Bank Guarantee for Retention Money Security (Form PW3-11)

[This is the format for the Retention Money Guarantee to be issued by a scheduled bank of Bangladesh in accordance with GCC Sub Clause 72.3. All italicized text is for guidance on how to prepare this guarantee and shall be deleted from the final document]]

Demand Guarantee

[Bank's Name, and Address of Issuing Branch or Office]

Beneficiary: *[insert Name and Address of the Procuring Entity]*

Date: *[insert date]*

RETENTION MONEY GUARANTEE No.: [insert number]

We have been informed that *[insert name of Contractor]* (hereinafter called "the Contractor") has entered into Contract Number *[insert reference number of the Contract]* dated [insert date] with you, for the execution of *[insert name of Contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, when the Taking-Over Certificate has been issued for the Works and the first half of the Retention Money has been certified for payment, payment of Tk. [insert the amount of the second half of the Retention Money] which becomes due after the Defects Liability Period has passed and certified in the form of Defects Correction Certificate, is to be made against a Retention Money Guarantee.

At the request of the Contractor, we *[insert name of Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of Tk. *[insert amount in figures]* (Taka [insert amount in words]) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor failed to properly correct the defects duly notified in respect of the Works.

It is a condition for any claim and payment under this guarantee to be made that the payment of the second half of the Retention Money referred to above must have been received by the Contractor on its account number*[insert A/C no] at [name and address of Bank].*

This guarantee is valid until *[insert the date of validity of Guarantee that being twenty eight (28) days beyond the Defects Liability Period]*. Consequently, we must receive at the above-mentioned office any demand for payment under this guarantee on or before that date.

Signature

Seal of Bank and Signature

Section 6. Bill of Quantities

Preamble to Bill of Quantities

1. The complete description for the work items listed in the Bill of Quantities is given in Section-06 of the Bid Documents.

2. The works shall be measured in accordance with the Measurement and Payment Sub-Clauses given at the end of each section of the specifications unless otherwise stated, together with any additional items included in the Bill of Quantities. The rates for these items should include all costs, including work of an ancillary or temporary nature, Test Fees, overheads and profit, required by the Bidder and shall (except insofar as is otherwise provided in the Contract) cover all his obligations under the Contract for the complete construction and maintenance of the works.

3. The quantities shall be computed net. In measuring earthworks no allowance shall be made for temporary batters, working space, shoring, Temporary works or bulking of the soil and the Bidder should make due allowance in his rates.

4. Payment for pre-cast piles shall be made in separate items for supplying and driving as per contract prices and units, concrete, reinforcement, pile shoe items shall be included.

5. The rates inserted against each item are to include for the provision and operation of all equipment necessary to meet the specifications. The Bidder shall be responsible for supplying the equipment.

6. The Bidder should not assume that equipment will be available from the BEZA and shall allow for obtaining equipment from other sources.

7. If the Bidder fails to enter a price against an item in the Bill of Quantities the amount shall be deemed to be included elsewhere in his rates.

8. The Bidder's attention is drawn to Clauses of the Conditions of Contract, which deal with variations in quantities.

9. No additional item of work of any nature shall be undertaken before a written order by the Engineer has been issued to the Bidder in this respect and a rate agreed. If there is no agreement between the Bidder and the Engineer on the rate, then the Engineer may instruct the Bidder to proceed with the work at a rate fixed by the Engineer.

10. The Bidder is responsible for ensuring the necessary tests and measurements are carried out field and at the laboratory fixed by BEZA in order to ensure that the work complies with the specifications. The Bidder shall give 24 hours notice of each item of work, which is due for testing. Any item of work, which is covered or buried without tests being carried out, may be rejected by the Engineer. Bidder's quoted rate for each item of work shall be inclusive of such test fees.

11. Only materials and work complying fully with all specified requirements shall be eligible for payment under the Contract.

12. Usable materials salvaged from within the site are the property of the BEZA and shall be applied to the works as indicated in the Bill of Quantities.

General Notes for Bidder:

01. Preshipment Inspection required for Chillers, Fire Pumps and Fire Detection Alarm system by third party or 3 persons of Client.

02. All cost for PSI will be borne by contractor.

Bill of Quantities

Name of Works: Interior works and HVAC system installation for BEZA in Administrative Building in BSMSN

IFT No. 01/2020-21, Package No. : BEZA WD-1802 B, Lot No. : 01

Item No.	Description of Item	Unit	Quantity	Unit Rate (BDT)		Amount (BDT)	
				In figures	In words	In figures	In words
1	*2*	*3*	*4*	*5*	*6=5*	*7=4x5*	*8=7*
1	Supplying, fitting and fixing foreign (China or equivalent) made polished porcelain/ mirror polished/Glazed porcelain homogeneous floor tiles complying BDS ISO 13006: 2015, water absorption ≤ 0.5%, modulus of rupture (MOR) ≥ 35 N/mm2, irrespective of color &/or design, with cement sand (F.M. 1.2) mortar (1:4) base and raking out the joints with white cement including cutting and laying the tiles in proper way and finishing with care etc. all complete and accepted by the Engineer-in-charge. (Cement: CEM-II/A-M) In ground floor. Polish porcelain/ mirror polished/ Glazed porcelain (Marbel Shaded) 600 mm x 1200 mm floor tiles	Sqm	6020.59				
2	Supplying, fitting and fixing foreign (China or equivalent) made glazed wall tiles complying BDS ISO 13006: 2015, irrespective of color &/or design, with 20 mm thick cement sand (F.M. 1.2) mortar (1:3) base and raking out the joints with white cement including cutting, laying and hire charge of machine and finishing with care etc. including water, electricity and other charges complete in all respect and accepted by the Engineer-in-charge. (Cement: CEM-II/A-M). In ground floor. Glazed wall tiles (Marbel Shaded) 600 mm x 1200 mm	Sqm	1125.60				
3	Supplying, fitting and fixing foreign (China or equivalent) made glazed wall tiles complying BDS ISO 13006: 2015, irrespective of color &/or design, with 20 mm thick cement sand (F.M. 1.2) mortar (1:3) base and raking out the joints with white cement including cutting, laying and hire charge of machine and finishing with care etc. including water, electricity and other charges complete in all respect and accepted by the Architect-in-charge. (Cement: CEM-II/A-M). In ground floor. Glazed	Sqm	75.00				

