PART-1 REHABILITATION OF THE UNFPA PREMISES – NEW BUILDING

TECHNICAL SPECIFICATIONS

06-Oct-2022 R00

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ANNEX I

CIVIL & ARCH SPECIFICATIONS

I. PURPOSE

THE PURPOSE OF THIS WORK IS TO SUPPLY AND INSTALL THE REQUIRED MATERIAL TO MAKE THE OFFICES READY FOR USE AT NEW BUILDING LOCATED NEAR CURRENT UNFPA BUILDING.

II. SPECIFICATIONS

1. Concrete Works

- General Requirements:
  - All concrete work shall be carried out in accordance with these specifications except that in the case of reinforced concrete the provisions of B.S 8110-1: 1997: Structural Use of Concrete - Part 1 : Code of Practice for Design and Construction shall apply in so far as they override, modify or supplement the clauses contained herein. The Contractor shall submit to the Project Manager full details of all materials which he proposes to use for making concrete.
- Cement:
  - The cement shall, unless specifically stated to the contrary, be common cement complying with the requirements of Uganda Standard US 310 – 1& 2: 2001. Where other cements are specified they shall comply with the requirements of the relevant European Norms (EN) Standards.
  - All cement shall be obtained from manufacturers in Uganda. Where cement is to be imported, prior approval of the Project Manager shall have to be obtained.
  - The Contractor shall supply, when requested by the Project Manager, test certificates relating to each type of cement used certifying that it complies with the appropriate Uganda Standard.
  - Unless approval is given for bulk handling, all cement shall be transported and delivered in sound and properly secured bags and stored in a dry, weatherproof, well ventilated shed with a raised floor or in such a building as is approved by the Project Manager.
  - Each delivery of cement in bags shall be stacked in one place. The bags shall be closely stacked to reduce air circulation but shall not be stacked against an outside wall. Where

pallets are used, they shall be constructed so that the bags are not damaged during handling and stacking. No stack of cement bags shall exceed 3 m in height. Different types of cement in bags shall be clearly distinguished by visible markings and shall be stored in separate stacks. Cement in bags shall be used in the order in which it is delivered.

- Bulk cement shall be stored in weatherproof silos, which shall bear a clear indication of the type of cement contained in them. Different types of cement shall not be mixed in the same silo.
- Cement shall be delivered or stored on site in such quantities to ensure that the concrete work on any section of the Works can be carried out without interruption. Each consignment shall be kept separate and distinct.
- Any cement that has been injuriously affected by dampness or any other cause shall not be used and shall immediately be removed from the site. Cement which has become hardened and lumpy shall be removed from site.
- Cement which has been stored on site for longer than one month shall be tested at the Central Materials Laboratory of the Ministry responsible for Works or at the Uganda National Bureau of Standards Laboratories as directed by the Project Manager.

– Aggregate for Concrete:
  - Aggregates for concrete shall consist of clean natural sands, gravel, crushed stone or other material which have been approved for use by the Project Manager and shall apply in respect of quality with the requirement of BS EN 12620 “Coarse and Fine Aggregates from Natural Sources for Concrete”. Standard Specifications for Building Works Part 1 - Section 4 Ministry of Works and Transport 18
  - Tests shall be made at frequent intervals or when called for to determine the amount of impurities in the aggregates and if ordered by the Project Manager fine aggregates shall be washed at the Contractor’s own expense.
  - BS EN 12620 requires that aggregates shall be hard, durable clean and free from adherent coatings such as clay.
  - They shall not contain harmful materials such as iron pyrites, iron oxide, mica, shale or similar laminar materials, or flaky or elongated particles, in such a form or in sufficient quantity as to adversely affect the strength or durability of the concrete or any materials which might attach reinforcement where this is required.

- The various sizes of particles of which an aggregate is composed shall be uniformly distributed throughout the mass. The quantities of clay, silt and fine dust shall not exceed:-
  - Sand or crushed gravel sand, 3% by weight when using the test given in BS 812 Clause 13
  - Crushed stone sand, 5% by weight when using the test given in BS 812 Clause 12.
  - Coarse aggregate, 1% by weight when using the test given in BS 812 Clause 13.
  - All in aggregate, 2% by weight when using the test given in BS 812 Clause 13.
  - A guide to the silt and clay content of sand and crushed gravel sand can be obtained by the field settling test described in B.S. 812 Clause 14 when the silt and clay content should not exceed 65 by volume.

– Sand
  - All sands for making mortar shall be clean well-graded silicious sand of good, sharp, hard quality equal to samples which shall be deposited with and approved by the Project Manager. earth, loam, dust, salt, organic matter and any other deleterious substances, Standard Specifications for Building Works Part 1 - Section 4 Ministry of Works and Transport 19

– Water for concrete mixing shall be from an approved source and shall be clean and free from acids, vegetable matter and any other deleterious material in solution or suspension. Potable water shall be suitable for concrete preparation.

