedestal assembly shall provide easy adjustment of leveling and accurately aligned panel to ensure lateral resistance. It shall be designed to avoid any rattle or squeaks. It consists of 100x100x2mm thick galvanized base and head assembly consisting of 75mmx75mmx3.5mm embossed ribbed head with four holes with PVC locator for panel location and sound insulation. The panels shall be corner locked to the pedestals for complete rigidity and stability. Pedestal shall be peRmanently fixed to sub floor by application of epoxy or fastners to achieve Finished Floor Height (FFH) of 300mm The system shall provide a minimum clear uninterrupted clearance between the bottom of the floor for electrical conduits and wiring etc	**sqm**	6.60		₹ 0	
E	**Transition profile**					
1	Providing and fixing pre-approved bought out transition profiles of SS for joints on the floor between flooring of two different materials. The transition profile to have flanges to overlap over both the materials on either side as per sample approved by the architect. Approx width of 32 mm OR a straight SS strip 8mm thk, 20mm in height.	**rmt**	RO			
	Approved make: Bottom line or equivalent					
	TOTAL CARRIED TO SUMMARY				**₹ 0**	
6	**WOODEN AND BAMBOO WORKS**					
A	**Door**					
1	Providing and fixing flush door shutters of approved quality and make non decorative type core of commercial board of Century construction with internal frame of 1st class Indian teak wood including providing and fixing 4 nos. 125mm long and 1.9mm thick brass/chrome plated Butt hinges with 4 brass/chrome plated screws, 6 mm thick hard wood lipping all around complete as per specification basic rate of flush door (32mm thick) = 100Rs/Sft.	**Sqm**	24.68		₹ 0	
1.1	Extra for pasting 4mm thick MDF board as per design or pattern. (finishing with duco paint paid for separately)	**sqm**	11.66		₹ 0	
1.2	Extra for pasting 1mm thick laminate as per design or pattern	**sqm**	37.70		₹ 0	
1.3	Extra for pasting 3mm thick veneer as per design or pattern	**sqm**	RO			
2	Extra for providing and fixing 38mm thick **wooden beading** on the shutter, design as approved by architect					
2.1	Marandi Wood	**Rmt**	43.00		₹ 0	
3	Providing and fixing **wooden door frame (chaukhat)** as per the drawing.					

3.1	Marandi wood	**Rmt**	74.20		₹ 0	
B	**Hardware**					
1	Providing and fixing SS hardwares (unless otherwise specified) including all necessary screws, nails, adhesive, Cutting in door frames, shutters, floors and providing all other necessary fixing arrangement and fixing of all accessories as per manufacturers specification etc. of approved makes complete as per direction of Engineer-In-Charge.					
1.1	Mortice Sash Lock (Euro Profile) (Basic Rate @ Rs. 4275/Each)	**Nos.**	5		₹ 0	
1.2	Door Closer (Basic Rate @ Rs.1985/Each)	**Nos.**	14		₹ 0	
1.3	Door Stopper (Basic Rate @ Rs.275/Each)	**Nos.**	14		₹ 0	
1.4	Tower Bolt : Flush bolt manual of 152mm length , SS brush finish. (Basic Rate @ Rs. 506/Each)	**Nos.**	14		₹ 0	
1.5	SS Lever Handle (Basic Rate @ Rs. 1688/Pair)	**Nos.**	14		₹ 0	
1.6	Allenkey lock (Basic Rate @ Rs. 551/Each)	**Nos.**	2		₹ 0	
1.7	One side key lock - SS brush finish (Basic Rate @ Rs. 2608/Each)	**Nos.**	8		₹ 0	
1.8	Door Buffer - SS brush finish (Basic Rate @ Rs. 225/Each)	**Nos.**	10		₹ 0	
C	**Skirting**					
1	Providing and fixing 100 mm high **skirting of teak wood**, with half round top with sealer and lacquer polish of approved shade with necessary fixing arrangements and screws, including drilling necessary holes for rawl plugs etc. and priming coat on unexposed surface complete :					
1.1	12 mm thick	**Rmt**	RO			
D	**Bamboo Flooring/Skirting/Dado**					
1	Providing & fixing in position, Phenol bonded **Bamboowood flooring** (Made in India) with planks of sizes 14mm thick, 1800mm length (minimum) and 130mm wide (minimum) in approved colour, texture and finish, having Performance Appraisal Certificate (PAC) issued by Building Materials & Technology Promotion Council (BMTPC). The flooring shall be fixed with tongue and groove interlocking system with underlayment of 4mm thick expanded poly ethylene foam sheets having density 40 kg / cum, over prepared surface with necessary quarter round planks of size 1900mm x 18mm, and door reducer of size 1900mm x 44mm, wherever required. The bamboowood planks shall have minimum density of 1000 kg/cum & minimum hardness 1000 Kgf with Eco friendly UV coating, all complete as per direction of the Engineer in-charge.	**sqm**	RO			
2	Providing & fixing in position, Phenol bonded **Bamboowood (Made in India) in wall skirting** with planks of sizes 14mm thick, 1900mm length (minimum) and 85mm wide (minimum) in approved colour, texture and finish, having Performance Appraisal Certificate (PAC) issued by Building Materials & Technology Promotion Council (BMTPC). The skirting shall be fixed with S S screws & rawl plugs over underlayment of 4mm thick expanded poly ethylene foam sheets having 40 kg /cum density, over prepared surface.The Bamboowood planks shall have minimum density of 1000kg/cum & minimum Hardness 1000 Kgf. with Eco friendly UV coating, all complete as per direction of Engineer in-charge	**sqm**	RO			
3	Providing & fixing in position, Phenol bonded **Bamboowood wall cladding** (Made in India) at all height with planks of sizes 10mm thick, 1800mm length (minimum) and 130mm wide (minimum) in approved colour, texture and finish, having Performance Appraisal Certificate (PAC) issued by Building Materials & Technology Promotion Council (BMTPC) with necessary profiled edges fixed with 40mm S S screws 5 nos in each tile to frame work made of second class teak wood of size 20 x 15 mm in centre of each tile and bottom and top of work height. 40 x 15mm placed at ends of each tile. The Cladding shall be laid over backlayment of 1.00mm thick expanded poly ethylene foam of density 40kg/cum in two layers, first layer on wall surface before fixing wooden frame and second layer on frame under cladding. The bamboowood planks shall have minimum density of 1000 kg/cum & minimum Hardness 1000 Kgf. with Eco friendly UV coating, all complete as per direction of the Engineer in-charge	**sqm**	RO			
E	**Storage**					
1	**Low height storage with top**					
	Size: depth of 450mm to 600mm					
	Providing and fixing low height storage of size not more than **750m high X 450-750mm deep** , fabricated out of 19mm **block board** with 0.8 mm liner laminate on the inside. Shelves also to be lined with 0.8mm laminate from inside. All exposed edges to be finshed with 2mm thk PVC edge banding. **Wherever there is solid wall surface, BWP board to be used instead of block board backing**					
	Cost of the storage units to be inclusive of brushed steel finish handles , SS hinges, tower bolts, Shutter magnets (Medium), locks, tower bolts, magnetic ball catch, hinge etc and all necessary hardware of approved make all complete as per drawing and detail and as per the instructions of the architect. The storages to have a support member of SS brushed steel section as per detail/design/design as provided by the Architect					
	All storage units to have shutters fabricated out of 18mm MDF/ 19mm Commercial Board. All exposed edges to be finshed with 2mm thk PVC edge banding. Double shutters to have 3" SS stoppers on top and bottom of one shutter (inside) and a lock on the other side other than the necessary hardware's.					
	The shelves (nos. as per architects drawings) to be of 19mm thk **block board** finished on both sides with 0.8 mm liner laminate. All exposed edges to be finshed with beading, finished with melamine polish. All shelves to be kept radjustable, using S.S 20mm bats as supports.					
	All laminate fixing to ensure absence of 'bubbles/etc', indicating improper finishing techniques applied; all such instances, if and as/when observed, shall need to be rectified by the appropriate contractor(s), at their sole risk and responsibility					
	All Storages/Counters to be factory finished as per actual dimensions as on site, and fixed on site as per Architects details/Drawings.					
	Cost to include 150mm vertical Splash back in laminate as per detail drawings					
	Elevation area/face area will be considered for measurement					

	Basic Rate of Laminate: Merino Arctic White plain/EQV as selected, matching PVC edge binding from REHAU/Eqv					
1.1	With Visible face including top and shutters finished in 3mm thick Veneer (natural Polish paid for separately)	**sqm**	6.98		₹ 0	
1.2	With Visible face including top and shutters finished in 1mm thick laminate	**sqm**	RO			
1.3	With Visible face including top and shutters finished in MDF/commercial board (finishing with duco paint paid for separately)	**sqm**	7.50		₹ 0	
2	**Undercounter Storage without top**					
	Size: depth of 450mm to 600mm					
	as above, includes all cutout required for Sink etc. BWP ply to be painted with Black japan paint on wall surface					
	Basic Rate of Laminate: Merino Arctic White plain/ EQV, matching PVC edge binding from REHAU/Eqv					
2.1	With Visible face and shutters finished in 3mm thick Veneer + (natural Polish paid for separately)	**sqm**	RO			
2.2	With Visible face and shutters finished in 1mm thick laminate	**sqm**	3.48		₹ 0	
2.3	With Visible face including top and shutters finished in MDF/commercial board (finishing with duco paint paid for separately)	**sqm**	9.83		₹ 0	
3	**Full height storage**					
	Size: 450 – 700 mm deep x 2400 mm high					
	same as Low height storage					
	Laminate: Merino Arctic White plain/EQV, matching PVC edge binding from REHAU/Eqv					
3.1	With Visible face and shutters finished in 3mm thick Veneer (natural Polish paid for separately)	**sqm**	RO			
3.2	With Visible face and shutters finished in 1mm thick laminate	**sqm**	RO			
3.3	With Visible face including top and shutters finished in MDF/commercial board (finishing with duco paint paid for separately)	**sqm**	9.87		₹ 0	
4	**Overhead Storage**					
	Size: 300 – 450mm deep X 750mm high					
	Same as low height storage and rate to be inclusive of all necessary hardware etc.like handles, locks ; tower bolts, magnetic ball catch, hinge etc. of approved make all complete. Rates of overhead storage to be inclusive of light trough below, according to design/details, throughout the running length of the storage.					
	Location: - Above working counter & pantry counter					
	Laminate: Merino Arctic White plain/ EQV, matching PVC edge binding from REHAU/Eqv					
4.1	With Visible face and shutters finished in 3mm thick Veneer (natural Polish paid for separately)	**sqm**	RO			
4.2	With Visible face and shutters finished in 1mm thick laminate	**sqm**	RO			
4.3	With Visible face including shutters finished in MDF/commercial board (finishing with duco paint paid for separately)	**sqm**	24.98		₹ 0	
F	**Full height Shutter**					
1	Providing & fixing shutter along with frame (plyboard) made out of 19mm block board finished with 1.0mm thk laminate from inside. Cost to be inclusive of pre-approved brushed steel handles, SS auto closing hinges, tower bolts, ball catches, multipurpose locks and all necessary hardware all complete as per drawing and detail and as per the instructions of the architect.					
1.1	With Visible face and shutters finished in 3mm thick Veneer (natural Polish paid for separately)	**sqm**	RO			
1.2	With Visible face and shutters finished in 1mm thick laminate	**sqm**	RO			
1.3	With Visible face and shutters finished in 4mm thick MDF (finishing with duco paint paid for separately)	**sqm**	39.60		₹ 0	
2	Extra for cutting V grooves in the veneer or mdf with proper finishing	**Rmt**	100.00		₹ 0	
G	Sourcing and installation of pre finished Jodhpur/Rajasthani doors and frame as selected by the architect basic rate of door + frame = 60,000 Rs	**Nos**	3		₹ 0	
H	Sourcing and installation of pre finished Jodhpur/Rajasthani columns as selected by the architect. basic rate of column = 20,000 Rs	**Nos**	7		₹ 0	
I	Sourcing and installation of pre finished Jodhpur/Rajasthani brackets as selected by the architect. basic rate of column = 15,000 Rs	**Nos**	6		₹ 0	
	TOTAL CARRIED TO SUMMARY				**₹ 0**	
7	**ALUMINIUM and UPVC WORKS**					
A	**Aluminium**					
1	Supply and installation of **powder coated aluminium partition** using profile 63mm x 38mm (1.6mm thick) for framework, 83mm x 45mm with 10mm (fixed) and 6mm (door) clear toughened glass, lock, handle and all necessary hardware.	**sqm**	77.40		₹ 0	
2	Supply and installation of powder cooted aluminium **four track sliding door** in DOMAL profile (Jindal / equilent), 6 mm thick toughened glass alongwith E P D M rubber gasket and all necessary hardware	**Sqm**	12.60		₹ 0	
3	Extra for sandwiching rice paper laser cut in pattern between two 5mm thick toughened glasses	**Sqm**	10.00		₹ 0	
3.1	deduction for toughened glass mentioned above in 1 when using item 1.2 instead	**Sqm**	10.00		₹ 0	

4	Supply and Installation of multitrack sliding system to display artwork on the panels using 19mm thick blockboard in laminated finish + margin on the side, as per architect. Boards to move on 1" G channel, along with sliding runner, having each panel size of 7' x 3'. Extra to be paid for artwork as per actual.	**Sqm**	15.00		₹ 0	
B	**UPVC**					
1	P/F factory made White UN-PLASTICIZED Poly Vinyl Chloride (uPVC) Partitions or Windows/Doors (as per approved list of makes or approved by Architect/ Consultant) at all levels made out of extruded three chambered profile frames with hermetically sealed double glazed glass customized in min 56mm wide system i/c all fittings and fixing at site and sealing of gaps as per the designs & specifications narrated below and as per direction of Engineer-in-charge, all complete.					
	(i) PARTITION PROFILES : All profiles i.e**.** Window outer profile, mullion/transom profile, door outer profile, shutter (sash) profile shall be as per annexure -3 or as pre-approved by architect in charge and these shall be conforming to the relevant standards & passing to relevant tests (DIN/ BS/ IS) as mentioned in technical specifications of contract. All profiles should be 100% lead free					
	(ii) HARDWARE: The profile section should be compatible for double glazing using high quality locking mechanism and stainless steel Friction stays of Grade AISI 304 and other suitable handle and fixtures. The hardware must have cleared 20 days Salt Spray Test as per IS: 9844-1981 guidelines from any testing agency as decided by Engineer-in-charge.					
	(iii) BEADS: The glazing bead profiles must be coextruded with gaskets and confirm to the same test as profiles.					
	(iv) GASKET: The gasket should be made of TPV(thermo plastic vulcanizate)/ EPDM (Ethylene propylene di-monomer)/ Pure Silicone of high quality or as per structural design and approved by architect in charge with double gasket sealing between the outer frame and the shutter (sash) frame.					
	(vi) GI REINFORCEMENT: All the profile sections should be reinforced with GI sheet of min 2mm thickness. the reinforcement must be as per structural design for stability and pre-approved by architect in charge. The reinforcement must have cleared a 20 days Salty Spray Test as per ASTM-B-117 guidelines from any testing agency as decided by Engineer-in-charge.					
	(vii) COUPLERS: Fixed casement window coupler with fixed casement window with min 12 mm wide uPVC with steel reinforcement. Fixed casement window coupler with openable casement door with 12-15 mm wide Aluminium/uPVC section.					
	(viii) INSTALLATION: The window must be aligned in plumb and water level and installed to the window sill using high quality steel fasteners. The outer frame of window and sill must be sealed with silicone based sealants from outside and acrylic paintable sealant from inside. Installation shall be done by manufacturer or skilled contractor. Installation must carry a manufacturing warranty for a period of 10 years against manufacturing defects and 5 years for leak proof installation. Installations shall also include cutting and re-do POP work as necessary on site as per direction of Engineer-In-Charge.					
	(viii) Other Arrangements: The outer frame and shutter frame must have provision of drainage and should included all necessary hardware fittings such as high quality Espangnolette handle and Wedge Block etc. All complete in the pattern as per architectural drawings and as per direction of Engineer-in-charge.					
	a) For Fixed Portion in Windows in DGU (the measurement shall be taken from outer profile to outer profile (L x B) and nothing extra shall be paid for curvature.					
	(b) Extra for openable portion above item No. 1. (a) (The measurement of openable portion shall be measured from outer to outer side for payment.)					
1.1	(a) GLASS: Hermetically sealed double glass insulated unit of 24 mm thickness using 6 mm toughened glass on both sides and 12mm air gap with aluminium spacer having desiccants to prevent condensation. The double glazed glass shall be of high quality Double Glazed Unit (Outer 6mm with Coating Face 2-12 mm Air Gap, Inner. 6mm clear Glass).OR 8mm single glass toughned The colour & spectrophotometric properties of Glass shall be as per clause 11 of Technical Specification or as approved by architect in charge.	**sqm**	30.94		₹ 0	
1.2	(b) GLASS: 6mm toughned single glass. The colour & spectrophotometric properties of Glass shall be as per clause 11 of Technical Specification or as approved by architect in charge.	**sqm**	68.14		₹ 0	
	TOTAL CARRIED TO SUMMARY				**₹ 0**	
8	**FINISHING WORKS**					
A	**Plaster**					
1	Providing and laying plaster to masonry wall, RCC work, beams and columns etc. in cement mortar 1:6 (1 cement : 6 fine (75%) and coarse (25%) sand) finished smooth including hacking the surfaces, scaffolding, curing, making grooves at desired location, fixing chicken wire mesh at dissimilar materials etc. complete as per drawing.					
1.1	10 - 12mm thick	**sqm**	412.50		₹ 0	
1.2	18 - 25mm thick	**sqm**	RO			
2	Providing and laying 6 - 12mm internal **plaster to ceiling** in cement mortar 1:4 (1 cement : 4 fine (75%) and coarse (25%) sand) finished smooth including hacking the surfaces, scaffolding, curing, making grooves at desired location, fixing chicken wire mesh at dissimilar materials etc. complete as per drawing.	**sqm**	50.00		₹ 0	
3	Extra for providing and fixing galvanized chicken wire mesh in strips for crack repair in plaster where required.	**sqm**	100.00		₹ 0	
4	Extra for **neat cement punning**.	**sqm**	RO			
B	**POP Punning**					

1	Providing and applying plaster of paris (super fine quality) punning of 6 to 8mm thickness to be smooth finish in line and level to the entire satisfaction of Project in charge including scraping and hacking the existing finished surfaces, scaffolding etc. complete as per drawing.	**sqm**	RO			
C	**Texture Paint**					
1	Providing and applying two or more coats of exterior grade texture paint on wall surfaces over a coat of primer including surface preparation scaffolding etc complete as per manufacturers specificaton and top surface finished as per requirement of Architect and Project Manager. (Basic Rate @ Rs. 55/Sqft)	**sqm**	RO			
D	**Premium Acrylic Emulsion**					
1	Providing and applying three or more coats of Premium Acrylic emulsion paint, LOW VOC PAINT, as approved by architect-in-charge, and shade to give a smooth finish on new plastered surfaces over a coat of approved primer including the cost of preparing the surfaces with filling materials (putty), along with sand papering wherever required, scaffolding etc. complete.	**sqm**	715.16		₹ 0	
1.1	Over old work (two or more coats)	**sqm**	950.00		₹ 0	
1.2	Extra for scraping off of old coats for repainting	**sqm**	950.00		₹ 0	
E	**Duco Paint**					
1	Providing and applying three or more coats of duco paint of Asian Paints or equivalent as approved by architect-in-charge, and rubbing to give a smooth finish on new and old surfaces over a coat of approved primer including the cost of preparing the surfaces with filling materials (putty), along with sand papering wherever required, scaffolding etc. complete.	**sqm**	103.43		₹ 0	
F	**Enamel Paint**					
	Providing and applying three or more coats of enamel paint of Asian Paints or equivalent as approved by architect-in-charge, and shade to give a smooth finish on new and old surfaces over a coat of approved primer including the cost of preparing the surfaces with filling materials (putty), along with sand papering wherever required, scaffolding etc. complete. (done with machine)	**Sqm**	RO			
G	**Texture Paint**					
1	Providing and applying **Stucco Paint** as per architects choice, appropriate priming of the surface and required coats need to be provided (basic rate 125Rs/sft)	**Sqm**	100.00		₹ 0	
H	Finishing wooden surfaces with **clear laquer polish** of approved brand to give an even shade including preparing and priming surface with filling material etc.	**Sqm**	6.98		₹ 0	
I	Finishing wooden surfaces with 4 coats of **touch wood clear polyurethane polish** including surface preparation and staining to desired shade complete	**Sqm**	RO			
J	**Melamine Polish** on woodwork, 1 or more coats, as approved by architect	**Sqm**	RO			
K	**False ceiling works**					
1	**Gypsum Flase Ceiling**	**sqm**	100.00		₹ 0	
	Providing and fixing Gypsum False Ceiling of which includes G.I.Perimeter Channels of size .55mm thick (having One Flange of 20mm. and another flange of 30mm and a web of 27mm) along with perimeter of ceiling, screw fixed to brick wall / partition with the help of Nylon sleeves and screws at 610mm centres. Then suspending G.I. intermediate channels of size 45mm (0.9mm thick with 2 flanges of 15mm each) from the soffit at 1220mm centres with ceiling angle of width 25mm X 10mm X 0.55mm thick fixed to soffit with G.I. cleat and steel expansion fasteners. Ceiling section of 0.55mm thick having knurled web of 51.5mm and 2 flanges of 26mm each with lips of 10.5mm are then fixed to the intermediate channel with the help of connecting clips and in direction perpendicular to the intermediate channel at 450 mm centres.					
	12.5mm tapered edge Gypboard (conforming to IS 2095-1982) is then screw fixed to ceiling section with 25mm dry wall Philips screws at 230mm centres. Screw fixing is done mechanically with drilling machine with suitable attachment. Finally tapered edges of the Gyp boards are to be jointed and finished so as to have a flush look which includes filling and finishing with jointing compound, paper tape etc complete as per the recommended practices of India Gypsum. Rate to be included all kinds of profiles and cut outs required for light fixtures, Speakers, Smoke detector, trap doors and AC grill in the ceiling also supply and fixing plywood support required in ceiling to fix camera / lights / speakers and light fittings. Please note this includes Providing and fixing lighting, cove height of 50-75mm, with specifications as per item no. 1 to house concealed cove lighting as per the design and detail and all compete to receive paint as in item no. 1 as per the instructions of the architect.					
	Note: Installation should be as per IGL/ St Gobain OR RONDA as per specifications					
2	**Metal Ceiling**					
2.1	**ACOUSTIC CEILING TILE (WHITE)** :- Providing & Fixing of Armstrong Mineral Fibre Acoustical Suspended Ceiling System with Dune Max (Sabbia) COMPLETE.SILHOUTTE" grid and shadow angle of size 600x1600x18mm laid on 24mm hot dipped galvanized steel suspension system. The tile should have thickness of 18mm and humidity resistance of 95% RH, average NRC 0.7, sound attenuation of 20db, light reflectance >84%. Thermal conductivity k= 0.036 w/mk, colour white , fire performance 0/class I (BS-476) Installation to comprise main runner spaced at 1200mm maximum centres. The last hanger at the end of each main runner should not be greater than 450mm from the adjacent wall. Flush fitting 1200mm long cross tees to be interlocked between main runner at 600mm centres to form 1200x600mm module. Perimeter trim to be Armstrong wall angle of size 19x19x3000mm, secured to wall at 450mm maximum centres.	**sqm**	RO			
3	**Sounds Baffles**					

3.1	Providing and hanging **SS Blades Straight 400 x 1800 x 40mm - Traffice white** sound absorbing baffles from the ceiling of armstrong make with required support/hanging system as approved by architect	**Nos**	10		₹ 0	
3.2	Providing and hanging **SS Blades Curved 400 x 1800 x 40mm - Traffice white** sound absorbing baffles from the ceiling of armstrong make with required support/hanging system as approved by architect	**Nos**	10		₹ 0	
L	**Paneling**					
1	Providing and Fixing of **Laminated wooden slats Panelling** for Interior fit outs of approved make over 12 mm thick commercial grade ply in straight and curved shape. Cost to include making cutout to accommodate strip lights.	**sqm**	RO			
2	**Mirror paneling**	**sqm**	7.25		₹ 0	
	Providing and fixing 6mm thk mirror paneling on a 12mm thk WATER GRADE PLY BASE (mirror to be of Saint gobain/Modi make or manufacture, as specified by Architects/Clients). The mirror panel to be hanged on the wall with screws and flattened hooks as per design and mirror to be stuck with silicon/fevicol and detail all complete as per the instructions of the architect.					
3	**Wooden hand printing block paneling**					
	Providing and fixing hand printing wooden blocks (average size 100 x 100mm) with fevicol to on 12mm thick MDF base fixed on backing of gypsum board fixed on the wall. Price per piece of print block is 100Rs	**Sqm**	2.23		₹ 0	
4	**Acoustic Wall Panelling**					
4.1	Providing and fixing **Armstrong Optra Fabric Acoustical Wall panel – 600 x 600mm & 600 x 1200mm** with required fixing system as per architects (price for 2' x 2' and 2' x 4' is the same)	**Nos**	10.00		₹ 0	
M	**Trap Doors**					
1	Providing and fixing Trap doors to house AC ductable units, made out of 50mm x 12.5mm TW frame and 19mm thk marine ply consisting of openable panels. The shutter to be finished in 1.0mm thk laminate of approved shade and color, on inside and outside, and all wooden members shall be finished in melamine polish. Cost to include heavy duty hinge, tower bolts other necessary hardware					
1.1	Size:, 300mmx300mm,	**Nos**	RO			
1.2	Size:, 600mmx600mm,	**Nos**	RO			
1.3	Size: 1200mmx900mm,	**Nos**	2		₹ 0	
N	**Drywall** – G.I Framework for Partitions (48mm) + 12mm MDF	**sqm**	126.33		₹ 0	
	P/F **G.I Frame for Partitions** 48mm Gypsteel Ultra™ C stud (0.5mm thick having one flange of 34mm and another flange of 36mm made of GI Steel) placed at 610mm centre to centre in 50mm Gypsteel Ultra™ floor and ceiling channel (0.5mm thick have equal flanges of 32mm made of GI steel), which is anchored to the floor & true ceiling using suitable anchor fasteners or metal screws with nylon plugs. Gypsteel fixing channel of 99mm width (0.9mm thick having two flanges of 9.5mm each) has to be provided at the horizontal joints of the two boards screw fixed to the studs using metal to metal flat head screws. Hardwood with plywood will be provided as additonal support for taking load of LCD, overhead storage, shelves, fix door frames, skirting etc whereever required. GI Framwork will be cladded with two layers of 12 mm gypsum on oneside and one layer of gypsum and 1 layer of ply/ MDF on otherside.					
	Glass Wool Insulation - Providing and placing 50 mm thick glass wool insulation of 32 kg/ cum. density neatly packed in black fleece bag (Non Woven Tissue) bags of various sizes and shapes,bags shall be fully stiched all round with 25 mm double leaf fold, sealing the rockwool fibre fully. The bags to be stuffed in the cavities of Gyp. partitions from floor up to RCC slab above, cross stiched from one side with GI frame work of partition by 24 g GI wire to keep bags in possition. Suggested Brand : Twiga / Eqv					
	MAKE: St Gobain - Gyproc / RONDA					
	Do as above but instead of MDF skin use double skin of gypsum sheet on bothside for above false ceiling partitions,including Glass wool insulation	**sqm**	RO			
O	**Pelmets**	**rmt**	25.00		₹ 0	
	Providing & fixing pelmet size of 150 x 150 for projector in 19mm blockboard finished with 4mm gypsum as per architects design/details/ instructions. Cost to include framework for mounting pull down screen / as required, all complete					
	TOTAL CARRIED TO SUMMARY				**₹ 0**	
9	**FURNITURE AND FURNISHING**					
A	**Furniture to be made**					
1	**Tables**					
1.1	**2 Seater Conference Room Table** of size 1300 x 650mm, made using 19mm thick commercial plyboard finished with 3mm thick veneer as selected by architect. The outer edge (outer, longer, one side only) of the table to be decorated with wooden hand print block fixed upright on the table of width not exceeding 100mm (block basic rate 100rs/ block). Modesty board made of plywood finished with veneer as above, design as per architect. The Frame + legs of the table to be made of cp teak finished size 1.5" x 2" including the angled footrest. The table to be finished with natural look melamine polish.	**Nos**	12		₹ 0	

1.2	**1 Seater Conference Room Table** of size 650 x 650mm, made using 19mm thick commercial plyboard finished with 3mm thick veneer as selected by architect. The outer edge (outer, longer, one side only) of the table to be decorated with wooden hand print block fixed upright on the table of width not exceeding 100mm (block basic rate 100rs/ block). Modesty board made of plywood finished with veneer as above, design as per architect. The Frame + legs of the table to be made of cp teak finished size 1.5" x 2 including the angled footrest. The table to be finished with natural look melamine polish.	**Nos**	4		₹ 0	
1.3	**Reception table of size 1500 x 600mm** made of commercial ply board finished with veneer of architects choice and natural polish. Foot rest to be given in the table, as per design. top to be rested on sides of the table made with commercial plyboard finished with veneer on the outside. No Modesty board, but front to be covered using teak sleepers size 4" x 1.5" stacked one over the other and fixed to each other to a height of 40 inches. As per design and finished with natural polish. Basic rate of teak (2000Rs/Cft)	**Nos**	1		₹ 0	
1.4	**Director room tables of size 1500 x 750mm** made using 19mm thick commercial plyboard finished with 3mm thick veneer as selected by architect. The outer edge (outer, longer, one side only) of the table to be decorated with wooden hand print block fixed upright on the table of width not exceeding 100mm (block basic rate 100rs/block). The Frame + legs of the table to be made of cp teak finished size 1.5" x 2" including the angled footrest. The table to be finished with natural look melamine polish.	**Nos**	4		₹ 0	
B	**Furniture to be purchased**					
1	**Tables + equiptment**					
1.1	Godrej Workstations 1200 x 600mm (same as existing, basic rate - 30,222Rs)	**Nos**	28		₹ 0	
1.2	Extra for Godrej Keyboard tray 480 x 280 x 40mm (same as existing, basic rate - 1,155Rs))	**Nos**	28		₹ 0	
1.3	Extra for Godrej Pedestal 646 x 390 x 440mm (same as existing, basic rate - 5,562 Rs)	**Nos**	28		₹ 0	
1.4	Cafeteria Table **–** 1.3 x 0.8M, Table top: Particleboard, Ash veneer, Stain, Clear acrylic lacquer, Underframe: Solid pine, Solid birch, Adhesive, Ash veneer, Stain, Clear acrylic lacquer, Leg: Particleboard, Adhesive, Ash veneer, Stain, Clear acrylic lacquer. Ikea or equivalent. Basic Rate – 12,990	**Nos**	2		₹ 0	
1.5	Breakout space centre table – 750mm diameter, Wood : Solid Sheesham Wood. Legs made of Rust-proof premium metal. (Basic Rate 11,999 Rs) SARAF Furniture MG road or equivalent	**Nos**	5		₹ 0	
1.6	Breakout space side table – 460mm diameter, Wood : Solid Sheesham Wood. Legs made of Rust-proof premium metal. (Basic Rate 5,499 Rs) SARAF Furniture MG road or equivalent	**Nos**	3		₹ 0	
1.7	Director room side tables – 470mm diameter, Wood : Solid Sheesham Wood. Legs made of Rust-proof premium metal. (Basic Rate 8,799 Rs) SARAF Furniture MG road or equivalent	**Nos**	6		₹ 0	
1.8	DG room centre table - 600mm diameter, Solid Sheesham Wood. Legs made of Rust-proof premium metal. (basic rate of table - 9,999 Rs) SARAF Furniture MG road or equivalent	**Nos**	1		₹ 0	
2	**Chair**					
2.1	Godrej Thrive high chair with headrest (check existing on site, basic rate - 14,670) for workstation employees.	**Nos**	7		₹ 0	
2.2	Godrej Ace high chair with headrest and coat hanger (check existing on site, basic rate - 14,670Rs) – For directors	**Nos**	5		₹ 0	
2.3	Fixed Leatherite chair (check existing on site, basic rate - 9,599Rs) – for director visitor	**Nos**	3		₹ 0	
2.4	Staff room chair – circular fixed chair with leatherette seat and metal frame (check existing on site)	**Nos**	3		₹ 0	

2.5	Director Guest chairs + DG visitor + DG meeting Area, made of reclaimed teak wood, upholstery as per architect. basic rate 18,000 Rs. Green Territory, Jodhpur or equivalent.	**Nos**	20		₹ 0	
2.6	Handmade jute fabric finish stool with wooden legs, basic rate (Jaypore or equivalent) – 4399Rs	**Nos**	21		₹ 0	
2.7	Cafeteria chairs – Rattan back Chair with chair pad, white frame + legs (rattan white/ Laila natural) basic rate – 7,500Rs Ikea or equivalent	**Nos**	10		₹ 0	
2.8	Conference room chair, made of reclaimed teak wood, upholstery as per architect. basic rate 18,000 Rs. Green Territory, Jodhpur or equivalent.	**Nos**	34		₹ 0	
C	**Furniture to be Refurbished**					
1	**Sofas**					
1.1	Re-upholster existing sofas, change fabric only (basic rate fabric = 300rs/mtr)	**Seat**	14		₹ 0	
1.2	Re-upholster existing sofas, change fabric and foam (basic rate fabric = 300rs/mtr)	**Seat**	RO			
D	**Artwork**					
1	Gond Art to be made by artist on canvas mounted on wooden frame(stretcher bars), basic rate of artist with painting material is 10000 Rs/Sqm	**Sqm**	35.00		₹ 0	
E	**Carpets and Rugs**					
1	**Kashmiri Carpet,** buying and laying Kashmiri carpet as per architects choice, average size 5’ x 8’ basic rate 1,50,000 Rs per piece	**Nos**	2		₹ 0	
2	**Jaipur Rugs,** buying and laying Jaipur Rugs as per architects choice, average size 5’ x 8’ basic rate 15,000 per piece	**Nos**	5		₹ 0	
F	**Curtains and Blinds**					
1	**Roller Blinds (REGULAR BLINDS)**	**Sqm**	21.09		₹ 0	
	Providing & fixing roller blinds comprising of polymer coated fibre fabric with minimum openness factor of 3% as per AS standards. The fabric shall be fire retardant and have high heat reflection ratios. The roller mechanism shall be a moulded unit made from engineering grade plastic polymer with steel spring support. The fabric shall be finished on the sides with edge tape duly welded for waviness control. The fabric shall be attached to the roller tube with high quality self adhesive tape.					
	make: Green Screen - Mac, Rosselle, Walltract, Vista as selected					
2	**Bamboo/Chic Blinds**					
	Providing & fixing bamboo roller blinds. The roller mechanism shall be a moulded unit made from engineering grade plastic polymer with steel spring support. The blind shall be finished on the sides with edge tape duly welded for waviness control. As approved by architect	**Sqm**	21.09		₹ 0	
	TOTAL CARRIED TO SUMMARY				**₹ 0**	
10	**MISCELLANEOUS**					
A	**Toughened Glass Partition for Urinals**					
	Providing and fixing 12mm think toughened frosted glass partitions and fixed to the wall of max size 1200 x 600mm.	**Nos**	2		₹ 0	
B	**Evacuation Signage**	**Nos**	4		₹ 0	
	Providing and Fixing evacuation signage plan on coated paper of size 450mmx600mm and framing it all around with a glass cover					
C	**Graphic panels (Installed area to be measured and paid for)**					
	On solid surfaces	**sqm**	10.00		₹ 0	
	Opaque graphic film in vinyl of about 2 mil thickness in solid colours for decorative applications. Cost to include color printing, design & installation, designing and samples , drafts for client approvals all complete as per design detail					
	Make - 3M					
D	**Text cut out of vinyl**	**sqm**	10.00		₹ 0	

	Providing and fixing colored Text as per approved design of 3M film over painted / glass partitions as per detail and instructions of the architect.Cost to include color printing, design & installation, designing and samples , drafts for client approvals all complete as per design detail					
	Make - 3M					
E	**Frosted Film**	**sqm**	22.50		₹ 0	
	Providing and fixing frosted film make film on Glass Partition with MCS warranty of 5 years as per the manufacturer specification. (Finished works to be measured as smt). To include cost of printing & designing, samples and drafts approvals					
	Approved make: 3M					
F	**Planters**					
	Purchasing planters as per architects choice, basic rate of planters 3000Rs	**Nos**	20		₹ 0	
G	**Chair Lift**					
	Providing and fixing chair lift with appropriate wood + MS railing on 4th floor for 2 steps at the reception area. Basic rate of lift 1,25,000	**Nos**	1		₹ 0	
	TOTAL CARRIED TO SUMMARY				**₹ 0**	

Electrical, LV Works, and Equiptments					
S. No.	**SUMMARY**				**AMOUNT**
A	**LIGHT AND SOCKET OUTLET POINT WIRING**				**₹ 0**
B	**CONDUITS AND MS FLOOR RACEWAYS CHANNELS FOR STRUCTURED CABLING/ LV SERVICES**				**₹ 0**
C	**MAIN LT & HVAC DISTRIBUTION PANELS + SUB-DITRIBUTION BOARDS (DB'S)**				**₹ 0**
D	**MAIN CABLES & SUBMAINS**				**₹ 0**
E	**PUBLIC ADDRESS SYSTEM PA**				**₹ 0**
F	**40 KVA UPS**				**₹ 0**
G	**PASSIVE IT (DATA / LAN) & WIFI.**				**₹ 0**
H	**SUPPLY OF LIGHTING FIXTURES & FANS (Projected)**				**₹ 0**
I	**DALI LIGHTING CONTROL (LUTRON)**				**₹ 0**
J	**FIRE ALARM & SMOKE DETECTION**				**₹ 0**
K	**CCTV**				**₹ 0**
L	**AV & CONFERENCE ROOM WITH AUTOMATION**				**₹ 0**
	GRAND TOTAL				**₹ 0**
	NOTE: Rates are exclusive of all taxes & duties.				
S. No.	**DESCRIPTION**				**AMOUNT**
A	**LIGHT AND SOCKET OUTLET POINT WIRING**				
	The rates for point wiring for all the items shall include the following :				
a	The Point Wiring shall include the wiring of light / outlets of any length from the distribution board via Ocupancy Sensor / Via Switch to the to first point (Primary Point)				
b	All the switch boxes, outlet and junction boxes shall be covered with **White Polycarbonate modular cover plate.**				
c	Painting of junction boxes .				
d	Embedding conduits and allied fittings in walls/floors/ slabs etc. during construction and/or in chases including cutting chases and making good as necessary in the case of concealed conduit work.				
e	All accessories necessary to complete the wiring as specified.				
f	Internal wiring between accessories.				

g	Wherever flexible conduit are required GI flexible conduit of suitable size shall be used with checknut.				
1)	Wiring including termination for the following light points/ Ceiling Fans & Exhaust Fans with 3 x 1.5 sq. mm PVC insulated FRLS **copper** conductor wires of 650/1100 Volts grade in concealed/exposed Heavy Duty PVC FRLS conduits of suitable dia (Minimum 20 mm) including providing 6 amp flush type switches,anodized MS box for housing switches **White Polycarbonate modular** cover plate for switch of approved make complete with boxes and earthing. All the circuit must be dressed with circuit identification tags.				
a.	First point controlled by one no. 6 amp 2 way switch.	Nos.	15		₹ 0
b.	First point controlled by MCB. (Cost of MCB not included) Light Points on DALI Circuit Loop.	Nos.	25		₹ 0
c	Same as item No. 1 above but **LOOP** POINT i.e. wiring including termination of point looped from first point with 3 x 1.5 sq. mm PVC insulated FRLS **copper** conductor wire of 650/1100 volt grade in concealed/exposed Heavy Duty FRLS PVC conduit and earthing (controlling switch in item no.1.a) Light Points on Dali Circuit Loop / Switch Control)	Nos.	80		₹ 0
2)	Wiring including termination for the following light points with 3 x 1.5 sq. mm PVC insulated **copper** conductor FRLS wires of 650/1100 Volts grade in concealed/ exposed Heavy Duty FRLS PVC conduits and controlled by 6/10 amp MCB, complete as required including earthing and as per specifications. (The cost of MCB has been taken elsewhere in the tender).(For Emergency Lighting). All the circuit must dressed with circuit identification tags				
a.	**One** point controlled by 6/10A MCB	Nos.	4		₹ 0
b	Same as item (a) above but LOOP POINT i.e. wiring including termination of point looped from first point with 3 x 1.5 sq. mm PVC insulated copper conductor FRLS wire of 650/1100 volt grade in concealed/exposed Heavy Duty FRLS PVC conduit (controlling MCB and earthing. (For Emergency Lighting)	Nos.	20		₹ 0
3)	Wiring including termination for 6 amp Switch / Socket outlet point with 3 x 1.5 sq. mm PVC insulated FRLS **copper** conductor wires in concealed/exposed Heavy Duty FRLS PVC conduits or existing raceways including providing 6 amp switch,3 pin 6A shuttered socket,anodised MS box for housing switches sockets, approved White Polycarbonate modular cover plate and earthing. (Independent Utility Points Units on Walls / Room Partitions in Meeting Rooms/Conference Rooms/ Toilets etc and for AC Indoor Units .Max 4 Sockets on 1 Ckt) Cost to include Circuit wire from DB to points.	Nos.	25		₹ 0

4)	Wiring including termination for set of 2 Nos. 6 amp Switch / Socket outlet point with 3 x 1.5 sq. mm PVC insulated FRLS **copper** conductor wires in concealed/ exposed Heavy Duty FRLS PVC conduits or existing raceways including providing 6 amp switch,3 pin 6A shuttered socket,anodised MS box for housing switches sockets, approved White Polycarbonate modular cover plate and earthing. (Independent UPS Points Units on Walls / Room Partitions Max 2 Sets of Sockets on 1 Ckt)	Nos.	R/O		
5)	Wiring including termination for 16 amp power socket outlet points with 2 x 4 sq. mm PVC insulated FRLS copper conductor wires of 650/1100 Volts grade in concealed/exposed Heavy Duty FRLS PVC conduits or existing raceway as called for including providing 16 amp flush type combined 6 pin shuttered sockets and switches, anodisedMS outlet boxes for 16 A 6 pin sockets and switches,approved **White Polycarbonate modular** cover plate and earthing with 4 Sq.mm. PVC insulated copper conductor FRLS wire.(Two Outlets can be connected on I Ckt)) All the circuit must dressed with circuit identification tags (Utility Points)	Nos			₹ 0
6)	Wiring including termination for 16 amp power socket outlet point with 2 x 4 sq. mm PVC insulated FRLS **copper** conductor wire of 650/1100 Volts grade in concealed/exposed Heavy Duty FRLS PVC conduits or in exisiting racewayincluding providing 16 a*mp flush type combined 6 pin shuttered socket and swit*ch,anodised MS boxes for 16 amp 6 pin socket and switch, approved **White Polycarbonate modular** cover plate and earthing with 4 Sq.mm. PVC insulated copper conductor FRLS wire (Only one outlet shall be connected to each circuit). All the circuit must dressed with circuit identification tags (TOILET GEYSER / KITCHEN / PANTRY POWER	Nos	30		₹ 0
7)	Supplying and fixing of 20 amp 1-phase industrial socket outlet including supplying FR thermo plasted moulded boxes of suitable size, Including 10 amp DP MCB and a Industrial plug top, complete as required and as per specifications.**(For Server Room Rack)**	Nos	2		₹ 0
8)	Supplying and fixing of the following 1 / 3 Phase enclosure, FR thermo plastic moulded boxes of suitable size, including suitable 1 / 3 Phase DP **MCB** and complete as required and as per specifications. (HVAC & TFA OUT DOOR / INDOOR UNITS) **IP 65**	Nos			.
a	16 amp 4 Pole (3.8 tr Split AC ODU + TFA & VRF 6.36 TR INDOOR UNITS).	Ea	8		₹ 0
b	40 amp 4 Pole (VRF ODU 14HP X 2 + TFA ODU 16 HP X 1)	Ea	3		₹ 0
c	20 AMP DP (1.8 TR & 1.5/1 TR SP ODU)	Ea	14		₹ 0
9)	Wiring including termination for the following configuration of outlets for workstations with **3 core x 2.5 sq.mm**. Copper conductor ,PVC insulated PVC sheathed wires of 650/1100V grade in existing conduit/raceway NOTE :- Colour coding shall be strictly followed for wiring. For Raw in one circuit maximum FOUR workstations shall be looped and for UPS in one circuit maximum TWO workstations shall be looped. All the circuit must dressed with circuit identification tags (**Note :- This item is only for Commercial Office Work Station Points.**	Rm	900		₹ 0

6)	Supply & Installation of the following Switch Socket Combinations in Work Stations / Meeting Room Table Cubby's.				
a)	1 Nos. 6, **universal socket outlets** controlled by 1 no.6A switch .(Raw power at **W/S) Note :- This item is only for Office Work Station Points.**	Nos	70		₹ 0
b)	2 No. 6A, **Universal outlets** controlled by 1 No. 6A switch (UPS power W/S) Note :- **This item is only for Commercial Office Work Station Points.**	Nos	70		₹ 0
	Total carried over to Summary				**₹ 0**
B	**CONDUITS AND MS FLOOR RACEWAYS CHANNELS FOR STRUCTURED CABLING/ LV SERVICES**				
S.No	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
1)	Supplying and fixing in position MS anodised box for data/voice outlet suitable for fixing of RJ 45 jack complete as required.(For Data/voice)	NOS	10		₹ 0
2)	Supplying and fixing in position following sizes of Heavy Duty FRLS conduits including providing all accessories concealed/ exposed as required.				
a.	25 mm dia conduit (For Data/Voice/PA/CCTV/TV/AV wiring) complete with all fixing accessories	RM	1200		₹ 0
b.	32 mm dia conduit (For Data/Voice wiring) complete with	RM	100		₹ 0
c.	40 mm Dia Conduit	RM	100		₹ 0
d.	50 mm Dia Conduit	RM	100		₹ 0
3)	Supply and fixing of following sizes of **MS Painted** channels (Raceways) 14 gauge, with openable cover, with all accessories as required including junction boxes, orange colour for power and blue colour for data, in floor including chissiling of the floor and making good the same as per manner complete as required. **Required junction boxes will be provided for smooth pulling of structured and power cabling.It will be the responsibility of the contractor to coordinate with structured cabling contractor for laying of cable.**				
a.	150 mm x 40 mm	RM	50		₹ 0
b.	100 mm x 40 mm	RM	100		₹ 0
4)	Supply and fixing in position MS anodised box for T.V. outlet including white poly carbonate modular cover plate and co-axial type T.V. socket outlet complete as required.	NOS	4		₹ 0
5)	Supply , drawing,termination of RG-6 co-axial cable for TV in existing conduit complete as required. (From Point upto LV Shaft near Stairwell). Note :- Dish & Suitable cabling from dish to the LV shaft to beprovided by TV Vendor including all necessary joints/splitterspower boosters etc - Clients Scope)	RM	100		₹ 0
	Total carried over to Summary				**₹ 0**

C	**MAIN LT PANELS + SUB DISTRIBUTION BOARDS RAW & UPS**				
S.No	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
1)	Design, manufacture, testing at works, supply and delivery including supervision during installation testing & commissioning of 2 mm thick MS sheet steel fabricated cubicle type Panel dust and vermin proof complete with hinged and lockable doors. All the panels shall be floor mounted and dead front construction complete with interconnections by copper tapes/ wires and painting.				
	All MCB,s shall be C curve type, except UPSDB in which MCB shall be D curve type.				
a.	**MAIN LT DISTRIBUTION PANEL.**	Each	1		₹ 0
	Incoming				
	1 No. 250 A FP MCCB, 36 KA service breaking capacity, complete with required extended rotary handle and suitable spreader links as required alongwith				
	Indicating Panel				
	The Indicating panel of incomer shall be provided with the following :				
i.	Multifunction meter for V,A, KWHr, HZ, P, KVAr and equivalent to EM6436 with CT's (250/5A , CL1 5VA Type Resin Cast) and RS 485 communication port.				
ii.	3 Nos. phase indicating lamps; backed up with MCB.				
iii.	One Set of ON / OFF indication lamps				
	Bus Bar				
	1 No. 250 amp TPN **Al** Bus bar of suitable length with current density of 1.3 sq.mm/amp.				
	Outgoing				
	All MCCB outgoing feeders shall be provided with ON indication lamp.				
a	1 Nos. 200 amp TP MCCB of 25 KA service breaking capacity & Trip setting as required ,with heavy duty solid neutral link (FOR AC PANEL) Complete with suitable extended rotary handle and spreader links.				
b	1 Nos. 100 amp TP MCCB of 25 KA service breaking capacity & Trip setting as required ,with heavy duty solid neutral link (For UPS) complete with extended rotary handle and suitable spreader links as per requirement.				
c	3 Nos. 63 A FP MCB,10 KA breaking capacity LIGHTING/POWER DB'S.				
a.	**MAIN HVAC DISTRIBUTION PANEL.**	Each	1		₹ 0

	Incoming				
	1 No. 200 A FP MCCB, 36 KA service breaking capacity, complete with required extended rotary handle and suitable spreader links as required alongwith				
	Indicating Panel				
	The Indicating panel of incomer shall be provided with the following :				
i.	Multifunction meter for V,A, KWHr, HZ, P, KVAr and equivalent to EM6436 with CT's (250/5A , CL1 5VA Type Resin Cast) and RS 485 communication port.				
ii.	3 Nos. phase indicating lamps; backed up with MCB.				
iii.	One Set of ON / OFF indication lamps				
	Bus Bar				
	1 No. 250 amp TPN **Al** Bus bar of suitable length with current density of 1.3 sq.mm/amp.				
	Outgoing				
	All MCCB outgoing feeders shall be provided with ON indication lamp.				
	40 AMP TPN MCB + 40 A 4 POLE RCCB 100 Ma	3			
	25 AMP TPN MCB + 25 A 4 POLE RCCB100 Ma	8			
	25 AMP DP MCB + 25 A 2 POLE RCCB 100 Ma	14			
2)	Supplying, installing in position, testing and commissioning of the following Distribution Boards made of 18 gauge powder coated MS sheet steel , wall mounted/fully recessed in wall, indoor industrial type, with dust **& vermin** proof, hinged and lockable doors,double door design, complete with inter connecting wires of proper guage, aluminium coated copper thimbles and with the circuit identification tags. Incomer MCB to each ELCB along with earthing terminal. The DB shall be suitable for taking cable/conduit as incoming/outgoing.All MCB to be C curve unless specified otherwise				
a	12 way TPN DB with 30 Nos of 10/20 amps SP MCB's i.e. 10 Nos. of 10/20 amp SP MCB's arranged in 3 rows arranged in 3 tier one above other and controlled by 1 No. 63 amp FP MCB and neutral link. Each row of MCB's shall be provided with 32 amp DP ELCB of 100mA sensitivity. **(For Raw Lig., Pow.)**	EACH	2		₹ 0
b	12 way TPN DB with 30 Nos of 10/20 amps SP MCB's i.e. 10 Nos. of 10/20 amp SP MCB's arranged in 3 rows arranged in 3 tier one above other and controlled by 1 No. 63 amp DP Isolator and 3 Nos. 32 amp DP RCCB 30 Ma sensitivity and neutral link. **All MCB to be D curve**	EACH	2		₹ 0
	TOTAL CARRIED TO SUMMARY				**₹ 0**

D	MAIN CABLES & SUBMAINS				
S.No	Description	Unit	Qty	Rate	Amount
1)	Supplying, unloading, storing , laying, testing and commissioning including end termination of following sizes XLPE insulated (Heavy duty) **Alluminium / Copper** conductor cables suitable for working voltage upto and including 1100 Volts, laid and tied on existing overhead cable trays; or laid and tied over MS supports in masonry trenches including providing MS supports and clamps for fixing to supports in an approved manner complete as required and as per specifications. **Circuit identification tags made of Aluminium / Steel should be attached with the concerned cable alongwith the test report of following sizes of cable to be submitted by the contractor at the time of delivery of material at site**				
a	3.5 x 95 Sq.mm Al.Ar. (Main Panel to HVAC Panel on Terrace)	Mtrs	20		₹ 0
b	4 x 10 Sq.mm Al.Ar (HVAC Panel to VRF/TFA ODU)	Mtrs	45		₹ 0
c	4 x 6 Sq.mm Al.Ar (HVAC Panel to 3.8 Tr. Split ODU + VRF & TFA Indoor Units)	Mtrs	120		₹ 0
d	2 x 4 Sq.mm Cu.Ar (HVAC Panel to Single Phase Split AC ODU)	Mtrs	210		₹ 0
e	8 SWG GI Loose wire (Earth x 2 to travel with each of the above cabes from Main HVAC Panel to each 3 Phase ODU & Earth x 1 for the Single Phase ODU)	Mtrs	580		₹ 0
2)	Supplying , drawing,termination of the following size of PVC insulated FRLS copper conductor wires 650/1100 V grade in existing conduits, complete as required and as per specifications.				
a.	4 x 10 sq. mm PVC insulated copper conductor earth wire along with 2 runs of 6 sq.mm. PVC insulated copper conductor wire.(SUBMAINS FOR LIGHT/POWER DB'S FROM MAIN LT PANEL)	RM	60		₹ 0
b	2 x 10 + 1 X 6 sq. mm PVC insulated copper conductor wire.(SUBMAIN FOR SERVER ROOM UPS 5 KVA FROM MAIN LT PANEL)	RM	25		₹ 0
	TOTAL CARRIED TO SUMMARY				**₹ 0**
E	**PUBLIC ADDRESS SYSTEM (PA)**				
S.NO	**Item Description**	**Units**	**Qty.**	**Rate**	**Total price**
	MAKES - HONEYWELL				
1	SITC **(Honeywell) 240 W Mixer Amp**	Nos.	1.00		₹ 0
2	STIC Goose Neck Standalone Call Station of 8 preset buttons and 8 configurable buttons,	Nos.	1.00		₹ 0
3	SITC of 1.5/3/6W Ceiling Speaker complete with ceiling surface mount back box.(Honeywell HNCL06 or Equivalent)	Nos.	20.00		₹ 0
4	SITC for Volume Control for Cabins	Nos.	10.00		₹ 0

5	SITC of Wiring including terminations of 2 core 1.5 mm PVC insulated copper conductor wires in existing conduit/ trunking / Raceway as required.	RM	500		₹ 0
	TOTAL CARRIED TO SUMMARY				**₹ 0**
F	**40 KVA UPS**	**Uniy**	**Qty**	**Rate**	**Amount**
1	**40 kva Online UPS with Unity Power Factor , Efficiency above 95%, THDI >4% (15 Minutes back up)**	Nos	1.00		₹ 0
2	Battery 12v 42 AH	Nos	40.00		₹ 0
3	Rack and Links + Breaker with UV/OV Coil and auxilary contact and DC Cables.	Set	1.00		₹ 0
	TOTAL CARRIED TO SUMMARY				**₹ 0**
G	**PASSIVE IT DATA / LAN / WIFI / TELEPHONE**				
S.No	**Description**			**Supply & Installation**	
		Unit	**Qty**	**Rate (INR)**	**Amount (INR)**
	Average Length: 28Mtr				
	DATA & VOICE HORIZONTAL COMPONENTS (CAT-6)				
	Rack Side				
1	4-pair, Cat6 UTP LSZH Cable, roll of 305m	Box	15		₹ 0
2	AngleFlex Patch Panel - KeyConnect,24-port, 1U, Black (Empty)	Nos	9		₹ 0
3	Cat6+ Modular Jack (Including T Bar), Keyconnect, Unshielded, Blue **[Blue For Data]**	Nos	74		₹ 0
4	Cat6+ Modular Jack (Including T Bar), Keyconnect, Unshielded, Yellow**[Yellow for Voice]**	Nos	70		₹ 0
5	Cat6+ Modular Jack (Including T Bar), Keyconnect, Unshielded, Red **[Red for Redundant]**	Nos	34		₹ 0
6	Cat 6 UTP LSZH Stranded Patch Cord, Gray, 2Mt, X-Stand for color **[2Mtr Blue for Data]**	Nos	74		₹ 0
7	Cat 6 UTP LSZH Stranded Patch Cord, Gray, 2Mt, X-Stand for color -**[2Mtr Yellow for Voice]**	Nos	70		₹ 0
	User End				
8	Cat6+ Modular Jack (Including T Bar), Keyconnect, Unshielded, Blue **[Blue For Data]**	Nos	74		₹ 0
9	Cat6+ Modular Jack (Including T Bar), Keyconnect, Unshielded, Yellow**[Yellow for Voice]**	Nos	70		₹ 0
10	Cat6+ Modular Jack (Including T Bar), Keyconnect, Unshielded, Red **[Red for Redundant]**	Nos	34		₹ 0
11	Cat 6 UTP LSZH Stranded Patch Cord, Gray, 2Mt, X-Stand for color **[2Mtr Blue for Data]**	Nos	74		₹ 0
12	86×86 key connect, Single Port, 6C, UK style faceplate (white), Shuttered	Nos	2		₹ 0
13	86×86 key connect, Double Port, 6C, UK style faceplate (white), Shuttered	Nos	38		₹ 0
14	86×86 key connect, Quad Port, 6C, UK style faceplate (white), Shuttered	Nos	34		₹ 0
	For Wi-Fi				
15	4-pair, Cat6A U/UTP LSZH Cable, roll of 305m	Box	1		₹ 0
16	REVConnect 10GX Jack, Single Pack (with Core)Keyconnect, Unshielded, Blue	Nos	6		₹ 0
17	REVConnect 10GX Jack, Single Pack (with Core)Keyconnect, Unshielded, Blue-RJ-45 Connector	Nos	6		₹ 0
18	Cat 6A UTP LSZH Stranded Patch Cord,, 2Mt, X-Stand for color	Nos	6		₹ 0
	Riser And its Accessories				
19	50 Pair Riser Cable Un-armoured **(we are considering MDF box will mount in server Room)**	Mtr	15		₹ 0

20	100 Pair MDF Box with disconnect module **[for Resource side]**	Nos	1		₹ 0
21	AngleFlex Patch Panel - KeyConnect,24-port, 1U, Black (Empty)	Nos	3		₹ 0
22	Cat6+ Modular Jack (Including T Bar), Keyconnect, Unshielded, Yellow**[Yellow for Riser]**	Nos	70		₹ 0
	Miscellaneous Item & Local Material				
23	Miscellaneous Item(Ferrule & Labelling, Velcro tie, PVC tie)	Set	1		₹ 0
24	3x3 PVC Gang box	Nos	10		₹ 0
	45UOpen Network Rack				
25	**Single BAY RACK AL S34 45U/19W BLACK** Bay Rack will comprise of Aluminum vertical post, with pre tapped holes and "U" marking, one Pair of Base Plate and one pair of top channels and corresponding hard wares to assemble the Rack. Open frame architecture for all-round accessibility. Modularity : Easy to couple	Nos	1		₹ 0
	HIGH DENSITY MGR, 45U HEIGHT, 8"Width /18"D with Top & Bottom welded frame, One Pair of Vertical Channels fitted with fingers. Front and rear steel door with central lock, and related hardware. The doors are provided with two way operated locking mechanism, which ensure the door opening on both ways (Left to right /right to left), convenient for the cable installer. No necessary to remove the doors from the cabinet while cabling. Front and Back Cable Routing Paths, Address overhead or under raised floor cabling . Fingers to Support heavy cable bunches, Fingers congruent to “U” Spacing, Intermediate sections for Cable Support .Easy to Install Equipment :	Nos	2		
	RUNWAY JOINING BKT RIGHT ANGLE	Nos	1		
	RUNWAY MOUNTING KIT	Nos	1		
	LADDER CLOSING BKT	Nos	1		
	WALL BKT SET OF 2	Nos	1		
	GROUTING BOLT M10x100 SET OF 4	Nos	1		
	HARDWARE PKT OF 20NOS	Nos	4		
	Cantilever tray	Nos	1		
	CABLE RUNWAY, 1 METER	Nos	2		
	PDU HORIZONTAL 5X15AMP WITH 6 SOCKET WITH 16AMP MCB AND INDICATOR WITH 3MTR CABLE	Nos	1		
	Installation				
1	Laying & pulling of 4 pair utp cable	Mtrs.	5490		₹ 0
2	Laying of 50 pair riser cable	Mtrs.	15		₹ 0
3	Termination of I/O from workstation side	Nos	178		₹ 0
4	Fixing and labelling of 24Port unloaded patch panel	Nos	12		₹ 0
5	Termination of I/O from Rack side	Nos	248		₹ 0
6	Ferruling and labelling and bunching of copper nodes	Nos	178		₹ 0
7	Fixing and labelling of Faceplate and gang box	Nos	74		₹ 0
8	Penta Scanning testing of existing copper nodes	Nos	178		₹ 0
9	Fixing and dressing of 45U open network rack	Nos	1		₹ 0
10	Termination and labelling of 100Pair MDF box	Nos	1		₹ 0
11	Documentation charges	Nos	1		₹ 0
12	Certification Charges	Nos	1		₹ 0
13	Project Management charges	L/S	1		₹ 0
	TOTAL CARRIED TO SUMMARY				**₹ 0**

H	**PROVIDING & INSTALLATION OF LIGHTING FIXTURE AND CEILING FANS / EXHAUST FANS. ALL FIXTURES TO BE 4000 K**	Unit	Qty	Rate	Amount
1	Linear Suspended light 1000/1200 mm x 50 MM W 24-30 W / Mtr complete with all required suspending system and straight connectors to join two or more fixtures as per site requirement and **DALI DRIVER.** (ABOVE WORK STATIONS HALL AREA)	Nos	35		₹ 0
2	Linear Recessed light 1000/1200 mm x 50 MM W 24-30 W / Mtr complete with all required suspending system and required L joints to form rectangular formation as per site requirement and **DALI DRIVER.** (RECESSED IN FALSE CEILING IN CONFERENCE ROOMS / DIRECTOR GENERALS CABIN)	Nos	25		₹ 0
3	12 W Surface mounted (on True Ceiling) Cylindrical or Square and 110/27 (APPROX) (TOILETS / CALLING BOOTHS / STORES / STAIRCASE LANDINGS / PEON STAFF ROOMS / JANITOR ROOM / SERVER ROOM)	Nos.	50		₹ 0
4	12/15 W Recessed adjustable angle .80/100 mm dia with DALI DRIVER	Nos	35		₹ 0
5	36 W 400 Dia x 57 Deep Suspended with acrylic translucent diffuser with DALI DRIVER (EXECUTIVE CABINS WITHOUT FALSE CEILING / RECEPTION)	Nos.	14		₹ 0
6	480 MM Exhaust Fan with Louvers	Nos.	6		₹ 0
7	36" Ceiling Fan	Nos.	19		₹ 0
	TOTAL CARRIED TO SUMMARY				**₹ 0**
			109		
I	**DALI LIGHTING CONTROL (LUTRON)**				

Sr No.	Products Description	Unit	Qty	Unit Price	Total
1	The HomeWorksR QS processor provides control and communication to HomeWorksR QS system components. The Ethernet link allows communication to the HomeWorksR QS software, integration with third-party systems and communication between multiple processors. HomeWorksR QS processors may be connected using either standard networking or using ad-hoc networking. All processors on a project must be connected to a single network.The HomeWorksR QS software and all integrationequipment must be connected to the same network as the processors including power supply & connect bridge.		1		₹ 0
2	DALI Dimming controller; Controls 2 independent DALI links with up to 64 DALI ballasts per link. 4 groups of sensors inputs: Occ sensor, daylight sensor and IR sensor. Requires mains/line voltage feed.With suitable enclosure. Cost of DALI driver will be additional. **(Per unit DALI controller will handle 128 fixture only)**		1		₹ 0
3	Hager ceiling mount sensor with dual channel for washroom area and calling booths. One channel for light sensing and one for exhaust fan control.		15		₹ 0
4	Lutron wireless daylight sensor which makes sure that the lights aren not left ON when sufficient daylight (lux) is present. The LutronR wireless daylight sensor is a battery-powered sensor that automatically controls lights via RF communication to compatible dimming or switching devices.		15		₹ 0