Item No.	Description of Item	Unit	Quantity	Unit Rate (BDT)		Amount (BDT)	
				In figures	In words	In figures	In words
1	*2*	*3*	*4*	*5*	*6=5*	*7=4x5*	*8=7*
	feature wall tiles (600 mm x 1200 mm, 800X800 mm, 450X900 mm, 300X600 mm, 200X 1200mm & if any other tiles according to the design of architect)						
4	Supplying, fitting and fixing foreign (China or equivalent) made GP homogeneous stair tiles having non skidding offsets, complying BDS ISO 13006: 2015, water absorption ≤ 0.5%, modulus of rupture (MOR) ≥ 27 N/mm2, irrespective of color &/or design, with cement sand (F.M. 1.2) mortar (1:4) base and raking out the joints with white cement including cutting and laying the tiles in proper way and finishing with care etc. all complete and accepted by the Engineer-in-charge. (Cement: CEM-II/A-M) In ground floor. Glazed stair tiles of size 300 mm x 600 mm, anti slip.	Sqm	443.95				
5	Supplying, fitting and fixing MDF board ceiling (complying unit wt 499 to 550 kg/m3, bending strength 0.35 N/mm2, max swelling 8%, moisture content not more than 10%), of 12 mm thick with best quality and well seasoned Garjan wood frame of section 70 mm x 30 mm at 600 mm x 600 mm in grid suspended from ceiling or roof or beam by 12 SWG double ply G.I. wire fixed to the ceiling by rowel plug, screws, hooks, nails etc, maintaining straight lines and desired finished level at bottom face including vertical strut as required, cutting holes in slabs or beams by electric drill machine and mending good the damages, if any during execution of the work, also including cost and carriage of all materials, accessories, labour for installation, electricity charge, scaffolding, screws, nails, Duco Paint over a coat of priming etc. all complete, as per drawing design and accepted by the Engineer-in-charge.	Sqm	731.51				
6	Supplying, fitting and fixing of 0.7 mm thick perforated/plain Metal board false ceiling with aluminum frame suspended from ceiling false ceiling of size 600 mm x 600 mm, powder coated of approved design, framing by aluminium T-bar of natural anodized finish suspended in 600 mm x 600 mm grid from ceiling by 12 SWG	Sqm	1360.18				

Item No.	Description of Item	Unit	Quantity	Unit Rate (BDT)		Amount (BDT)	
				In figures	In words	In figures	In words
1	*2*	*3*	*4*	*5*	*6=5*	*7=4x5*	*8=7*
	double ply wire, fixed to the ceiling by rowel plug, screws, hooks, nails etc., maintaining straight lines and desired finished level at bottom face including vertical wooden strut as required, making holes in slabs or beams by electric drill machine and mending good the damages, if any during execution of the work, also including cost of all materials, electricity, accessories, scaffoldings, labour for installation, screws, nails, etc. all complete as per drawing, design and accepted by the Engineer-in-charge.						
7	Supplying, fitting and fixing 12 mm thick burma teak (BT) veneered board in walling with best quality and well seasoned garjan wood frame of section 70 mm x 30 mm at 600 x 600 mm in grid, fitted and fixed to wall by plugs, nails, screws etc. including treatment of inner surface with termite and damp proofing agent maintaining leveled and finished exposed faces including. making holes in wall and mending good the damages, if any during execution of the work, also including cost and carriage of all materials, electricity, accessories, labour for installation, scaffolding, screws, nails etc. including Duco Paint over a coat of priming etc. all complete as per design, approved sample and accepted by the Engineer-in-charge.	Sqm	456.03			
8	Supplying, fitting and fixing stainless steel (SS) stair railing of standard height with 2 mm thick 62 mm dia pipe for hand-rail, 6 nos 62 mm x 50 mm x 2 mm vertical box in each flight, 2 mm thick 25 mm dia 5 nos horizontal pipes as per drawing, design including carrying, polishing fabricating, welding and fixing with tread by 25 mm long royal bolt etc. all complete and accepted by the Engineer-in-charge.	Sqm	45.15				
9	Supplying, fitting and fixing 10 mm thick tempered glass railing in stair with 62 mm dia 2 mm thick SS pipe for hand rail, 2 nos 62 mm x 50 mm x 2 mm vertical pipe in each flight & 3 nos 62 mm x 50 mm x 2 mm vertical pipe in each landing fitted and fixed with 65 mm x 55 mm x 6 mm SS base plate including welding, bending, fabricating, polishing all complete as per drawing, desing and specification	Sqm	588.50				

Item No.	Description of Item	Unit	Quantity	Unit Rate (BDT)		Amount (BDT)	
				In figures	In words	In figures	In words
1	*2*	*3*	*4*	*5*	*6=5*	*7=4x5*	*8=7*
	etc all complete in all respect and accepted by Engineer-in-charge.						
10	Supplying, fitting and fixing 10 mm thick clear tempered glass door including all accessories, 1 set floor mounted auto door closure, special quality 2 nos. clamping devices, 1 set locking device, top hinge and handle etc. complete in all respect as per drawing and direction of the Engineer-in-charge.	Sqm	132.50				
11	Supplying, fitting and fixing of 10 mm thick clear tempered glass wall upto 3.0 m height with vertical fin glass support of same thickness and support shall be at least 1.2 m c/c fixed properly with glass by silicon glue with supply and fittings of all required accessories such as SS u channel, nut bolts, aluminium angle, steel rowel bolt, screws , rivets norton tape masking tape, structural sealant, gum bracket rod etc. all complete in all respect as per drawing and direction of the Engineer-in- charge.	Sqm	677.50				
12	Supplying, fitting and fixing 38 mm thick finished well matured seasoned (minimum 250 mm wide plank) wooden grooved single panel flush door shutters with top and middle rail 100 mm x 38 mm, bottom rail 225 mm x 38 mm and style 100 mm x 38 mm, having vertical panels 100 mm x 38 mm including keeping 6 mm x 12 mm even groove all around and minimum 12 mm grooved lap to each panel. Providing 4 (four) nos best quality 100 mm long iron hinges, 12 mm dia best quality 200 mm and 250 mm long iron socket and tower bolts, 2 (two) nos heavy type best quality nickel plated handles long, 1 (one) no best quality hasp bolt, hinged cleats, 1 Door closer, wooden buffer blocks including supply of necessary nails and screws, finishing by sand papering etc. complete in all floors as per drawing and accepted by the Engineer-in-charge. (All sizes of wood are finished).	Sqm	35.10				
13.1	Add for each additional floor for 1st floor (For Floor, Wall, Stair & Feature wall Tiles)	Sqm	1699.58				
13.2	Add for each additional floor for 2nd floor (For Floor, Wall, Stair & Feature wall Tiles)	Sqm	1879.16				
13.3	Add for each additional floor for 3rd floor (For Floor, Wall, Stair & Feature wall Tiles)	Sqm	1860.41				
13.4	Add for each additional floor for 4th floor (For Floor, Wall, Stair & Feature wall Tiles)	Sqm	281.57				
14	Supplying, fitting and fixing 10 mm thick tempered glass railing in verandah with 62 mm dia 2 mm thick SS pipe for hand rail, 5 nos 62 mm x 50 mm x 2 mm vertical box fitted with concrete slab by 65 mm x 55 mm x 6	Sqm	152.76				

