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Indian Institute of Technology Hyderabad

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TECHNICAL SPECIFICATIONS - CIVIL WORKS

Name of the work: Construction of Campus School Building (G+1) RCC Structures at IIT Hyderabad, Kandi, Sangareddy.

Executive Engineer (Civil)
IIT Hyderabad

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SCOPE OF WORK & TECHNICAL SPECIFICATIONS

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[1] Construction of Campus School Building (G+1) RCC Structures at IIT Hyderabad.

Construction of Campus School Building (G+1) RCC structure with plinth area of 2032 sqm. The plinth level of the building shall be 450mm above the exiting Ground Level of proposed school building yard. The Floor-to-Floor Height is 4 m for both the floors. The building shall accommodate 18 classrooms with adequate washroom facilities for male, female, and physically challenged students with one staircase and one lift. The foundation shall be suitably designed for (G+3) Ultimate structure for future vertical extension of additional two (2) floors. Conceptual Drawings for the above Campus School building is attached.

"Plinth Area" shall have the meaning as given in IS: 3861.

MINIMUM SPECIFICATIONS FOR CAMPUS SCHOOL BUILDING

Sl. No.	Items of Work	Specifications
1.	**Building**	
1.1	Foundation & Super structure	The structure shall be of Reinforced Cement Concrete (RCC) G+1 framed structure made of suitable foundation design including Columns, Beams, Slabs and staircases etc. The foundation shall be suitably designed for G+3 Ultimate structure for future vertical extension of additional two (2) floors. As per Structural design & approved drawings, building shall be earthquake resistant for the zone of location. The foundation shall be designed as per the detailed soil investigation report. The scope includes Construction of underground and Terrace Water Storage Tanks, Staircase Head room, Parapet Walls with SS railing, Closing of Service Shafts and Pedestals for all service lines as per the approved Drawings and as per the directions of Engineer in Charge. For Toilet Block: where ever required, ledge walls of suitable thickness shall be constructed using CC Solid blocks to run the concealed plumbing lines & flushing cisterns. Surplus excavated earth shall not be taken out of the campus and shall be used in campus itself as per direction of the

		The contractor shall get the design mix approved by the Engineer-in-Charge before start of the concrete production activities. Minimum M-30 grade design mix concrete shall be used for RCC work. The reinforcement shall be FE 500 D grade conforming to IS 1786. The contractor shall submit the delivery challans and offer Material Inspection on receipt of the same before consuming into the works.
1.2	Anti-termite treatment as per IS:6313	The Anti termite treatment shall be carried out at below stated locations as specified in IS 6313 1. Treatment for RCC Foundations and Basement 2. Treatment of Top Surface of Plinth Filling 3. Treatment at Junction of the Wall and the Floor 4. Treatment of Soil Along External Perimeter of Building The method of treatment and chemical consumption shall be as per the IS 6313.
1.3	Plinth Filling: a) Moorum soil filling b) Sand filling under floor c) PCC Concrete under footings d) Grade Slab at Stilt Level	Plinth shall be filled with Moorum soil (free from rocks, boulders etc.,) available at site/ within the campus/barrowed from outside as required for the required depth. 150mm thick with river sand / crushed stone sand or fine aggregates conforming to IS 383-2016 over the filled and consolidated Moorum soil. Minimum 100mm thick mat concrete below footing / raft as per the Structural designing drawings or as approved by Engineer In-Charge. Minimum 200 mm thick RCC grade shall be laid under flooring work in ground floor with reinforcement of 8 mm dia TMT bars of Grade Fe500D @ 200 mm c/c. both ways.
1.4	Solid Block work	All the walls shall be constructed with 200mm thick (+/- tolerance allowed in thickness nearest to the available approved manufacturer's solid blocks) Cement Concrete solid blocks except toilet internal wall partitions based on the approved Architectural drawings.
1.5	Water proofing treatment	Water Proofing Treatment on Lift Pits, Terrace, open corridors, water storage tanks, top of LMR, Mumty and in Toilets Shall be done as per specifications mentioned at "Particular Specifications"

1.6	Plinth Protection	Making 900mm width plinth protection with 50 mm thick of cement concrete 1:2:4 (1 cement : 2 coarse sand derived from natural sources : 4 graded stone aggregate 20 mm nominal size derived from natural sources) over 75 mm thick bed of dry brick ballast 40 mm nominal size, well rammed and consolidated and grouted with fine sand, including necessary excavation, levelling & dressing & finishing the top smooth.
2.	**Joinery:**	
2.1	Door frames & filling of light weight foam concrete	**For All Doors frames including Toilet Blocks main door frame:** Providing Polyester powder coated (minimum 50 microns) Aluminium door frames of sections size not less than 125 x 75 mm and thickness of profiles shall be minimum 3mm with required colour shade for all doors and fixed in position with hold fast lugs or with dash fasteners of HILTI or equivalent make of required dia & length and as per the approved shop drawings. After placing of door frames at site, those hollow profile aluminium sections shall be filled up with light weight foam concrete as required and to facilitate the concreting into the door frames the provision of the openings shall be made at required levels and locations.
2.2	Door shutters	**For All Door shutters excluding Toilet Blocks main door shutter:** Providing and fixing factory made 32 mm thick laminated flush door shutter made of 30mm thick ISI marked flush door shutters non-decorative type, core of block board construction with frame of 1st class hard wood and well matched commercial 2 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters having 1 mm thick decorative type laminates in mat finish, colour, shade, pattern as approved by Engineer-in- charge on both faces of shutter fixed with phenol formaldehyde synthetic resin type adhesive conforming to IS 848 including providing and fixing concealed external lipping with 2nd class teak wood battens 30 mm X 12mm on all edges of shutters and polishing the three exposed faces of lipping with melamine polish in approved shade including fixing shutters with ISI marked stainless steel butt hinges of 5 no's of size 125x75x3mm with stainless steel screw etc. The door shutter shall have vision panel of size 600mmx200mm with edge beading including 8mm thick toughened glass as required as per the directions of Engineer In-Charge.

2.3		**Toilet Blocks main door shutter:** Providing and fixing factory made 32.5/33 mm thick laminated flush door shutter made of 30/30.5mm thick ISI marked flush door shutters non-decorative type, core of block board construction with frame of 1st class hard wood and well matched commercial 2 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters having 1 mm thick decorative type laminates in mat finish, colour, shade, pattern as approved by Engineer-in- charge on front face of shutter and backside of door shutter with 1.5/2.0mm thick acrylic sheet fixed with phenol formaldehyde synthetic resin type adhesive conforming to IS 848 including providing and fixing concealed external lipping with 2nd class teak wood battens 30 mm X 12mm on all edges of shutters and polishing the three exposed faces of lipping with melamine polish in approved shade including fixing shutters with ISI marked stainless steel butt hinges of 5 no's of size 125x75x3mm with stainless steel screw etc. The door shutter back side shall be fixed the 2mm thick acrylic sheet for full area of the shutter etc., in addition to the laminate all above complete as per the relevant drawings and as directed by Engineer-in-charge. (32.5/33mm thick door shutter comprising of 30/30.5mm thick flush door shutter of non-decorative + 1.0mm thick lamination on front side of door shutter + 1.5/2.0mm thick acrylic lamination on back side of door shutter).
2.4		**Toilet Block internal wash room door frames and Shutters:** **Door Frame:** Providing and fixing factory made uPVC door frame made of uPVC extruded sections having an overall dimension as below (tolerance ±1 mm), with wall thickness 2.0 mm (± 0.2 mm), corners of the door frame to be Jointed with galvanized brackets and stainless steel screws, joints mitred and Plastic welded. The hinge side vertical of the frames reinforced by galvanized M.S. tube of size 19 X 19 mm and 1mm (± 0.1 mm) wall thickness and 3 nos. stainless steel hinges fixed to the frame complete as per manufacturer's specification and direction of Engineer in-charge. Extruded section profile size 42x50 mm **Door Shutter:** 30 mm thick factory made Polyvinyl Chloride (PVC) door shutter made of styles and rails of a uPVC hollow section of size 60x30 mm and wall thickness 2 mm (± 0.2 mm), with inbuilt decorative moulding edging on one side. The styles and rails mitred and joint at the corners by means of M.S. galvanised/ plastic brackets of size 75x220 mm having

		wall thickness 1.0 mm and stainless-steel screws. The styles of the shutter reinforced by inserting galvanised M.S. tube of size 25x20 mm and 1 mm (± 0.1 mm) wall thickness. The lock rail made up of 'H' section, a uPVC hollow section of size 100x30 mm and 2 mm (± 0.2 mm) wall thickness fixed to the shutter styles by means of plastic/ galvanised M.S. 'U' cleats. The shutter frame filled with a uPVC multi chambered single panel of size not less than 620 mm, having over all thickness of 20 mm and 1 mm (± 0.1 mm) wall thickness. The panels filled vertically and tie bar at two places by inserting horizontally 6 mm galvanised M.S. rod and fastened with nuts and washers including installation of required Stainless steel accessories like Hinges (4 no's), Aldrops, latch etc. complete as per manufacturer's specifications and approved shop drawings by the Engineer-in charge.
2.5	Ironmongeries	Providing and fixing Ironmongeries of approved make in doors in sets as listed below with necessary matching screws, bolts, nuts & nails etc. **All Room doors including Toilet Blocks main door excluding toilet doors** 1. Dead lock package of approved make with 55mm backset, 20mm square for end prepared for euro profile cylinder(EPC) including strike plate and EPC 60mm Length internal thumb turn & external key operation & Escutcheons in stainless steel satin finish (304 grade). The lock shall be with 3 keys 2. Stainless steel satin finish D-type pull handle 200mm long ,19mm dia. With extended spindle- 1 Pair 3. Stainless steel satin finish floor door stopper with rubber buffer -1 No. 4. Stainless steel wall mounted magnetic door stopper -1 No. 5. Stainless steel satin finish tower bolt 300x10 mm size with CP brass screws- 1 No 6. Hydraulic door closer of approved make with standard arm (Silver finish) hold open with mounting back plate with screws to pivoted/hinged door of approved make for weight up to 60kg. All adjustment screws face fixed. **For toilet block internal wash room doors** • Stainless steel satin finish Aldrop 200mm X12mm long with CP brass screws - 1 No. • Stainless steel satin finish latch 200mm long with CP brass screws - 1 No. • Stainless Steel Pull handles of size 150mm long – 1 pair. **For Shafts, Ducts** a. Stainless steel satin finish tower bolt 300x10 mm size with CP brass screws- 1 No

		b. Mortice shaft dead bolt with key (Alen Key lock) with BS 57mm and 25mm square for end in SS finish of approved make. The lock shall be with 1 key. c. Stainless steel satin finish D-type pull handle 200mm long ,19mm dia. With extended spindle- 1 Pair
3	**STEEL WORK, DOORS & WINDOWS:**	
3.1	MS Grill in windows & Ventilators and MS Gratings Etc.,.	MS sections shall be sand papered till removal of rust, outcrops on sections etc., and make the sections smooth by applying grey metal putty as required and applied a priming coat of Zinc Chromate Primer. All windows should be fitted with MS grill (minimum weight 12 kg per Sqm) and painted with 2 coats of Synthetic Enamel Paint as per approved shop drawings by the Engineer in Charge.
3.2	**Railing in staircase/ Balcony railing**	**For Staircase** - 1.2-meter-high railing with SS 304 grade stainless steel of 50 mm dia.(OD), 2.5mm wall thickness for handrail & for all vertical posts @900mm centre to centre with balusters, flanges, end caps as required with minimum 3 Nos. intermediate bars, which parallel to hand rail with SS 304 grade 25mm dia.(OD), 1.5mm wall thickness as per the approved design & pattern and approved shop drawings by the Engineer – in – charge.
3.3	Railing at Corridors & Terrace parapet and Wall side staircase railing rod with brackets	**Over Parapet walls of Corridors and Terrace hand rail and other areas wherever required:** Providing, fixing horizontal Hand rail & vertical posts of required height at spacing@1000mm c/c made of 50mm (O.D) dia and 2.5 mm wall thickness Stainless steel (grade 304) pipe. Railing shall be fixed by welding to the MS Flats, which embedded in concrete bed blocks of solid block parapets with required Stainless steel pins, dowels, clamps, rubber, screws, gaskets etc. including jointing and sealing with suitable arrangement and also the SS pipes of horizontal portion of railing between two columns (or) column & wall shall be fixed with end plates & fasteners to fix rigidly with required number all complete as per the approved detailed drawing by the Engineer-in-charge. The SS railing over 1.2m height Parapet wall in corridors, terrace and other locations wherever required as per the architectural drawings shall be provided min. 300mm height. Altogether including railing the total parapet height shall be 1500mm from finished floor level. The wall side of staircase railing shall be with SS (304 grade) 50mm (OD) dia and 2.5mm wall thick fixed to the solid block wall/Columns with required length of brackets of SS 32mm(OD) dia and 1.5mm thickness @900mm C/C with necessary plates and fasteners etc as per the design and approved shop drawings by the Engineer-in-charge.

3.4	**Aluminium Windows & Ventilators**	**For Windows:** Providing and fixing Polyester Powder coated aluminium sections (minimum thickness of polyester powder coating 50 micron) for windows and ventilators with extruded aluminium sections of approved make by using aluminium sections For window frame: with three track system section sizes min. 116mmx45.5mmx1.3mm thick for bottom section, 116mmx25mmx1.4mm thick for top and side sections. For window shutter: with three track system section sizes min. 50mmx25mmx1.2mm thick for Top and side sections, 60mmx25mmx1.15mm thick for bottom sections. Interlocking section shall be of 50mmx25mmx1.3mm thick including fixing of zinc alloy powder coated suitable handles. The glass shall be of 8mm thick heat strengthened glass including wall fixtures and fastening with EPDM rubber glass seal, S.S. Concealed lock TPI bearing and aluminium cleats, Silicon sealant, screw, nails, any other hardware required etc. complete as per design, approved shop drawings by the Engineer In-Charge.
		For Fixed Ventilators: Providing and fixing Polyester Powder coated aluminium sections (minimum thickness of polyester powder coating 50 micron) for ventilators with extruded aluminium sections of approved make by using aluminium outer frame sections of size min. 63.5mmx38.1x1mm, Intermediate sections of size min. 63.5mmx38.1x1.2mm with providing fixed glazing shall be with 6mm thick Toughened frosted glass of required size. Wherever required, opening shall be made in the ventilator for exhaust fan installation purpose.
3.5	Glazing of windows Ventilators and openings	Glazing shall be with 8mm thick Heat Strengthened glass for windows. And 6mm thick Toughened frosted glass shall be used for ventilators.
3.6	Roller blinds for windows	**All Windows:** Providing and fixing of Roller Blinds of approved brand & manufacture having openness factor 3%, Weighted composition 75% PVC,25% Polyester with fabric thickness 0.6 to 0.7mm, 250cm of maximum width at 470 gsm(+ or - 5%) fabric weight conforming to the Fire resistance NFPA 701,BS 5867 part - 2 type A, with required colour fastness to light grade of 6 & UV Blockage up to 97%, And Hardware consist of Control unit, Idler, Head rail, Roller tube, Bottom rail, Operating chain and Fixing brackets & clamps complete as per given specifications and as per the direction of Engineer-In- Charge.

3.7	Fire rated Doors	**All Fire Escape areas as per the approved drawings and as per the direction of Engineer in charge.** Providing, supplying and fixing internal metal fire rated doors (double/ single leaf) of approved make with Fire Resistant 120 minutes rating as per manufacturers/particular specifications and similar to the prototype tested by CBRI, Roorkee & Certificate issued thereof (as per IS:3614 Part-2, 1992) with overall size as per requirement. Door frames shall be made with 1.6mm thick galvanised steel sheet pressed to double rebate profile of size 143x57mm and filled with foam concrete. Door shutters shall be made with 1.2mm thick galvanised steel sheet pressed formed to provide fully flush double skin panel which shall be not less than 46mm thick with lock seam joints at style edges. The internal construction of panel shall be filled with insulating mineral wool with reinforcement at top, bottom and around stiles. The door shutters shall be provided with provision for vision panel of required size (as per Architectural drawings) with 6 mm thick clear toughened Boro Silicate glass of Schott / Pyran make to give120 minutes fire rating. The item shall also include provision for required iron monger like Panic Bar & Trim, Door closure etc as required, shutter and frame which shall be finished with Zinc Phosphate storing primer & Polyurethane paint etc. complete. The shutter shall be fixed to frame with 5 knuckle, 2 bearing butt hinges of size 100x75x3mm of DORMA make or approved equivalent make in SS 304 and in Satin Stainless steel as per EN 1935, CE marked with required number of hinges for each shutter, all complete and as per the design, shop drawings and directions of the Engineer-In-Charge.
3.8	Aluminum louvers & System	**For Covering the Shafts exposed in Elevations:** Providing, fabricating and fixing in position louvers system in facade with 100mm x 15mm x 1.2mm Aluminium louvers(C-section), as detailed and approved in shop drawing (based on concept architectural drawings). The louvers shall be fixed to aluminum framing system consisting of aluminium tube (mullions) 63 x 38 x 2 mm and aluminum clip of size 36mm x 31mm x 1mm; The mullions shall be fixed with GI bracket of 50mm x 50mm x 5mm, 50mm long with anchor fasteners. All aluminium section / louvers to be polyester powder coated (60 microns) all around in approved shade and colour. All items shall be strengthened and lapped as required. Nos. of aluminium mullions shall be as per the drawing. The aluminium clip and louvers shall be fabricated as per profile shown in the drawing. Prior to start of work contractor shall submit detailed full scale shop drawings including plan,

		elevation and detail of fixing with structure for approval of the Engineer in-charge. Samples of each item on full scale as directed by the Engineer in-charge shall be submitted for approval. Work shall be commenced only on approval of shop drawing by the Engineer in Charge.
4.	**Flooring, Dado, Cladding, Jambs, Sill and Counters:**	
4.1	Flooring	• All rooms except wash rooms: Pre-Polished 25mm thick Kota Stone flooring with stone slabs/tiles of minimum size of 600mmX600mm with even shade and approved sample laid in approved pattern jointing with grey cement slurry mixed with pigment to match the shade of the tiles including rubbing and polishing to match with the existing surface as per the approved drawings and as per the direction of Engineer in charge. • Common Corridor areas: - 18mm thick Pre-Polished Granite stone flooring with slabs as per the approved size, shade, colour and pattern with 3mm spacers with epoxy joint grouting as per the approved drawings & directions of Engineer in charge. • Staircase Portion: - 18mm thick Pre-Polished Granite stone single piece slabs shall be laid for Treads and Risers with edge nosing & edge gripping shall be made with minimum 3Nos. grooves parallel to the step as per the approved design, pattern and colour and as directed by the Engineer in charge. • Wash rooms - Antiskid Vitrified floor tile of minimum size 400x400 mm laid with adhesive/Cement mortar and with spacers, groove filled with tile epoxy grout of approved brand and shall be executed as per the approved drawings and as per the direction of Engineer in charge.
4.2	Skirting / Dado	**Skirting:** All rooms and corridors/ common areas - Specifications for materials of skirting will be same as per flooring with matching joint pattern having 100mm height laid with adhesive as per the directions of Engineer in charge. **Staircase Dadoing**: Staircase all sides of wall shall be provided Dadoing with vitrified tiles of 300mm x 600 mm up to 1200mm height above the Staircase Step tread/Landing

		floor level, tiles shall be 1st quality conforming to ISO: 13006 of approved make in all colours & design patterns, for dado fixing with cement based high polymer modified quick-set tile adhesive (Water based) as per manufacturer's specifications, conforming to IS:15477 including grouting of joints etc., all complete as per the directions of Engineer in charge.
		Toilets Dadoing: Providing and laying Vitrified tiles 300x450 mm up to false ceiling height of 1st quality conforming to ISO: 13006 of approved make in all colours & design patterns, for dado fixing with cement based high polymer modified quick-set tile adhesive (Water based) conforming to IS: 15477, in average 3mm thickness, including grouting of joints etc., all complete as per the directions of Engineer in charge.
4.3	Cladding on Lift Well	Wet Cladding shall be done to front face of Lift well with 18 mm thick Pre-Polished Granite slabs in approved shade, colour and pattern shall be fixed to the walls with approved make polymer modified stone adhesives as required complete as per the directions of Engineer in charge. Wet cladding shall be taken care of by fixing the cladding stone slabs with necessary SS brackets & pins etc. as required.
4.4	Granite for Windows Sills, Common Corridor area parapet wall tops for fixing SS railings.	18 mm thick Pre polished granite slab of approved colour & shade with edge moulding, fixed either with rich cement mortar or polymer modified stone adhesive as required complete as per the directions of Engineer in charge.
4.5	Wash Basin under counters	**In Wash rooms - wash basins** : 18 mm thick Pre polished granite slab of approved colour & shade with edge moulding, fixed either with rich cement mortar or polymer modified stone adhesive as required complete over the RCC M25 supporting slab as per the directions of Engineer in charge.
5.	**FINISHING :**	
5.1	Plastering (Internal & External):	**On CC Block work:** Internal wall surfaces shall be plastered with 12mm/15mm thick Cement plaster and External wall surfaces shall be plastered with 18mm cement plaster in two coats as per the specifications. The light weight wire mesh made of expanded GI/fibre material shall be provided at the vertical/horizontal joints of concrete and solid block masonry walls and also at the areas where chasing done for fixing of electrical/plumbing conduits. The cement mortar for the plastering shall be of 1:3 (1 Cement and 3 coarse sand/CSS). **On Ceilings:** 6mm Cement Plastering with 1:3 (1cement :3 fine sand) shall be done over the RCC slab ceiling surfaces.

5.2	Internal putty & paintings:	All the internal wall surfaces of the Rooms including external corridor walls i/c parapet wall inner face up to a height of 1.5m shall be finished with two or more coats of cement based polymer modified wall putty conforming to IS:17545, to get an even surface and application of two or more coats of premium quality Synthetic Glossy enamel paint over the application of priming coat with oil based primer. The internal wall surfaces above 1.5m height including all slab ceilings at all locations shall be finished with two or more coats of cement-based polymer modified wall putty conforming to IS:17545, to get an even surface, one coat of cement primer and two or more coats of premium acrylic emulsion paint with low VOC of Asian/Nippon Paints OR equivalent to achieve the even shade and colour, complete as per directions of EIC.
5.3	External putty, Texture & paintings:	External wall surface shall be finished with exterior grade polymer modified cement based wall putty conforming to IS:17545, in two or more coats OR Texture of approved design & pattern as per the architectural intent and approved finishing matrix and shall be painted surfaces with premium acrylic smooth weather proof exterior paints of Apex Ultima of Asian Paints or Nippon Paints or equivalent in two or more coats over the priming coat of external primer.
6.0	**Internal Sanitary Water Supply Installations :**	
6.1	W.C. with flushing system	**In Toilets:** Providing and fixing Vitreous china Wall hung European WC of approved make and colour of CERA make model no: S10431441SN or approved equivalent make, with Concealed flushing cistern with 10 liters capacity, dual flush fittings, seat cover, CI chair bracket, mounting bolts, WC connector, including cutting and making good the walls and floors by using of silicon sealant, wherever required, all complete as approved and directed by Engineer In Charge.
6.2	Hand Shower (Health Faucet)	**In Toilets:** Providing and fixing ABS Chrome plated Brass Hand Shower (Health Faucet) of Jaguar make Model no. 563 GA or approved equivalent make, including 8 mm dia, 1 Meter long Flexible pipe chrome finished & wall hook or approved equivalent make, as approved by Engineer - In - Charge, including cutting and making good the walls wherever required complete as per directions of the Engineer-in-charge.