5	Lutron Radio Power Savr occupancy / vacancy sensors are wireless, battery-powered, passive infrared (PIR) sensors that automatically control lights via RF communication to compatible dimming and switching devices.		15		₹ 0
6	The Pico wireless control is a flexible and easy to use device that allows the user to control Lutron wireless load control devices from anywhere in the space. This battery operated control requires no external wiring.Utilizes Lutron reliable Clear Connect RF technology.Can provide control of blinds, curtains, or lighting devices withina range of 9 m through walls and 18 m line-of-sight.**(Wireless)**		18		₹ 0
7	The QS Sensor Module (QSM) is a ceiling-mounted devicethat integrates Lutron wireless and wired sensors and controls through the QS communication link to Energi Savr Node (ESN) units, GRAFIK Eye QS control units.		6		₹ 0
8	Local panel enclosure for housing the DALI module.		2		₹ 0
9	SITC 2 x 1.5 Sq.mm wire for DALI LOOP in existing conduit.	Mtrs	400		₹ 0
Total Cost of the Automation System					₹ 0
J	**FIRE ALARM & SMOKE DETECTION (HONEYWELL FIRELITE)**				
S.No.	**Item Description**	**Unit**	**Qty.**	**Rate**	**Amount**
1	Supply, Installation, Testing & Commissioning of wall recess mounted microprocessor based networkable UL APPROVED 1/2 loop Analogue addressable fire alarm control panel . (with loop capacity up to 49 detectors and devices in the loop) with graphic 6x40 character LCD display, 2000 events historical logging flash E-PROM, 220 volts AC power supply, automatic battery charger, 24 volt sealed lead acid battery suitable operating the system for 30 min. in emergency condition.	Nos	1		₹ 0
2	Providing & Installation of Response Indicator (RI) complete with all accessories & suitable back box. Note :- All above ceiling detectors not easily visible from under the ceiling / Detectors inside ducts to have an RI placed at a suitable location.	Nos	10		₹ 0
3	Supply and Installation of plug in type Intelligent Addressable Photoelectric Smoke Detectors including mounting base plate, complete as required. UL Listed	Nos	30		₹ 0
4	Supply and Installation of plug in type Intelligent Addressable Heat Detectors including mounting base plate, complete as required. UL Listed	Nos	2		₹ 0
5	Supply and Installation of Hooter with Flasher suitable for alarm siren complete with M.S. Box enclosure as required. UL listed	Nos	2		₹ 0
6	Supply and Installation of intelligent addressable resettable Manual Call Station (unbreakable glass), all cost of require modules, complete as required.	Nos	6		₹ 0
7	Supply and Installation of intelligent addressable Fault Isolator Modules for isolating faulty circuits between two fault isolators.	Nos	1		₹ 0
8	Supply & Installation Addressable Duct detector.	Nos	2		₹ 0
9	Supply of intelligent addressable Input/ Monitor modules for flow switch or any other input dry contact type.	Nos	3		₹ 0
10	Supply of intelligent addressable Control Modules	Nos	1		₹ 0
11	**Supply of intelligent addressable Input module for the signal from Morley Panel to MALL panel (Siemens)**	Nos.	0		₹ 0

12	Supply and laying including securing to Ceiling / Wall using suitable GI Saddles of 2C x 1.5 sq.mm. annealed electrolytic copper conductor Armored FIRE SURVIVAL CABLE.	Meter	150		₹ 0
13	Supply and installation of MS Box with cover suitable for installation of base plate of the detector on true ceiling including cost of 2 copper glands suitable for the 2 x 1.5 Sq.mm Cu.Ar. cable.	Nos.	30		₹ 0
	Total				**₹ 0**
K	**CCTV**				
1	Network TDN IR Indoor Camera, 1/3" CMOS, 2.0 MP, 2.8 mm Fixed, 12 IR LEDs, PoE, H.264	No.	6		₹ 0
2	8CH NVR, 1 SATA HDD Slot (Max 4TB), 12VDC,Realtime Recording Resolution (8 Channels @ 720P,8 Channels @1080P),Realtime Local Playback(4 Channels @ 720P,2 Channels @1080P),Multiplex Operation,H.264 High profile,BNC/VGA/HDMI output, main profile, baseline,HDD Redundancy,Free DDNS,Network backup, USB HDD, USB writer, SATA writer,1 RS485, support 18 kinds of PTZ protocols,ONVIF 2.0	No.	1		₹ 0
3	Surveillance Hard Disk 2 TB	No.	1		₹ 0
4	8-PORT GIGABIT ETHERNET POE SWITCH	No.	1		₹ 0
	Total carried over to Summary				**₹ 0**
L	AV & CONFERENCE ROOM WITH AUTOMATION				
1)	Newline (Or Equivalent) 55" FHD Interactive Panel , Built in 2 Cameras (1080p) , 4 Array Microphone 20 W Built in Speaker. (Small Conference room / Director General Cabin)	Nos	2		₹ 0
2)	4K OPS (Core i5 7 Gen , 8 GB Ram , 12 GB SSD Windows 10 Professional	Nos.	2		₹ 0
3)	Samsung or Equivalent 49" 4 K Display Panel	Nos.	5		₹ 0
4)	HDMI TX over IP with POE	Nos.	2		₹ 0
5)	HDMI RX over IP with POE	Nos.	7		₹ 0
6)	4k HDMI Cable	Mtrs	30		₹ 0
7)	Crestron® 3 Series is an enterprise-class control system for residential, commercial, and government applications. Featuring the 3-Series® control engine, the 3-series forms the core of any modern networked home or commercial building, managing and integrating all the disparate technologies throughout your facility to make life easier, greener, more productive, and more enjoyable.	Nos	1		₹ 0
8)	Crestron Din 8SW8	Nos	1		₹ 0
9)	Lutron Wall Mount Keypad 10 Button HQWISNB	Nos	2		₹ 0
10)	IR Probe (Lutron)	Nos.	6		₹ 0
11)	lind-mount backcan for quick and easy install Combined 70V/100V and low impedance direct operation • 20 Watts at 8Ω nominal setting • 15W multi-tap at 70V/100V 68 Hz – 17 kHz bandwidth with wide 130° coverage White or black (-BK) JBL Control 12 CT or Equivalent	Nos	6		₹ 0
12)	Four-channel, 300W @ 4Ω Analog Power Amplifier, 70V/ 100V ,Bluetooth and USB JBL VMA 1120 or Equivalent	Nos	2		₹ 0

13)	"Universal stereo input adaptor, converts any output to line level. Also converts 100v to low impedance and provides isolation which avoids ground loops" BUZZSTOP MKIII or Equivalent	Nos	2		₹ 0
14)	100" Motorised Projector Screen	Nos	2		₹ 0
15)	Epson or Equivalent 3000 + Lumens Projector with Mount	Nos	2		₹ 0
16)	1 X 2 HDMI SPLITTER	NOS	2		₹ 0
					₹ 0

HVAC Works					
	SUMMARY				**AMOUNT**
	GRAND TOTAL				**₹ 0**
S. No.	**Description**	**Units**	**Qty.**	**Rate**	**Amount**
A. MAIN EQUIPMENTS					
1.0	**VARIABLE REFRIGERANT FLOW SYSTEM**				
	Supply, installation, testing & comissioning of **Variable Refrigerant Flow Heat Pump** type multi unit air-conditioning system complete with indoor and outdoor units with individual controller operations.				
1.1	Supply, installation, testing & comissioning of Modular type microprocessor based outdoor units equipped with highly efficient inverter driven Scroll Compressors, special precoated heat exchanger, low noise condenser fan, auto check function for connection error, auto address setting, etc. with capacities as mentioned below, with suitable angle Iron Base frames, lifting shifting including heavy labour & crane, R-410A refrigerant Top up etc as required. The units shall be suitable for 415V±10%,50 Hz. supply & complete with electrical controls & panels. **The ODUs shall be installed on terrace above fifth floor.**				
1.1.1	20 HP (with 2 units of 10 HP) Heat pumps (R-410a)	Nos.	2		₹ 0
1.2	Supply, installation, testing & comissioning of Indoor units equipped with pre-filter, fan section with low noise fan, multispeed motor, coil section with DX coil, outer cabinet, drain pan, insulation, pipe connections, with fire retardant flexible connection for ductable units, corded remote control etc. (cost of remote controller is taken separate hereafter) of various capacities as per specifications and drawings. The cost shall include the cost of power & control cabling & earthing upto 3 m distance including plug top suitable for 15 A/3 pins socket and control wiring of 2 core x 1.5 sqmm copper between indoor units and their corded remote sensor				
1.2.1	6.36 TR Ductable type Units (Recirculatory)	Nos.	4		₹ 0
1.2.2	2.56 TR Treated Fresh air Units	Nos.	4		₹ 0
1.3	Corded type wall mounted remote controller with controls of temperature set up, louver set up airflow mode, etc.	Nos.	R.O.		
1.4	Cordless Remote Control	Nos.	8		₹ 0
1.5	Supply, Installation & fixing of Imported fittings Y-joints and headers	Sets	6		₹ 0
1.6	2 Core Shielded communication cable in Conduit between outdoor to indoor units and indoor unit.	RM	110		₹ 0
1.7	GI tray for exposed refrigerant copper piping cover with GI sheet and tightened with self threaded screw				
1.7.1	150 mm wide	RM	30		₹ 0
1.7.2	300 mm wide	RM	30		₹ 0
1.7.3	450 mm wide	RM	10		₹ 0
1.8	Supply, installation, testing & comissioningof Central Remote Controller for VRF /VRV System	Nos.	1		₹ 0
	Central Electronic Remote controller, including necessary software, operating, monitoring, setting and controlling of all indoor and outdoor units of the VRF / VRV system inclusive of cable & accessories.				
	The controller shall be capable of the following minimum functions:				
	i) Run status of each IDUs				
	ii) Temperature setting of the individual IDU's				
	iii) Indication of actual temp. in the room at particular time				

	iv) Communication with ODU microprocessor to share the complete data of the ODUs.				
2.0	**VENTILATION FANS**				
2.1	Supply, Installation, Testing and Commisioing of Inline Fans from the list of approved makes given in the technical bid complete with canvass connection, vibration isolation, etc. with 15 MM Static Pressure. The cost shall include power wiring upto 3 metres with power plug from switch and socket to be provided by others.				
2.1.1	500 CFM; 15MM SP	Nos.	2		₹ 0
2.1.2	300 CFM; 15MM SP	Nos.	1		₹ 0
2.1.3	200 CFM; 15MM SP	Nos.	1		₹ 0
2.2	Supply, installation, testing and commissioning of toilet extract fan of plastic construction having aerodynamically designed & balanced blades, low speed and and low noise motor suitable to deliver 170 CMH (100 CFM) complete with gravity louvre shutter, bird screen, wiring with plug upto socket provided near the fan.	Nos.	1		₹ 0
				SUB TOTAL - A	**₹ 0**
B. PIPING					
1.0	Supply, Installation, Testing and Commisioing of Interconnecting refrigerant copper pipe work with (19mm/13mm thick) closed cell elastomeric nitrile rubber tubular insulation, control cable, between each set of indoor & outdoor units of VRF system, as per specifications, all piping inside the room (hide inside the false ceiling) shall be properly supported in GI slotted angle cable trays and all external piping exposed shall run in covered cable tray.				
1.1	34.92 MM OD with 19 MM insulation	RM	5		₹ 0
1.2	28.58 MM OD with 19MM insulation	RM	25		₹ 0
1.3	22.2 MM OD with 19MM insulation	RM	15		₹ 0
1.4	19.05 MM OD with 19 MM insulation	RM	40		₹ 0
1.5	15.9 MM OD with 13 MM insulation	RM	25		₹ 0
1.6	12.7 MM OD with 13 MM insulation	RM	15		₹ 0
1.7	9.5 MM OD with 13MM insulation	RM	60		₹ 0
1.8	6.4 MM OD with 13 MM insulation	RM	5		₹ 0
2.0	Providing and fixing uPVC High Pressure Drain Water Piping complete with fittings (elbows, tees, reducers, sockets etc.), supports, jointing, 6mm thick nitrile rubber insulation etc. and any other item required to make the system complete (Split Units & VRF Indoor units). Nominal Diameters in mm as indicated below:				
2.1	32mm	Rmt	40		₹ 0
2.2	25mm	Rmt	160		₹ 0
				SUB TOTAL - B	**₹ 0**
C. AIR DISTRIBUTION					
1.0	Supply, Installation, Testing and Commisioing of sheet metal ducting complete with supports, vanes, nuts, bolts etc. as per specifications and drawings.				
1.1	**G.I. Sheet Metal Ducting (Rectangular)**				
1.1.1	0.80 MM (22 Gauge) Site Fabricated	Sqm.	10		₹ 0
1.1.2	0.63 MM (24 Gauge) Site Fabricated	Sqm.	10		₹ 0
1.1.3	0.80 MM (22 Gauge) Factory Fabricated	Sqm.	5		₹ 0
1.1.4	0.63 MM (24 Gauge) Factory Fabricated	Sqm.	5		₹ 0
1.2	**Duct Acoustic Lining**				
	13mm thick open cell elastomeric nitrile rubber class 'O' secured with approved adhesive (Duct shall be insulated internally).	Sqm.	40		₹ 0
1.3	**Duct Insulation**				

	Closed cell elastomeric nitrile rubber class 'O' secured with approved adhesive (Duct shall be insulated internally).				
1.3.1	9 MM Thick	Sqm.	100		₹ 0
1.3.2	20 MM Thick	Sqm.	5		₹ 0
	Closed cell elastomeric nitrile rubber class 'O' secured with approved adhesive (Duct shall be insulated externally).				
1.3.3	9 MM Thick	Sqm.	50		₹ 0
1.3.4	20 MM Thick	Sqm.	5		₹ 0
1.4	**Grilles/Diffusers/Louvres**				
	Extruded aluminium supply and return air grilles/diffusers/ louvres, volume control dampers, supply air plenum, etc. duly powder coated as per specifications and drawings.				
1.4.1	Aluminium linear / rectangular supply air grilles with dampers (with Black Bushes)	Sqm.	5		₹ 0
1.4.2	Aluminium linear / rectangular return air grilles without dampers (with Black Bushes)	Sqm.	5		₹ 0
1.4.3	Aluminium linear / square supply air diffusers with dampers (with Black Bushes)	Sqm.	1		₹ 0
1.4.4	Aluminium linear / square return air diffusers without dampers (with Black Bushes)	Sqm.	1		₹ 0
1.4.5	Aluiminium Fresh Air & Exhaust Air Louvers with bird screen as per specifications.	Sqm.	2		₹ 0
1.4.6	Adjustable circular disc type exhaust air registers of 150 mm dia.	Nos.	12		₹ 0
1.4.7	Supply, installation, testing and commissioning of air transfer grilles of aluminium power coated	Sqm.	1		₹ 0
1.5	**Oval / Eliptical shape ducting**				
	Fabrication, Installation and Testing of factory fabricated oval/ Eliptical sheet metal ducts with single wall in accordance with the approved shop drawings and specifications. The ducts shall be acoustically lined / insulated (Cost of insulation / lining is not to be considered in this item, this is covered in separate item) with open / closed cell elastomeric insulation (Nitrile Rubber). Ducting GI sheet should be 180 GSM				
1.5.1	0.80 MM (22 Gauge)	Sqm.	80		₹ 0
1.5.2	1.00 MM (20 Gauge)	Sqm.	100		₹ 0
1.6	**Volume Control Dampers**				
	Supplying and fixing of volume control dampers with flanges nuts, bolts gaskets, supports, painting, etc. as required at site.	Sqm.	1		₹ 0
1.7	**Fire Dampers**				
1.7.1	Supplying and fixing of fire dampers complete with fusible link, Electric limit switch, 16 gauge sleeve and 18 gauge louver heat resistant bush, flanges nuts, bolts gaskets, supports, painting, etc. as required at site.	Sqm.	R.O.		
1.7.2	Fusible Link and Electrical Limit switch	Set	R.O.		
				SUB TOTAL - C	**₹ 0**
D. MISCELLANEOUS					
1.0	Dismantling of existing aircooled split type airconditioners (Hi wall / Cassette indoor unit) and storing at the location decided by owner within the premises, power & control componets with wiring and outdoor units, interconnecting refrigerant piping (wherever unit is not to be reinstalled at same place), power & control cabling (wherever unit is not to be reinstalled at same place), of following capacities (Contractor will be required to pump down the refrigerant before dismantling)				
1.1	Hi wall Units of 1.0 / 1.5 / 1.8 TR	Set	29		₹ 0
1.2	Cassette type units of 3.8 TR	Set	2		₹ 0
2.0	Reinstallation of old split units after servicing (some of existing ACs which are dismantled) and are in good condition complete with interconnecting refrigerant piping, power & control cabling, Refrigerant top up, MS Stand for out door unit, etc.				

2.1	Reinstallation of old split units after servicing				
i.	Hi wall Units of 1.0 TR	Nos.	1		₹ 0
ii.	Hi wall Units of 1.5 TR	Nos.	1		₹ 0
iii.	Hi wall Units of 1.8 TR	Nos.	10		₹ 0
iv.	Cassette type Units of 3.8 TR	Nos.	2		₹ 0
2.2	Interconnecting refrigerant piping as per specifications				
i.	Hi wall Units of 1.0 TR	RM	15		₹ 0
ii.	Hi wall Units of 1.5 TR	RM	15		₹ 0
iii.	Hi wall Units of 1.8 TR	RM	160		₹ 0
iv.	Cassette type Units of 3.8 TR	RM	30		₹ 0
2.3	Power and Control cabling as per specifications				
i.	Hi wall Units of 1.0 TR	RM	15		₹ 0
ii.	Hi wall Units of 1.5 TR	RM	15		₹ 0
iii.	Hi wall Units of 1.8 TR	RM	160		₹ 0
iv.	Cassette type Units of 3.8 TR	RM	30		₹ 0
2.4	Refrigerant R32 top up for ACs				
i.	Hi wall Units of 1.0 TR	Lot	1		₹ 0
ii.	Hi wall Units of 1.5 TR	Lot	1		₹ 0
iii.	Hi wall Units of 1.8 TR	Lot	10		₹ 0
iv.	Cassette type Units of 3.8 TR	Lot	1		₹ 0
2.5	Refrigerant R22 top up for ACs				
i.	Hi wall Units of 1.0 TR	Lot	1		₹ 0
ii.	Hi wall Units of 1.5 TR	Lot	1		₹ 0
iii.	Hi wall Units of 1.8 TR	Lot	1		₹ 0
iv.	Cassette type Units of 3.8 TR **(R410A)**	Lot	1		₹ 0
				SUB TOTAL - D	**₹ 0**
E. AIR PURIFICATION REQUIREMENTS					
1.0	Providing additional Fiber filters for removal of Virus, bacteria, dust, Pollen, PM 2.5, Smoke in Hi wall type and Cassette type units working on Nano technology. The Copper Ions Fiber technology of high efficiency fiber embedded with antimicrobial technology. Fiber products exhibiting antibacterial and antiviral properties by copper and silver ions jointly attacking the viral and bacterial cells. The filter should be having minimum 99.98% efficiency for Bacteria and viruses including Corona Virus & 99% PM 2.5 Filtering efficiency. Pressure drop through filter should be minimum (Not exceeding 0.6 mm). Test certificates for product performance need to be submitted with the offer. **This filter will be added to the Split unit**				
i.	Hi wall Units of 1.0 TR	Nos.	1		₹ 0
ii.	Hi wall Units of 1.5 TR	Nos.	1		₹ 0
iii.	Hi wall Units of 1.8 TR	Nos.	10		₹ 0
iv.	Cassette type Units of 3.8 TR	Nos.	2		₹ 0
	Bidder may quote alternative technology / system as an option with the merits / demerits				
2.0	Providing Polarised Media filters with Antiviral coating /Screen for removal of Virus, bacteria, dust, Pollen, PM 2.5, Smoke in Ductable type units. Filter requiring 12 Volts that feeding 6500V DC current. Filter standard efficiency to be MERV13. Maximum pressure drop through filter should be 3-4 mm. Filter should be having activated carbon layer also to remove odor, dust, pollen, etc. Filter should not produce ozone or ionized particles. Filter should be having Antiviral coating / screen to Kill viruses with 99.9% efficiency including Corona Virus. Test certificates for product performance need to be submitted with the offer. The arrangement of converting power to 12 V DC should also be included in the cost. **The filter shall replace the original filter of ductable / TFA Unit if the machine is not capable of handling additional pressure drop.**				
i.	For 2.56 TR / 320 CFM TFA Units	Nos.	4		₹ 0

ii.	For 6.36 TR ductable units	Nos.	4		₹ 0
	Bidder may quote alternative technology / system as an option with the merits / demerits				
				SUB TOTAL - E	**₹ 0**
				GRAND TOTAL	**₹ 0**
NOTE - GST SHALL BE EXTRA IN ABOVE COST					

Plumbing Works					
	SUMMARY				**AMOUNT**
A)	SANITARY WARE INSTALLATION				₹ 0
B)	INTERNAL COLD WATER SUPPLY				₹ 0
C)	INTERNAL DRAINAGE (SOIL, WASTE, & VENT) & RAIN WATER				₹ 0
	GRAND TOTAL				**₹ 0**
S. NO	**DESCRIPTION**	**UNIT**	**QTY**	**RATE**	
A)	**SANITARY WARE INSTALLATION**				
	Important note:				
i.	Detail of Sanitary fixture are for the information of the Contractor, however model / makes of all sanitary fixture shall be selected by Architect / Interior designer / client and the same shall be binding for execution				
ii.	No additional all fixing cost shall be paid for change in type of sanitary fixture or fitting.				
iii.	Provision of extension piece for final connection of CP fitting shall be supplied and installed by the contractor accordingly (as required)				
IV.	Supply of all other accessories, brackets / supports, C.P. nut, bolts, washers shall be contractor's scope and shall be part of fixing/installation.				
1	Providing and fixing of vitreous china single trap syphonic pattern having back inlet, supporting chair **wall hung** water closet with flush valve and CP brass flush bend (European type) water closet with seat and lid, with C.P. brass hinges and rubber buffers, adapter, rubber joints fixed to W.C., C.P. brass screwed washers including cutting, seat and cover and making good the walls and floors wherever required and HDPE wc pan connector including jointing with white cement coomplete in all respects. **(EWC With seat and cover)**	Each	4		₹ 0
	Make Hindware, **Catalogue No. 92054 "Star White"**				
2	Providing and Fixing of low noise Concealed cistern without frame , mounting module for brick work with actuation plate with water saving: delayed filling process saves appr. 0,5 l/flush ; Dual Flush - 3 litre and 6 Litre.	Each	4		₹ 0
	Make : Geberit Sigma concealed cistern 8 cm ; Geberit actuator plate Sigma21 for dual flush, metal colour chrome-plated				
3	Providing and fixing white color vitreous China Under Counter, rectangular wash basin with R.S. or CI bracket and 32 mm dia outlet, with 32 mm dia C.P. bottle trap with brass C.P. wall cap and extension pieces, 15 mm dia C.P. brass angle stop cock with 10mm dia C.P. brass connection pipe etc. CP brass chain, CP wall flange, rubber adopter for waste connection complete, CP brass chain CP waste and CP pipe to wall with CP wall flange and rubber adopter for waste connection complete, with pedestal of matching model below wash basin, including cutting and making good the walls wherever required.	Each	4		₹ 0
	Make Hindware, **Catalogue No. 10080 Garnet Under Counter "Star White"**				

4	Providing and fixing of Pressmatic wash basin tap Material: Housing material: brass DIN EN	Each	4		₹ 0
	Make Jaquar, Product No. PRS-061				
5	Supply, installation, testing and commissioning vitreous china flat back large urinal complete with concealed wall hangers, fully automatic photoelectric cell operated No-touch urinal flushing system (Battery/electrical operated vandal proof- twin flush (pre & post use) operation), flush mounted sensors complete in all respects in fully operational conditions, C.P. brass flush pipe with C.P. clamps and screws, C.P. flange with spreader, 32 mm C.P. cast brass bottle trap and pipe to wall with wall flange complete including cutting and making good the walls and floors where required.	Each	3		₹ 0
	Urinals Make Hindware, **Catalogue No. 60010 Dyna Standrad "Star White" ; Urinals Sensors Make Jaquar PRODUCT CODE: SNR-STL-51087**				
6	Providing, Fixing, testing and commissioning of white vitreous china large **urinal partition** with concealed CI bracket, cutting and making good.	No.	3		₹ 0
	Make Hindware, **Catalogue No. 61005 Dyna Standrad "Star White" ;**				
7	Providing, Fixing, testing and commissioning **600 x450 mm leveled edge mirror** of superior quality glass complete with 6 mm thick asbestos sheet grout fixed to wooden cleats with C.P brass screw & washers as per architect requirements.	No.	2		
8	Providing, Fixing, testing and commissioning of **sink** supported by C.I./M.S. Brackets (duly painted with 2 coats of paint over a coat of primer) C.P. cast brass bottle trap with extension piece, rubber adapter, wall flange, union, C.P. brass chain rubber plug & making				
	Make : Jayna with Single bowl and Single Drain Board				
8.1	Stainless steel sink with drain board.	No.	1		
9	Providing, Fixing, testing and commissioning of C.P. brass wall / counter mounted **sink mixer** with C.P. wall flange, overhead swinging spout complete as required and making good.	No.	1		
	Make: Jaquar, PRODUCT CODE: CON-309KNB;				
10	Providing and fixing Towel ring with brackets fixed to wooden cleats with C.P. brass screws.	Each	2		
11	Providing and fixing soap container with brackets fixed to wooden cleats with C.P. brass screws.	Each	2		
12	Providing and fixing CP Bottle Trap for basin, sink and urinal.	Each	8		
	Make: Jaquar, PRODUCT CODE: ALD-CHR-769 L300X190; PRODUCT RANGE: ALLIED				
13	Providing and fixing of Regulating Angle valve with Comfort handle, with extended push rod, push rosette Ø 54 mm ; Material – Brass DIN EN / Noise Class I ; Connection: 1/2“/DN 15, Outlet: 1/2“/DN 15 ; Chrome / Weight 0.130 KG per piece	Each	13		
	Make: Jaquar, PRODUCT CODE: ARI-CHR-39053 PRODUCT RANGE: ARIA				

14	Supplying, storing, handling, shifting, installation, testing and commissioning of CP Toilet paper Holder, wall flange etc. complete.	Each	4		
	Make: Jaquar, Model No. ACN-CHR-1155S				
15	Providing and fixing C.P. brass health faucet with 8mm dia 1m long PVC tube and wall hook complete in all respects. all complete as directed by Engineer-in-charge.				
	Make: Jaquar, Model No. ALD-563	Each	4		
16	Providing, Fixing, testing and commissioning of 15 mm dia C.P. brass 2 way bib cock with C.P. wall flange of approved quality and making good.				
	Make: Jaquar, Model No. FLR-5041N	Each	4		
17	Providing and fixing solid state, no touch operting, fully hygienic **hand drier** of approved shade **with single blower,** with time delay, summer & winter control, music while drying, volume ON/OFF controls including providing necessary brackets, cable from drier to Plug, Plug top key and lock etc, complete as required.	Each	2		
	Make: Euronics, Model No. EH27 Stainless Steel				
18	Providing & fixing C.P. brass **twin coat hook** with PVC rawl plug & C.P. brass screw complete as required.	Each	4		
19	Providing and Fixing high quality 5 Liters stainless steel rust proof dustbin 202 grade stainless steel anti skid scratch resistant rubber bumper	Each	4		
20	Providing and Fixing horizontal/vertical storage type **water heater** of approved shade with copper container with multi-function safety valve for high pressure operation without additional pressure reducing valve, glasswool insulation, stove enamelled M.S jacket, thermostatically controlled inner heater with pilot neon lamps, angle valve on inlet connection, 15mm dia C.P flexible connection pipe in inlet & outlet suitable for working pressure of 5 kg/sqcm complete as required. **(For Kitchen)**				
	Make : Racold/Approved by Engineer in Charge)				
20.1	Capacity 15 litres	No.	1		
21	Providing and Fixing of Paper Towel Dispenser, Towels with c/z Folds wall flange etc. complete.	Each	2		
	Make: Jaquar, PRODUCT CODE: PTD-SAP-DT0106CS				
22	Providing, Fixing, testing and commissioning of C.P **Copper connection 375 mm long** including nuts and washers and making connection to fixtures and fittings complete as required.	No.	4		
23	Providing, Fixing, testing and commissioning PCA Spray SLC Aerators for good water dispersion at low flow rates (Make - Neoperl)				
23.1	Wash Basin **(2.2 GPM)**	No.	4		₹ 0
23.2	Sink **(2.2 GPM)**	No.	1		₹ 0

	Total (A)				**₹ 0**
B)	**INTERNAL COLD WATER SUPPLY**				
1	Providing and fixing **CPVC** (Chlorinated Poly Vinyl Chloride) water supply pipes with pipe as per CTS SDR 11 (operating pressure - 7 Bar @ 82 Deg C and 28 Bar @ 23 Deg C)for pipes from 1/2 Inch to 2 Inch. Schedule 40 Pipe to be used from 2-1/2 Inch to 6 Inch. Pipes shall be joined using solvent welded CPVC fittings i.e. Tees, Elbows, Couplers, Unions, Reducers, brushings etc. including transition fittings (connection between CPVC & metal pipe/GI) i.e. Brass Adaptors (both Male & Female threaded) conforming to ASTM D-2846. ASTM F441 with only CPVC solvent cement conforming to ASTM F-493. All termination points for installation of faucets shall have brass termination fittings. Installation shall be to as per Technical Manual of manufacturer of pipes & fittings.				
	Cost shall be inclusive of (a)Making maximum of 7.5 x 7.5 cm chase in wall and floors for the pipe, making good the same by using 1:2 cement mortar over the wire mesh and providing protection to embedded pipes and fittings (in wall chase) by wrapping two layers of 400 micron polythene sheet including proper overlaps on joints complete as required.				
1.1	1/2" dia (15 mm)	RM	5		₹ 0
1.2	3/4" dia (20 mm)	RM	35		₹ 0
1.3	1" dia (25 mm)	RM	5		₹ 0
2	.Providing and fixing **CPVC (Chlorinated Poly Vinyl Chloride)** water supply pipes with pipe as per CTS SDR 11 (operating pressure - 7 Bar @ 82 Deg C and 28 Bar @ 23 Deg C)for pipes from 1/2 Inch to 2 Inch. Schedule 40 Pipe to be used from 2-1/2 Inch to 6 Inch. Pipes shall be joined using solvent welded CPVC fittings i.e. Tees, Elbows, Couplers, Unions, Reducers, brushings etc. including transition fittings (connection between CPVC & metal pipe/GI) i.e. Brass Adaptors (both Male & Female threaded) conforming to ASTM D-2846. ASTM F441 with only CPVC solvent cement conforming to ASTM F-493. All termination points for installation of faucets shall have brass termination fittings. Installation shall be to as per Technical Manual of manufacturer of pipes & fittings. Fixing / supporting the pipes (& fittings) at wall/ ceiling level supported by galvanized clamps, fastener, hangers etc, as per specification. Exposed pipes to be painted of legends with direction arrow. GI pipe sleeves suitable higher size shall be provided wherever the pipes are crossing the fire rated walls / floors slab and sealing the sleeves with glass wool in between and fire sealant compound at either end all as per Project Manager's / Consultant requirement.				
2.1	1/2" dia (15 mm)	RM	5		₹ 0
2.2	3/4" dia (20 mm)	RM	25		₹ 0

2.3	1" dia (25 mm)	RM	8		₹ 0
2.4	1.1/4" dia (32 mm)	RM	25		₹ 0
3	Providing & fixing male/ female screwed end full way lever operated **forged brass ball valve** of brass body with forged brass hard chrome plated ball & teflon seat tested to a pressure 15 Kg / sq cm with (threaded joints) complete as required.				
3.1	20 mm dia	No.	1		₹ 0
3.2	25 mm dia	No.	2		₹ 0
3.3	32 mm dia	No.	1		₹ 0
4	Providing, fixing , testing and commissioning threaded / flanged **water meter** with direct reading dial in KL with all necessary fitting such as threaded pieces, unions pressure gauge, isolation cock, flanges piece for future removal, flanges / unions complete with all necessary testing charges and obtaining test certificates from municipal authorities, on following size pipe lines (1 no. strainer shall be provided at inlet & outlet and cost shall be inclusive for the same).				
4.1	25 mm dia (Gun metal)	No.	R.O		
4.2	32 mm dia (Gun metal)	No.	2		₹ 0
	Total (B)				**₹ 0**
C)	**INTERNAL DRAINAGE (SOIL, WASTE, & VENT) & RAIN WATER**				
2	Providing, Fixing, Testing & Commissioning **uPVC pipes (Class-3 ; 6 kg/cm2)** conforming to IS 4985-2000 including injection moulded fittings wherever required e.g. tees, bends etc. of any degree, clamps, couplings, adopters, plugs, unions, enlarger sockets etc and jointing with solvent cement including cutting holes in R.C.C/brick work (slab/beam/wall) and making good the floors, beams and walls with cement mortar wherever required complete. **(For Soil & Waste Pipe inside the Toilet).**				
2.1	32 mm dia	RM	8		₹ 0
2.2	40 mm dia	RM	4		₹ 0
2.3	50 mm dia	RM	5		₹ 0

3	Providing, fixing, jointing, testing and commissioning of **UPVC SWR pipe Type-A for Rain Water & Vent pipes upto 160mm dia. conforming to IS 13592 & for Rain Water pipe above 160 mm dia** (and for diameter above 160 mm relevant code) cut to required lengths including all necessary fittings and specials such as 45 or 90 deg. bends, Tee's, Y's, access pipe with solvant cement jointing and required size C.I. Grating on terrace. Fittings shall conform to IS 14735 and rubber ring shall conform to IS 5382. Fixing at wall / ceiling level supported by galvanized brackets & pvc coated clamps & hangers etc. **(For Rain Water and Vent Pipes)**				
3.1	75 dia	RM	R.O		
3.2	110 dia	RM	15		₹ 0
4	Providing, fixing, jointing, testing and commissioning of UPVC pipe **Type-B for Soil, Waste pipe** upto 160mm dia. confirming to IS 13592 (and for diameter above 160 mm relevant code) cut to required lengths including all necessary fittings and specials such as as 45 or 90 deg. bends, Tee's, Y's, access pipe with rubber ring jointing. Fittings shall conform to IS 14735 and rubber ring shall conform to IS 5382. Fixing at wall / ceiling level supported by galvanized brackets & pvc coated clamps & hangers etc.**)**				
4.1	75 dia	RM	R.O		
4.2	110 dia	RM	60		₹ 0
5	Providing and fixing in position 75 mm N.B. **upvc Multi Floor Trap** with 50 mm water seal conforming to IS:14735-90. Nahni traps of self cleaning design joining, embedding in concrete etc. complete. Rate to include making of opening in floor, marble / tiles, for fixing grating. **(Sunk Area Only)**	Nos.	4		₹ 0
6	**Providing & fixing in position UPVC full bore P / S trap** with 50 mm water seal of following sizes for embedded areas. Making proper connection with refined pig lead / drip seal joints, cutting chase / hole in floors /slabs and bringing the same in proper condition and shape after placing the trap in right position complete as required.				
6.1	100 mm inlet and 100 mm outlet.	No.	2		₹ 0
6.2	150 mm inlet and 100 mm outlet.	No.	1		₹ 0
7	Providing & fixing 80mm x 50mm **G.I. waste with reducing elbow & nipple** cutting chases, the floor / slab, repairs complete as required and connection to	No.	2		₹ 0
8	Providing and fixing **Heavy class SS grating** with Cockroach proof SS strainer of approved design including setting in floor with cement motor to match with floor finish as per architect requirement & suitable for waste and FD.				
8.1	Size 100 mm x 100 mm or 100 mm dia	No.	6		₹ 0
8.2	Size 150 mm x 150 mm or 125 mm dia	No.	1		₹ 0

9	Providing and fixing of Floor & Ceiling Clean out plug with opening arrangements for soil / waste pipe and other necessary fittings including jointing, all complete as per standard detail.				
	Make : ACO / Chilly / Neer / GMGR / McAlpine				
9.1	For 100 mm dia pipe	No.	7		₹ 0
	Total (C)				**₹ 0**

Fire Fighting Works					
	SUMMARY				**AMOUNT**
(A)	FIRE HYDRANT SYSTEM				₹ 0
B)	Fire Sprinklers and Dismantling works				₹ 0
C	Portable Fire Extinguishers				₹ 0
	GRAND TOTAL				**₹ 0**
Sr. No	**DESCRIPTION**	**UNIT**	**QTY**	**UNIT PRICE**	
				RATE	
(A)	**FIRE HYDRANT SYSTEM**				
1	Providing & fixing Stainless Steel fire hydrant single landing valve with 80 mm N.B. flanged inlet, brass spindle controlled 63 mm dia female instantaneous outlet type. S.S. coupling, blank cap, chain, twist release type lug & all accessories Conforming to IS:5290. Including fixing with anchor fastner and flanged tapping from wet riser and providing pressure gauge with gun metal ball valve complete as required.	Nos.	4		
2	Providing & fixing swinging type First Aid hose reel in red colour drum with 36 mts long and 20 mm dia heavy duty rubber water hose, 20 mm dia globe valve stop cock, terminating with S.S. coupling & nozzle of 6mm outlet with shut off valve confirming to IS 8090 - 1976 complete with MS socket for tap-off, drum and brackets (including painting) for fixing on wall with anchor fastner, bolts & nuts conforming to IS:884-1969 complete as required.	No.	4		
3	Providing & fixing non-percolating rubber reinforced lined fire hose pipe (as per IS : 636) of 63 mm dia and length as described below. The hose shall be rated for brust pressure of 35.7 Kg/sqcm. Hose shall be complete with ISI marked brass male & female coupling (IS:903) bound & rivetted to hose pipe with Copper rivets & 1.5 mm Copper wire (Location : Internal fire hydrant)				
3.1	7.5 m length	Nos	R.O		
3.2	15 m length	Nos.	8		
4.0	Providing and Fixing 63 mm dia instantaneous pattern branch short Stainless Steel pipe, 20 mm dia nozzle conforming to IS 903, suitable for inter connection to hose pipe coupling complete as required.	Nos.	4		
4.1	Providing and fixing standard firemans axe with heavy rubber handle.	Nos.	4		
5.0	Providing & fixing indoor type hose lockable cabinet frames fabricated from 40 x 40 x 5 angle iron sections and 16 gauge MS sheet with full front glass door and locking arrangement, suitable to accommodate landing valves, 15 m long hoses, first-aid hose reel and branch pipe nozzle & fire mans' axe. The cabinet frame shall be painted with one coat of primer and two or more coats of synthetic enamel paint of approved make and shade of as required (Approx 2.1 m (high) x 0.9 m (wide) x 0.6 m (deep)). The item shall be complete of MS housing with front door.				
	(Cost shall be inclusive of providing break glass box containing key for the cabinet along with hammer).	Nos.	4		
6.0	Designing, providing and fixing Orifice plate made out of stainless stand plate (thickness as per specification) for following size of pipe to reduce pressure upto 3.5 Kg/sqcm complete in all respects.				
6.1	80 mm dia (3 MM Thick)	No.	4		

	Fire Hydrant (A)				**₹ 0**
B)	**Fire Sprinklers and Dismantling works**				
7.0	Providing, laying, jointing and testing of following sizes of **MS `C' Heavy class pipe** pipes conforming to IS-1239 with all accessories like all fittings (all pipes & fittings upto 50mm dia threaded **shall be** the threaded Ductile Iron (ASTM A536) or Cast Iron (ASTM A126) or **F**orged Steel fittings and for pipes above 50 mm dia MS fitting with welded joint shall be used) including tees, elbows, reducers, union, flanges, rubber gaskets, GI nuts bolts, washer including supporting/fixing the pipe on floor / wall /ceiling with clamps, hangers (using anchor fasteners) as per specification.				
	M.S. pipe sleeve of suitable higher size shall be provided wherever the pipes are crossing the walls/floors and sealing the sleeves with glass wool in between & fire sealant compound at either end all as per Project Manager's requirements including cutting holes and chases in brick, R.C.C work and making good the same to original conditions complete in all respects. All hangers, clamps, brackets etc. shall be of galvanized iron unless specified otherwise and the supply of the same shall also be included in rates under this head. Welding of any kind on the galvanized support / hanger shall not be permitted.				
7.1	25 mm dia	RM	30		₹ 0
7.2	32 mm dia	RM	30		₹ 0
7.3	40 mm dia	RM	20		₹ 0
7.4	50 mm dia	RM	10		₹ 0
7.5	65 mm dia	RM	8		₹ 0
7.6	80 mm dia	RM	15		₹ 0
7.7	100 mm dia	RM	2		₹ 0
8.0	Providing two coats of synthetic enamel paint of approved shade over a coat of primer. Prior to application of primer the surface should be cleaned for any dirt, rusts, rough substance etc. Including painting of legends both direction arrow as per the approval of the Project Manager				
8.1	25 mm dia	RM	30		₹ 0
8.2	32 mm dia	RM	30		₹ 0
8.3	40 mm dia	RM	20		₹ 0
8.4	50 mm dia	RM	10		₹ 0
8.5	65 mm dia	RM	8		₹ 0
8.6	80 mm dia	RM	15		₹ 0
8.7	100 mm dia	RM	2		₹ 0
9.0	Designing, providing and fixing **Orifice plate** made out of stainless steel plate (thickness as per specification) for following size of pipe to reduce pressure upto 3.5 Kg/sqcm complete in all respects.				
9.1	80 mm dia	No.	2		₹ 0
9.2	100 mm dia	No.	2		₹ 0

10.0	Providing , fixing, testing & commissioning of brass **quartzoid sprinklers (UL listed)** of 15 mm dia size, K-80 suitable for sustaining the pressure on the seat & water hammer effect. The type & temperature rating shall be as follows :				
10.1	Pendent Sprinkler, Standard coverage (68 deg. C) -Quick response	Nos	25		₹ 0
10.2	Upright Sprinkler, Standard coverage (68 deg. C) Quick response	Nos	10		₹ 0
11	Providing & fixing **male/ female screwed end full way lever operated forged brass ball valve** of brass body with forged brass hard chrome plated ball & Teflon seat tested to a pressure rating not less than **16 Kg/sq cm** with (threaded joints)				
	(Cost shall be inclusive of providing necessary union / flange connection).				
11	25 mm dia	Nos.	4		₹ 0
12	Providing and fixing dial type **Pressure gauge** with isolation cock and chrome coated copper pipe on main header Dial diameter 150 mm celebration 0-15/ sq.cm.	Nos.	2		₹ 0
13	Providing, fixing, testing & commissioning of U.L.listed/ FM approved corrugated SS-304 Braided **Flexible sprinkler pipe** droplet for 12 kg/ sq. cm. working pressure with 1/2" BSP threaded outlet & 1" BSP threaded inlet with reducer nipple, snap, clamp, T-bar bracket etc. with necessary fitting complete as required suitable for 68 degree temperature sprinkler.				
13	1000 mm length	Nos.	1		₹ 0
13	1200 mm length	Nos.	1		₹ 0
13	1500 mm length	Nos.	R.O.		
14	Providing and Fixing electrically operated **water flow switches (Vane type)** and accessories, complete with tap off socket arrangement as required, with potential free contact with 2 Nos. NONC.				
14	80 mm dia	No.	2		₹ 0
	Dismantling Work				
15	Dismantling G.I. pipes i.e. taking out the pipes, manually/ by mechanical means including stacking of pipes within 50 metres lead as per direction of Engineer-in-charge :				
15.1	15 mm to 40 mm nominal bore	Meter	100		₹ 0
15.2	Above 40 mm nominal bore	Meter	100		₹ 0
16	Dismantling carefully Upright/Pendent Sprinklers and its accessories from Fire Pipework and stored with care in separate cardboard/ Wooden boxes so that these sprinklers would be reused further.				
16.1	Pendent Sprinkler, Standard coverage (68 deg. C) -Quick response	Nos	50		₹ 0
16.2	Upright Sprinkler, Standard coverage (68 deg. C) Quick response	Nos	10		₹ 0
	Fire Sprinklers and Dismantling work				**₹ 0**

C	**Portable Fire Extinguishers**				
15	Supplying and fixing HFC 236 Clean agent Fire Extinguishers with 5 years warranty,which will work for all classes of fire, easy snap safety seal ,state of the art magnetic pressure gauge, Inst alert,controllable discharge mechanism,EPDM rubber hosepipe. Conforms to ISI standards,CE certified and ISO 9001certified. Make: Cease Fire/Equivalent.				
a.	2 Kg Capacity	Nos	R.O		
b.	4 Kg Capacity	Nos	2		₹ 0
c.	6 Kg Capacity	Nos	R.O		
16	4.5 kg High Pressure Portable Fire Extinguisher, CO2 Gas as per IS 15222 for Fire Classes B,C & Electrical Fire, Discharge Control mechanism fitted with high pressure steel braided Discharge Hose and Flat Horn with diffuser Nozzles for dispersed discharge of CO2, Internal coating not applicable & External coating of enamel spray painting, Cylinders construction: hot spinning seamless & bearing ISI mark, confirms to IS 7285 and PESO/CCOE Nagpur Approved.	Nos			₹ 0
	Portable Fire Extinguishers				**₹ 0**
	Total Sum				**₹ 0**

DRAWING SCHEDULE - H/O for CDRI , SHRI RAM KALA KENDRA							
ARCHITECTURAL DRAWING PACKAGE							
ITEM		**DRAWING TITLE**	**DRAWING NO.**	**PAPER SIZE**	**STAGE**	**STATUS**	**ISSUE DATE**
00 SERIES							
	1	DEMOLITION PLAN	3208/CDRI/NDELHI/P 001	A2	TENDER		
100 SERIES		**INETRIOR LAYOUT PLANS**					
	1	FOURTH FLOOR PLAN	3208/CDRI/NDELHI/P 101	A1	TENDER		
	2	FIFTH FLOOR PLAN	3208/CDRI/NDELHI/P 102	A1	TENDER		
110 SERIES		**WORKING PLANS**					
	1	FOURTH FLOOR PLAN	3208/CDRI/NDELHI/P 111	A1	TENDER		
	2	FIFTH FLOOR PLAN	3208/CDRI/NDELHI/P 112	A1	TENDER		
120 SERIES		**RCP PLAN**					
	1	FOURTH FLOOR PLAN	3208/CDRI/NDELHI/P 121	A1	TENDER		
	2	FIFTH FLOOR PLAN	3208/CDRI/NDELHI/P 122	A1	TENDER		
150 SERIES		**FLOORING PLAN**					
	1	FOURTH FLOOR PLAN	3208/CDRI/NDELHI/P 151	A1	TENDER		
	2	FIFTH FLOOR PLAN	3208/CDRI/NDELHI/P 152	A1	TENDER		
500 SERIES		**TOILET/KITCHEN**					
	1	LADIES TOILET TYPICAL	3208/CDRI/NDELHI/ID 500	A3	TENDER		
	2	MALE TOILET TYPICAL	3208/CDRI/NDELHI/ID 501	A3	TENDER		
	3	DIFFERENTLY ABLED TOILET TYPICAL	3208/CDRI/NDELHI/ID 502	A3	TENDER		
	4	TOILET DG	3208/CDRI/NDELHI/ID 503	A3	TENDER		
	7	PANTRY DG	3208/CDRI/NDELHI/ID 504	A3	TENDER		
600 SERIES		**DOOR&WINDOW SCHEDULE & DETAILS**					
	1	DW SCHEDULE	3208/CDRI/NDELHI/D 604	A3	TENDER		
1100 SERIES		**INTERIOR DETAILS**					
FOURTH FLOOR	1	LIFT LOBBY TYPICAL	3208/CDRI/NDELHI/ID 1101	A3	TENDER		
	2	RECEPTION AND WAITING LOBBY	3208/CDRI/NDELHI/ID 1102	A3	TENDER		
	3	DIRECTOR'S CABIN 1	3208/CDRI/NDELHI/ID 1103	A3	TENDER		
	4	DIRECTOR'S CABIN 2	3208/CDRI/NDELHI/ID 1104	A3	TENDER		
	5	STAFF AREA	3208/CDRI/NDELHI/ID 1105	A3	TENDER		
	6	BREAKOUT ZONE	3208/CDRI/NDELHI/ID 1106	A3	TENDER		
	7	CONFERENCE ROOM	3208/CDRI/NDELHI/ID 1107	A3	TENDER		
	8	CENTRAL WORK SPACE	3208/CDRI/NDELHI/ID 1108	A3	TENDER		
FIFTH FLOOR	9	READING AREA	3208/CDRI/NDELHI/ID 1109	A3	TENDER		
	10	MEETING ROOM FOR 6 TYPICAL	3208/CDRI/NDELHI/ID 1110	A3	TENDER		
	11	DIRECTORS CABIN 3	3208/CDRI/NDELHI/ID 1111	A3	TENDER		
	12	DIRECTORS CABIN 4	3208/CDRI/NDELHI/ID 1112	A3	TENDER		
	13	BREAKOUT ZONE	3208/CDRI/NDELHI/ID 1113	A3	TENDER		
	14	CENTRAL WORK SPACE	3208/CDRI/NDELHI/ID 1114	A3	TENDER		
	15	DIRECTORS GENERALS ROOM	3208/CDRI/NDELHI/ID 1115	A3	TENDER		

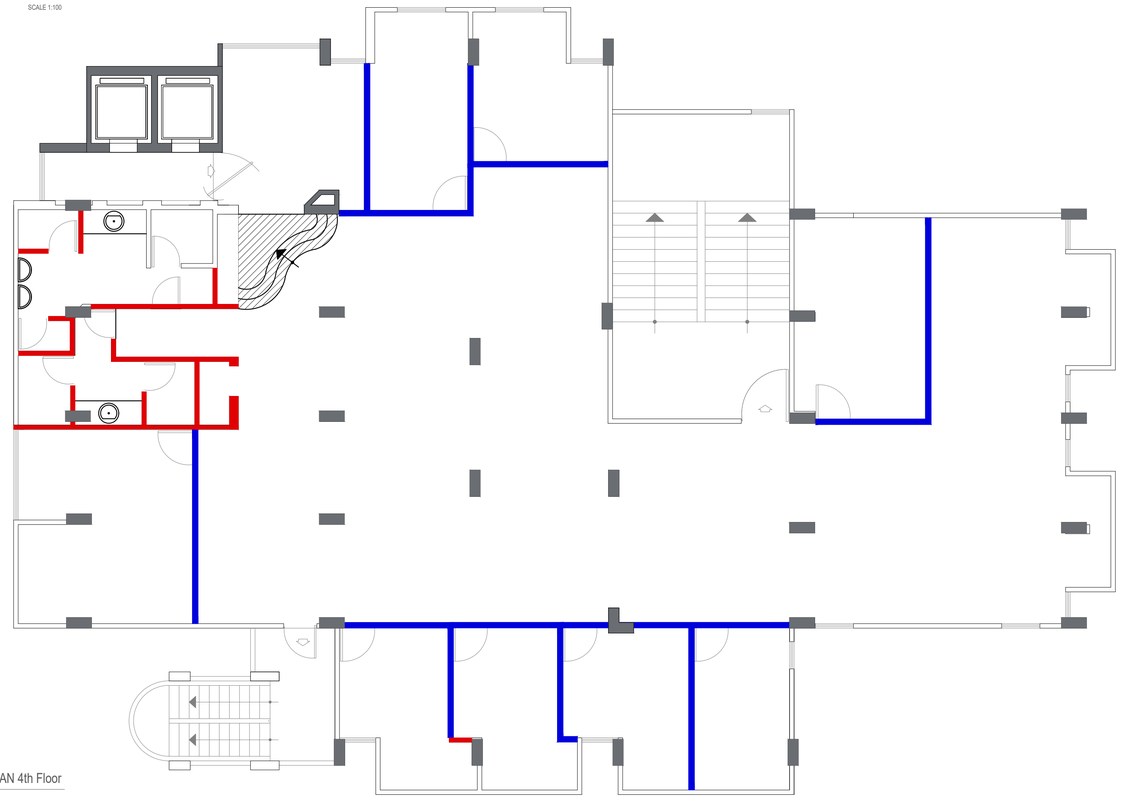
08-06/4/2020-DIR_HR-OPS

1146/2021/DIR_HR-OPS

List of Drawings

	16	DG WAITING SPACE	3208/CDRI/NDELHI/ID 1116	A3	TENDER		
	17	DIRECTORS CABIN 5	3208/CDRI/NDELHI/ID 1123	A3	TENDER		
	18	WAITING AREA	3208/CDRI/NDELHI/ID 1124	A3	TENDER		
1200 SERIES		**FURNITURE SCHEDULES**					
	1	FURNITURE SCHEDULE	3208/CDRI/NDELHI/D 1200	A3	GFC		
1300 SERIES		**SCHEDULES**					
	1	MASTER FINISH SCHEDULE	3208/CDRI/NDELHI/D 1300	A3	GFC		
NOTE:		**THE DRAWINGS SCHEDULE IS TENTATIVE AND A BASIC FRAMEWORK FOR STARTING THE DRAWING PACKAGES. IT SHOULD NOT BE LIMITED TO THE ABOVE MENTIONED SCOPE OF WORK.**					

01 P PLAN 5th Floor
SCALE 1:100



02 P PLAN 4th Floor
SCALE 1:100

Partition walls

Brickwork

Steps

NOTE:
1. Flooring to be demolished
2. False ceiling boards to be removed
3. Brickwork to be demolishes a/s drawing
4. Partition boards to be removed a/s drawing
5. All window and doors to be removed

Notes & References

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N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

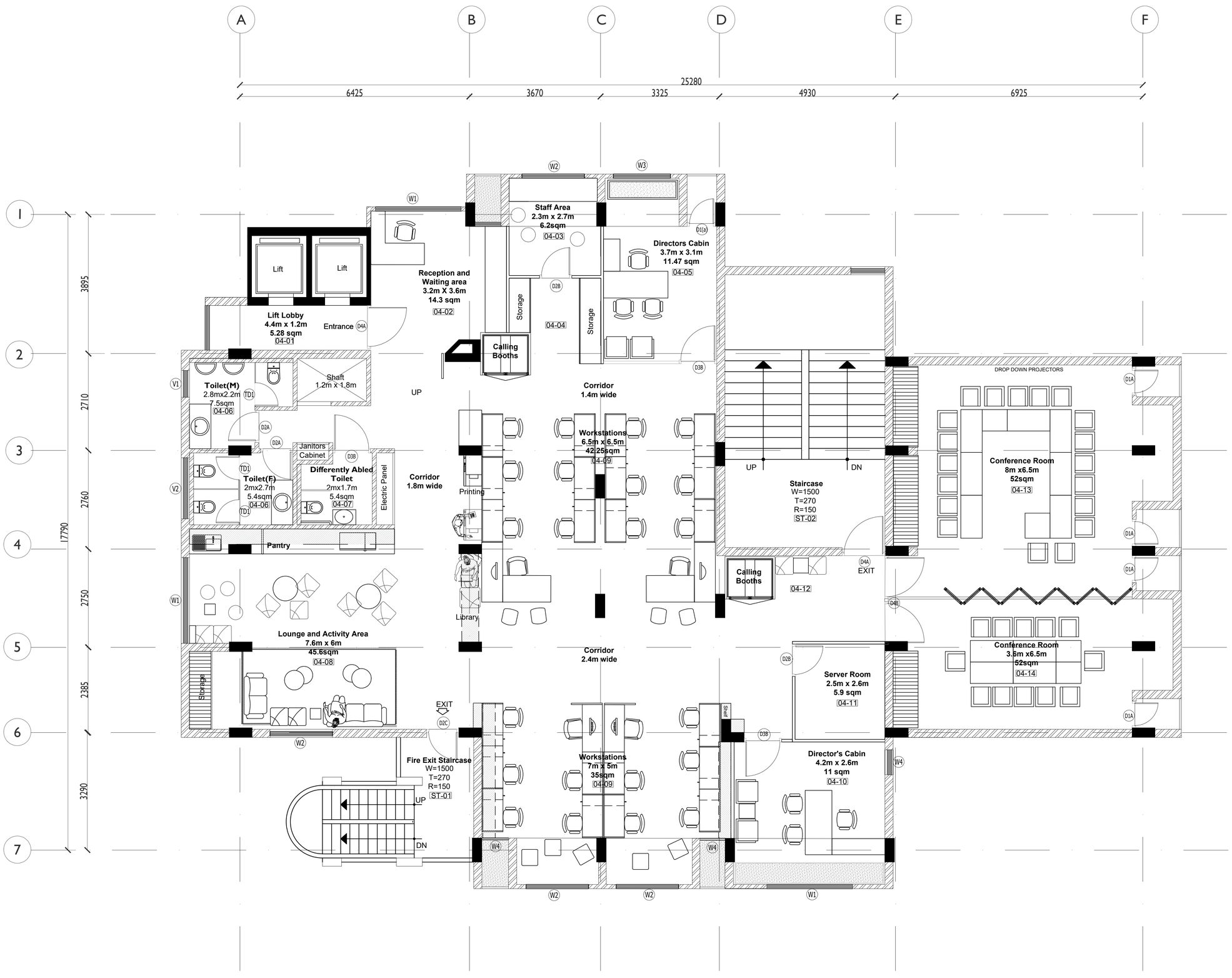
PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Demolition plan

Drawing No:
3208/CDRI/NDELHI/P 001

Scale: 1:50@A1 | Drawn: AA
Date: 2021-01-06 | Chkd By: AP

N



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Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: INTERIOR LAYOUT PLAN

Drawing No: 3208/CDRI/NDELHI/P 101

Scale: 1:50@A1 | Drawn: AA

Date: 2021-01-06 | Chkd By: AP

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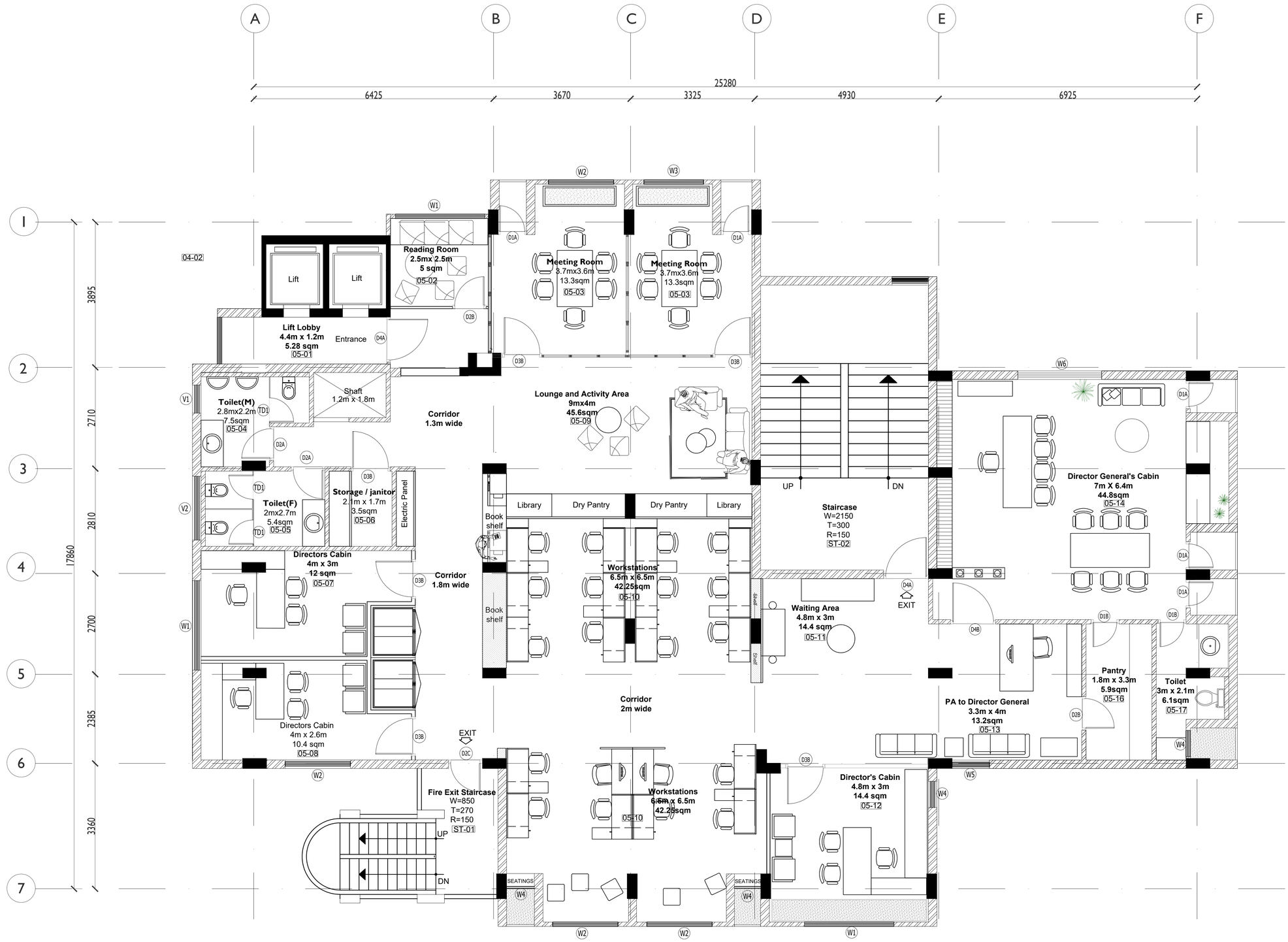

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N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: INTERIOR LAYOUT PLAN

Drawing No: 3208/CDRI/NDELHI/P 102

Scale: 1:50@A1 | Drawn: AA

Date: 2021-01-06 | Chkd By : AP

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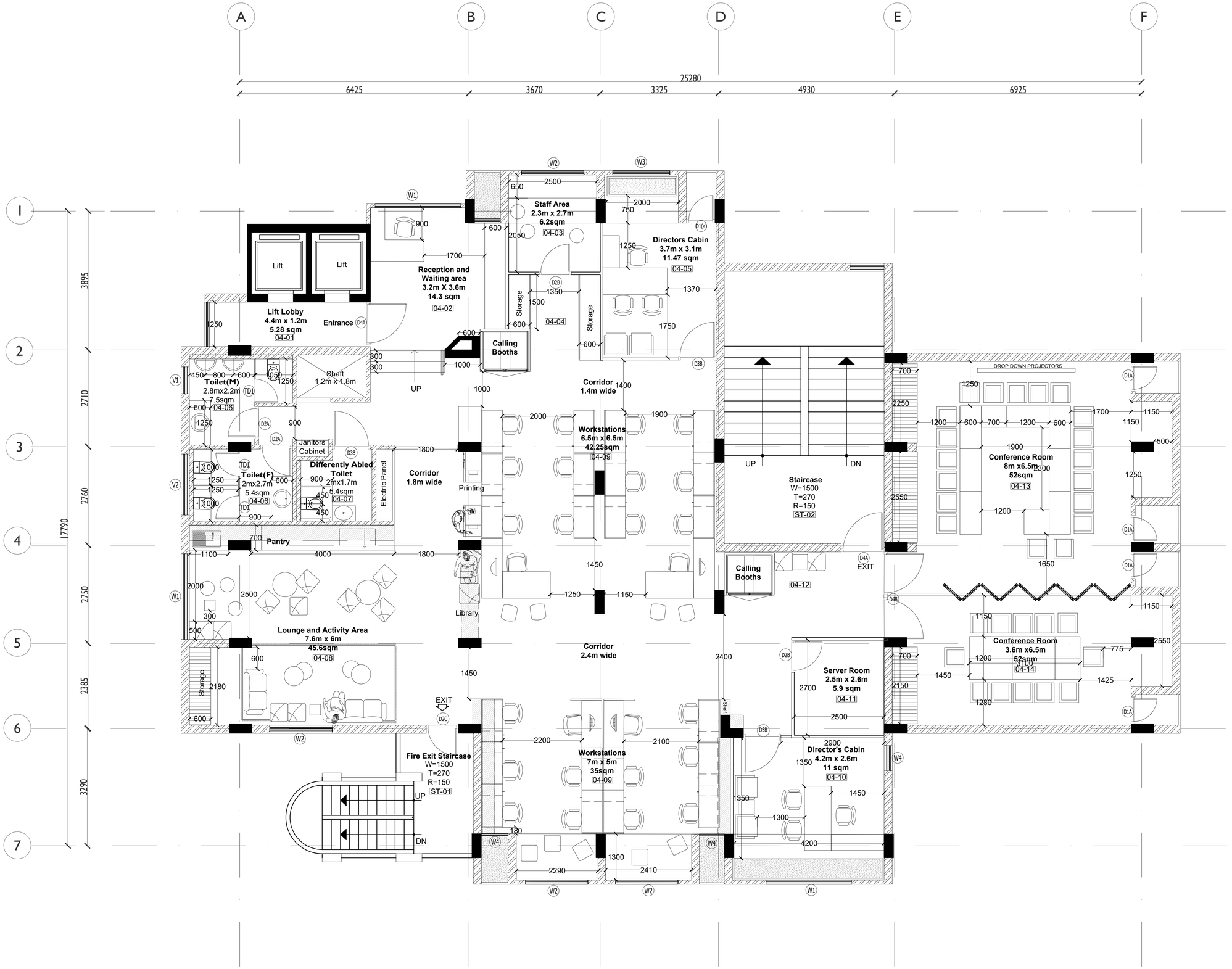

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All dimensions are in millimeters unless noted otherwise.