Item No.	Description of Item	Unit	Quantity	Unit Rate (BDT)		Amount (BDT)	
				In figures	In words	In figures	In words
1	*2*	*3*	*4*	*5*	*6=5*	*7=4x5*	*8=7*
	mm SS plate @ 600 mm c/c including all fittings, fixtures as per drawing, desing and specification etc all complete in all respect and accepted by Engineer-in-charge.						
15	Supplying, fitting and fixing 18 mm thick burma teak (BT) veneered board louver ceiling (complying unit wt 499 to 550 kg/m3, bending strength 0.35 N/mm2, max swelling 8%, moisture content not more than 10%), with best quality and well seasoned Garjan wood frame of section 75 mm x 38 mm at 600 mm x 600 mm in grid suspended from ceiling or roof or beam by 12 SWG double ply G.I. wire fixed to the ceiling by rowel plug, screws, hooks, nails etc, maintaining straight lines and desired finished level at bottom face including vertical strut as required, cutting holes in slabs or beams by electric drill machine and mending good the damages, if any during execution of the work, also including cost and carriage of all materials, accessories, labour for installation, electricity charge, scaffolding, screws, nails, including Duco Paint by 2 coats over a coat of priming etc. all complete, as per drawing design and accepted by the Engineer-in-charge.	Sqm	78.08				
16	Supplying, fitting and fixing 12 mm thick MDF Jali over 12mm thick Gorjon ply board in walling with best quality and well seasoned garjan wood frame of section 70 mm x 30 mm at 600 x 600 mm in grid, fitted and fixed to wall by plugs, nails, screws etc. including treatment of inner surface with termite and damp proofing agent maintaining leveled and finished exposed faces including. making holes in wall and mending good the damages, if any during execution of the work, also including cost and carriage of all materials, electricity, accessories, labour for installation, scaffolding, screws, nails etc. including Duco Paint over a coat of priming etc. all complete as per design, approved sample and accepted by the Engineer-in-charge.	Sqm	74.78				
17	Supply & fixing of LED tube / panel light fitting of the following features, size and model with all necessary elements such as driver, chips etc. complete. Model & sample shall be approved by the Engineer. (i) Square panel ENERGY+ Model: EPPLLED 2001 or equivalent product of ENERGY+ / SUNKO / ENERGYPAC / etc.	nos	160				

Item No.	Description of Item	Unit	Quantity	Unit Rate (BDT)		Amount (BDT)	
				In figures	In words	In figures	In words
1	*2*	*3*	*4*	*5*	*6=5*	*7=4x5*	*8=7*
	(ii) Rated life: 30,000 hr. (minimum) (iii) luminous flux : 100 + 1m/w (iv) LED chips : EDISON / EPISTAR / OSRAM / PHILIPS / CREE / BRIDGELUX. (v) Driver: MEANWELL / OSRAM / PHILIPS / IEC standard. (vi) Size : 600 mm x 600 mm **48 W (2' x 2')**						
18	Supply & fixing of LED spot light fitting of the following features and model with all necessary elements such as driver, chips etc. complete. Model & sample shall be approved by the Engineer. (i) GLORIA cat. no.- Gcdl-332 (7 W / 9 W / 12 W)or equivalent product of ENERGYPAC / ENERGY + etc. (ii) Rated life : 30,000 hr. (minimum)(iii) Luminous flux : 100 + 1m/w(iv) LED chips : EDISON / EPISTAR / OSRAM / PHILIPS / CREE/ BRIDGELUX.(v) Driver: MEANWELL / OSRAM / PHILIPS / IEC standard.	nos	612				
19	Supply & fixing of the following LED bulbs & tube lamps manufacturers by ENERGY+ / MEP / HARMONICS / ELECTRO / SUNTEC / GE / TRANSTEC / ENERGYPAC or equivalent brand accepted / approved by the Engineer. **600 mm / 2'- 9 / 10 watt-T5 AC LED tube Lamp**	nos	620				
20	Supply & fixing of LED spot light fitting of the following features and model with all necessary elements such as driver, chips etc. complete. Model & sample shall be approved by the Engineer. (i) Round panel (surface type) ENERGY+ cat. No. - EPPLLED 2006 or equivalent product of GLORIA / SUNKO / ENERGYPAC / ASHA etc. (ii) Rated life: 30,000 hr. (minimum) (iii) luminous flux : 100 + 1m/w (iv) LED chips: EDISON / EPISTAR / OSRAM / PHILIPS / CREE / BRIDGELUX. (v) Driver: MEANWELL / OSRAM / PHILIPS / IEC standard. **24 W**	nos	64				
21	Supply & fixing of LED bath-room light fitting of the following features and model with all necessary elements such as driver, chips etc. complete. Model & sample shall be approved by the Engineer. (i) ENERGY + cat. no. - EPML-10024 or equivalent product of GLORIA / SUNKO / ENERGYPAC etc. (ii) Rated life : 50,000 hr. (minimum) (iii) Luminous flux : 100 + 1m/w (iv) LED chips : EDISON / EPISTAR / OSRAM / PHILIPS / CREE/	nos	48				

Item No.	Description of Item	Unit	Quantity	Unit Rate (BDT)		Amount (BDT)	
				In figures	In words	In figures	In words
1	*2*	*3*	*4*	*5*	*6=5*	*7=4x5*	*8=7*
	the insulation shall be plastered with neat finish over G.I wire-mesh.						
41.0	**Pre-insulated Pipe Pipe: Black steel schedule 40(s) ASTM-A-53 Grade B. BS 1387 grade C Heavy duty** **Insulation:** Poly Urethene, density: 45 kg.m3 minimum, Insulation Thermal conductivity: 0.022 w/mK at 20 C mean temp. **Jacketing:** 0.5mm GP Sheet, spiral wound The works shall be complete with factory fabricated bends, tees, elbows, reducers, socket, union, nipple, flange, etc. as per requirement, drawing and direction. Pipe work shall be complete with pipe hangers, supports, vibration isolator brackets, etc. .						
41.1	Dia 200 mm (thick 50mm)	m	150				
41.2	Dia 150 mm (thick 38mm)	m	50				
41.3	Dia 100 mm (thick 38mm)	m	100				
41.4	Dia 80 mm (thick 38mm)	m	50				
41.5	Dia 65 mm (thick 38mm)	m	100				
41.6	Dia 50 mm (thick 38mm)	m	200				
41.7	Dia 40 mm (thick 38mm)	m	250				
41.8	Dia 32 mm (thick 38mm)	m	150				
41.9	Dia 25 mm (thick 32mm)	m	350				
41.10	Dia 20 mm (thick 32mm)	m	450				
42.0	**Chilled Water Pipe Insulation (Joining between Preinsulated pipe or in case of shortage of imported items)** Chilled Water Pipe Insulation with Poly Urethene and Jacketing with GP Sheet of 26 SWG.						
42.1	Dia 200 mm (thick 50mm)	m	1				
42.2	Dia 150 mm (thick 38mm)	m	1				
42.3	Dia 100 mm (thick 38mm)	m	1				
42.4	Dia 80 mm (thick 38mm)	m	1				
42.5	Dia 65 mm (thick 38mm)	m	1				
42.6	Dia 50 mm (thick 38mm)	m	1				
42.7	Dia 40 mm (thick 38mm)	m	1				
42.8	Dia 32 mm (thick 38mm)	m	1				
42.9	Dia 25 mm (thick 32mm)	m	1				
42.10	Dia 20 mm (thick 32mm)	m	1				
43.0	**Duct Work** Supply, fabrication and installation of galvanized sheet steel duct work complete with bends, Tees, reducers, branch takeoffs, air chamber etc. as per direction and drawing. Hangers,						