6.3	white vitreous china oval counter sunk basin.	**In Toilets:** Providing and fixing white vitreous china oval counter sunk basin of HINDWARE make model no. Zen basin Star white 10049 or approved equivalent approved make, size, colour and shade, with CP pillar cock of Jaguar make model no. 15001PM or equivalent make as approved by Engineer In Charge, with regular spout without popup waste with 15 mm 450 mm braided hoses of Jaquar make model no.805B or equivalent make, C.P. brass angular stop cocks of Jaquar make model no. 5053N or equivalent make as approved by Engineer-In-Charge, CP bottle trap and waste coupling both of Jaquar make model no.769 and 705/709 or approved equivalent make, polymer brackets, silicon sealant, with all fittings and fixtures complete, including cutting and making good the walls and floors, wherever required, all leads, lifts, levels and heights and as per directions of Engineer - in - charge.
6.4	Stainless Steel Toilet paper Holder	**In Toilets:** Providing and Fixing Stainless Steel Toilet Paper Holder of Jaguar make model no. ACN -1153S or approved equivalent make, fixed on Wooden / PVC Cleats with CP Screws etc. All complete as per directions of the Engineer-in-charge.
6.5	Two way CP brass bib cock	**In Toilets**: Providing and Fixing 15 mm dia. two-way CP brass bib cock with wall flange and ceramic disc cartridge complete, including cutting and making good the walls wherever required, making all necessary connections etc. All complete as per directions of the Engineer-in-charge. a) CP Brass bib cock of JAGUAR Make, Model No. FLR-5041 N or equivalent make as approved by Engineer - In - Charge.
6.6	Soap dispenser	**At Wash Basin area in Toilets**: Providing and Fixing Wall mounted Soap dispenser of JAGUAR Make Model No. ACN CHR 1137N or approved equivalent make, including all necessary materials required for fixing. All complete as per directions of the Engineer-in-charge.
6.7	Stainless steel (304) square frame grating	**In Toilets, Corridors and other common areas:** Supply and fixing of approved make 0.6mm thick Stainless steel (304) square frame grating with circular removable jali including fixing in white cement to match floor finish as per directions of Engineer - in - charge.
6.8	Coat hook	**In Toilets**: Providing and fixing C.P. brass Coat hook of Jaguar make model no. CPA-CHR-1161 or approved equivalent make, with necessary CP brass screws, all Complete as per direction of Engineer-in-Charge.

6.9	Urinals	**In Toilets**: Providing and fixing of Urinals of CERA make model no. S4020112 or approved equivalent make, with CP push cock with CP water Spreader both of Jaquar make or equivalent make including CP bottle trap of model no. 769 and waste coupling both of Jaquar make or approved equivalent make, polymer brackets, silicon sealant, with all fittings and fixtures complete, including cutting and making good the walls and floors, wherever required, all leads, lifts, levels and heights. All the CP fixtures shall suits/matches the above urinal fixture as per directions of Engineer - in - charge.
6.10	Urinal Partitions	Providing and fixing granite stone slab with table rubbed, edges rounded and polished, of size 75x50 cm deep and 1.8 cm thick, fixed in urinal partitions by cutting a chase of appropriate width with chase cutter and embedding the stone in the chase with epoxy grout or with cement concrete 1 :2:4 (1 cement: 2 coarse sand : 4 graded stone aggregate 6 mm nominal size) as per direction of Engineer-in-charge and finished smooth.
6.11	Mirror	Providing and fixing 8mm thick bevelled edge Mirror, comprising of 2 to 3 parts covering all wash basins fixed on 12mm thick marine ply, including bevelling of mirror edges, countersunk Stainless steel screws, wood beading and edging etc. all complete as per drawings and as per direction of Engineer in-charge
6.12	Divyang Toilet Set	Providing & fixing Divyang toilet set with European Closet (P Trap) & wall mount wash basin & all divyang requirements with dual flush tank, seat & lead (heavy duty) including C.I. Brackets, C.P. brass hinges, M.S. / C.I. painted brackets, 32mm CP waste Coupling, 32mm size CP bottle trap, CP brass Spatula Faucet, etc. all Internal fittings complete with one no Hinged rail, 4 numbers of S.S grab rails etc. rubber buffers, C.P nuts, bolts etc. making holes in walls & floors, & finishing for ready to use. All materials specified above shall form part of the Divyang toilet set and shall be from Divyang range of approved makes and in line with the range of fixtures provided in all other toilets.
6.13	Internal Water Supply	Providing and Fixing Chlorinated Polyvinyl Chloride (CPVC) Pipes, having thermal stability for hot & cold water supply including all CPVC plain & brass threaded fittings including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and the cost of cutting chases and making good the same including testing of joints complete as per direction of Engineer-In-Charge. Including Providing and fixing Zoloto or equivalent gun metal/brass ball valve of lever type (screwed end) as required as per the approved drawing.

6.14	Water Meter	Providing and fixing 65mm dia, 2 Nos dual SIM/lithium battery based digital type water Metre conforming to IS: 2373 of Kritsnam make or equivalent complete with bolts, nuts, rubber insertions etc: at the required locations as per direction of Engineer-In-Charge.
6.15	Butterfly valves	'Providing and fixing C.I. butterfly valves, water end type class PN 1.6 as per I.S:13095 or BS:5155 with integrally moulded linear of nitrile or EPDM, SS Disc and steam lever operated including necessary nuts, bolts, gaskets, flanges etc. All complete as per the design & approved drawings of the Engineer - In - Charge.
6.16	Puddle Flange	Providing and fixing 600 mm long MS hot dip galvanized Puddle Flange fabricated out of 6 mm thick MS plates of suitable size and pipe shall be confirming to IS:1239 heavy class pipes properly fixed in walls / top slab of tanks. The entire fittings shall be hot dipped galvanized after fabrication. Length shall be minimum 600 mm or wall thickness plus 200 mm on either side (whichever is more). Each Puddle shall be flanged on outer side for connection of pipe / fittings all complete as per the design & approved drawing by the Engineer-In-Charge.
7.0	**DRAINAGE SYSTEM:**	
7.1	RCC Pipes	Providing and laying non-pressure NP2 class (light duty) R.C.C. pipes with spigot/collar jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement: 2 fine sand) including testing of joints etc. complete: Internal or External Road/Plaza Crossings: For Road/Plaza Crossings NP3 Class (Heavy duty) R.C.C. pipes shall be provided below the Ground Level with Concrete Encasement & with required soil over burden cushion over the pipe as per the design, Specs and approved drawings of the Engineer in Charge

7.2	Manholes	Constructing brick masonry manhole in cement mortar 1:4 (1 cement : 4 coarse sand) with R.C.C. top slab with 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm Nominal size), foundation concrete 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm Nominal size), inside plastering 12mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) finished with floating coat of neat cement and making channels in cement concrete 1:2:4 (1cement : 2 coarse sand : 4 graded stone aggregate 20mm Nominal size) finished with a floating coat of neat cement complete as per standard design : Inside size 90x80 cm and 45 cm deep including C.I. cover with frame (medium duty) 450x600 mm clear opening which shall meet the requirement of IS 1726. With solid cement concrete blocks of small size as available in the local market with minimum of M7.5 Grade concrete.
		The Depth of the Manholes shall be as per the actual site requirement w.r.to the invert levels of the pipes, gradients etc. as desired for smooth of flow of drainage as per the design & drawings approved by the Engineer in charge.
7.3	Gully Traps	Constructing Gully Traps wherever required as per the approved drawings and shall be confirmed to the CPWD Specifications.
7.4	Soil & waste pipes and fittings	Double Stack system shall be adopted. One pipe only to carry the soil waste from WCs and another pipe only to carry the waste water from Wash basins and common areas. Wherever AC provisions shall be made and those AC drain pipe outlets of those rooms shall be connected to External drain lines. Providing and fixing 3-layer PP-R (Poly propylene Random copolymer) pipes confirming to IS:15801 UV stabilized & anti - microbial fusion welded, having thermal stability for hot & cold water supply, including all PP - R plain & brass threaded polypropylene random fittings, including trenching, refilling & testing of joints complete
7.5	Manhole Covers	Supply and fixing of C.I Manhole frame and cover for water tanks, sumps and all other places wherever required, fixing at all heights, leads and all other materials required for fixing. All complete as per directions of Engineer in Charge.
8.0	**Water supply line :**	
8.1	External pipe lines	CPVC Pipes as per IS 15778 and HPDE pipes as per IS 4984 shall be laid as per approved plumbing drawings and as per the Directions of Engineer in Charge.

8.2	Internal piping & fittings– Concealed work	CPVC Pipes as per IS 15778 shall be laid as per approved plumbing drawings and as per the Directions of Engineer in Charge.
8.3	Painting of Pipes: a) Exposed on buildings	Synthetic enamel paint as per the Directions of Engineer in Charge.
8.4	Fittings :	Pillar cocks, angle cocks, 2way bib cocks with health faucet, long body bib cocks, coat hook, along with other miscellaneous fittings like bottle trap, floor trap, urinal push cock and spreader, waste couplings etc.; as per approved make and model and as per the direction of Engineer – in – Charge. (The above are indicative only. However, the contractor has to provide all fixtures and fittings for functional suitability). Note: The fixtures and fittings shall be of standard equivalent to Jaguar make Florentine series or more only.
8.5	Terrace Water Tank	20,000 litres Capacity RCC water storage tank (Service tank) with suitable water proofing treatment and laying of ceramic tiles for walls and floor of the tank including float valve, scour valve, Rungs and CI cover with locking arrangement etc., complete. The 20,000 litres Capacity shall includes separate domestic and flush water tanks. In addition to the above, RCC water storage tank for firefighting of suitable capacity shall be provided exclusively for firefighting purpose. This RCC firefighting tank shall be monolithically connected above mentioned RCC Domestic and flush Water tanks. The inlet of service tank shall be connected from this firefighting tank in such a way that the over flow firefighting shall flow to the service tank (this means firefighting storage tank remains always full). The tanks should have the fixed MS access ladder arrangement for monitoring/maintenance purposes. The water tanks should have the automatic water cut-off mechanism.
8.6	UG Sump	1 lakh litres Capacity RCC UG water tank with suitable water proofing treatment and laying of ceramic tiles for walls and floor of the tank including float valve, scour valve, Rungs, CI cover with locking arrangement etc., complete as per the approved drawings and a per the direction of Engineer in Charge.

8.7	Rain water pipes	Providing and fixing UPVC rain water pipes of 6 kg/cm2 conforming to IS: 4985 including all fittings such as with or without access door, bends, junctions, cowls, offsets, etc., and jointing with solvent cement and excavation, refilling and disposal of surplus earth, including cutting holes in walls and floors, excavation, refilling and disposal of surplus earth wherever required and making good the same, complete as directed by the Engineer-in-Charge. The rain water pipes wherever laying in soil (connection to existing man holes) shall be laid inside the NP2 hume pipes. The number of Rainwater pipes shall be as per the design and provisions of CPWD specifications. The khurras shall be provided for effective rain water disposal at open terrace area as specified in CPWD specification and as directed by Engineer In-charge.
8.8	External Service Lines towards Water Supply, Drip Irrigation and Sewerage.	Water Supply: - DI pipe lines of suitable diameter from UG sump or HDPE pipe lines of suitable diameter from nearest line to Service tank of the both proposed school building and existing school building with number of control valves as required complete as per the design & approved drawings by the Engineer-in-charge. Sewerage: NP2 pipes of suitable diameter to be laid from each building to the nearest sewerage line / STP complete and NP3 pipes encased in concrete wherever Road Crossings as per directions of Engineer-in-charge. Drip Irrigation / Sprinkler: - CPVC pipe lines of suitable diameter with control valves, sprinkler system complete for horticulture operations specified. (Note:- The External Service Lines towards Water Supply, Drip irrigation/ sprinkler and Sewerage shall be executed as per relevant specifications attached.)
9.0	**Drinking water facility**	The drinking water Tap-off points shall be provided in each floor as per the approved drawings by Engineer In-Charge.
10.0	**Accessibility of Buildings**	The building shall be accessible by differently abled persons with Ramps, Tactile flooring way, SS Railing, Grab bars, Lifts etc., as required as per GRIHA norms as per the design & approved drawings by E-in-C.
11.0	**External Development**	

11.1	Paver Blocks	Providing and laying 80mm thick factory-made cement concrete interlocking paver block of M -40 grade for fire tender path made by block making machine with strong vibratory compaction, of approved size, design & shape, laid in required colour and pattern over and including 50mm thick compacted bed of fine sand, filling the joints with fine sand etc. over 100 mm thick RCC M30 grade slab including GSB layer of 150mm thick over well compacted earth all complete as per the approved drawings by Engineer-in-charge.
11.2	Kerb Stone and Saucer Drains	Providing and laying at or near ground level factory made Kerb stone of M-25 grade cement concrete in position to the required line, level and curvature jointed with cement mortar 1:3 (1 cement: 3 coarse sand) including making joints with or without grooves (thickness of joints except at sharp curve shall not to more than 5mm) including making drainage opening wherever required complete etc. as per the approvals of Engineer-in-charge.
		Providing and laying in position saucer drain & drain cover made of precast cement concrete units of specified profile and measurements, with key and of other shapes as required in site as per drawing in M 30 grade concrete seated on PCC foundation of M-10 grade including placing and joining with CM mortar of mix 1:4 (1Cement : 4 grade coarse sand) as per the approved Drawings for Saucer drain and other relevant approved drawings and as per the directions Engineer-in-charge.
11.3	GSB	Construction of granular sub-base by providing close graded Material conforming to specifications, mixing in a mechanical mix plant at OMC, carriage of mixed material by tippers to work site, for all leads & lifts, spreading in uniform layers of specified thickness with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per specifications and directions of Engineer-in-Charge. a) With material conforming to Grade-I (size range 75 mm to 0.075 mm) having CBR Value-30.
11.4	Planter Boxes	CC Solid Block Planter boxes with 18 mm thick Granite coping shall be constructed as per the approved drawings and as per the instructions of Engineer in Charge.
12.0	Open Paved area around the Building	80 mm thick factory-made cement concrete Interlocking paver block of M40 grade as per Arch drawing and approved development plan over 50 mm thick sand cushion over 150 mm thick Granular sub-base (GSB) and over well compacted earth.

13.0	Miscellaneous civil and beautification works	Miscellaneous works like pathways connecting between old building to new building, Flower beds, approach ramps etc. shall be done as per the approved drawings and as per the Direction of Engineer in Charge.
14.0	Horticulture	The works shall be done as per specifications mentioned at "Particular Specifications"
15.0	FRP Grating	• Platforms in shafts: FRP grating supported on suitable size MS angle supports all round the grating as per the design & approved drawings by the Engineer in charge. And as per specifications and details mentioned at "Particular Specifications".

NOTE: The above list is only indicative and not exhaustive. The contractor has to plan and execute all the missing fittings / fixtures / item to make the premises to the full use. Nothing extra shall be paid on this account.

COMMON SPECIFICATIONS

GENERAL CONDITIONS

General specifications for construction:

1. Several documents forming the Bid are to be taken as mutually complementary to each another.

2. Except for the items, for which particular specifications are given or where it is specifically mentioned otherwise in the description of the items, the work shall generally be carried out in accordance with the following:

Civil work:

1. CPWD Specifications 2019 Volume- I

2. CPWD Specifications 2019 Volume- II

3. MORTH specifications (5th Edition) published by IRC with up to date amendments.

All above specifications shall be applicable with corrections slips up to the last date of submission/ uploading of Bid.

All above specifications hereinafter shall be referred as CPWD specifications. Wherever CPWD Specifications are silent, the latest BIS Codes/Specifications, National Building Code 2016, MoRTH specification or any other specification shall be followed.

If there is any difference or discrepancy between the description of items as given in the schedule of quantities, particular specifications for individual items of work (including special conditions) and BIS Codes etc., the following order of preference shall be followed:

a) Detailed description as per the Scope of work, Technical & particular Specifications against BOQ item as mentioned at tender.
b) Architectural Drawings and Schedule of finishes.
c) CPWD Specifications, Civil, Electrical & Mechanical and Horticulture with up to date corrections as on last date of submission of Bid.
d) Manufacturer's Specifications
e) Indian Standard Specifications of B.I.S.
f) National Building Code 2016
g) Sound Engineering practices.
h) Decision of Engineer-in-charge.

A reference made to any Indian Standard Specifications in these documents, shall imply to the latest version of that standard, including such revisions/

amendments as issued by the Bureau of Indian Standards up to last date of submission of Bids. The Contractor shall provide and make it available at his own cost all such publications of relevant Indian Standards applicable to the work at site, with correction slips up to last date of submission of Bids.

GENERAL:

1. The Bidder shall acquaint himself with the proposed site of work, its approach roads, working space available etc. before quoting his rates and no claim on this account shall be entertained by the department.

2. The Contractor(s) shall get himself acquainted with nature and extent of the work and satisfy himself about the availability of materials from kiln or approved quarries for collection and conveyance of materials required for construction.

3. Contractor shall take all precautionary measures to avoid any damage to adjoining property. All necessary arrangement shall be made at his own cost.

4. The Contractor shall take all necessary precautions to prevent any nuisance or inconvenience to the occupiers of adjacent properties and to the public in general and to prevent any damage to such properties and any pollution of smoke, streams and water-ways. He shall make good at his cost and to the satisfaction of the Engineer-in-charge, any damage to roads, paths, cross drainage works or public or private property whatsoever caused thereon by the Contractor. All waste or superfluous materials shall be disposed of by the Contractor without any reservation entirely to the satisfaction of the Engineer-in-charge. Nothing extra shall be paid on this account.

5. Utmost care shall be taken to keep the noise levels to the barest minimum so that no disturbance as far as possible is caused to the occupants / users of building/adjacent properties.

SETTING OUT:

1. The Contractor shall establish, maintain and assume responsibility for grades, lines, levels and bench marks. He shall report any errors or inconsistencies regarding grades, lines, levels, dimensions to the Engineer-in-charge before commencing work. Commencement of work shall be regarded as the Contractors acceptance of such grades, lines, levels and dimensions and no claim shall be entertained at a later date for any errors found.

2. If at any time, any error in this respect shall appear during the progress of the work, the Contractor shall, at his own expense rectify such errors, if so required to the satisfaction of the Engineer-in-charge.

a) Though the site levels may be indicated in the drawings, the Contractor shall ascertain himself and confirm the site levels with respect to GTS (Global Trigonometrical Survey) Bench mark from the concerned authorities.

b) The approval by the Engineer-in-charge of the setting out by the Contractor shall not relieve the Contractor of any of his responsibilities.

c) The Contractor shall be entirely and exclusively responsible for the horizontal, vertical and other alignment, the level and correctness of every part of the work and shall rectify effectively any errors or imperfections therein. Such rectifications shall be carried out by the Contractor at his own cost to the instructions and satisfaction of the Engineer-in-charge-in-Charge.

d) The rates quoted by the Contractor are deemed to be inclusive of site clearance, setting out work, profile, establishment of reference bench mark, spot levels, construction of all safety and protection devices, barriers, earth embankments, preparatory works, all testing of materials, working during monsoon, working at all depths, height and locations etc. unless specified in the schedule of items.

Temporary Water, Electricity & Telephone Connections:

1. The Contractor shall make his own arrangements for water and for electricity by obtaining electric connections and by providing diesel generators of adequate capacity if required and make necessary payments directly to the State Govt. departments concerned. Contractor shall get the water tested from laboratory approved by the Engineer-in charge at regular interval as per the CPWD Specifications 2019. All expenses towards collection of samples, packing, transportation, testing charges etc. shall be borne by the Contractor.

2. The Contractor shall arrange electricity at his own cost for testing of the various electrical installations as directed by Engineer-in-charge and for the consumption by the Contractor for executing the work. Also all the water required for testing various electrical installations, fire pumps, wet riser / firefighting equipment's, fire sprinklers etc. and also testing water supply, sanitary and drainage lines, water proofing of underground sump, Terrace tanks, water proofing treatment etc. shall be arranged by the Contractor at his own cost. Nothing extra shall be payable on this account.

3. Arrangement of temporary telephone, Internet, water and electricity connections required by Contractor, shall be made by him at his own cost and also necessary permissions shall be obtained by him directly from concerned authorities, under intimation to the Department. Also, all initial cost and running charges, and security deposit, if any, in this regard shall be borne by him. The Contractor shall abide by all the rules/ bye laws applicable in this regard and he shall be solely responsible for any penalty

on account of violation of any of the rules / byelaws in this regard. Nothing extra shall be payable on this account.

4. The Contractor shall be responsible for maintenance and watch and ward of the complete installation and water / electricity meter and shall also be responsible for any pilferage, theft, damage, penalty etc. in this regard. The Contractor shall indemnify the Department against any claim arising out of pilferage, theft, damage, penalty etc. whatsoever on this account. Security deposit for the work shall be released only after No Dues Certificates are obtained from the local Authorities from whom temporary electric/ water / telephone connection have been obtained by the Contractor. Nothing extra shall be payable on this account.

5. The Department shall in no way be responsible for either any delay in getting electric and/or water and/or telephone., Internet connections for carrying out the work or not getting connections at all. No claim of delay or any other kind, whatsoever, on this account shall be entertained from the Contractor. Also contingency arrangement of stand-by water & electrical supply shall be made by the Contractor for smooth progress of the work so that work does not suffer on account of power failure or disconnection or not getting connection at all. No claim of any kind whatsoever shall be entertained on this account from the Contractor. Nothing extra shall be payable on this account.

EXECUTION:

1. The work shall be carried out in accordance with the Detailed Architectural drawings and structural drawings, to be prepared and submitted by architectural/structural consultants engaged by the Contractor and approved by the Engineer-in-charge. Before commencement of any item of work the Contractor shall correlate all the relevant architectural and structural drawings, nomenclature of items and specifications etc. issued for the work and satisfy himself that the information available there from is complete and unambiguous. The figures and written dimension of the drawings shall be superseding the measurement by scale. The discrepancy, if any, shall be brought to the notice of the Engineer-in- charge before execution of the work. The Contractor alone shall be responsible for any loss or damage occurring by the commencement of work on the basis of any erroneous and or incomplete information and no claim whatsoever shall be entertained on this account.

2. The Contractor shall conduct his work, so as not to interfere with or hinder the progress or completion of the work being performed by other Contractor(s) or by the Engineer-in-charge and shall as far as possible arrange his work and shall place and dispose of the materials being used

or removed, so as not to interfere with the operations of other Contractor & simultaneously working or he shall arrange his work with that of the others in an acceptable and coordinated manner and shall perform it in proper sequence to the complete satisfaction of others.

3. The cost of work shall be inclusive of pumping out or bailing out water encountered in foundation, if required, for which no extra payment will be made. This will include water encountered from any source, such as rains, floods, and sub-soil water table being high due to any other cause whatsoever.

4. The foundation trenches shall be kept free from water while works below ground level are in progress.

5. The work shall be executed and measured as per metric dimensions given in the Schedule of quantities, drawings etc. (F.P.S. units wherever indicated are for guidance only).

6. Samples including brand /quality of materials and fittings to be used in the work shall be got approved from the Engineer-in-charge, well in advance of actual execution and shall be preserved till the completion of the work. Nothing Extra shall be paid on this account.

7. Unless otherwise specified in the schedule of quantities, the rates quoted by the Contractor for all items of the work shall be inclusive of cost of all Labour, material, leads & lifts, tools & plants, mandatory taxes direct and indirect costs and other inputs involved in the execution of the item. Nothing extra shall be paid on this account.

8. Royalty or Seigniorage fee for all the boulders, stone aggregate, brick aggregate, shingle, coarse or fine sand, earth, gravel, bajri etc. collected by him for the execution of the work, and payment need to be done directly to the Revenue Authority or authorized agent of the State Government concerned or Central Government. Further, the Contractor needs to submit proof of submission of full royalty to the State Government or local authority. Nothing extra shall be payable on this account.

9. Any cement slurry/bonding material added over base surface for continuation of concreting for better bond is deemed to have been built in the items and nothing extra shall be payable and no extra cement considered in consumption on this account.

10. Unless otherwise specified in the contract, no payment shall be made for any damage caused by rain, snowfall, flood or any other natural calamity, whatsoever during the execution of the work. The Contractor shall be fully

responsible for any damage to the Govt. property and work for which the payment has been advanced to him under the contract and he shall make good the same at his risk and cost. The Contractor shall be fully responsible for safety and security of his material, T&P, Machinery brought to the site by him.

11. The Contractor shall be required to protect the flooring work with suitable material till handing over of the building. Nothing extra shall be payable on this account.