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Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: WORKING PLAN

Drawing No: 3208/CDRI/NDELHI/P 111

Scale: 1:50@A1 | Drawn: AA | Date: 2021-01-06 | Chkd By: AP

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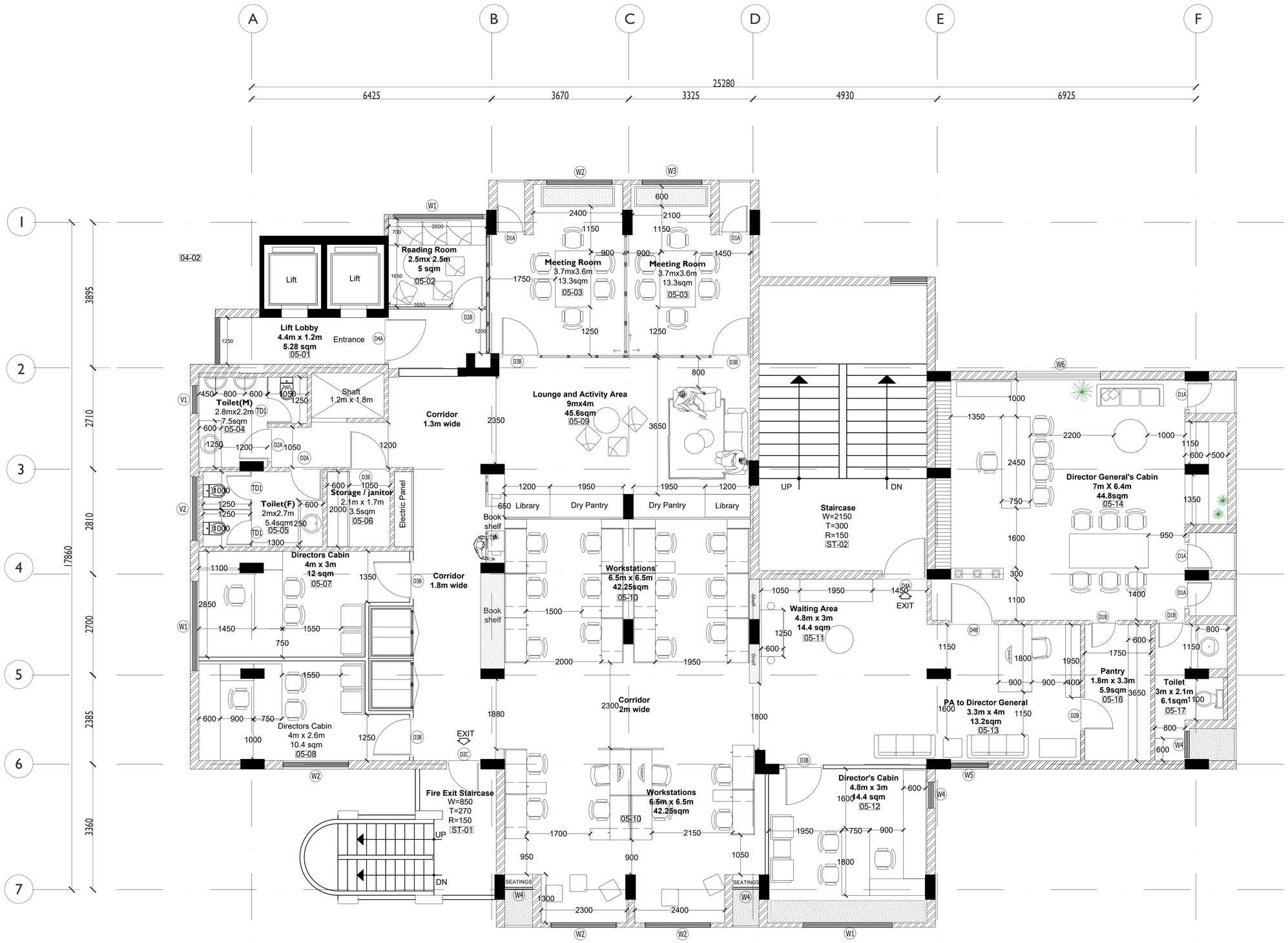

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All dimensions are in millimeters unless noted otherwise.

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Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: WORKING PLAN

Drawing No: 3208/CDRI/NDELHI/P 112

Scale: 1:50@A1 | Drawn: AA | Date: 2021-01-06 | Chkd By : AP

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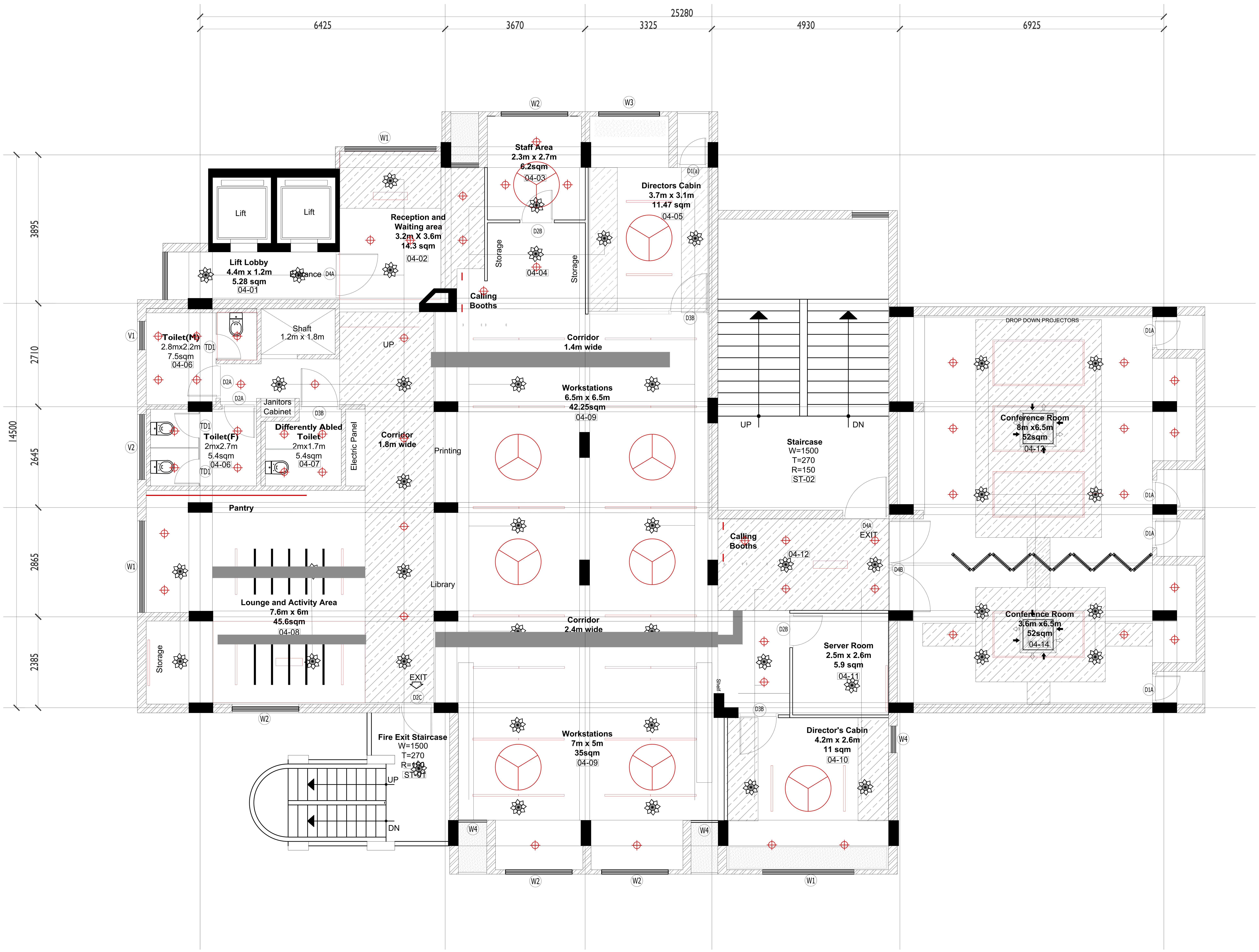

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

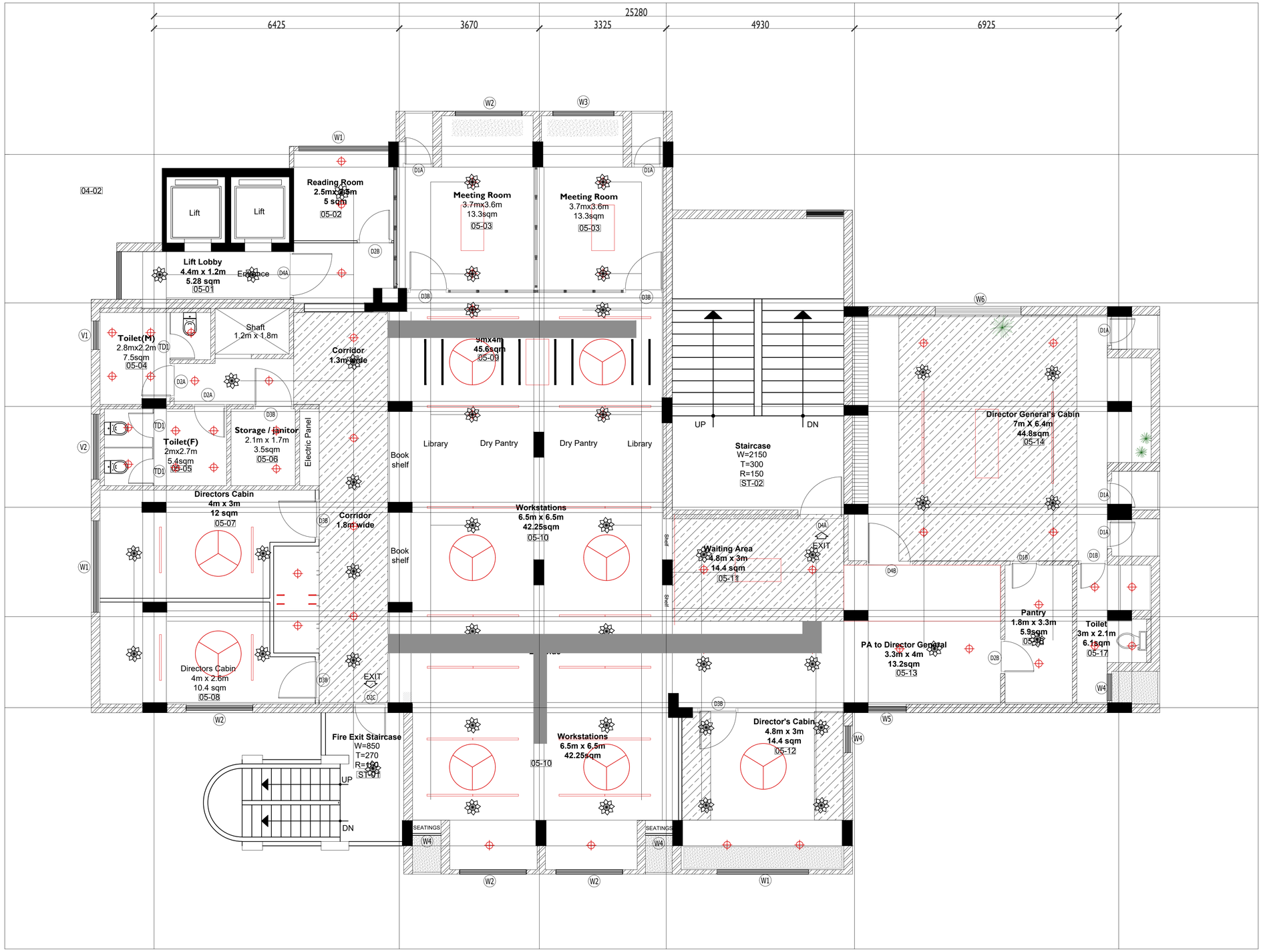
FLOORING PLAN
3208/CDRI/NDELHI/P 151
1:50@A1
AA
2021-01-06
AP

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: RCP PLAN

Drawing No: 3208/CDRI/NDELHI/P 121

Scale: 1:50@A1	Drawn: AA	N
Date: 2021-01-06	Chkd By : AP	



Notes & References

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

FLOORING PLAN
3208/CDRI/INDELHI/P 151
1:50@A1 AA
2021-01-06 AP

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

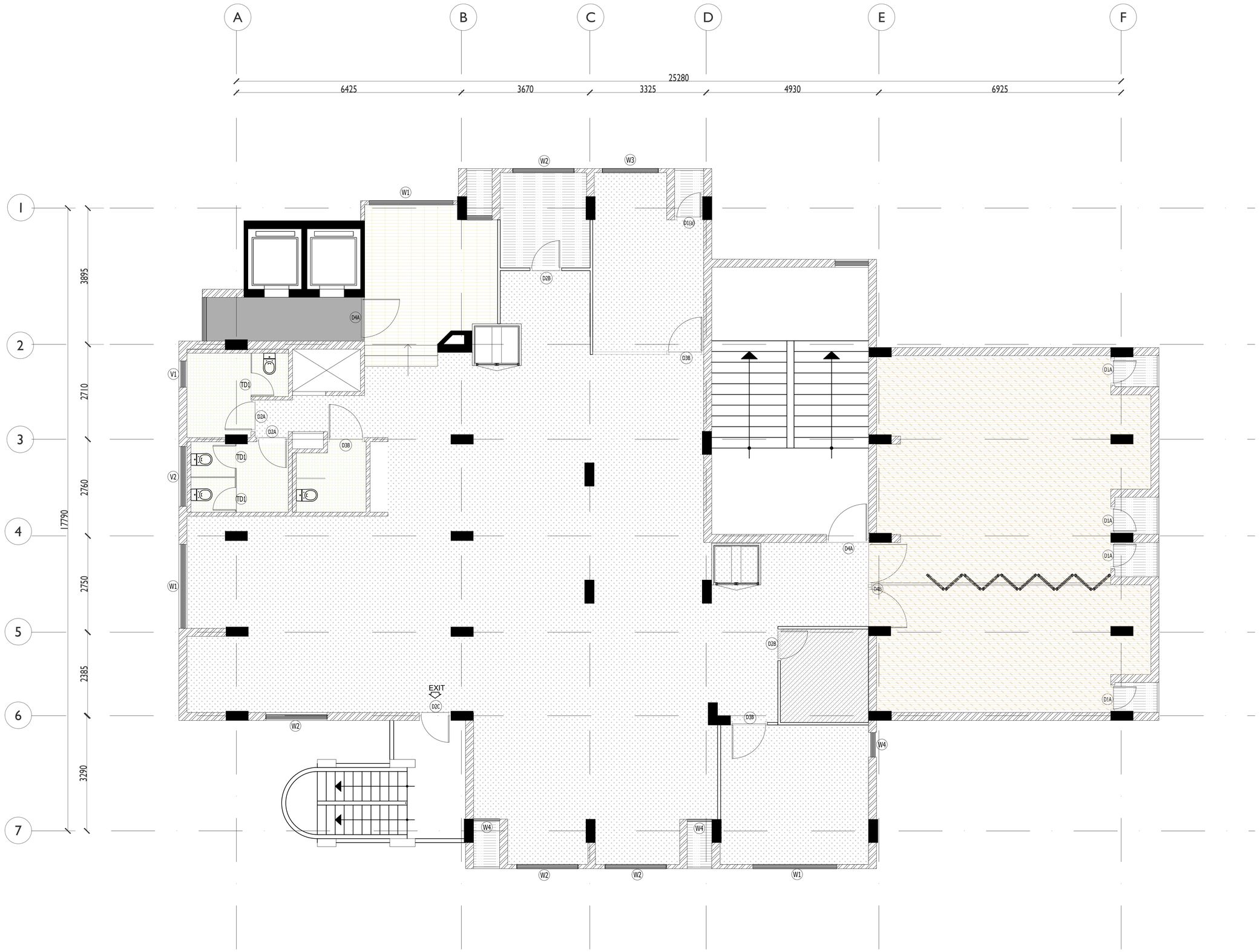
Drawing Title: RCP PLAN

Drawing No: 3208/CDRI/INDELHI/P 12.2

Scale: 1:50@A1 | Drawn: AA

Date: 2021-01-06 | Chkd By: AP

N



Notes & References

General Notes -

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- Existing stone flooring
- Kota Stone with jaisalmer and brass inlay (K)
- Bamboo flooring (B)
- Kota stone (S)
- Kota stone with jaisalmer (J)
- Vinyl flooring (V)
- Vitrified tiles (T)

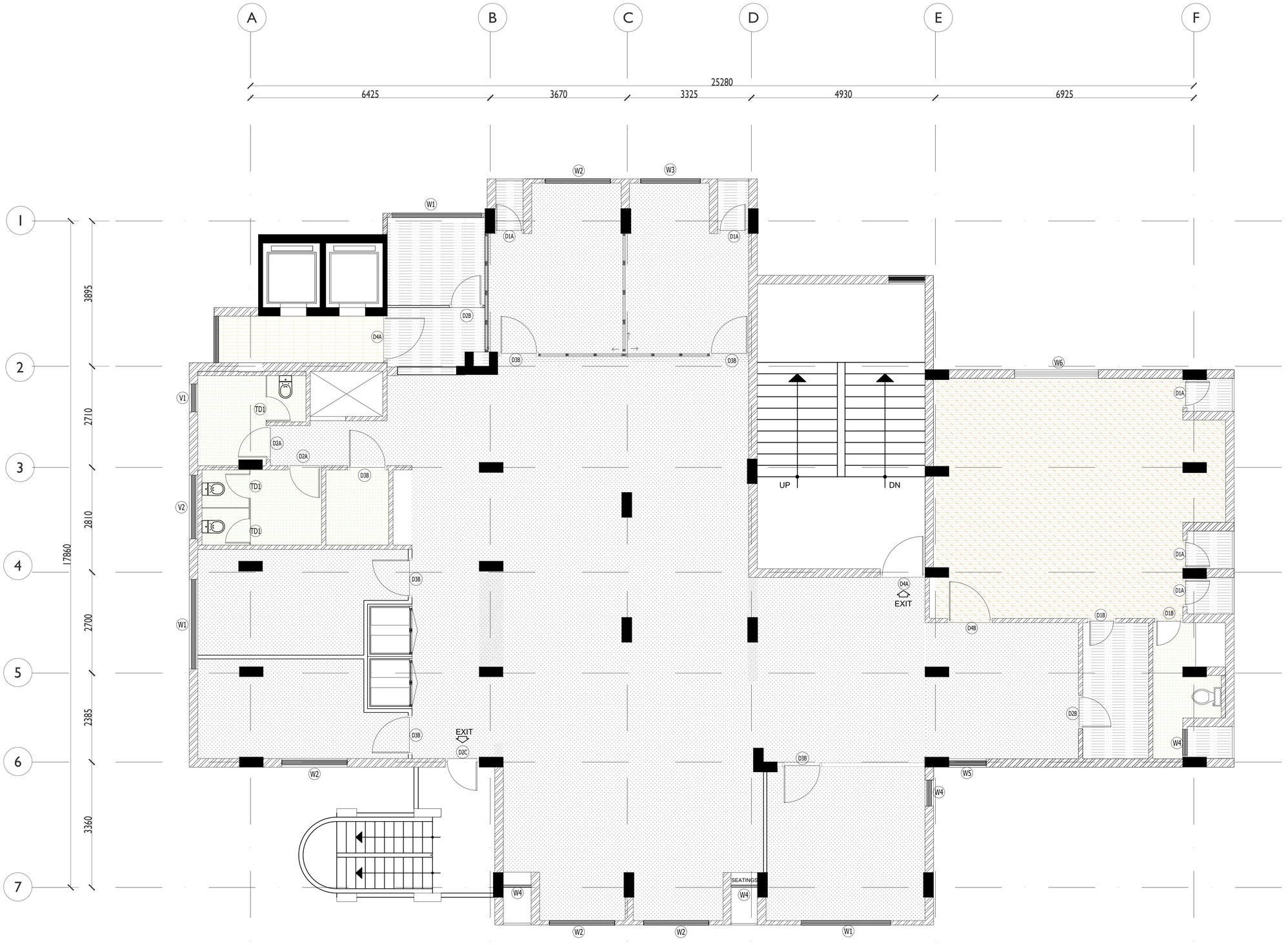
PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: FLOORING PLAN

Drawing No: 3208/CDRI/NDELHI/P 151

Scale: 1:50@A1 | Drawn: AA
Date: 2021-01-06 | Chkd By: AP

N



Notes & References

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- Existing stone flooring
- Kota Stone with jaisalmer and brass inlay (K)
- Bamboo flooring (B)
- Kota stone (S)
- Kota stone with jaisalmer (J)
- Vinyl flooring (V)
- Vitrified tiles (T)

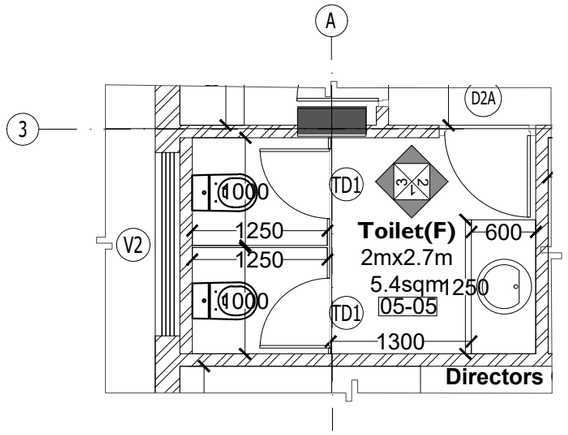
PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: FLOORING PLAN

Drawing No: 3208/CDRI/NDELHI/P 152

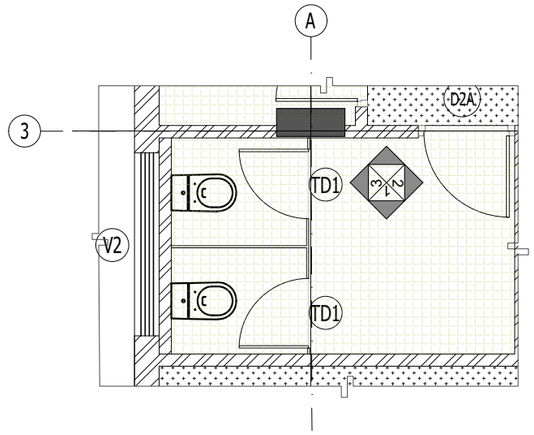
Scale: 1:50@A1 | Drawn: AA
Date: 2021-01-06 | Chkd By: AP

N



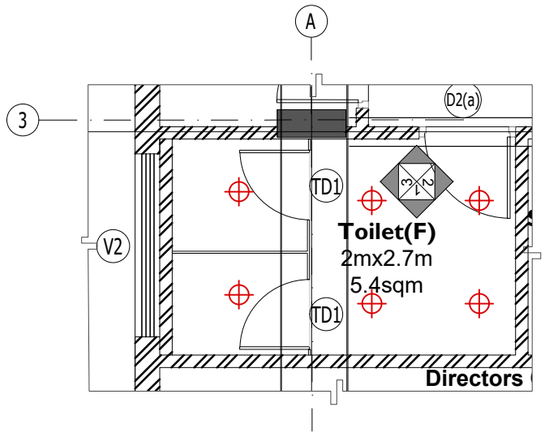
01 Plan

SCALE 1:50 @ A3



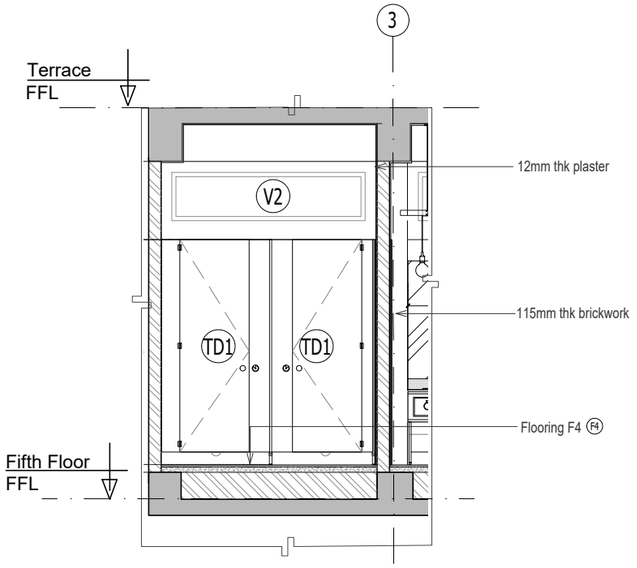
02 Flooring Layout PLan

SCALE 1:50 @ A3



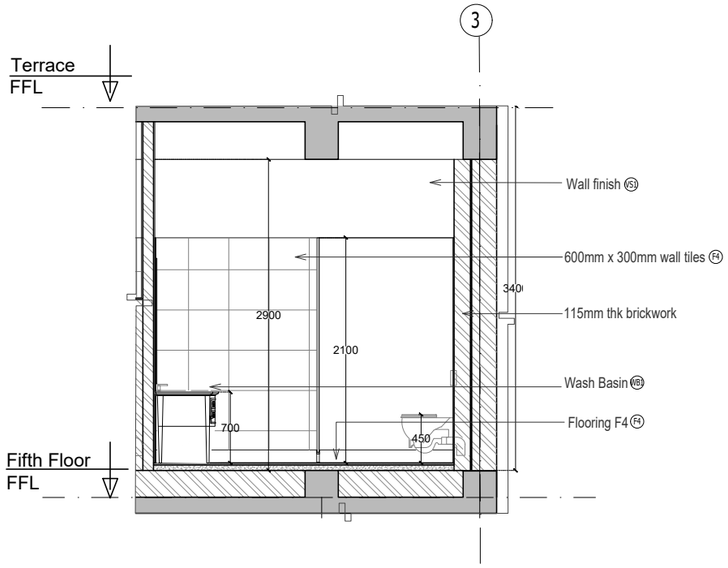
03 RCP

SCALE 1:50 @ A3



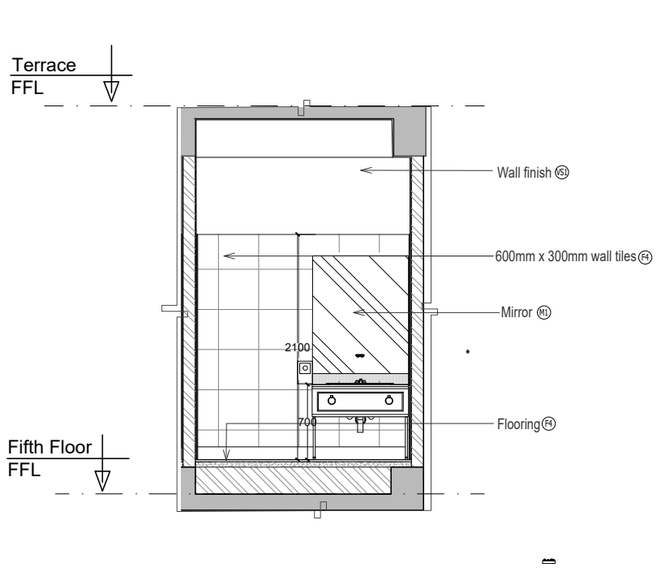
04 EL Elevation1

SCALE 1:50 @ A1



05 EL Elevation2

SCALE 1:50 @ A1



06 EL Elevation-3

SCALE 1:50 @ A1

Notes & References

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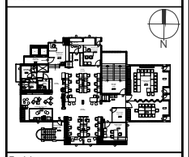


Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

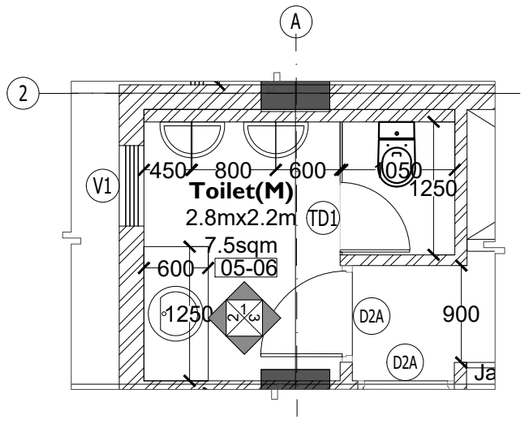
PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Interior drawing : Ladies toilet

Drawing No:
3208/CDRI/NDELHI/ID 500

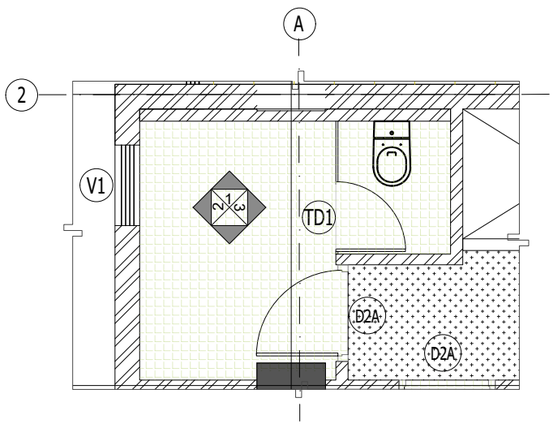
Scale: 1:50@A1 | Drawn: AA

Date: 2021-01-06 | Chkd By: AP



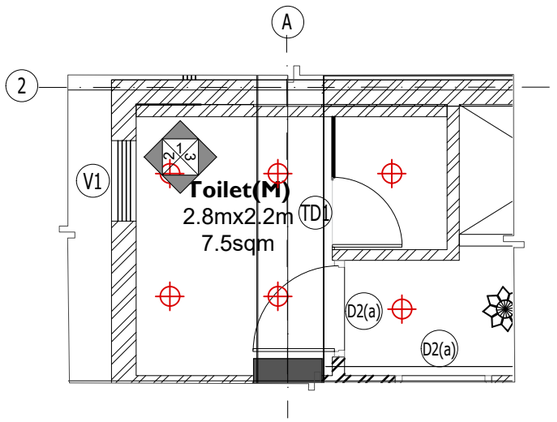
01 Plan

SCALE 1:50 @ A3



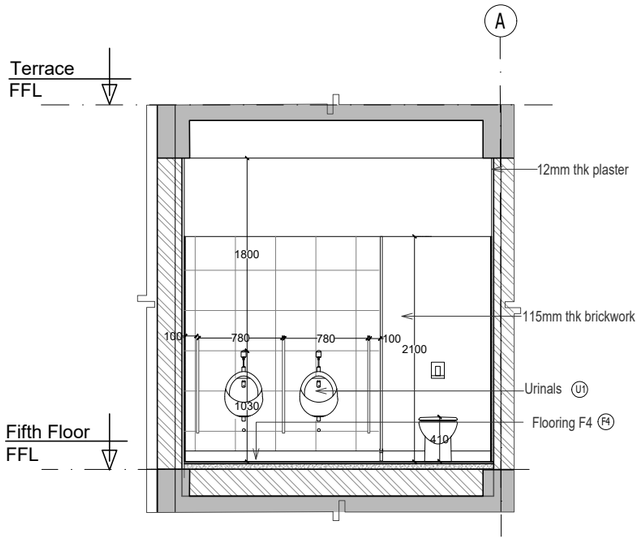
02 Flooring Layout PLan

SCALE 1:50 @ A3



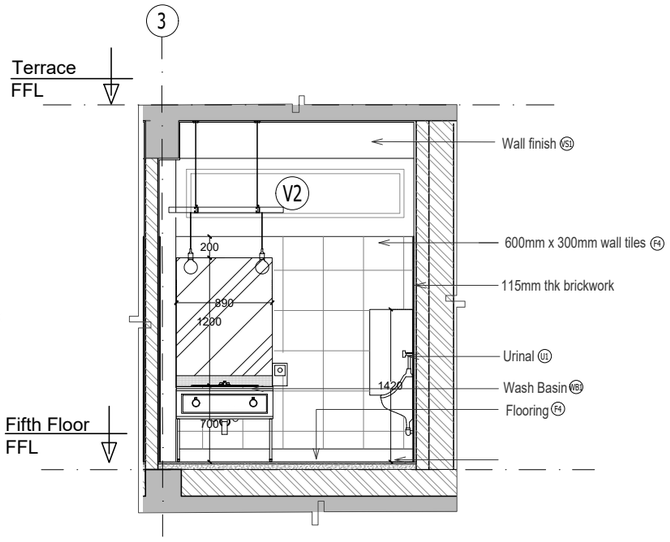
03 RCP

SCALE 1:50 @ A3



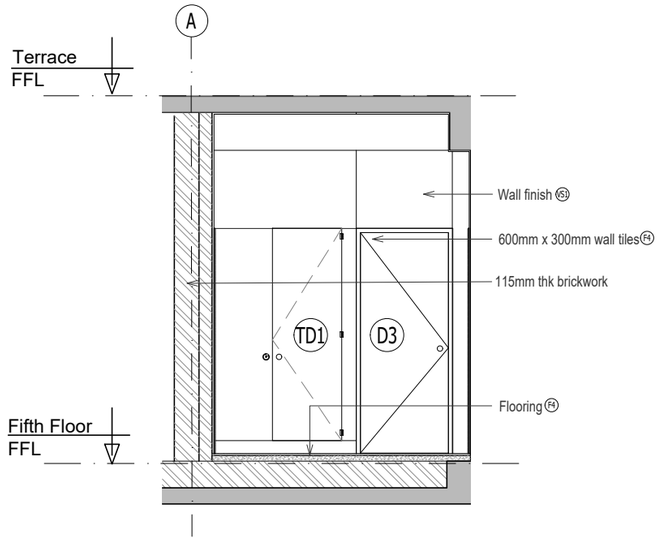
04 EL Elevation1

SCALE 1:50 @ A1



05 EL Elevation2

SCALE 1:50 @ A1



06 EL Elevation-3

SCALE 1:50 @ A1

Notes & References

General Notes -

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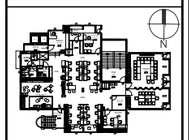


Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

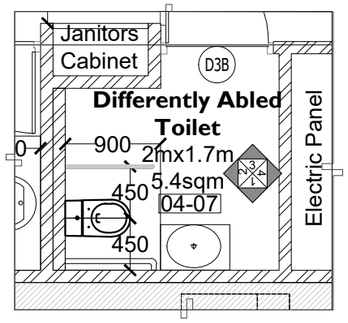
PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Interior drawing : Gents toilet

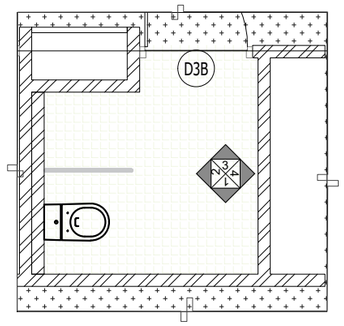
Drawing No:
3208/CDRI/NDELHI/ID 501

Scale: 1:50@A1 | Drawn: AA

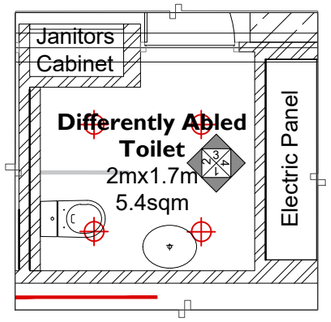
Date: 2021-01-06 | Chkd By: AP



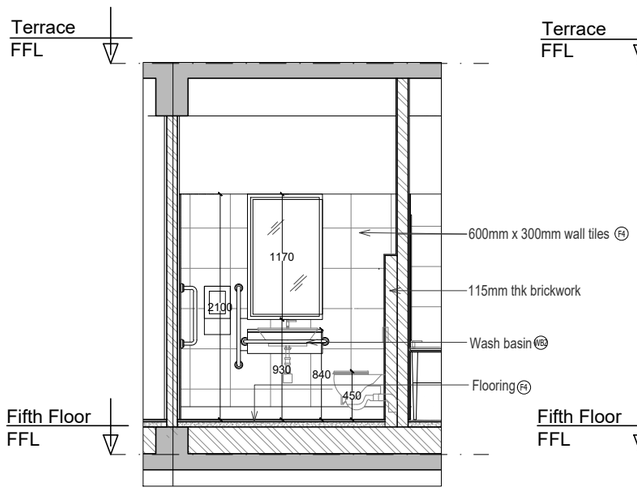
01 Plan
SCALE 1:50 @ A3



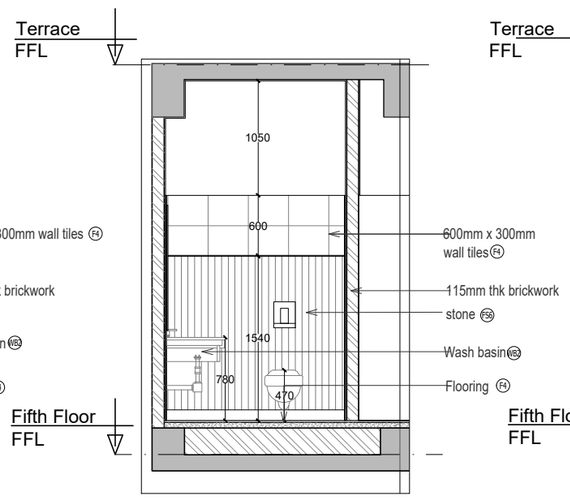
02 Flooring LAyout PLan
SCALE 1:50 @ A3



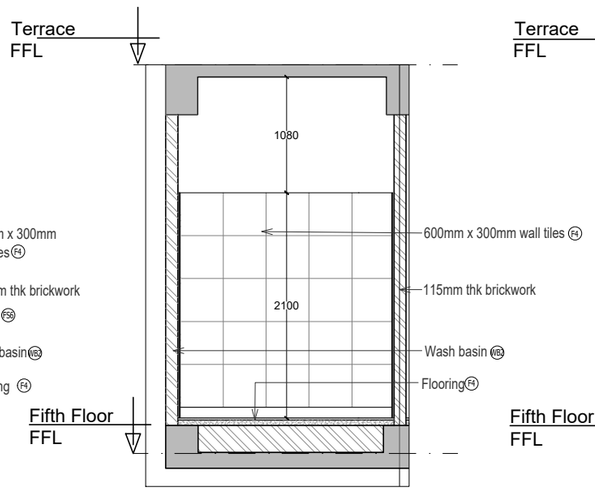
03 RCP
SCALE 1:50 @ A3



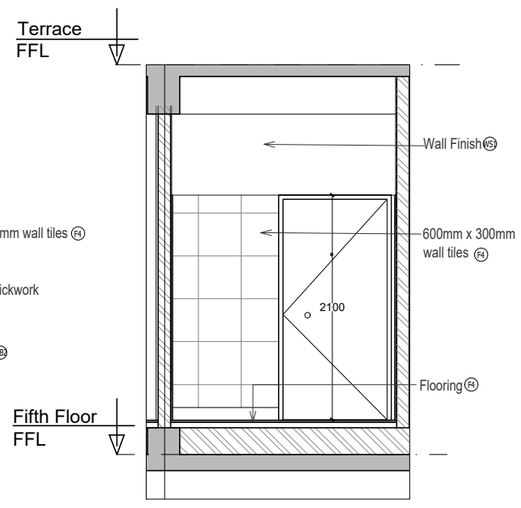
04 EL Elevation1
SCALE 1:50 @ A1



05 EL Elevation2
SCALE 1:50 @ A1



06 EL Elevation-3
SCALE 1:50 @ A1



07 EL Elevation-4
SCALE 1:50 @ A1

Notes & References

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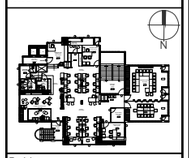


Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :
SHiFt STUDIO FOR HABITAT FUTURES
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

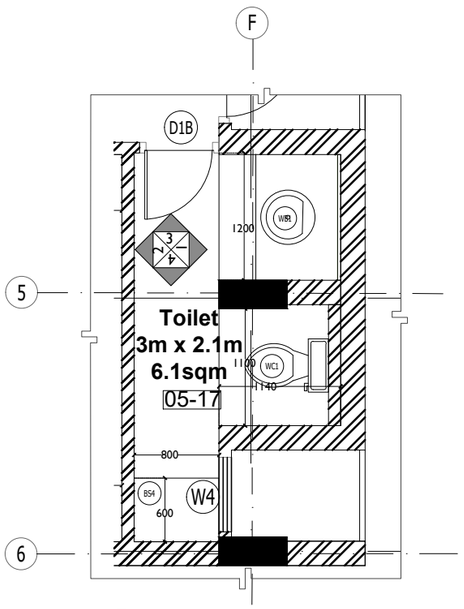
- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Interior drawing : Differently abled toilet

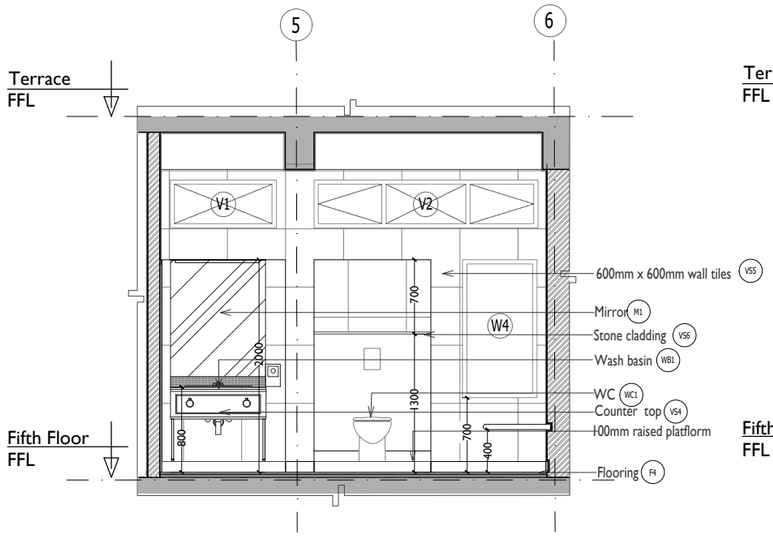
Drawing No:
3208/CDRI/NDELHI/ID 502

Scale: 1:50@A1 | Drawn: AA
Date: 2021-01-06 | Chkd By : AP



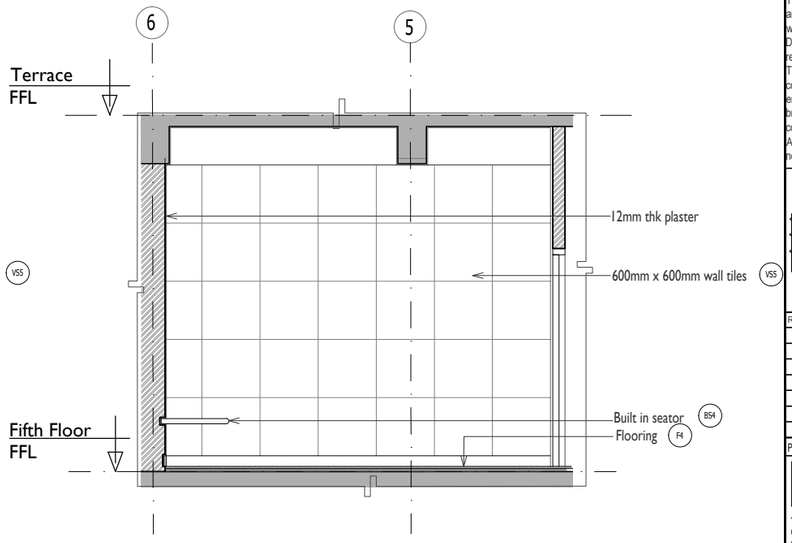
01 Plan

SCALE 1:50 @ A3



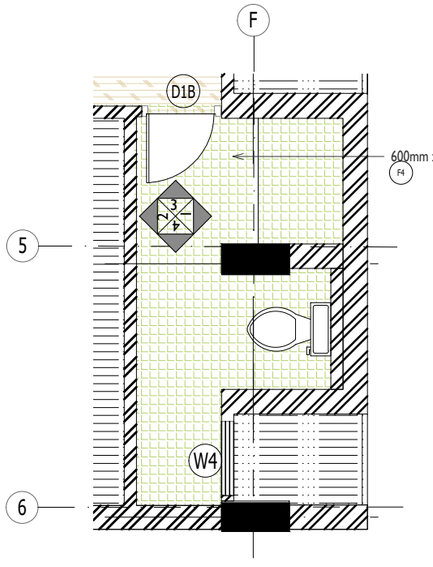
02 EL Elevation-1

SCALE 1:50 @ A1



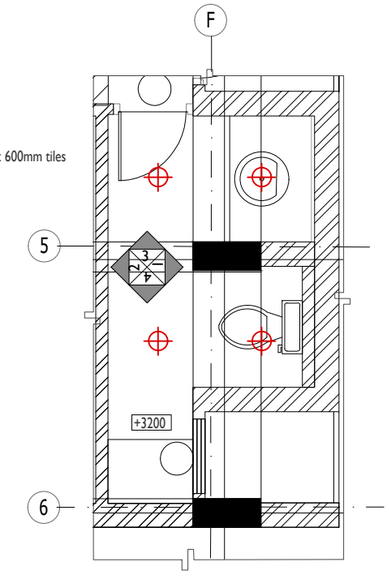
03 EL Elevation-2

SCALE 1:50 @ A1



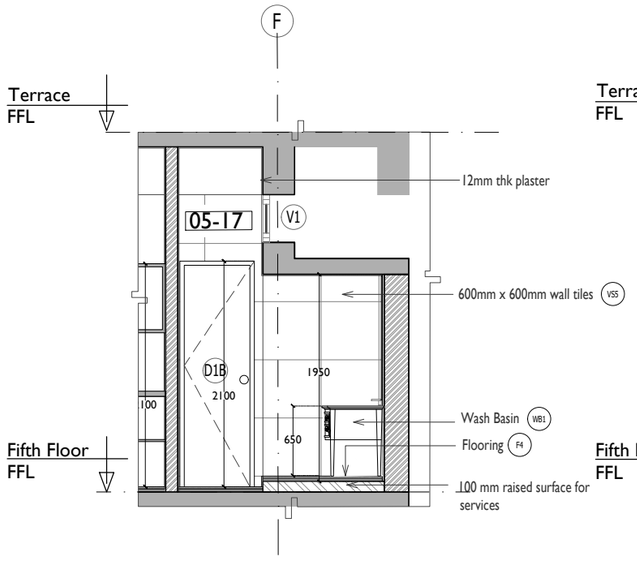
04 Flooring Layout PLan

SCALE 1:50 @ A3



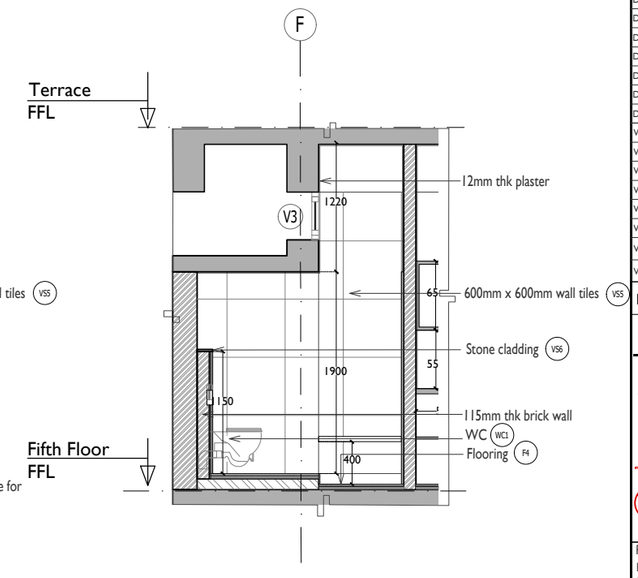
05 RCP

SCALE 1:50 @ A3



06 EL Elevation-3

SCALE 1:50 @ A1



07 EL Elevation-4

SCALE 1:50 @ A1

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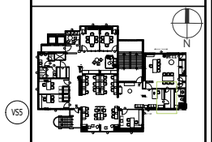


Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

PROJECT:-

H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:

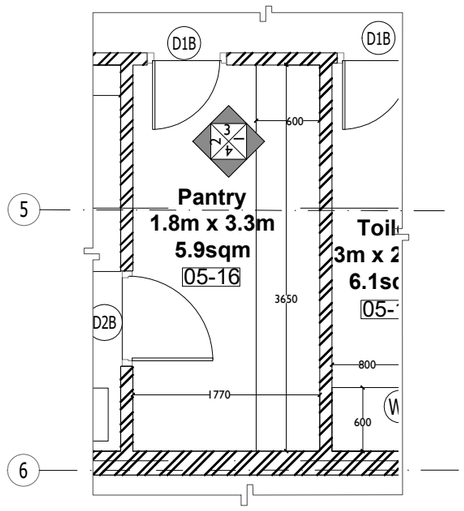
Interior Drawings : DG toilet

Drawing No:

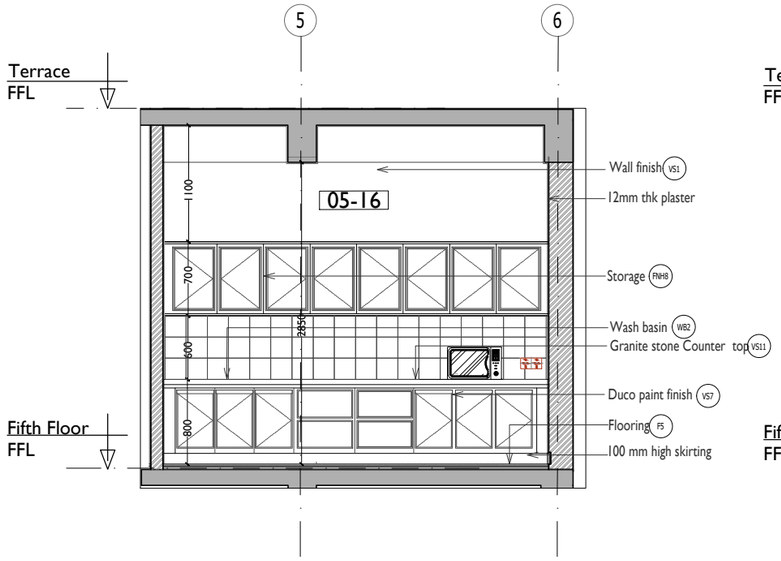
3208/CDRI/NDELHI/ID 503

Scale: 1:50@A1 | Drawn: AA

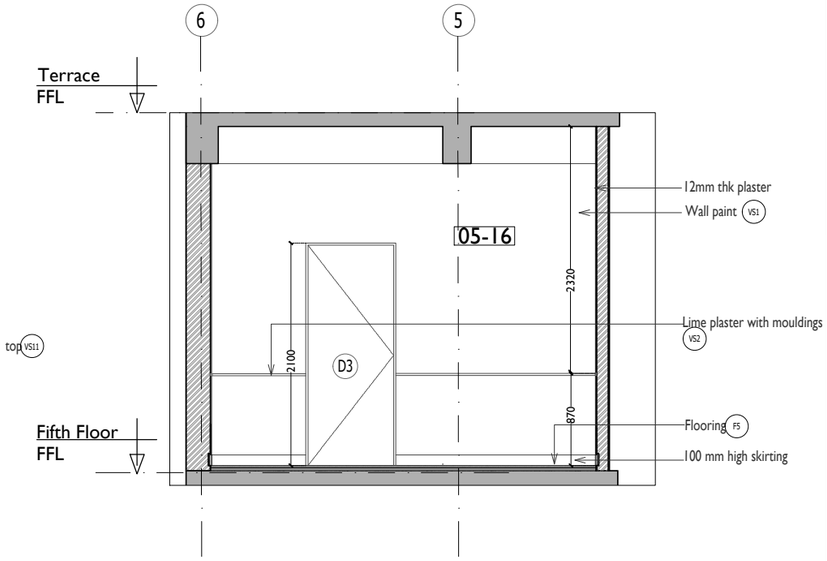
Date: 2021-01-06 | Chkd By: AP



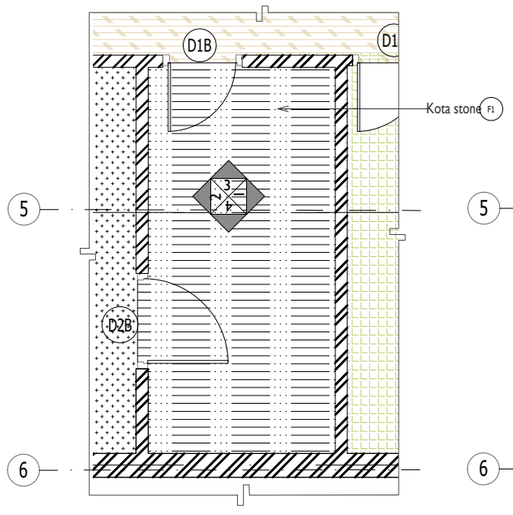
01 Plan
SCALE 1:50 @ A3



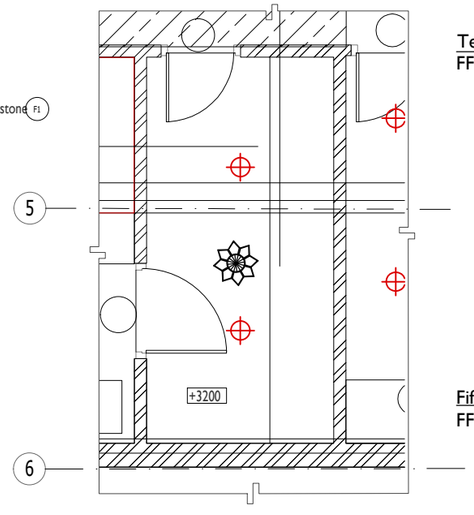
02 EL Elevation-1
SCALE 1:50 @ A1



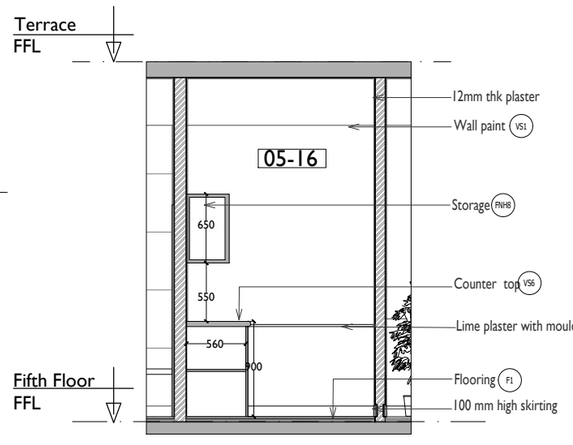
03 EL Elevation-2
SCALE 1:50 @ A1



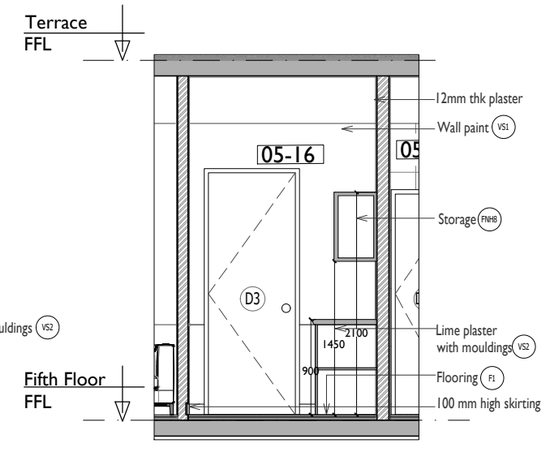
04 Flooring Layout PLan
SCALE 1:50 @ A3



05 RCP
SCALE 1:50 @ A3



06 EL Elevation-3
SCALE 1:50 @ A1



07 EL Elevation-4
SCALE 1:50 @ A1

Notes & References

General Notes -
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Dimensions on the drawing are to be read, not scaled.
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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

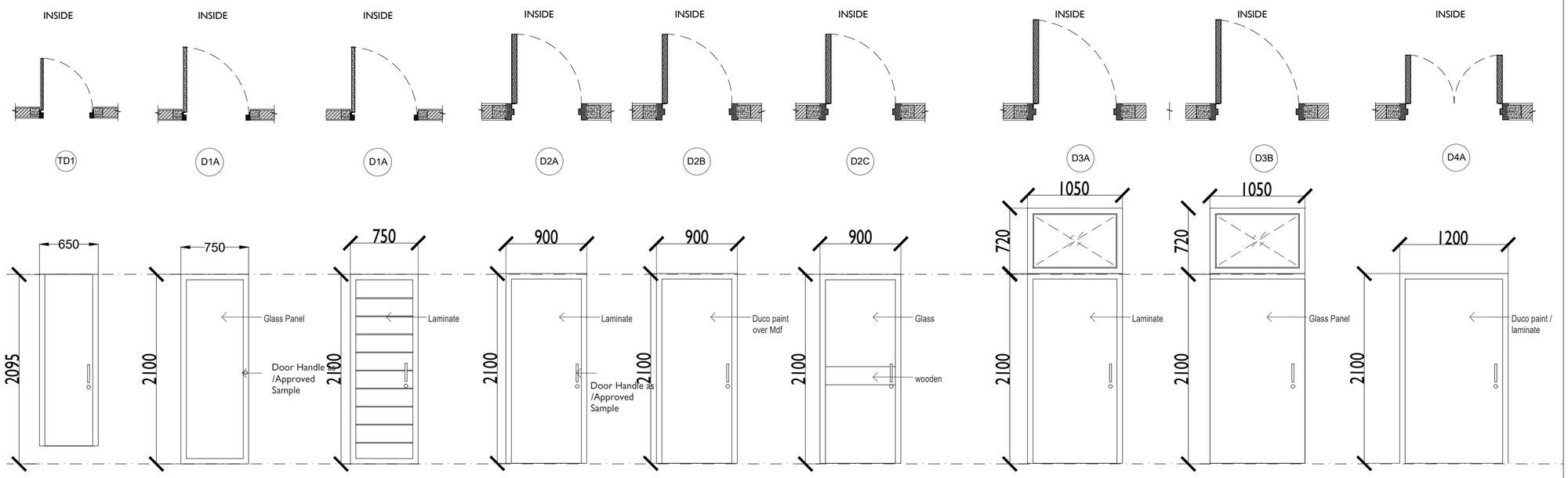
PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Interior Drawings : DG pantry

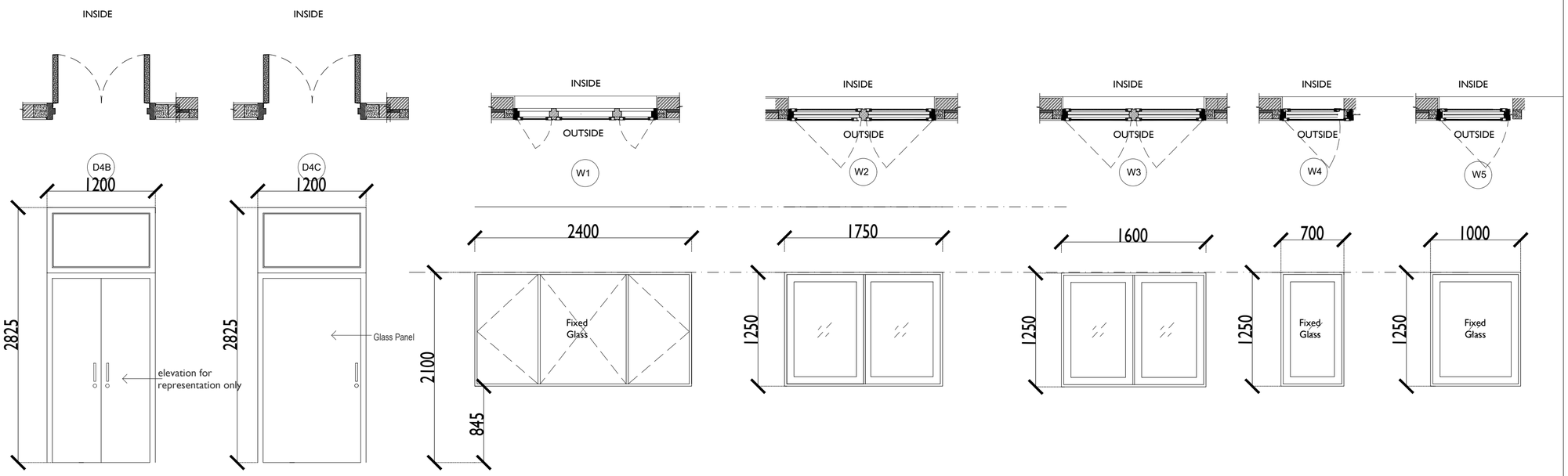
Drawing No:
3208/CDRI/NDELHI/ID 504

Scale: 1:50@A1 | Drawn: AA
Date: 2021-01-06 | Chkd By: AP

N



NO. /TYPE	TD1 DOOR	D1A DOOR	D1B DOOR	D2A DOOR	D2B DOOR	D2C DOOR	D3 DOOR	D3 DOOR	D4 DOOR
PANEL	As per vendor	Aluminium framed glass door	35 MM Thick Flush Door	35 MM Thick Flush Door	35 MM Thick Flush Door	35 mm Wooden fire door	35 MM Thick Flush Door	FRAMELESS GLASS DOOR	35 MM Thick Flush Door
FRAME		45 x 45Thk Aluminium frame	50 x100 mm thk wooden frame	50 x100 mm thk wooden frame	50 x100 mm thk wooden frame	50 x100 mm thk fire rated wooden frame	50 x100 mm thk wooden frame		50 x100 mm thk wooden frame
LOCATION	FOR Balconies	4Th - 5TH FLOOR	4Th - 5TH FLOOR	4Th - 5TH FLOOR	4Th - 5TH FLOOR	4Th - 5TH FLOOR		4Th - 5TH FLOOR	4Th - 5TH FLOOR



NO. /TYPE	D4B DOOR	D4C DOOR	W1 Window	W2 Window	W3 Window	W4 Window	W5 Window
PANEL	as sample approved and	Aluminium framed glass door	Upvc framed glass pane	Upvc framed glass pane	Upvc framed glass pane	Upvc framed glass pane	Upvc framed glass pane
FRAME	procured	45 x 45 Aluminium frame	45 x 45mm UPVC frame	45 x 45mm UPVC frame	45 x 45mm UPVC frame	45 x 45mm UPVC frame	45 x 45mm UPVC frame
LOCATION	4Th - 5TH FLOOR	4Th - 5TH FLOOR	4Th - 5TH FLOOR	4Th - 5TH FLOOR	4Th - 5TH FLOOR	4Th - 5TH FLOOR	4Th - 5TH FLOOR

Notes & References

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N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :
SHiFt STUDIO FOR HABITAT FUTURES
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

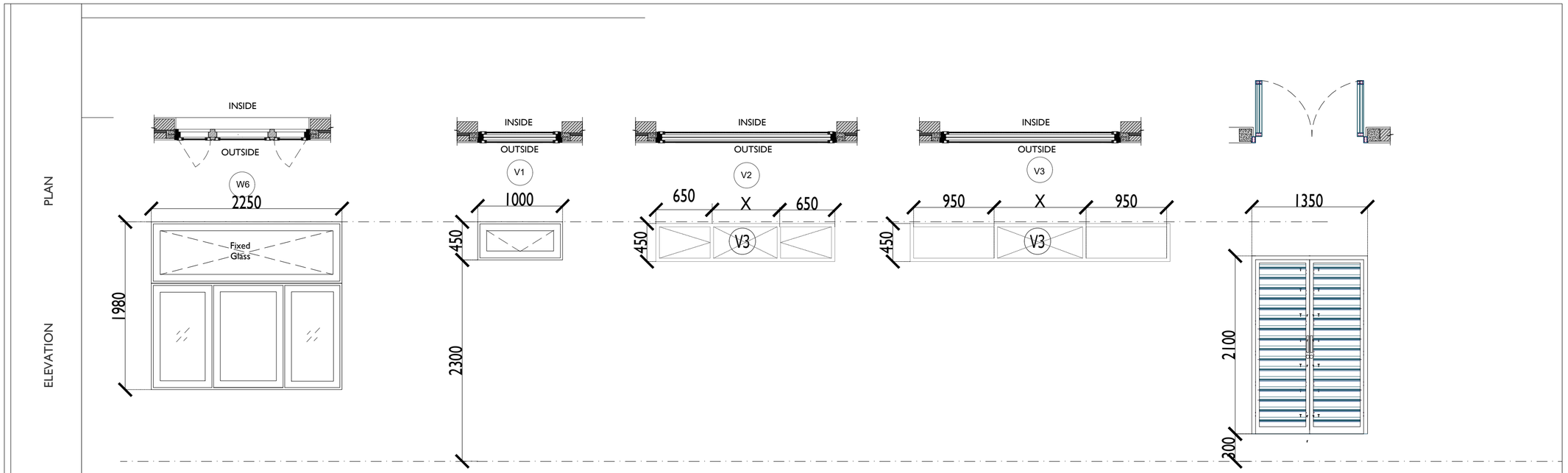
PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Door Window Schedule

Drawing No:
3208/CDRI/NDELHI/D 604

Scale: 1:50@A1 | Drawn: AA
Date: 2021-01-06 | Chkd By : AP

N



NO. /TYPE	W6 Window	V1 Window	V2 Window	V3 Window	SD DOOR
PANEL	Upvc framed glass pane	Upvc framed glass pane	Upvc framed glass pane	Upvc framed glass pane	50 mm Thick Aluminum Shutter
FRAME	45 x 45mm UPVC frame	45 x 45mm UPVC frame	45 x 45mm UPVC frame	45 x 45mm UPVC frame	Aluminum Frame 63.5X38X3.18 Thick
LOCATION	4Th - 5TH FLOOR	4Th - 5TH FLOOR	4Th - 5TH FLOOR	4Th - 5TH FLOOR	4Th - 5TH FLOOR

Notes & References

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

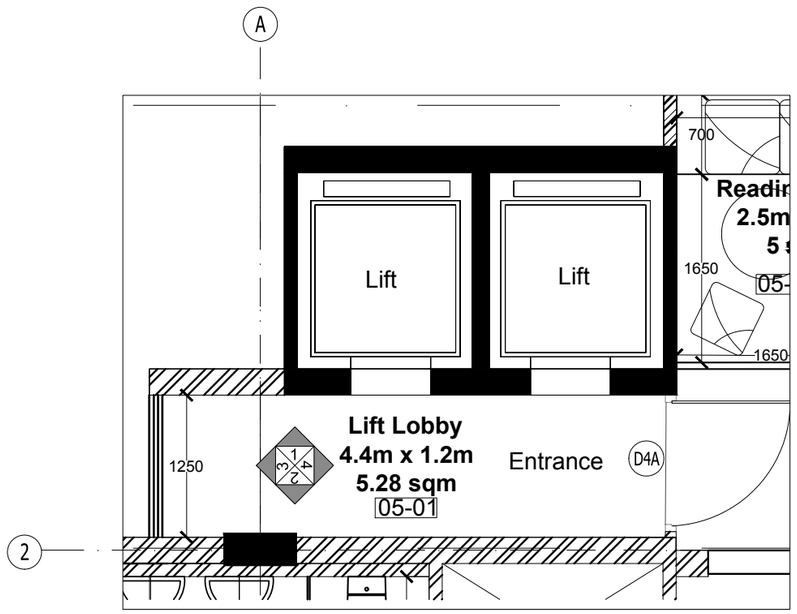
PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Door Window Schedule

Drawing No:
3208/CDRI/NDELHI/D 604

Scale: 1:50@A1 | Drawn: AA
Date: 2021-01-06 | Chkd By : AP

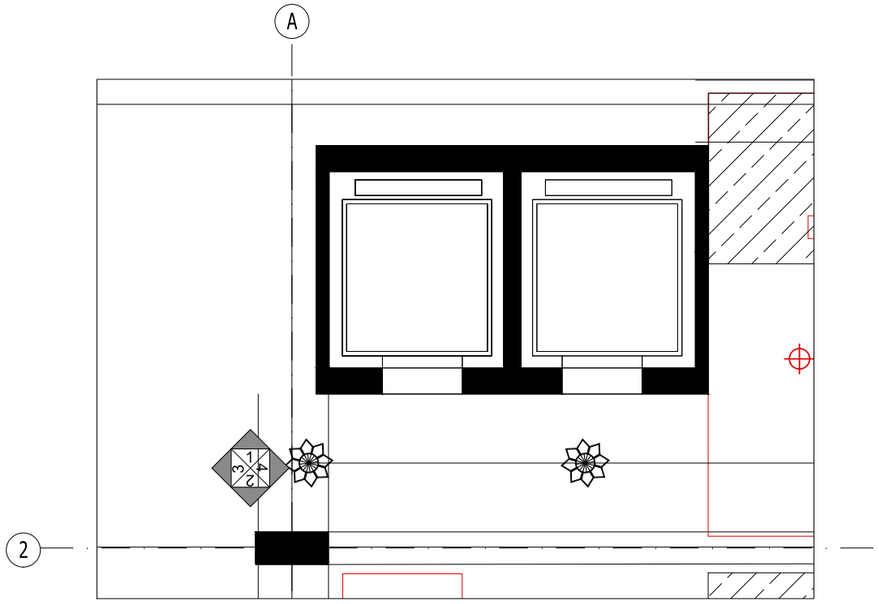
N



01 Plan

Plan

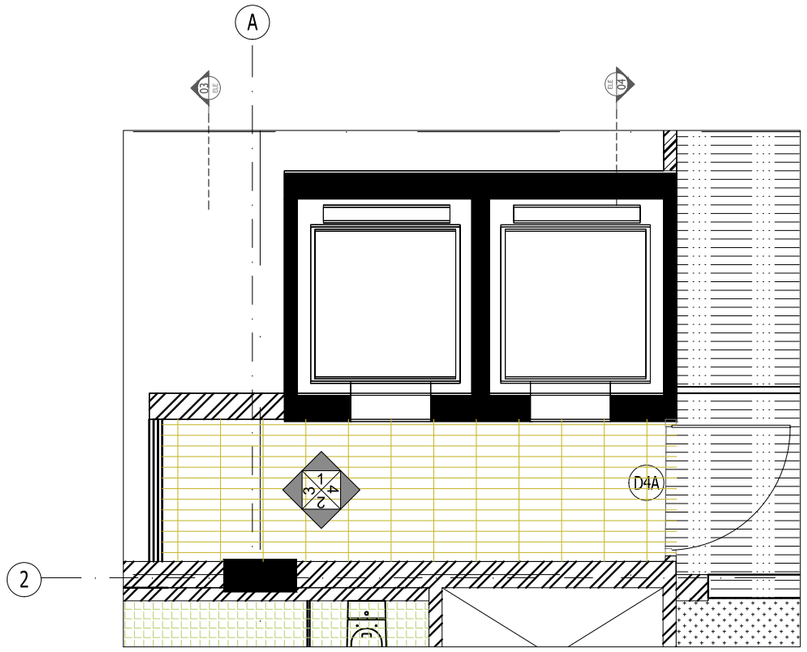
SCALE 1:50 @ A1



03 RCP

RCP

SCALE 1:100@ A3



02 FLOORING LAYOUT

FLOORING LAYOUT

SCALE 1:100@ A3

Notes & References

General Notes -

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Dimensions on the drawing are to be read, not scaled.