Item No.	Description of Item	Unit	Quantity	Unit Rate (BDT)		Amount (BDT)	
				In figures	In words	In figures	In words
1	*2*	*3*	*4*	*5*	*6=5*	*7=4x5*	*8=7*
	brackets, stiffeners and isolator boxes shall be fabricated with M.S. angle/F.I. bar or rod as per drawing and direction and shall be galvanized. Duct shall be constructed with best-bloomed galvanized sheet steel. Before installation of duct, inside and outside shall be cleaned from any dust. Between flanges, for flanged end duct, approved type of gasket shall be used. Approved type of sealing compound shall be used to make the duct work leak-proof. Duct shall be hanged or supported at an interval of not more than 1.8 meter.						
43.1	Galvanised Steel Sheet metal duct						
43.1.1	Duct made of 22 SWG sheet	sqm	20				
43.1.2	Duct made of 24 SWG sheet	sqm	600				
43.2	Pre-insulated Duct Duct made of pre-insulated non-metallic duct, It includes Tees, Bends, Elbows, Reducers, Offsets, etc. Approved sealant shall have to be used to make duct leak proof. Foam density: Minimum 48 kg/m3 Thermal conductivity: 0.035 kg/m. K Aluminum Thickness: 80micro-meter Duct thickness 25mm	sqm	700				
44.0	Duct Acoustic Lining Duct accoustic lining made of nitrile rubber base with open elastomeric foam, specially prepared for duct accoustic. Lining shall have peelable self adhesive tape for fixing with duct. -Operating temperature: -20 C to 85 C -Thermal Conductivity: Max 0.047 W/mK @ 20 C -Fire: Class 1 -Density: Min 140 kg/m3 -Tensile Strength: Minimum 100kPa -Thickness: 15mm	sqm	9.5				
45.0	Air Terminals Air terminals shall be constructed						

No persons of either the Engineer's or Contractor's staff other than authorised boatmen shall be allowed to operate the boats.

The Bill of Quantities indicates the requirements for road and river transport. When items of transport are out of use for repairs, servicing etc., equivalent substitutes shall be provided by the contractor.

Items of transport and drivers or boatmen considered unsuitable by the Engineer shall be replaced.

RELOCATION OF PUBLIC UTILITIES

Description

The Contractor shall be responsible for establishing the locations of all public utilities within the Site of the Works, and for their protection.

Where the necessity for the permanent relocation of public utilities has been identified, details will be indicated on the Drawings.

Should the Contractor consider that the temporary diversion of public utilities is necessary in order to carry out Contract works, he shall submit details of his proposals to the Engineer.

Relocation works will normally be undertaken by the concerned authorities, with which the Contractor will be expected to liaise. The Contractor shall indicate relocation works in his ContractProgramme.

GENERAL CONTRACTOR'S OBLIGATIONS

Site Establishment, Maintenance and Demobilisation

The Contractor is to allow for the provision, maintenance and removal at the end of the Contract of all offices, stores, covered workshops, canteens, toilet facilities etc. for his own use, required to execute the Works in accordance with the Contract Documents. In addition, the Contractor is to allow for complying with his obligations for safety, security and protection of the environment described in the Contract Documents.

Provision of Insurances

This item is for the provision of insurances as required in accordance with Clauses. The minimum amount of third party insurance shall be as stated in the Contract Data. Failure to provide insurance will result in no interim payments.

As-Built Drawings

The Contractor shall furnish sets of as-built Drawings of the Works to the Engineer, showing the permanent works as actually constructed, within one month of completion of the Works. Included in the sets of as-built Drawings will be revisions of Tender Drawings and Drawings supplied to the Contractor during the Contract as well as revisions of drawings supplied by the Contractor during the Contract. The As-built drawings submitted by the Contractor will be subject to the approval of the Engineer.

The Technical Specification is described in below:

Item No.	Description of Item
1	*2*
1	Supplying, fitting and fixing foreign (China or equivalent) made polished porcelain/ mirror polished/Glazed porcelain homogeneous floor tiles complying BDS ISO 13006: 2015, water absorption ≤ 0.5%, modulus of rupture (MOR) ≥ 35 N/mm2, irrespective of color &/or design, with cement sand (F.M. 1.2) mortar (1:4) base and raking out the joints with white cement including cutting and laying the tiles in proper way and finishing with care etc. all complete and accepted by the Engineer-in-charge. (Cement: CEM-II/A-M) In ground floor. Polish porcelain/ mirror polished/ Glazed porcelain (Marbel Shaded) 600 mm x 1200 mm floor tiles
2	Supplying, fitting and fixing foreign (China or equivalent) made glazed wall tiles complying BDS ISO 13006: 2015, irrespective of color &/or design, with 20 mm thick cement sand (F.M. 1.2) mortar (1:3) base and raking out the joints with white cement including cutting, laying and hire charge of machine and finishing with care etc. including water, electricity and other charges complete in all respect and accepted by the Engineer-in-charge. (Cement: CEM-II/A-M). In ground floor. Glazed wall tiles (Marbel Shaded) 600 mm x 1200 mm
3	Supplying, fitting and fixing foreign (China or equivalent) made glazed wall tiles complying BDS ISO 13006: 2015, irrespective of color &/or design, with 20 mm thick cement sand (F.M. 1.2) mortar (1:3) base and raking out the joints with white cement including cutting, laying and hire charge of machine and finishing with care etc. including water, electricity and other charges complete in all respect and accepted by the Architect-in-charge. (Cement: CEM-II/A-M). In ground floor. Glazed feature wall tiles (600 mm x 1200 mm, 800X800 mm, 450X900 mm, 300X600 mm, 200X 1200mm & if any other tiles according to the design of architect)
4	Supplying, fitting and fixing foreign (China or equivalent) made GP homogeneous stair tiles having non skidding offsets, complying BDS ISO 13006: 2015, water absorption ≤ 0.5%, modulus of rupture (MOR) ≥ 27 N/mm2, irrespective of color &/or design, with cement sand (F.M. 1.2) mortar (1:4) base and raking out the joints with white cement including cutting and laying the tiles in proper way and finishing with care etc. all complete and accepted by the Engineer-in-charge. (Cement: CEM-II/A-M) In ground floor. Glazed stair tiles of size 300 mm x 600 mm, anti slip.
5	Supplying, fitting and fixing MDF board ceiling (complying unit wt 499 to 550 kg/m3, bending strength 0.35 N/mm2, max swelling 8%, moisture content not more than 10%), of 12 mm thick with best quality and well seasoned Garjan wood frame of section 70 mm x 30 mm at 600 mm x 600 mm in grid suspended from ceiling or roof or beam by 12 SWG double ply G.I. wire fixed to the ceiling by rowel plug, screws, hooks, nails etc, maintaining straight lines and desired finished level at bottom face including vertical strut as required, cutting holes in slabs or beams by electric drill machine and mending good the damages, if any during execution of the work, also including