– Concrete Mixes by Volume or Weight:
  - The proportion for concrete mix sizes shall be specified either by:
    - Volume
    - Weight
  - Concrete mixes by volume will be permitted in the case of mass concrete work, unreinforced foundations and beds and for small isolated structural members such as lintels and isolated beams providing that in all cases the Project Manager is satisfied that the required strengths are being obtained.
  - Weight batching shall be used for all other concrete work in reinforced concrete ground beams, column bases, structural frames, floors, roofs, staircases, retaining walls and the like.

– Concrete Mixes

- Concrete mixes shall be designed to satisfy the specified characteristic strengths. The mean strength of the designed mix shall exceed the specified values by twice the expected standard deviation so as to take into account the inevitable variation.
- Both fine and coarse aggregates shall be from natural sources and shall be graded such as to produce a concrete of specified proportions which will Design Mixes
- The strengths attained for each mix shall be in accordance with those stated in Table 4.12.1 as described later.
- If, because of the nature of the aggregates available, it becomes impossible to achieve the desired strength and workability, the Project Manager reserves the right to vary or "design" the mix proportion in order that concrete of the necessary quality will be produced.
- The Contractor shall include for this and for a minimum increase of 10% in the cement content of any specified mix, whether by volume or weight, without extra charge.

– Trial Mixes
  - When directed by the Project Manager, the Trial Contractor shall make trial mixes for his approval mixes, before general manufacture of concrete commences.
  - Trail mixes shall be made using the identical plant and compaction methods which will be used in the works and deposited in suitable representative formwork.
  - Careful measurements of the cement, aggregate and water: cement ratios, slump and workability shall be made and the time of mixing noted for each mix.
  - Six "preliminary" test cubes shall also be made for each mix. Three cubes from each batch shall be tested for compressive strength at seven (7) days and the remaining three at twenty eight (28) days. The density of all the cubes shall be determined before the strength tests are carried out.
  - Mixes shall be made in such numbers as directed until the desired qualities are obtained.
  - Every precaution shall be observed to ensure that the manufacture and placing of concrete in the works is carried out in the same fashion as that used in the manufacture of the selected trial mix.
  - The Project Manager may direct that fresh trial mixes be made should there be any change in the source or grading of the aggregate, manner of making and compacting, or other change from the trial mix adopted originally.

- The crushing strength of "preliminary" test cubes taken from trial mixes, shall at 28 days be not less than 25% more than that specified for the minimum crushing strength of "Works" test cubes as later described, for the same quality of concrete.
- Concrete cubes shall be submitted to the Project Manager for "Preliminary" and "Work" Cube Tests. The Contractor shall equip himself with accurately made metal moulds for casting 100mm square concrete cubes.
- The moulds and method of preparing such cubes shall be in accordance with B.S 1881 "Method of Testing Concrete".
- Batches of six "Preliminary" cubes shall be taken from the trial mixes as previously described. Six "Work" cubes shall be taken for testing from any batch or class of concrete in use on the works as directed by the Project Manager.
- Three cubes shall be tested at 7 days and three at 28 days.
- Concrete test cubes shall be submitted to the Central Materials Laboratory, Kampala, for testing and the Contractor shall carefully identify each cube and provide all information relative thereto, e.g. contract number, mix proportions, date cast, where the rest of the batch has been incorporated in the works and the Contractor's name and test cube reference number.
- In the event that any cubes representative of concrete which has already been incorporated in the work failing to give the required compressive strength, the Project Manager reserves the right to instruct the contractor to cut out and remove all work affected by these cubes and replace it entirely at his own expense.

– Mixing of Concrete
  - Concrete shall be thoroughly mixed to a uniform consistency in measured batches in a mechanical mixer of capacity proportionate to the amount of concrete required in any section of the works under construction. Mixing shall continue for not less than two minutes after all the materials including water, which shall be added last of all, have been passed into the drum and before any portion of the batch is discharged but in all cases the actual shall conform to that required for the selected trail mix.
  - The water content shall be carefully controlled and shall be added in sufficient quantity to make up the amount found to be necessary in the trial mix under no circumstances will the water; cement ratio be exceeded and any batch which is mixed too wet shall be rejected.

The entire contents of the mixer drum shall be discharged before the succeeding batch is introduced into the drum.

- Mixers and or batching plant shall be properly maintained throughout the contract and any mixer of plant which is faulty in any respect shall not be used. Drums of all mixers shall revolve at a constant speed recommended by the manufacturers. A mixer which has been standing idle for twenty minutes after mixing the last batch shall be thoroughly washed and cleaned before any fresh mix is made. Mixers shall be thoroughly cleaned at the finish of each run of concrete mixing or at the end of each day. All mixing plant shall be thoroughly cleaned if used for High Aluminum or other specialized cement concretes after Common Cement concretes and vice-versa.