12. The Contractor shall provide for adequate number of garbage bins around the construction site and the workers facilities and will be responsible for the proper utilization of these bins for any solid waste generated during the construction. The Contractor shall ensure that the site and the workers facilities are kept litter free. Separate bins should be provided for plastic, glass, metal, biological and paper waste and labelled in both Hindi and English with suitable symbols.

13. The Contractor shall be responsible for the watch and ward / guard of the buildings safety, fittings and fixtures provided by him against pilferage and breakage during the period of installations and thereafter till the building is physically handed over to the department. No extra payment shall be made on this account.

14. Existing drains, pipes, cables, over-head wires, sewer lines, water lines and similar service encountered in the course of the execution of work shall be protected against the damage by the Contractor at his own expense. In case the same are to be removed and diverted, the same shall be payable to the Contractor unless specified in the item or specifications concerned to that item. The Contractor shall work out the cost and submit to Engineer-in-charge for approval. The Contractor shall not store materials or otherwise occupy any part of the site in a manner likely to hinder the operation of such services.

15. The Contractor(s) shall obtain all requisite permission/ licenses from the Municipality, police and other authorities that may be required as per law for temporary constructions, enclosures etc. Contractor(s) shall pay necessary charges on account of these operations in executing the contract for which nothing shall be paid. He shall make good any damage to the property whether public or private and shall maintain lights either for illumination or for cautioning the public at night. The Contractor(s) shall erect the barricading as per norms mentioned in the Bid document or higher height enclosing the area as per direction of Engineer-in-charge,

and nothing extra will be payable on this account.

16. The Contractor(s) shall take instructions from the Engineer-in-charge regarding collection and stacking of materials at any place. No excavated earth or building rubbish shall be stacked on areas where other buildings, roads, services and compound walls are to be constructed. The stacking shall take place as per stacking plan. However, if any change is required, the same shall be done with the approval of Engineer-in-charge.

17. Contractor(s) shall provide Permanent Bench Marks, flag tops and other reference points for the proper execution of work and these shall be preserved till the end of the work. All such reference points shall be in relation to the levels and locations, given in the Architectural and plumbing drawings.

18. The Contractor shall have to use properly designed barricading system of MS Framework with pre-coated Galvanised sheets to barricade the entire plot premises up to a height of min. 4m from the ground level and the cost of same deemed to be inclusive in the overall contract cost. Such barricading shall only be removed from the premises after completion of the work.

19. No foreign exchange shall be made available by the Department for importing (purchase) of equipment, plants, machinery, materials of any kind or any other items required to be carried out during execution of the work. No delay and no claim of any kind shall be entertained from the Contractor, on account of variation in the foreign exchange rate.

20. Water tanks, taps, sanitary, water supply and drainages pipes, fittings and accessories should conform to the specifications provided in Bidding documents, if CPWD Specifications are not available, NBC – 2016, IS codes shall be followed. The Contractor(s) should engage approved plumbers for the work and get the materials (fixtures/fittings) tested, by the municipal Body/Corporation authorities wherever required at his own cost. The Contractor(s) shall submit for the approval of the Engineer-in-charge- in-Charge the name of the plumbing Agency proposed to be engaged by him.

21. The Contractor shall get the water tested with regard to its suitability for construction and conforming to the relevant BIS Code at 3 months' frequency or on change of source of water whichever is earlier. The Contractor shall obtain written approval from the Engineer-in-charge before he proceeds by using the same for execution of work. The water testing charges shall be borne by the Contractor.

22. All materials obtained/procured from Govt. Stores or otherwise shall be got checked by the Engineer-in-charge or his any authorized representatives on receipt of the same at site before use by making MIRs as required by all the stakeholders.

23. All material shall only be brought at site as per program finalized with the Engineer-in-charge. Any redelivery of the material not required for immediate consumption shall not be accepted and thus not be paid for.

24. All materials and fittings brought by the Contractor to the site for use shall conform to the samples approved by the Engineer-in-charge which shall be preserved till the completion of the work. If a particular brand of material is specified in the item of work in Schedule of Quantity, the same shall be used after getting the same approved from Engineer-in-charge. Wherever brand/quality of material is not specified in the item of work, the Contractor shall submit the samples as per approved list of brand names given in the Bid document/particular specifications for approval of technical sanctioning authority. For all other items, materials and fittings of BIS Marked shall be used with the approval of Engineer-in-charge. Wherever BIS Marked material / fittings are not available, the Contractor shall submit samples of materials / fittings manufactured by firms of repute conforming to relevant specifications or BIS codes and use the same only after getting the approval. To avoid delay, Contractor should submit samples as stated above well in advance so as to give timely orders for procurement. If any material, even though approved by Engineer-in-charge is found defective or not conforming to specifications, shall be replaced / removed by the Contractor at his own risk & cost.

25. The day to day receipt and issue accounts of different grade/brand of cement shall be maintained separately in the standard Performa by the Contractor which shall be periodically checked by the Engineer-in- charge or his authorized representative.

26. Cement bags shall be stored in two separate stacks, one for tested cement and the other for fresh cement (under testing) to be constructed by the Contractor at his own cost as per sketches given in C.P.W.D Specifications – 2019 Vol. I to II with up to date correction slips having weatherproof roofs and walls. The size of the cement godown is indicated in the sketch for guidance. The actual size of godown shall be as per site requirements and nothing extra shall be paid for the same. The decisions of the Engineer-in-charge regarding the capacity needed will be final. The authorized representative of the Contractor at the site of work is responsible for the issue of cement from godown according to the daily

requirement with the knowledge of Engineer-in-charge or his authorized representative. The account of daily receipt and issue of cement shall be maintained in a register in the prescribed performa and signed daily by the Contractor or his authorized agent in token of its correctness.

27. For construction works which are likely to generate malba / rubbish, the Contractor shall dispose of malba / rubbish & other unserviceable materials and wastes at his own cost to the notified specified Municipal dumping ground only and under no circumstances these shall be stacked / dumped even temporarily, outside the construction premises

28. The Contractor shall arrange all the materials and manpower in advance for execution of work within stipulated period and as per Milestones specified in the Bid document.

29. The Contractor shall give performance test of the entire installation(s) as per the specifications & codes in the presence of the Engineer-in-charge or his authorized representative before the work is finally accepted and nothing extra what-so-ever shall be payable to the Contractor for the test.

Scaffolding & Staging:

1 Wherever required for the execution of work, all the scaffolding shall be provided and suitably fixed, by the Contractor. The scaffolding shall be provided strictly with steel double scaffolding system, suitably braced for stability, with all the accessories, gangways, etc. with adjustable and suitable working platforms to access the areas with ease for working and inspection. Single scaffolding system is strictly prohibited and shall invite necessary action. It shall be designed to take all incidental loads. It should cater to the safety features for workmen. It shall be ensured that no damage is caused to any structure due to the scaffolding. Nothing extra shall be payable on this account.

2. Any particular structural system may involve requirement of scaffolding and staging for its execution. Since the choice of selection of structural system is left to the Contractor, the rates quoted by him are deemed to be included for the requirement of scaffolding and staging for that particular structural system. Hence nothing extra is payable for using scaffolding or staging or any other supporting system for a given structural system chosen by the Contractor.

3 The Contractor should submit the shop drawings of staging and shuttering for approval of Engineer-in-charge before actually commencing the execution of work under the item. Nothing extra shall be payable on this account.

Co-ordination with other agencies:

1 The Contractor shall executive his work so as not to interfere with or hinder the progress of the work being performed by other Contractors or by the Engineer-in-charge. As far as possible, he shall arrange his work and place, so as not to interfere with the operations of other Contractors or shall arrange his work with that of the others, in an acceptable and coordinated manner and shall perform it in proper sequence.

Procurement of materials:

1. All material shall only be brought at site as per program finalized with the Engineer-in-charge. Any pre-delivery of the material not required for immediate consumption shall not be accepted and thus not paid for.

2 The Contractor shall procure the required materials in advance so that there is sufficient time for testing of the materials and approval of the same before use in the work.

PARTICULAR SPECIFICATIONS FOR CIVIL WORKS

1.0 EARTH WORK: -

1.0 The work shall be done in accordance with CPWD Specifications - 2019 - Vol. I & Vol. II and National Building Code 2016 with up to date correction slips.

1.1 Excavation shall be undertaken to the width of the Basement / Retaining wall footing including necessary margins for construction operation as per drawing or directed otherwise. Where the nature of soil or the depth of the trench and season of the year, do not permit vertical sides, the contractor at his own expense shall put up the necessary shoring, strutting and planking or cut slopes with or without steps, to a safer angle or both with due regard to the safety of personnel and works and to the satisfaction of the Engineer – in – charge.

1.2 Wherever the Black-cotton soil encountered in Road works shall be removed the soil in total for the designated designed depths and excavate further more depth of minimum 800mm and said block cotton soil shall be removed and refilled bottom layer of 500mm depth with good Moorum soil and then further 300mm depth layer with crushed stone dust (CSS) and as per the directions of Engineer in Charge.

1.3 Wherever the Black-cotton soil encountered in foundations of proposed structures shall be removed the black Cotton soil in total till the Moorum strata reaches and as per the structural designer's recommendations.

1.4 Exactions in encountered Hard rock shall be carried out with suitable methods like chemical cracking with non-explosive chemicals etc., except blasting and as per the directions of Engineer in Charge.

1.5 The contractor shall make at his own cost all necessary arrangements for maintaining water level, in the area where works are under execution low enough so as not to cause any harm to the works or problems in carrying out with the execution. The water coming from any source, such as rains, accumulated rain water, floods, leakages from sewer and water mains, subsoil water table being high or due to any other cause whatsoever. The contractor shall make necessary provision of pumping, dredging, and bailing out water coming from all above sources and excavation and other works shall be kept free of water by providing suitable system approved by the Engineer-in-charge.

1.6 All the major excavation shall be carried out by mechanical excavator.

2.0 Anti-termite treatment

Diluting and injecting chemical emulsion for PRE - CONSTRUCTIONAL anti-termite treatment shall be carried out as per the BIS 6313.

Materials

Chemicals: Any one of the following chemicals in water emulsion to achieve the percentage
concentration specified against each chemical shall be used:

(i) Chlorpyriphos Emulsifiable Concentrate (EC)of 20%
(ii) Imidacloprid 30.5% Suspension Concentrate(SC)
(iii) Bifenthrin 2.5% Emulsifiable Concentrate (EC)

Anti-termite treatment chemical is available in concentrated form in the market and concentration is indicated on the sealed containers. To achieve the specified percentage of concentration, Chemical should be diluted with water in required quantity before it is used. Graduated containers shall be used for dilution of chemical with water in the required proportion to achieve the desired percentage of concentration. For example, to dilute chemical of 20% concentration. 19 parts of water shall be added to one part of chemical for achieving 1% concentration.

3.0 CONCRETE WORK: -

The work shall be done in accordance with CPWD Specifications - 2019 - Vol.I & Vol. II withup to date correction slips.

1.0 R.C.C./P.C.C WORK (DESIGN MIX CONCRETE):-

The work shall be done in accordance with CPWD Specifications - 2019 - Vol. I & Vol. II with up to date correction slips.

The minimum grade of PCC shall be M 15/M20 or as per the directions of engineer in charge.

2.0 R.C.C. (DESIGN MIX CONCRETE):-

The RCC work shall be done with Design Mix Concrete. Wherever letter M has been indicated, the same shall imply for the Design Mix Concrete. The Design Mix Concrete will be designated based on the principles given in IS: 456, 10262 & SP 23. The condition and specifications stated herein shall have precedence overall conditions and specifications stated in relevant I.S codes / CPWD specifications. The concrete mix shall be designed for specified target mean compressive strength in order to ensure that the work test results do not fall below the acceptance criteria specified for the concrete mix. The Contractor shall design mixes for each class of concrete indicating that the concrete ingredients and proportions will result in concrete mix meeting requirements specified. The mix shall be designed with quantities of admixture / plasticizer

proposed to achieve required workability & strength. The specifications mentioned here in below shall be followed for Design Mix Concrete.

2.1 The sources of coarse aggregate, fine aggregate & water to be used in concrete work shall be identified by the contractor & he will satisfy himself regarding their conforming to the relevant specification & their availability before getting the same approved by the Engineer-in-Charge.

2.2 **Coarse Aggregate**: - As per CPWD Specifications - 2019 - Vol.I & Vol. II with up to date correction slips.

2.3 **Fine Aggregate:** -As per CPWD Specifications - 2019 - Vol.I & Vol. II with up to datecorrection slips.

2.4 **Water:** - It shall confirm to requirements laid down in IS:456-2000 / CPWD Specifications -2019 - Vol.I & Vol. II with upto date correction slips.

2.5 **Cement:** - **OPC 53** shall be used for design mix concrete and shall conform to IS-8112.

2.6 **Admixtures / Plasticizers:** - The admixture shall confirm to IS: 9103, wherein required, the admixture of approved quality and approved make only shall be used to attain the required workability.

2.7 **Grade of Concrete:** - For RCC Works: Minimum Grade Shall be M30 or as per the approved Structural designs whichever is more and as per the directions of Engineer in Charge.

NOTE: -

i) . In the designation of a Concrete mix letter M refers to the mix and the number of the specified characteristic compressive strength of 15 cm - Cube at 28 days expressed in N / mm2

2.8 The contractor shall engage one of the following approved laboratories/ test house at their own expenses for designing the concrete mix in accordance with relevant IS Codes and to conduct laboratory test to ensure the target strength and workability criteria for a given grade of concrete.

2.8.1 IIT's other than IIT Hyderbad

2.8.2 Any other Institute / Laboratory as approved by EIC.

2.9 The various ingredients for mix design / laboratory tests shall be sent to the lab / test houses through the Engineer-in-Charge and the samples of such aggregates sent shall be preserved at site.

2.10 The contractor shall submit the report on design mix from any of above approved laboratories for approval of Engineer-in-Charge within 30 days from the date of issue of letter of acceptance of the tender. No concreting shall be done until the design mix is

approved. In case of change of source or characteristic properties of the ingredients used in the concrete mix during the work, a revised laboratory mix design report conducted at laboratory established at site shall be submitted by the contractor as per the direction of the Engineer-in-Charge.

2.11 **Trial Batches**

2.12 The designed mix proportion shall be checked for target mean compressive strength by means of trial batches.

2.13 The quantities of materials for each trial mix shall be sufficient for at least six specimens (cubes) and the concrete required for carrying out workability tests.

2.14 The workability of trial mix No. 1 shall be measured and mix shall be carefully observed for freedom from segregation, bleeding and its finishing characteristics. The water content, if required, shall be adjusted corresponding to the required changes in the workability.

2.15 With the modified water content, the mix pro-portions shall be recalculated by keeping with water cement ratio unchanged. The mix proportions, as modified, shall form the Trial Mix No. 2 and tested for the specified strength and workability.

2.16 In addition, trial mix No. 3 and 4 shall be designed by keeping water contents same as that determined for trial mix 2 but varying the water cement ratio + 10 percent of the specified value and tested for their design characteristics.

2.17 All cost of mix designing and testing connected therewith including charges payable to the laboratory shall be borne by the Contractor including redesigning of the concrete mix wherever required and directed by Engineer-in-Charge.

2.18 **APPROVAL OF DESIGN MIX:-**

The mix design for a specified grade of concrete shall be done for a target meancompressive strength

Tck = Fck + 1.65xS

Where Fck = Characteristic compressive strength at 28 days.

s = Standard deviation which depends on degree of quality control.

The degree of quality control for this work is "good" for which the standard deviation (s) obtained for different grades of concrete shall be as follows: -

GRADE OF CONCRETE	STANDARD DEVIATION(S)
M-10	3.5
M-15	3.5
M-20	4.0
M-25	4.0
M-30	5.0
M-35	5.0
M-40	5.0
M-50	5.0

Minimum three sets of separate preliminary test shall be carried out for each trial batch of concrete mix. Each test shall comprise six specimens and only one test set of six specimens shall be made on any particular day. Out of the six specimen of each set, three shall be tested at seven days and remaining three at 28 days. The preliminary tests at seven days are intended only to indicate the strength to be attained at 28 days. While the design mix shall be approved only on the basis of test strength of 28 days. The design mix shall be considered satisfactory and approval if at least three preliminary test sets individually satisfy the following strength and workability criteria.

(a) The average strength of each test sets is not less than the specified target meanscompressive strength (TCK).

(b) The strength of any specimen cube is not less than 0.85 Tck.

(c) The concrete mix is required degree of workability and acceptance concrete finish.

2.19 All cost of mix designing and testing connected therewith including charges payable to thelaboratory shall be borne by the Contractor.

2.20 **WORK STRENGTH TEST: -TEST SPECIMEN: -**

Work strength test shall be conducted in accordance with IS:516 on random sampling. Each test shall be conducted on six specimens, three of which shall be tested at 7 days and remaining three at 28 days.

TEST RESULTS OF SAMPLES: -

The test results of the sample shall be the average of the strength of three specimens. The individual variation shall not be more than +/- 15% percent of the average. If variation is more, the test results shall be treated as invalid. 90% of the total tests shall be done at the laboratory established at site by the contractor and remaining 10% in any laboratory as approved by EIC as stated above.

FREQUENCY OF TESTS: -

The minimum frequency of sampling of concrete of each

grade shall be as specified in IS-456-2000.

2.21 **STANDARD OF ACCEPTANCE: -**

The acceptance criteria of Concrete shall be as per IS 456.2000

2.22 **Production of Concrete**

The contractor may procure all the concrete from approved Ready Mix Concrete (RMC) supplier as approved by the Engineer-in-charge after carryout the necessary design mixes from the approved labs as specified above. All technical requirements such as cement type, minimum cement quantity, w/c ratio, aggregates weights, slump, admixture etc. shall be ensured at RMC plant in line with the approved design mixes and contractor shall be wholly responsible for ensuring the quality of concrete as required at site. The concrete batch sheet shall be supplied for every batch of concrete. Necessary moisture corrections of aggregate shall be ensured on daily basis prior to production of concrete. Dedicated contractors engineer shall be deployed during the production of concrete to ensure the material utilization and quality of the concrete.

2.23 **Transportation, Placing and Compaction of Concrete**

a. Mixed concrete from the RMC plant shall be transported to the point of placement by transit mixers and placed in position through concrete pumps and/or steel closed bottom buckets capable of carrying minimum 0.6 cum concrete. In case the concrete is proposed to be transported by transit mixer, the mixing speed shall not be less than 4 rev/min. of the drum nor greater than a speed resulting in a peripheral velocity of the drum 70 m/minutes at its largest diameter. The agitating speed of the agitator shall be not less than 2 rev/min nor more than 6 rev/min of the drum. The number of revolution of the mixing drum or blades at mixing speed shall be between 70 to 100 revolutions for a uniform mix, after all ingredients, have been charged into the drum. Unless tempering water is added, all rotation after 100 revolutions shall be at agitating speed of 2 to 6 rev/min and the number of such rotations shall not exceed 250. The general construction of transit mixer and other requirement shall conform to IS:5892.

b. In case concrete is to be transported by pumping, the conduit shall be primed by pumping a batch of mortar through the line to lubricate it. Once the pumping is started, it shall not be interrupted (if at all possible) as concrete standing idle in the line is liable to cause a plug. The operator shall ensure that some concrete is always there in the pump receiving hopper during operation. The lines shall always be maintained clean and shall be free of dents at all stages. Special precaution shall be taken that

surrounding temperature during concreting shall not exceed 30 degrees centigrade.

c. Except where otherwise agreed to by the Engineer-in-Charge, concrete shall be deposited in horizontal layers to a compacted depth of not more than 450 mm. Unless agreed to by the Engineer-in-Charge, concrete shall not be dropped into place from a height exceeding 1.5m. In order to avoid such situations chutes, tremie pipe or closed bottom buckets shall be used. These shall be kept clean and used in such a way as to avoid segregation. Slope of the chute shall be so adjusted that concrete flows without the use of excessive quantity of water. The delivery end of chute shall be as close as possible to the point of deposit. The chute shall be thoroughly flushed with water before and after each working period and the water used for this purpose shall be discharged outside the formwork. The concrete shall be compacted by using immersion type vibrators. When the concrete is being continuously deposited to a uniform depth along a member, vibrator shall not be operated within one meter of free end of the advancing concrete. Every effort shall be made to keep the surface of the previously placed layer of concrete alive so that the succeeding layer can be amalgamated with it by the vibration process. The vibrator head shall not be brought more than 200 mm near to the formwork as this may cause formation of water stagnations. The formwork shall be strong and great care shall be exercised in its assembly. It shall be designed to take up increased pressure of concrete and pressure variations caused in the neighborhood of vibrating head, which may result in excessive local stress on the formwork. The joints of the formwork shall be made and maintained tight and close enough to prevent the squeezing out slurry or sucking in of air during vibration. The formwork to receive concrete shall be cleaned and made free from standing water, dust, etc. The contractor shall keep provision for screed and shutter vibrators at site.

d. No concrete shall be placed in any part of the structure until the approval of Engineer-in-Charge has been obtained. If concreting is not started within 24 hours of the approval being given, it shall have to be obtained again from the Engineer- in-Charge. Concreting shall be done continuously over the area between construction joints. Fresh concrete shall not be placed against concrete which has been in position for more than 30 minutes.

2.24 In case of rejection of concrete on account of unacceptable compressive strength, governed by para "Standard of Acceptance" as above, the work for which samples have failed shall be redone at the cost of contractor. However, the Engineer-in-Charge may order for additional tests (like cutting cores, ultrasonic pulse velocity test, load test on structure on part of structure, etc.) to be carried out at the

cost of contractor to ascertain if the portion of structure wherein concrete represented by the sample has been used, can be retained on the basis of results of individual or combination of these tests.

STEEL REINFORCEMENT:

- The Steel Reinforcement work shall be carried out as per CPWD Specifications - 2019 - Vol.I & Vol. II with upto date correction slips. And as per the directions of the Engineer in Charge.

  - The minimum grade of Reinforcement Steel shall be FE 500D.

4.0 Water Proofing

Before application of the any waterproofing treatment, the mother slab shall be flooded with water up to a depth of 50mm for a period of 48 hours. Leakages found shall be marked and grouted with cementitious grout admixed with cebex 100 or equivalent. After the curing period of the grout, the mother slab shall again be flooded with water as mentioned above for a period of 48 hours.
The above procedure shall be repeated till the mother slab is leak and seepage proof. Only after satisfactory inspection and clearance from the Engineer in Charge the below mentioned waterproofing procedures shall be followed for the respective areas of application.

a. **On Terrace/ Mumty / Top slab of the Shafts etc., :**

I. Grouting all the joints with non-shrink cement polymer based grout using CONBEXTRA GP2 of M/s Fosroc or equivalent, Bore packing of pipes, sleeves, etc. applying a coat of styrene- butadiene based polymer coating of NITOBOND SBR of M/s Fosroc or equivalent.

II. Providing and applying at the junction of slab and vertical offsets hunching with cement mortar 1:4 admixed with NITOBOND SBR of M/s Fosroc or equivalent at required dosage as recommended by manufacturer.

Providing and applying NITO PROOF 600PF of M/s Fosroc or equivalent single component polyurethane of medium viscosity grade (approximately 600 poise), spray applied, to give a tough elastomeric waterproof membrane of minimum DFT of 1.30mm, properties conforming to ASTM standards.

III. Laying protective and slope making float finished concrete screed of average 120mm thick using M20 grade concrete, mixed with CONPLAST X4211C of M/s Fosroc or equivalent integral based water proofing admixture, with minimum thickness of 50mm at the rain water outlet, in proper slope of 1.5%, including making golas at the junctions of horizontal and vertical surfaces, finished with 12mm thick cement plastering in CM 1:4 mixed with CONPLAST X4211C of M/s Fosroc or equivalent integral based water proofing admixture

including floating coat of neat cement slurry mixed with CONPLAST X4211C of M/s Fosroc or equivalent, making cutting grooves and filling with polysulphide etc. all complete as per manufacturer's specifications and directions of Engineer-in-charge.

IV. The water proofing treatment shall cover the entire surface area of the slab and shall be continued up to 300mm above the FFL on all Vertical surfaces.

b. In Sunken part of floors:

I. Grouting all the joints with non-shrink cement polymer based grout using CONBEXTRA GP2 of M/s Fosroc or equivalent, Bore packing of pipes, sleeves, etc., applying a coat of styrene - butadiene based polymer coating of NITOBOND SBR of M/s Fosroc or equivalent.