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-

H/O CDRI at
Shri Ram Kala Kendra

COALITION FOR DISASTER RESILIENT INFRASTRUCTURE

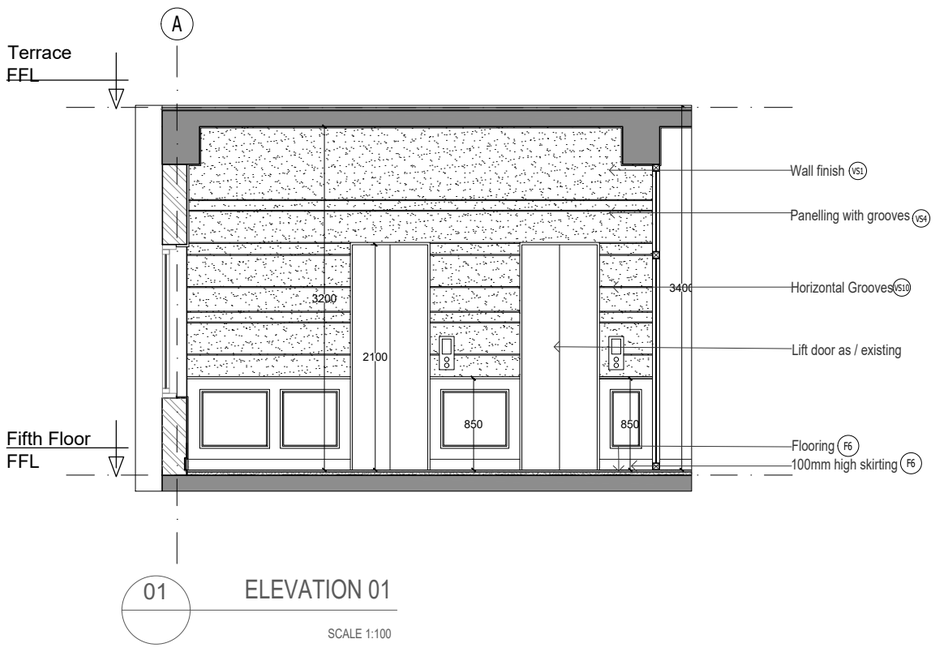
Drawing Title:
Interior Drawings : Lift Lobby Typical

Drawing No:
3208/CDRI/NDELHI/ID 1101

Scale: 1:50@A1 | Drawn: AA

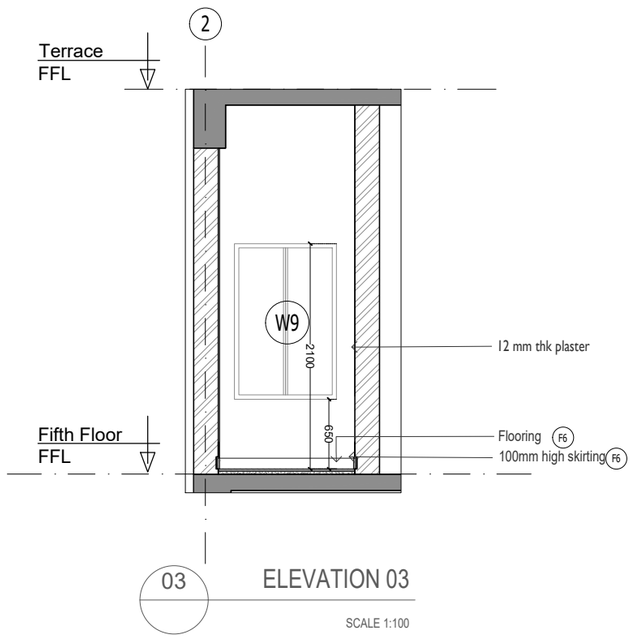
Date: 2021-01-06 | Chkd By : AP

N



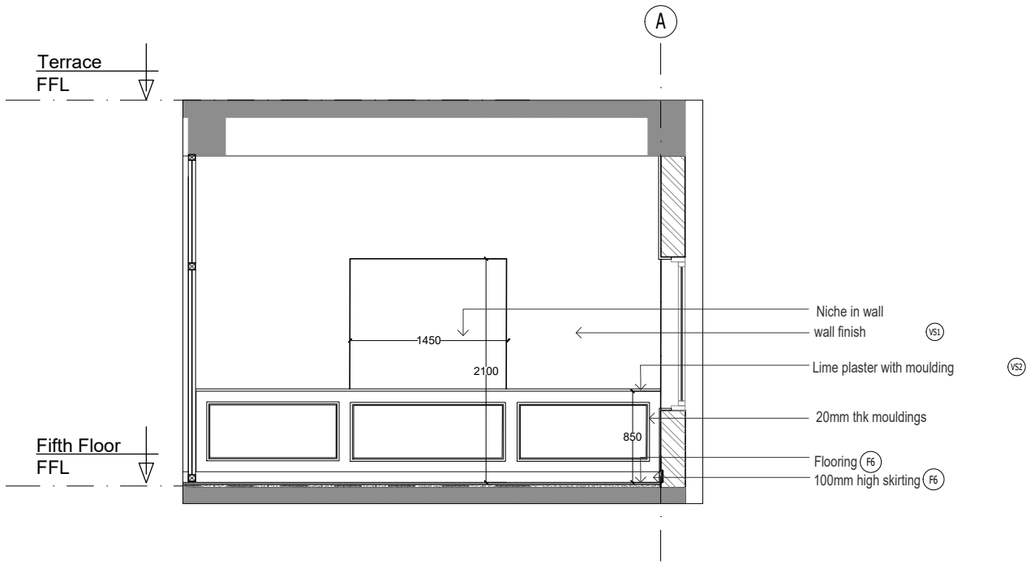
01 ELEVATION 01

SCALE 1:100



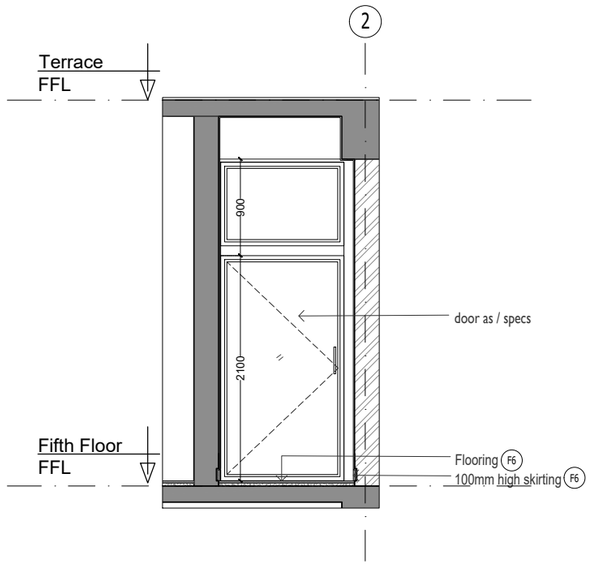
03 ELEVATION 03

SCALE 1:100



02 ELEVATION 02

SCALE 1:100



04 ELEVATION 04

SCALE 1:100

Notes & References

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

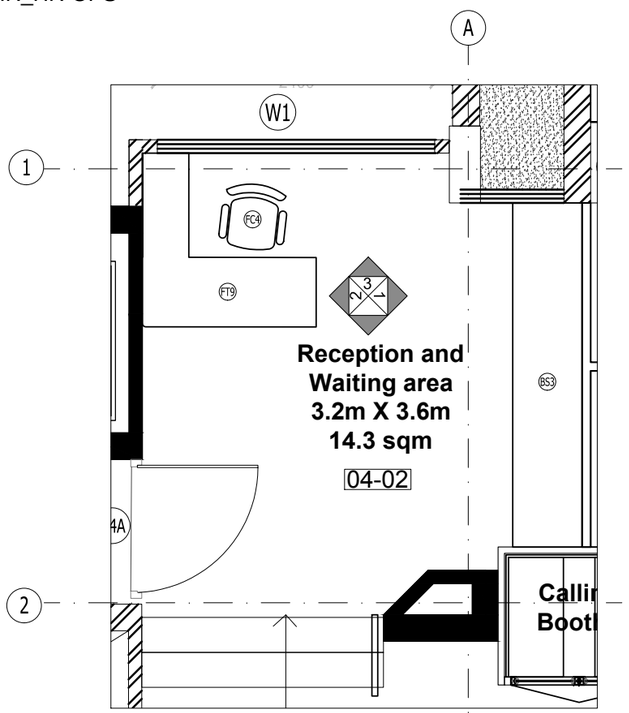
COALITION FOR DISASTER RESILIENT INFRASTRUCTURE

Drawing Title:
Interior Drawings : Lift Lobby Typical

Drawing No:
3208/CDRI/NDELHI/ID 1101

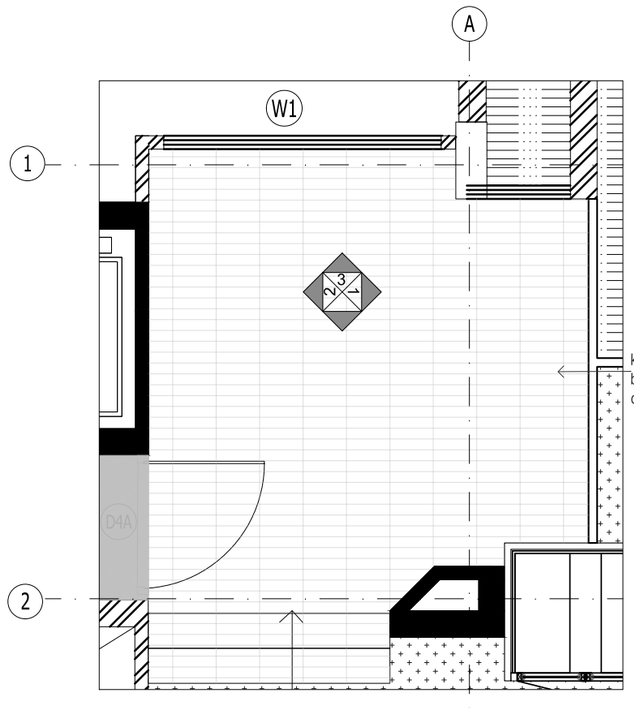
Scale: 1:50@A1 | Drawn: AA | Date: 2021-01-06 | Chkd By: AP

N



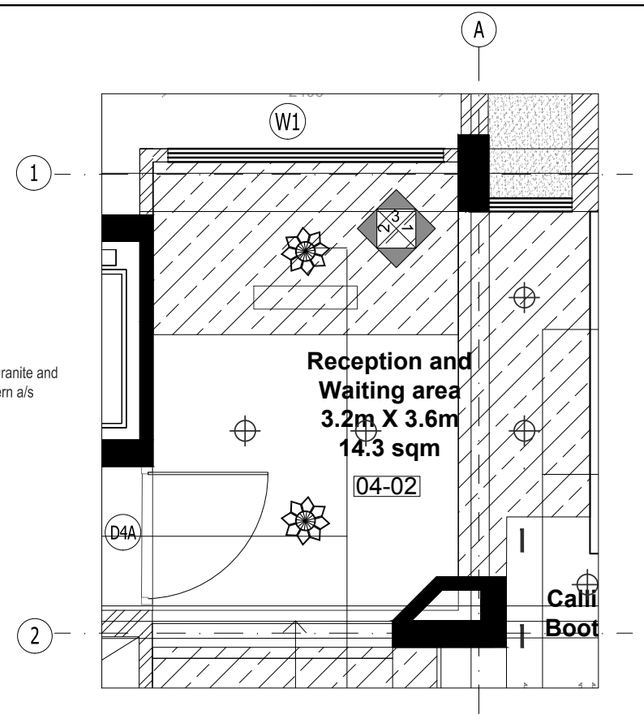
01 Plan — Plan

SCALE 1:50 @ A3



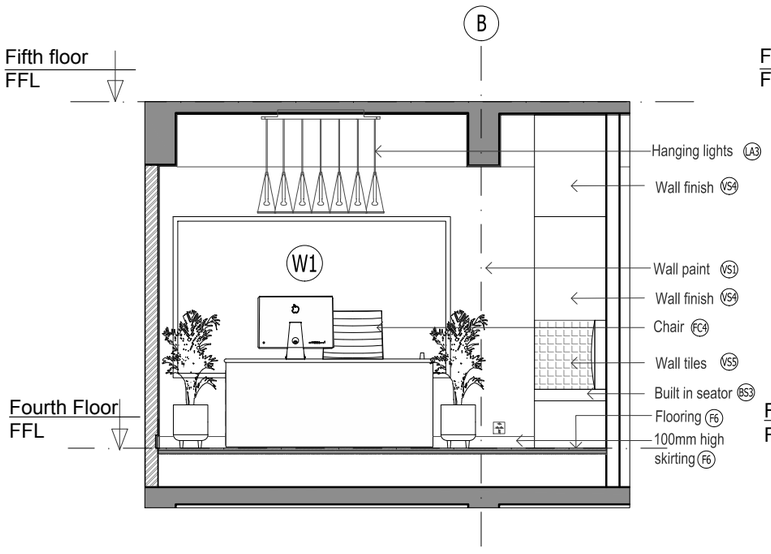
01 Plan — Flooring layout plan

SCALE 1:50 @ A3



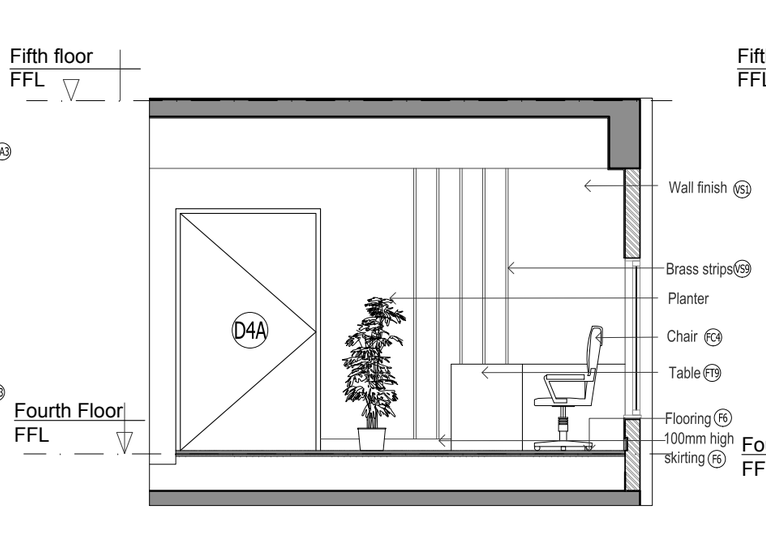
03 RCP — RCP Plan

SCALE 1:50 @ A3



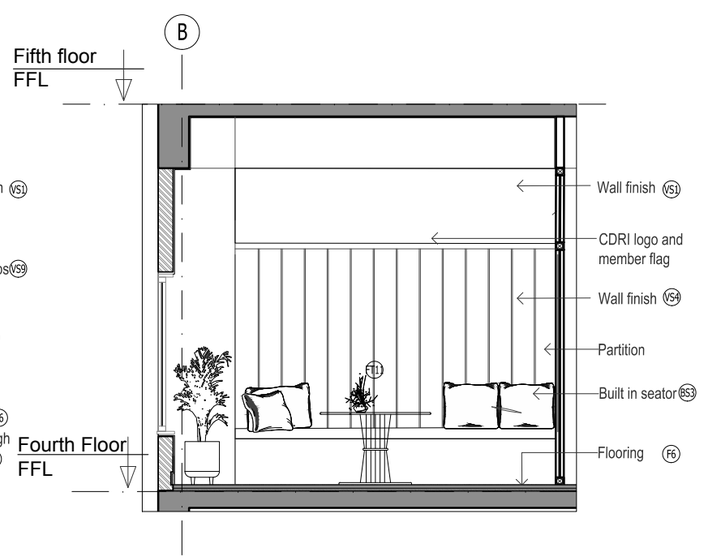
06 EL — Elevation-1

SCALE 1:50 @ A3



06 EL — Elevation-2

SCALE 1:50 @ A3



06 EL — Elevation-3

SCALE 1:50 @ A3

Notes & References

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All dimensions are in millimeters unless noted otherwise.

N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

PROJECT:-

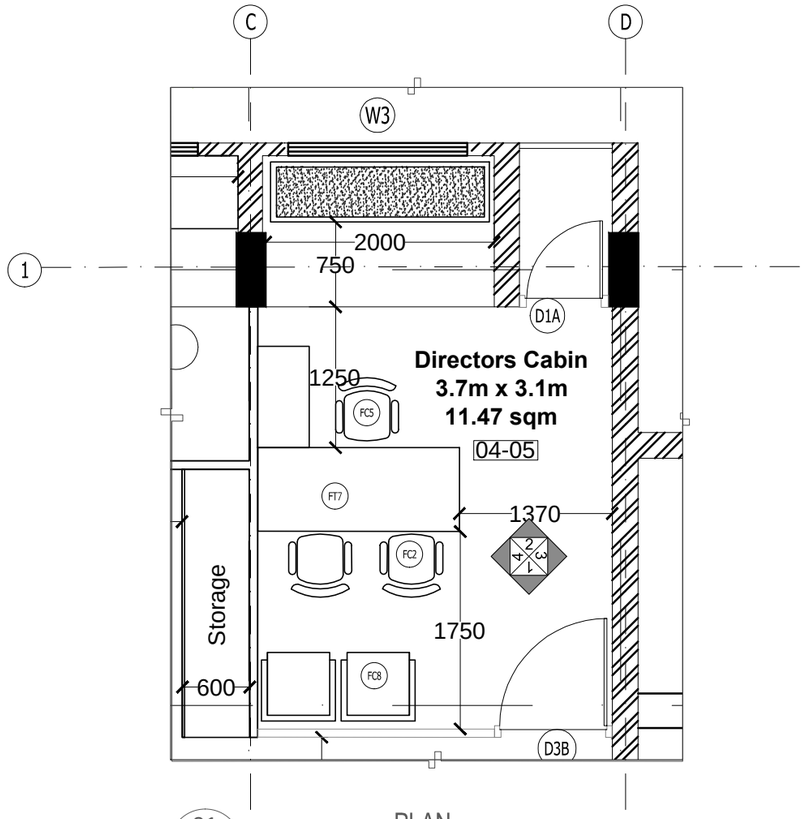
COALITION FOR DISASTER RESILIENT INFRASTRUCTURE

Drawing Title:
Reception and waiting area

Drawing No:
3208/CDRI/NDELHI/ID 1102

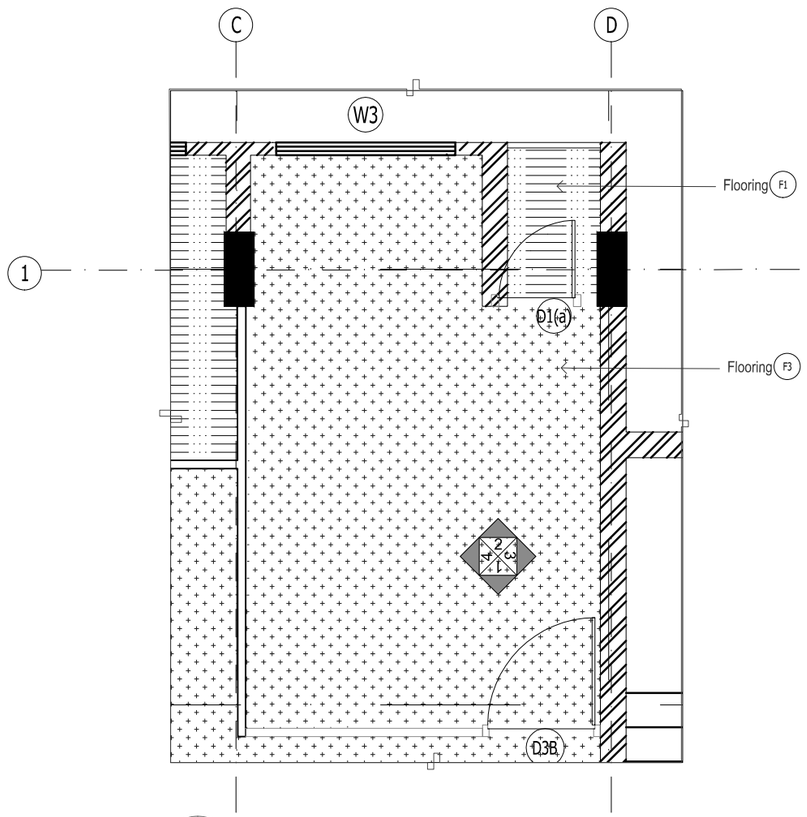
Scale: 1:100@A3 | Drawn: AA | Date: 2020-11-04 | Chkd By : AP

N



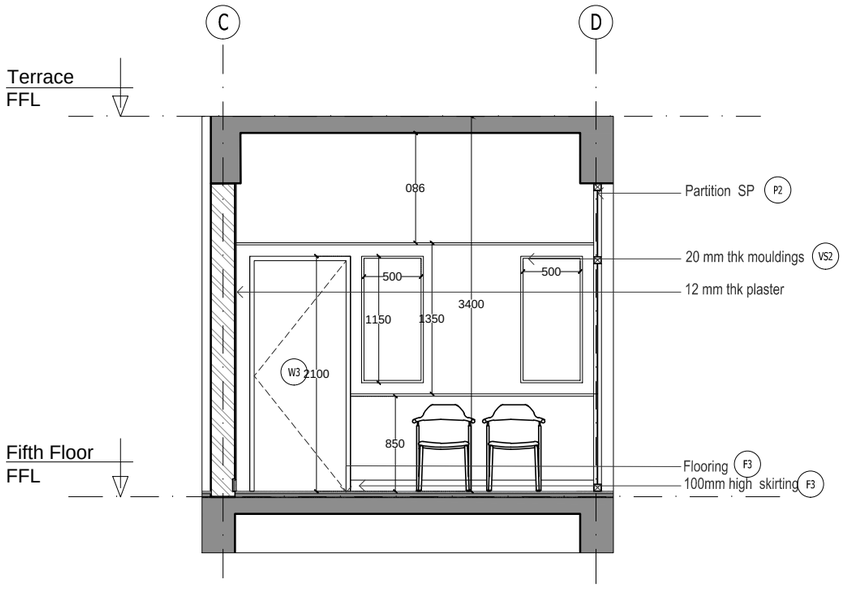
01 PLAN

SCALE 1:50@ A3



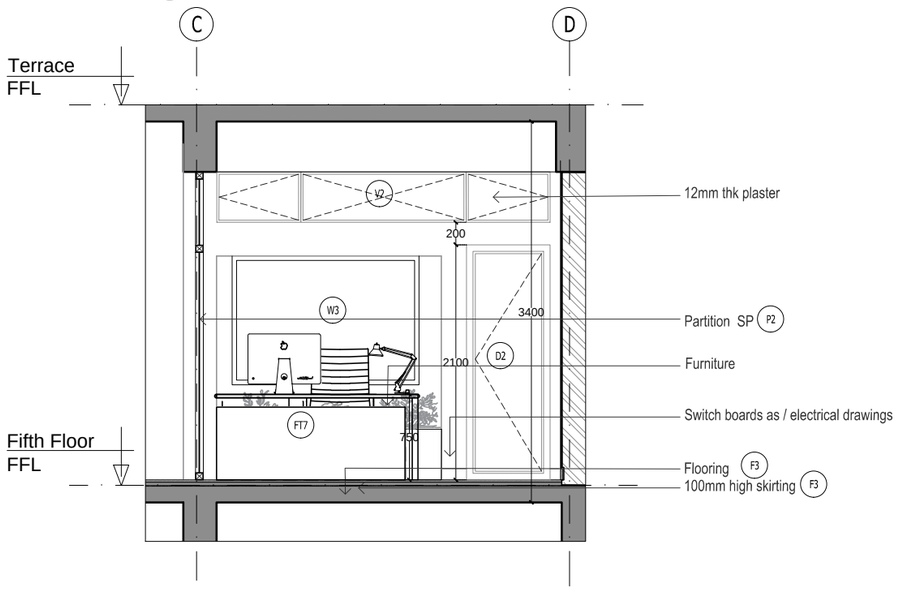
02 FLOORING LAYOUT

SCALE 1:50@ A3



01 ELEVATION 01

SCALE 1:50



02 ELEVATION 02

SCALE 1:50

Notes & References

General Notes -

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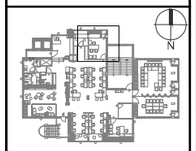


Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

PROJECT:-

H/O CDRI at
Shri Ram Kala Kendra

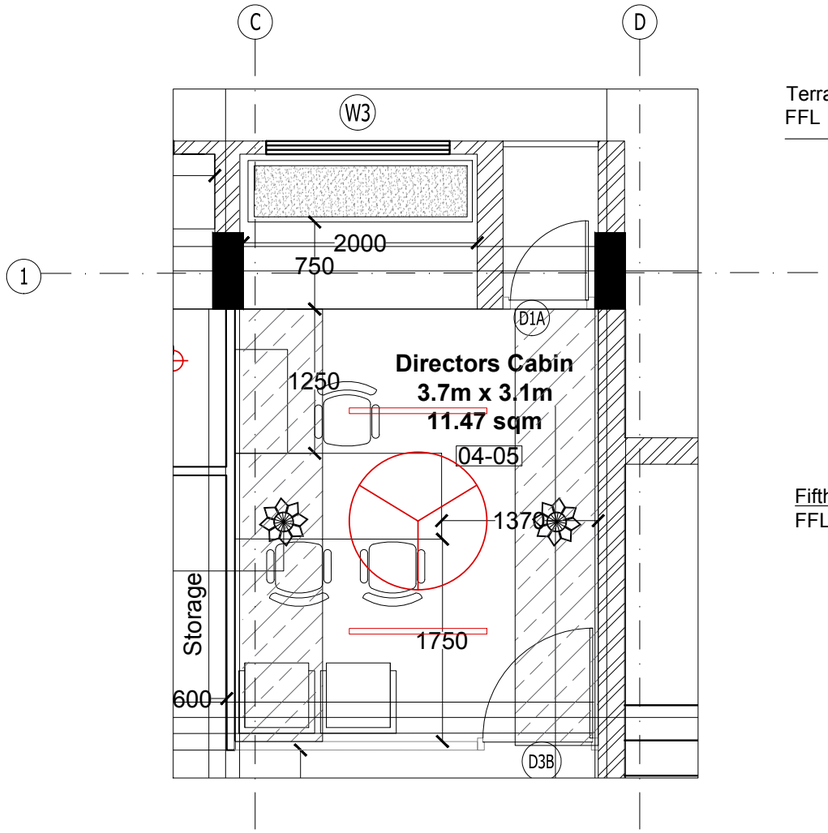
Drawing Title:
Interior Drawings : Director Cabin - 5th floor

Drawing No:
3208/CDRI/NDELHI/ID 1103

Scale: 1:50@A1 | Drawn: AA

Date: 2021-01-06 | Chkd By: AP

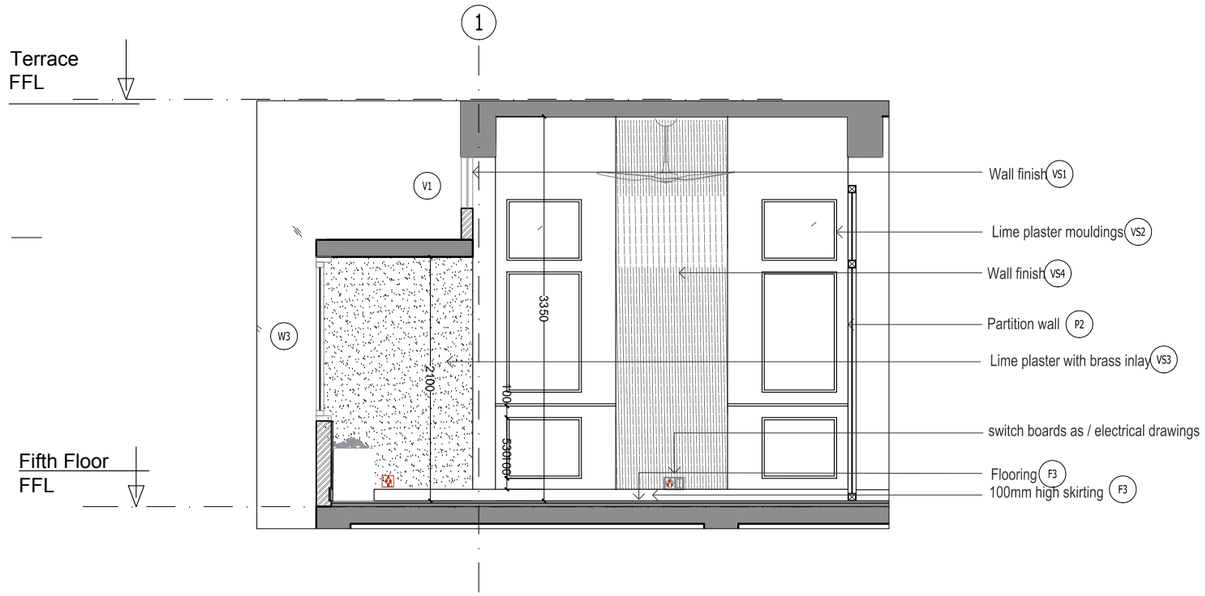
N



03 RCP

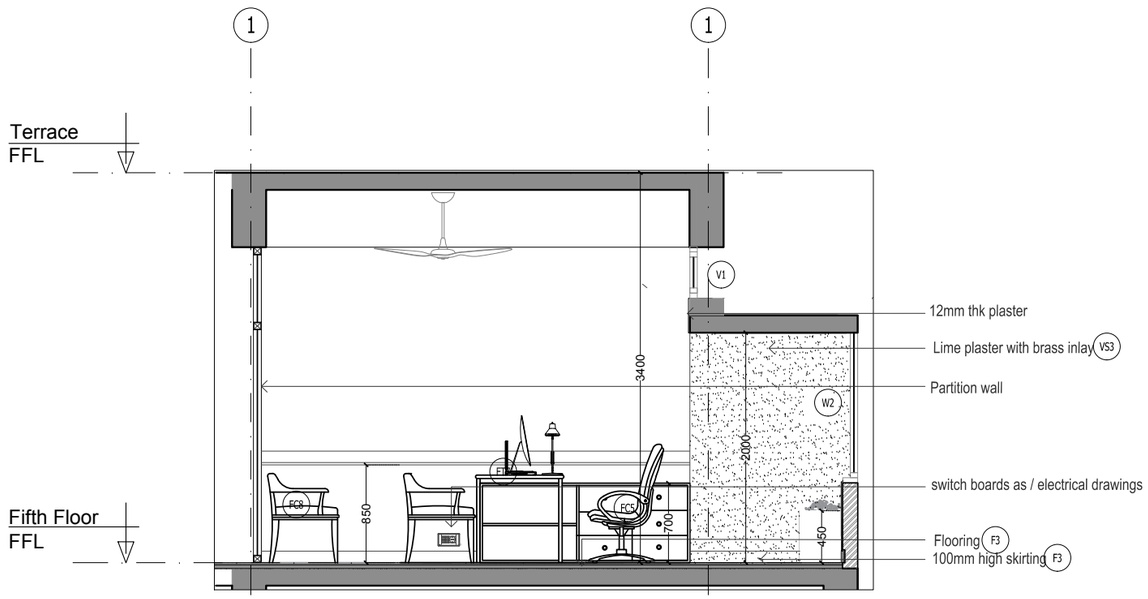
SCALE 1:50@ A1

FC2



03 ELEVATION 03

SCALE 1:50



04 ELEVATION 04

SCALE 1:50

Notes & References

General Notes -

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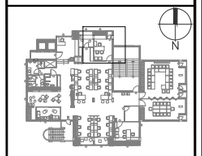


Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

PROJECT:-

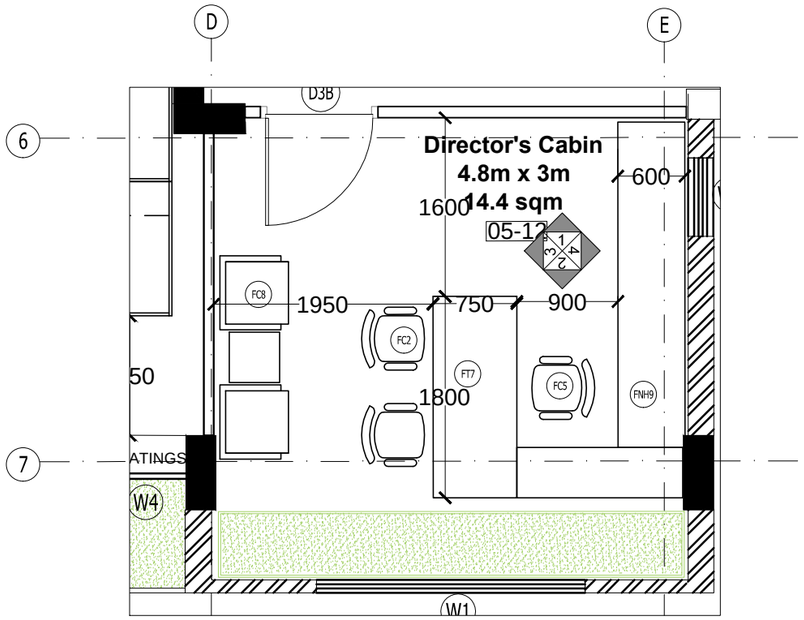
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Interior Drawings : Director Cabin - 5th floor

Drawing No:
3208/CDRI/NDELHI/ID 1104

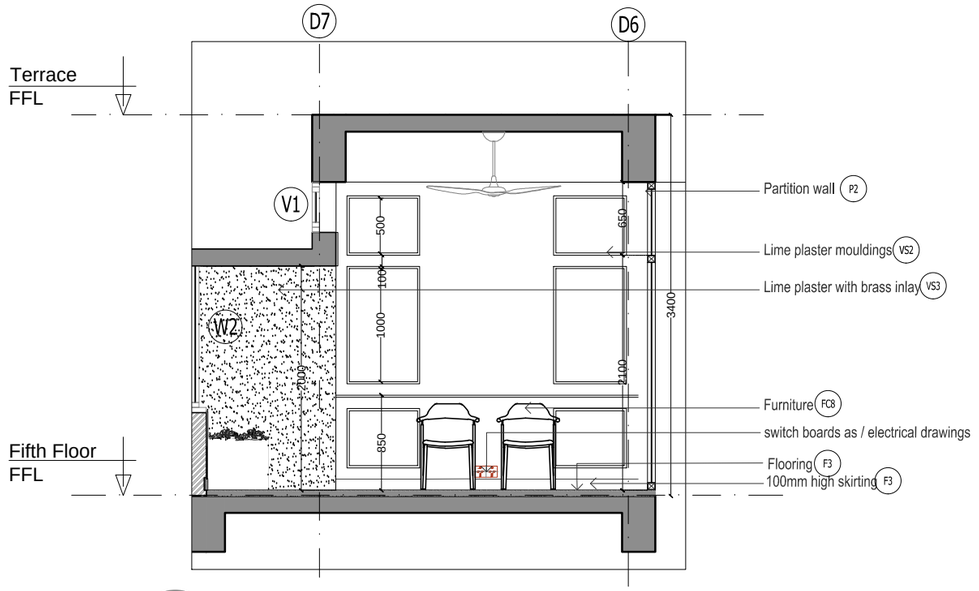
Scale: 1:50@A1 | Drawn: AA

Date: 2021-01-06 | Chkd By: AP



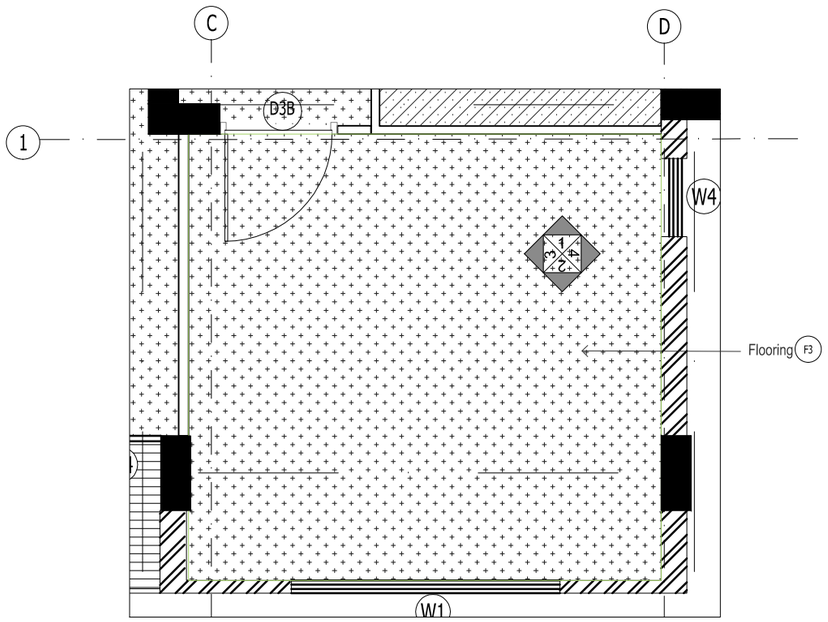
01 PLAN

SCALE 1:50@ A3



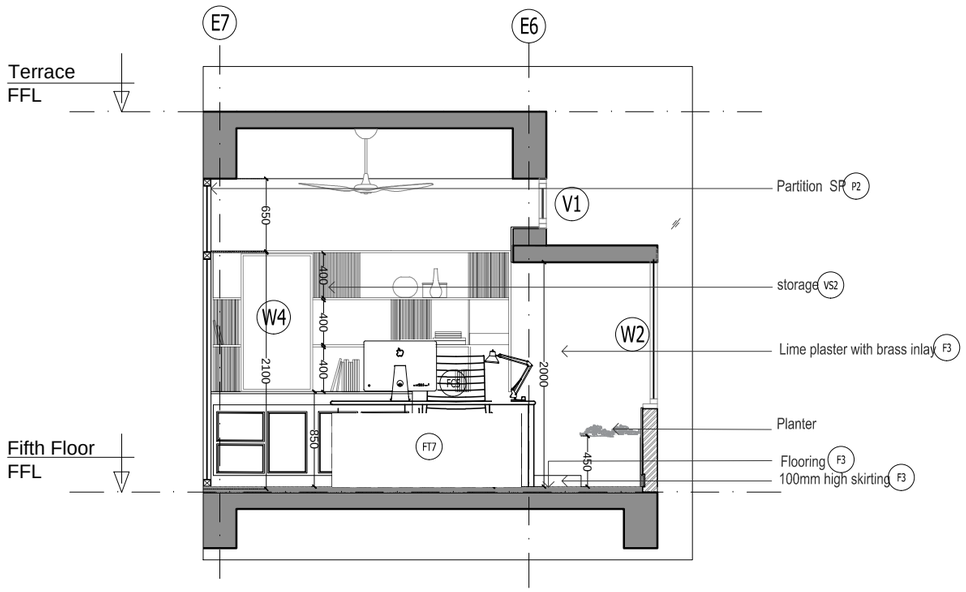
01 ELEVATION 01

SCALE 1:50



02 FLOORING LAYOUT

SCALE 1:50@ A3



01 ELEVATION 01

SCALE 1:50

Notes & References

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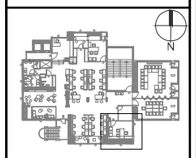


Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

PROJECT:-

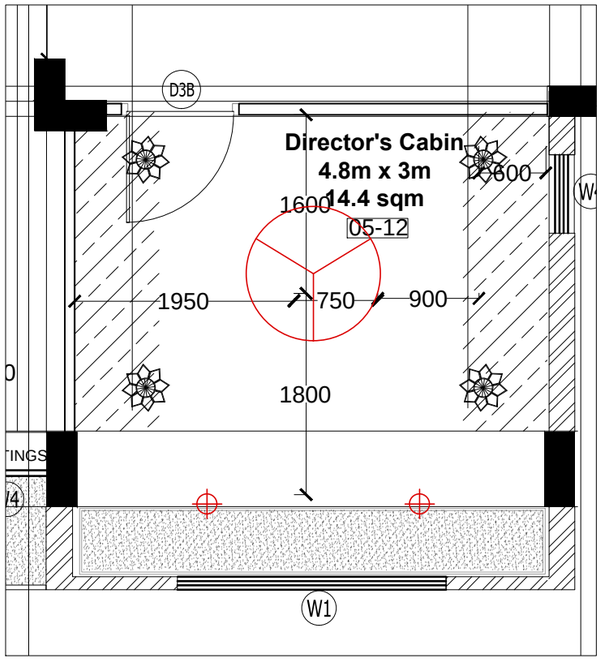
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Interior Drawings : Director Cabin - 5th floor

Drawing No:
3208/CDRI/NDELHI/ID 1104

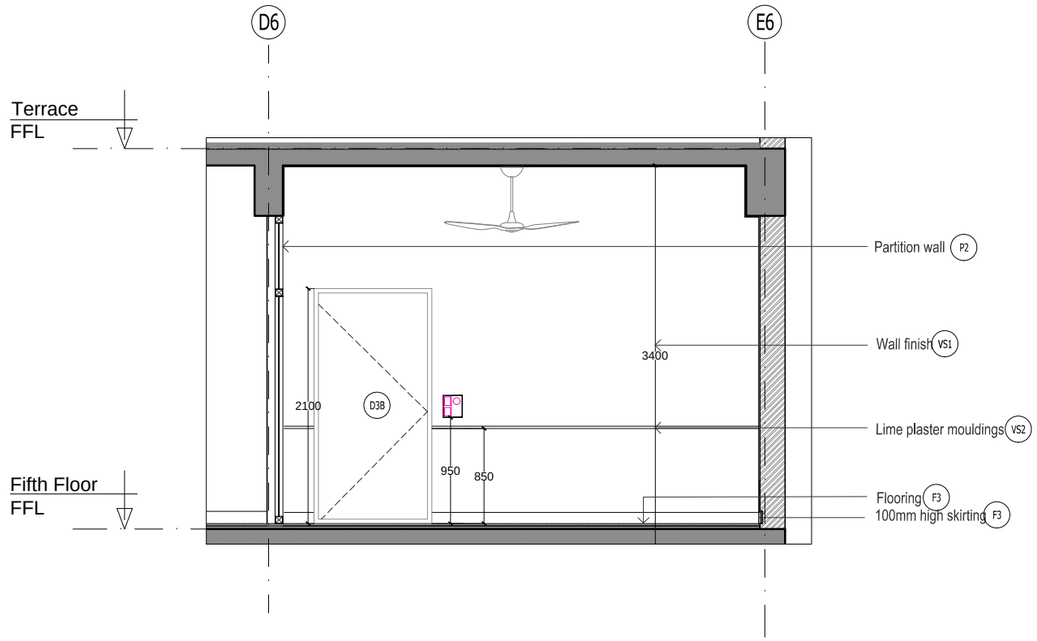
Scale 1:50@A1 | Drawn: AA

Date: 2021-01-06 | Chkd By :AP



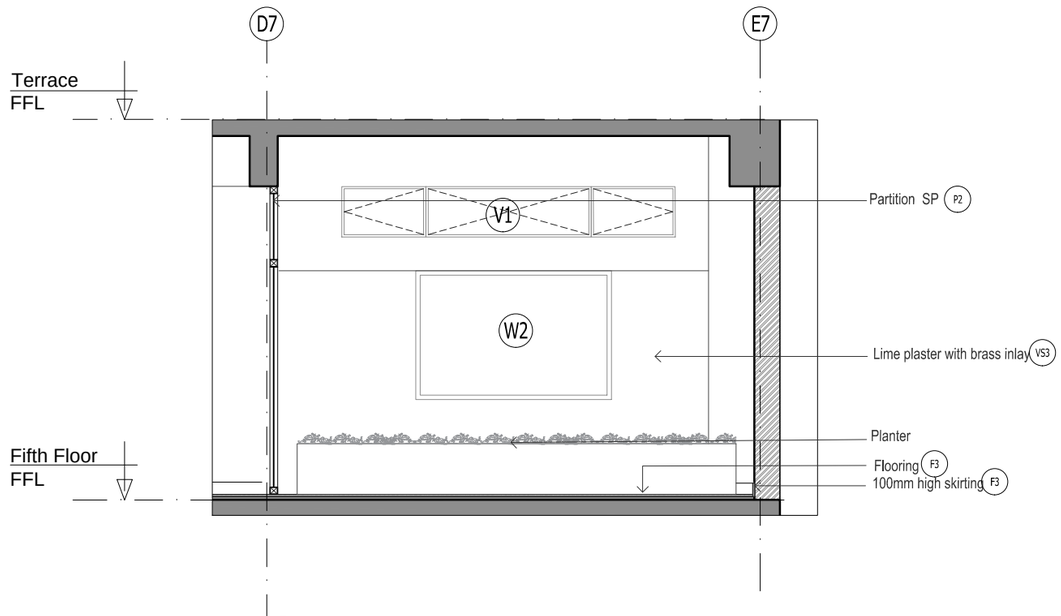
03 RCP

SCALE 1:50@ A1



03 ELEVATION 03

SCALE 1:50



04 ELEVATION 04

SCALE 1:50

Notes & References

General Notes -

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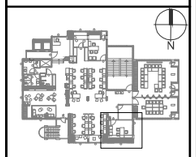


Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

PROJECT:-

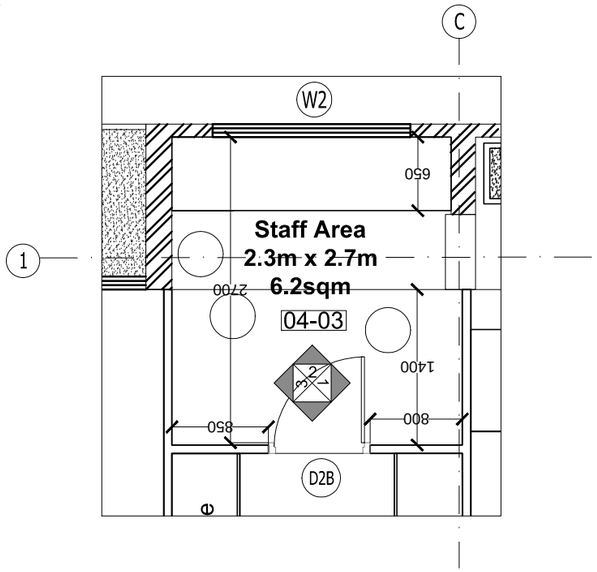
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Interior Drawings : Director Cabin - 5th floor

Drawing No:
3208/CDRI/NDELHI/ID 1104

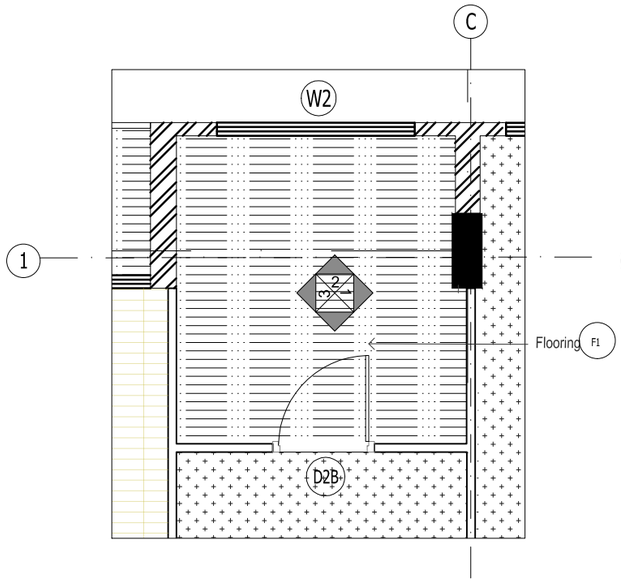
Scale 1:50@A1	Drawn: AA
Date: 2021-01-06	Chkd By :AP

N



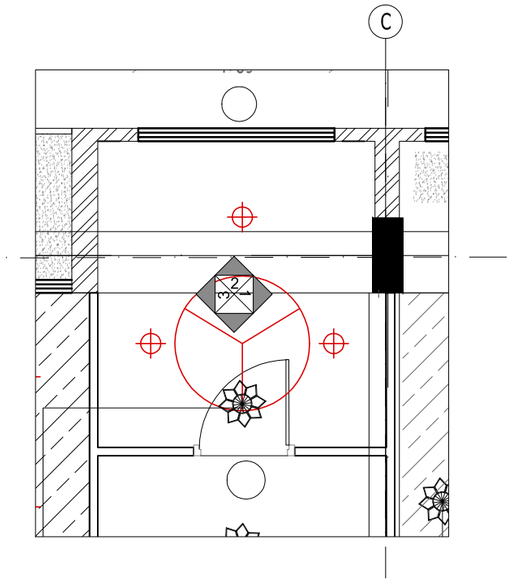
01 Plan — Plan

SCALE 1:50 @ A3



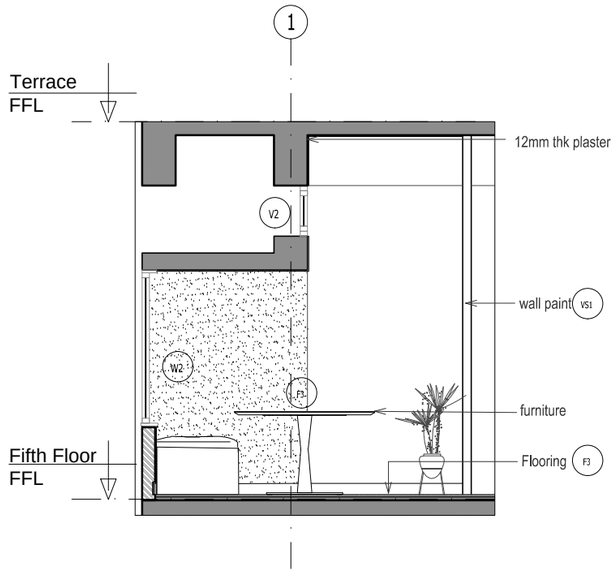
01 Plan — Flooring layout plan

SCALE 1:50 @ A3



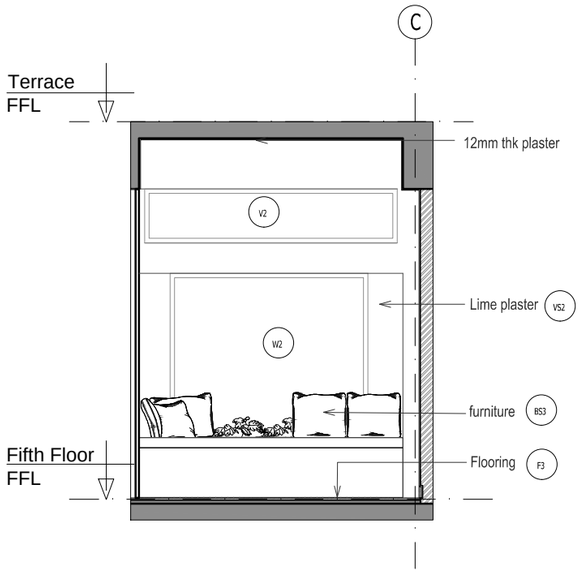
03 RCP — RCP Plan

SCALE 1:50 @ A3



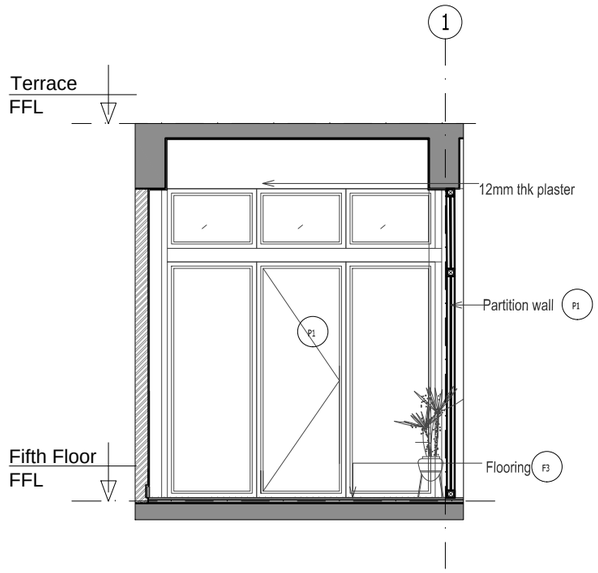
04 EL — Elevation-1

SCALE 1:50 @ A3



05 EL — Elevation-2

SCALE 1:50 @ A3



06 EL — Elevation-3

SCALE 1:50 @ A3

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Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

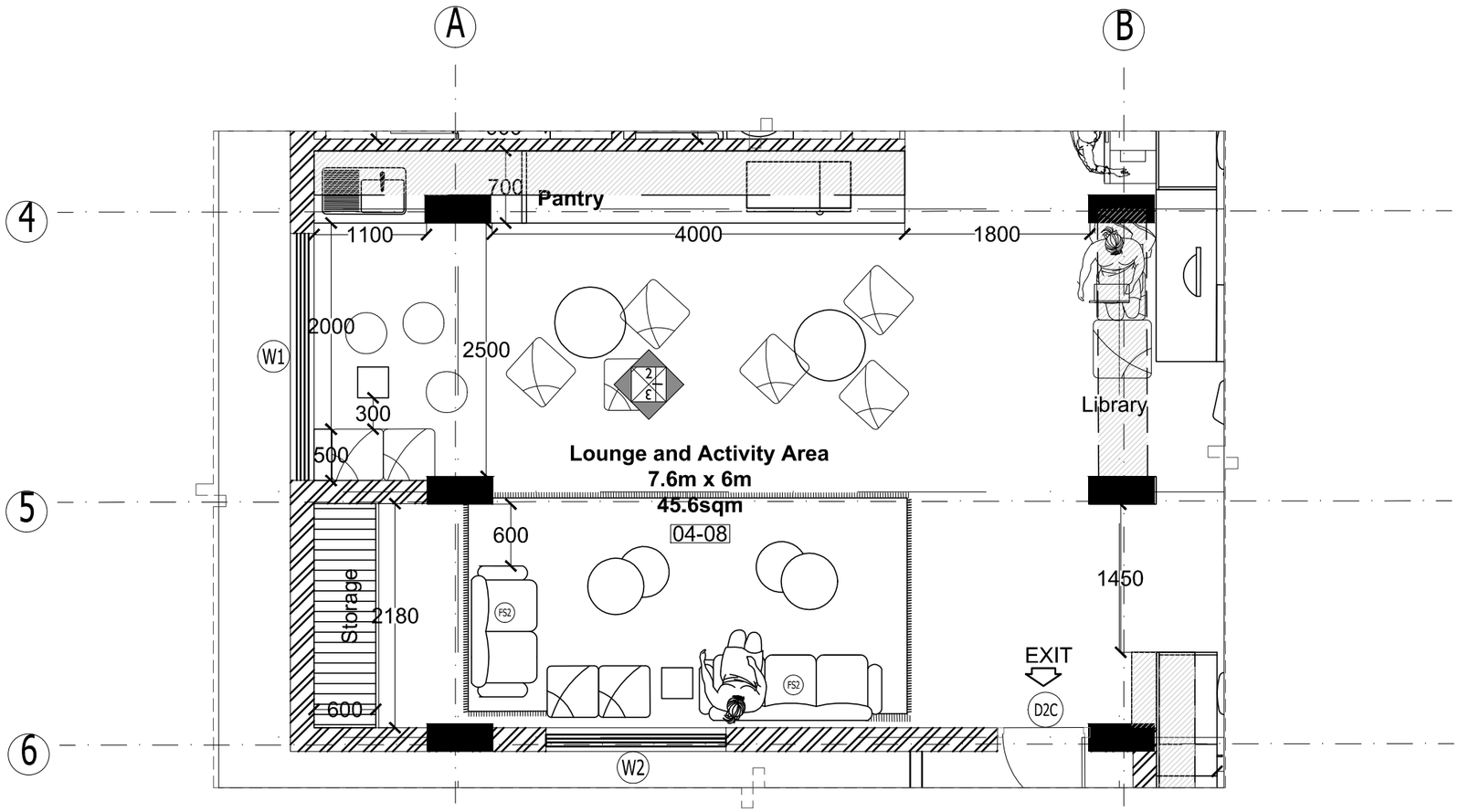
No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Staff area

Drawing No:
3208/CDRI/NDELHI/ID 1105

Scale 1:50@A1 | Drawn: AA
Date: 2021-01-06 | Chkd By : AP



01 PLAN

SCALE 1:50

Notes & References

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N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi I 10048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

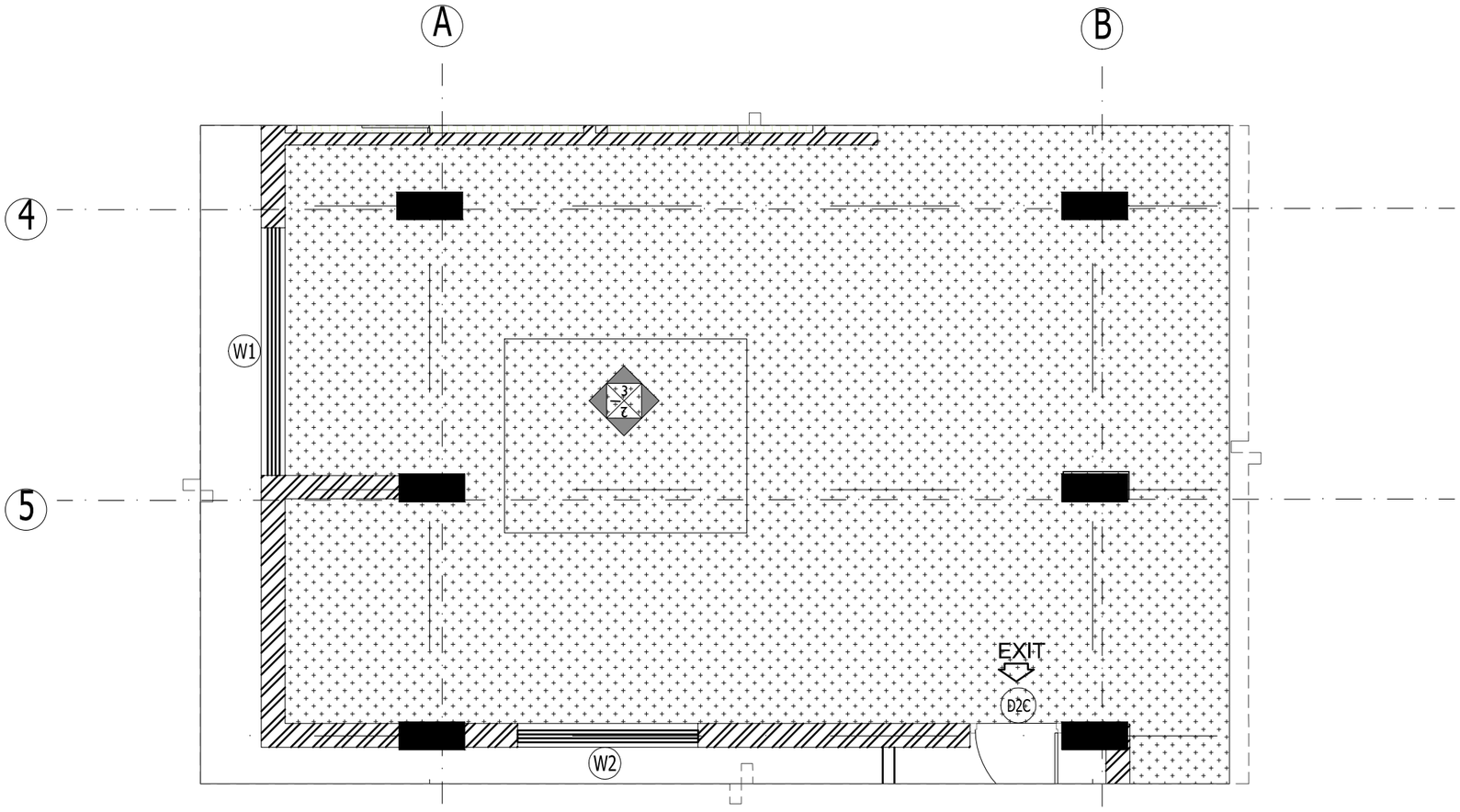
PROJECT:-
H/O for CDRI at
Shri Ram Kala Kendra

Drawing Title:
Breakout space-4th floor - Interior

Drawing No:
3208/CDRI/NDELHI/ID 1106

Scale: 1:100@A3 | Drawn: AA | Date: 2020-10-26 | Chkd By : AP

N



02 FLOORING LAYOUT

SCALE 1:50

Notes & References

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N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O for CDRI at
Shri Ram Kala Kendra

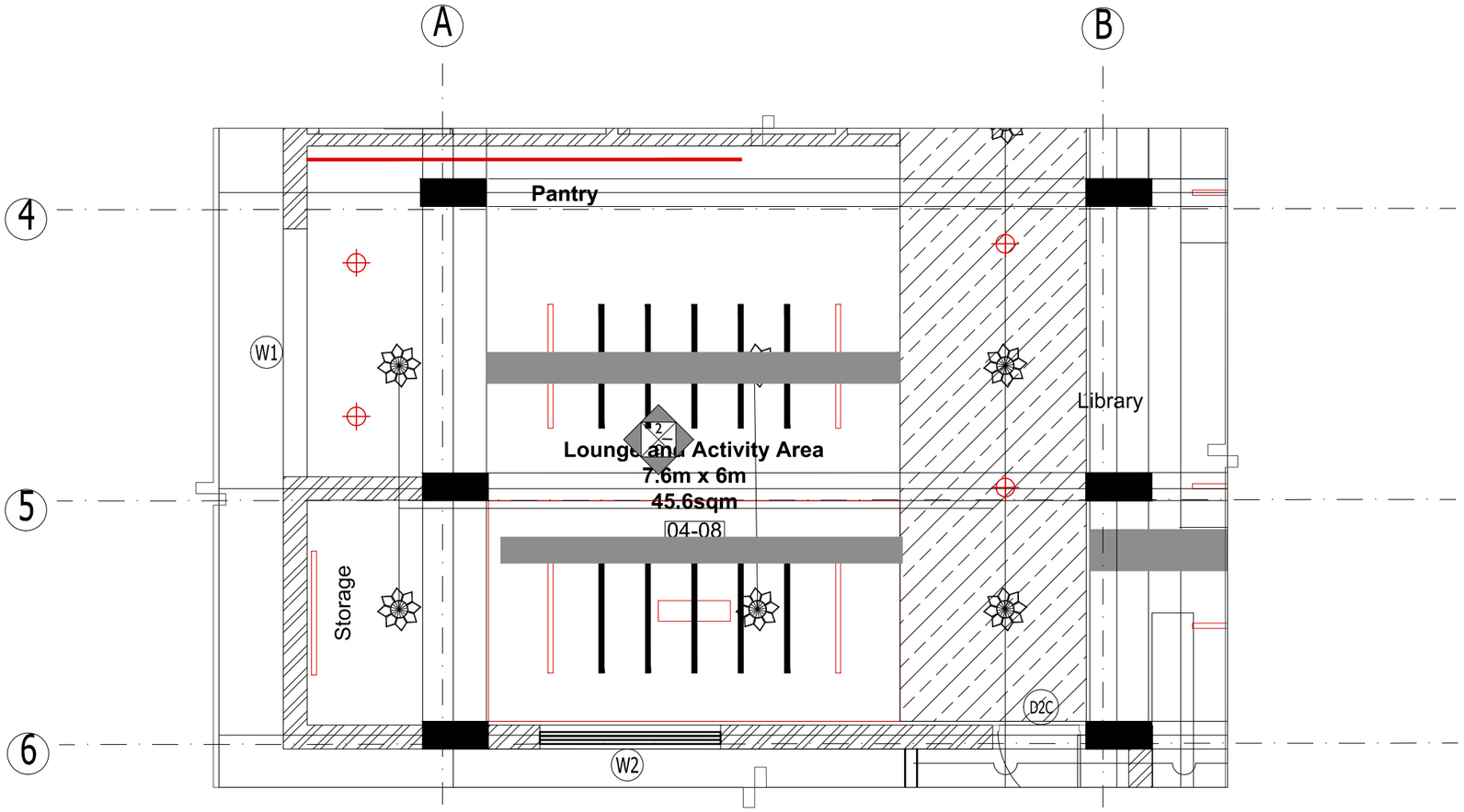
Drawing Title:
Breakout space-4th floor - Interior

Drawing No:
3208/CDRI/NDELHI/ID 1106

Scale: 1:100@A3 | Drawn: AA

Date: 2020-10-26 | Chkd By : AP

N



01 RCP

SCALE 1:50

Notes & References

General Notes -

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All dimensions are in millimeters unless noted otherwise.