Item No.	Description of Item
1	*2*
	cost and carriage of all materials, accessories, labour for installation, electricity charge, scaffolding, screws, nails, Duco Paint over a coat of priming etc. all complete, as per drawing design and accepted by the Engineer-in-charge.
6	Supplying, fitting and fixing of 0.7 mm thick perforated/plain Metal board false ceiling with aluminum frame suspended from ceiling false ceiling of size 600 mm x 600 mm, powder coated of approved design, framing by aluminium T-bar of natural anodized finish suspended in 600 mm x 600 mm grid from ceiling by 12 SWG double ply wire, fixed to the ceiling by rowel plug, screws, hooks, nails etc., maintaining straight lines and desired finished level at bottom face including vertical wooden strut as required, making holes in slabs or beams by electric drill machine and mending good the damages, if any during execution of the work, also including cost of all materials, electricity, accessories, scaffoldings, labour for installation, screws, nails, etc. all complete as per drawing, design and accepted by the Engineer-in-charge.
7	Supplying, fitting and fixing 12 mm thick burma teak (BT) veneered board in walling with best quality and well seasoned garjan wood frame of section 70 mm x 30 mm at 600 x 600 mm in grid, fitted and fixed to wall by plugs, nails, screws etc. including treatment of inner surface with termite and damp proofing agent maintaining leveled and finished exposed faces including. making holes in wall and mending good the damages, if any during execution of the work, also including cost and carriage of all materials, electricity, accessories, labour for installation, scaffolding, screws, nails etc. including Duco Paint over a coat of priming etc. all complete as per design, approved sample and accepted by the Engineer-in-charge.
8	Supplying, fitting and fixing stainless steel (SS) stair railing of standard height with 2 mm thick 62 mm dia pipe for hand-rail, 6 nos 62 mm x 50 mm x 2 mm vertical box in each flight, 2 mm thick 25 mm dia 5 nos horizontal pipes as per drawing, design including carrying, polishing fabricating, welding and fixing with tread by 25 mm long royal bolt etc. all complete and accepted by the Engineer-in-charge.
9	Supplying, fitting and fixing 10 mm thick tempered glass railing in stair with 62 mm dia 2 mm thick SS pipe for hand rail, 2 nos 62 mm x 50 mm x 2 mm vertical pipe in each flight & 3 nos 62 mm x 50 mm x 2 mm vertical pipe in each landing fitted and fixed with 65 mm x 55 mm x 6 mm SS base plate including welding, bending, fabricating, polishing all complete as per drawing, desing and specification etc all complete in all respect and accepted by Engineer-in-charge.
10	Supplying, fitting and fixing 10 mm thick clear tempered glass door including all accessories, 1 set floor mounted auto door closure, special quality 2 nos. clamping devices, 1 set locking device, top hinge and handle etc. complete in all respect as per drawing and direction of the Engineer-in-charge.
11	Supplying, fitting and fixing of 10 mm thick clear tempered glass wall upto 3.0 m height with vertical fin glass support of same thickness and support shall be at least 1.2 m c/c fixed properly with glass by silicon

Item No.	Description of Item
1	*2*
	glue with supply and fittings of all required accessories such as SS u channel, nut bolts, aluminium angle, steel rowel bolt, screws , rivets norton tape masking tape, structural sealant, gum bracket rod etc. all complete in all respect as per drawing and direction of the Engineer-in- charge.
12	Supplying, fitting and fixing 38 mm thick finished well matured seasoned (minimum 250 mm wide plank) wooden grooved single panel flush door shutters with top and middle rail 100 mm x 38 mm, bottom rail 225 mm x 38 mm and style 100 mm x 38 mm, having vertical panels 100 mm x 38 mm including keeping 6 mm x 12 mm even groove all around and minimum 12 mm grooved lap to each panel. Providing 4 (four) nos best quality 100 mm long iron hinges, 12 mm dia best quality 200 mm and 250 mm long iron socket and tower bolts, 2 (two) nos heavy type best quality nickel plated handles long, 1 (one) no best quality hasp bolt, hinged cleats, 1 Door closer, wooden buffer blocks including supply of necessary nails and screws, finishing by sand papering etc. complete in all floors as per drawing and accepted by the Engineer-in-charge. (All sizes of wood are finished).
13.1	Add for each additional floor for 1st floor (For Floor, Wall, Stair & Feature wall Tiles)
13.2	Add for each additional floor for 2nd floor (For Floor, Wall, Stair & Feature wall Tiles)
13.3	Add for each additional floor for 3rd floor (For Floor, Wall, Stair & Feature wall Tiles)
13.4	Add for each additional floor for 4th floor (For Floor, Wall, Stair & Feature wall Tiles)
14	Supplying, fitting and fixing 10 mm thick tempered glass railing in verandah with 62 mm dia 2 mm thick SS pipe for hand rail, 5 nos 62 mm x 50 mm x 2 mm vertical box fitted with concrete slab by 65 mm x 55 mm x 6 mm SS plate @ 600 mm c/c including all fittings, fixtures as per drawing, desing and specification etc all complete in all respect and accepted by Engineer-in-charge.
15	Supplying, fitting and fixing 18 mm thick burma teak (BT) veneered board louver ceiling (complying unit wt 499 to 550 kg/m3, bending strength 0.35 N/mm2, max swelling 8%, moisture content not more than 10%), with best quality and well seasoned Garjan wood frame of section 75 mm x 38 mm at 600 mm x 600 mm in grid suspended from ceiling or roof or beam by 12 SWG double ply G.I. wire fixed to the ceiling by rowel plug, screws, hooks, nails etc, maintaining straight lines and desired finished level at bottom face including vertical strut as required, cutting holes in slabs or beams by electric drill machine and mending good the damages, if any during execution of the work, also including cost and carriage of all materials, accessories, labour for installation, electricity charge, scaffolding, screws, nails, including Duco Paint by 2 coats over a coat of priming etc. all complete, as per drawing design and accepted by the Engineer-in-charge.
16	Supplying, fitting and fixing 12 mm thick MDF Jali over 12mm thick Gorjon ply board in walling with best quality and well seasoned garjan wood frame of section 70 mm x 30 mm at 600 x 600 mm in grid, fitted and fixed to wall by plugs, nails, screws etc. including treatment of inner surface with termite and damp proofing agent maintaining leveled and finished exposed faces including. making holes in wall and mending good the damages, if any during execution of the work, also including cost and carriage of all materials, electricity, accessories, labour for installation, scaffolding, screws, nails etc. including Duco Paint over a

Item No.	Description of Item
1	*2*
	coat of priming etc. all complete as per design, approved sample and accepted by the Engineer-in-charge.
17	Supply & fixing of LED tube / panel light fitting of the following features, size and model with all necessary elements such as driver, chips etc. complete. Model & sample shall be approved by the Engineer. (i) Square panel ENERGY+ Model: EPPLLED 2001 or equivalent product of ENERGY+ / SUNKO / ENERGYPAC / etc. (ii) Rated life: 30,000 hr. (minimum) (iii) luminous flux : 100 + 1m/w (iv) LED chips : EDISON / EPISTAR / OSRAM / PHILIPS / CREE / BRIDGELUX. (v) Driver: MEANWELL / OSRAM / PHILIPS / IEC standard. (vi) Size : 600 mm x 600 mm **48 W (2' x 2')**
18	Supply & fixing of LED spot light fitting of the following features and model with all necessary elements such as driver, chips etc. complete. Model & sample shall be approved by the Engineer. (i) GLORIA cat. no.- Gcdl-332 (7 W / 9 W / 12 W)or equivalent product of ENERGYPAC / ENERGY + etc. (ii) Rated life : 30,000 hr. (minimum)(iii) Luminous flux : 100 + 1m/w(iv) LED chips : EDISON / EPISTAR / OSRAM / PHILIPS / CREE/ BRIDGELUX.(v) Driver: MEANWELL / OSRAM / PHILIPS / IEC standard.
19	Supply & fixing of the following LED bulbs & tube lamps manufacturers by ENERGY+ / MEP / HARMONICS / ELECTRO / SUNTEC / GE / TRANSTEC / ENERGYPAC or equivalent brand accepted / approved by the Engineer. **600 mm / 2'- 9 / 10 watt-T5 AC LED tube Lamp**
20	Supply & fixing of LED spot light fitting of the following features and model with all necessary elements such as driver, chips etc. complete. Model & sample shall be approved by the Engineer. (i) Round panel (surface type) ENERGY+ cat. No. - EPPLLED 2006 or equivalent product of GLORIA / SUNKO / ENERGYPAC / ASHA etc. (ii) Rated life: 30,000 hr. (minimum) (iii) luminous flux : 100 + 1m/w (iv) LED chips: EDISON / EPISTAR / OSRAM / PHILIPS / CREE / BRIDGELUX. (v) Driver: MEANWELL / OSRAM / PHILIPS / IEC standard. **24 W**
21	Supply & fixing of LED bath-room light fitting of the following features and model with all necessary elements such as driver, chips etc. complete. Model & sample shall be approved by the Engineer. (i) ENERGY + cat. no. - EPML-10024 or equivalent product of GLORIA / SUNKO / ENERGYPAC etc. (ii) Rated life : 50,000 hr. (minimum) (iii) Luminous flux : 100 + 1m/w (iv) LED chips : EDISON / EPISTAR / OSRAM / PHILIPS / CREE/ BRIDGELUX. (v) Driver: MEANWELL / OSRAM / PHILIPS / IEC standard.
22	Providing & fixing the fancy bracket light fitting of the following