II. Providing and applying at the junction of slab and vertical offsets haunching with cement mortar 1:4 admixed with NITOBOND SBR of M/s Fosroc or equivalent at required dosage as recommended by manufacturer.

III. Providing and applying NITO PROOF 600PF of M/s Fosroc or equivalent single component polyurethane of medium viscosity grade (approximately 600 poise), spray applied, to give a tough elastomeric waterproof membrane of minimum DFT of 1.30mm, properties conforming to ASTM standards

IV. Filling the sunken portion after laying pipes etc, with light weight burned red mud brick bats including layer of cement concrete of min. 50mm thick.

V. The water proofing treatment shall cover the entire surface area of the slab and shall be continued up to 300mm above the FFL on all Vertical surfaces.

c. In water storage tank:

I. Grouting all the joints with non-shrink cement polymer based grout using CONBEXTRA GP2 of M/s Fosroc or equivalent, Bore packing of pipes, sleeves, etc., applying a coat of styrene - butadiene based polymer coating of NITOBOND SBR of M/s Fosroc or equivalent.

II. Providing and applying at the junction of slab and vertical offsets haunching with cement mortar 1:4 admixed with NITOBOND SBR of M/s Fosroc or equivalent at required dosage as recommended by manufacturer.

III. Providing and applying on internal & external surfaces of walls and on top of roof & bottom slab, NITOCOTE EP405 of M/s Fosroc or equivalent make.

IV. Laying protective and slope making float finished concrete screed of using M20 grade concrete, mixed with CONPLAST X4211C of M/s Fosroc or equivalent integral based water proofing admixture, in proper slope including making golas at the junctions of horizontal and vertical surfaces, finished with 12mm thick cement plastering in CM 1:4 mixed with CONPLAST X4211C of M/s Fosroc or equivalent

integral based water proofing admixture including floating coat of neat cement slurry mixed with CONPLAST X4211C of M/s Fosroc or equivalent on top of bottom slab all complete as per manufacturer's specifications and directions of Engineer-in-charge.

V. NITOCOTE EP405 coating on internal and external surfaces of walls shall be protected with 12mm thick cement plaster of 1:4 cement mortar (1 cement:4 coarse sand) finished with a floating coat of neat cement punning.

d. In Corridor areas:

I. All surfaces should be dry and free from contamination such as oil, grease, loose particles, decayed matter, laitance, and all traces of mould release oils and curing compounds

II. Area to receive the treatment shall be ponded with water for 24 hours to observe any leakages

III. Identified areas where leakages were observed shall be grouted with cement slurry admixed with Cebex 100 of Fosroc make or equivalent

IV. After completion of Final set of cement slurry, Area shall be again ponded with water to observe any seepages

V. Above procedure shall be repeated till the mother slab is leakage and seepage proof

VI. Brush bond of Fosroc Make or equivalent shall be applied in two coats. Minimum thickness of waterproofing membrane shall be 2mm.

VII. After application of waterproofing membrane necessary protection shall be provided to waterproofing membrane by spreading cement slurry and area shall be restricted for movement of workmen

VIII. Flooring work shall be immediately commenced after completion of waterproofing treatment to avoid any damages to the waterproofing membrane

IX. The water proofing treatment shall cover the entire surface area of the slab and shall be continued up to Skirting top level on all Vertical surfaces.

e. Vertical & Horizontal Pipe/ Sleeve Bore Hole Grouting:

A: Grouting of the Bore Hole

SURFACE PREPARATION:

Clean the surface with wire brush to remove loose particles & hidden dirt on the concrete surface. Wash the grouting area with water and saturate it for at least 24 hours before starting the grouting operation. Roughen the surface of the pipe for proper adhesion of the Grout material.

Pouring Non-Shrink Grout:

Prepare and pour Dr. Fixit Pidigrout 10M or equivalent high strength, non-shrink, free flow grout in annular space around the

pipe /the bore hole to be grouted as per the manufacturer's specifications and as per directions of the Engineer in Charge.

Curing: Cover the exposed areas of grout by wet burlap (jute bag) up to the period as recommended by the manufacturer and as per directions of Engineer in Charge

Ponding Test: Fill the above area with water up to 50mm depth for 48 hours and check for any leakages. If any leakages found repeat the above mentioned procedure till the leakage is arrested.

B. Application of KEMPEROL 1K PUR & KEMPEROL 165 FLEECE System or Equivalent System

Preparing the substrate: The substrate must be dry (in concrete, the residual moisture in the upper 2 cm must be < 5 %), sound and free from any material that would hinder adhesion.

Primer: Prior to the application of the KEMPEROL 1K-PUR or equivalent Waterproofing, prime with KEMPERTEC Primer or equivalent according to the primer recommendations by the manufacturer.

Application: Apply approx. 2/3 of KEMPEROL 1K-PUR or equivalent Waterproofing, roll in KEMPEROL 165 fleece or equivalent and embed it using a nylon roller. Ensure the fleece sections have a 5 cm overlap and are free from bubbles. Apply the remaining 1/3 of KEMPEROL 1K-PUR or equivalent Waterproofing onto the still wet first layer, ensuring saturation.

Ponding Test: Fill the above area with water up to 50mm depth for 24 hours and check for any leakages. If any leakages found repeat the above mentioned procedure till the leakage and seepage is arrested.

Note: For all water proofing systems for respective areas of applications as mentioned above, the treated surfaces shall be checked for any leakage and seepage by flooding with water up to a depth of 50mm for a period of 48 hours. Leakages/seepage found shall be Treated as per the approved methodology as per the directions of Engineer in charge.

Guarantee Bond

a) Five years guarantee bond in prescribed proforma attached with Bid document shall be Submitted by the Contractor which shall also be signed by both the specialized agency and the Contractor to meet their liability/ liabilities under the Guarantee Bond. However, the sole responsibility about efficiency of water proofing

treatment shall rest with the main Contractor.

b) **10% (Ten percent) of the cost of Water Proofing work shall be retained as Security Deposit and the amount so withheld would be released after Five years from the date of completion of the entire work under the agreement, if the performance of the work done is found satisfactory**. If any defect is noticed during the guarantee period, it shall be rectified by the Contractor within seven days of receipt of intimation of defects in the work. If the defects pointed out are not attended to within the specified period, the same will be got done from another agency at the risk and cost of Contractor.

c) However, the Security Deposit deducted may be released in full against Bank Guarantee of equivalent amount in favour of authority intimated by Engineer-in-Charge, if so decided by the Engineer-in- Charge.

d) The Security Deposit against this item of work shall be in addition to the Security Deposit mentioned elsewhere in contract form.

5 FIRE RATED DOORS

Providing, supplying and fixing internal metal fire rated doors (double/ single leaf) of approved make with Fire Resistant 120 minutes

1.0 Scope:

This specification covers the preparation of shop drawings, Manufacture and installation of factory made metal fire rated Doors with all accessories as approved by the Engineer-in-Charge.

2.0 Applicable Codes:

1. IS: 277 Galvanised steel sheet (plain and corrugated) with Z 120 Coating
2. IS: 2062 Steel for General Structural purpose
3. IS: 4351 Specification for Steel Door Frame
4. IS: 4376 Hot Dip Zinc Coating on Mild Steel Clips
5. IS: 3614 (Part – II) Metallic & Metallic Fire Check Doors, Resistant Test & Part – II Performance Criteria.

3.0 Material:

3.1 Frame

Frame shall be manufactured from 1.60 mm galvanised steel sheets complying to latest IS 277 Code with Z 120 sheet to the specified profiles and dimensions.

Door frame profile shall be double rebated of dimensions 143 mm X 57 mm (+ / - 0.3) with bending radius of 1.4 mm.

Frames shall be provided with a 3 mm thick Soffit bracket plates on all jambs with provision for anchor bolt fixing to wall openings.

All frames shall have reinforcement pads for fixing of door closer, at appropriate location as per manufacturer's details.

Frames shall be provided with hinge plates 3 mm thick pre-drilled to receive hinges for screw mounted fixing. All cut outs including hinge plates, strike plates shall have mortar guard covers from inside to prevent cement, dust ingress into cut outs at the time of grouting.

Frames shall have factory finish pre-punched cut outs to receive specified hardware and ironmongery.

Frame shall be filled with foam concrete.

Individual frame members shall be protected with Co-extruded PE film, low tack adhesive. PE film shall be minimum 56 micron thick.

The frame shall be pre-painted with Zinc Phosphate storing primer (35 DFT) & Polyurethane paint (35 DFT) of approved shade.

3.2 Shutter

Fire door shutter shall be manufactured from minimum 1.2 mm thick galvanized sheets conforming to latest IS: 277 Code with Z 120 coating.

Shutters shall be press formed not less than 46 mm thick, double skin hollow door with lock seam joints at stile edges. Shutters shall have no visible screws or fasteners on either face. Internal reinforcement shall be provided at top bottom and stile edges for desired fire rating.

Shutters shall be provided with Mineral Wool which shall be bonded to the inner faces of the shutter.

Shutters shall be factory prepared with pre-punched cutouts and reinforcements to receive ironmongery (like panic bar, external trim, lever action flush bolt, door closer, door coordinators etc.,) as specified in the drawings. The shutter should have an interlocking arrangement at this stile edges for flat surface on either side.

Shutters shall have pre-drilled hinge plates with hinge guard covers. Shutters with locks shall have concealed lock box with lock fixing brackets with pre-tapped holes.

For shutter with door closer, reinforcement pads shall be provided at appropriate location as per manufacturer's design.

The shutter shall be pre-painted with Zinc Phosphate storing primer (35 DFT) & Polyurethane paint (35 DFT) of approved shade.

3.3 Vision panel

Vision panel sizes shall be as per drawings. Vision panel shall be provided

with toughened Boro Silicate Clear Fire Rated Clear Glass of thickness 6 mm. Glass to be fixed with clip on frames for square and rectangular vision panels with no visible screws and fixed with spin turned rings for vision panels and Glazing Tape with one side adhesive. Shutters shall be protected with Co-extruded PE film, low tack adhesive. PE film shall be minimum 56 micron thick. All frames and shutters shall be duly marked as per door schedule for easy identification at site.

4.0 Workmanship:

4.1 General

The Contractor shall furnish all materials, Labour, operations, equipment, tools & plant, scaffolding and incidentals necessary for the completion of all metal work in connection with steel doors, as called for in the drawings, specifications and BOQ.

All metal work shall be free from defects, impairing strength, durability, appearance and shall be of the best quality for purposes specified, made with structural proprieties to withstand safety, strains, stresses to which they shall normally be subjected to.

All fittings shall be of high quality, as specified and as per approval.

The Contractor shall strictly follow, at all stages of work, the stipulations contained in the Indian Standard Safety Code or its Equivalent British Standard, the provisions of the safety code and the provision of the safety rules as specified in the General Conditions of the Contract for ensuring safety of men and materials.

Any approval, instructions, permission, checking, review, etc., whatsoever by the Engineer-in-Charge, shall not relieve the Contractor of his responsibility and obligation regarding adequacy, correctness, completeness, safety, strength, quality, workmanship, etc.

All knocked down frames shall be stacked flat and shutters vertically on wooden runners and suitably covered as per the instructions of manufacturer to prevent rust and damage.

4.2 Installation

4.2.1 Door Frame

It shall be ensured that all threaded preparations are covered from the back of the frame using self-adhesive strip to prevent penetration of mortar back-fill into screw threads. The head member of assembled frame shall be positioned against jambs ensuring correct alignment and secured using M8 x 200 long plated bolts together with nuts, spring and flat washers.

The assembled frame shall be kept in position within the opening by means of bracing. In order to correctly position the frame against finished floor level or equalise on adjustable floor anchors where specified, shim shall be used under jambs. The frame shall be checked for squareness, alignment,

twist etc. with carpenter's bevel and plumb.
A tie rod shall be fixed to the frame during installation to ensure the correct dimensions between the frame rebated and the same may be removed after installation as per instructions of the Engineer – in - charge.

4.2.2 Door Shutters

The shutter shall then be fixed to the frame which has already been installed. The shutter shall be aligned so as to match the hardware to the cutouts in the frame.

5.0 MTC (Manufacturer's Test Certificate) for Fire rated Door:

The Contractor shall ensure and arrange MTC for the Fire rated Door conforming to IS: 3614 Part-II 1992 and MTC report of the approved lab shall be submitted for its approval by Engineer – in - charge.

6. FLOORING

(i) All flooring, skirting, dado and window sill works shall be done in accordance with CPWD Specifications, 2019 Volume-1 and Volume-II with upto date correction slips as on last date of submission of Bid. The provision of BIS Codes listed in CPWD Specifications shall form a part of this document with all latest codes.

(ii) Whenever flooring is to be done in patterns of tiles and stones, the Contractor shall get samples of each pattern laid and approved by the Engineer-in-charge before final laying of such flooring. Nothing extra shall be payable on this account.

(iii) Different stones / tiles used in pattern flooring, skirting, dado and window sill work shall be executed as defined in the Schedule of finishes, floor finishing layouts and Detailed Architectural Drawings. Contractor needs to refer room data sheet / schedule of finishes and material palette attached with Bid document. Nothing extra for laying pattern flooring shall be paid over and above the quoted rate. No additional wastage, if any, shall be accounted for any extra payment.

(iv) Samples of flooring stones/ Tile (Kota/ Marble/ Granite/ Ceramic tiles/ Vitrified tiles etc.) shall be brought to site well in advance for approval of the Engineer-in-charge. The sizes of stones for flooring shall be of size mentioned in Schedule of finishes & Detailed Architectural Drawings or as approved by Engineer-in-charge. Approved samples should be kept at site with the Engineer-in-charge and the same shall not be removed except with the written permission of Engineer-in-charge. No payment whatsoever shall be made for these samples.

(v) The Marble/ Kota/ Granite or any other stone shall be fully supported by the details establishing the quarry and its location or source.

(vi) The marble / Kota stone flooring in treads and risers of staircase is to be laid in single piece.

(vii) The rate of items of flooring is inclusive of Providing Sunken Flooring in Bathrooms, Kitchen, W.C., etc. and nothing extra on this account is admissible.

(viii) Chasing of required width and thickness shall be made in brick work at skirting location so as to flush the external surface of skirting with internal plastering. No extra payment towards making chases in brick work at skirting shall be made.

(ix) Proper gradient shall be given to flooring for toilets, verandah, kitchen, courtyard etc. so that the wash water flows towards the direction of floor trap. Any reverse slope if found, shall be made good by the Contractor by dismantling the defective floor/grading concrete and nothing shall be paid for such rectifications.

(x) The flooring and skirting will be executed as per pattern shown in the Architectural drawings and as per approval of Engineer-in-charge and nothing extra shall be payable on this account.

(xi) The rate shall include the cost of all materials and labour involved in all the operations. Nothing extra shall be paid for use of cut/sawn stone/ tiles in the work

(xii) Contractor shall need to protect the finished floor surface during execution of other activities using Cello or approved equivalent bubble guard of minimum 500 gsm thick (minimum size 2400 x1200 mm), fixing the same over floor surface with mastic tape or another approved adhesive. The protective layer shall be removed and cleared of all debris out of site including cleaning the entire covered flooring area at the time of handing over as directed by the Engineer-in-charge.

(xiii) Stone for Window Sills should be of approved finish/quality as mentioned in Schedule of finishes & Detailed Architectural Drawings or as approved by Engineer-in-charge. Stone for sill should be minimum 18mm thick granite stone and all exposed edges of sills shall be chamfered at site, half or full bull nosing with mirror polishing should be at factory and brought to site. All polishing work and laying details for stone work shall beas per CPWD specifications and as directed by Engineer-in-charge.

(xiv) Pattern for any type of flooring / dado shall be as per Detailed Architectural Drawings. The cost of flooring work is inclusive of all material, workmanship, labour, pattern, colour, style, skirting etc. complete. No extra payment shall be made on this account. The joints for all flooring to run in a straight line and should follow as mentioned below:

(a) **For any type of Granite / Kota Stone floor & dado**: min. 3mm (three mm) spacer joints filled with MYK Laticrete SP – 100 or Equivalent approved adhesive as per the Directions of Engineer in Charge

(b) **For any type of Vitrified / Ceramic tile floor & dado**: 3mm spacer joint filled with MYK Laticrete SP – 100 or Equivalent approved adhesive as per the Directions of Engineer in Charge.

(xv) Vitrified / Ceramic Tile Flooring:

(a) The work of Vitrified / Ceramic Tile Flooring, Skirting, Dado and wall lining, in general, shall be done as per CPWD Specifications, 2019 Volume-I & Volume-II with upto date correction slips as on last date of submission of Bid document.

(b) The tiles shall be of approved make and shall generally conform to relevant ISO standards. The Vitrified tiles of specified sizes shall be used and sample of tiles shall be got approved from the Engineer-in-charge. The Mandatory tests for vitrified tiles shall be got done as per CPWD Specifications, 2019 Volume-I & Volume-II with upto date correction slips as on last date of submission of Bid document / relevant BIS Code.

(b) The vitrified/ceramic tiles shall be as specified in the drawing. The tiles shall be of specified colours as shown in the drawings or as approved by Engineer-in-charge and will be laid in pattern as per architectural drawings. Nothing extra shall be paid for laying tiles in specific pattern. The tiles shall be first quality of approved make.

(c) Contractor to obtain prior approval of Engineer-in-charge for tiles make, sizes, shade and colour as per Architectural drawings and material palette before bringing it to site. The tiles shall be laid as specified in the Schedule of Finishes including grouting of joints with pigmented epoxy grouts. Tiles joints shall be as per the pattern provided in Architectural drawings.

(xvi) Grouting:

(a) **All Horizontal and Vertical Joints of the Flooring and Dadoing shall be filled with Grouting** with MYK Laticrete SP – 100 or Equivalent approved adhesive as per the Directions of Engineer in Charge.

a. STONE WORK: -

- The execution of stones work shall be in general as per CPWD

Specifications - 2019 - Vol.I & Vol. II with upto date correction slips.

- All holes, rebates, recesses etc. for providing fixing and inserts shall be predrilled and precut and worked using precision machine tools.
- Samples of each item of stone work either individually or in combination shall be prepared for approval of Engineer-in-Charge before commencement of work.
- Sequence of execution for cladding work shall be submitted by the contractor for approval of Engineer-in-Charge.

Staircase and Entrance Steps, Risers, Ramp at Entrance for Physically challenged:

Stone for Staircase and Entrance Steps, Risers, Ramp at Entrance for Physically challenged shall be in one single piece in approved finish/quality as mentioned in Schedules of finishes, room data sheet document & Detailed Architectural Drawings or as directed by the Engineer-in-charge. All exposed edges of treads shall be chamfered at site, half or full bull nosing with mirror polishing should be carried at factory. All staircase treads or any entry steps shall have three numbers of "V" grooving for anti- slip purpose and brought to site. All polishing work and laying details for stone work shall be as per CPWD specifications, 2019 Volume-I & Volume-II with upto date correction slips as on last date of submission of Bid.

b. <u>Stainless Steel Railing/Handrails:</u>

(i) Th The work of Stainless Steel Railing/Composite Railing /Handrails (weldless), in general, shall be done in accordance with CPWD Specifications, 2019 Volume-1 and Volume-II with upto date correction slips as on last date of submission of Bid.

(ii) The Contractor shall supply all materials, labour, tools, ladders, scaffolding and other equipments necessary for the completion and protection of all stainless steel work.

(iii) All stainless steel pipes and plates shall conform to **SS 304 grade** andthe relevant clauses associated with this grade of steel to be followed.

(iv) Fixing shall be done by stainless steel expansion bolts/dash fastners of approved size and make as directed by Engineer-in-charge and welding to be done by using organ welding rods and the surface being duly finished and cleaned by K2 passivation, which is nitric acid plus floric acid solution treatment by which the chances of corrosion will be eliminated and any burn out marks on the metal will also be eliminated.

(v) All stainless steel material will have to be coated by a solution of Inox to avoid finger in prints and avoidance of settlement of environment / atmospheric dust.

c. WOOD WORK: -

- The wood work in general shall be carried out as per CPWD Specifications - 2019 Vol.I & II with upto date correction slips.
- All fittings and fixtures shall be got approved from the Engineer-in Charge before procurement well in advance and the approved samples shall be kept at site till completion of the work for which nothing extra shall be paid.
- The shape and size of beading shall be as per drawings. The joints of beading shall be mitred.

d. STEEL WORK: -

The Work shall be carried out as per CPWD Specifications – 2019 with all latest correction slips and as per the direction of Engineer in Charge.

e. FINISHING

(i) All finishing works, in general, shall be done in accordance with CPWD Specifications, 2019 Volume-1 and Volume-II with upto date correction slips as on last date of submission of Bid's

(ii) For plastering work PPC may be used.

(iii) All painting material shall have brought to the site of work in the original sealed containers. The material brought to the site of work shall be sufficient for at least 30 days of work. The empty containers shall not be removed from the site till the completion of the work without permission of the Engineer-in-charge.

(iii) Paint Register shall be maintained as per CPWD proforma for periodical verification by the client.

(iv) Contractor needs to refer Detailed Architectural Drawings, elevations, sections (both interior and Architectural related), Schedule of finishes, room data sheet and material palette attached with Bid document for the location and finishing specifications recommended. No deviations in design, pattern, and colour shall be permitted without approval of Engineer-in-charge. Contractor shall provide minimum three samples for each finishing items to Engineer-in-charge for approvals prior to execute the work.

(v) All types of paint, polish, primer to have low VOC content as per the requirement of GRIHA rating.

(vi) All painting finish works will be got done by the Contractor from the approved applicator.

a. Smooth "Exterior Grade" Premium Acrylic Emulsion Paint

This paint shall be done on all exterior building surface, exposed soffits, wherever required as mentioned in Schedules of finishes, room data sheet document & Detailed Architectural Drawings or as directed by the Engineer-in-charge. The work shall be carried out as per CPWD Specifications, 2019 Volume-1 and Volume-II with upto date correction slips as on last date of submission of Bid.

b. Smooth "Interior grade" Premium Acrylic Emulsion Paint

This paint shall be executed on all internal areas as mentioned in Schedules of finishes, room data sheet document & Detailed Architectural Drawings, material palette or as directed by the Engineer-in-charge, in two or more coats of finishing paint, with one primer over one coat of internal putty. Shade and colour of paint shall be as per material palette. The work shall be carried out as per CPWD Specifications, 2019 Volume-1 and Volume-II with upto date correction slips as on last date of submission of Bid. The BIS Codes listed in CPWD specifications 2019 shall form a part of this document with all latest codes.

c. Melamine/ Sprit polish

This Melamine / sprit Polish shall be executed on all internal wood works as specified for like veneer surfaces, any wood door, panels, wall cladding, wooden skirting, wooden door lipping Patti, etc. as mentioned in Schedules of finishes, room data sheet document & Detailed Architectural Drawings, material palette or as directed by the Engineer-in-charge. The work shall be carried out as per CPWD Specifications, 2019 Volume-1 and Volume-II with upto date correction slips as on last date of submission of Bid. The BIS Codes listed in CPWD specifications 2019 shall form a part of this document with all latest codes.

8. INTERNAL SANITARY, WATER SUPPLY AND DRAINAGE WORKS:

(1) accordance with CPWD Specifications, 2019 Volume-1 and Volume-II with upto date correction slips as on last date of submission of Bid.

(2) The entire responsibility for execution of Sanitary, Water Supply and Drainage works including the protection of the sanitary and water supply fittings and other fittings and fixtures against pilferage and breakage during the period of installation and thereafter until the building is handed over,

maintaining highest standard of Quality and Workmanship, shall rest on the Contractor.

(3) The Contractor shall furnish all labour, materials and equipment, transportation and incidental necessary for supply, installation, testing and commissioning of the complete Plumbing / Sanitary system as described in the Specifications and as shown on the drawings. This also includes any material, equipment, appliances and incidental work not specifically mentioned herein or noted on the Drawings/Documents as being furnished or installed, but which are necessary and customary to be performed under this contract. The Plumbing / Sanitary System DBR (Design Basis Report) shall comprise of following:

(a) Sanitary Fixtures and Fittings.