N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O for CDRI at
Shri Ram Kala Kendra

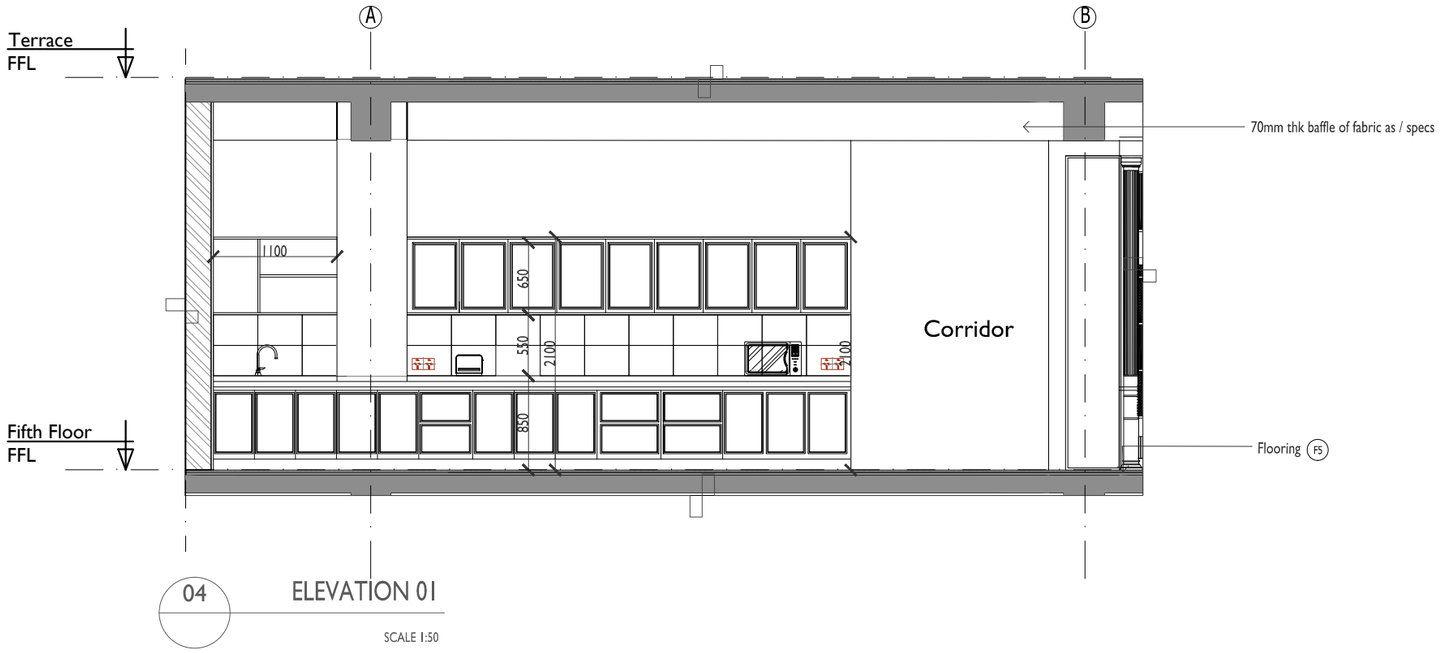
Drawing Title:
Breakout space-4th floor - Interior

Drawing No:
3208/CDRI/NDELHI/ID 1106

Scale: 1:100@A3 | Drawn: AA

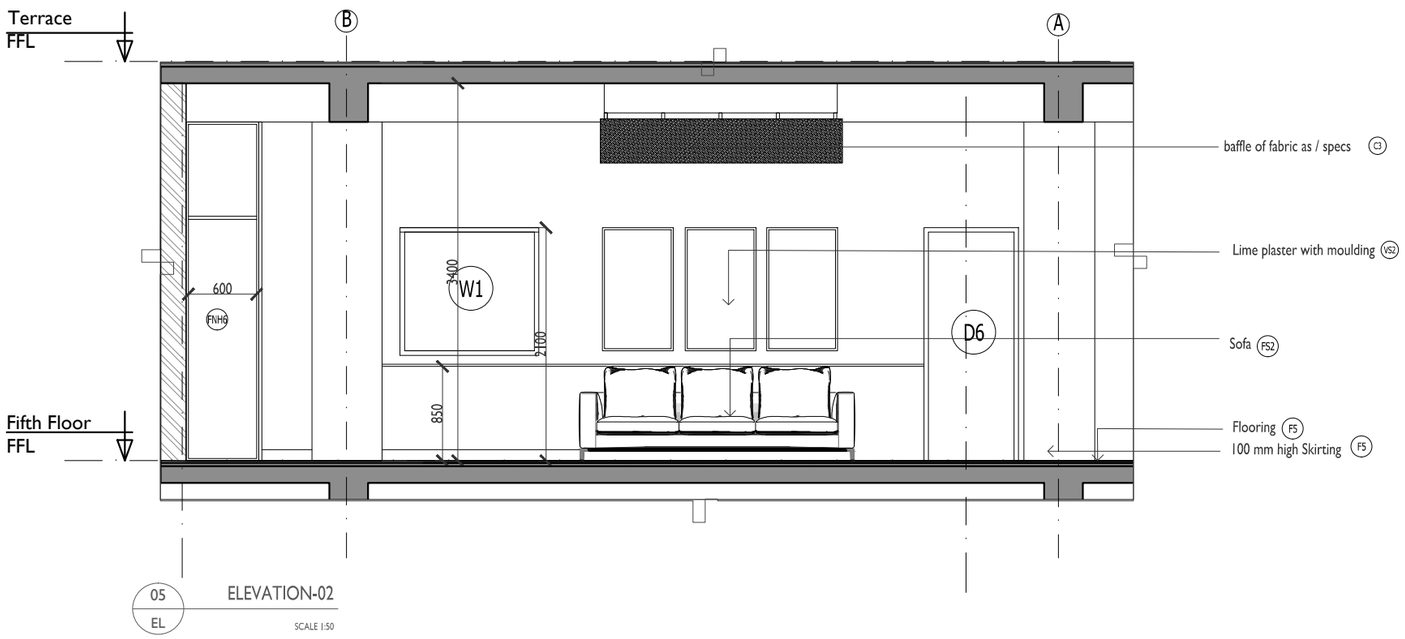
Date: 2020-10-26 | Chkd By: AP

N



04 ELEVATION 01

SCALE 1:50



05 EL ELEVATION-02

SCALE 1:50

Notes & References

General Notes -

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Dimensions on the drawing are to be read, not scaled.

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All dimensions are in millimeters unless noted otherwise.

N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-

H/O for CDRI at
Shri Ram Kala Kendra

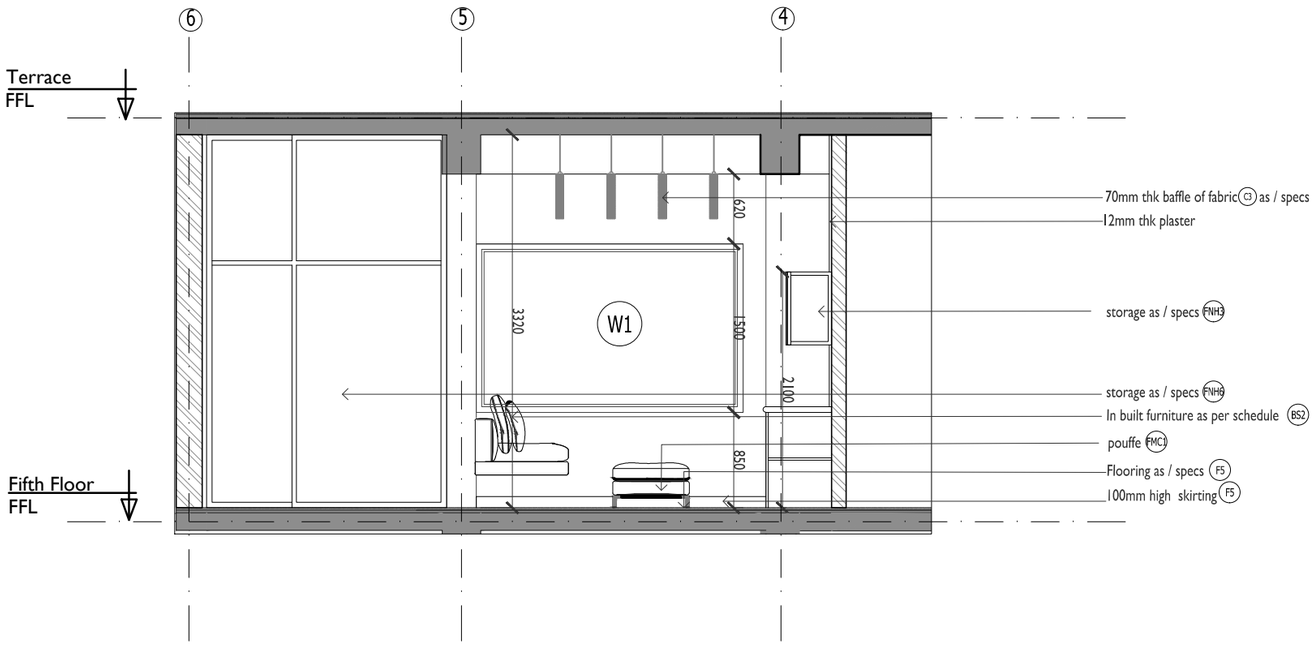
Drawing Title:
Breakout space-4th floor - Interior

Drawing No:
3208/CDRI/NDELHI/ID 1106

Scale: 1:100@A3 | Drawn: AA

Date: 2020-10-26 | Chkd By : AP

N



06 ELEVATION 03

SCALE 1:50

Notes & References

General Notes -

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All dimensions are in millimeters unless noted otherwise.

N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O for CDRI at
Shri Ram Kala Kendra

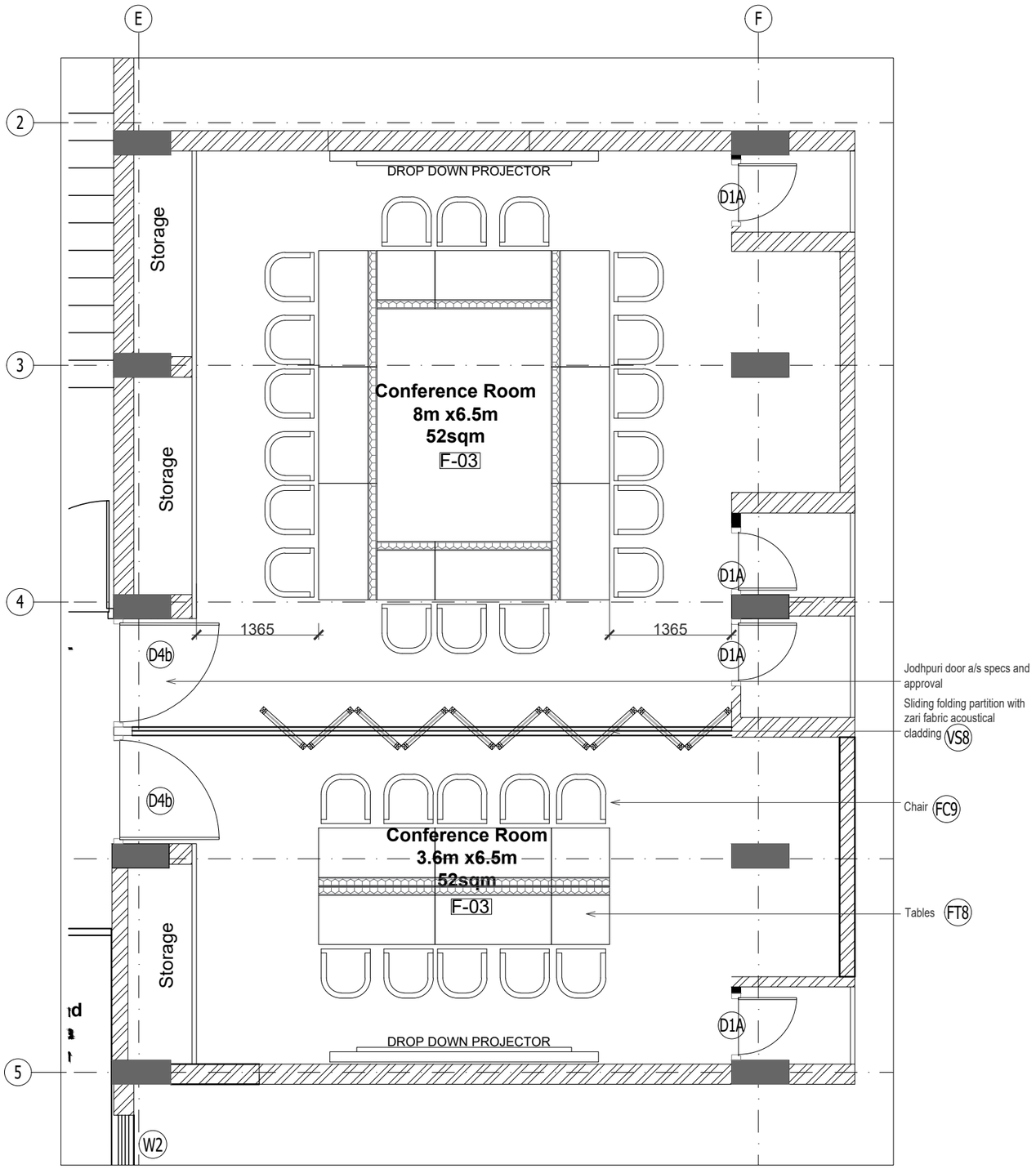
Drawing Title:
Breakout space-4th floor - Interior

Drawing No:
3208/CDRI/NDELHI/ID 1106

Scale: 1:100@A3 | Drawn: AA

Date: 2020-10-26 | Chkd By: AP

N



01 LAYOUT PLAN

SCALE 1:50@ A3

Notes & References

General Notes -

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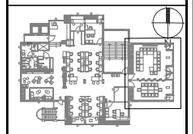


KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

PROJECT:-

COALITION FOR DISASTER RESILIENT INFRASTRUCTURE

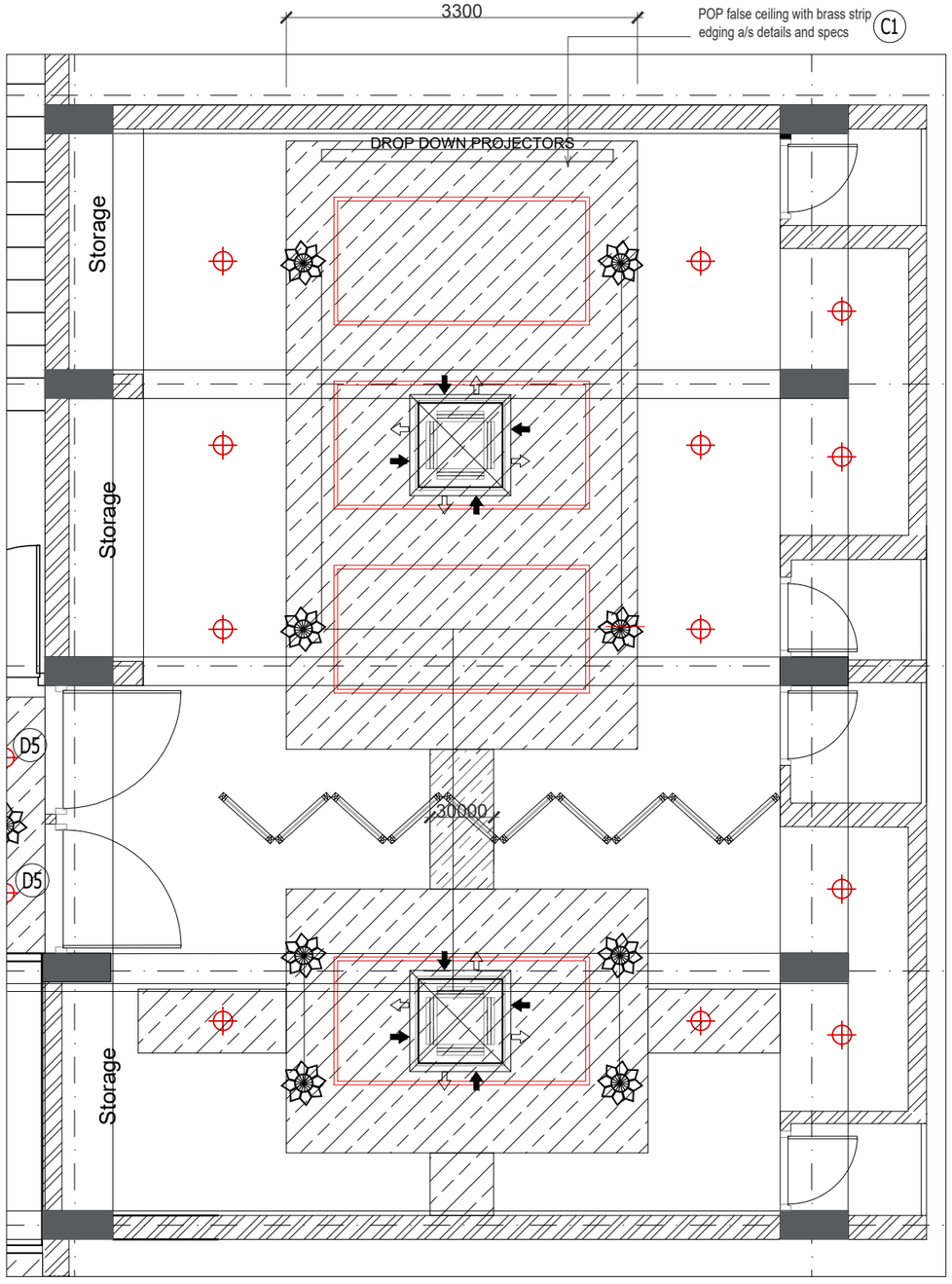
Drawing Title:

Interior Drawings : Conference Room

Drawing No:

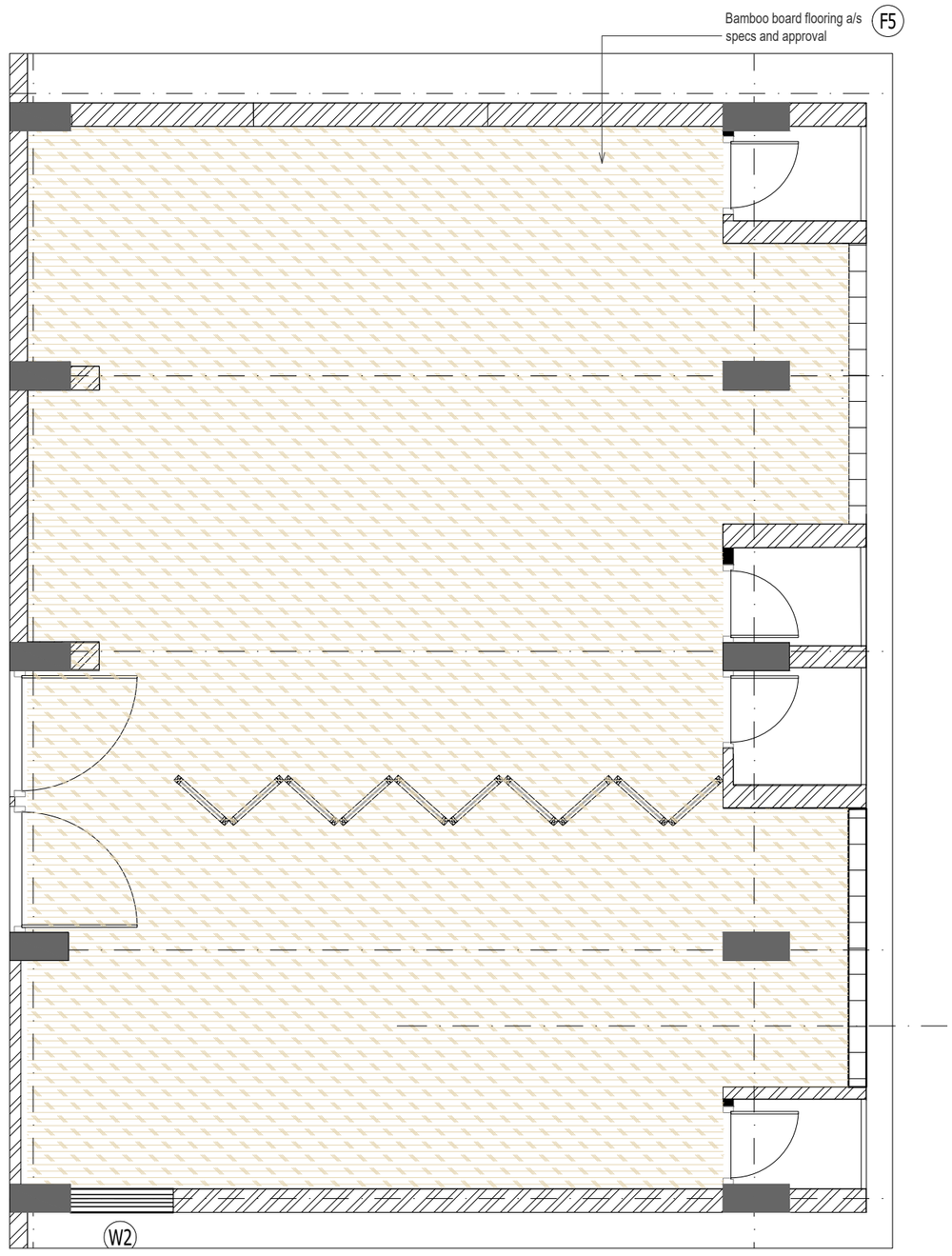
3208/CDRI/NDELHI/ID 1107

Scale: 1:100@A3 | Drawn: AA | Date: 2020-11-04 | Chkd By : AP | N



02 RCP

SCALE 1:50@ A3



03 FLOORING PLAN

SCALE 1:50@ A3

Notes & References

General Notes -

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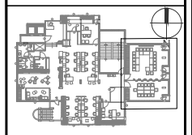


KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

PROJECT:-

COALITION FOR DISASTER RESILIENT INFRASTRUCTURE

Drawing Title:

Interior Drawings : Conference Room

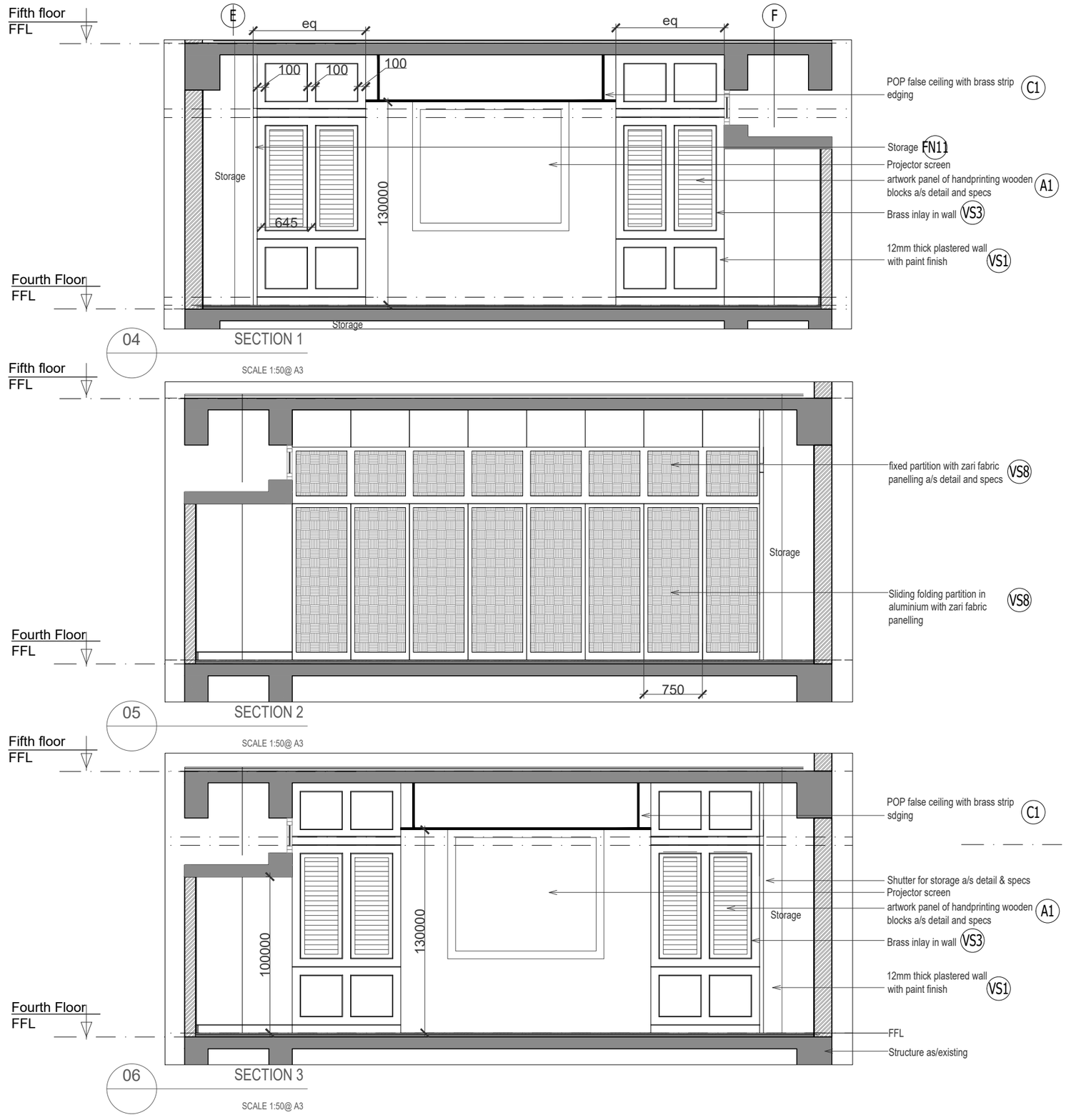
Drawing No:

3208/CDRI/NDELHI/ID 1107

Scale: 1:100@A3 | Drawn: AA

Date: 2020-11-04 | Chkd By : AP

N



Notes & References

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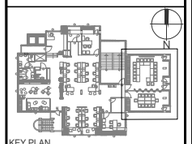


KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

PROJECT:-

COALITION FOR DISASTER RESILIENT INFRASTRUCTURE

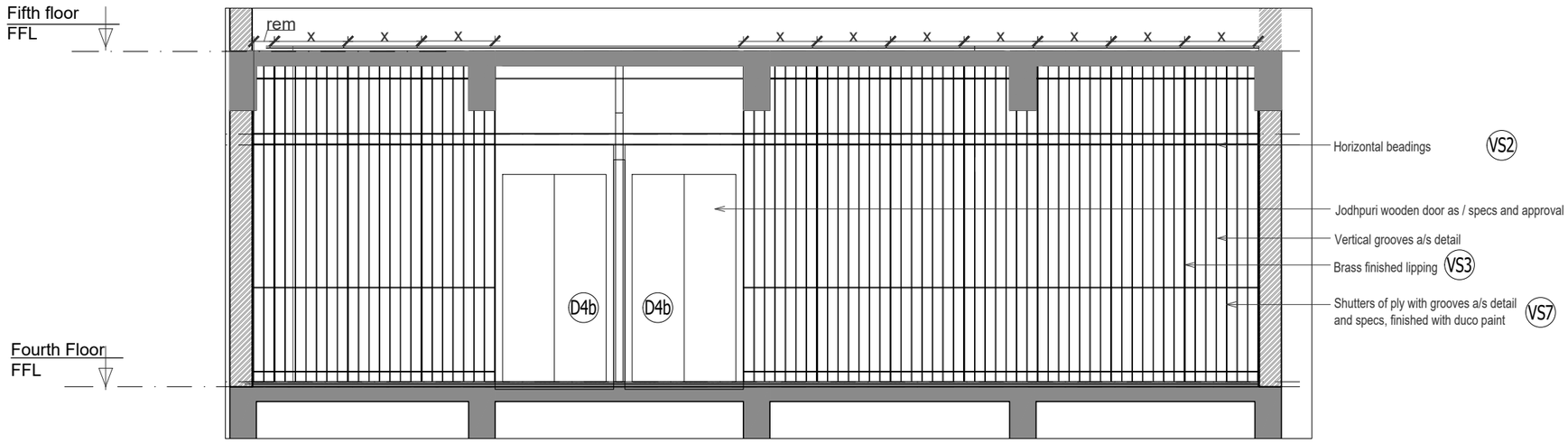
Drawing Title:

Interior Drawings : Conference Room

Drawing No:

3208/CDRI/NDELHI/ID 1107

Scale: 1:100@A3 | Drawn: AA | Date: 2020-11-04 | Chkd By : AP



07 SECTION 04

SCALE 1:50

08 SECTION 05

SCALE 1:50

Notes & References

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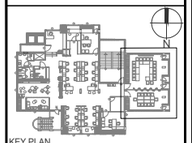


KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

PROJECT:-

COALITION FOR DISASTER RESILIENT INFRASTRUCTURE

Drawing Title:

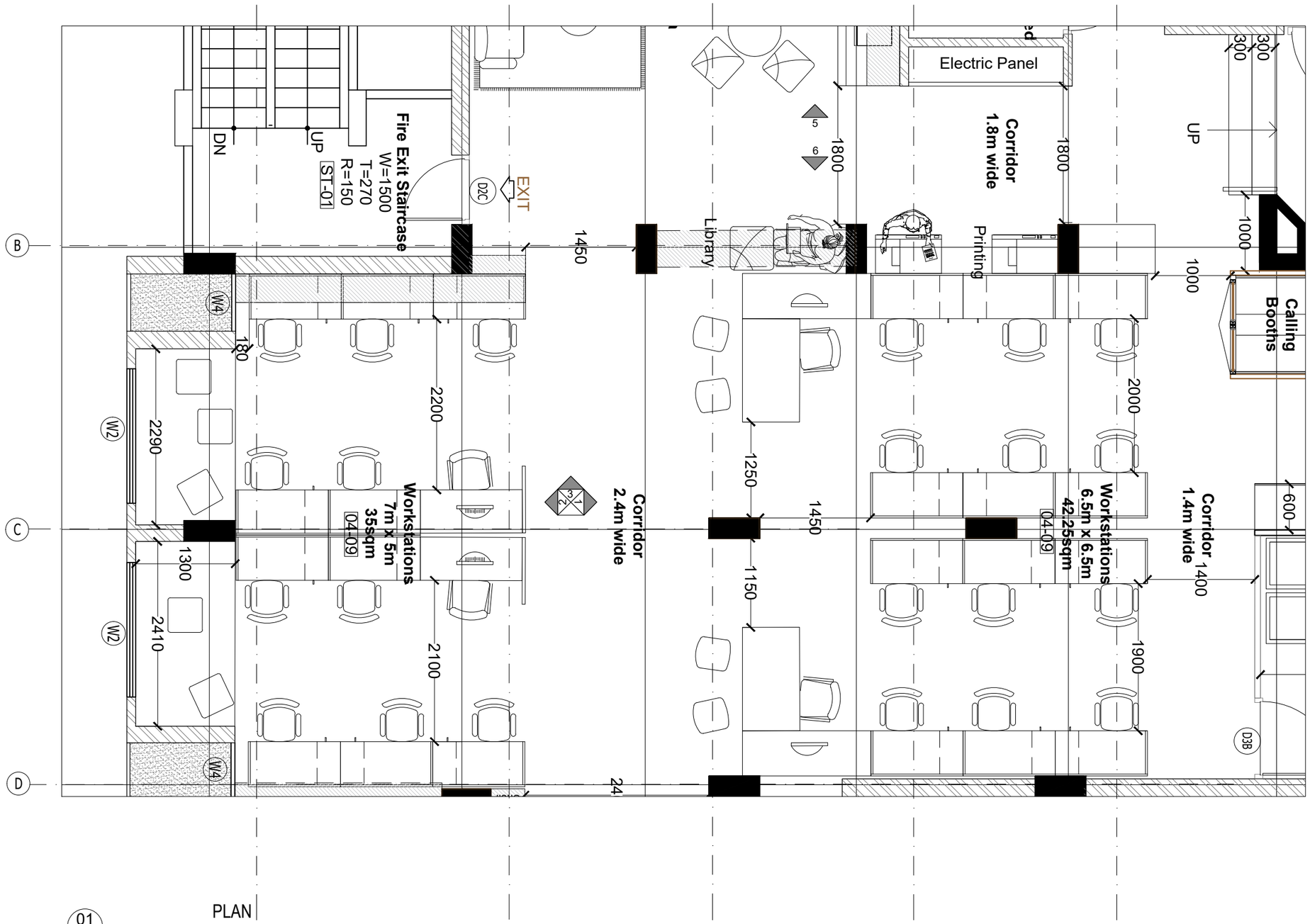
Interior Drawings : Conference Room

Drawing No:

3208/CDRI/NDELHI/ID 1107

Scale: 1:100@A3 | Drawn: AA

Date: 2020-11-04 | Chkd By : AP



01 PLAN

SCALE 1:50@ A3

Notes & References

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FL

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-

H/O CDRI at
Shri Ram Kala Kendra

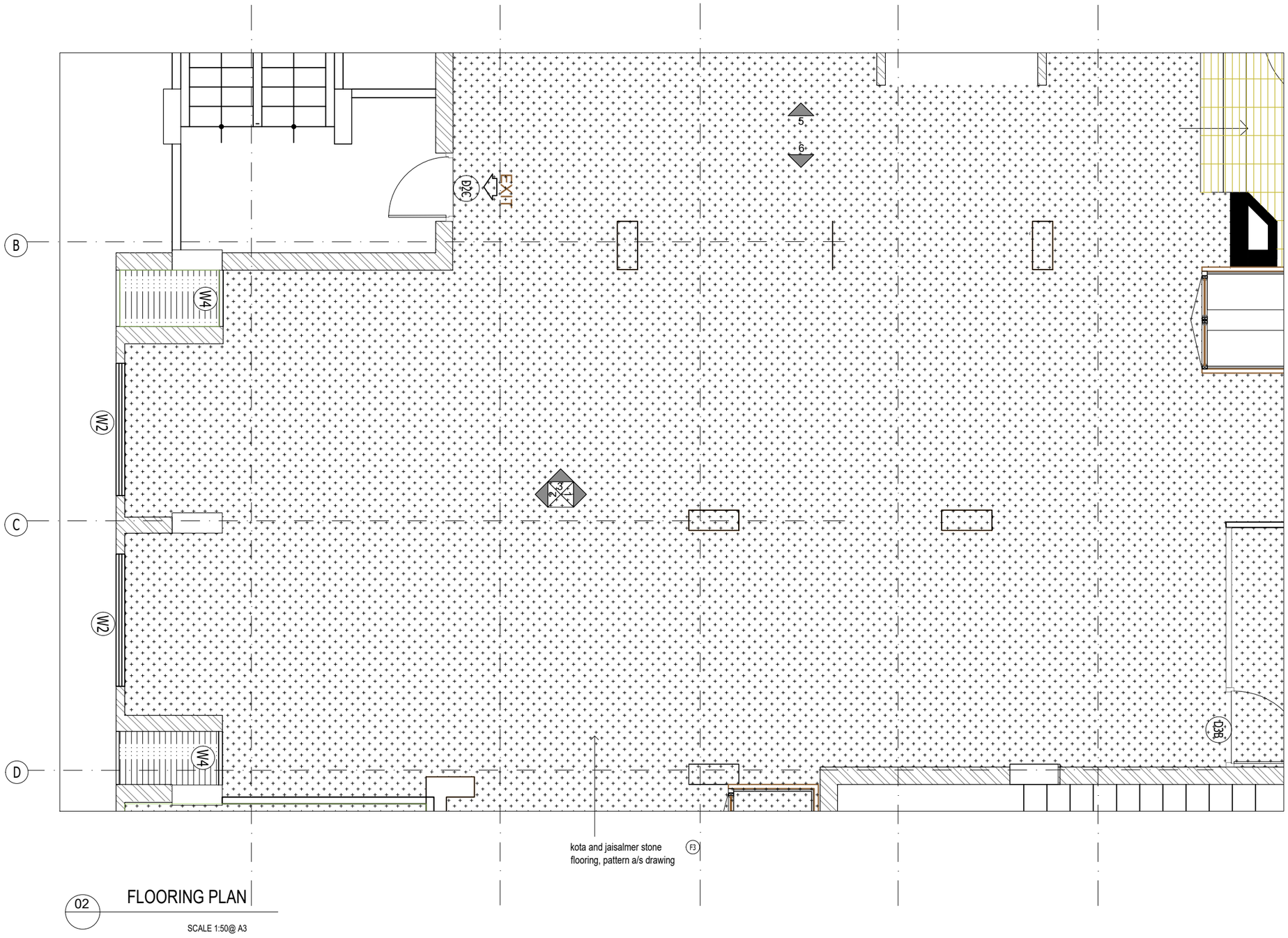
Drawing Title: WORKSPACE - 4th Floor

Drawing No: 3208/CDRI/NDELHI/ID 1108.1

Scale: 1:50@A1 | Drawn: AA

Date: 2021-01-06 | Chkd By: AP

N



02 FLOORING PLAN

SCALE 1:50@ A3

Notes & References

General Notes -

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FU

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: WORKSPACE - 4th Floor

Drawing No: 3208/CDRI/NDELHI/ID 1108.2

Scale: 1:50@A1 | Drawn: AA

Date: 2021-01-06 | Chkd By: AP

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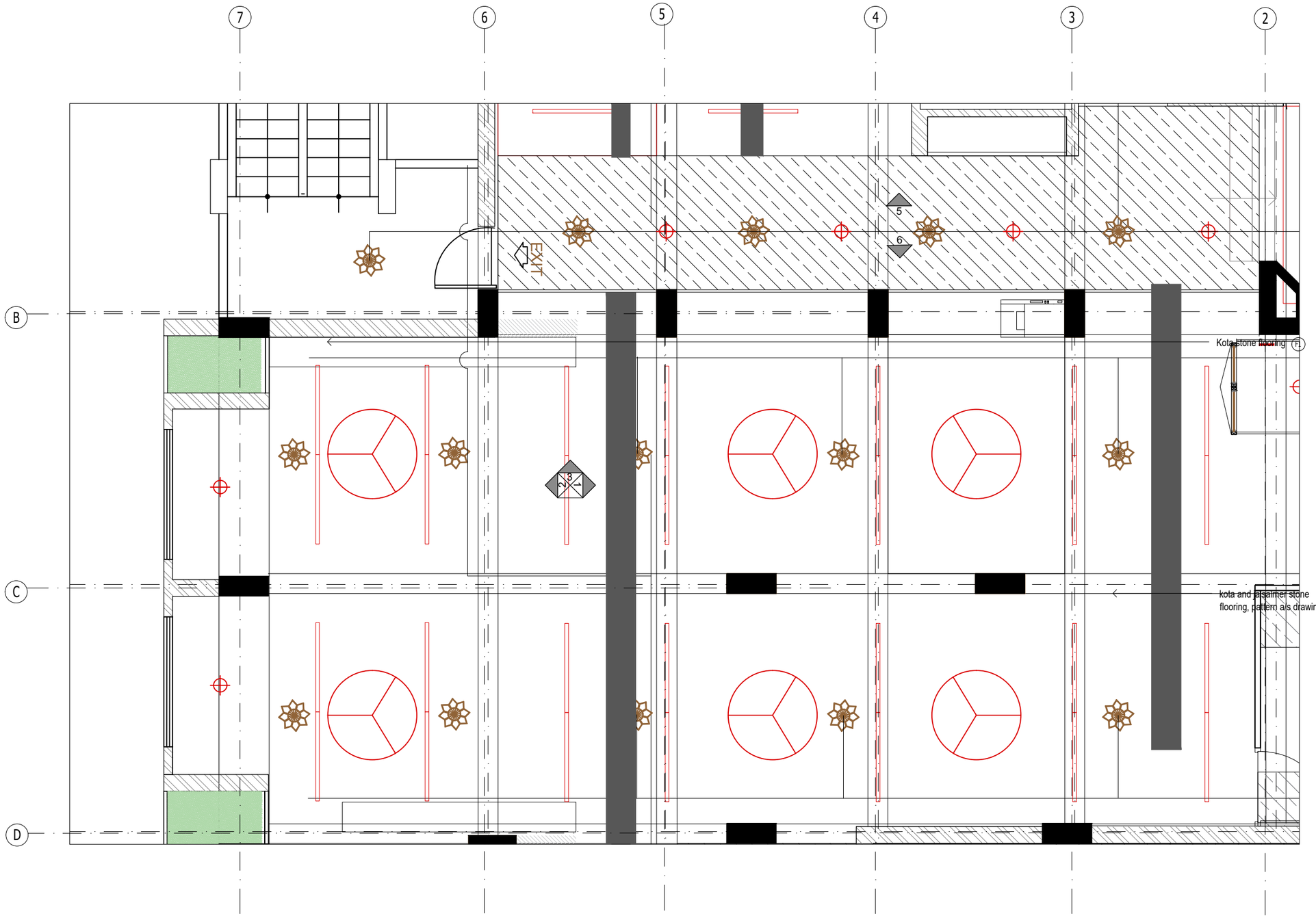

03 RCP

RCP

SCALE 1:50@ A3

Notes & References

General Notes -

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N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FI

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

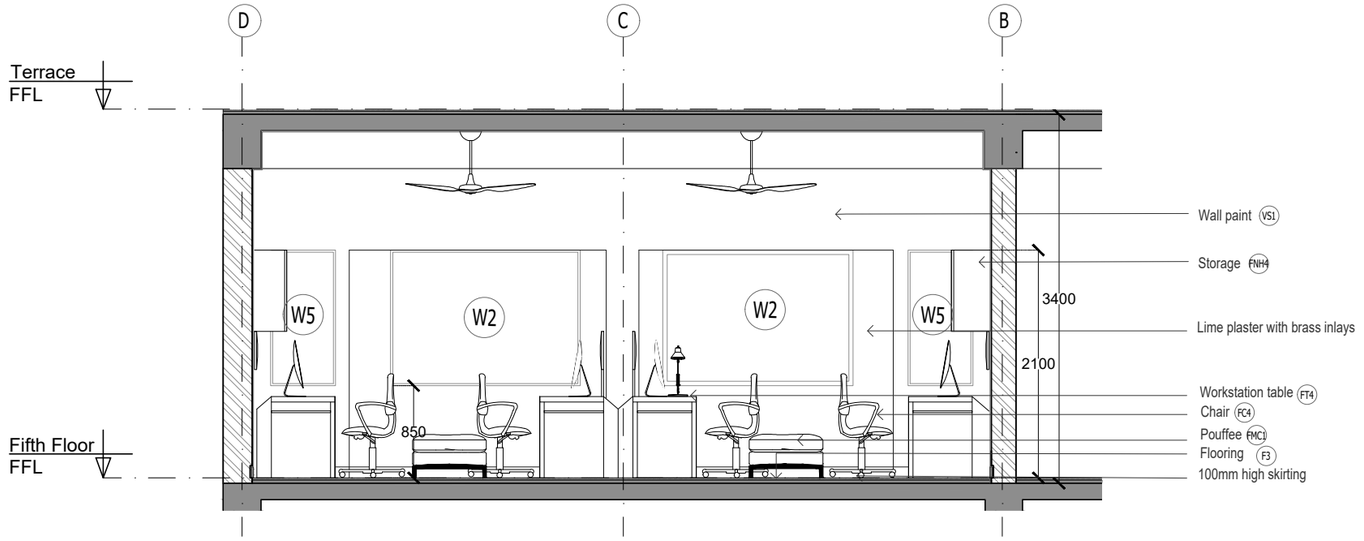
Drawing Title: WORKSPACE - 4th Floor

Drawing No: 3208/CDRI/NDELHI/ID 1108.3

Scale: 1:50@A1 | Drawn: AA

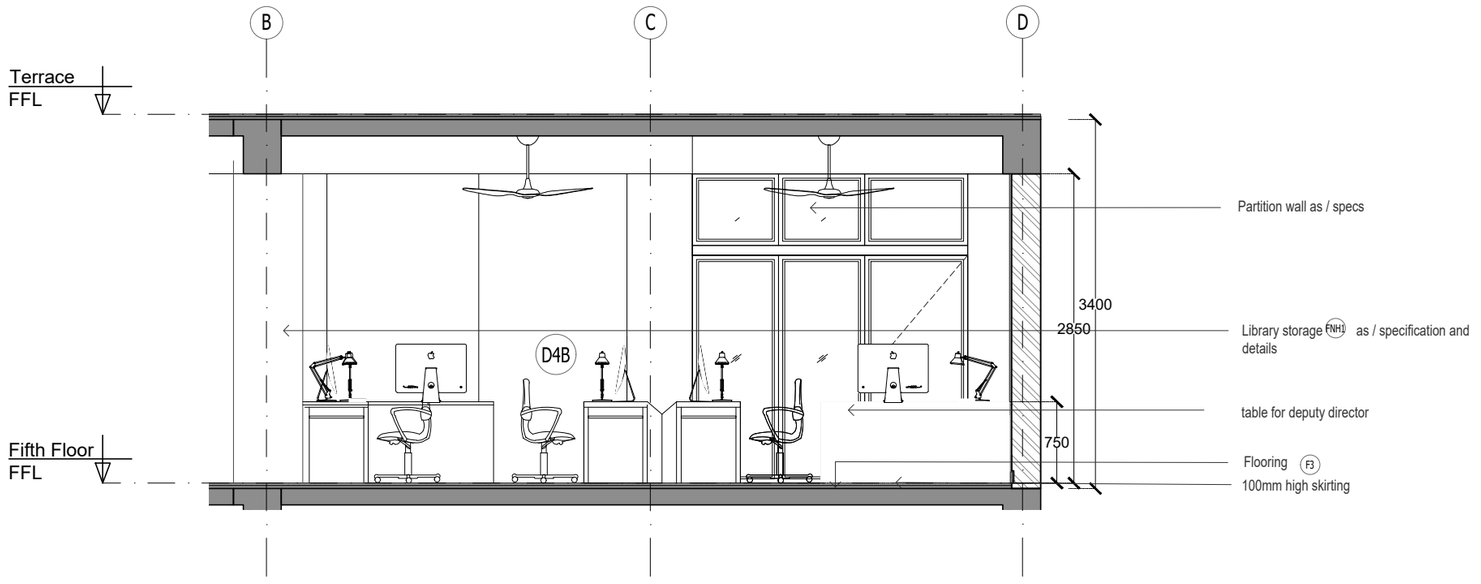
Date: 2021-01-06 | Chkd By : AP

N



04 ELEVATION 01

SCALE 1:50



05 ELEVATION 02

SCALE 1:50

Notes & References

General Notes -

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FL

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

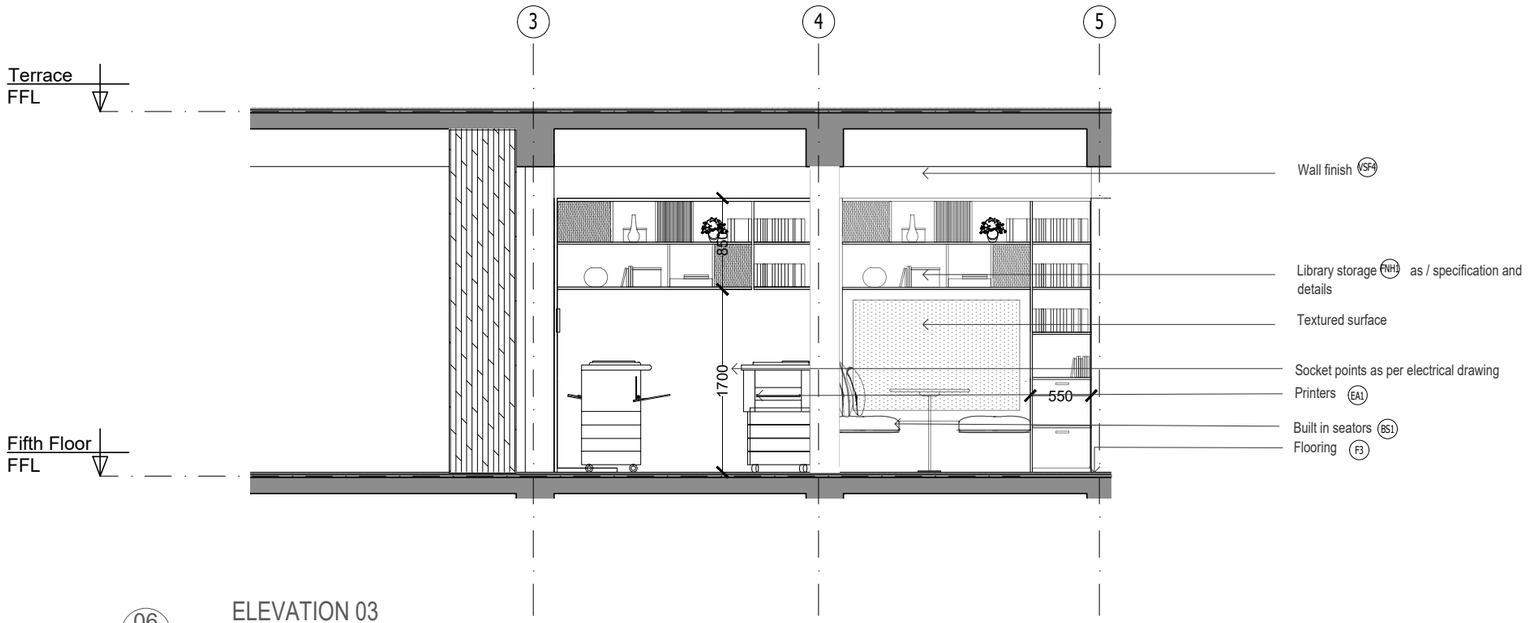
Drawing Title: WORKSPACE - 4th Floor

Drawing No: 3208/CDRI/NDELHI/ID 1108.4

Scale: 1:50@A1 | Drawn: AA

Date: 2021-01-06 | Chkd By: AP

N



06 ELEVATION 03

SCALE 1:50

07 ELEVATION 04

SCALE 1:50

Notes & References

General Notes -
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Dimensions on the drawing are to be read, not scaled.
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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

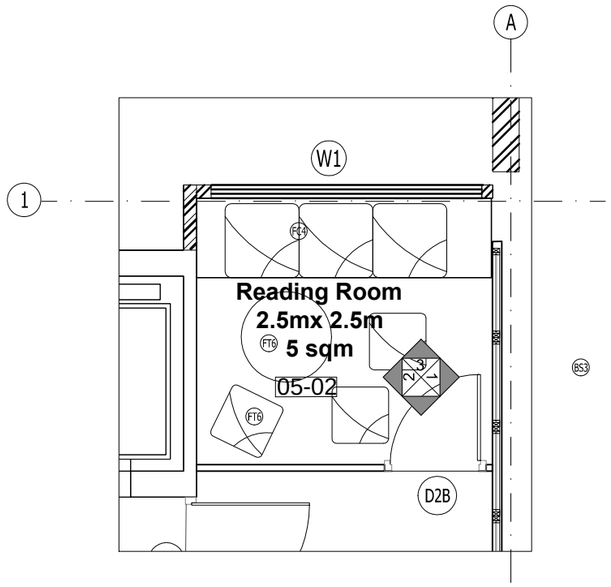
PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: CENTRAL WORKSTATION

Drawing No: 3208/CDRI/NDELHI/ID 1108

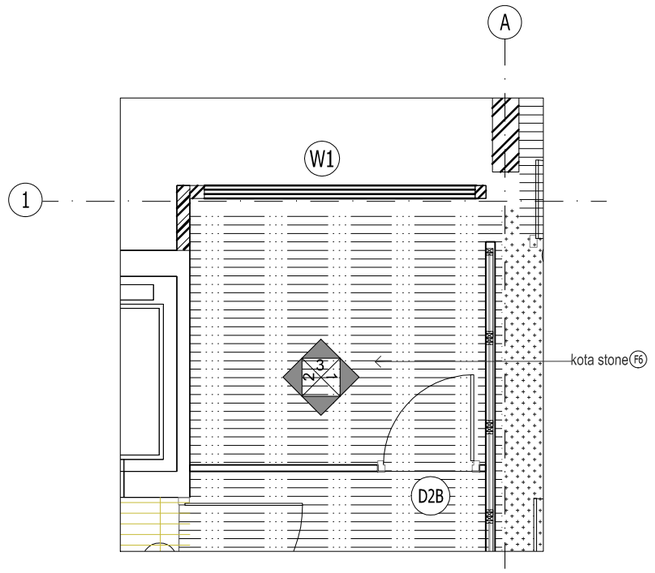
Scale: 1:50@A1 | Drawn: AA | Date: 2021-01-06 | Chkd By: AP

N



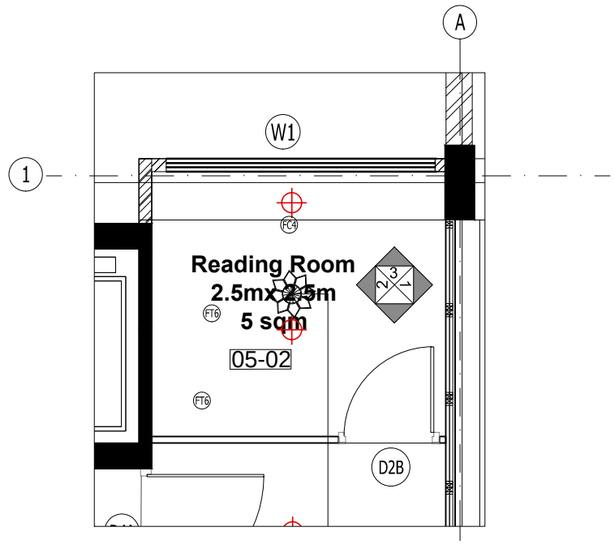
01 Plan — Plan

SCALE 1:50 @ A3



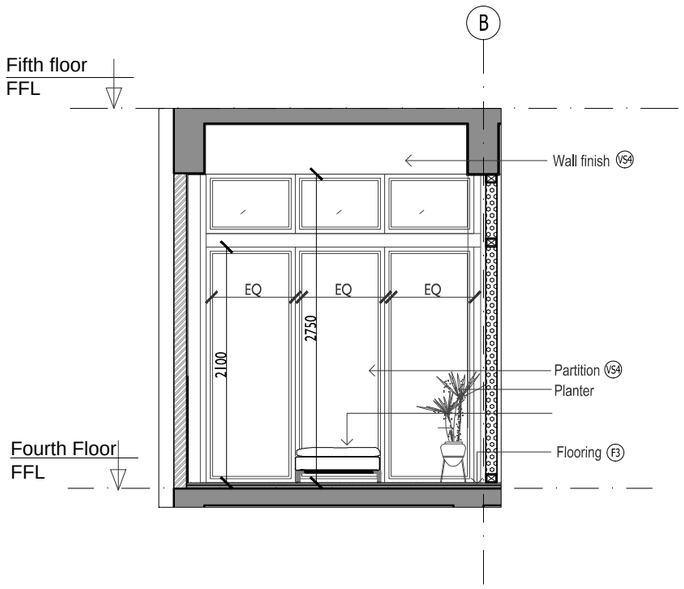
01 Plan — Flooring layout plan

SCALE 1:50 @ A3



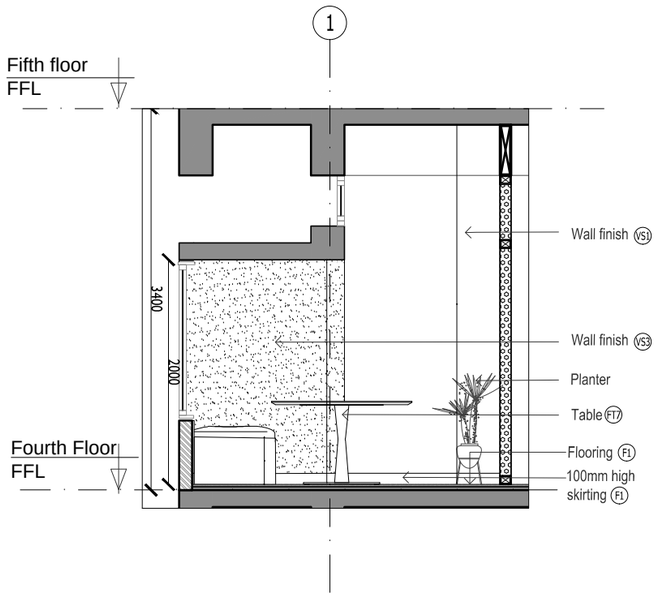
03 RCP — RCP Plan

SCALE 1:50 @ A3



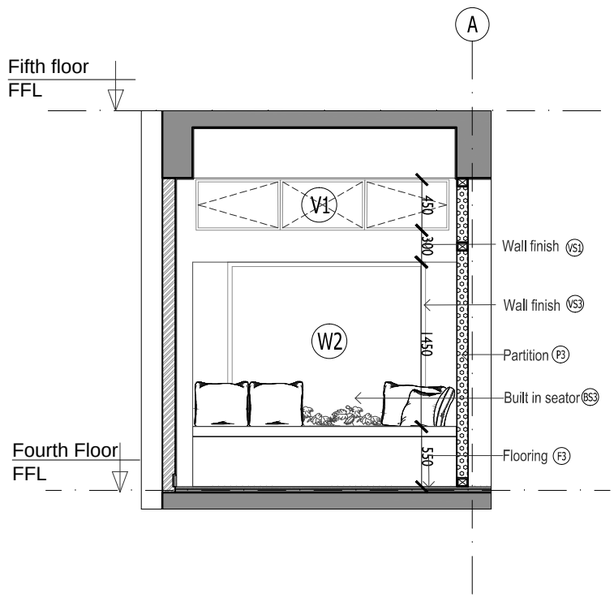
06 EL — Elevation-1

SCALE 1:50 @ A3



06 EL — Elevation-2

SCALE 1:50 @ A3



06 EL — Elevation-3

SCALE 1:50 @ A3

Notes & References

General Notes -

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All dimensions are in millimeters unless noted otherwise.