Item No.	Description of Item
1	*2*
	manufacturer's model & catalogue number with carrier, brass holder, earth terminal, necessary wiring with 2 x 0.4 sq.mm stranded PVC insulated flexible FR cable etc. Suitable for use CFL & LED lamp (except lamp) complete sample accepted / approved by the Engineer. ENERGY+ cat. no. EPWB 3003 / 1 W or equivalent product of GLORIA / SUNKO / CRESCENT / SHWASH / ASHA etc.
23	Providing and fixing single phase distribution board (SPDB) [concealed / surface] having the following components and specifications: [Fig : 4.2] 1. Steel board : size 20"x15"x4" MS sheet : 18SWG with hinged type door and locking arrangement duly painted with powder coating with epoxy polyester resin on all surfaces of board (gray / off-white) etc. Infront side there will be tempered thick fiber glass with rubber gaskets to observe the inside arrangement. 2. Copper bar: size 10"x 1"x 3mm (2 nos.) and 6"x 1"x 3mm (1 no) mounted on insulator capacity: 60-100A at both ends. 3. 1 no. DPSPMCB (main control) and following nos. SPMCB ,DPSPMCB and SPMCB manufactured and tested in accordance with relevant IEC / VDE / NEMA / BS / JIS standard. Minimum breaking capacity 6/10 KA with thermal overcurrent and instantaneous electromagnetic short circuit release. 4. Loop Cable [from phase bar to SPMCB(circuit&power)] size: 1c-1x2.5sqmm (BYM) With DPSPMCB and SPMCB'S of MEM / ABB / HAVELLS / LEGRAND / FEDERAL /HAGER / VITZRO or equivalent brand accepted / approved by the engineer. (Manufactured by RECO / NASCO / C&S or equivalent product of any other manufacturer) 10-way SPDB incoming : 1x100A DPSPMCB outgoing : 10x5-10A SPMCB
24	Providing & fixing 250 volt single phase 3-pin combined switch socket outlet (surface / Concealed type) manufactured and tested in accordance with relevant IEC / VDE / NEMA / BS / JIS standards mounted on required size 18 SWG galvanized plain sheet board / Plastic Board (Self-extinguishing 650oC) of 76.2 mm. (3") depth. (Manufacturer shall have certificate of standard which they follow). **13/15/16/20Amps. Made in ENGLAND / GERMANY / JAPAN / USA or EU countries.**
25	Providing & fixing 250 volts. 5 / 6 amps (minimum) concealed type following switch / switch socket manufactured and tested in accordance with relevant IEC / VDE / NEMA / BS / JIS standards mounted on required size 18 SWG galvanized plain sheet / PVC board (Self-extinguishing 650oC) of 76.2 mm (3") depth. All electrical contacts shall be of brass / copper. (Manufacturer shall have certificate of standard

Item No.	Description of Item
1	*2*
	-Non-return flaf to prevent back flow -Balanced turbine fan with curved blade -Capacitor operated motor with Class E insulation -Spring clip on front cover for easily removable -ESP: 50 pa -Power supply: 220V, 1 ph, 50 Hz, -Sound rating: Max 40 dBA at 3 m -Air flow rate: 50 CFM
40.0	**Closed Type Expansion Tank with Auto Refil Pump** The closed type Expansion Tank shall be complete with Automatic Refil Unit based on system pressure requirement (2 to 3 Bar, adjustable). It is constructed of mild steel. The tank shall be painted. Accessories: -Auto Refil pump (pressure actuated with Pr. Sensor) -Isolating valve -Check valve -Pressure relief Valve -Air Purger -Starter Panel -Capacity: 1500 Liter The outside surface of the tank shall be insulated with 38mm. Thick of fire retardant type closed cell insulation. The tank shall be installed on R.C.C colum after proper clipping of the roof. All the accessories of the tank shall be properly cleaned, painted over the primer. The outer surface of the insulation shall be plastered with neat finish over G.I wire-mesh.
41.0	**Pre-insulated Pipe** **Pipe:** **Black steel schedule 40(s) ASTM-A-53 Grade B. BS 1387 grade C Heavy duty** **Insulation:** Poly Urethene, density: 45 kg.m3 minimum, Insulation Thermal conductivity: 0.022 w/mK at 20 C mean temp. **Jacketing:** 0.5mm GP Sheet, spiral wound The works shall be complete with factory fabricated bends, tees, elbows, reducers, socket, union, nipple, flange, etc. as per requirement, drawing and direction. Pipe work shall be complete with pipe hangers, supports, vibration isolator brackets, etc. .
41.1	Dia 200 mm (thick 50mm)
41.2	Dia 150 mm (thick 38mm)
41.3	Dia 100 mm (thick 38mm)
41.4	Dia 80 mm (thick 38mm)
41.5	Dia 65 mm (thick 38mm)
41.6	Dia 50 mm (thick 38mm)
41.7	Dia 40 mm (thick 38mm)
41.8	Dia 32 mm (thick 38mm)
41.9	Dia 25 mm (thick 32mm)
41.10	Dia 20 mm (thick 32mm)
42.0	**Chilled Water Pipe Insulation (Joining between Preinsulated pipe**