(b) Internal and External Water Supply.

(c) Internal and External Drainage.

(d) Balancing, testing & commissioning.

(e) Test reports and completion drawings.

(4) For the work of water supply and sanitary installations, the Contractor shall engage the approved plumbers and submit the name of proposed plumbing agencies with their credentials for review of the Engineer-in-charge. For quality control & monitoring of workmanship, Contractor shall assign at least one Plumbing Engineer who would be exclusively responsible for ensuring strict quality control, adherence to specifications and ensuring top class workmanship for the installation.

(5) The Scope of work shall include the cost of cutting holes in walls, floors, RCC slabs etc. Wherever required and making good the same for which nothing extra shall be paid.

(6) Providing & fixing CP Brass caps /extension pieces wherever required for CP Brass fixtures shall be done for corresponding CP Brass fittings. Nothing extra shall be paid on this account.

(7) The Contractor shall examine all architectural, structural, plumbing, electrical and other services drawings before starting the work for addressing any discrepancies and obtain clarifications from all stakeholders. Any changes found essential to coordinate installation of his work with other services and trades, shall be made with prior approval of the Engineer-in-charge without additional cost to the department.

(8) The Contractor shall furnish, for the approval of Engineer-in-charge, the two sets of detailed shop drawings of complete work and materials including layouts for Plant room, Pump room, Typical toilets

drawings showing exact location of supports, flanges, bends, tee connections, reducers, detailed piping drawings showing exact location and type of supports, valves, fittings etc; external insulation details for pipe insulation etc.

(9) These shop drawings shall contain all information required to complete the work. These Drawings shall contain details of construction, size, arrangement, operating clearances, performance characteristics and capacity of all items of equipment, also the details of all related items of work by other Contractors. Each shop drawing shall contain tabulation of all measurable items of equipment/materials/works and progressive cumulative totals from other related drawings to arrive at a variation-in-quantity statement at the completion of all shop drawings. Minimum 4 sets of drawings shall be submitted after final approval along with softcopy Hard disk/pen drive. When he makes any amendments in the above drawings, the Contractor shall supply two fresh sets of drawings with the amendments duly incorporated along with check prints, for approval. The Contractor shall submit further four sets of shop drawings to the Engineer-in-charge for the exclusive use by the Engineer-in-charge and all other agencies. No material or equipment may be delivered or installed at the job site until the Contractor has in his possession, the approved shop drawing for the particular material/equipment / installation.

(10) Shop drawings shall be submitted for approval four weeks in advance of planned delivery and installation of any material to allow the Engineer-in-charge In-Charge ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce shop drawings at the right time, in accordance with the approved programme.

(11) Samples of all materials like valves, pipes and fittings etc. shall be submitted to the Engineer-in-charge prior to procurement for approval and retention by Engineer-in-charge In-Charge and shall be kept in their site office for reference and verification till the completion of the Project. Wherever directed a mockup or sample installation shall be carried out for approval before proceeding for further installation without any extra cost.

(12) Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimensions. Where drawings are approved, said approval does not mean that the drawings supersede the contract requirements, nor does it in any way relieve the Contractor of the responsibility or requirement to furnish material and perform work as required by the contract.

(13) All materials and equipment shall conform to the relevant Indian Standards and shall be of the approved make and design. Makes shall be in conformity with list of approved manufacturers as per the Bid document.

(14) Balancing of all water systems and all tests as per for the CPWD Specifications shall be carried out by the Contractor through a specialist group, in accordance with the Specifications and Standards. The installation shall be tested and shall be commissioned only after approval by the Engineer-in-charge In-Charge. All tests shall be carried out in the presence of the representatives of the Engineer-in- charge and nothing extra shall be payable on this account.

(15) The Contractor shall submit completion plans for water supply, internal sanitary installations and building drainage work as specified in the GCC. These drawings shall be submitted in the form of two sets of hard disk/pen drive and four portfolios (300 x 450 mm) each containing complete set of drawings on approved scale indicating the work as installed. These drawings shall clearly indicate complete plant room layouts, piping layouts and sequencing of automatic controls, location of all concealed piping, valves, controls and other services. In case, the Contractor fails to submit the completion plans as aforesaid, security deposit shall not be released and these shall be got prepared at his risk and cost.

(16) The CCI/CI/PVC pipe and GI pipe etc. wherever necessary, shall be fixed to RCC columns, beams etc. with rawl plugs and nothing extra shall be paid for this.

(17) The variation in consumption of material shall be governed as per CPWD specification and clauses of the contract to the extent applicable.

(18) The Contractor shall bear all incidental charges for cartage, storage and safe custody of materials and shall construct suitable godowns, yards at the site of work for storing materials so as to be safe against damage by sun, rain, fire or theft etc., at his own cost and also employ necessary watch and ward establishment for the purpose at his own cost.

(19) All 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 Finishes, specifications, elsewhere in this Bid document & drawings. The quoted rates shall be deemed to be all inclusive for a complete item fit for use including all materials, Labour, T&P, specials, equipment, testing & commissioning etc. Accessories shall include proper fixing arrangement, brackets, nuts, bolts, screws and required connection pieces. Nothing extra whatsoever shall be payable on this account.

(20) Fixing screws shall be half round head chromium plated brass screws with C.P. washers where necessary or otherwise as provided in the item.

(21) Porcelain sanitary ware shall be glazed vitreous china of first quality free from warps, cracks and glazing defects and shall conform to

relevant BIS codes. Colour of sanitary ware, shall be specified or as selected by the Engineer-in-charge. Nothing extra shall be payable on this account.

(22) Horizontal pipes running along ceiling shall be fixed on structural adjustable clamps of approved design. Horizontal pipes shall be laid to uniform slope and the clamps adjusted to the proper levels so that the pipes fully rest on them and are properly secured.

(23) Contractor shall provide all nuts, bolts, welding material and paint the Clamps with one coat of red oxide and two or more coats of black enamel paint.

(24) Slotted angle/channel supports on walls shall be provided wherever shown on drawings. Angles/channels shall be of sizes shown on drawings or specified in schedule of quantities. Angles/channels shall be fixed to brick walls with bolts embedded in cement concrete blocks and to RCC walls with suitable anchor fasteners. The spacing of support bolts horizontally shall not exceed 1 m.

(25) Wherever M.S. clamps are required to be anchored directly to brick walls, concrete slabs, beams or columns, nothing extra shall be payable for clamping arrangement and making good with cement concrete 1:2:4 mix (1 cement: 2 coarse sand: 4 stone aggregate 20mm nominal size) or as directed by the Engineer-in-charge.

(26) The ground Colour shall be applied throughout the entire length of pipe. Colour bands shall be superimposed on the ground Colour and shall be applied near valves, junctions, joints, service appliances, bulkheads, valves, etc. for clear identification of fluid being carried and to avoid confusion. The relative proportional widths of the first Colour band to the subsequent bands shall be 4:1. The minimum width of the narrowest Colour band shall be 25 mm.

(27) Rates for all items quoted shall be inclusive of all work and items given in the above mentioned specifications and Schedule of finishes and applicable for the work under floors, in shafts or at ceiling level at all heights and depths. All rates are inclusive of cutting holes and chases in RCC and masonry work and making good the same. All rates are inclusive of pre-testing and on site testing of the installations, materials and commissioning.

(28) Cleaning and Disinfection of Pipelines: -

On completion of hydraulic tests and before a pipe is disinfected, it shall be proved to be free from obstruction, debris and sediment by scouring or by any other process which the Engineer-in-charge may prescribe. Upon satisfactory completion of testing and cleaning, the pipelines shall be disinfected as ordered. Chlorine solution shall be applied at the charging

point as the pipeline is being filled and dosing shall be continued until the pipeline is full and at least 50 parts of chlorine per million parts of water have been made available and distributed evenly. If ordinary bleaching power is used, proportions will 150 gms of power to 1000 litre of water. If a proprietary brand is used, the proportion shall be as specified by the manufacturer. The treated water shall be left in pipeline for a period as directed but not exceeding 24 hours' chlorine residual tests shall be taken at various points along the pipeline. The disinfection process shall be repeated until the sample of water taken from the pipeline are declared fit for human consumption by a recognized laboratory.

(29) Opening, cut out in slabs, beams as required shall be left out by inserting PVC spouts of required size before casting of RCC members. Nothing extra shall be paid on this account.

General Requirements:

(i) All materials, sanitary fixtures and fittings shall be new and of best quality confirming to CPWD specification and subject to the approval of Engineer-in-charge. Wherever particular makes are mentioned, the choice of selection shall remain with the Engineer-in-charge.

(ii) Chromium plated fittings shall be cast brass chromium plated of the best quality approved by Engineer-in-charge.

(iii) All Appliances, fittings and fixtures shall be fixed in a neat workman like manner true to level and heights shown on the drawings and in accordance with the manufacturer's recommendations. Care shall be taken to fix all inlet and outlet pipes at correct positions at proper location and height. Faulty locations shall be made good and any damage to the finished floor, plaster, paint, insulation shall be made good by the Contractor at his own cost.

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

(a) 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).

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

(c) All appliances shall be securely fixed. Manufacturers' brackets and fixing methods shall be used wherever possible. Compatible rust- proofed fixings shall be used. Fixing shall be done in a manner that minimizes noise transmission.

(d) Pipe connections shall be made with demountable unions. Pipe work shall not be fixed in a manner that it supports or partially supports an appliance.

(e) Appliances shall be fixed so that water falls to the outlet.

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

(v) Sizes of Sanitary fixtures given in CPWD specifications or in the Drawings are for identification with reference to the catalogues of makes considered. Dimensions of similar models of other makes if allowed may vary the dimensions and the similar and equivalent as approved by EinC shall be provided and no claim for extra payment shall be entertained nor shall any payment bededucted on this account.

Sanitary Fixtures

(i) WC, Urinal, wash basins, faucet, toilet paper holder, soap dispenser, coat hook, grab bars etc. shall be of premium quality of approved make, as mentioned in Schedules of finishes, data sheet document & Detailed Architectural Drawings, material palette or as directed by the Engineer-in-charge considering requirement of space, location complete in all respects including accessories, labour, workmanship etc.

(ii) Colour, shade, shape, size shall be as decided by the Engineer-in- charge.

(iii) All appliances, fixtures and fittings shall be tested before and after installation. Water seals of all appliances shall be tested.

Internal Drainage

(i) Internal drainage shall be designed by the Contractor and got approved by Engineer-in-charge. The Contractor has to associate specialized agency. Who has executed and designed internal drainage system, the shop drawings layout plans.

(ii) Work under this section shall consist of providing and fixing all labour, materials, equipment's and appliances necessary and required to completely install all soil, waste, vent, rain water pipes and fittings as per relevant BIS code and CPWD specification.

(iii) Without restricting to the generality of the foregoing, the soil, waste, vent, rain water pipe system shall include the following:

(a) Soil, waste and vent pipes, Vertical and Horizontal and fittings, joints, clamps and connection to sewer line as shown in the drawings at

Ground Floor level.

(b) Floor and Urinal traps, Cleanout plugs and inlet fittings.

(c) Waste pipe connection from all fixtures i.e., wash basins, sinks, urinals and plant room equipment.

(d) Rain water pipes & fitting (Terrace Rain Water and Balcony Drain).

(e) All pipe fittings exposed on wall shall be painted with two or more coat of desired shade and Colour. All sanitary fittings, hanger where no sunken floor is provided.

(f) Testing of all pipes shall be as per relevant codes.

(iv)The scope also include access doors/opening for clean out, accessible for maintenance including MS ladder, platform etc. at suitable locations with primer and painting complete.

Soil, Waste, Vent and Rain Water Pipe System:

(i) The soil, waste system above ground has to be planned as "Two Stack System" [Double Stack System] as defined in IS: 5329 having separate pipes for waste from wash basins, showers, bath tub, sinks, Floor drains, AHUs, condensate drain and separate pipe for soil discharge. All piping work shall be executed as per CPWD Specification, 2019 Vol. I & Vol. II with up to date corrections with as on last date of submission of Bid, and shall be got tested

(ii) POLYPROPYLENE RANDOM CO-POLYMER (PP-R) PIPES

(a) All Soil, waste, vent, anti-siphonage, rain water pipes, fittings and accessories like P-traps, bends, elbows, Y/Tees, swept tees etc., of required diameter as per design shall Polypropylene Random Co-Polymer (PP-R) Pipes.

(b) The execution of work shall be in general as per CPWD Specifications - 2019 - Vol.I & Vol. II with up to date correction slips.

(c) All pipes shall be straight and smooth and their inside free from irregular bore, blow holes, cracks and other manufacturing defects.

(d) All vertical stacks shall be 100 mm away from the wall by providing adjustable clamps/angle etc. whichever required.

(e) All pipe supports and clamps shall be as per specifications and recommendations of the manufacturer.

Water Supply work:

(i) Work under this section consists of providing and fixing, pipes and fittings all Labour, materials equipment and appliances necessary and required for

water supply system (Domestic Water Supply (Internal) + Flushing Water Supply (Internal) as required as per design and water supply system. The Contractor shall submit plan of water supply distribution system of the building both internal and external in accordance with relevant BIS Code and duly approved by Engineer-in-charge.

(ii) Without restricting to the generality of the foregoing, the water supply system shall include the following:

(a) Pumping supply from Domestic / Flushing/ RO/ Soft Water/ Irrigation/Water/ Under Ground Tank to all fixtures/appliances.

(b) Connections to all fixtures etc.

I. Ball valve/butterfly valve/Non Return valve/Pressure Reducing Valve/Water Meter.

a. All supports made of galvanized iron.

b. All concealed pipes fittings bend for water supply shall be of CPVC of appropriate grade of required diameter as per drawing & design. The scope includes smooth flow of water supply pipes with equitable and proper distribution of pressure.

II. Valves and other accessories shall be located as to provide easy accessibility for operations, maintenance and repairs.

III. Pipe shall be securely fixed to wall and ceiling by suitable and adjustable clamps at intervals specified.

(iii) **CHLORINATED POLYVINYL CHLORIDE (CPVC) PIPES**

(a) CPVC pipes & fittings used in hot & cold potable water distribution system shall conform to requirement of IS 15778. The material from which the pipe is produced shall consist of chlorinated polyvinyl chlorides. The polymer from which the pipe compounds are to be manufactured shall have chlorine content not less 66.5%

(b) 66.5%. chlorine content CPVC Pipes including Fittings and Valves shall be provided as mentioned in Schedules of finishes, room data sheet document & Detailed as per Architectural Drawings, material palette or as directed by the Engineer-in-charge.

(c) All pipes inside the buildings and outside the building shall be CPVC Pipes conforming to IS: 15778.

(d) Fittings shall be of malleable galvanized iron of approved make. Each fitting shall have manufacturer's trade mark stamped on it. Fittings for G.I pipes shall include couplings, bends, tees, reducers, nipples, unions, bushes etc. Fittings etc. shall conform to IS: 1879. (Part 1 to

X) 1987.

(e) All excavation, trenching, painting, sand filling, pipe protection and pipe installation shall be as per CPWD specifications and directions of Engineer-in-charge.

(iv) Pipe Support: Steel Wire Rope Hangers & Supports:

(a) Wire Hangers shall be used to suspend all static HVAC & Mechanical services. Wire Hangers should consist of a pre-formed wire rope sling with a range of end fixings to fit various substrates and service fixings, these include a ferruled loop, permanently fixed threaded M6 (or M8, M10, M12) stud, permanently fixed nipple end with toggle, at one end or hook or eyelet, cladding hook, barrel, wedge anchor, eyebolt anchor or any other end fixture type or size as per manufacturer's recommendation and design. The end fixings and the wire must be from the same manufacturer with several options available. The system should be secured and tensioned with a Hanger self-locking double channel grip at the other end. Once the grip is locked for safety purpose, unlocking should only be done by using a separate setting key and should not be an integral part of the self- locking grip. Only wire and/or supports supplied and/or approved, shall be used with the system.

(b) Wire Hangers should have been independently tested by Lloyds Register. APAVE, TUV, UL, CSA, Chiltern International fire, ADCAS,

Intertek, ECA, and SMACNA, approved by ULC and CSA and comply with the requirements of DW/144 and BSRIA - wire Rope Suspension systems. Wire rope should be manufactured conforming to BSEN 12385: 2002

(c) The Contractor shall select the correct specification of wire hanger to use for supporting each particular service as directed by Engineer- in-charge. Each size is designated with a maximum safe working load limit (which incorporates a 5:1 safety factor).

(d) The correct specification of wire hanger required is determinedusing the following formula:

(1) Weight per metre of object suspended (kg) X distance between suspension points (m) = weight loading per Hanger suspension point (kg).

(2) Where the installed wire rope is not vertical then the working load limit shall be reduced in accordance with the recommendations give in the manufacturer's handbook.

(3) The Contractor shall select the correct length of wire rope required to support the service. Specials can be made, check with manufacturer. No in–line joints should be made in the rope.

(v) Ball Valves:

All ball valves shall be heavy duty of approved make. Valves shall withstand

test pressure of 25 Kg/Sq. cm. Ball valves shall conform to the following specifications.

Size	Construction	Ends
15 to 50 mm	Bronze body S.S. Working Part stainless steel balls, spindle, Teflon seating and gland packing, steel handle (to BS 5351).	Screwed

(vi) Butterfly Valve:

(a) All butterfly valves shall be heavy duty cast iron of approved make. The valves shall be suitable for 15 Kg/Sqcm test pressure and shall conform to the following specifications Butterfly valve shall be of best quality conforming to IS: 13095:

(b) Butterfly Valves shall be of cast iron body with following details:

(1) Disc shall be CI heavy duty electrolysis nickel plated abrasion resistant.
(2) The shaft shall be of EN-8 Carbon Steel with low friction nylon bearings.
(3) The seat shall be drop tight constructed by bonding resilient elastomer inside a rigid backing.
(4) Built in flanged rubber seals.
(5) Actuator to level operated for valves above ground and T Key operated for valves below ground.
(6) Built in flanges for screwed on flanged connections.
(7) Manufacturer's details on fixing and installation will be followed.

(vii) Ductile Iron (DI) Pipe:

(a) Ductile Iron (DI) Pipe shall be provided as mentioned in Schedules of finishes, room data sheet document and Detailed Architectural Drawings, material palette or as directed by the Engineer-in-charge.

(b) Pipe laid in ground for water supply of municipal connection shall be laid in trenches/underground, shall be of DI class K-9 of required dia and size as per drawing/design including trenching necessary fittings like union, collar, bends and tees with appropriate joints. The technical specification of ductile iron pipe conform to Indian standard IS: 8329-1994, IS: 2531-1998 and EN: 545-1994

(c) The ductile iron pipe shall be strong, both inner & outer surfaces shall be smooth, free from lumps, cracks, blister and scars.

(d) The ductile iron pipe shall be lined with cement mortar in the manufacturing unit by centrifugal process.

(e) The ductile iron fitting shall conform to IS: 9523-1980.

(f) The joints for ductile iron pipe shall be suitable for rubber gasket conforming to IS :5383

(g) Laying and jointing shall be similar to cast iron pipes.

(h) The test pressure shall be 1.5 times the maximum sustained operating pressure and the test pressure shall be as per IS: 8329-1994

(i) Slotted angles/ channels shall be measured per linear metre of finished length and shall include support bolts and nuts, length embedded in the cement concrete blocks of 1:2:4 (1cement:2coarse sand:4 stone aggregate 20mm nominal size) formed in the masonry walls. Nothing extra shall be paid for the cement concrete block and making good the masonry walls, anchor fasteners etc. complete.

(viii) Non-Return Valves:

All non-return valves shall be provided as mentioned in Schedules of finishes, room data sheet document and Detailed Architectural Drawings, material palette or as directed by the Engineer-in-charge, conforming to relevant Indian Standards and in accordance with the following specifications. Non-return valves shall be of approved make.

Size	Construction	Ends
Up to 50 mm.	Gun metal	Screwed
65 mm and above	Gun metal/cast iron	Flanged

(ix) Technical Specification of Pressure Reducing Valve:

(a) Pressure Reducing Valves shall be provided as mentioned in Schedules of finishes, room data sheet document and Detailed Architectural Drawings, material palette or as directed by the Engineer-in-charge.

(b) Pressure Reducing Valve in brass housing (DZR) with G¼ "pressure gauge connection part, spring bonnet with adjustable opening having adjustable knob for pressure adjustments. The diaphragm shall be in fiber-reinforced NBR and seals in NBR. The adjustment spring shall not be in touch with water at any given time.

9.0 DEVELOPMENT WORKS AND BULK SERVICES

- **External Sewerage System:**

(i) Planning, Designing and Construction of Sewerage systems consisting of 150mm/200mm/250mm/300mm/ 350mm/ 400mm/450mm dia NP2 RCC Pipes of spigot and socket ends including Manholes of required size, shape and depth complete as per approved drawings and layout of the campus etc. by preparation of preliminary and detailed working drawings, structural analysis and design, planning, designing and execution of all services by incorporating stipulated specifications and integrating all services with External Developmental works all complete as per directions of Engineer-in- Charge based on the drawings enclosed in the Bid document as applicable for this work.

(ii) Planning, Designing and Construction of all cross drainage works that falls within the alignment of the Sewerage systems as per approved layout plan of the campus, which are essential and necessary to keep the Sewerage systems in position as per the approved layout.

(iii) The invert level of Sewerage systems shall be as per approved design keeping minimum gradient for self-cleaning velocity.

(iv) Necessary Manholes/inspection/ intercepting chambers shall also be included in the scope wherever required as per approved drawing.

(v) The cutting, supply and filling of earth to maintain levels of ground in position as per the approved layout plan shall be considered as included in the scope of work and nothing extra shall be paid on this account.

(vi) The Contractor shall take adequate protective measures to see that the excavation operations do not damage the adjoining structures or dislocate the services. Water supply pipes, sluice valve chambers, existing sewerage pipes, manholes, drainage pipes and chambers, communication cables, power supply cables etc. met during the course of excavation shall be properly supported and adequately protected, so that these services remain functional.

However, if any service is damaged during excavation, it shall be restored in a reasonable time.

(vii) The detailed Specifications mentioned below are indicative only. The items, that are necessary to complete the scope of said work but not mentioned below, shall be considered as included in the quoted rate and nothing extra shall be payable.

- **Detailed Specification for Sewerage System:**

1. The Contractor has to plan, design, prepare the drawings for Sewerage System and get the same approved from Engineer – In –Charge before execution.

2. The Sewerage lines of ancillary buildings shall be considered in buildings up to and including first manhole.

3. Garbage shall not be directly discharged in the Sewerage System. For garbage, a separate storage bin shall be provided.

4. This item is operated from the first manhole of the buildings to the Sewage Treatment Plant which includes the following operations.

   (a) Excavation of trench for laying Pipes and refilling after laying pipes as per CPWD specifications.
   (b) Earth excavation for Manholes and refilling after construction.
   (c) Providing, Laying and fixing NP2 pipe line of various diameters for sewage disposal over M – 15 grade PCC bed of 100 mm thick as per approved design and drawing by the Engineer-in-charge.
   (d) Constructing Manholes, drop manholes of required size (shape based on depth as per invert levels, gradient and interval) etc., as per CPWD specifications including construction of gully trap including plastering on external surface of all manholes and chambers, making connection from and to the manholes wherever required.
   (e) Disposal of building rubbish or malba or excess earth received from cutting/filling including unserviceable, dismantled or waste material by mechanical means including loading, transporting, unloading to approved municipal dumping ground or as approved by Engineer-in-charge for all leads and lifts involved.

- **Filtered Water Supply Network:**

(i) Planning, Designing and Construction of Filtered Water Supply network consisting Water Supply main, branch and distribution lines consisting of 25/32/40/50/65/80mm dia CPVC pipes and peripheral grid of appropriate dia DI Pipes including chambers and fittings/specials such as Tees, Bends, collars, Unions, tappers, caps, Sluice Valves, Gate Valves, scour valves, non-return valves, air-relief valves, thrust blocks etc. as per approved drawing by preparation of preliminary and detailed working drawings, structural analysis & design, planning, designing and execution of all services by incorporating stipulated specifications and integrating all services with other Developmental works all complete as per directions of Engineer-in-Charge based on the drawings enclosed in the Bid document applicable for this work.