N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

PROJECT:-

COALITION FOR DISASTER RESILIENT INFRASTRUCTURE

Drawing Title:

Reception and waiting area

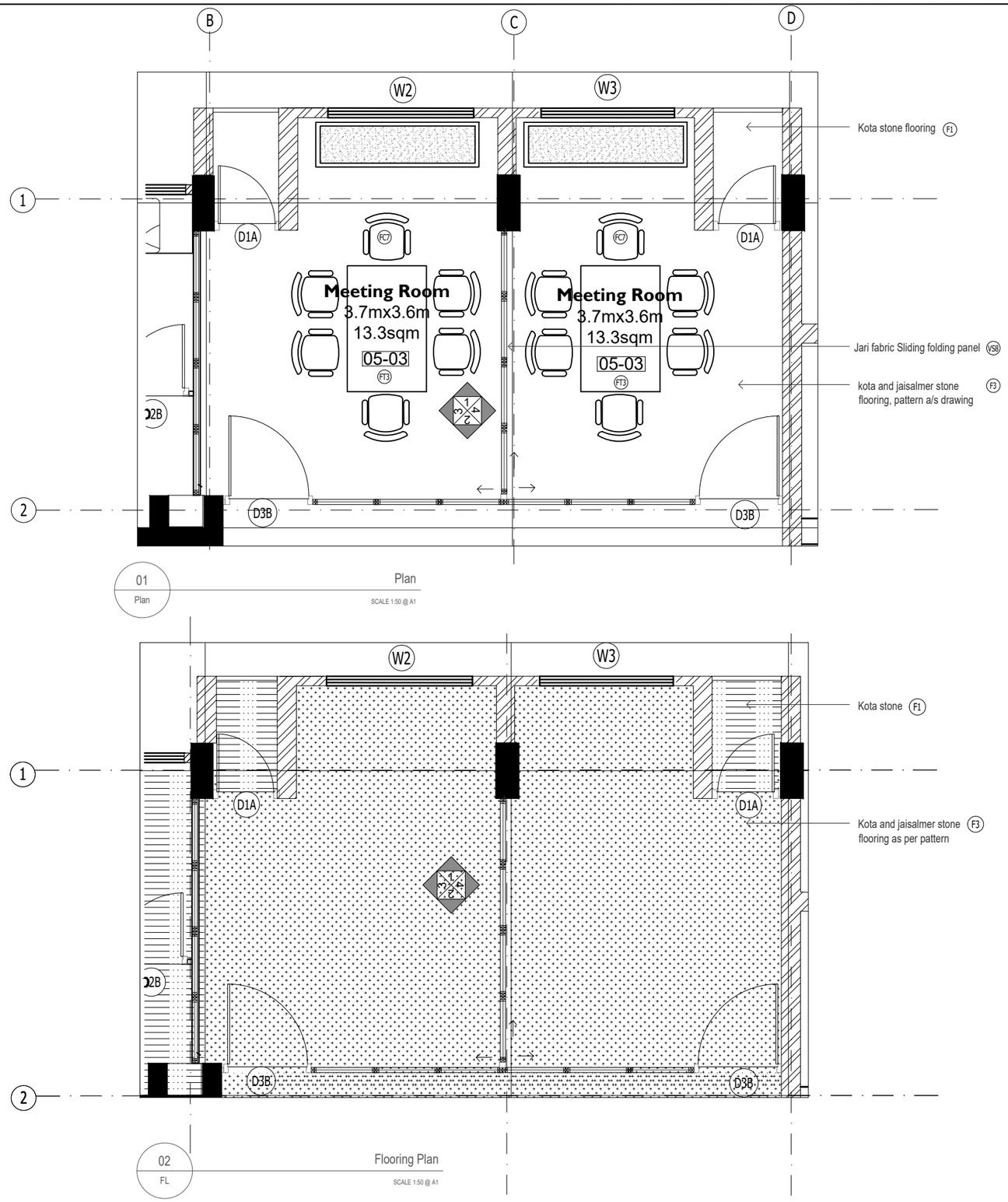
Drawing No:

- 3208/CDRI/NDELHI/ID 1109

Scale 1:100@A3 | Drawn: AA

Date: 2020-11-04 | Chkd By : AP

N



01 Plan — Plan
SCALE 1:50 @ A1

02 FL — Flooring Plan
SCALE 1:50 @ A1

Notes & References

General Notes -
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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

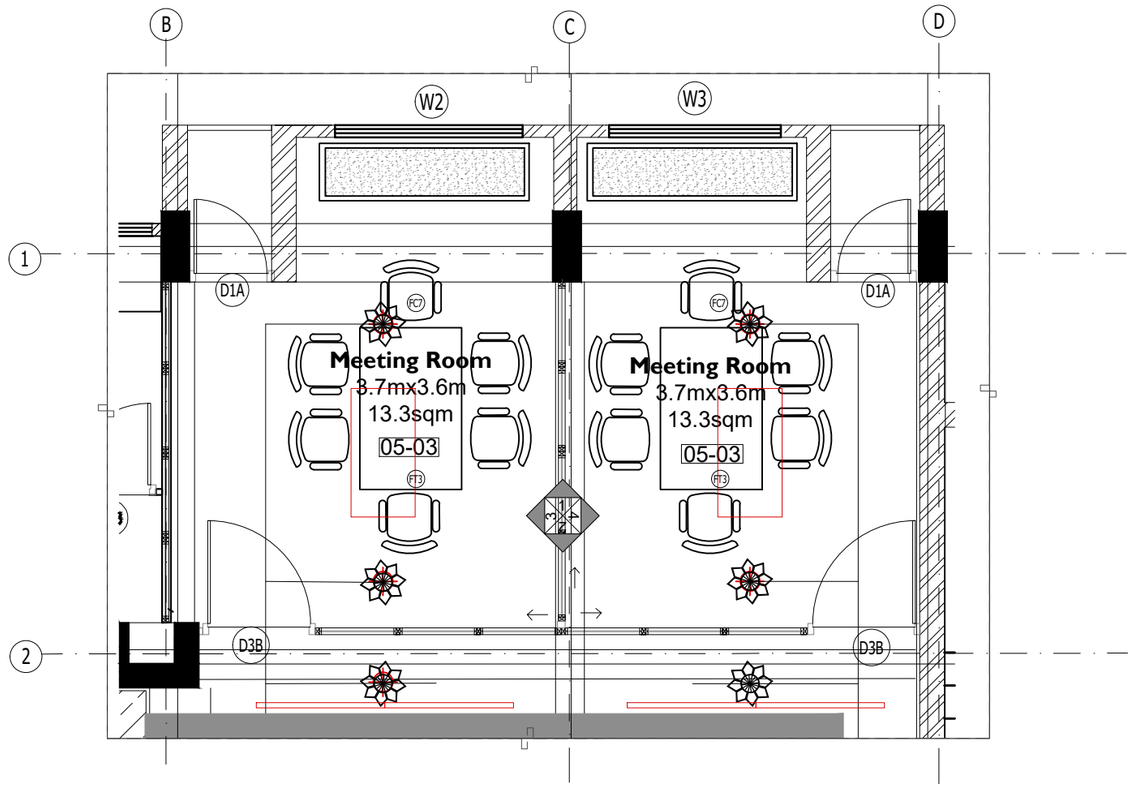
PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Typical meeting room for 6

Drawing No:
3208/CDRI/NDELHI/ID 1110

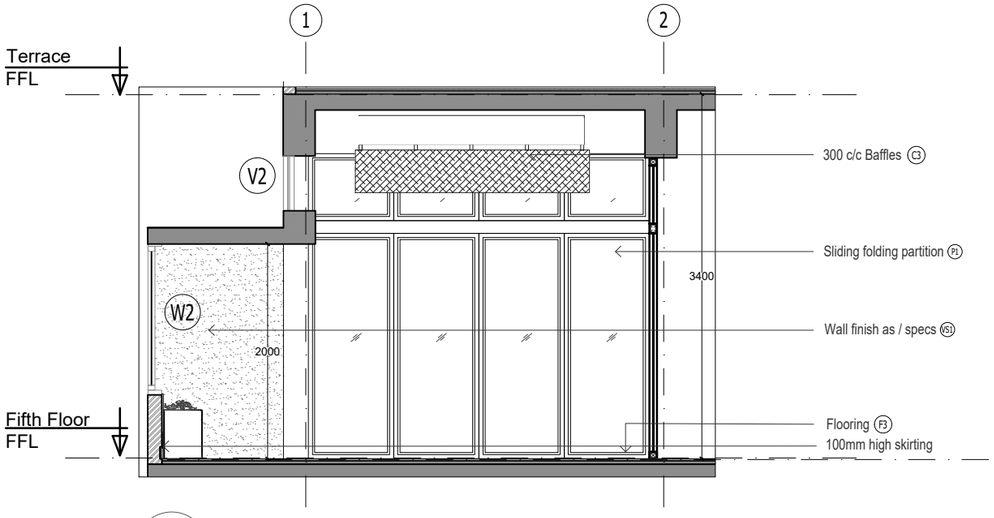
Scale: 1:50@A1 | Drawn: AA
Date: 2021-01-06 | Chkd By: AP

N



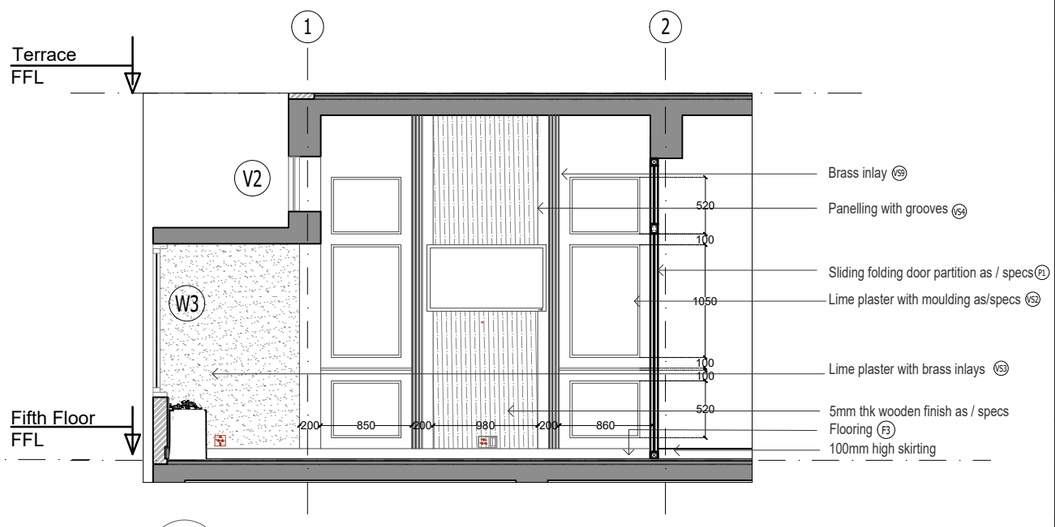
03 RCP — RCP Plan

SCALE 1:50 @ A1



04 EL — Elevation-3

SCALE 1:50 @ A1



05 EL — Elevation-4

SCALE 1:50 @ A1

Notes & References

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

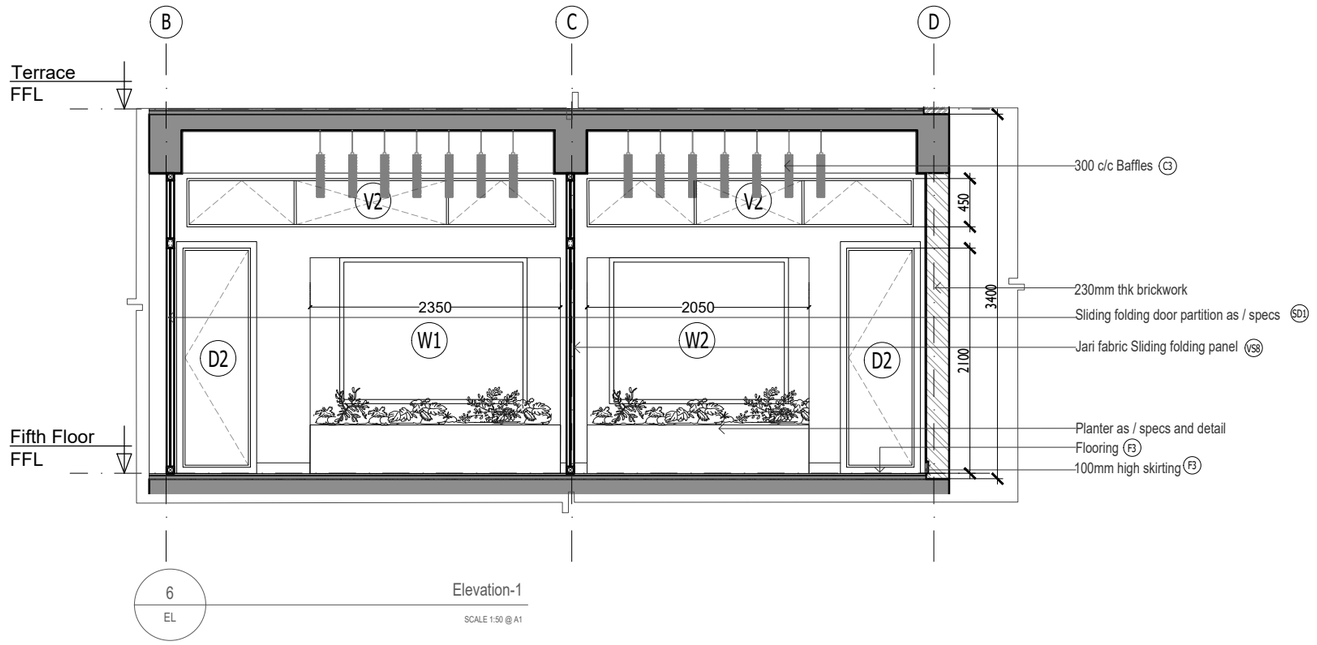
PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Typical meeting room for 6

Drawing No:
3208/CDRI/NDELHI/ID 1110

Scale: 1:50@A1 | Drawn: AA | Date: 2021-01-06 | Chkd By: AP

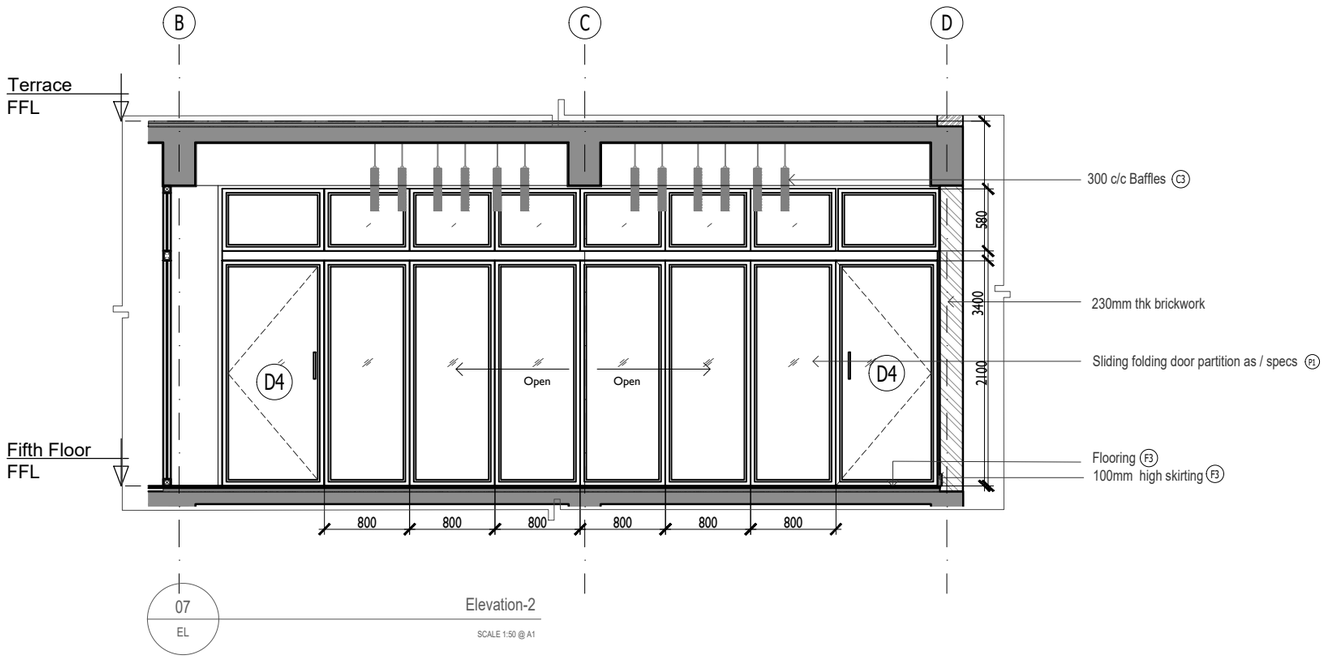
N



6 EL

Elevation-1

SCALE 1:50 @ A1



07 EL

Elevation-2

SCALE 1:50 @ A1

Notes & References

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N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

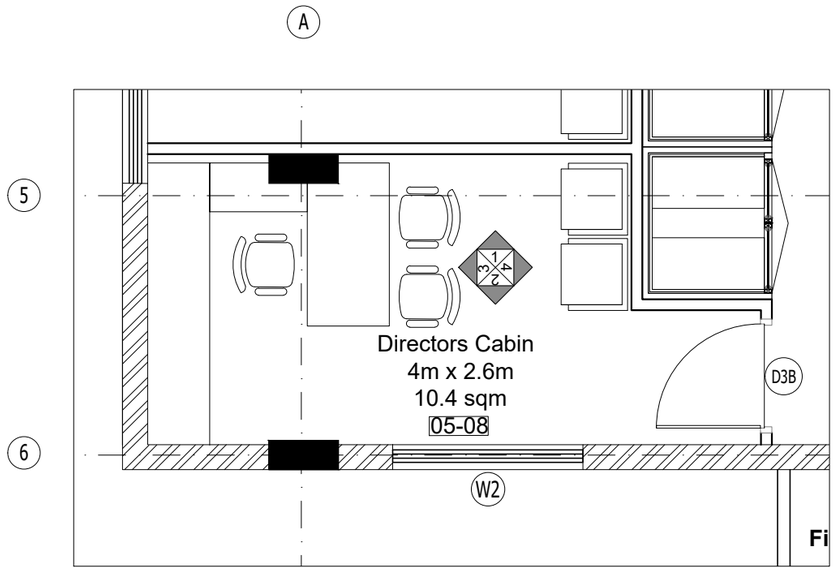
Drawing Title: Typical meeting room for 6

Drawing No: 3208/CDRI/NDELHI/ID 1110

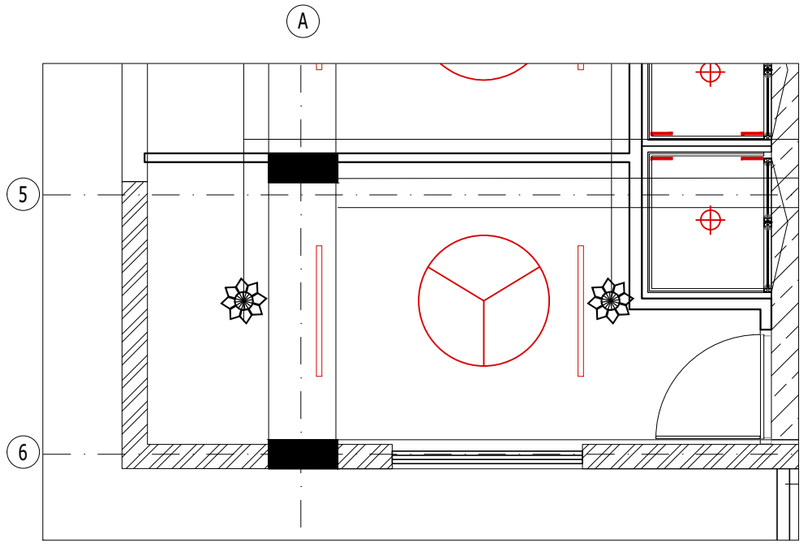
Scale: 1:50@A1 | Drawn: AA

Date: 2021-01-06 | Chkd By : AP

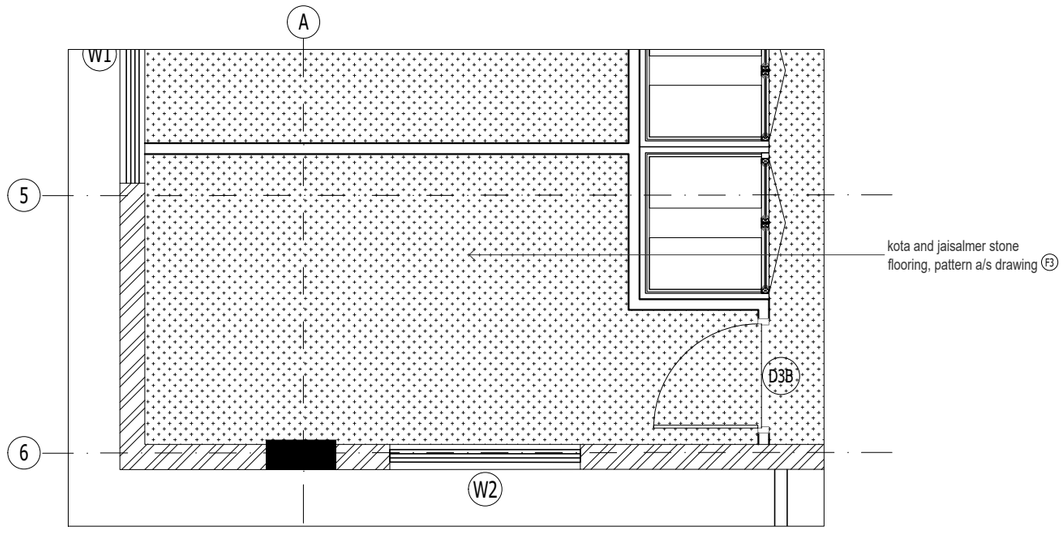
N



01 Plan — Plan
SCALE 1:50 @ A1



03 RCP — RCP Plan
SCALE 1:50 @ A1



02 FL — Flooring Plan
SCALE 1:50 @ A1

Notes & References

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N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FL

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

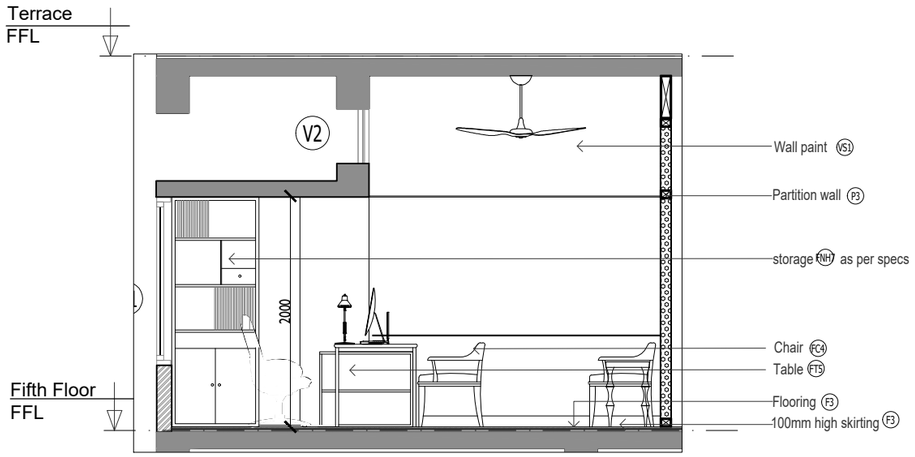
PROJECT:-
H/O for CDRI at
Shri Ram Kala Kendra

Drawing Title:
Directors cabin- 5th floor

Drawing No:
3208/CDRI/NDELHI/ID 1111.1

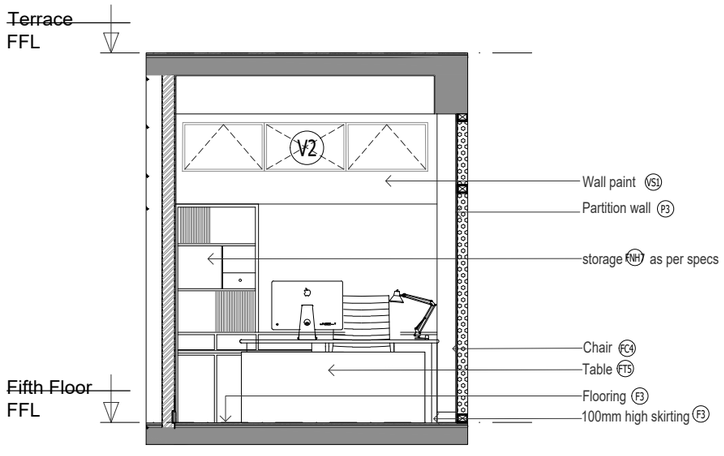
Scale: 1:100@A3 | Drawn: AA
Date: 2020-10-26 | Chkd By: AP

N



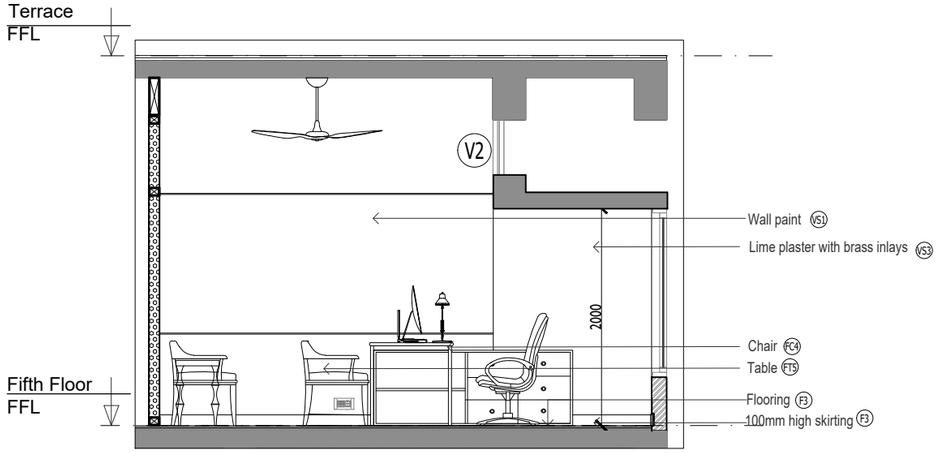
04 EL — Elevation-1

SCALE 1:50 @ A3



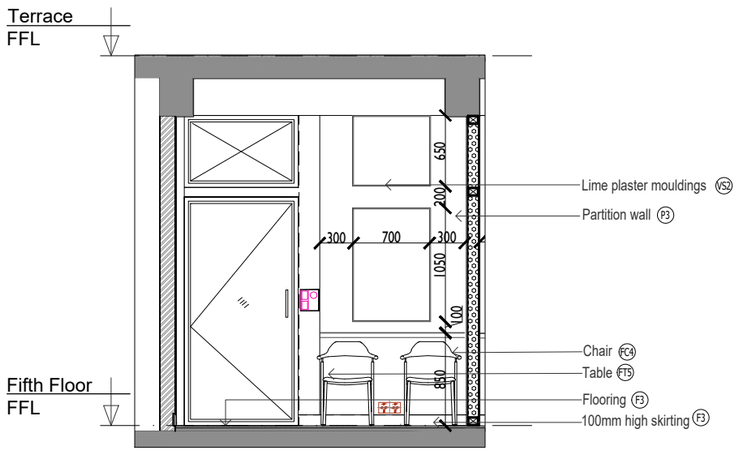
05 EL — Elevation-3

SCALE 1:50 @ A3



06 EL — Elevation-2

SCALE 1:50 @ A3



06 EL — Elevation-4

SCALE 1:50 @ A3

Notes & References

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N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FL

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O for CDRI at
Shri Ram Kala Kendra

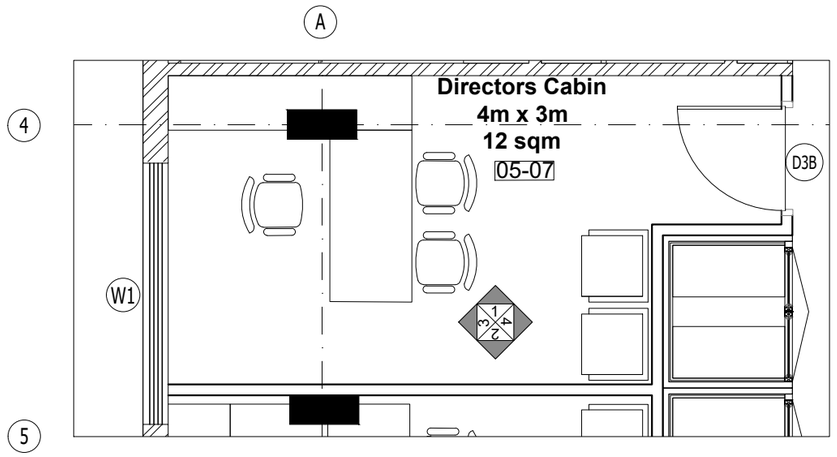
Drawing Title:
Directors cabin- 5th floor 2

Drawing No:
3208/CDRI/NDELHI/ID 1111.2

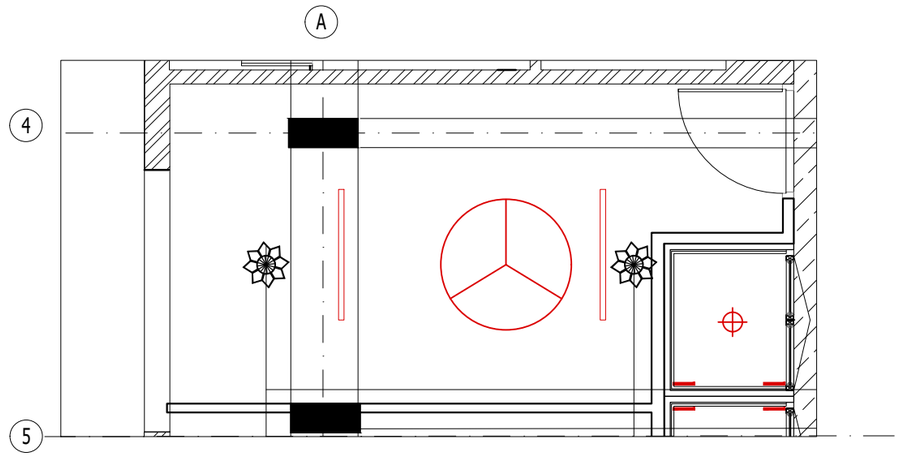
Scale: 1:100@A3 | Drawn: AA

Date: 2020-10-26 | Chkd By : AP

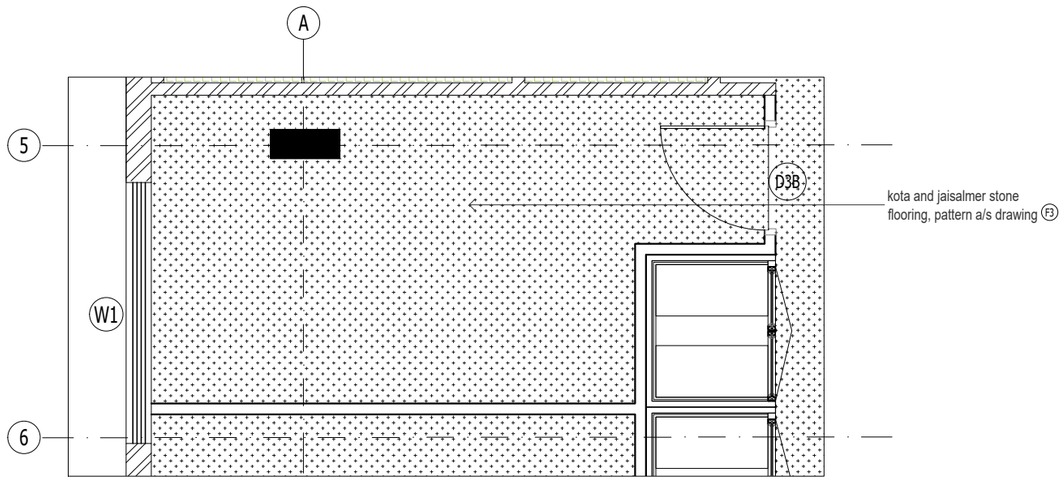
N



01 Plan
Plan
SCALE 1:50 @ A1



03 RCP
RCP Plan
SCALE 1:50 @ A1



02 FL
Flooring Plan
SCALE 1:50 @ A1

Notes & References

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All dimensions are in millimeters unless noted otherwise.

N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FL
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

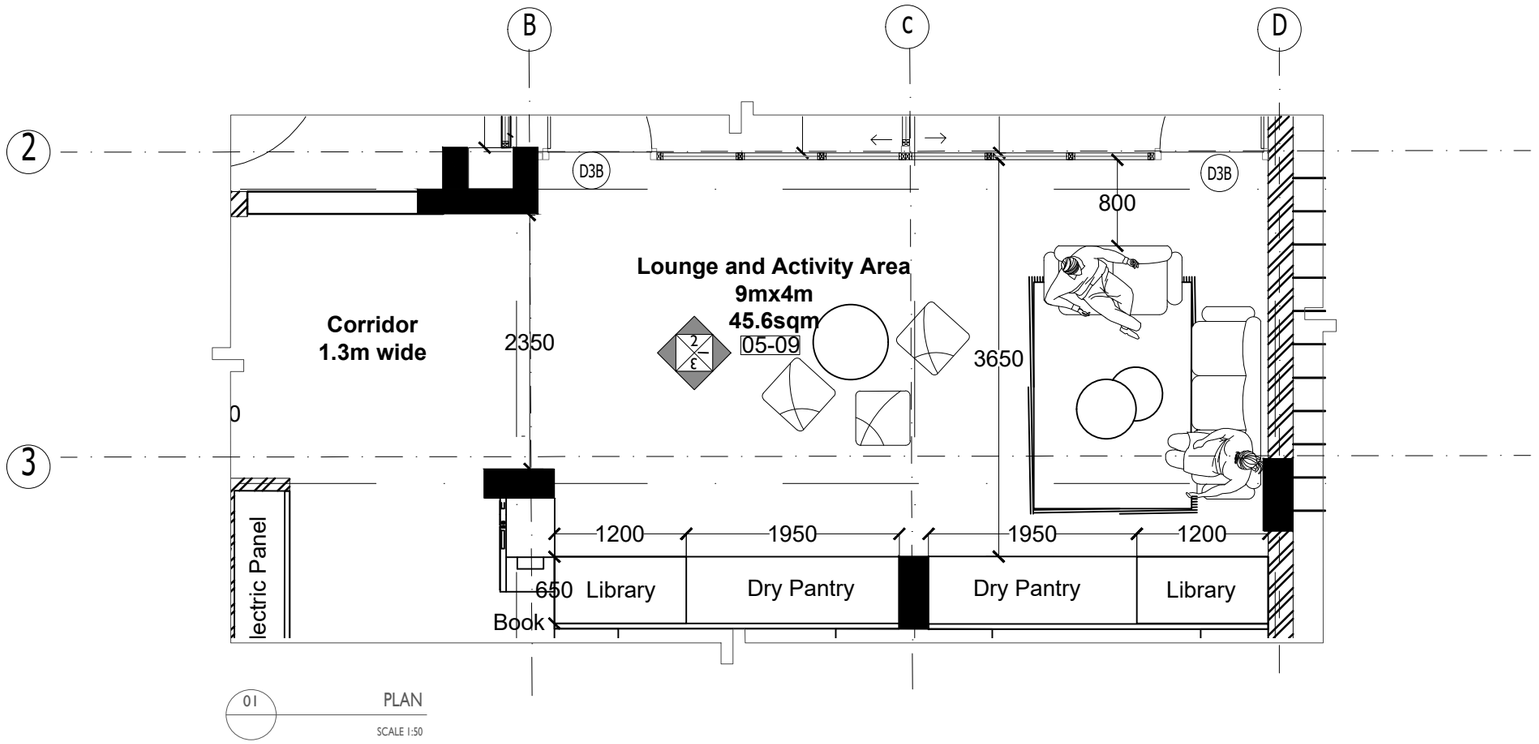
- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

PROJECT:-
H/O for CDRI at
Shri Ram Kala Kendra

Drawing Title:
Directors cabin 4- 5th floor

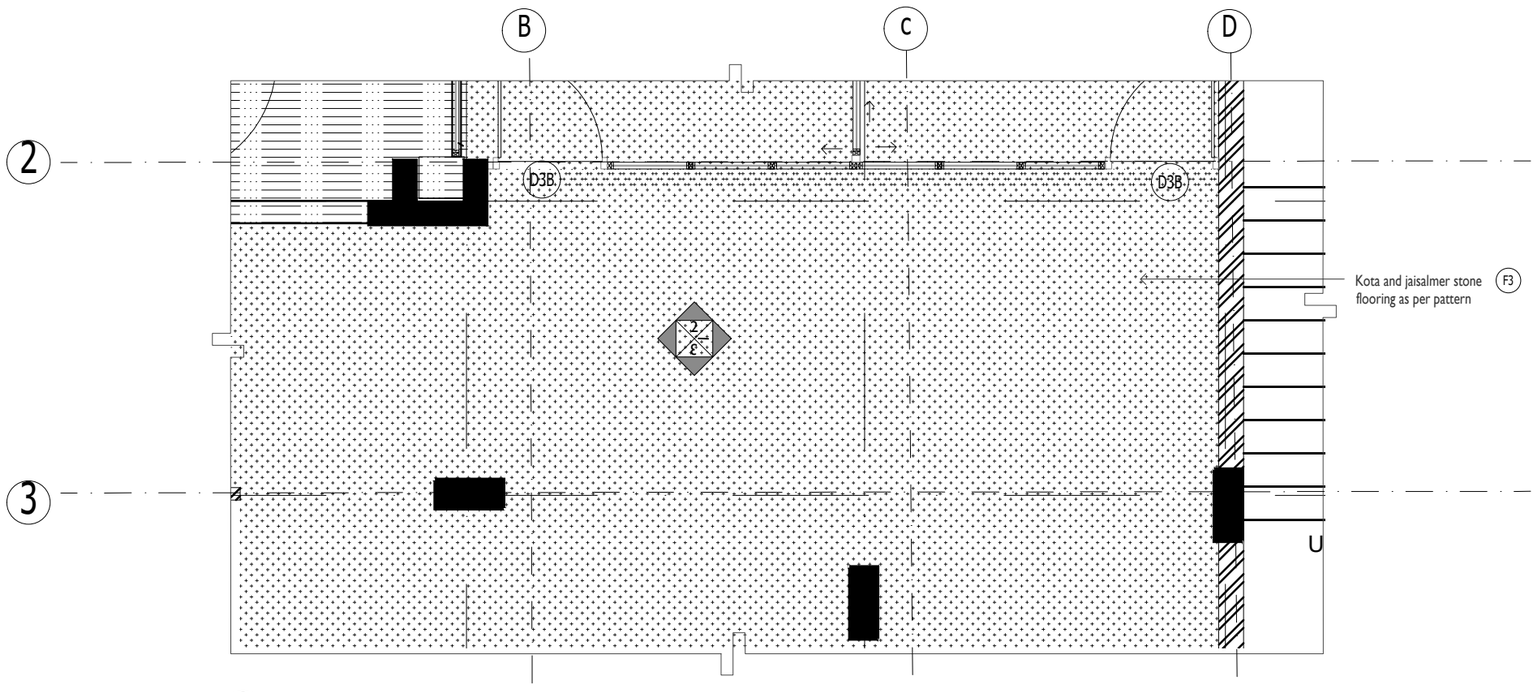
Drawing No:
3208/CDRI/NDELHI/ID 1112.1

Scale: 1:100@A3	Drawn: AA	N
Date: 2020-10-26	Chkd By : AP	



01 PLAN

SCALE 1:50



01 FLOORING LAYOUT

SCALE 1:50

Notes & References

General Notes -
This drawing is the property of SHiFt and shall not be used or reproduced without their written permission.
Dimensions on the drawing are to be read, not scaled.
The executing agency is required to correlate all relevant drawings and any errors or discrepancies are to be brought to the notice of SHiFt before commencement of work.
All dimensions are in millimeters unless noted otherwise.

N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

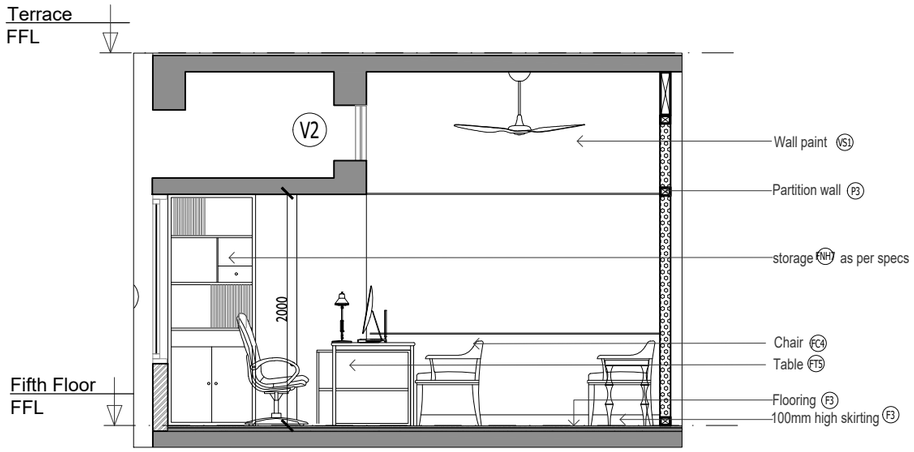
PROJECT:-
H/O for CDRI at
Shri Ram Kala Kendra

Drawing Title:
Breakout space-5th floor - Interior

Drawing No:
3208/CDRI/NDELHI/ID 1113

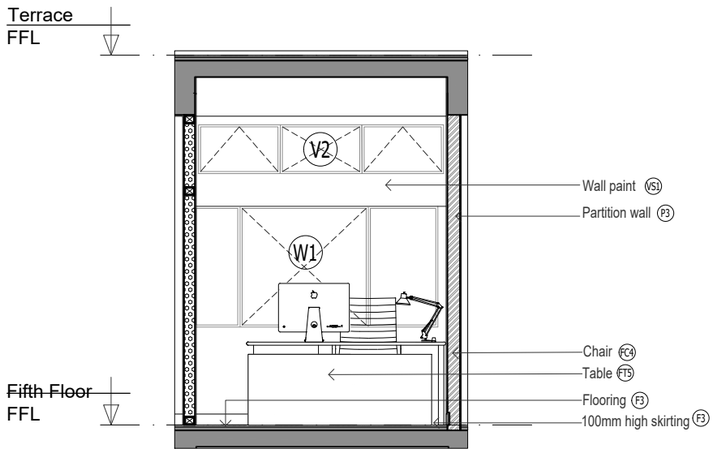
Scale: 1:100@A3 | Drawn: AA
Date: 2020-10-26 | Chkd By : AP

N



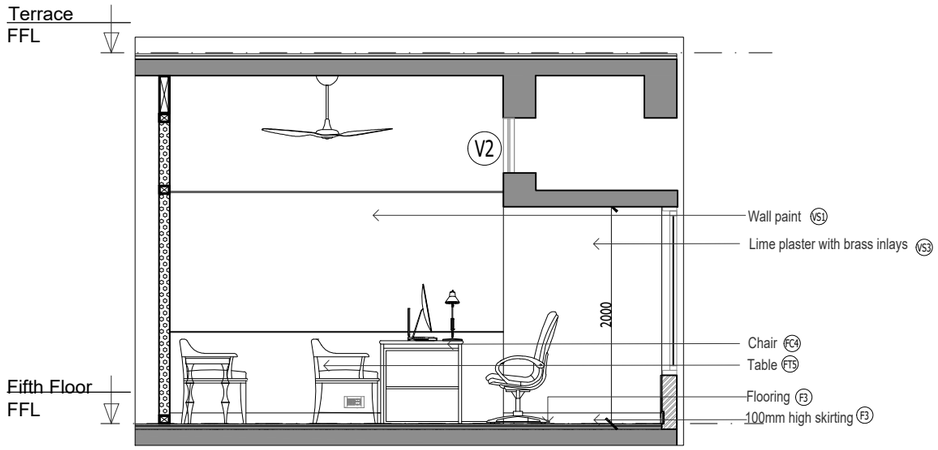
04 EL — Elevation-1

SCALE 1:50 @ A3



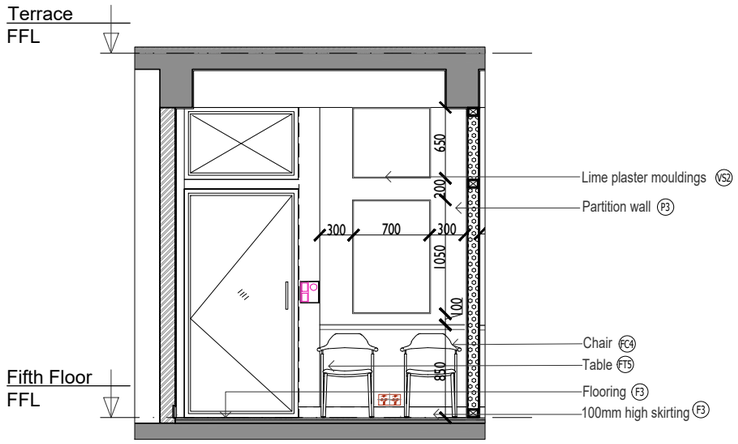
05 EL — Elevation-3

SCALE 1:50 @ A3



06 EL — Elevation-2

SCALE 1:50 @ A3



06 EL — Elevation-4

SCALE 1:50 @ A3

Notes & References

General Notes -

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All dimensions are in millimeters unless noted otherwise.

N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FL

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O for CDRI at
Shri Ram Kala Kendra

Drawing Title:
Directors cabin 4- 5th floor

Drawing No:
3208/CDRI/NDELHI/ID 1112.2

Scale: 1:100@A3 | Drawn: AA

Date: 2020-10-26 | Chkd By : AP

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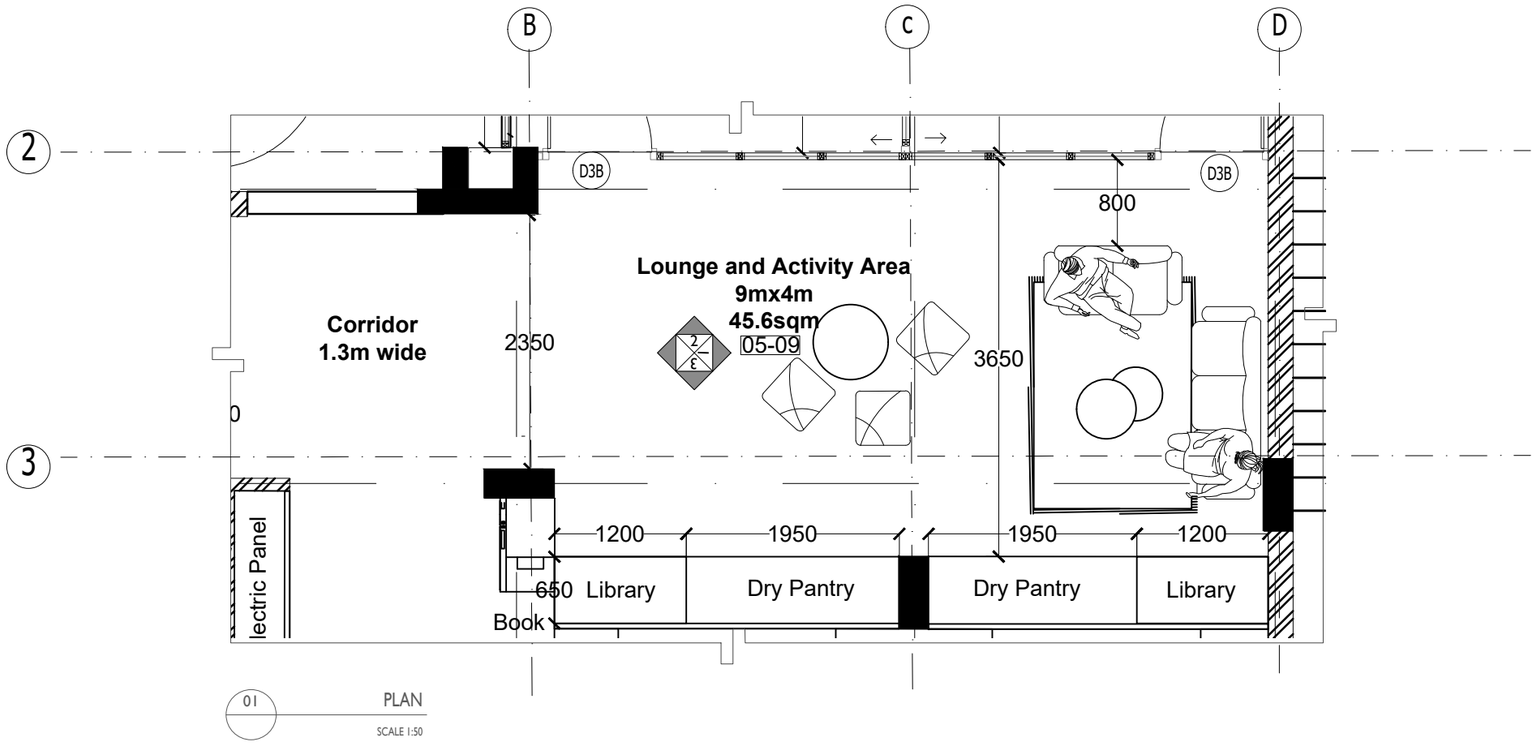
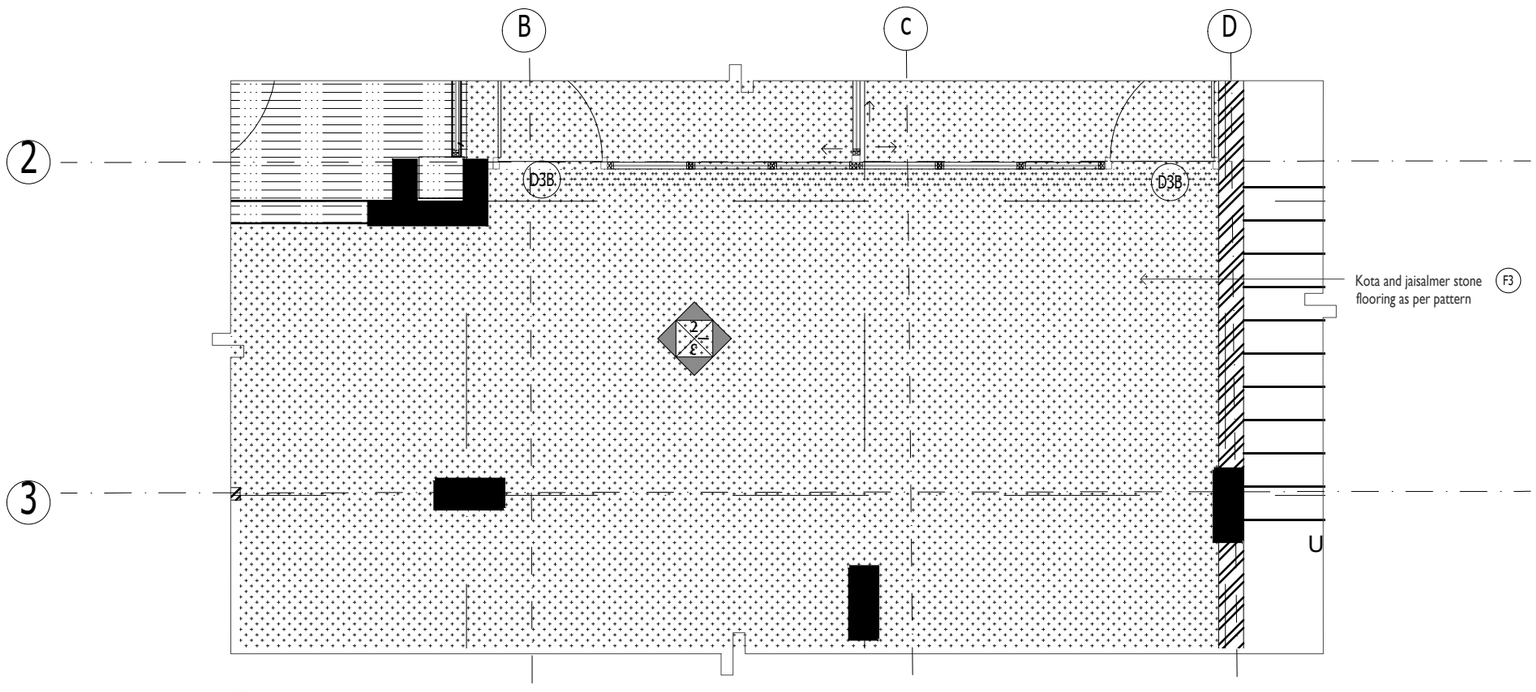


01 PLAN

SCALE 1:50



01 FLOORING LAYOUT

SCALE 1:50

Notes & References

General Notes -
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N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O for CDRI at
Shri Ram Kala Kendra

Drawing Title:
Breakout space-5th floor - Interior

Drawing No:
3208/CDRI/NDELHI/ID 1113

Scale: 1:100@A3 | Drawn: AA
Date: 2020-10-26 | Chkd By : AP

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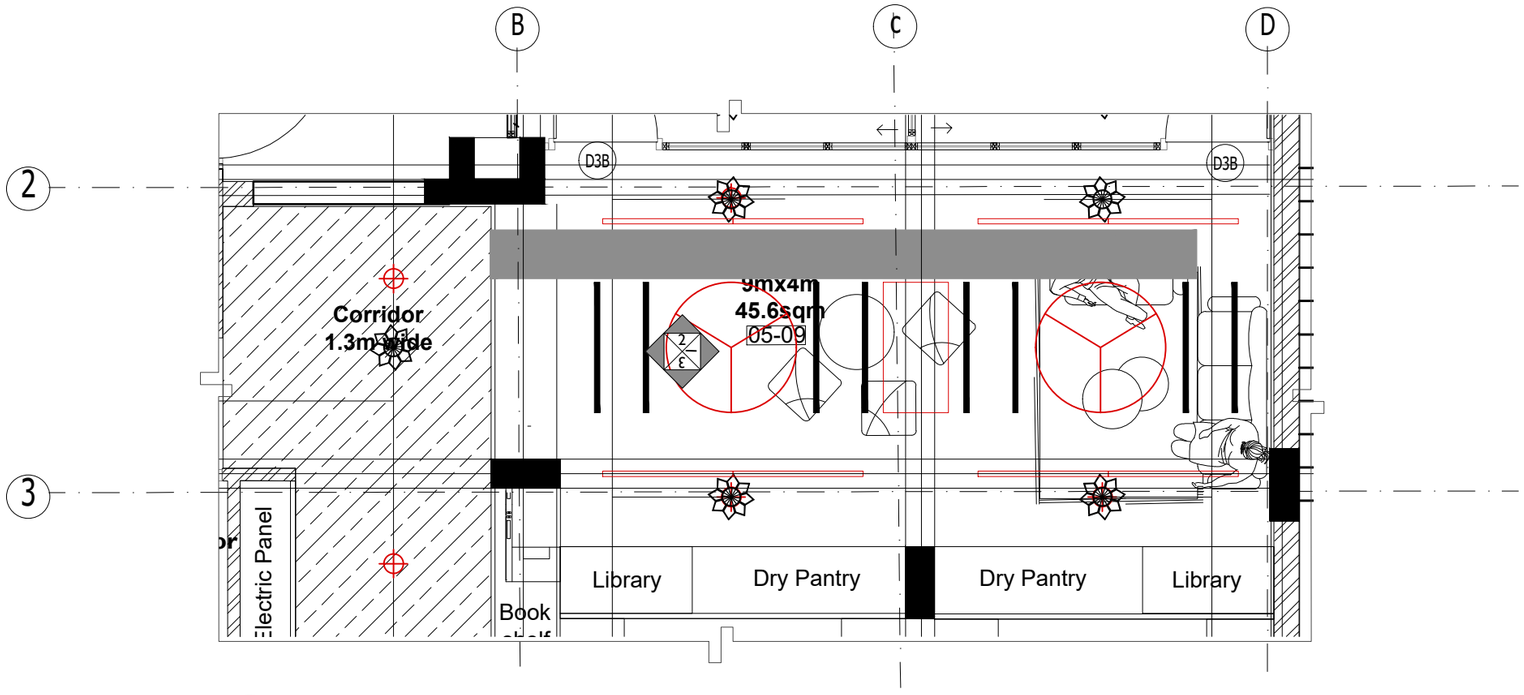
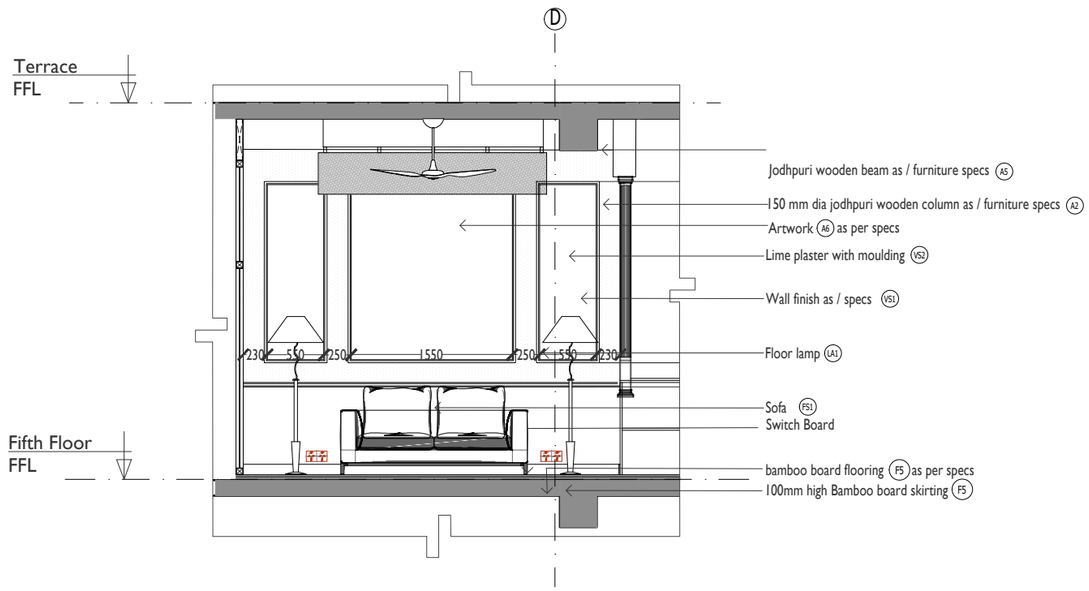


03 RCP

SCALE 1:100@ A3



04 ELEVATION 01

SCALE 1:50

Notes & References

General Notes -

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All dimensions are in millimeters unless noted otherwise.

N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

PROJECT:-

H/O for CDRI at
Shri Ram Kala Kendra

Drawing Title:
Breakout space-5th floor - Interior

Drawing No:
3208/CDRI/NDELHI/ID 1113

Scale:	1:100@A3	Drawn:	AA
Date:	2020-10-26	Chkd By :	AP

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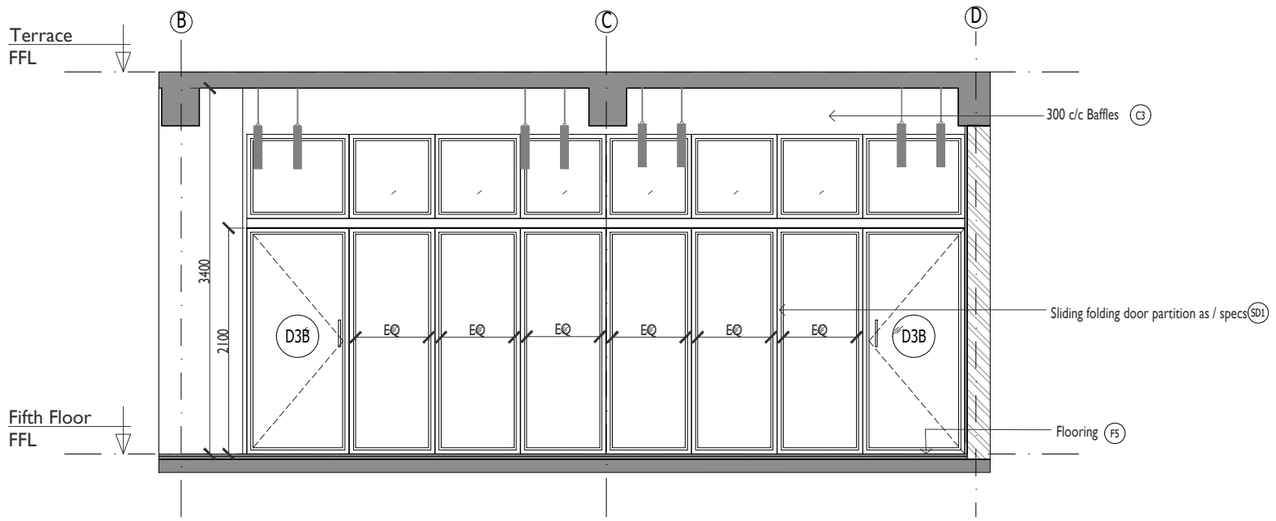
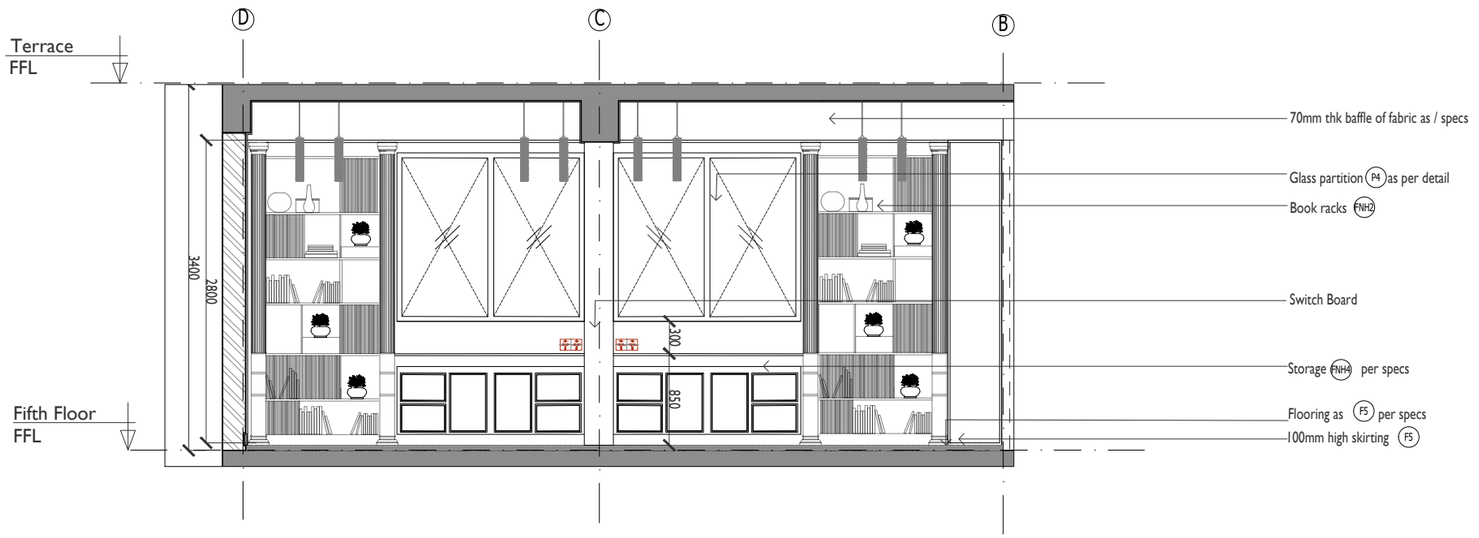


05 EL ELEVATION-02

SCALE 1:50



06 ELEVATION 03

SCALE 1:100

Notes & References

General Notes -

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All dimensions are in millimeters unless noted otherwise.