Item No.	Description of Item
1	*2*
	or in case of shortage of imported items) Chilled Water Pipe Insulation with Poly Urethene and Jacketing with GP Sheet of 26 SWG.
42.1	Dia 200 mm (thick 50mm)
42.2	Dia 150 mm (thick 38mm)
42.3	Dia 100 mm (thick 38mm)
42.4	Dia 80 mm (thick 38mm)
42.5	Dia 65 mm (thick 38mm)
42.6	Dia 50 mm (thick 38mm)
42.7	Dia 40 mm (thick 38mm)
42.8	Dia 32 mm (thick 38mm)
42.9	Dia 25 mm (thick 32mm)
42.10	Dia 20 mm (thick 32mm)
43.0	**Duct Work** Supply, fabrication and installation of galvanized sheet steel duct work complete with bends, Tees, reducers, branch takeoffs, air chamber etc. as per direction and drawing. Hangers, brackets, stiffeners and isolator boxes shall be fabricated with M.S. angle/F.I. bar or rod as per drawing and direction and shall be galvanized. Duct shall be constructed with best-bloomed galvanized sheet steel. Before installation of duct, inside and outside shall be cleaned from any dust. Between flanges, for flanged end duct, approved type of gasket shall be used. Approved type of sealing compound shall be used to make the duct work leak-proof. Duct shall be hanged or supported at an interval of not more than 1.8 meter.
43.1	**Galvanised Steel Sheet metal duct**
43.1.1	Duct made of 22 SWG sheet
43.1.2	Duct made of 24 SWG sheet
43.2	Pre-insulated Duct Duct made of pre-insulated non-metallic duct, It includes Tees, Bends, Elbows, Reducers, Offsets, etc. Approved sealant shall have to be used to make duct leak proof. Foam density: Minimum 48 kg/m3 Thermal conductivity: 0.035 kg/m. K Aluminum Thickness: 80micro-meter Duct thickness 25mm
44.0	**Duct Acoustic Lining** Duct accoustic lining made of nitrile rubber base with open elastomeric foam, specially prepared for duct accoustic. Lining shall have peelable self adhesive tape for fixing with duct. -Operating temperature: -20 C to 85 C -Thermal Conductivity: Max 0.047 W/mK @ 20 C -Fire: Class 1

Test Frequency

Item No.	Description of Item	Test
1	*2*	*3*
31	**Air Cooled Water Chiller (VFD Driven) CH-01 & 02** Air Cooled Water Chiller complete with twin Screw Compressor with motor, Built-in starter panel with VFD, Air Cooled Condenser, insulated Evaporator, temperature and pressure indicator, microprocessor control panel, Flow switch, Standard safety devices, spring mounted vibration isolators, charged compressor oil and other accessories. The units Control Panel shall be factory wired and tested. The unit shall be complete with Safety and Control devices as specified in Technical Specifications: -Condenser material: Copper Coil with Aluminum Fins -Cooling capacity: 615 kW (175 Ton of Refrigeration) -Chilled water inlet/outlet Temp : 11.56 C / 6 C -Chilled water flow rate: 1589.7 l/min (420 US GPM) -Condenser air inlet temperature: 35 C -Fouling factor for Evaporator: 1.8x10-5 m2.0C/W -Minimum Number of Compressor: 2 -Min Number of Refrigerant Circuit with Gas Locking devices: 2 -IPLV rate: Min 4.5 -Capacity control: Stepless -Guard for Condenser Fins -Refrigerant: R407C / R 134a / R410 or Environ friendly Refrigerant -Power input source : 400+/-10%V, 50 Hz, 3 Ph	**Preshipment Inspection by third party or 3 persons of client.**
60.0	**FIRE PUMP :** Pump for fire fighting system shall be complete with mounting, coupled drive, controller etc. Pump shall be operated on pressure signal from pressure switch with all controls and accessories as per pump detail drawing. The works includes cabling from Pump controllers to Pumps, control cabling, Pressure transmission piping, etc. Bidder must submit Software selection for all Pumps complying Water flow rate and head.	**Preshipment Inspection by third party or 3 persons of client.**
60.1	**Diesel Engine Driven Fire Pump (FP 01)** Engine driven fire pump shall be complete with direct coupled 4 stroke diesel engine, pump, all controls and accessories, diesel tank etc. as per specification and drawing. Pump type: Turbine type Water Flow rate: 1000 US GPM, Pump Head: 9 BAR Pump Efficiency: minimum 60%, Pump RPM: 2900 Pump casing: Cast Iron, Test pressure: Min 18 Bar Pump Impeller: Bronze, Pump shaft: Alloy steel Pump water seal: Gland packing, Pump set shall have following accessories: Engine Capacity: 20% over then break horse power Engine over speed shutdown device Engine Tachometer: Engine oil pressure gauge Engine Battery & Charger Engine Aspiration: Turbo	**Preshipment Inspection by third party or 3 persons of client.**

Item No.	Description of Item	Test
1	*2*	*3*
	charged, Fuel Connection, Fire resistance Flexible Supply & Return, Fuel Tank with fuel system and direct reading fuel gauge, 5-8 Stages impeller Automatic air release valve: - 90mm dia Suction gauge range 30"-0-150 psi - 90mm dia Discharge gauge range 0-300 psi - Float - operated air release valve - Flexible coupling - Coupling guard - Pressure relief valve with enclosed Waste cone - Concentric reducer All accessories of pressure sensing line Other accessories shall be NFPA 20 compliant Work also includes: Chimney for Diesel Engine Pump Controller Exhaust ducting, louver, insect proof netting **Listed: UL/ULC/EN/VDS/JIS**	
60.2	**Electric Motor Driven Fire Pump (FP 01)** Electrical driven fire pump shall be complete with motor, starter, base plate, coupling, all other accessories etc. as per specification and drawing. Pump type: Turbine type Water Flow rate: 1000 US GPM, Pump Head: 9 BAR Pump Efficiency: min 60%, Service Factor for Motor: 1.20 Pump RPM: 2900 Pump casing: Cast Iron, Test pressure: Min 18 Bar Pump Impeller: Bronze, Pump shaft: Alloy steel Pump water seal: Gland packing, Pump set shall have following accessories: Suction & Discharge gauge, 5-8 Stages impeller Automatic air release valve: - 90mm dia Suction gauge range 30"-0-150 psi - 90mm dia Discharge gauge range 0-300 psi - Float - operated air release valve - Flexible coupling - Coupling guard - Pressure relief valve with Waste cone - Concentric reducer All accessories of pressure sensing line Pump Controller Other accessories shall be NFPA 20 compliant **Listed: UL/ULC/EN/VDS/JIS**	**Preshipment Inspection by third party or 3 persons of client.**
60.3	**Jockey Pump (JP 01)** Jockey pump shall vertical type complete with pump, pump motor, pressure switches all other standard accessories as per specification. Water Flow rate: 50 US GPM, Pump Head: 9.5 BAR Type : Multi-stage vertical turbine, Efficiency: 60% minimum, Supply: 380V/50Hz/3Ph voltage supply, Motor: RPM TEFC sq.cage, Service factor 1.2, NFPA-20 compliant. - with Fitting: 20mm Casing relief valve - with gauges for suction and discharge **Pump Controller shall be UL/ULC/EN/VDS Listed**	**Preshipment Inspection by third party or 3 persons of client.**
78.0	**IRE ALARM CONTROL PANEL:** Addressable type Fire Alarm Control Panel complete with following basic options. Master Controller Assembly / CPU shall be suitable	