(ii) Planning, Designing and Construction of all cross drainage works that falls within the alignment of the Filtered water supply network as per approved layout plan of the campus, which are essential and necessary to keep the Filtered water supply network in position as per the approved layout.

(iii) Necessary inspection chambers are also be included in the scope wherever required as per approved drawing.

(iv) The cutting, supply and filling of earth to maintain levels of ground in position as per the approved layout plan shall be considered as included in the scope of work and nothing extra shall be paid on this account.

(v) The detailed Specifications mentioned below are indicative only. The items, that are necessary to complete the scope of said work but not mentioned below, shall be considered as included in the quoted rate and nothing extra shall be payable.

- **Detailed Specification for Filtered Water Supply Network:**

a) The water supply network should cater to the needs of supplying water from RCC UG Sump to RCC Terrace Water Storage Tanks and from there to both "proposed" and "existing" school buildings. The system shall consist of peripheral grid running in the entire campus from RCC Terrace Water Storage Tanks from which distribution feeding system upto individual buildings will take off.

b) The Contractor has to plan, design, prepare the drawings for Water Supply System and get the same approved from Engineer — in — Charge before execution.

c) Excavation of trench for laying Pipes and refilling after laying pipes as per CPWD specifications.

d) Earth work excavation for chambers, D.I. Specials, valves, thrust blocks etc. and refilling after construction/ laying.

e) Providing and laying Ductile Iron Pipe line with push joint from RCC Terrace Water Storage Tank outlet to make outer main grid with alround campus as per the approved drawing along with specials like Tees, Bends, sockets, Tappers, sluice valves, scour valves, Air relief valves, Non return valves, Thrust blocks etc.

f) Providing and laying Ductile Iron Pipe line with push joint from RCC UG Sump to RCC Terrace Water Storage Tank as per the approved drawing along with specials like Tees, Bends, sockets, Tappers, sluice valves, scour valves, Air relief valves, Non return valves, Thrust blocks etc.

g) Construction of chamber for sluice valves, scour valves, Air relief valves, Non return valves shall be as per CPWD specification and as per approved drawing.

h) All buildings are to be connected with nearest water supply lines by CPVC pipes of dia 80 mm and 50 mm so that water supply should be made to the building along with fittings, Gun metal gate valves, Gun metal non return valves, masonry chambers for valves, including excavation, providing sand alround and refilling after laying etc.

i) All pipe work shall be so designed, laid or fixed, and maintained so that it remains completely watertight, thereby avoiding wastage of water, damage to property and the risk of contamination of the water is eliminated.

j) The design of the pipe work shall be such that there is no possibility of backflow towards the source of supply from any cistern or appliance whether by siphonage or otherwise, and reflux or non- return valves shall not be relied upon to prevent such back flow.

k) There shall, therefore, be no cross connection whatsoever

between a pipe or fitting for conveying or containing wholesome water and a pipe or fitting for conveying or containing impure water or water liable to contamination or of uncertain quality of water which has been used for any purpose. The provision of reflux or non-return valves or closed and sealed valves shall not be construed a permissible substitute for complete absence of cross-connection.

- **Unfiltered Water Supply Network:**

1. Planning Designing and Construction of Unfiltered water supply network distribution lines as per approved drawing by preparation of preliminary and detailed working drawings, structural analysis and design, planning, designing and execution of all services by incorporating stipulated specifications and integrating all services with other Developmental works all complete as per directions of Engineer-in-Charge based on the drawings enclosed in the Bid document applicable for this work.
2. Planning Designing and Construction of all cross drainage works that falls within the alignment of the Unfiltered water supply network as per approved layout plan of the campus, which are essential and necessary to keep the Unfiltered Water Supply Network in position as per the approved layout.
3. The cutting, supply and filling of earth to maintain levels of ground in position as per the approved layout plan shall be considered as included in the scope of work and nothing extra shall be paid on this account.
4. The length of water supply line shall be measured nearer to centimeter for Payment.
5. The detailed Specifications mentioned below are indicative only. The items, that are necessary to complete the scope of said work but not mentioned below, shall be considered as included in the quoted rate and nothing extra shall be payable.

- **Detailed Specification for Unfiltered water supply network:**

a) Providing and laying treated water supply (from STP) grid around campus with suitable dia CPVC pipe of schedule 80 and branches with 40mm dia CPVC pipe of SDR 11 along

with fittings, Gun metal gate valves, Gun metal non return valves, masonry chambers for valves, including excavation, providing sand alround and refilling after laying etc. complete for horticulture and flushing purpose and to fill artificial pond (Water body) created in the campus.

b) The Contractor has to plan, design, prepare the drawings for water supply system and get the same approved from Engineer — in — Charge before execution.

c) Excavation of trench for laying Pipes and refilling after lying pipes as per CPWD specifications.

d) All buildings are to be connected with nearest unfiltered water supply lines by CPVC of schedule 80 pipes of dia 80 mm and 50 mm so that unfiltered water supply should be made to the dual plumbing system of building along with fittings, Gun metal gate valves, Gun metal non return valves, masonry chambers for valves, including excavation, providing sand alround and refilling after laying etc.

e) All pipe work shall be so designed, laid or fixed, and maintained so that it remains completely watertight, thereby avoiding wastage of water, damage to property and the risk of contamination of the water is eliminated.

f) The design of the pipe work shall be such that there is no possibility of backflow towards the source of supply from any cistern or appliance whether by siphonage or otherwise, and reflux or non-return valves shall not be relied upon to prevent such back flow.

g) There shall, therefore, be no cross connection whatsoever between a pipe or fitting for conveying or containing wholesome water and a pipe or fitting for conveying or containing impure water or water liable to contamination or of uncertain quality of water which has been used for any purpose. The provision of reflux or non-return valves or closed and sealed valves shall not be construed a permissible substitute for complete absence of cross-connection.

- **Storm Water Drains:**

1. Planning, Designing and Construction of RCC Storm water drain as per approved drawings and layout of the campus etc., by preparation of preliminary and detailed working drawings, structural analysis and design, planning, designing and execution of all services by incorporating stipulated specifications and integrating all services with External Developmental works all complete as per directions of Engineer-in-Charge based on the drawings enclosed in the Bid document applicable for this work. The drains are to be connected to the rain water harvesting sump/pits or municipal storm water drains/outfalls.
2. Planning, Designing and Construction of all cross drainage works that falls within the alignment of the Storm water drain as per approved layout plan of the campus, which are essential and necessary to keep the Storm water drain in position as per the approved layout.
3. The minimum width of drain shall be 300mm. However, sizes of drain shall be followed as per approved design. The invert level of drain shall be as per approved design keeping minimum gradient of self- cleaning velocity. The bottom surface of inside drain shall have 50mm benching.
4. Necessary inspection/ intercepting chambers shall also be included in the scope wherever required as per approved drawing.
5. The cutting, supply and back filling of earth to maintain levels of ground in position as per the approved layout plan shall be considered as included in the scope of work and nothing extra shall be paid on this account.
6. The Contractor shall take adequate protective measures to see that the excavation operations do not damage the adjoining structures or dislocate the services. Water supply pipes, sluice valve chambers, existing sewerage pipes, manholes, drainage pipes and chambers, communication cables, power supply cables etc. met within the course of excavation shall be properly supported and adequately protected, so that these services remain functional. However, if any service is damaged during excavation shall be restored in reasonable time.
7. The detailed Specifications mentioned below are indicative only. The items, that are necessary to complete the scope of said work but not mentioned below, shall be considered as

included in the quoted rate and nothing extra shall be payable.

- **Detailed Specification for Storm Water Drain:**

a) Earth work in excavation in all kind of soil by mechanical means (Hydraulic excavator) / manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as per direction of Engineer in charge.

b) Providing and laying or more as per design in position cement concrete including the cost of centering and shuttering.

c) Providing and laying in position RCC storm water drain in cement concrete including the cost of centering, shuttering, finishing, transportation, laying and fixing in position with Cement mortar of 1:3 as per approved design, drawings.

d) The bottom portion of inner surface of drain shall have 50mm thick benching in CC 1:2:4 in required slop with floating coat of neat cement punning.

e) Providing and fixing RCC perforated drain covers of appropriate size as per design with necessary reinforcement complete, all as per direction of Engineer-in-charge.

f) However, in curves, bends etc. or in places where it is difficult to go for precast sections, Contractor is permitted to use brick work for which nothing extra is payable.

g) Disposal of building rubbish or malba or excess earth received from cutting/filling including unserviceable, dismantled or waste material by mechanical means including loading, transporting, unloading to approved municipal dumping ground or as approved by Engineer-in-charge for all leads and lifts involved.

- **Utility Ducts / Service Trenches:**

1. Planning, Designing and Construction of RCC Service

trenches of various sizes, as per approved drawings and layout of the campus etc. by preparation of preliminary and detailed working drawings, structural analysis and design, planning, and execution of all services including chilled water supply and return insulated pipe grid, Low Voltage (LV) cables etc. by incorporating stipulated specifications and integrating all services with other Developmental works all complete as per directions of Engineer-in-Charge based on the drawings enclosed in the Bid document applicable for this work.

2. Planning, Designing and Construction of all cross drainage works that falls within the alignment of the Service trench as per approved layout plan of the campus, which are essential and necessary to keep the Service trench in position as per the approved layout.
3. The minimum width of trench shall vary from 3.00 m to 4.50 m However, sizes of trench shall be followed as per approved design. Provision shall be made in the design to separate and dispose the rain water, collected if any, to keep away from the service lines. The service lines like cables, pipes etc., shall run on the sides of trench with suitable supporting system like structural steel brackets, but not directly on the side walls.
4. Necessary inspection/ intercepting chambers/ Junctions shall also be included in the scope wherever required as per approved drawing.
5. The cutting, supply and back filling of earth to maintain the Service trench levels in position as per the approved layout plan shall be considered as included in the scope of work and nothing extra shall be paid on this account.
6. The Contractor shall take adequate protective measures to see that the excavation operations do not damage the adjoining structures or dislocate the services. Water supply pipes, sluice valve chambers, existing sewerage pipes, manholes, drainage pipes and chambers, communication cables, power supply cables etc. met within the course of excavation shall be properly supported and adequately protected, so that these services remain functional. However, if any service is damaged during excavation, it shall be restored in reasonable time.
7. The detailed Specifications mentioned below are indicative

only. The items, that are necessary to complete the scope of said work but not mentioned below, shall be considered as included in the quoted rate and nothing extra shall be payable.

- **Detailed Specification of trenches for Services:**

a) Earth work in excavation in all kind of soil by mechanical means (Hydraulic excavator) / manual means in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift up to 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as per direction of Engineer in charge.

b) Providing and laying as per design in position cement concrete of including the cost of centering and shuttering.

c) Providing and laying in position RCC storm water drain in cement concrete of including the cost of centering, shuttering, finishing, transportation, laying and fixing in position with Cement mortar of 1:3 as per approved design, drawings.

d) Reinforced cement concrete work as per design Factory made cover on service trench including the cost of centering, shuttering, finishing and reinforcement, with 6 mm cement plaster in 1:3 (1 cement: 3 coarse sand) on RCC surface.

e) Structural steel work in single section, fixed to the fly ash brick side wall of service trench to support cables, pipes etc. including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete.

f) Disposal of building rubbish or malba or excess earth received from cutting/filling including unserviceable, dismantled or waste material by mechanical means including loading, transporting, unloading to approved municipal dumping ground or as approved by Engineer-in-charge for all leads and lifts involved.

- **Fire Tender Paths:**

1. Planning, Designing and Construction of **Fire tender path**

as per approved drawings and layout of the campus along with Kerb etc. by preparation of preliminary and detailed working drawings, structural analysis and design, planning, designing and execution of all services by incorporating stipulated specifications and integrating all services with External Developmental works all complete as per directions of Engineer-in-Charge based on the drawings enclosed in the Bid document applicable for this work.

2. Planning, Designing and Construction of all cross drainage works that falls within the alignment of the roads as per approved layout plan of the campus, which are essential and necessary to keep the roads in position as per the approved layout.
3. The cutting, supply and filling of earth to maintain the road levels in position as per the approved layout plan shall be considered as included in the scope of work and nothing extra shall be paid on this account.
4. The detailed Specifications mentioned below are indicative only. The items, that are necessary to complete the scope of said work but not mentioned below, shall be considered as included in the quoted rate and nothing extra shall be payable.

- **<u>Detailed Specification for Fire tender path:</u>**
  a) Earth work in surface excavation in all kind of soil not exceeding 30 cm in depth but exceeding 1.5 m in width as well as 10 sqm on plan including getting out and disposal of excavated earth as directed by Engineer-in- Charge.
  b) Preparation and consolidation of sub grade with power road roller of 8 to 12 tone capacity, dressing to camber and consolidating with road roller including making good the undulation and re-rolling the sub grade.
  c) Providing and laying in position 150mm thick Reinforced cement concrete bed as a base to Paver blocks including over a 75mm thick PCC including centering and shuttering.

  d) Providing and laying at or near ground level Kerb stone of cement concrete in position to the required line, level and curvature, jointed with cement mortar 1:3 (1 cement: 3 coarse sand), including making joints with or without

grooves (thickness of joints except at sharp curve shall not to more than 5mm), including making drainage opening wherever required complete etc. as per direction of Engineer-in-charge. C.C. Kerb stone shall be approved by Engineer-in-charge.

e) Providing and laying factory made chamfered edge Cement Concrete paver blocks of 80mm thick with approved Colour, design & pattern in drive ways, of M-40 strength, size/ shape, thickness made by table vibratory method using PU mould, laid in required Colour and pattern over 50mm thick compacted bed of sand, compacting and proper embedding/laying of inter locking paver blocks into the sand bedding layer through vibratory compaction by using plate vibrator, filling the joints with sand and cutting of paver blocks as per required size and pattern, finishing and sweeping extra sand complete all as per direction of Engineer-in-Charge.

f) The existing fire tender having grass pavers shall be removed and re-laid with new 80mm thick M-40 garde pavers for an area of approximately 150 sqmt including laying of base courses in line with the procedure as stipulated above without any additional cost to IITH.

g) The six numbers of Planter boxes existed in the existing plaza area shall be removed and the plants in the planter boxes shall be replanted within the school boundary premises as directed by the Engineer In-charge. After removing the planter boxes, the area shall be laid with the pavers by using the existing pattern pavers to get the even look without any additional cost to IITH.

h) Disposal of building rubbish or malba or excess earth received from cutting/filling including unserviceable, dismantled or waste material by mechanical means including loading, transporting, unloading to approved municipal dumping ground or as approved by Engineer-in-charge for all leads and lifts involved.

- **Paver blocks at Plaza area**

SUB GRADE

Construction of subgrade using approved available soil within the IITH Compound, spread the earth layer by layer, mix with water to achieve MDD at

Optimum Moisture Content and compacting it with vibratory roller of 8-10 tonnes capacity to required percentage of MDD (IS:2720-Part 8) as per MORTH Clause 305 including all leads and lifts complete.

SUB-BASE CONSTRUCTION

Providing and construction of granular sub base (GSB) of Grading -II of Table 400-1 including mixing in a mechanical mixing plant at OMC, carriage of mixed Material to work site, spreading in uniform layers as per drawing with motor grader on prepared cum subgrade and compacting with vibratory roller to achieve required percentage of MDD (as per IS:2720: Part 8), complete as per Clause 401 of MORTH Specifications and as per approved drawing and as per direction of Engineer in Charge

CC Pavers

Providing and laying 80mm thick factory-made cement concrete paver block of M -40 grade made by block making machine with strong vibratory compaction, of approved size, design & shape, laid in required colour and pattern over and including 50mm thick compacted bed of coarse sand, filling the joints with line sand etc. all complete as per the direction of Engineer-in-charge.

The plants existing within the plaza area shall be removed and replanted within the school premises as directed by the Engineer In-charge without any additional cost to IITH. Further, the existing electrical poles which are located in plaza and other upcoming building area shall be removed and replaced at desired location as per the directions of Engineer In-charge without any additional cost to IITH.

- **RCC Underground Sumps:**

1. Planning, Designing and Construction of RCC Under Ground Sumps with pump house as per details given below consisting of **1** Lakhs capacity with internal separation for Domestic, Fire and STP Treated water requirements all complete as per approved drawings using the specifications mentioned below by preparation of preliminary and detailed working drawings, structural analysis & design, planning, designing and execution of all services by incorporating stipulated specifications and integrating all services with External Developmental works all complete as per directions of Engineer-in-Charge.
2. The cutting, supply and filling of earth to maintain the UG sump levelsin position as per the approved layout plan shall be considered as included in the scope of work and nothing extra shall be paid on this account.
3. The Specifications mentioned are indicative only. The items,

that are necessary to complete the scope of said work but not mentioned below, shall be considered as included in the quoted rate and nothingextra shall be payable.

General:

1. The Contractor has to plan, design, prepare the drawings for RCC UG Sump of required capacity and get the same approved from the Engineer – In – Charge before execution.

2. The cost of structural design and drawing shall be got proof checked by IITs/NITs/ any other Govt Engineering college or Institute as per decision of the Engineer-in-charge and Nothing extra shall be payable on this account.

3. Any other drawing required by the department for execution of work, from time to time, will be furnished by the Contractor as per relevant IS codes and sound engineering practice without hampering the progress of work. Such drawings shall be used in the work only after approval of the Engineer in charge. All necessary help andcooperation shall be provided by the Contractor for incorporating any changes in such drawings, if any, as suggested by the Engineer in charge. Nothing extra shall be payable on any account.

4. The structural designing shall be carried out considering the safe bearing capacity of soil. In case the nature of soil is found such which need some additional measures/modifications in structural design and drawing due to less bearing capacity of soil or due to any other reason whatsoever, the work shall be executed accordingly by the Contractor as per modified design & drawing without any extra cost. Such changes if any, shall be done as per relevant IS Code provisions and sound engineering practice as approved by Engineer- in-charge. Nothing extra shall be payable on any account.

5. The designs and execution of work shall be in accordance with the provisions of the following I.S. Codes, incorporating subsequent revisions, if any.
   (i) I.S. 456-2000
   (ii) I.S. 875
   (iii) I.S. 1893 (Part-I) 1984 with revisions
   (iv) I.S. 3370 (Part-I & II) with revisions(v) I.S. 2309

   Where I.S. Codes are not applicable the sound Engineering practices shall apply. The decision of Engineer in charge

in this regard shall be final and binding on the Contractor.

6. To make the tanks water tight against seepage and leakage, water proofing treatment of approved quality shall be mixed with concrete and plaster during mixing as per the manufactures specifications.

7. After completion of the construction work, the Terrace tank, underground tank and pipe lines shall be fully disinfected before commissioning. All expenditure in this regard shall be borne by the Contractor.

8. In case of any dispute on interpretations of any provision of the Indian Standard above, the decision of the Engineer in charge shall be final and binding on the Contractor and not open to the arbitration.

9. All the centering and shuttering shall be good in line & level, shape & size and should be free from any undulations etc. In overall, the quality of centering and shuttering should be such that after removal of forms, the exposed concrete surface gives a uniform appearance true to lines, levels and curvature free from any pitting etc.

10. Nothing extra shall be paid for centering and shuttering required for RCC slabs, beams, walls, columns, domes, shafts, staircase, bracings, all coffers etc. curved in plan and / or in elevation and providing holes, slits, coffers etc. wherever required.

11. After physical completion of work, the Contractor shall have to fill the tanks with water to show that it is completely watertight. The tanks shall be kept filled for a minimum period of three days (or as desired by the Engineer in charge) and no leakage, seepage or dampness shall be there in the tank. Nothing extra shall be paid for arranging the water and for filling it in the tanks for testing of making other arrangement.

12. If any leakage, seepage or dampness is observed during testing, necessary rectification shall have to be done by the Contractor at his own cost and the tanks shall be re-tested in the manner stated above. Nothing extra shall be paid for arranging the water and for filling it in the tanks for re-testing.

13. The Contractor shall guarantee the safety and water

tightness of the structure and in the event of the tank developing leakage or any other defects on the completion and filling up the same shall be rectified by the Contractor without any additional cost to Institute.

14. In the event of the tank not conforming to the above requirements and if the Contractor fails to rectify the defects to the satisfaction of the Engineer in charge. The Contractor shall not be eligible for any payment under the contract and all sums which might have been paid by way of work done shall be recovered from the dues of the Contractor either under this contract or any other contract with the Govt. In the event of the amount available with the Govt. does not cover the full amount due from the Contractor or if no amount is available with the Govt. against the Contractor, the Contractor shall on demand from the Engineer in charge remit the required amount within ten days.

15. Any damage done by the Contractor to any existing work during the course of execution of the work tendered for, shall be made good by him at his own cost.

16. The cost of Raising head from ground, Delivery pipe with sluice valve up to ground level and chamber, Scour pipe with sluice valve and chamber, over flow pipe up to ground, ladder etc. shall be included in this job and nothing extra shall be on this account.

The rates shall include all the operations above mentioned and also not mentioned but required for making the Underground sumps functional. Nothing extra shall be paid on this account.

Guarantee Bond for RCC Underground Sump: -

Five years Guarantee bond in prescribed proforma **given in the Bid document** shall be submitted by the Contractor which shall also be signed by both the specialized agency and the Contractor to meet their liability / liabilities under the guarantee bond. However, the sole responsibility about efficiency of water proofing treatment shall rest with the Building Contractor. **10% (Ten per cent) of the cost of water-proofing work shall be retained as Security Deposit and the amount so deducted would be released after 5 (Five) years from the date of completion of the entire work under the agreement, if the performance of the treatment is found satisfactory**. If any defect is noticed during the guarantee period, the Contractor shall rectify it within 15 days of receipt

of intimation of defects in the work. If the defects pointed out are not attended to within the specified period, the same will be got done from another agency at the risk and cost of Contractor. However, this Security Deposit can be released in full, if Bank Guarantee of equivalent amount for Full **5 (Five) years** is produced and deposited with the department.

Detailed Specifications for RCC Under Ground Sump:

(1) **General**: The tentative location of UG Sump has been shown in the layout plan enclosed in the Bid Document. The scope of work includes, planning, designing, construction, testing and commissioning including all necessary connections, fittings and fixtures of UG sump.

(2) **Foundation**:

(a) Foundation shall be designed with RCC Cast in situ base slab and walls using appropriate grade of Design Mix cement concrete (not less than M 30) and Fe 500D reinforcement as per structural drawings or any other methods of construction suitable to the structural system. The foundation shall rest at a minimum depth below natural ground level as mentioned in the structural drawing. The depth of foundation is variable as per site condition.

(b) Levelling course for foundation as per design.

(3) **Structural System**:

(a) The structure shall be with conventional RCC cast-in-situ construction. The structure shall be Earthquake resistant RCC Cast in situ structure, which shall be constructed with M 30 or more grade of Design Mix cement concrete and Fe 500D Reinforcement.

(b) The RCC UG Sump shall be executed as per Structural drawings to be submitted by the Contractor and approved by Engineer-in- Charge. The Sump shall conform to NBC 2016 Guidelines/ Specifications.

(c) RCC in walls beams and slabs shall be as per the approved structural drawings with design mixed concrete/ RMC mixed with permissible admixtures, centering, shuttering & reinforcement.

Centering /shuttering and scaffolding material shall be used for all R.C.C. work to give an even finish of concrete surface. The detailed dimensions and mix for building elements to be adopted shall be as per provisions of IS: 456, IS:1642, IS: 1893, IS: 3792, IS: 6073, IS: 13920, IS:11447, IS: 15916, IS: 15917 and as per approved

structural design. RCC leaner than M-30 shall not be used.