N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-

H/O for CDRI at
Shri Ram Kala Kendra

Drawing Title:

Breakout space-5th floor - Interior

Drawing No:

3208/CDRI/NDELHI/ID 1113

Scale: 1:100@A3 | Drawn: AA

Date: 2020-10-26 | Chkd By: AP

N

01 Plan

Plan

SCALE 1:50 @ A1

Notes & References

General Notes -

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FI

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

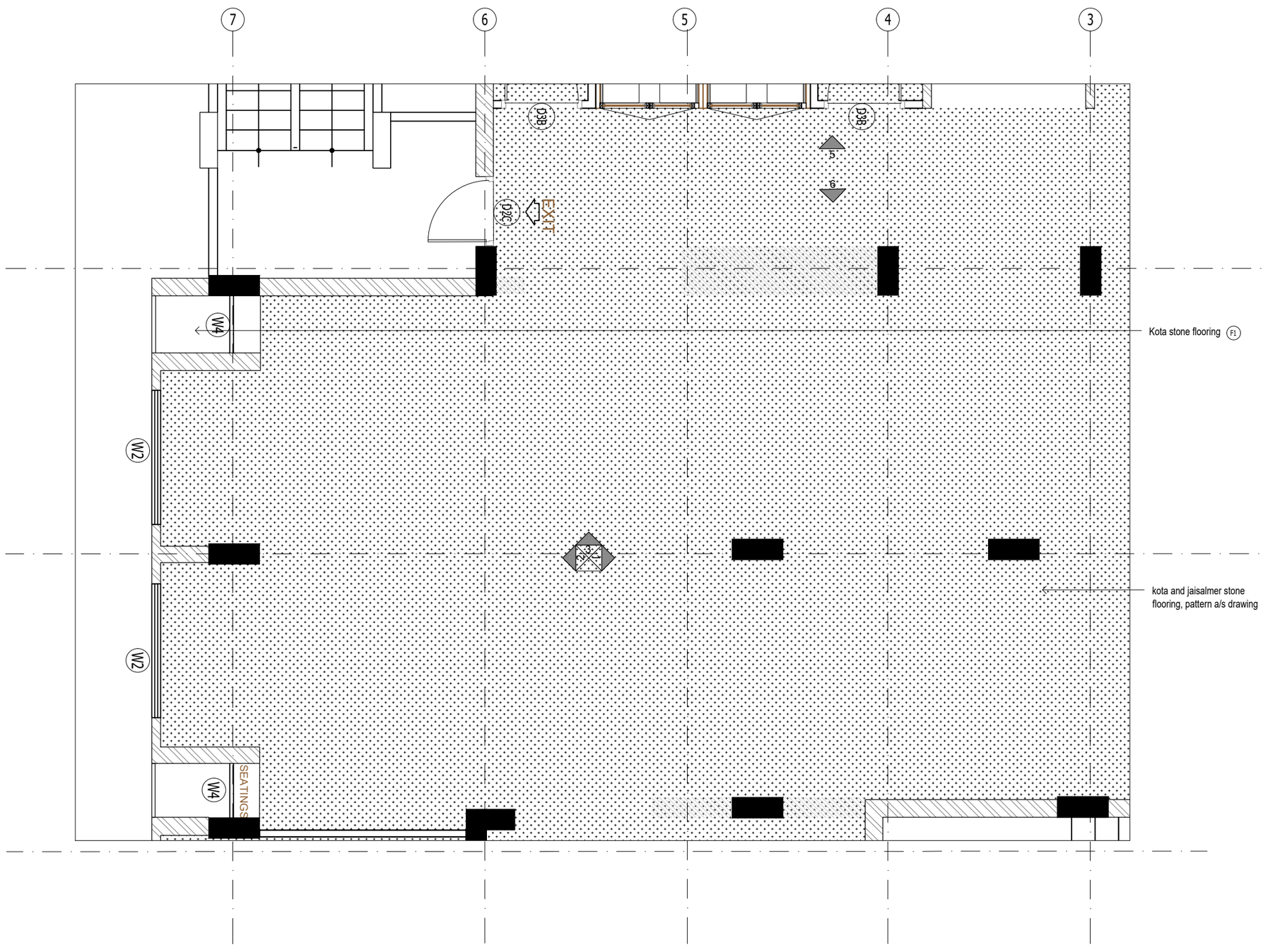
Drawing Title: WORKSPACE - 5th Floor

Drawing No: 3208/CDRI/NDELHI/ID 1114.1

Scale: 1:50@A1 | *Drawn:* AA

Date: 2021-01-06 | *Chkd By:* AP

N



02 FLOORING LAYOUT

SCALE 1:50@ A1

Notes & References

General Notes -

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N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FL

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-

H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
WORKSPACE - 5th Floor

Drawing No:
3208/CDRI/NDELHI/ID 1114.2

Scale: 1:50@A1 | Drawn: AA | Date: 2021-01-06 | Chkd By: AP

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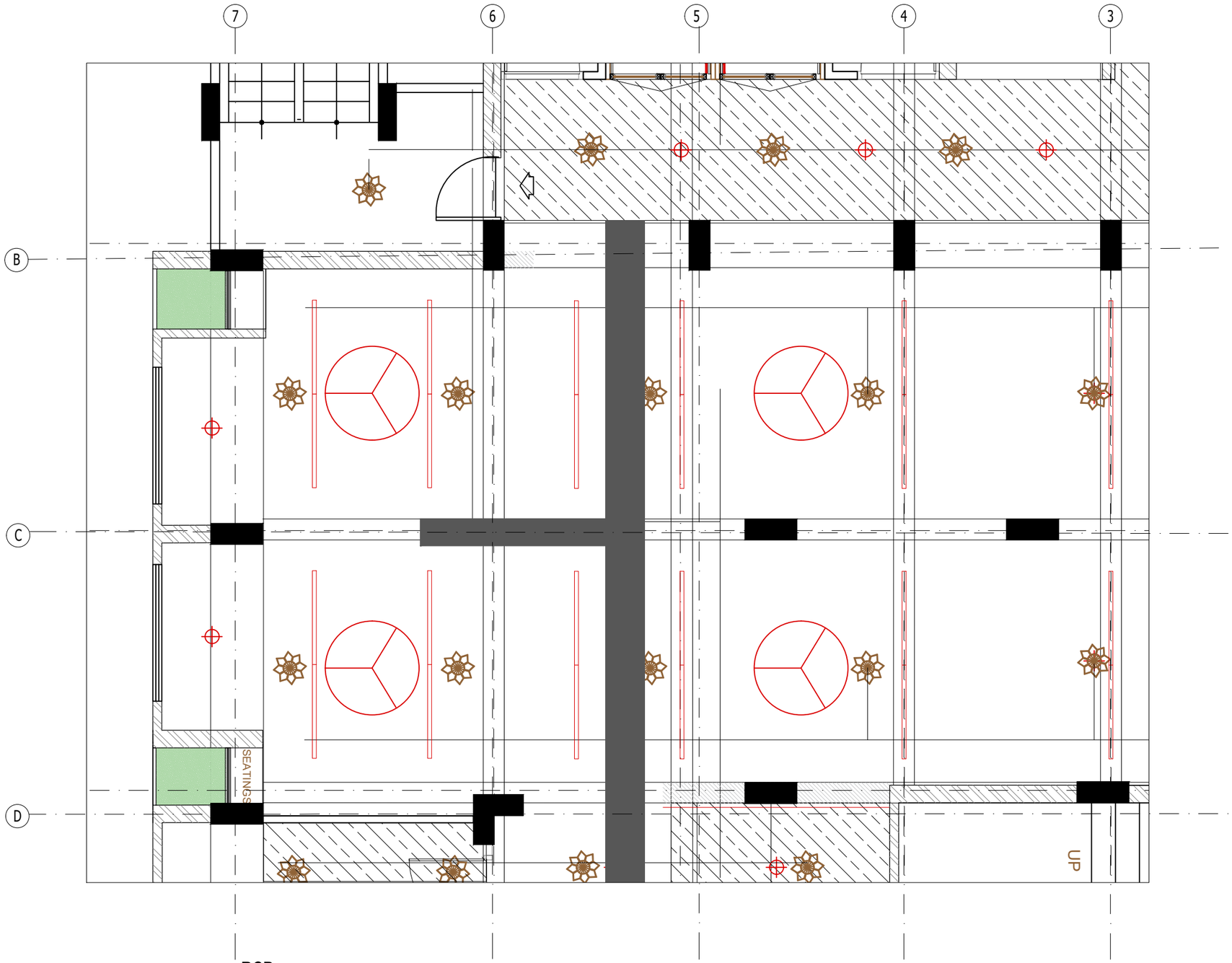

03 RCP

RCP

SCALE 1:100@ A3

Notes & References

General Notes -

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FL

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-

H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
WORKSPACE - 5th Floor

Drawing No:
3208/CDRI/NDELHI/ID 1114.3

Scale: 1:50@A1 | Drawn: AA

Date: 2021-01-06 | Chkd By : AP

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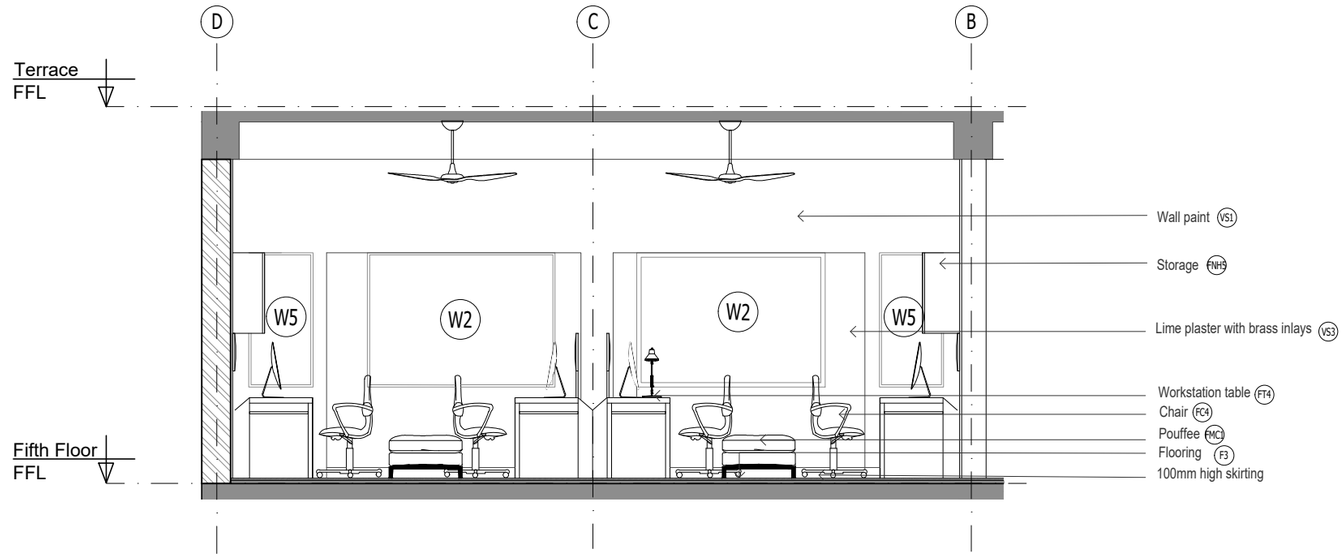
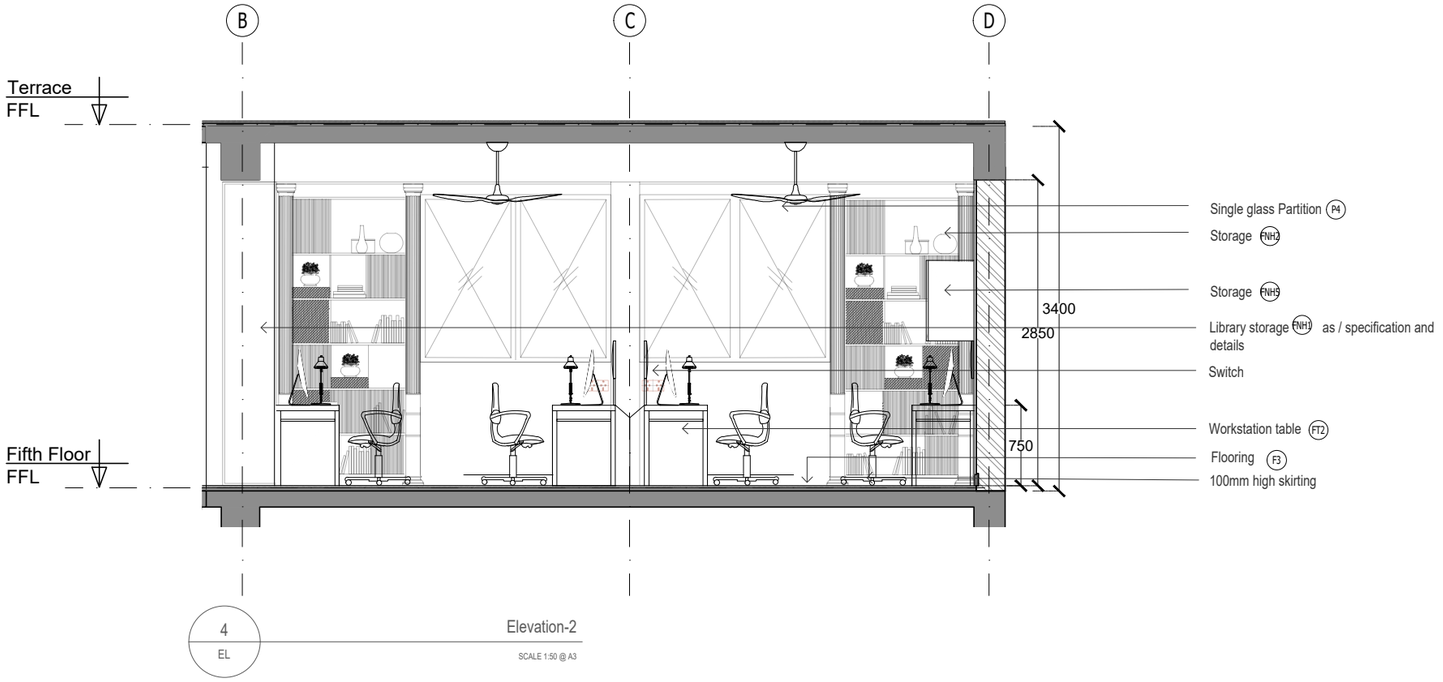


3 EL — Elevation-1

SCALE 1:50 @ A3



4 EL — Elevation-2

SCALE 1:50 @ A3

Notes & References

General Notes -

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: CENTRAL WORKSTATION

Drawing No: 3208/CDRI/NDELHI/ID 1114

Scale: 1:50@A1 | Drawn: AA

Date: 2021-01-06 | Chkd By : AP

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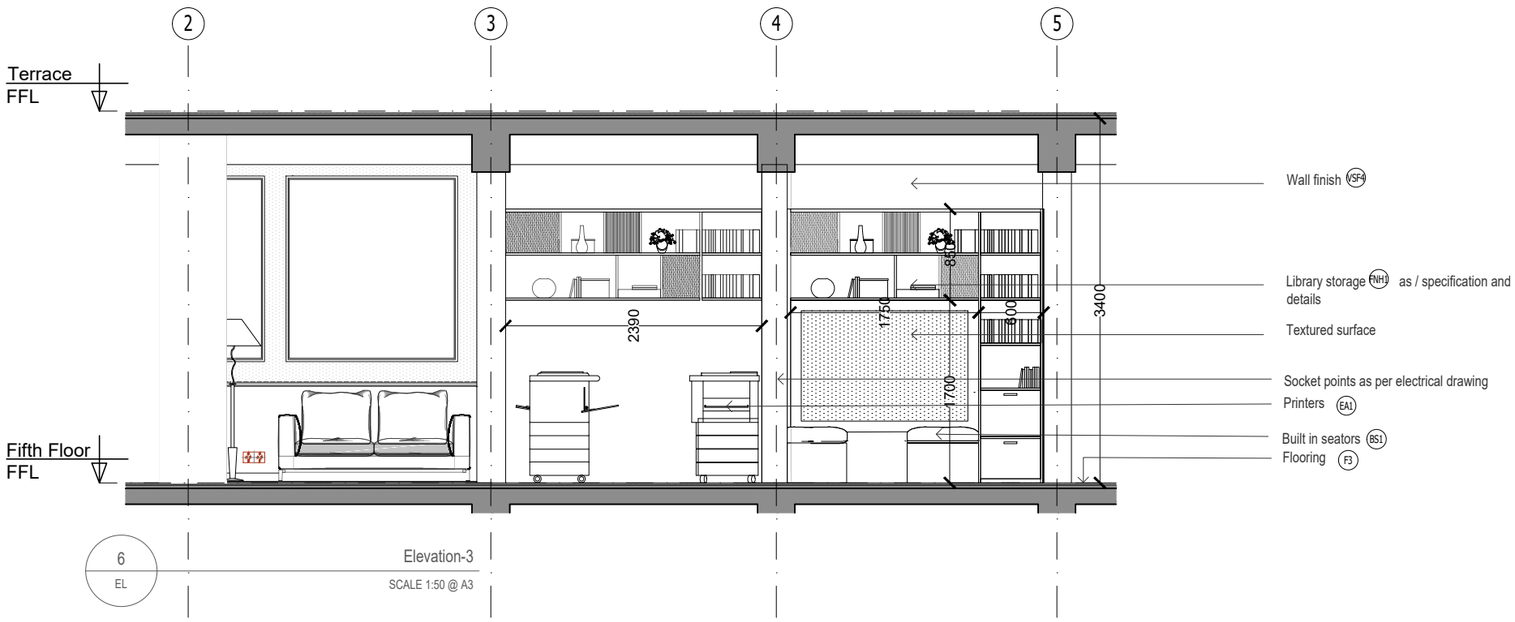
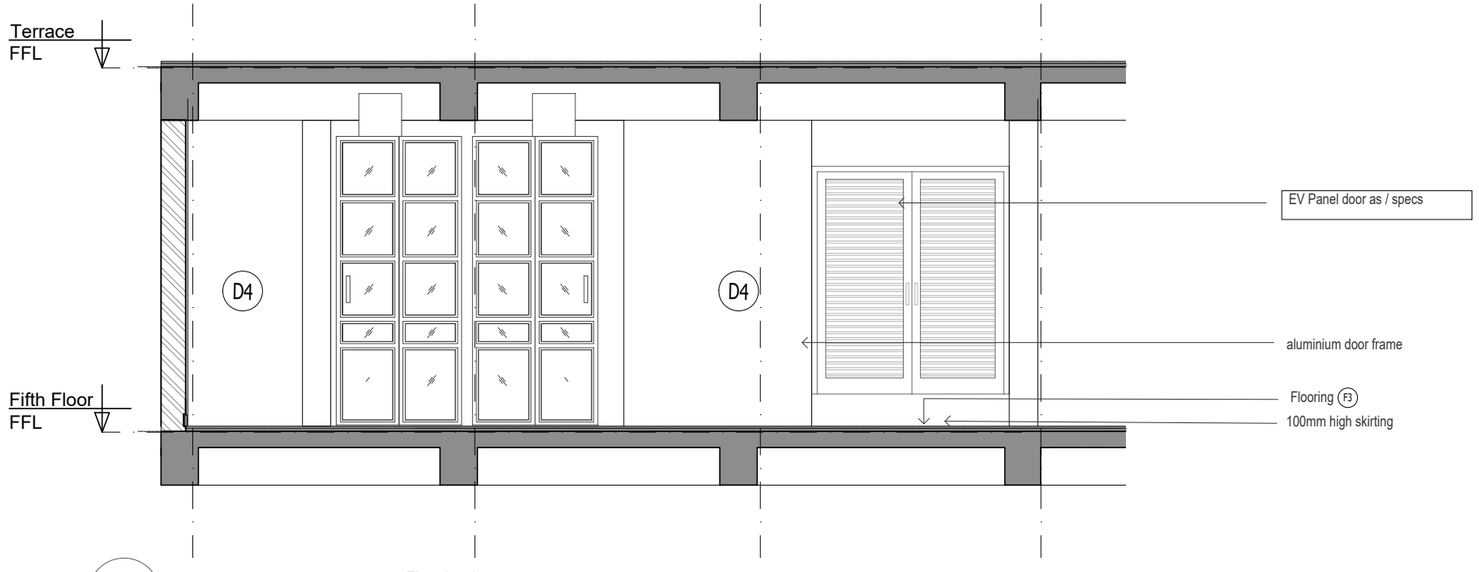


6 EL

Elevation-3

SCALE 1:50 @ A3



7 EL

Elevation-4

SCALE 1:50 @ A3

Notes & References

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

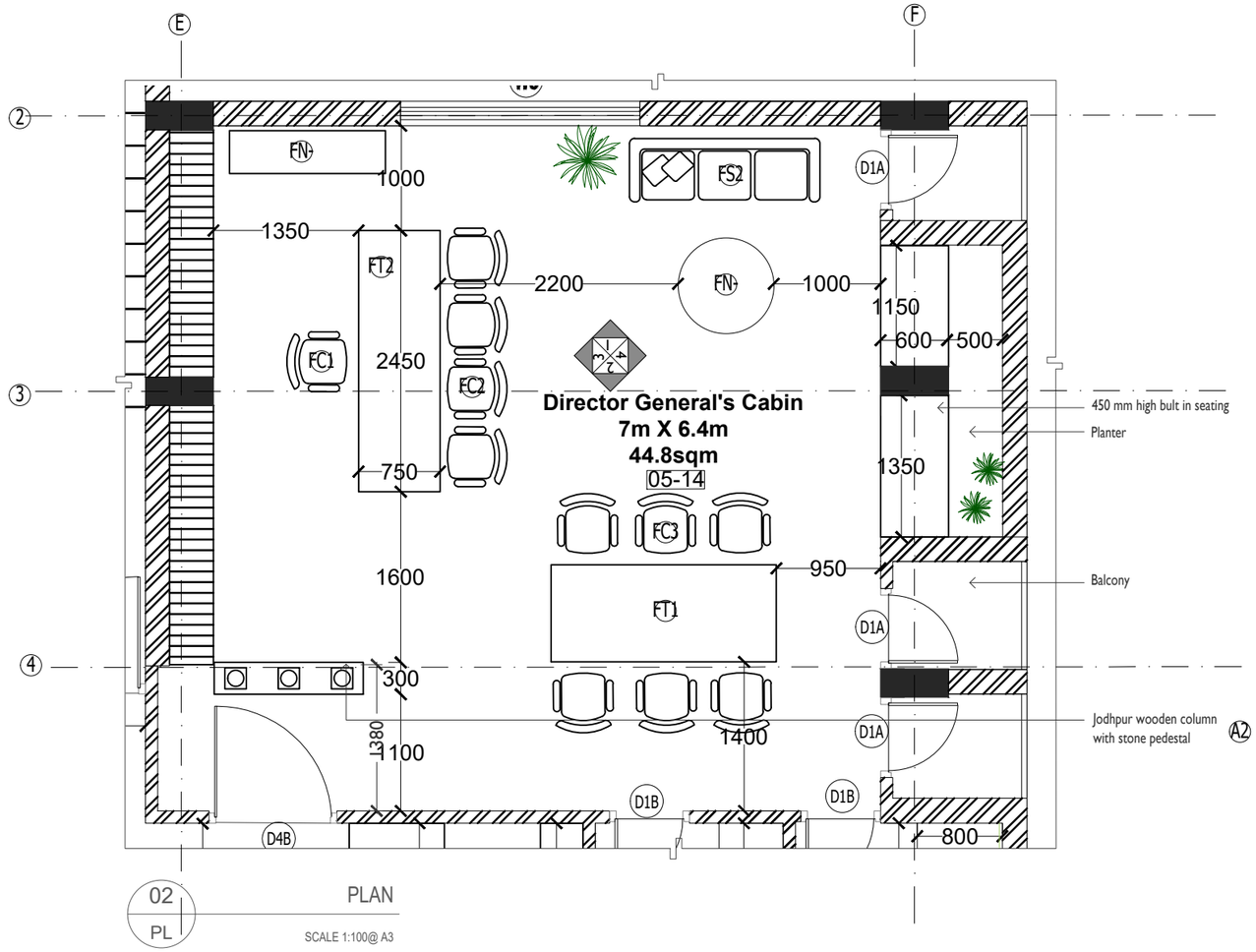
Drawing Title: CENTRAL WORKSTATION

Drawing No: 3208/CDRI/NDELHI/ID 1114

Scale: 1:50@A1 | Drawn: AA

Date: 2021-01-06 | Chkd By: AP

N



02 PL PLAN

SCALE 1:100@ A3

Notes & References

General Notes -

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All dimensions are in millimeters unless noted otherwise.

N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FUTURES
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-

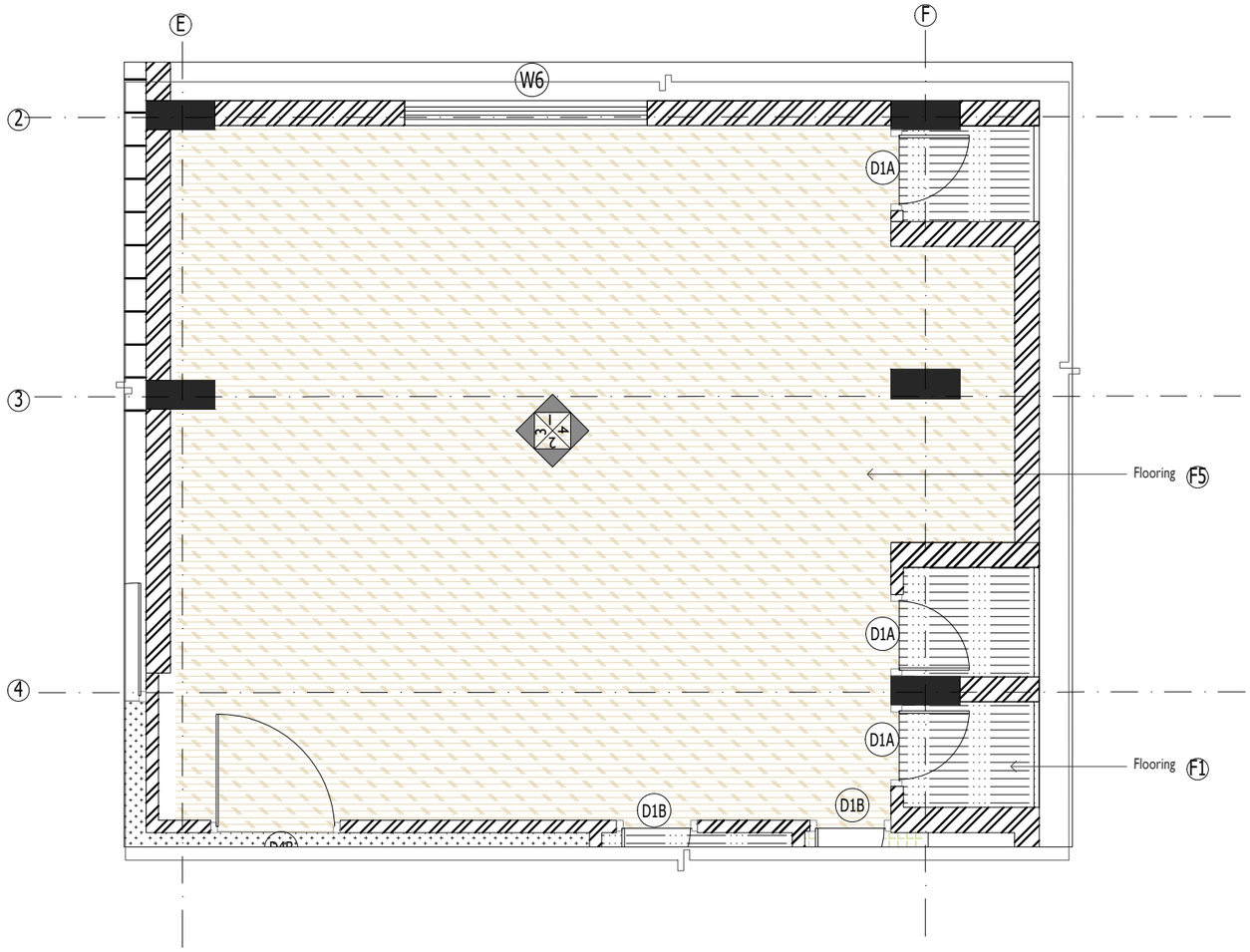
Drawing Title: DIRECTOR GENERAL'S ROOM

Drawing No: 3208/CDRI/NDELHI/ID 1115

Scale: | Drawn:

Date: | Chkd By :

N



02 FL FLOORING LAYOUT

SCALE 1:100@ A3

Notes & References

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N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-

H/O for CDRI at
Shri Ram Kala Kendra

Drawing Title:

DIRECTOR GENERAL'S ROOM

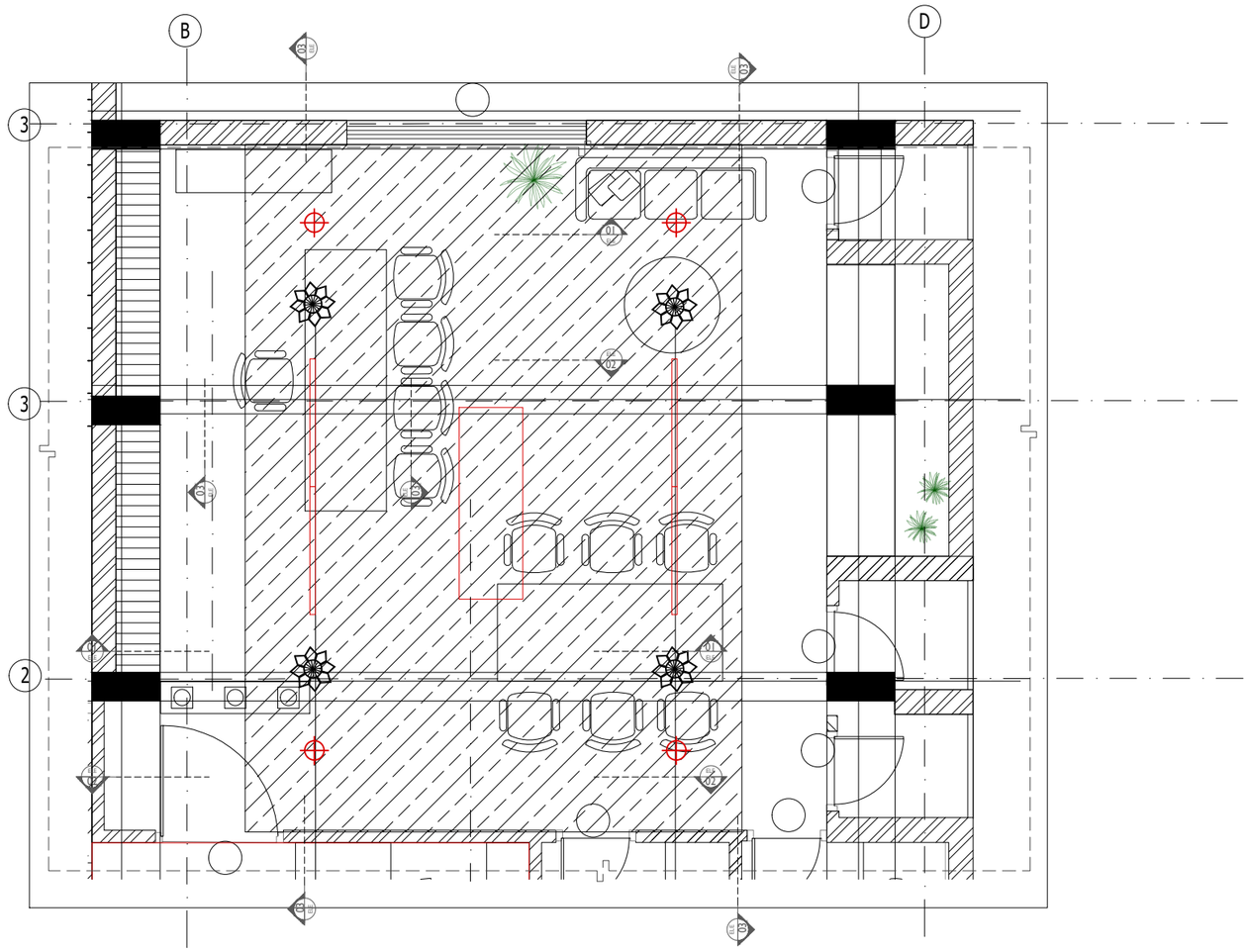
Drawing No:

3208/CDRI/NDELHI/ID 1115

Scale: 1:50@A3 | Drawn: AA

Date: 2020-10-26 | Chkd By : AP

N



01 RCP

SCALE 1:100@ A3

Notes & References

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N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

SUSTAINABLE CONSULTANT :-

STRUCTURAL ENGINEER

MEP CONSULTANT :-

HVAC CONSULTANT :-

ELECTRICAL CONSULTANT :-

PROJECT MANAGEMENT :-

PROJECT:-
COALITION FOR DISASTER RESILIENT INFRASTRUCTURE

Drawing Title:
DIRECTOR GENERAL'S ROOM

Drawing No:
3208/CDRI/NDELHI/ID 1115

Scale: 1:100@A3 | Drawn: AA
Date: 2020-10-26 | Chkd By: AP

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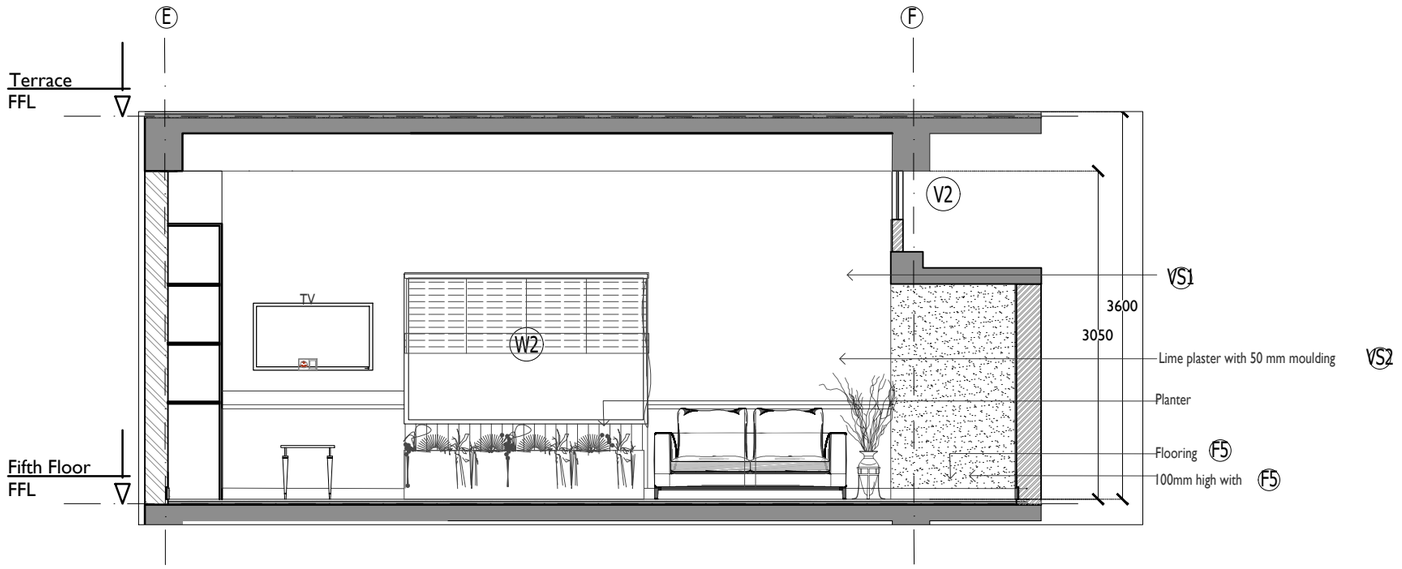
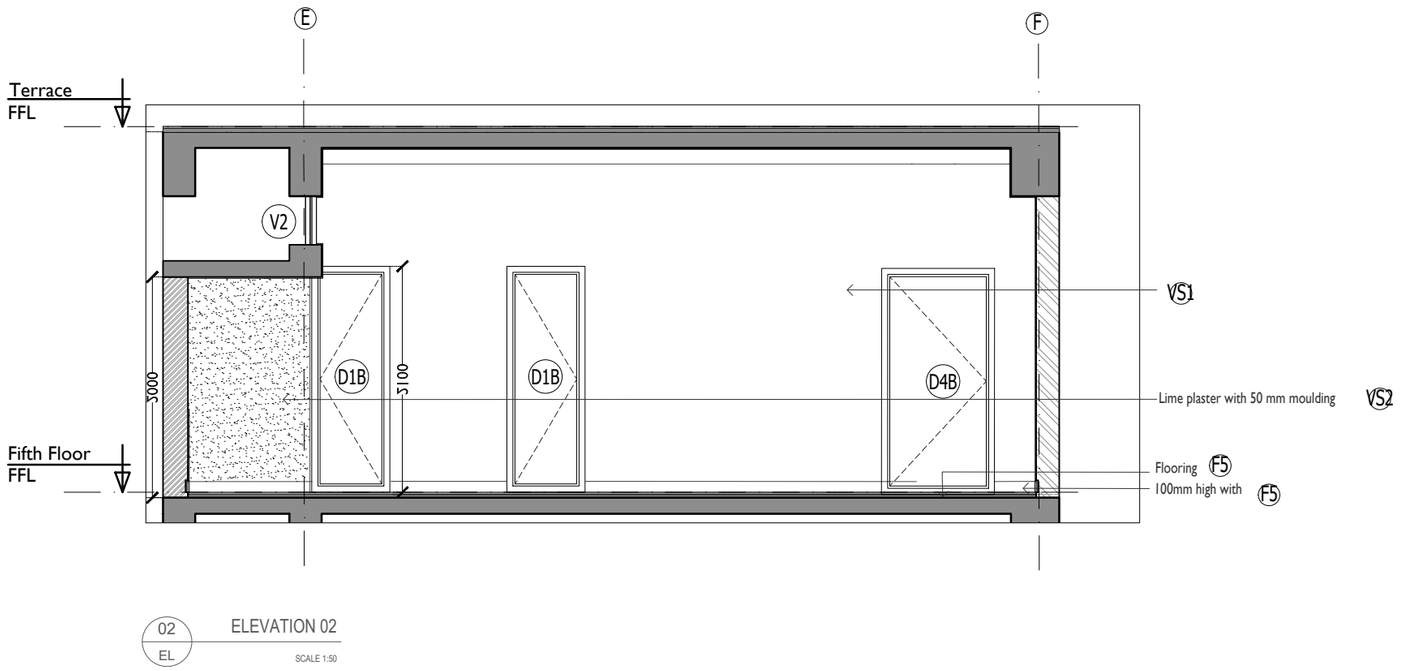


01 EL ELEVATION 01

SCALE 1:50



02 EL ELEVATION 02

SCALE 1:50

Notes & References

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N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O for CDRI at
Shri Ram Kala Kendra

Drawing Title:
DIRECTOR GENERAL'S ROOM

Drawing No:
3208/CDRI/NDELHI/ID 1115

Scale: 1:50@A3 | Drawn: AA | Chkd By : AP | Date: 2020-10-26

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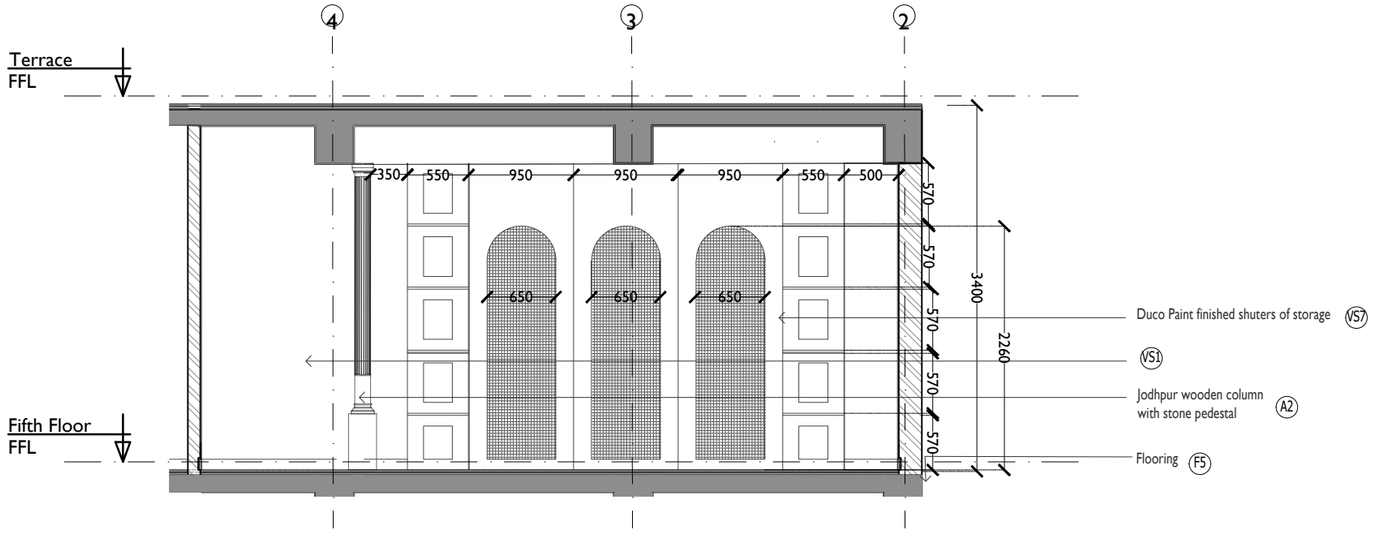
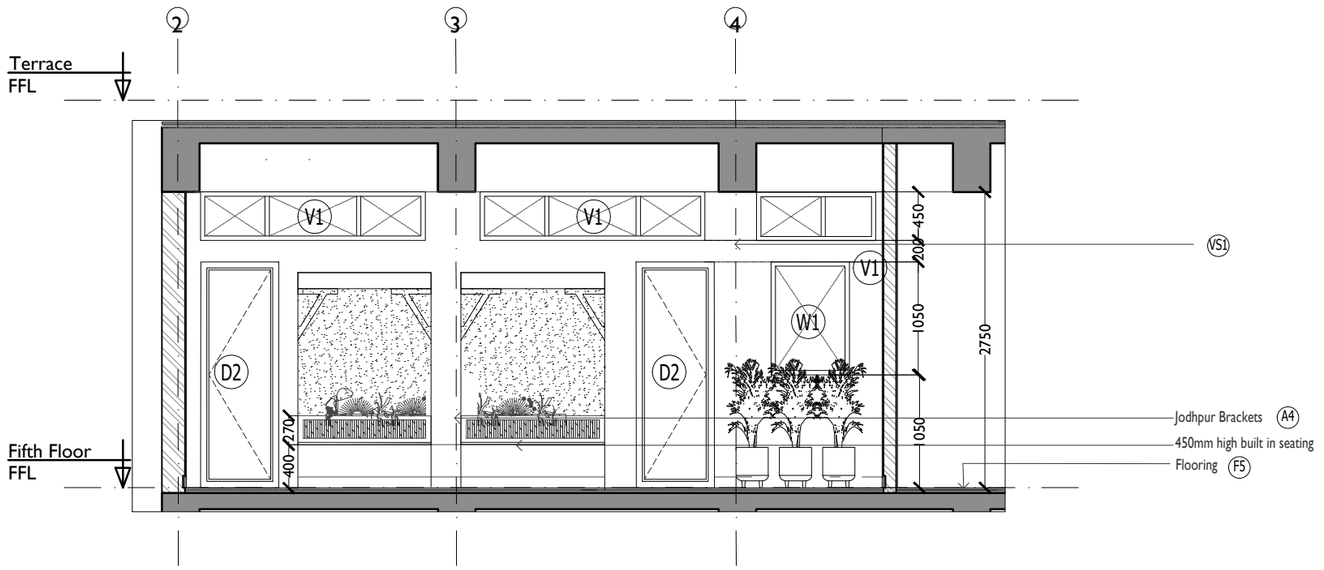


03 EL — ELEVATION-03

SCALE 1:50



04 EL — ELEVATION 04

SCALE 1:50

Notes & References

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N

KEY PLAN

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O for CDRI at
Shri Ram Kala Kendra

Drawing Title:
DIRECTOR GENERAL'S ROOM

Drawing No:
3208/CDRI/NDELHI/ID 1115

Scale: 1:50@A3 | Drawn: AA

Date: 2020-10-26 | Chkd By : AP

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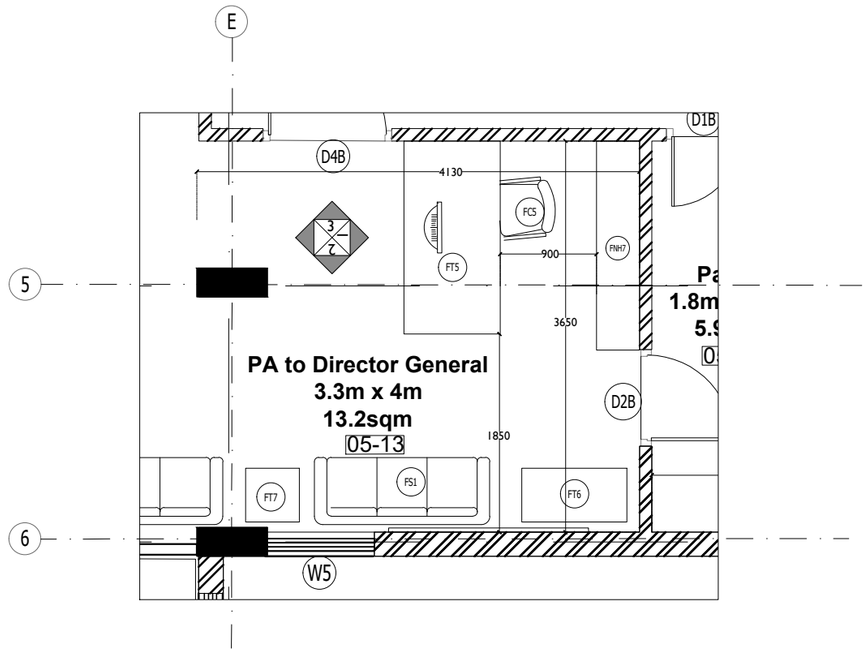
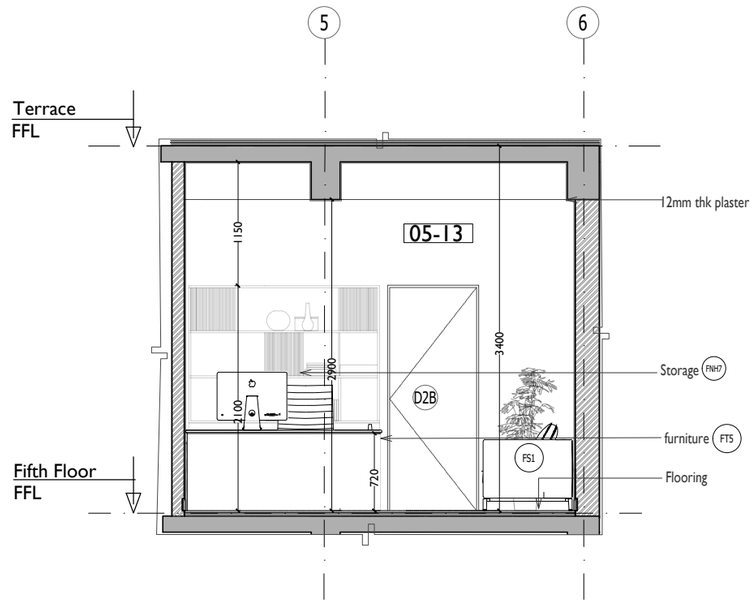
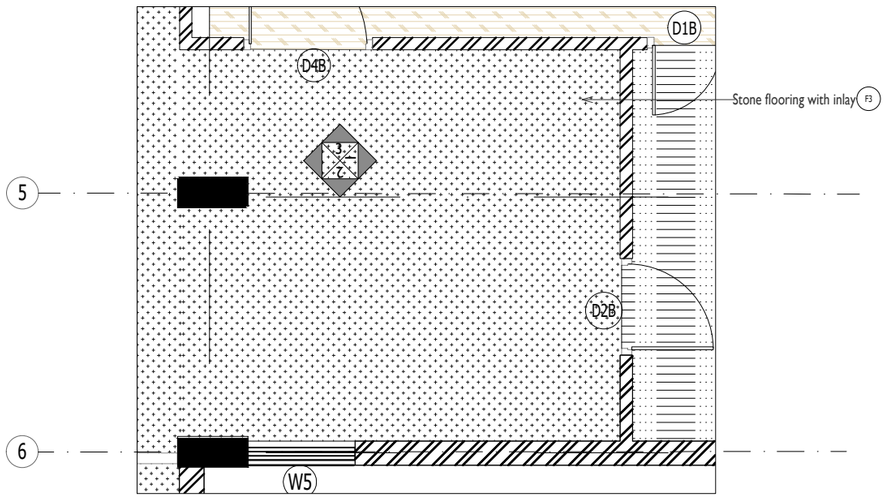


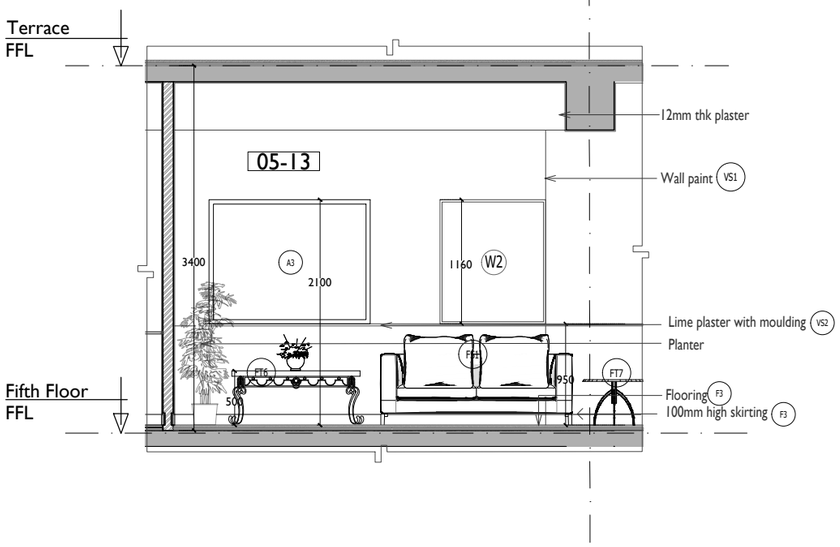
01 Plan
SCALE 1:50 @ A3



02 EL Elevation-1
SCALE 1:50 @ A1



03 Flooring Layout PLan
SCALE 1:50 @ A3



04 EL Elevation-2
SCALE 1:50 @ A1

Notes & References

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N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

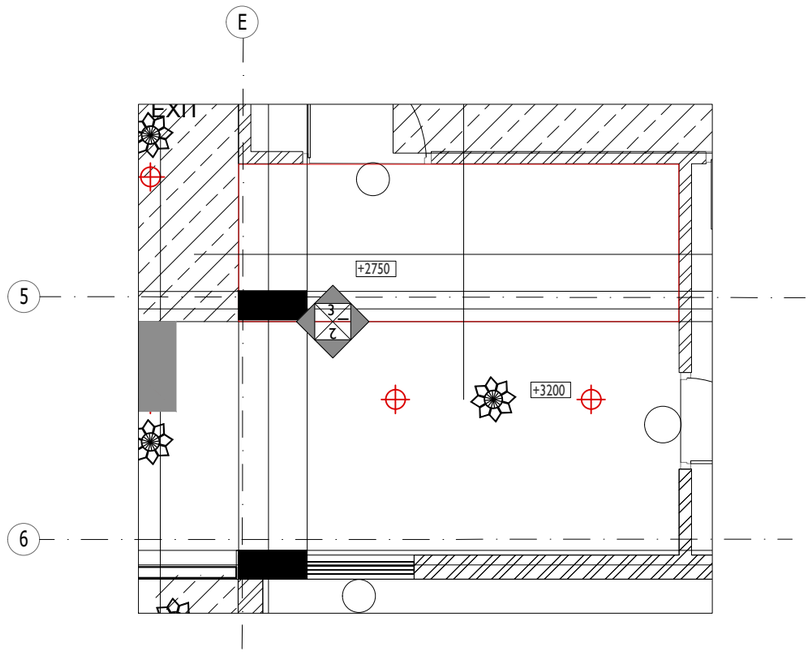
PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Interior Drawings : DG waiting area - 5th floor

Drawing No:
3208/CDRI/NDELHI/ID 1116

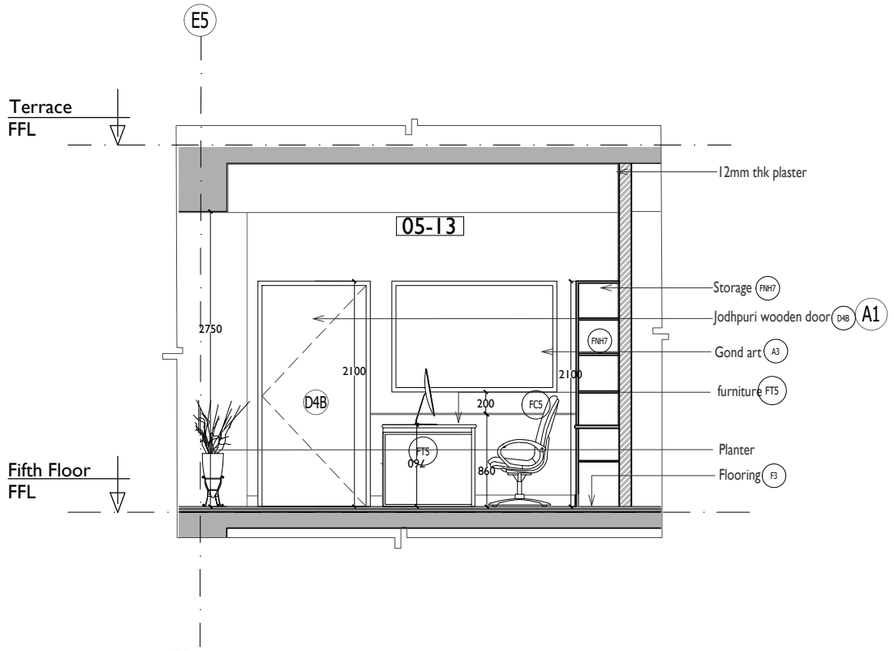
Scale: 1:50@A1 | Drawn: AA
Date: 2021-01-06 | Chkd By : AP

N



03 RCP

SCALE 1:50@ A3



03 SECTION 03

SCALE 1:50

Notes & References

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N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt STUDIO FOR HABITAT FUTURES

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

LEGEND

- POP False ceiling a/s specs
- Crafted Acoustic baffles
- Spinkler heads
- Ducts
- Drop down LED light fixture a/s specs
- Light fixture LED type 2, a/s specs
- Linear continous LED light fixture type 3 a/s specs
- Ceiling fan a/s specs

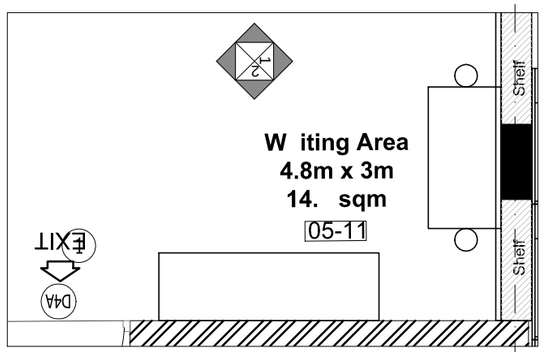
PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Interior Drawings : DG waiting area

Drawing No:
3208/CDRI/NDELHI/ID 1116

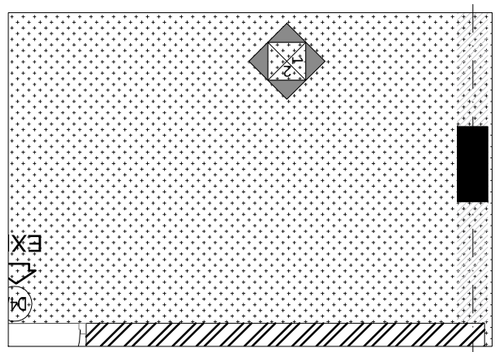
Scale: 1:50@A1 | Drawn: AA | Date: 2021-01-06 | Chkd By : AP

N



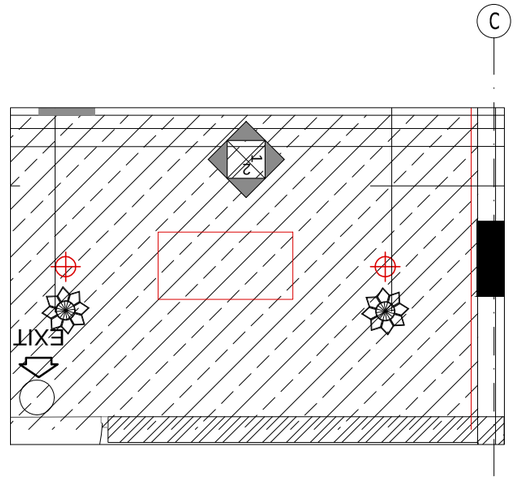
01 Plan — Plan

SCALE 1:50 @ A3



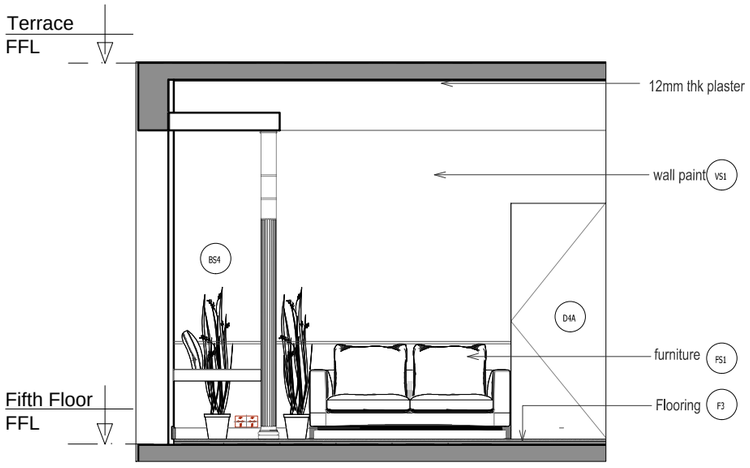
01 Plan — Flooring layout plan

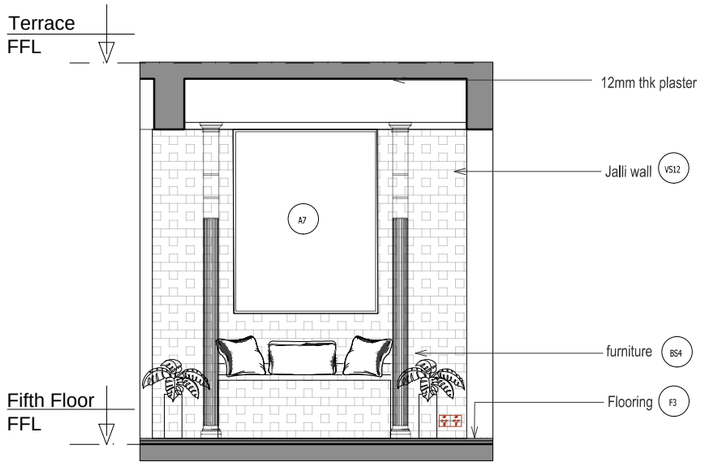
SCALE 1:50 @ A3



03 RCP — RCP Plan

SCALE 1:50 @ A3





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Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURES
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

Door and Window Schedule

No.	Width	Height	Sill LVL	Lintel LVL
TD	650	1850	FFL	2100
D1A	750	2100	FFL	2100
D1B	750	2100	FFL	2100
D2A	900	2100	FFL	2100
D2B	900	2100	FFL	2100
D3A	1050	2100	FFL	2100
D3B	1050	2100	FFL	2100
D4A	1200	2100	FFL	2100
D4B	1200	2100	FFL	2100
D4C	1200	2100	FFL	2100
D4D	1200	2100	FFL	2100
W1	2400	2100	850	2100
W2	1750	2100	850	2100
W3	1600	2100	850	2100
W4	700	2100	850	2100
W5	1000	2100	850	2100
W6	2250	2100	850	2100
V1	As per site	450	2300	2750
V2	As per site	450	2300	2750

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
Waiting Area

Drawing No:
3208/CDRI/NDELHI/ID 1124

Scale: 1:50@A1 | Drawn: AA
Date: 2021-01-06 | Chkd By: AP

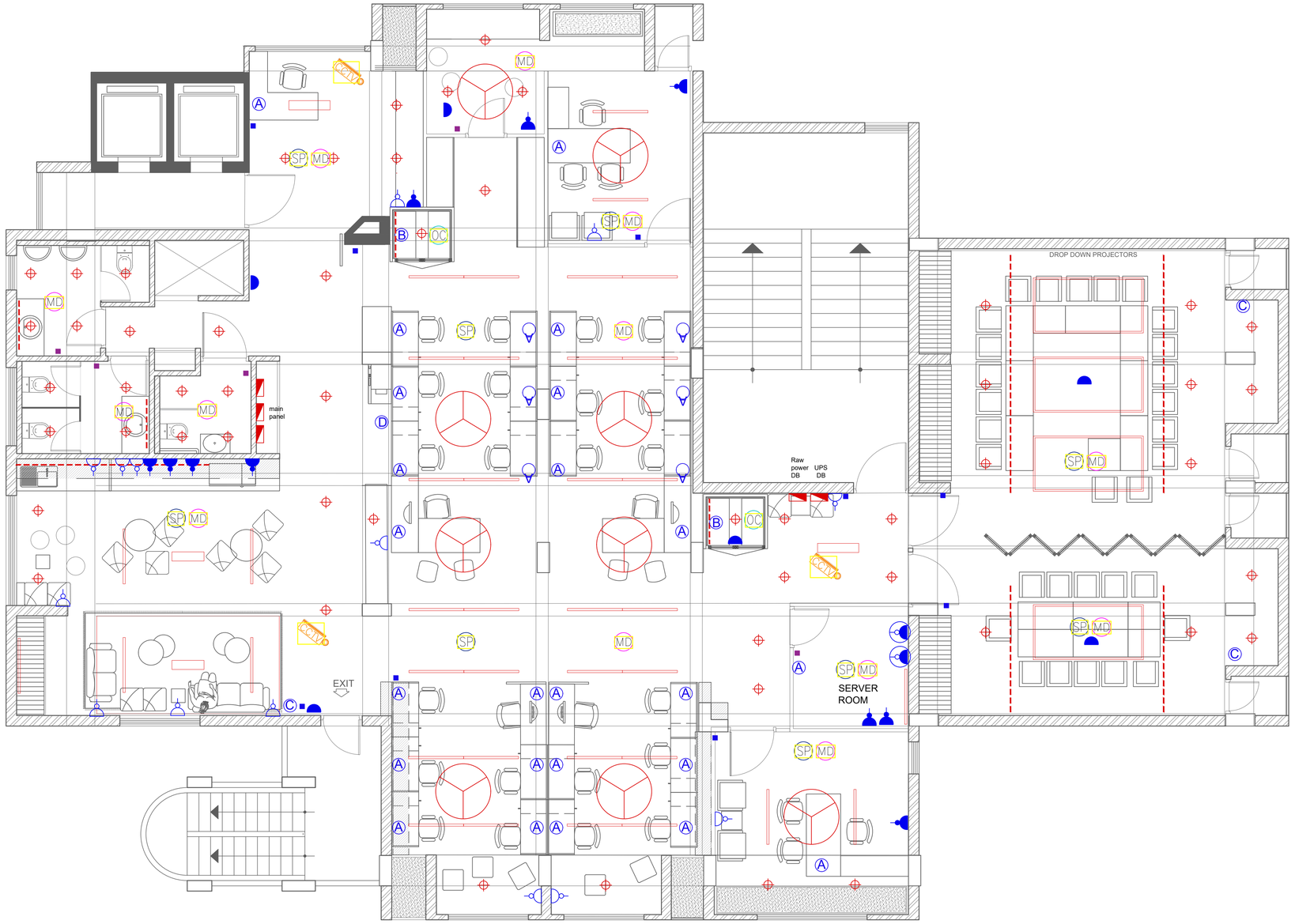
MASTER FINISH SCHEDULE - CDRI OFFICE , MANDI HOUSE		
ARCHITECTURAL DRAWING PACKAGE		
Vertical Surface finishes		
S. no	Symbol	Item
1	VS1	Low VOC Wall paint on POP , Plastered wall
2	VS2	Lime Plaster with 25mm mouldings
3	VS3	Lime Plaster with 8mm thick brass inlay
4	VS4	Wooden slat panelling, polished
5	VS5	Ceramic wall tiles
6	VS6	Stone wall cladding
7	VS11	Granite stone cladding
8	VS7	MDF panelling with V grooves and duco paint finish
9	VS8	Zari fabric panelling
10	VS9	8mm brass strip inlay
11	VS10	12mm thick moulding in painted wall
12	VS11	Horizontal beadings
13	VS12	Jaali work
Floor finishes		
S. no	Symbol	Item
1	F1	18mm thick Kota stone
2	F2	Antistatic Vinyl flooring
3	F3	Kota stone with jaisalmer stone inlay
4	F4	Vitrified Tiles
5	F5	Bamboo board tiles
6	F6	Kota stone and brass inlay
Ceiling Finishes		
S. no	Symbol	Item
1	C1	Gypsum false ceiling
2	C2	OBD Paint
3	C3	Acoustic baffles of crafted fabric
Partition Walls		
S. no	Symbol	Item
1	P1	Fixed partition of double glass panes sandwiching laser cut rice paper
2	P2	Sliding/Folding partition of double glass, 5 mm thick each, panes sandwitching laser cut rice paper
3	P3	Gypsum board dry wall with 50mm glasswool Insulation
4	P4	Fixed aluminium partition of 10mm thick toughened glass
Artworks		
S. no	Symbol	Item
1	A1	Handprinting wooden blocks made into an wall art panel
2	A2	Wooden Jodhpur columns
3	A3	Gond art panels fixed on walls
4	A4	Wooden Jodhpur brackets
5	A5	Wooden Jodhpur beams
6	A6	Madhubani art panels fixed on walls

08-06/4/2020-DIR_HR-OPS

1146/2021/DIR_HR-OPS

List of Drawings

DRAWING SCHEDULE - CDRI OFFICE , MANDI HOUSE								
Mechanical, Electrical and Plumbing Drawing package								
ITEM		DRAWING TITLE	DRAWING NO.	PAPER SIZE	STAGE	STATUS	ISSUE DATE	REMARKS
100 SERIES		PLUMBING						
	1	FOURTH FLOOR PLAN	3208/CDRI/NDELHI/PL 01	A1	Tender			
	2	FIFTH FLOOR PLAN	3208/CDRI/NDELHI/PL 02	A1	Tender			
	3	TYPICAL WASHROOM DETAIL	3208/CDRI/NDELHI/PL 03	A1	Tender			
110 SERIES		ELECTRICAL						
	1	FOURTH FLOOR PLAN	3208/CDRI/NDELHI/EL 01	A1	Tender			
	2	FIFTH FLOOR PLAN	3208/CDRI/NDELHI/EL 02	A1	Tender			
120 SERIES		FIRE-FIGHTING						
	1	FOURTH FLOOR PLAN	3208/CDRI/NDELHI/FF 01	A1	Tender			
	2	FIFTH FLOOR PLAN	3208/CDRI/NDELHI/FF 02	A1	Tender			
130 SERIES		HVAC						
	1	FOURTH FLOOR PLAN	3208/CDRI/NDELHI/AC 01	A1	Tender			
	2	FIFTH FLOOR PLAN	3208/CDRI/NDELHI/AC 01	A1	Tender			
		THE DRAWINGS SCHEDULE IS TENTATIVE AND A BASIC FRAMEWORK FOR STARTING THE DRAWING PACKAGES. IT SHOULD NOT BE LIMITED TO THE ABOVE MENTIONED SCOPE OF WORK.						