Item No.	Description of Item	Test
1	*2*	*3*
	with port to add Voice alarm system / Fire Fighter Telephone system / Printer / Remote Annunciator etc. FACP must be comply with internationally accepted standard. Control units for Fire -Protective Signaling Systems" Addressable Fire Alarm Control Panel shall be complete, non-coded, Addressable, microprocessor based with initiating devices, notification appliances, and monitoring and control devices. Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACP indicating the location and type of device. Monitoring: FACP shall individually monitor sensors for calibration, sensitivity, and alarm condition, and shall individually adjust for sensitivity. The control unit shall determine the condition of each sensor by comparing the sensor value to the stored values. Environmental Compensation: The FACP shall maintain a moving average of the sensor's smoke chamber value to automatically compensate for dust, dirt, and other conditions that could affect detection operations. Programmable Sensitivity : Photoelectric Smoke Sensors shall have various sensitivity levels ranging from (±) 0.2% up to 3.7%, programmed and monitored from the FACP. Sensitivity Testing Reports: The FACP shall provide sensor reports that meet NFPA /internationally accepted standard calibrated test method requirements. The reports shall be viewed on a CRT Display or printed for annual recording and logging of the calibration maintenance schedule. The FACP shall automatically indicate when an individual sensor needs cleaning. The system shall provide a means to indicate that a sensor requires cleaning. When a sensor's average value reaches a predetermined value, (3) progressive levels of reporting are provided. The first level shall indicate that a sensor is close to a trouble reporting condition and will be indicated on the FACP as "ALMOST DIRTY." This condition provides a means to alert maintenance staff of a dirty sensor without creating a trouble in the system. If this indicator is ignored, a second level "DIRTY SENSOR" condition shall be indicated at the FACP and subsequently a system trouble is reported [to the Central Monitoring Station]. The sensor base LED shall glow steady giving a visible indication at the sensor location. The "DIRTY SENSOR" condition shall not affect the sensitivity level required to alarm the sensor. If a "DIRTY SENSOR" is left unattended, and its average value increases to a third predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the control unit. The FACP shall continuously perform an automatic self-test on each sensor which will check sensor electronics and ensure the accuracy of the values being transmitted. Any sensor that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition. Options at FACP : The control panel operator shall be able to make	**Preshipment Inspection by third party or 3 persons of client.**

Item No.	Description of Item	Test
1	*2*	*3*
	announcements via the push-to-talk paging microphone over the pre-selected speakers. Soft touch keypad, LED indications, LCD Display. Facility for total building paging shall be accomplished by the means of an "All Call" switch. Firefighter's phone (Optional) : Provide a supervised, two-way communication system between the Command Center/main fire alarm control panel and emergency phones. The firefighter's phone system shall be capable of handling single or simultaneous conversations with all phones connected into the system. As many as seven (7) phones shall be able to be connected into the active conversation. The phone system circuits shall be designed to prevent static, hum or other interference for clear, intelligible two-way conversation among all phones of the system. The phone system circuits shall be supervised, such that the FACP shall be able to differentiate between whether a handset has been plugged into the emergency phone jack or whether the circuit has a shorted wire. A beeping busy signal shall indicate to the person attempting to use a remote phone that the signal is being received at the control unit and that the lines are intact.The act of plugging a handset into an emergency phone jack or removal of any phone from its normal hook position shall cause an audible and visual indication at the control unit. Picking up the master phone and acknowledgment of the phone circuit shall silence the tone and allow for direct two-way communications.The act of unplugging handsets in use and replacement of remote phones will return the phone circuits to their normal supervisory functions.The FACP shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC power in a normal supervisory mode for a period of 24 hours with 5 minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operations shall be automatic.Battery: Sealed lead-acid. Provide sufficient capacity to operate the complete alarm system in normal or supervisory (non-alarm) mode for a period of 24 hours. Following this period of operation on battery power, the battery shall have sufficient capacity to operate all components of the system, including all alarm indicating devices in alarm or supervisory mode for a period of 5 minutes. Power Supply (Input Power) shall be 240VAC. All circuits requiring system-operating power shall be 24 VDC and shall be individually fused at the control unit.The incoming power to the system shall be supervised so that any power failure will be indicated at the control unit. A green "power on" LED shall be displayed continuously while incoming power is present.The system batteries shall be supervised so that a low battery or depleted battery condition or disconnection of the battery shall be indicated	

Item No.	Description of Item	Test
1	2	3
	at the control unit and displayed for the specific fault type. The system shall support 100% of addressable devices in alarm or operated at the same time, under both primary(AC) and secondary (battery) power conditions.Loss of primary power shall sound a trouble signal at the FACP. FACP shall indicate when the system is operating on an alternate power supply.Product data sheets for system components highlighted to indicate the specific products, features, or functions required to meet this specification. Alternate or as-equal products submitted under this contract must provide a detailed line-by-line comparison of how the submitted product meets, exceeds, or does not comply with this specification.Wiring diagrams, Shop drawings showing system details including location of FACP, all devices, circuiting and details of graphic annunciator.System Power and battery charts with performance graphs and voltage drop calculations to assure that the system will operate per the prescribed backup time periods and under all voltage conditions per UL and NFPA standards.System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs and outputs. A list of all input and output points in the system shall be provided with a label indicating location or use of IDC, NAC, relay, sensor, and auxiliary control circuits. Alphanumeric Display and System Controls: Panel shall be included an 80 character LCD display to indicate alarm, supervisory, and component status messages and shall include a keypad for use in entering and executing control commands. Voice Alarm: Provide an emergency communication system, integral with the FACP, including voice alarm system components, microphones, amplifiers, and tone generators. Features include: Amplifiers comply with UL 1711, "Amplifiers for Fire Protective Signaling Systems." Amplifiers shall provide an onboard local mode temporal coded horn tone as a default backup tone. Test switches on the amplifier shall be provided to test and observe amplifier backup switchover. Each amplifier shall communicate to the host panel amplifier and NAC circuit voltage and current levels for display on the user interface.All announcements shall made over dedicated, supervised communication lines. All risers shall support [Class A][Class B] wiring for each audio channel.Emergency voice communication audio controller module shall provide up to 30 minutes of message memory for digitally stored messages. Provide supervised connections for master microphone and up to 5 remote microphones.Fire fighters' telephone communication system: Arrange system to use dedicated, two-way, supervised voice communication links between the FACP and remote fire fighters' telephone stations throughout the building.Fire Alarm Control Unit	

Item No.	Description of Item	Test
1	*2*	*3*
	shall be capable of operating remote CRT's and/or printers; output shall be ASCII from an RS connection with an adjustable baud rate.Fire Alarm Control Unit shall be capable of operating a PC Annunciator which provides status annunciation and limited system control using a convenient and familiar Microsoft Windows® 2000 operating system based interface. PC Annunciator shall provide the following functions:FACP shall be with Login / Logout password protection with time duration selectable automatic logout. Displays: Alarm, Supervisory, Priority 2, and Trouble conditions with numerical tallies for each displays first and last alarms. Different event types have separate visible indicators with common audible indicator. Event logs can be searched and printed. View and / or print status reports and service reports (printing requires and available local or network printer).Alarm Silence, System Reset and priority to reset global and individual point acknowledge. Set system time and date and clear event log, individual point access for control or parameter revisions.Each RS port shall be capable of supporting and supervising a remote Printer; the FACP shall support as many as remote displays. The Fire Alarm Control Panel shall support five RS ports.Cabinet shall be Lockable steel enclosure. Arrange unit so all operations required for testing or for normal care and maintenance of the system are performed from the front of the enclosure. If more than a single unit is required to form a complete control unit, provide exactly matching modular unit enclosures. Operation and maintenance data for inclusion in Operating and Maintenance Manual. Include data for each type product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations.Operating Temperature Range: 32° to 120°F(0°to 49°C) Operating Humidity Range: Up to 93% RH, non-condensing @ 90° F (32° C) maximum Approvals: UL Listed / FM approved **FACP 251-500 Devices (Maximum)**	