(4) **Finishing:**

a. The bottom and the side walls of the sump shall be Ceramic Tile Flooring, Dado and wall lining, in general, shall be done as per CPWD Specifications, 2019 Volume-I & Volume-II with up to date correction slips.

b. The tiles shall be of approved make and shall generally conform to relevant ISO standards. The tiles of specified sizes shall be used and sample of tiles shall be got approved from the Engineer-in-charge. The Mandatory tests for tiles shall be got done as per CPWD Specifications, 2019 Volume-I & Volume-II with up to date correction slips as on last date of submission of Bid document / relevant BIS Code.

c. The ceramic tiles shall be as specified in the drawing. The tiles shall be of specified colours as shown in the drawings or as approved by Engineer-in-charge and will be laid in pattern as per architectural drawings. Nothing extra shall be paid for laying tiles in specific pattern. The tiles shall be first quality of approved make.

d. Contractor to obtain prior approval of Engineer-in-charge for tiles make, sizes, shade and colour as per Architectural drawings and material palette before bringing it to site. The tiles shall be laid as specified in the Schedule of Finishes including grouting of joints with pigmented epoxy grouts. Tiles joints shall be as per the pattern provided in Architectural drawings.

(5) **Water Supply Pipes, Pump Sets & Foot Rest:**

(a) The Contractor shall make all necessary connections of Inlet, Outlet, Overflow pipes as per CPWD specifications with GI/CI pipes as per the schedule of Quantities and as per directions of the Engineer-in-charge.

(b) The Contractor shall provide suitable capacity Pump Sets (with one working and one standby) along with suitable control Panel, cabling, connections, testing and commissioning etc., as per the approved scheme and as per directions of the Engineer-in- charge.

(c) Providing orange Colour safety foot rest of minimum 6 mm thick plastic encapsulated as per IS : 10910, on 12 mm dia steel bar conforming to IS: 1786, having minimum cross section as 23 mmx25 mm and over all minimum length 263 mm and width as 165 mm with minimum 112 mm space between protruded legs having 2 mm tread on top surface by ribbing or chequering besides necessary and adequate anchoring projections on tail length on 138

mm as per standard drawing and suitable to with stand the bend test and chemical resistance test as per specifications and having manufacture's permanent identification mark to be visible even after fixing, including fixing in UG sump with 30x20x15 cm cement concrete block 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) complete as per design.

(6) **Water Proofing Treatment:**

The Water Proofing Treatment shall be done as per methodology and specifications as mentioned in Water Proofing Sub-Head provided in the Bid Document.

- **RCC Terrace Tanks:**

1. Planning, Designing and Construction of RCC Terrace tanks consisting of 20,000 Liters capacity (For Domestic and Flushing tanks only) with additional capacity of tank as required for firefighting all complete as per approved drawings using the specifications mentioned below by preparation of preliminary and detailed working drawings, structural analysis and design, planning, designing and execution of all services by incorporating stipulated specifications and integrating all services with External Developmental works all complete as per directions of Engineer-in-Charge.

2. The RCC Terrace Tank levels shall be as per the approved layout plan shall be as per the scope of work and nothing extra shall be paid on this account.

3. The Specifications mentioned are indicative only. The items, that are necessary to complete the scope of said work but not mentioned below, shall be considered as included in the quoted rate and nothing extra shall be payable.

General:

1. The Contractor has to plan, design, prepare the drawings for RCC Terrace Tanks of required capacity and get the same approved from the Engineer – In – Charge before execution.

2. The cost of structural design and drawing shall be got proof checked by IITs/NITs/ any other Govt Engineering college or Institute as per decision of the Engineer-in-charge and Nothing extra shall be payable on this account.

3. Any other drawing required by the department for execution of work,

from time to time, will be furnished by the Contractor as per relevant IS codes and sound engineering practice without hampering the progress of work. Such drawings shall be used in the work only after approval of the Engineer in charge. All necessary help and cooperation shall be provided by the Contractor for incorporating any changes in such drawings, if any, as suggested by the Engineer in charge. Nothing extra shall be payable on any account.

4. The designs and execution of work shall be in accordance with the provisions of the following I.S. Codes, incorporating subsequent revisions, if any.
(i) I.S. 456-2000
(ii) I.S. 875
(iii) I.S. 1893 (Part-I) 1984 with revisions
(iv) I.S. 3370 (Part-I & II) with revisions(v) I.S. 2309

   Where I.S. Codes are not applicable the sound Engineering practices shall apply. The decision of Engineer in charge in this regard shall be final and binding on the Contractor.

5. To make the tanks water tight against seepage and leakage, water proofing treatment of approved quality shall be mixed with concrete and plaster during mixing as per the manufacture's specifications.

6. After completion of the construction work, the RCC Terrace Tank and pipe lines shall be fully disinfected before commissioning. All expenditure in this regard shall be borne by the Contractor.

7. In case of any dispute on interpretations of any provision of the Indian Standard above, the decision of the Engineer in charge shall be final and binding on the Contractor and not open to the arbitration.

8. All the centering and shuttering shall be good in line & level, shape & size and should be free from any undulations etc. In overall, the quality of centering and shuttering should be such that after removal of forms, the exposed concrete surface gives a uniform appearance true to lines, levels and curvature free from any pitting etc.

9. After physical completion of work, the Contractor shall have to fill the tanks with water to show that it is completely watertight. The tanks shall be kept filled for a minimum period of three days (or as desired by the Engineer in charge) and no leakage, seepage or dampness shall be there in the tank. Nothing extra shall be paid for arranging the water and for filling it in the tanksfor testing of making other arrangement.

10. If any leakage, seepage or dampness is observed during testing, necessary rectification shall have to be done by the Contractor at his

own cost and the tanks shall be re-tested in the manner stated above. Nothing extra shall be paid for arranging the water and for filling it in the tanks for re-testing.

11. The Contractor shall guarantee the safety and water tightness of the structure and in the event of the tank developing leakage or any other defects on the completion and filling up the same shall be rectified by the Contractor without any other cost.

12. In the event of the tank not conforming to the above requirements and if the Contractor fails to rectify the defects to the satisfaction of the Engineer in charge. The Contractor shall not be eligible for any payment under the contract and all sums which might have been paid by way of work done shall be recovered from the dues of the Contractor either under this contract or any other contract with the Govt. In the event of the amount available with the Govt. does not cover the full amount due from the Contractor or if no amount is available with the Govt. against the Contractor, the Contractor shall on demand from the Engineer in charge remit the required amount within ten days.

13. RCC Terrace Tank should be designed so that no adverse effects develop below the foundation, when tank is constructed up to top (without top dome) and is empty and wind blows with design speed, re-distribution of stresses will not be allowed.

14. No reduction in wind pressure prevailing in the area as per IS 875 shall be allowed for design of RCC components including RCC columns and for stability calculations.

15. Continuity effect of various structural components shall be required to be taken into account in design.

16. Wherever any reference of any IS Code / National Building Code / Any other published documents related to engineering has been made, the provisions contained thereof as per their latest versions shall be considered.

17. The cost of Raising head from ground, Delivery pipe with sluice valve up to ground level and chamber, Scour pipe with sluice valve and chamber, over flow pipe up to ground, ladder etc. shall be included in this job and nothing extra shall be on this account.

18. The required ladder shall be provided from terrace slab to top of the RCC overhead water tank for maintenance purpose.

19. The rates shall include all the operations mentioned above and also not mentioned but required for making the RCC Terrace Tanks functional.

Nothing extra shall be paid on this account.

Guarantee Bond for waterproofing @ RCC Terrace Tank: -

Five years Guarantee bond in prescribed proforma **given in the Bid document** shall be submitted by the Contractor which shall also be signed by both the specialized agency and the Contractor to meet their liability / liabilities under the guarantee bond. However, the sole responsibility about efficiency of water proofing treatment shall rest with the building Contractor. **10% (Ten per cent) of the cost of water-proofing work shall be retained as Security Deposit and the amount so deducted would be released after 5 (Five) years from the date of completion of the entire work under the agreement, if the performance of the treatment is found satisfactory**. If any defect is noticed during the guarantee period, the Contractor shall rectify it within 15 days of receipt of intimation of defects in the work. If the defects pointed out are not attended to within the specified period, the same will be got done from another agency at the risk and cost of Contractor. However, this security deposit can be released in full, if bank Guarantee of equivalent amount for Full **5 (Five) years** is produced and deposited with the department.

Detailed Specification for RCC Terrace Tank:

(a) **General:** The tentative location of RCC Terrace Tank has been shown in the layout plan enclosed in Bid Document. The scope of work includes, planning, designing, construction and commissioning including all necessary connections, fitting & fixtures of RCC Terrace Tank.

(b) **Structural System**: The structure consists of conventional RCC cast-in-situ beam-column-slab-wall system of construction. The structure shall be Earthquake resistant RCC Cast in situ structure, which shall be constructed with M 30 or more grade of Design Mix cement concrete and Fe 500D Reinforcement.

(c) **RCC Walls, Beams & Slabs**: RCC in walls beams and slabs shall be as per the approved structural drawings with design mixed concrete/ RMC mixed with permissible admixtures, centering, shuttering & reinforcement. The detailed dimensions & mix for structural elements to be adopted shall be as per provisions of IS: 456, IS:1642, IS: 1893, IS: 3792, IS: 6073, IS: 13920, IS: 11447, IS: 15916, IS: 15917 and as per approved structural design. RCC leaner than M-30 shall not be used.

(d) **Centering and Shuttering**: The Centering and Shuttering shall give an even finish of concrete surface. The Contractor shall provide centering and shuttering as per approved design and drawing all complete and Nothing extra shall be payable on account of additional lift involved in execution.

(e) **Finishing:**

I. The bottom and the side walls of the sump shall be Ceramic Tile Flooring, Dado and wall lining, in general, shall be done as per CPWD Specifications, 2019 Volume-I & Volume-II with up to date correction slips.

II. The tiles shall be of approved make and shall generally conform to relevant ISO standards. The tiles of specified sizes shall be used and sample of tiles shall be got approved from the Engineer-in-charge. The Mandatory tests for tiles shall be got done as per CPWD Specifications, 2019 Volume-I & Volume-II with up to date correction slips as on last date of submission of Bid document / relevant BIS Code.

III. The ceramic tiles shall be as specified in the drawing. The tiles shall be of specified colours as shown in the drawings or as approved by Engineer-in-charge and will be laid in pattern as per architectural drawings. Nothing extra shall be paid for laying tiles in specific pattern. The tiles shall be first quality of approved make.

IV. Contractor to obtain prior approval of Engineer-in-charge for tiles make, sizes, shade and Colour as per Architectural drawings and material palette before bringing it to site. The tiles shall be laid as specified in the Schedule of Finishes including grouting of joints with pigmented epoxy grouts. Tiles joints shall be as per the pattern provided in Architectural drawing.

(f) **Water Supply Pipes:** The Contractor shall make all necessary connections of Inlet, Outlet, Overflow pipes as per CPWD specifications with GI/CI pipes as per the schedule of Quantities and as per directions of the Engineer-in-charge.

(g) **Water Proofing Treatment:** The Water Proofing Treatment shall be done as per methodology and specifications as mentioned in Water Proofing Sub-Head provided in the Bid Document.

8. HORTICULTURE

1.0 General:

1.1 Scope: Contractor to furnish all materials labour and related items necessary to complete the work indicated on drawing and specified herein and also to make provision of storage, security of material on site

2.0 Materials:

2.1 Topsoil: (Poyta earth) pH range 6.5 to 7.5 Topsoil or good earth shall be a friable loam, typical of cultivated topsoil of the locality containing at least 2% of decayed organic matter (humus). It shall be taken from a well-drained arable site. It shall be free of subsoil, stones, earth clods, sticks, roots or other objectionable extraneous matter or debris. It shall contain no toxic material. No top soil shall be delivered in wet condition. Top soil available on Site may be used on approval of the Landscape Architect. For this the Contractor shall be paid only the Local Carting Charges Prevalent on Site/as agreed by the Client.

3.0 Earthwork:

Rough Grading:
Rough Grading of all areas within the project, including cut and fill sections and adjacent transition areas, shall be reasonably smooth, compacted and free from irregular surface changes. The degree of finish shall be that ordinarily obtainable except as otherwise specified. All ditches, swales, and gutters, shall be finished to drain readily. Unless otherwise indicated or drawings, the sub-grade shall be evenly sloped to provide drainage away from the building walls in all directions at a grade of not less than 1 in 50 provide rounding at top and bottom of banks and at other breaks in grade.

3.1Backfill & Fill:
A. General:
Place soil material/Moorum acceptable to Landscape Architect, in layers to required sub-grade elevations, for each classification listed below.

1. Under grassed areas, use satisfactory excavated or borrows material.

2. Backfill and fill materials are to be placed to layers not more than 20 cm in loose depth. Before compaction, moisten or aerate each layer as

necessary to provide the optimum moisture content. Compact each layer to required percentage of maximum density for each area classification. Do not place backfill or fill material on surfaces that are muddy.

3.2 Lawn or Unpaved Areas:
Compact top 15 cm of sub-grade and each layer of backfill or fill material at 90% maximum density.

3.3 Finish Grading:
A. If finished grades shown by spot elevations conflict with those shown by contours, spot elevations shall be used. Unless indicated, outside of buildings shall be given uniform slopes between points for which finished grades are shown or between such points and existing established grades, except vertical curves or rounding shall be provided at abrupt changes in slope. Do all grading require bringing entire project area to underside of respective surfacing or paving base as determined by the finished grade?

B. The contractor is responsible for bringing down all the grades to the finished contours and elevations shown.

C. Tolerance for finish grades shall be (+ or -) 5 cm in large planting areas but at junctions of soft & hard areas soil shall be 2-3 cm uniformly below paving level.

D. All grading and landscaping under this contract shall be done to provide adequate drainage and to preclude the pounding of water.

E. The Contractor shall uniformly distribute the top soil to the required depth over the entire site area to be grassed. Where top soil is spread directly over rock or gravel surfaces depth of the top soil shall be a minimum 20 cms.

4.0 Grassing and Flower beds:

4.1 Preparation:
Area to be grassed shall be prepared to a minimum depth of 200 mm on ground and / or to available depth on slab with good earth mixed with neem cake 20 0 gms/Sqm and approved insecticide powder 100 gms/Sqm and coco pit 1 kg/Sqm & fertilizer 125 gm/Sqm.

During period prior to planting the ground shall be maintained free from weeds. Grading and final leveling of the lawn shall be completed at least two weeks prior to the actual sowing, Regular watering shall be continued until sowing by dividing the lawn area into portions of approx. 5 mts square by constructing small bunds to retain water. These 'bunds' shall be leveled just prior to sowing of grass plants. At the time of actual

planting of grass, it shall be ensured that the soil has completely settled.

4.2 Sowing the grass roots. / laying lawn carpet
Grass roots (Cynodon dactylon, American Blue, Paspalum, Taiwan or local genus approved by the landscape architect) shall be approved beforehand. The grass roots stock received at site shall be manually cleared of all weeds and water sprayed over the same after keeping the stock in a place protected from sun and dry winds. Grass stock received at site may be stored for a maximum of three days. In case grassing for some areas is scheduled for a later date fresh stock of grass roots shall be ordered and obtained.

Korean Lawn carpets shall be of size 0.6m x 0.3 m neatly cut & of uniform thickness. Carpets shall have min. thickness of 50 mm with uniform lawn growth & color, free of weeds, pest etc

Carpets shall be laid on evenly prepared firm surface, joints filled with mixture of garden soil & manure, rolled over at appropriate time to form uniform carpet of grass.

4.3 Execution
Small roots shall be dibbled about 5.0cms apart into the prepared grounds. Grass areas will only be accepted as reaching practical completion when germination has proved satisfactory and all weeds have been removed. It is necessary to get a sample area admeasuring min .5 Sqm approved in all respects two weeks prior to plantation of main area.

4.4 Maintenance
As soon as the grass is approximately 3cm high it shall be rolled with a light wooden roller - in fine, dry weather and when it has grown to 5 to 8cms above the ground, weeds must be removed and regular cutting and rolling must be begin. A top-dressing of Fertilizer shall be applied when the grass is Sufficiently secure in the ground to bear the mowing machine, the blades must be raised an inch above the normal level for the first two or three cuttings. That is to say, the grass should be cut so that it is from 4 to 5 cms in length, instead of the 3 cm necessary for mature grass.

In the absence of rain, in the Monsoon the lawn shall be watered with sprinklers every, three days soaking the soil through to a depth of at least 20cms.Damage, failure or dying back of grass due to neglect of watering especially for seeding out of normal season shall be the responsibility of the contractor. Any shrinkage below the specified levels &/or mixing of species during the contract of defects liability period shall be rectified at the contractor's expense. The contractor is to exercise care in the use of rotary cultivator and moving machines to reduce to a minimum the hazards of flying stones and brickbats. All rotary mowing machines are to be fitted with safety guards.

4.5 Rolling:
Lawn mower with roller shall be used periodically, taking care that the lawn is not too wet and sodden.

4.6 Edgings:
These shall be kept neat and must be cut regularly with the edging shears, and edging shall be done with Golden Duranta, maroon Duranta or as per the directions of Engineer in Charge.

4.7 Watering:
Water shall be applied at least once in three days during dry weather. Watering whenever done should be through and should wet the soil at least up to a depth of 20cms.

4.8 Weeding: Prior to regular mowing the contractor shall carefully remove rank and unsightly weeds.

5.0 Planter Boxes with Plants:
The Planter boxes shall be constructed with CC Block masonry with Granite Cladding and filled with soil as mentioned above and planted with approved plants as per the directions of Engineer in Charge.

LIST OF APPROVED MAKES

This section gives list of approved makes for few items. The contractor shall obtain approval of makes of all materials at time of submission of detailed design. The contractor shall submit the samples of all the materials before procurement

1. CIVIL Works

Material / Item	Approved Make
CIVIL WORKS	
Cement OPC/ PPC	Ultratech, ACC, Lafarge, Bharathi, Zuari.
Reinforcement Steel	SAIL, TATA (TISCO), RINL, JINDAL
Ready Mix Concrete	Ultratech, ACC, RDC Concrete
AAC Blocks	Xtralite from Ultratech, Aerocon from HIL, ECOREX, BILTECH
AAC block joining mortar	Fixoblock xtralite from Ultratech, Smartfix from Aerocon, MYK Laticrete, Ardex Endura
Adhesive For Wood Work	Ardex Endura, Laticrete, Pidilite,
Air transfer grills	Trox, Ruskin Titus, Systemair India
Aluminium Accessories	Classic/ Argen/ Oxford/ Nulite/ Crown/ EBCO
Aluminium Sections	Hindalco, Jindal, Bhoruka, Indalco
Aluminium System Windows	Kaluco, Technal, Domal, ALCOI, Eternia from Hindalco, Alumak,
Aluminium Systems Glazing/ Curtain wall (Façade system)	Schuco, Reyners, Kawneer, Bhoruka
Aluminium D/W hardware	Alualpha, Lavaal, Giesse, Cotswold, Securistyle,
Aluminium Louvers	Hunter Douglas, Armstrong, Luxalon
Anchor Fastner, Rebar, Chemcial/ Mechanical fastner, Core - cutting, Dry stone cladding clamp, Expandable fastners	Hilti, Fischer
Anti-Termite Pesticides - (Chloropyriphos)	DE - Nocil, Bayer, Biflex-TC from FMC, Hilban from HIL
Acoustical Ceiling / Wall Panelling	Anutone, Ecophon - Saint Gobain, USG Boral, Armstrong, Knauf Denoline
Acoustic Wall Panel	Armstrong, Ecophon, Anutone
Access panel in False ceiling	Saint Gobain, USG Boral, Knauf Denoline,
Adhesive For Wood Work	Ardex Endura, Laticrete, Pidilite,
Aluminium Sections	Hindalco, Jindal, Bhoruka, Indalco, Global

Material / Item	Approved Make
Aluminium System Windows	Kaluco, Technal, Domal, ALCOI, Eternia from Hindalco, Alumak,
Aluminium Systems Glazing/ Curtain wall (Façade system)	Schuco, Reyners, Bhoruka or approved equivalent
Backer Road	Supreme, Fosroc
Calcium Silicate Board	Hilux, Aerolite, Pamtech, Promatech,
Cement - White	Birla, JK
Cement Fiber Board	Everest, NCL Industries (Bison Panel), Shera Board, Visaka Industries (V- Next), Century
Chemical Admixtures & Additives	BASF, Pidilite, Sika, Fosroc, Ecmas, Sunanda Chemicals, Mapei, Hycrete, Bal-Endura, MC Bauchemie, MYK Schomburg,
Commercial ply & Board	Greenply, Archidply, Century, Duroply, Uniply, Kitply, National
Crystalline Integral Waterproofing	Kryton, Penetron, Pidilite, BASF, Fosroc, Sika,
Ceramic Fritting on Glass	Art & Glass, GSC Glass, Ashai
Concrete Cover Blocks	Astra, Ramtec or approved equivalent. For exposed concrete only pointed type shall be
Vitrified/Ceramic Tiles	Kajaria, RAK, Restile, Somany, Jhonson, Asian
Compact laminated sheet	Greenlam, Marino
Ceiling Wall Panel	Armstrong, Ecophon, Anutone
Colour Coated Galvalume Standing Seam Roofing	Agrima Roof & Façade systems, Maxroof , Optima India
Door Closer	Dorma (XLC), Hafele, Yale, Geze
Door Locks, Access Control Lock	Dorma (XLC), Geze, Kich, Hafele, Assa Abloy (Yale)
Door Hardware (other than Floor spring, Closer, Locks)	Dorma (XLC), Kich, Hafele, Assa Abloy (Yale),
Door Seal – Wool pile Weather Strip	Reddiplex, Osaka rubber, Enviro Sealz, Anand
Double Side Tape, Decorative Tape	3M
Door Hardware (other than Floor spring, Closer, Locks)	Dorma (XLC), Kich, Hafele, Assa Abloy (Yale), Dorset,
EPDM Gaskets	Anand, Osaka Rubber, Roop, Bohra, Hanu, Maharashtra polymer
Epoxy Grout/ Cementitious Grout for Flooring	Ardexl Endura, MYK Latricrete, Kerakoll, Pidilite
External Paving Tiles (Cement based)	Pavit, Basant baton, Vyara, Ultra, Eurocon, Super
Expansion Joint System	3R, Kantaflex, sandfield, Deevin, Vexcolt
Expansion Filler board - Premoulded compressible	Supreme (Capcell HD100), Shalitex -STP
Fabric (Acoustic and fire rated)	Atmosphere, Palette, D'décor Fabric,Response
Fire Doors	Shakti Horman, Pacific, Navier, iCLEAN - IHMS,
Fire Rated Hardware	Dorma, Hafele, Geze, Horman, Assa Abloy (Yale),
Fire Seal, Fire smoke Seal	3M, Hilti, Dorma, Sealz, Lorient, Kelargo, Raven

Material / Item	Approved Make
Fire rated Glass	Vetrotech Saint-Gobain, Pyroguard, Glaverbel, Schott - Pyran, Pyroswiss
Fire rated Glass fixing gasket, tape	Karfani, 3M
Floor hardening compound	JBA, Ardex endura, Fosroc, Basf, Sika, Sunanda chemicals
Flush Door Shutter (Factory pressed laminated)	Century, Greenply, Duroply, Kitply, Uniply, Anchor
Fabric (Acoustic and fire rated)	Atmosphere, Palette, D'décor Fabric, Response
Floor Drain	Neer, ACO, GMGR
Glass, Tinted Glass, High Performance Glass, Reflective	Saint Gobain, Asahi, Pilkington
Glass Processing	FG, Fuso, Asahi,
Glass, Tinted Glass, High Performance Glass, Reflective Glass	Saint Gobain, Modiguard (Gujarat Guardian), Pilkington, Asahi
Glass Processing	FG, Fuso, Asahi, Saint Gobain
Glass Fibre Acoustical Tiles	ECOPHON, Armstrong, Anutone, AMF
Grab Bars and Disabled Hardware	Cera, Jaquar, Hindware, Dorma
Gypsum plaster	Stain Gobain, Perma board or approved
Grab Bars and Disabled	Cera, Jaquar, Hindware, Dorma
Gypsum ceiling board	Saint Gobain, Knauf, USG Boral
Gypsum plaster	Stain Gobain, Perma board approved equivalent
Glass	Saint Gobain, Modifloat, Pilkington
GI channels	Gypsteel, Anutone, Hillpoint Diamond Frames.
Heavy duty Vitrified Tile 16mm	Somany , Johnson , Nitco
Laminates	Marino, Century, Greenlam, Formica, Sunmica,
Laminated Shuttering Ply	Green Ply , Century Ply, Archidply
Laminated wooden slats	Hillpoint, Anutone, Topakustik Tranquil
Masking Tapes	3M, Sun Control, Wonder Polymer. Essentra
Metal Ceilings	Luxalon, Armstrong, Hunter Douglas, Saint
Metal Doors (Non Fire rated)	Shakti Horman, Naviar, Ahlada, Metaflex, Pacific
Mirrors	Saint Gobain, Modi Guard (Gujarat Guardian), Asahi, HNG, Pilkington
Non shrink cementious precision (anchoring) grout	Fosroc, Sika, Ardex Endura, BASF
PAINT - Cement Based	ICI Dulux, Berger Paints, Asian, Nerolac, Nippon
Paint - Acrylic, Synthetic Enamel, Acrylic emulsion- interior and exterior	Asian Paints, Akzo Nobel (Dulux), Berger, Nerolac, Jotun, Nippon
Paint - Texture Paints (Interior, Exterior)	Asian, Jotun, ICI Dulux, Berger, Nippon
Paint - Oil Bound Distemper & Dry Distemper	Asian Paints, AkzoNobel (ICI Dulux), Berger, Nippon
Paint - PU paint, epoxy paint and	Asian, Nippon, ICI, Berger, Jotun, Nippon
Polish for wooden work	MRF, Asian
Polysulphide Sealant	Fosroc, Dow corning, Sika, MC-bauchemie