01 PL — 4th floor ELECTRICAL

SCALE 1:50@A3

Notes & References

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N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURI

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

- 1x 6amp
- 1x 16amp
- A — 1x 20amp
- 1x 16 amp ceiling point
- Telephone point
- A — 2x6amp UPS switch socket + 1x5amp raw switch socket 1xtelephone +1xdata
- B — 1x6amp raw switch socket + 1xtelephone +1xdata
- C — 3sets of 2x6amp socket by 1 switch UPS + 2xdata +1xTV +2xHDMI +2xVGA + 1xSpeaker wire
- D — 1xdata + 1x16Amp raw switch Point
- E — 1x6amp socket +1xTV +1xHDMI
- MD — Smoke Detector
- SP — PA system
- OC — Occupancy sensor
- CCTV — Dome type CCTV
- Switchpoints
- Automation Key Pad
- Drop down LED light fixture
- Light fixture LED type 2
- Linear continous LED light fixture type
- Strip LED lights for cove lighting and calling booth
- Ceiling fan a/s specs

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

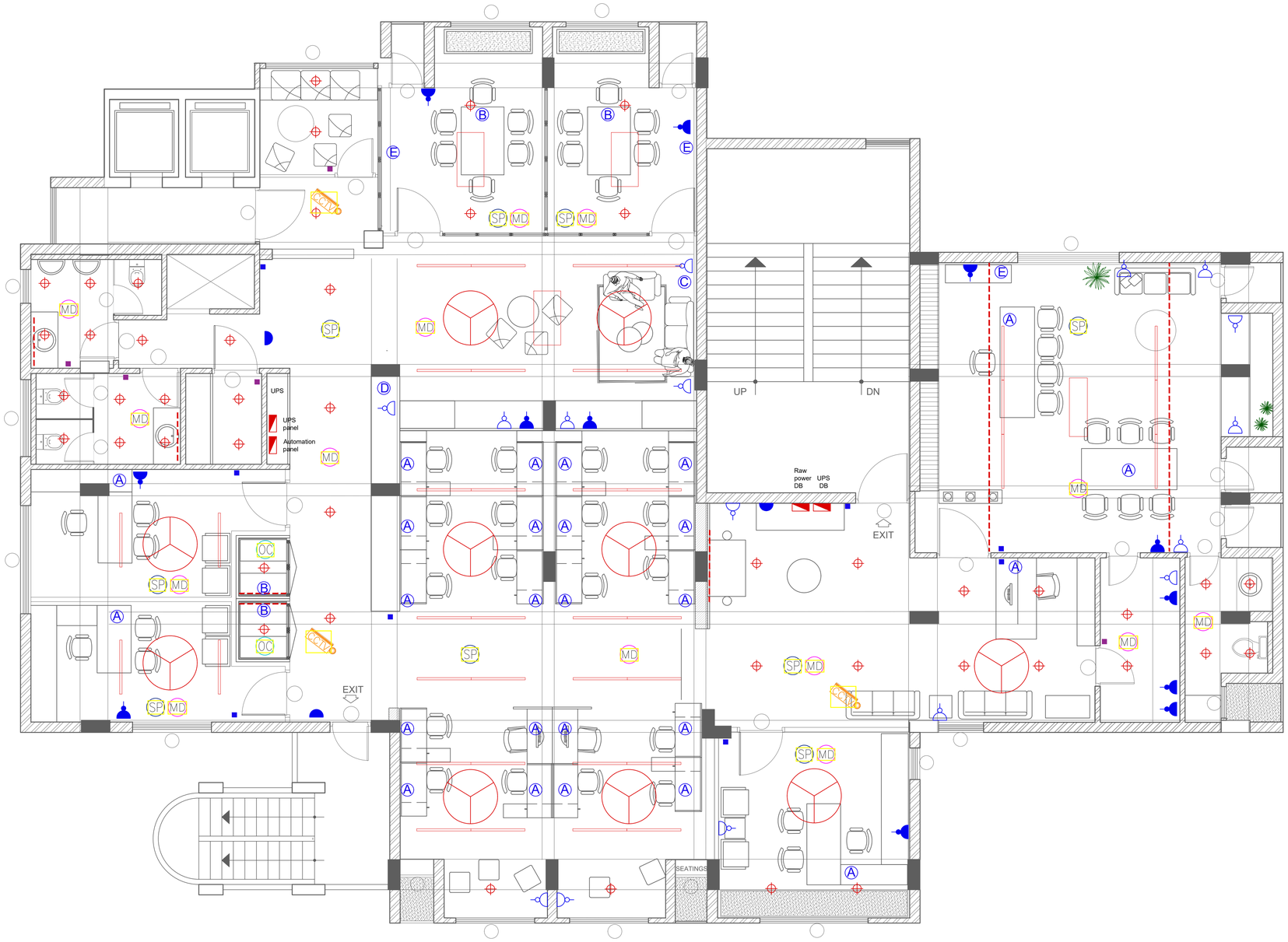
Drawing Title: 4th FLOOR ELECTRICAL PLAN

Drawing No: 3208/CDRI/NDELHI/EL 01

Scale: 1:50@A1 | *Drawn:* VK

Date: 2021-01-06 | *Chkd By:* SH

N



01 PL 5th floor ELECTRICAL

SCALE 1:50@ A3

Notes & References

General Notes -

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All dimensions are in millimeters unless noted otherwise.

N

Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURI
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

- 1x 6amp
- 1x 16amp
- 1x 20amp
- 1x 16 amp ceiling point
- Telephone point
- (A) 2x6amp UPS switch socket + 1x6amp raw switch socket 1xtelephone +1xdata
- (B) 1x6amp raw switch socket + 1xtelephone +1xdata
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- MD Smoke Detector
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- Drop down LED light fixture
- Light fixture LED type 2
- Linear continous LED light fixture type
- Strip LED lights for cove lighting and calling booth
- Ceiling fan a/s specs

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: 5th FILOOR ELECTRICAL PLAN

Drawing No: 3208/CDRI/NDELHI/EL 02

Scale: 1:50@A1 | *Drawn:* VK | *Date:* 2021-01-06 | *Chkd By:* SH

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01 PL — 4th floor FF Plan

SCALE 1:50@ A3

Notes & References

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Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FI

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

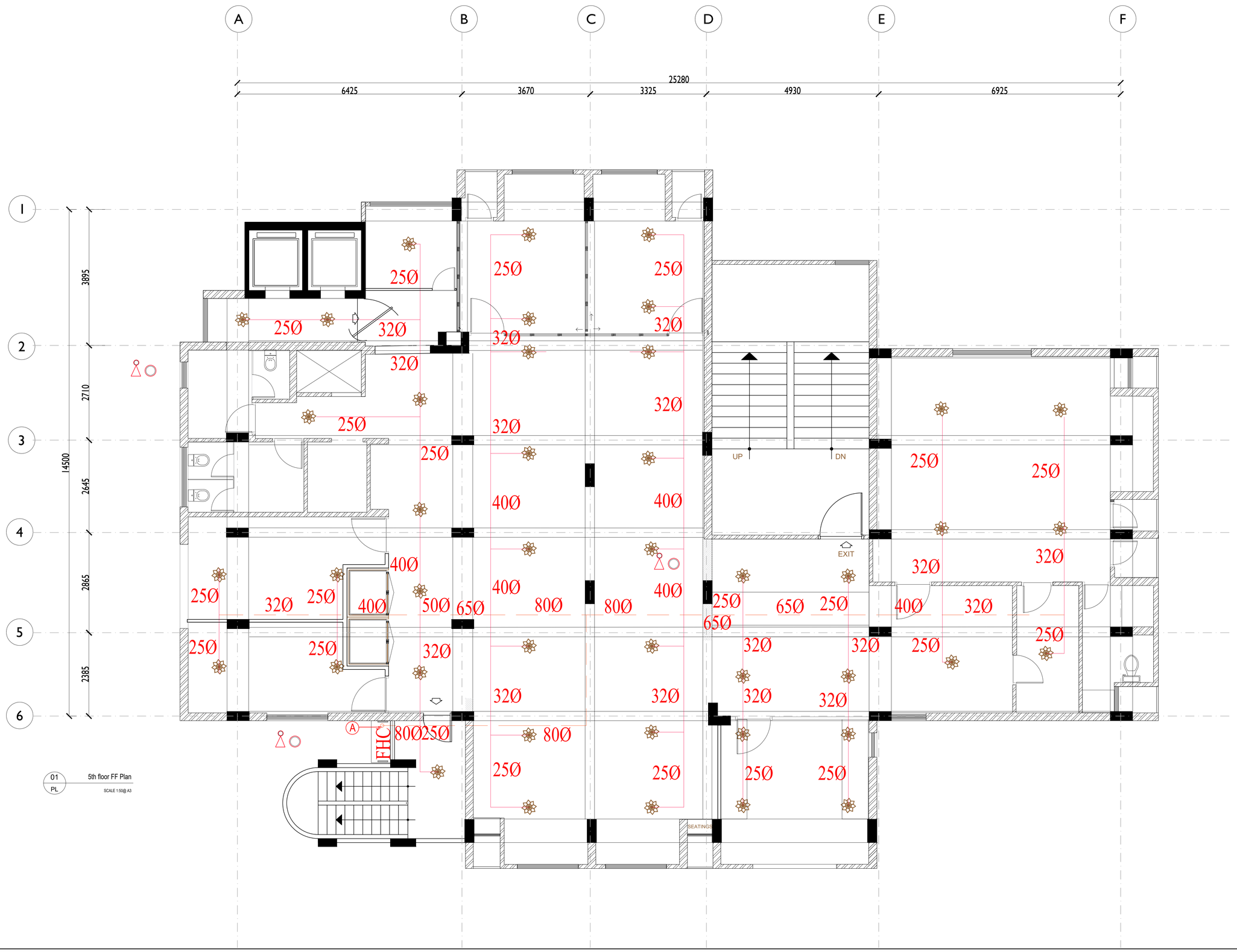
PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: 4th FLOOR FIREFIGHTING PLAN

Drawing No: 3208/CDRI/NDELHI/FF 01

Scale: 1:50@A1 | *Drawn:* VK | *Date:* 2021-01-06 | *Chkd By:* SH

N



01 PL — 5th floor FF Plan

SCALE 1:50@ A3

Notes & References

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41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: 5th FLOOR FIREFIGHTING PLAN

Drawing No: 3208/CDRI/NDELHI/FF 02

Scale: 1:50@A1 | *Drawn:* VK

Date: 2021-01-06 | *Chkd By:* SH

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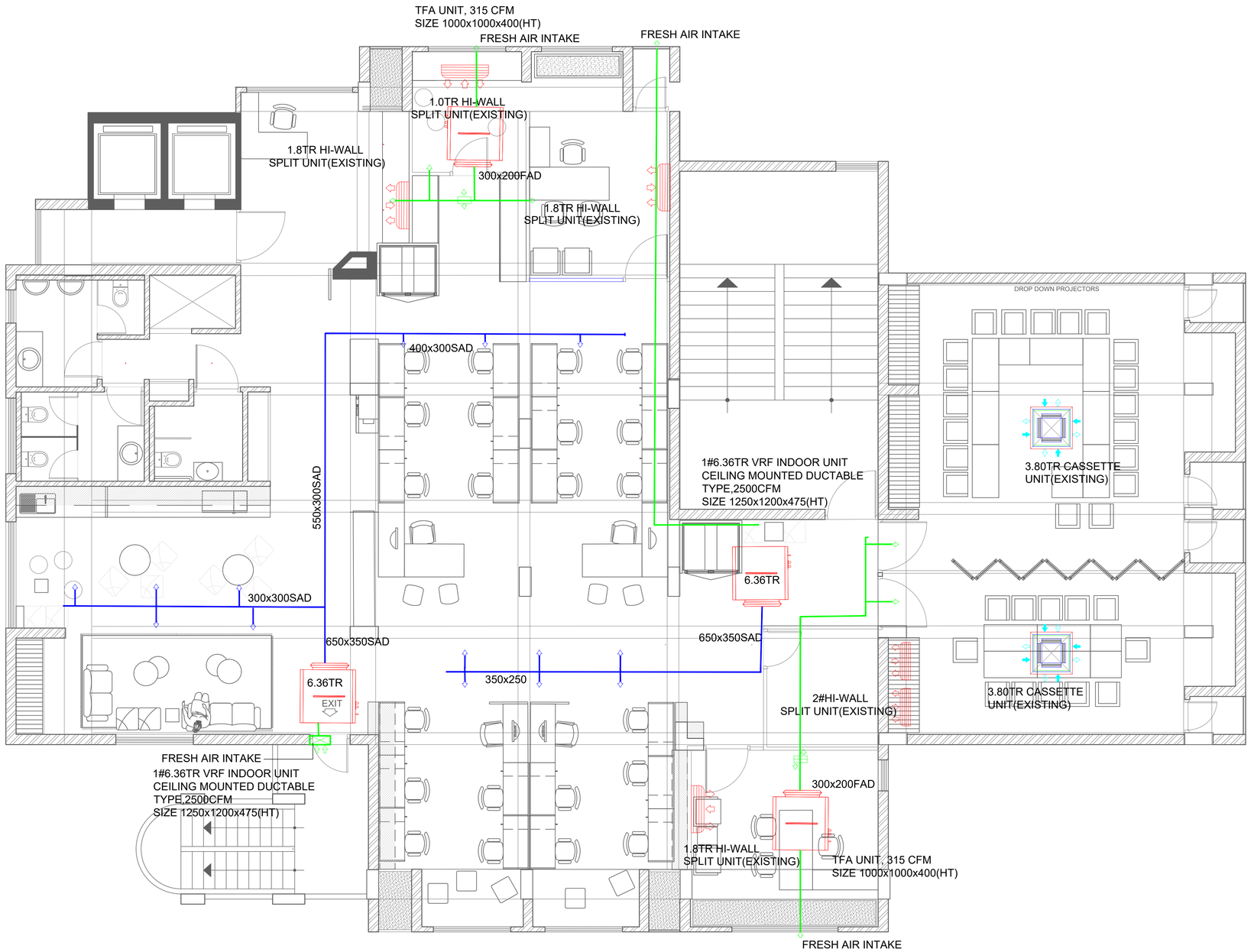

01 PL — 4th floor HVAC PLAN
SCALE 1:50@ A3

Notes & References

General Notes -

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Revision:

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PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURE
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: 4th FLOOR HVAC PLAN

Drawing No: 3208/CDRI/NDELHI/AC 01

Scale: 1:50@A1 | *Drawn:* VK | *Date:* 2021-01-06 | *Chkd By:* SH

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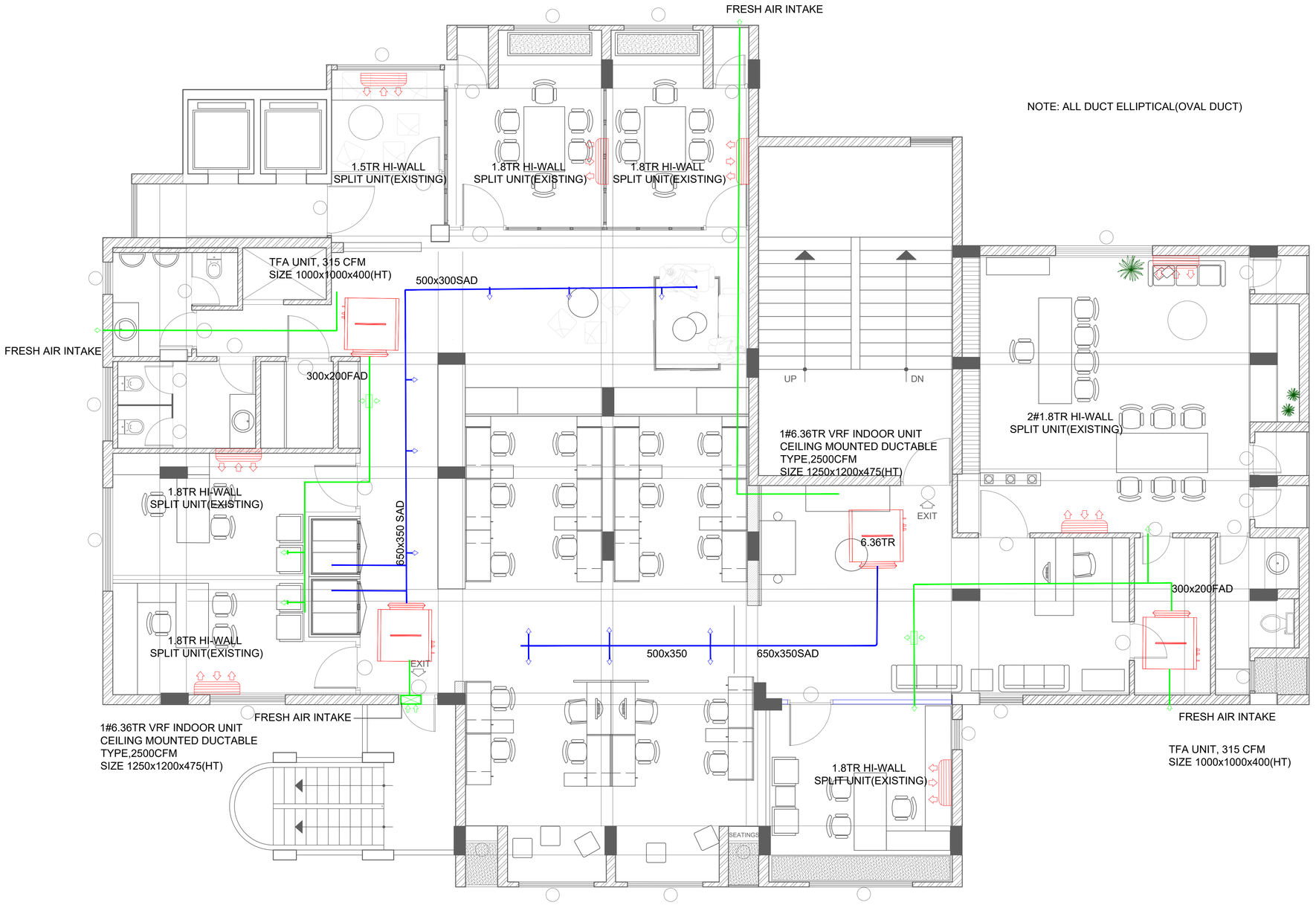

01 PL 5th floor HVAC PLAN
SCALE 1:50@ A3

Notes & References

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STUDIO FOR HABITAT FUTURI
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

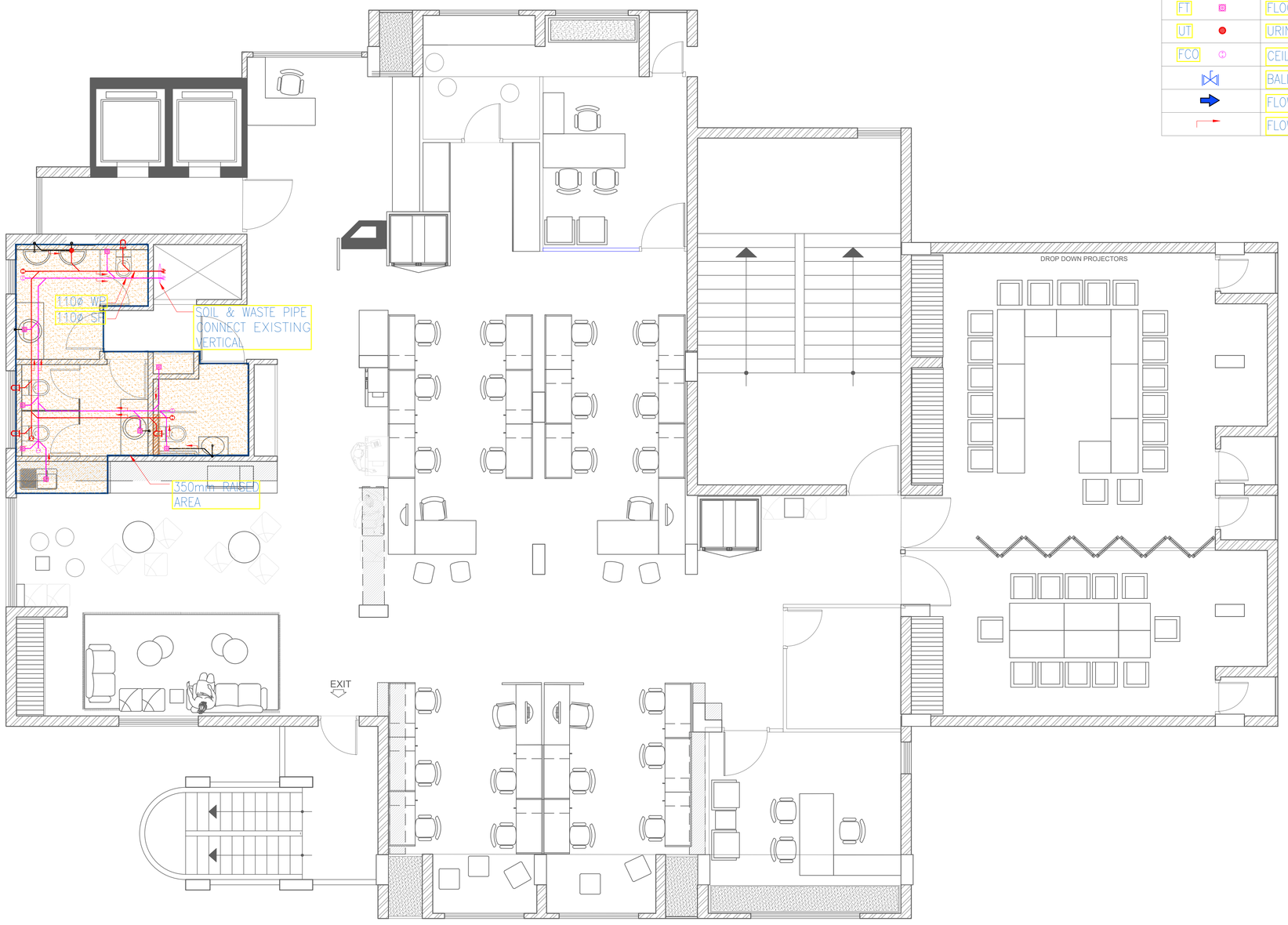
Drawing Title: 5th FLOOR HVAC PLAN

Drawing No: 3208/CDRI/NDELHI/AC 02

Scale: 1:50@A1 | *Drawn:* VK | *Date:* 2021-01-06 | *Chkd By:* SH

N

PLUMBING LEGEND: INTERNAL	
SP	SOIL PIPE
WP	WASTE PIPE (FT TO STACK)
WP	WASTE PIPE (WB/FD TO FT)
DWS	DOMESTIC WATER SUPPLY PIPE
FT	FLOOR TRAP
UT	URINAL TRAP
FCO	CEILING OUT PLUG (UNDER-SLUNG)
	BALL/BUTTERFLY VALVE
	FLOW DIRECTION (PRESSURIZED)
	FLOW DIRECTION/SLOPE (GRAVITY)



01 PL — 4th floor PLUMBING

SCALE 1:50@ A3

Notes & References

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SHiFt
STUDIO FOR HABITAT FUTURI

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: 4th FILOOR PLUMBING PLAN

Drawing No: 3208/CDRI/INDELHI/PL 01

Scale: 1:50@A1 | Drawn: MA | Date: 2021-01-08 | Chkd By :

N

PLUMBING LEGEND: INTERNAL	
SP	SOIL PIPE
WP	WASTE PIPE (FT TO STACK)
WP	WASTE PIPE (WB/FD TO FT)
DWS	DOMESTIC WATER SUPPLY PIPE
FT	FLOOR TRAP
UT	URINAL TRAP
FCO	CEILING OUT PLUG (UNDER-SLUNG)
	BALL/BUTTERFLY VALVE
	FLOW DIRECTION (PRESSURIZED)
	FLOW DIRECTION/SLOPE (GRAVITY)

110ϕ WP
110ϕ SP
SOIL & WASTE PIPE CONNECT EXISTING VERTICAL
350mm RAISED AREA
UP
DN
EXIT
EXIT
SEATINGS
350mm RAISED AREA
SOIL & WASTE PIPE CONNECT EXISTING VERTICAL

01 PL 5th floor PLUMBING
SCALE 1:50@ A3

Notes & References

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PRINCIPAL ARCHITECT :

SHiFt
STUDIO FOR HABITAT FUTURE
41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title: 5th FLOOR PLUMBING PLAN

Drawing No: 3208/CDRI/NDELHI/PL 02

Scale: 1:50@A1 | *Drawn:*
Date: 2021-01-08 | *Chkd By :*

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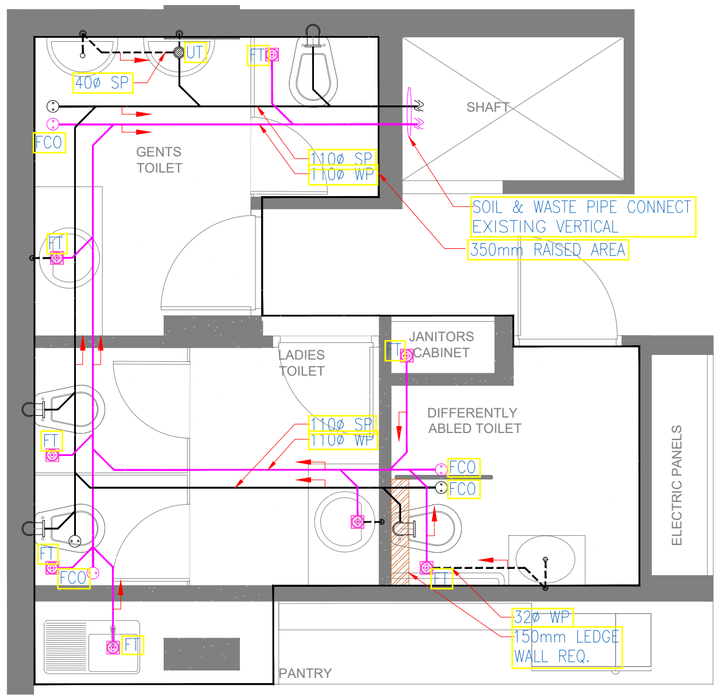
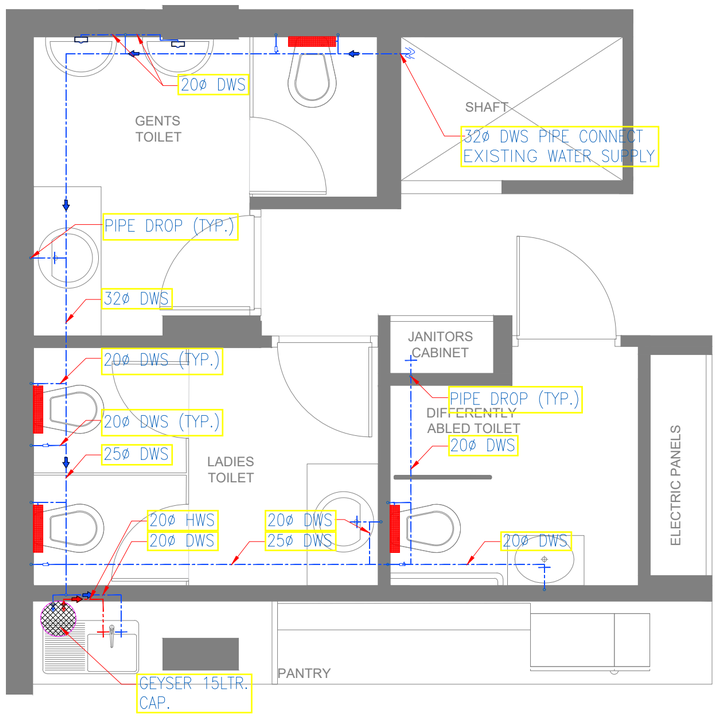
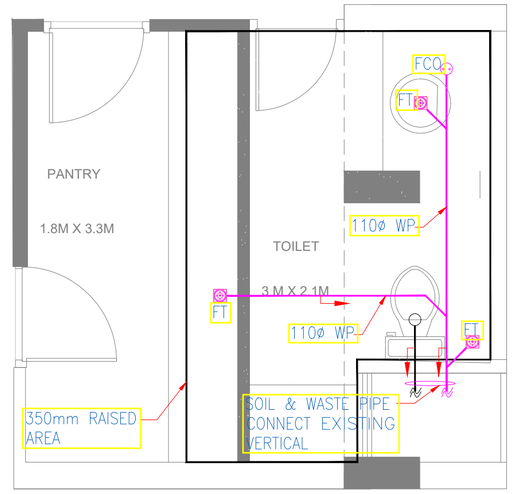
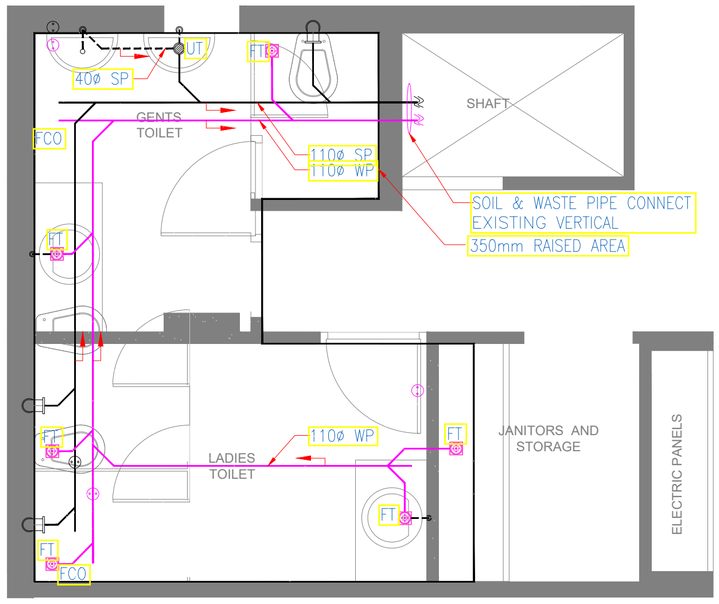
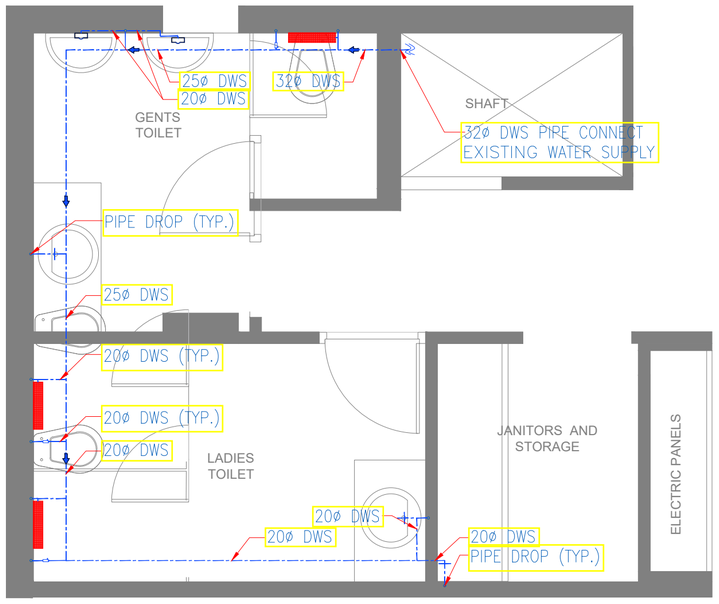


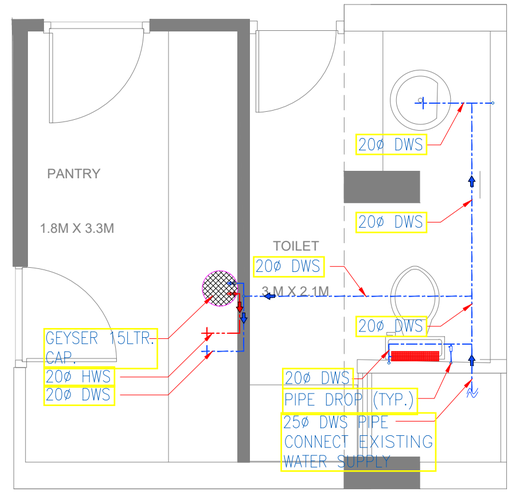


PLUMBING LEGEND: INTERNAL	
SP	SOIL PIPE
WP	WASTE PIPE (FT TO STACK)
WP	WASTE PIPE (WB/FD TO FT)
DWS	DOMESTIC WATER SUPPLY PIPE
HWS	HOT WATER SUPPLY PIPE
FT	FLOOR TRAP
UT	URINAL TRAP
FCO	FLOOR CLEAN OUT PLUG
	BALL/BUTTERFLY VALVE
	FLOW DIRECTION (PRESSURIZED)
HF	HEALTH FAUCET
CS	CISTERN









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Revision:

No.	Date	Description

PRINCIPAL ARCHITECT :

41, first floor, Zamrudpur Community Centre,Kailash Colony, New Delhi, Delhi 110048

PROJECT:-
H/O CDRI at
Shri Ram Kala Kendra

Drawing Title:
TYPICAL PLUMBING DETAIL

Drawing No:
3208/CDRI/NDELHI/PL 03

Scale: 1:50@A1 | Drawn: MA | Date: 2021-01-08 | Chkd By :

N

CDRI Secretariat

Mood Board and Rendered Images

SHiFt – Studio for Habitat Futures

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Material Palette

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Lift Lobby– Mood Board

Color Palette

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1146/2021/DIR_HR-OPS

Reception

Fourth Floor Plan

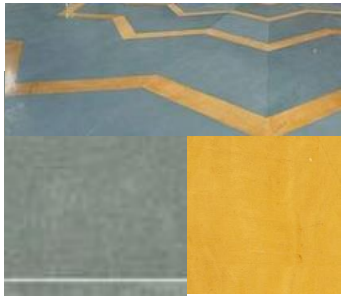
Reception – Mood Board

Color Palette


Built in Seating


Brass inlay

CDRI logo


Kota Jaisalmer with brass


Center Table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Reception Desk


Planters

Conference room/Seminar Room

Fourth Floor Plan

N

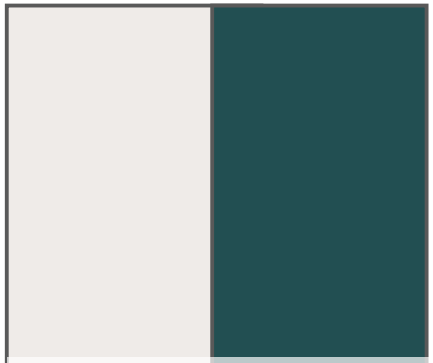
Conference room/Seminar Room

Color Palette

Zari fabric

Wooden door

Panel from blocks



Wall color

Bamboo board flooring

Wooden wall panel, brass inlay

Conference table and chair

Conference Room – Option 1

Conference Room – Option 1

Conference Room – Option 1

08-06/4/2020-DIR_HR-OPS

1146/2021/DIR_HR-OPS

Directors Cabin

Fourth Floor Plan

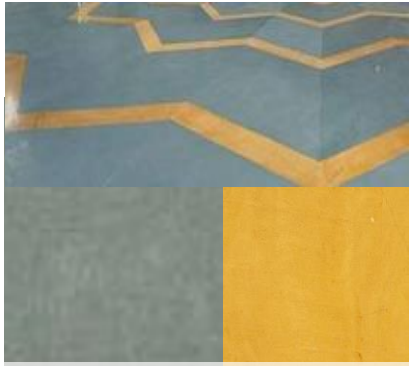
Fifth Floor Plan

Directors cabin – Mood Board

Color Palette

Wooden and white colored furniture

Gond Art



Kota and Jaisalmer stone

Wooden finish

Lime plaster with brass inlays

Wall paint color

Window

Planters

Directors Cabin

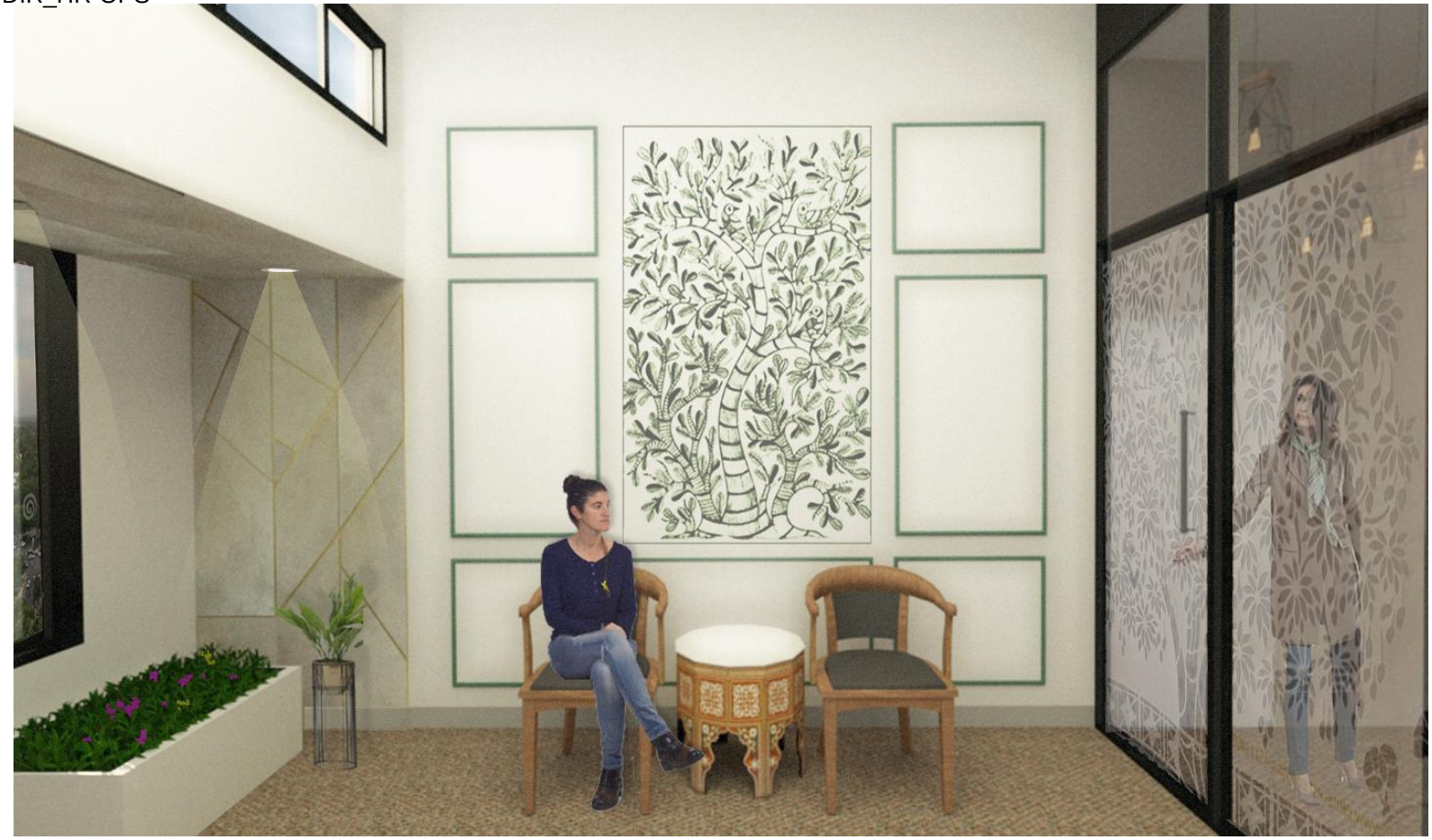
08-06/4/2020-DIR_HR-OPS

1146/2021/DIR_HR-OPS

Directors Cabin

08-06/4/2020-DIR_HR-OPS

1146/2021/DIR_HR-OPS



Director General's cabin

08-06/4/2020-DIR_HR-OPS

1146/2021/DIR_HR-OPS

Fifth Floor Plan

N

Director General's cabin – Mood Board

Color Palette

Cement wall tiles

Artwork

Window

Lounge seating

Bamboo board flooring

Wooden door and brackets

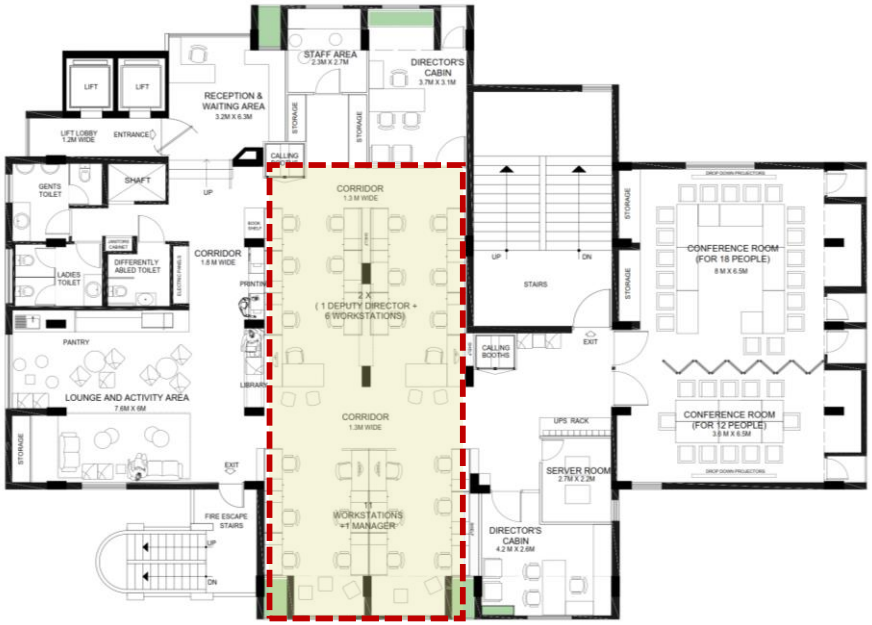
Wall color

Planters

08-06/4/2020-DIR_HR-OPS

Workstation Area

1146/2021/DIR_HR-OPS



Fourth Floor Plan

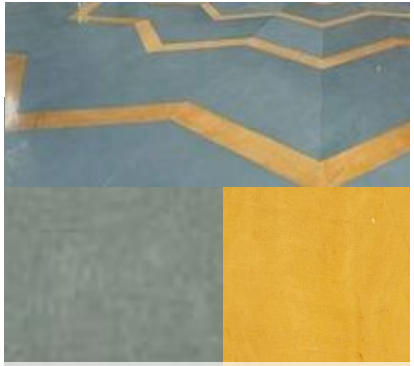
Fifth Floor Plan

Workstation Area – Mood board

Color Palette

white colored furniture

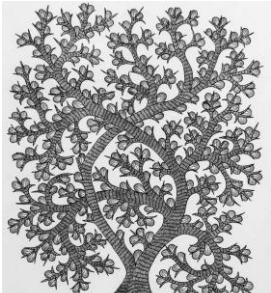
White Colored storages



Kota and Jaisalmer stone

Wooden furniture

Wall paint



Wall artwork

Lime plaster with brass inlays

Workstation Area

Workstation Area- Option I

08-06/4/2020-DIR_HR-OPS

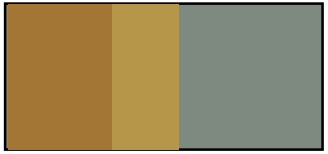
1146/2021/DIR_HR-OPS

Meeting Room

Fifth Floor Plan

Meeting Room - Mood Board

Color Palette

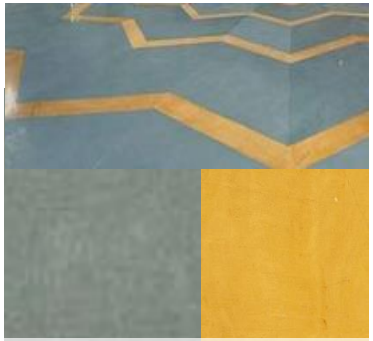


Rice paper panels

Chairs

Meeting table

Brass inlay



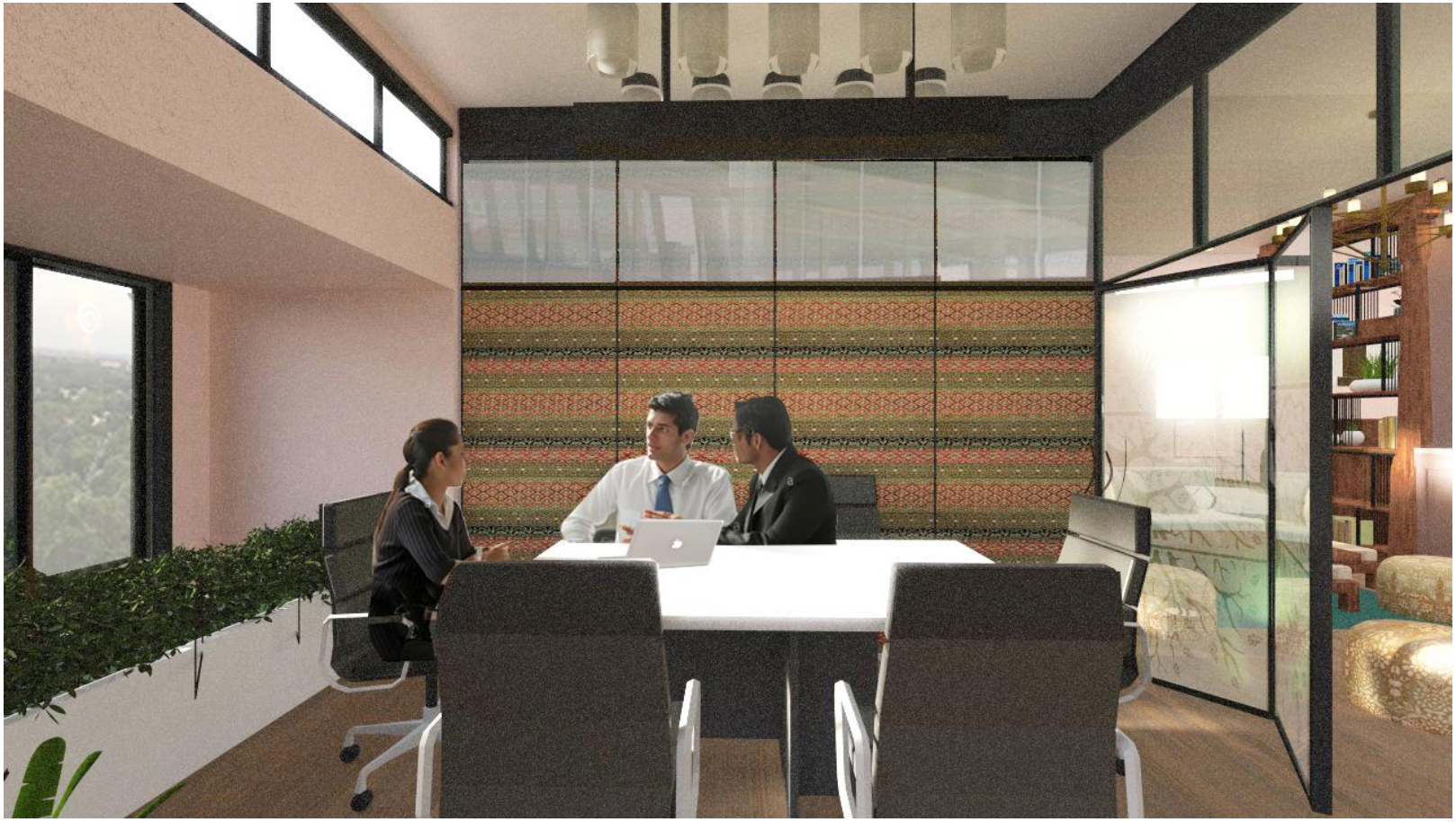
Kota and Jaisalmer stone

Zari Saree as acoustic fabric

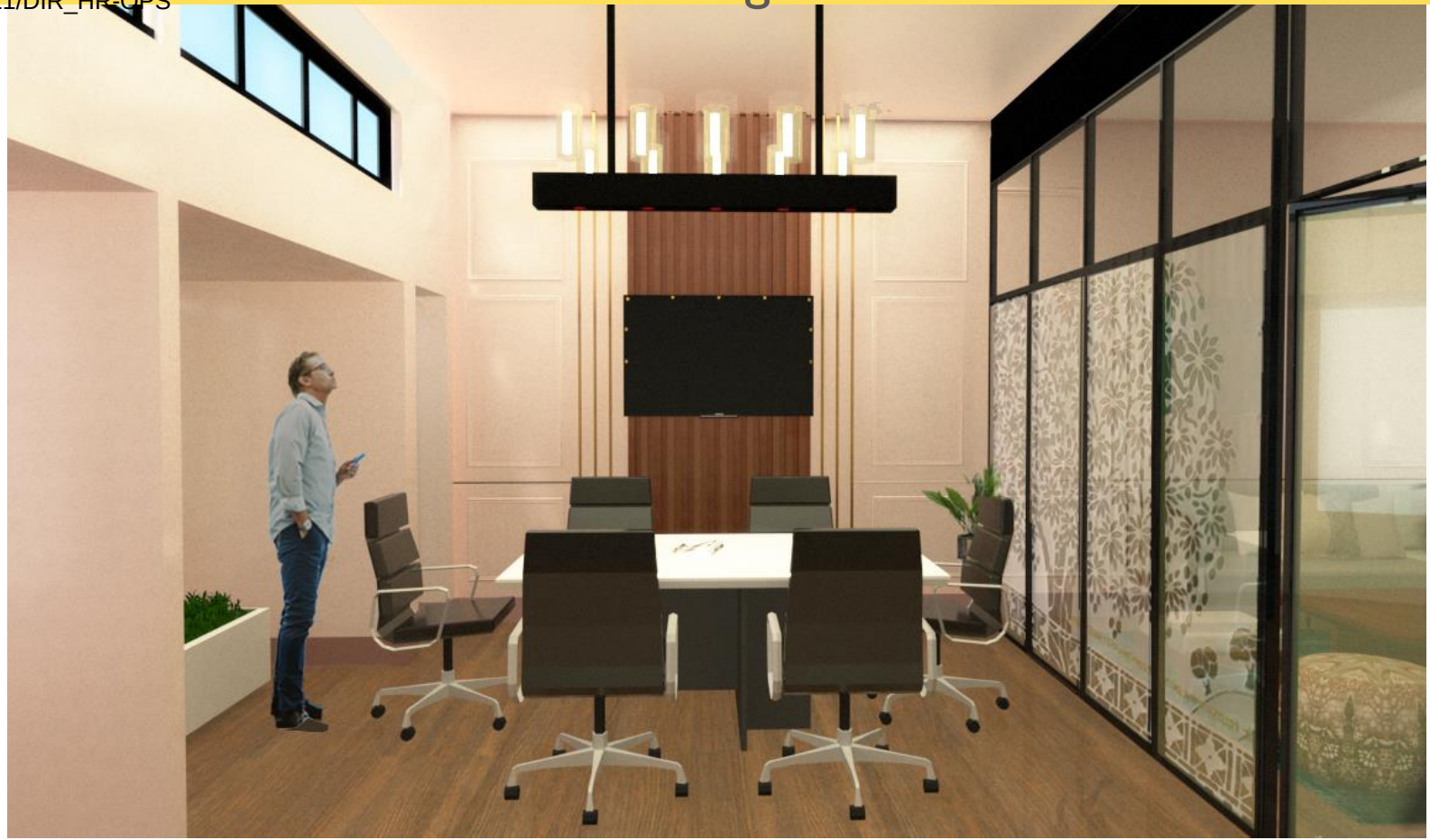
Wall paint

Wooden panel

Meeting Room I



Meeting Room 2



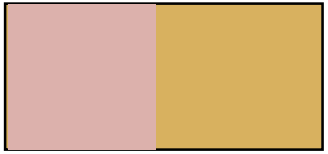
Breakout zone

Fourth Floor Plan

Fifth Floor Plan

Breakout zone – 5th floor

Color Palette



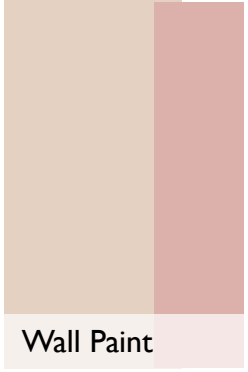
Rice paper panels

Kashmiri Carpet

Upcycled Jodhpuri wooden doors and columns

Bamboo board floor

White and Mustard Upholstery



Wall Paint

Breakout zone – 5th floor

Breakout zone_ 5th floor

Breakout zone – 4th floor

Color Palette

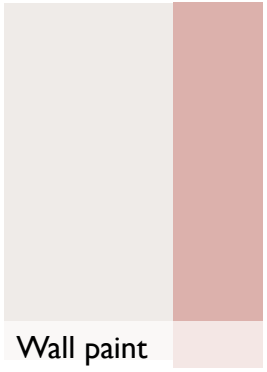
Madhubani art walls

Kashmiri carpet

Upcycled Jodhpuri wooden doors and columns

Kota and Jaisalmer stone

White and Mustard Upholstery



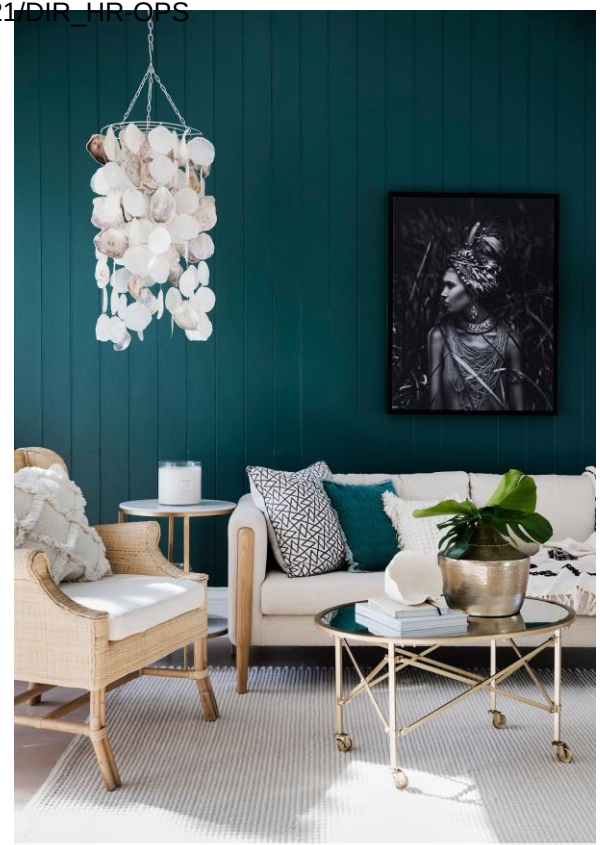
Wall paint

Reference Images for Material Finishes

08-06/4/2020-DIR_HR-OPS

1146/2021/DIR_HR-OPS

Pastel colored walls and moldings



Pastel colored walls and moldings

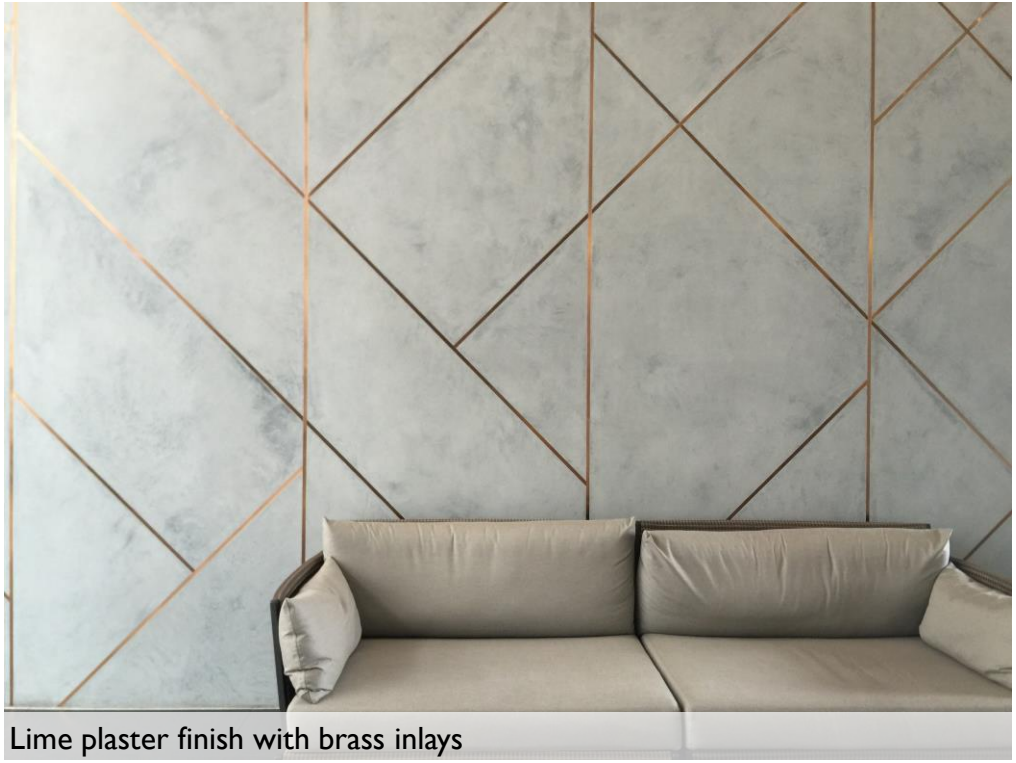
Use of light colored furniture

08-06/4/2020-DIR_HR-OPS

1146/2021/DIR_HR-OPS

Pastel colored walls and moldings

Teak wood furniture and pastel colored walls



Lime plaster finish with brass inlays