Material / Item	Approved Make
Polyurethane Concrete Flooring, Epoxy flooring, Self Levelling compound	BASF, Fosroc, Ardex Endura, MYK Schomburg, Sika,
Polyurethane overdeck insulation foam	BASF, Pidilite, Ecmas, Lloyd Insulations
Polyster Powder coating/ PVDF	Jotun, Akzo nobel (Interpon), Valspar, Asian PPG
Precast concrete tiles, Interlocking Paving, Brick paver,	Vyara, Basant betons, Super Decorative floorings, Ultra Tiles, Unistone, Nimco, Raise Stone.
Pre cast Concrete Landscape elements, gratings, kerb, Drain	Vyara, Basant betons, Super decorative floorings, KK Manholes & Gratings, Nimco, Raise Stone
Precoated Galvanised Sheets	Tata-Blue scope, Jindal, Everest, Interarch
Plain gypsum plaster board	Gyproc, USG Boral, Knauf Gypsum.
Silicon Gaskets	Sree Gaurav, Roop
Silicone Sealant	Wacker, Dow Corning, GE momentive, MC-bauchemie, Pidilite
Stainless Steel	SAIL, Jindal
Stainless Steel Bolts, Washers and Nuts, Pressure plates, screws	Kundan, Puja, Atu, GKW, knettlefoldl
Stainless Steel Friction Stay	Giesse, Securistyle, Cotswold, Hefele
Structural Silicon sealant, Weather Silicone	Dow Corning, Momentive (GE)
Structure Steel & Hallow Section Producers only	SAIL, TATA (TISCO), RINL, Jindal steel & Power (JSPL) or approved equivalent for non-structural
Suspended ceiling system	Armstrong, Saint Gobain, USG Boral, Knauf,
Tensile Fabric Roofing	Ferrari, Saint Gobain, Melher
Water Stops - Hydrophilic Swellable rubber strip	Sika, BASF, Fosroc, Hydrotile, Penetron
Wired Glass	From Locally approved glass manufacturer
PLUMBING WORKS	
Sanitary Ware, CP Fittings & Washroom Accessories	
Vitreous China Sanitary ware	
European Water Closet	Hindware / TOTO / Kohler / Parry ware / Cera
Concealed Cistern	Hindware / TOTO / Kohler/Cera/Parryware
Under Counter White Vitreous China Wash Basin	Hindware / TOTO / Kohler/Cera/Parryware
Divyang Toilet Set	Hindware / TOTO / Kohler/Cera/Parryware
White Vitreous China Urinal	Hindware / TOTO / Kohler/Cera/Parryware
C.P. Brass Faucets & Fittings	Jaquar / Hindware / Kohler/Cera
S.S. Floor Drain Grating Cover	Chilly / Neer / Futura/Camary
Internal Drainage Pipes & Fittings	
UPVC SWR Pipes & Fittings	Astral / Supreme / Ashirvad/ Birla
P.P. Pipes & Fittings	Astral Silencio / Huliot / Poloplast / Rehau /
Brass Floor Clean Out	Chilly / Camry / Neer
Air Admittance Valve	Ashirvad / Astral / Supreme
G.I. Perforated Strip	NECO / Kapilansh / Saint Gobain
G.I. Rubber Coated U-Clamps	Ashirvad / Astral / Supreme
G.I. Rubber Coated O-Clamps	Astral / Chilly / Intellotech

Material / Item	Approved Make
G.I. Threaded Rods	Hitech / Tata
C.I. Parapet Drain	Neer/GMGR/ACO
Water Supply Pipes & Fittings	
CPVC Water Supply Pipes	Astral / Supreme / Ashirvad / Birla
G.I. Pipes	Tata / Zenith / Jindal
HDPE Pipes	Jain Irrigation / Supreme / Oriplast / Nagarjuna
D.I. Pipes	Neco / Welspun
Pipe Insulation	Armaflex / Thermaflex
CPVC Ball Valve	Ashirvad / Astral / Supreme
Pressure Reducing Valves	Zoloto / Sant / Varie
Gun Metal Ball Valve	Zoloto / Sant / Leader
Gun Metal Wheel Operated Sluice Valve	Zoloto / Sant/ Leader
Gun Metal Gate Valve	Zoloto / Sant/ Leader
Gun Metal Butterfly Valve	Zoloto / Sant / Leader
Gun Metal Non-Return Valve	Zoloto / Sant/ Leader
Electrically Operated Actuator Valves	Zoloto / Sant / Equivalent
Cast Iron Y Strainer	Zoloto / Sant/ Leader
Water Meter	Krohne / Dwyer / Kritsnam
Air Release Valve	Zoloto / Sant/ Leader
Pressure Gauge	Zoloto / Sant / Equivalent
Water Level Sensor / Indicator	Honeywell / Wika / Seimens
Pipe Clamps and Support	Intellotech / Fischer / Hitech / Hilti

LIST OF PLANT AND EQUIPMENTS

REQUIREMENTS OF PLANT AND EQUIPMENT AT SITE & FACTORY

Sl. No.	Equipment	Numbers
1.	Needle Vibrators.	3
2.	Screed leveler.	1
3.	Plate Vibrator	2
4.	Reinforcement cutting machine.	1
5.	Power driven earth rammer (Soil compactor).	1
6.	Total station.	1
7.	Auto Level	2
8.	Water tanker (Minimum capacity of 5000 liters)	1
9.	Welding machine 400 Ampere	1
10.	Centrifugal mono block water pump minimum capacity2 HP	1
11.	Vibratory roller	1
12.	Drilling machine	2 Nos.
13.	Shuttering with necessary props	As per requirement
14.	Double steel scaffolding and staging materials	As per requirement
15.	Air compressor	1 No.
16.	DG set of minimum capacity 62.5 KVA.	1
17.	Good quality Camera for taking photographs and video recording of major activities for record purpose and for quality assurance.	1 No.
18.	Any other machinery required for completion of the work as per decision of Engineer-in-charge.	As per Actual Requirement

Note: 1. The above list is only indicative and not exhaustive. The Bidder may be required to deploy more T&P as per requirement of work.

2. All the above plants & equipment's are to be deployed as and when required or directed by Engineer-in-Charge.

LIST OF ESTABLISHING SITE TESTING OF MATERIALS

Equipment for conducting necessary tests (as per CPWD Specifications 2019 Volume-I) shall be provided and installed at site. The following laboratory equipment should be in general or as and when required be set up at site laboratory: -

Sl. No.	Equipment	Numbers
1.	2000KN compression testing machine, electrical-cum- manually operated	1
2.	Slump cone, steel plate, tamping rod, steel scale, scoop	2
3.	Vicat Apparatus with Desk pot	1
4.	Pumps and pressure gauges for hydraulic testing of pressure	1
5.	Graduated glass measuring cylinder of various capacity	As per requirement
6.	Sets of sieves for testing of coarse and fine aggregate.	1 set each.
7.	Cube moulds size 150mmx150mmx150mm	30
8.	Hot air oven temp. Range 50°C to 300°C-sensitivity 1 degree	1
9.	Electronic balance 600gx0.1g., 10kg and 50 kg	1
10.	Physical balance weight up to 5 kg	1
11.	Digital thermometer up to 150oc	1
12.	Measuring jars 100ml, 20ml, 500ml	2 Nos each
13.	Gauging trowels 100mm & 20mm with wooden	2
14.	Spatula 100mm & 20mm with long blade	2
15.	Vernier callipers 12" & 6" size	1
16.	Digital PH meter least count 0.01mm	1
17.	GI tray 600x450x50mm, 450x300x40mm,	2 Nos each
18.	Screw gauge 0.1mm-10mm, least count 0.05	2
19.	Measuring cylinder TPX or Poly propylene capacity 100 ml, 500 ml, 250 ml, 100 ml	As per requirement
20.	Pyrex, corning or Borosil beakers with cover capacity 500 ml, 20 ml, 50 ml	As per requirement
21.	Wash Bottles capacity 500 ml	As per
22.	Measuring tape (5 metre, 15 metre and 30m)	Each 1 no.
23.	Wheel Barrow	As per requirement
24.	Field Density Test Apparatus by core cutting	1set

Note: 1. The above list is only indicative and not exhaustive. The Bidder may be required to deploy more Equipment as per requirement of work.

2. All the above plants & equipment are to be deployed as and when required or directed by Engineer-in-Charge.

LIST OF MANDATORY TESTS

Sub Head: Mortars

LIST OF MANDATORY TESTS

Material	*Clause*	*Test*	*Field/ laboratory test*	*Test procedure*	*Min. quantity of material for carrying out the test*	*Frequency of testing*
1	*2*	*3*	*4*	*5*	*6*	*7*
Water	3.1.1	(i) pH Value (ii) Limits of Acidity (iii) Limits of Alkalinity (iv) Percentage of solids (a) Chlorides (b) Suspended matter (c) Sulphates (d) Inorganic solids (e) Organic solids	Lab Test	IS 3025	-	Water from each source shall be got tested before the commencement of work and thereafter once in every three months till the completion of the work. Water from municipal source need be tested only once in six months. Number of Tests for each source shall be 3
Cement	3.1.2	(a) Physical requirement (i) Fineness (ii) Soundness (iii) Setting time (Initial & Final) (iv) Compressive Strength (v) Consistency of standard cement paste	Lab	IS 4031	Each lot	Every 50 tonnes or part thereof. Each brand of cement brought to site shall be tested as per this frequency.
Sand	3.1.3.1	Organic impurities	Field	IS 2386-Part-2	20 cum	Every 40 cum or part thereof or more frequently as decided by Engineer-in-Charge.

	3.1.3.2	Silt Content	Field	IS 2386-Part-2	20 cum	-do-
	3.1.3.4	Particle size distribution	Field or Laboratory as decided by the Engineer-in-charge	IS 2386-Part-1	40 cum	40 cum or part thereof

1	*2*	*3*	*4*	*5*	*6*	*7*
Sand	3.1.3.5	Bulking of Sand	Field	IS 2386-Part-3	20 cum	Every 40 cum or part thereof or more frequently as decided by Engineer-in-Charge.
Fly Ash	3.1.5 & 3.1.5.1	Total chloride in percent by mass, max.	Lab	IS 12423	10 cum	Every 10 cum or part thereof or more as directed by Engineer-in-charge
		Loss of ignition in percent by mass, max.	Lab	IS 1727	10 cum	Every 10 cum or part thereof or more as directed by Engineer-in-charge
		Fineness, specific surface in m^2 kg /	Lab/field	Blaine's permeability method	10 cum	Every 10 cum or part thereof or more as directed by Engineer-in-charge
		Compressive strength at 28 days in N/mm^2, Min.	Lab.	IS-4031	10 cum	Every 10 cum or part thereof or more as directed by Engineer-in-charge

CONCRETE WORK

LIST OF MANDATORY TESTS

Material	*Clause*	*Test*	*Field/ laboratory test*	*Test procedure*	*Min, quantity of material for carrying out the test*	*Frequency of testing*
1	2	3	4	5	6	7
Ready Mix Concrete from RMC	Coarse Aggregates		RMC Plant Lab	IS 2386	50Cum	Test reports to be given by the RMC producer at every RMC supply of 100cum or part thereof
	Fine Aggregate		RMC Plant Lab	IS 2386	50Cum	-do-
	Cement		RMC Plant Lab	IS 4031	50Cum	-do-
	Fresh concrete	Slump test	Field/lab	IS 1199	10Cum	One test for 50cum for RCC work including in all other locations RCC done in a day is less than 50cum. Test may be carried out as per the directions of Engineer In-Charge.
		Concrete Cube	Lab	IS 516	10Cum	1 to 100Cum – 1 sample for every 25cum or part thereof. 101cum and above- 4 plus one additional sample for each additional 50cum or part thereof. (each sample consists of 3 cube specimens)
Steel for Reinforced cement concrete	5.1.3	(A) Physical Test and chemical tests				(a) For consignme nt below 100 tonnes	(b) For consignment over 100 tonnes
						(i) under 10 mm dia, one Sample for each 25 tonnes or part thereof	(i) Under 10 mm dia, one sample For each 40 tonnes or part thereof

						(ii) 10 mm to 16 mm dia one sample for each 45 tonnes or part thereof	(ii) 10 mm to 16 mm, one sample for each 50MT or part thereof.
						(iii) over 16 mm dia one sample for each 50 tonnes or part thereof	(iii) over 16 mm dia, one sample for each 75 tonnes or part thereof.

LIST OF MANDATORY TESTS – Masonry Work

Sl. No.	*Material*	*Clause*	*Test*	*Field/ laboratory Test*	*Test Procedure*	*Frequency of testing*
(i)	Bricks/Brick Tile	6.1.3, 6.1.4, 6.1.5	Testing of Bricks/Brick Tiles for dimensions, Compressive strength, Water absorption and efflorescence	Laboratory	IS 3495 Part-1 Part-2 Part-3 IS 1077	One test for 50,000 no's or part thereof (Min. qty. 2000nos)
(ii)	Sewer Bricks	6.1.4	Dimensions, Compressive strength, Water absorption And Efflorescence	Laboratory	IS 6441: Part-1 & Part-5 IS 3346: Part-3 IS 6441 – Part-3	One test for 100 cum or part thereof (Min. qty. 5cum.)

CLADDING WORK

LIST OF MANDATORY TESTS

Material	*Clause*	*Test*	*Field/ Laboratory Test*	*Test*	*Minimum quantity of material/ work for carrying out the test*	*Frequency of testing*
Granite		(i) Moisture	Lab	IS 1124	Min. Qty. 100 Sqm.	One test for 500 Sqm. or part thereof.
		(ii) Specific Gravity	Lab	IS 1122	-do-	-do-

WOOD WORK & P.V.C. WORK

LIST OF MANDATORY TESTS

Material	*Clause*	*Test*	*Field/ Laboratory Test*	*Test Procedure*	*Min, Quantity of Material for carrying out the test*	*Frequency of Testing*
1	2	3	4	5	6	7
Timber	9.1.6	Moisture content	Field (by moisture meter) laboratory test as required by Engineer-in-Charge	IS 1708-Part-1	1 cum	Every one cum or part thereof.
Flush door	9.7.10	1. End immersion Test 2. Knife test 3. Adhesion Test 4. Screw withdrawal resistance test	Laboratory	IS 4020 Part-13 to 16	26 shutters	As per sampling and testing specified in clause 9.7.11
Mortice Locks	9.15.13	Testing of spring	Laboratory	IS 2209	50 Nos	100 or part thereof.
PVC Door shutter						

STEEL WORK

LIST OF MANDATORY TESTS

Material	*Clause*	*Test*	*Field/ laboratory test*	*Test procedure*	*Min. quantity of material for carrying out the test*	*Frequency of testing*
1	*2*	*3*	*4*	*5*	*6*	*7*
Steel	10.1.1	(a) Tensile strength (b) Bend test	Laboratory	IS 1599 IS 1608	20 tonne	Every 40 Tonne or part thereof.
Steel tubular pipes	10.13	(a) Tensile Test (b) Bend Test (c) Flattening Test	Laboratory	IS 1608 IS 2329 IS 2328	8 tonne	Every 15 tonne or part thereof

Flooring Work

LIST OF MANDATORY TESTS

Material	*Clause*	*Test*	*Field/ Laboratory Test*	*Test Procedure*	*Min. quantity of material for carrying out the test*	*Frequency of testing*
1.	*2.*	*3.*	*4.*	*5.*	*6.*	*7.*
Pressed Ceramic tiles (for floor)	11.4,11.5& 11.16	1. Dimensions and surface quality 2. Physical properties 3. Chemical properties	Laboratory	I S: 13630 Part-2 Part3 Mohs scale Part 6, Part7 and Part8	5000 Nos.	10000 Nos. or part thereof

Minimum quantity of tiles for carrying out the test and frequency of test shall be as specified in the list of Mandatory Test. The number of tiles selected for each mandatory test shall be as follows"

(a) For conformity to requirements on shape and dimensions, wearing layer, and general quality - 12 tiles
(b) For wet transverse strength test - 6 tiles
(c) For resistance to wear test - 6 tiles
(d) For water absorption test - 6 tiles

LIST OF MANDATORY TESTS- GSB

Material		Test	*Field/ Laboratory Test*	Test Procedure	Frequency of Testing
Granular Sub Base (GSB)		(i) Gradation	Field	IS:2386 (Part 1)	One test per 400 cu.m.
		(ii) Atterberg limits	Laboratory	IS:2720 (Part 5)	One test per 400 cu.m.
		(iii) Water absorption	Laboratory		One test per 400 cu.m.
		(iv) Density of compacted layer	Laboratory		One test per 1000 cu.m.
		(v) Deleteriou s constituen ts	Field	IS:2386 (Part 2)	As required
		(vi) Soundness test	Field	IS:2386 (Part 5)	Same as mentioned under serial No. 8
		(vii) CBR	Laboratory		As required

LIST OF MANDATORY TESTS- WMM

Material		Test	*Field/ Laboratory Test*	Test Procedure	Frequency of Testing
Wet Mix Macadam		(i) Aggregate Impact Value or Los AngelesAbrasion value	Laboratory	IS:2386 (Part 4)	One tests per 1000 cu.m ofaggregate
		(ii) Grading of aggregate	Field	IS:2386 (Part 1)	One tests per 200 cu.m ofaggregate
		(iii) Combined Flakinessand Elongation Indices	Laboratory	IS:2386 (Part 1)	One tests per 500 cu.m ofaggregate
		(iv) Atterberg limits of portion of aggregate passing 425 micron sieve	Laboratory	IS:2720 (Part 5)	One tests per 200 cu.m ofaggregate
		(v) Density of compacted layer	Field		One set of three tests per 1000sq.m.
		(vi) Water absorption ofaggregate	Laboratory	IS:2386 (Part 3)	Once in a month
		(vii) Deleterious material	Field	IS:2386 (Part 2)	As required, once in a month

Apart from mandatory tests specified above, Tests required for conformance of various materials becoming part of permeant structure shall be carried out as per relevant IS Codes. The Engineer-in-Charge may at his discretion, call for any additional tests that he may consider necessary. Sampling, procedure and computations for such test shall be done in accordance with Relevant IS Codes, ASTM, EN and Standards

GUARANTEE BONDS

ANNEXURE-I
GUARANTEE BOND TO BE EXECUTED BY CONTRACTORS FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF WATER PROOFING WORKS

The Agreement made this ..... day of ..... two thousand and ..... between ..... son of ..... of ..... (hereinafter called the Guarantor of the one part) and the PRESIDENT OF INDIA (hereinafter called Government of the other part).

WHEREAS this agreement is supplementary to a contract (hereinafter called the Contract) dated ..... and made between the GUARANTOR of the one part and the Government of the other part, whereby the Contractor, inter alia, undertook to render the buildings and structures in the said contract recited completely water and leak-proof.

AND WHEREAS GUARANTOR agreed to give a guarantee to the effect that the said structures will remain water and leak-proof for **05 (Five) years from date of completion of entire project**.

NOW THE GUARANTOR hereby guarantees that water proofing treatment given by him will render the structures completely leak-proof and the minimum life of such water proofing treatment shall be five years to be reckoned from the date after the maintenance period prescribed in the contract.

Provided that the guarantor will not be responsible for leakage caused by earthquake or structural defects or misuse of roof or alteration and for such purpose:

(a) Misuse of roof shall mean any operation which will damage proofing treatment, like chopping of firewood and things of the same nature which might cause damage to the roof;

(b) Alteration shall mean construction of an additional storey or a part of the roof or construction adjoining to existing roof whereby proofing treatment is removed in parts;

(c) The decision of the Engineer-in-Charge with regard to cause of leakage shall be final.

During this period of guarantee the guarantor shall make good all defects and in case of any defect being found, render the building water-proof to the satisfaction of the Engineer-in-Charge at his cost, and shall commence the work for such rectification within seven days from the date of issue of the notice from the Engineer-in-Charge calling upon him to rectify the defects, failing which the work shall be got done by the Department by some other contractor at the GUARANTOR'S cost and

risk. The decision of the Engineer- in-Charge as to the cost, payable by the Guarantor shall be final and binding.

That if GUARANTOR fails to execute the water proofing or commits breach thereunder then the GUARANTOR will indemnify the Principal and his successors against all loss, damage, cost, expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and/or cost incurred by the Government the decision of the Engineer-in-Charge will be final and binding on the parties.

IN WITNESS WHEREOF these presents have been executed by the Obligor .....and by ..... and for and on behalf of the PRESIDENT OF INDIA on the day, month and year first above written.

Signed, sealed and delivered by OBLIGOR in the presence of

1.

2.

Signed for and on behalf of THE PRESIDENT OF INDIA by ..... in the presence of

1.

ANNEXURE-II

GUARANTEE TO BE EXECUTED BY THE CONTRACTOR FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF SANITARY INSTALLATIONS / WATER SUPPLY / DRAINAGE WORK AND ALUMINIUM WORK/FIRE CHECK DOORS

The agreement made this..... day of.....Two Thousand..... between.....S/o .....(hereinafter called the GUARANTOR on the one part) and the PRESIDENT OF INDIA (hereinafter called the Government on the other part) WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated and made between the GUARANTOR ON THE ONE PART AND the Government on the other part, whereby the contractor inter alia, undertook to render the work in the said contract structurally stable, leak proof and sound material, workmanship, anodizing, colouring, sealing etc.

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the affect that the said work will remain structurally stable, leak proof and guaranteed against faulty material and workmanship, defective anodizing / Powder coat colouring and finishing for **5 (Five) years from date of completion of entire project.**

NOW THE GUARANTOR hereby guarantee that work executed by him will be free from any leakage, seepage, cracks in pipes and guaranteed against faulty material and workmanship, defective galvanizing for five years to be reckoned from the date after the expiry of maintenance period prescribed in the contract.

The decision of the Engineer-in-Charge with regard to nature and cause of defect shall be final.

During this period of guarantee, the guarantor shall make good all defects and in case of any defect to satisfaction of Engineer-in-Charge at his cost and shall commence the work for such rectification within seven days from the date of issue of the notice from the Engineer-in-Charge calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the guarantor's cost and risk. The decision of the Engineer-in-Charge as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to make good all defects or commits breach there under, then the guarantor will indemnify the principal and his successor

against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and or cost incurred by the Government, the decision of the Engineer-in-Charge will be final and binding on both the parties.

Further, (i) the collateral damages caused due to any defective work, shall be borne by the Contractor and (ii) Any incidental works which are to be done for rectification and restoring the same to original condition, shall be borne by the Contractor.

IN WITHNESS WHEREOF these presents have been executed by the obligator.....

..... and ..... by
..... for and on behalf of the PRESIDENT OF INDIA on the day, month and year first above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of: -

1..... 2. .....

SIGNED FOR AND ON BEHALF OF THE PRESIDENT OF INDIA BY..... in the presence of: -

1..... 2. .....