– Hand Mixing
  - Hand mixing shall only be allowed with the express permission of the Project Manager.
  - The mixing shall be done on a clean, watertight, non-absorbent platform. The cement and fine aggregate shall be mixed dry until the mixture is thoroughly blended and uniform in color. The coarse aggregate shall then be added and mixed in until it is uniformly distributed throughout the batch. The correct quantity of water shall be added using a can with a rose nozzle and the mixing continued until the entire batch of concrete appears to be homogenous and has the desired consistency. Each batch of concrete shall be turned over at least three times dry and three times wet. Standard Specifications for Building Works Part 1 - Section 4 Ministry of Works and Transport 23
  - The platform shall be emptied before a subsequent batch is mixed and thoroughly cleaned if not in use for more than 20 minutes before the next batch is prepared or if a different type of cement is used as previously described.
  - For hand mixing the cement content of each mix shall be increased by 10% over that required for machine mixing and this shall be done at the Contractor's own expense.
– Transporting and Placing Concrete
  - Concrete shall be transported in a manner which will avoid any segregation, loss consolidation or drying out of the consistent materials and placing in the forms shall be completed before the initial set takes place. Concrete shall not be dropped through a height greater than 2m. Chutes and pumps may be used provided they shall be so arranged as to avoid segregation.

- All equipment for the transporting and placing of concrete shall be constantly cleaned and kept free of all coatings of hardened concrete or other obstructions.
- Concreting of any unit or section of the work shall be carried out in one continuous operation and no interruption of the concrete will be allowed without the approval of the Project Manager.
- In no case shall more than 20 minutes elapse between mixing and placing of any concrete in its final position.

– Ready Mix Concrete
  - The term "Ready Mix" concrete is applied in cases where concrete is obtained from a firm which specializes in the manufacture of concrete in bulk at a central plant whence it is transported to the site in transit mixers which keep it agitated until it is delivered. This term also applied to concrete in which the aggregate and cement are batched dry at a central plant and fed into the drum of a mixer mounted on a lorry in which it is transported to the site. Water is carried in a special container and is measured and fed into the drum and wet mixing started, either during the journey or when the mixer lorry reaches the site.
  - This type of concrete will only be allowed on the specific instructions of the Project Manager who will require a certificate with every batch of concrete delivered giving the actual weights of aggregate, cement and water used so that a guarantee is provided that the concrete is in accordance with the Specifications.

– Compaction of Concrete
  - After concrete has been placed in the forms it shall be compacted with approved tools and in such a manner as to produce a dense homogenous mass, free from segregation honeycombs and entrained air, filling all spaces between and around forms and reinforcement without voids of any kinds.
  - Where vibrators are used they shall be of the immersion type, approved by the Project Manager and have a frequency of not less than 5000 hertz (HZ). Vibrators shall not be attached to or allowed to come into contact with reinforcement or used in such a manner as to damage concrete in other parts of the structure, which has taken its initial set. Care is also to be taken so that concrete is not over vibrated or compacted and segregation taken place.

- Partially set concrete shall not be disturbed in any way and the Contractor shall ensure that it is not subjected to unnecessary loads, shocks or vibrations from adjacent plant or vibrators in the vicinity nor allow his workmen to walk on it or disturb it in any other way. Standard Specifications for Building Works Part 1 - Section 4 Ministry of Works and Transport 24

– Construction Joints
  - Construction joints shall be made where shown on the drawings or as directed by the Project Manager, but in either case they shall be so arranged that their number is kept to the minimum.
  - Construction joints shall be formed at right angles to the axis of the member concerned by the insertion of rigid stopping off forms.
  - Construction joints in slabs shall be vertical and in general, parallel to the main reinforcement, but when required at right angles to the main reinforcement they shall be constructed in the middle of the span.
  - The upper surface of lifts of concrete in walls and columns shall be horizontal and in the case of exposed finished work shall be so constructed so that they cannot be seen.
  - Lifts in walls and columns shall not exceed a height of 1m unless approved otherwise by the Project Manager.
  - Forms at construction joints shall be so made that they shall produce within the thickness of the joint a suitably grooved or keyed surface to act as a bond for the subsequent concrete.
  - As soon as the concrete is sufficiently set stop boards shall be removed and the face hacked and wire brushed to form a key and washed. Before placing of the adjacent concrete the surface of the joint is to be coated with a neat cement grout and left ready to receive the new adjacent concrete which is to be tightly packed up against its face.

– Protection of Concrete
  - Freshly placed concrete shall be protected from the sun, drying winds and rain until it has properly set and shall be kept damp with hessian, sand, polythene or other waterproof sheeting for not less than seven days after laying. In the case of rapid hardening cements being employed this shall be reduced to three days.

- Concrete which has not been properly protected and is damaged or adversely affected in any way whatsoever shall be carefully cut out and replaced at the Contractor's own expense.

– Concrete Surface Finishes
  - The surface of all concrete foundation beds shall be finished to a level even surface to receive the walling.
  - The upper surface of floors, roofs, landings etc. shall either be trowelled smooth or where they are to be covered with screeds for other finishes shall be floated while onset to a smooth even finish free of all projection and irregularities either level or to falls as shown on the drawings.
  - The trowelling and floating shall be done in such a manner that the surface is free of laitance or cement slurry. After the removal of formwork, all surfaces in contact with same shall be drenched with water, and carefully rubbed down with a carborundum block to remove fins and other irregularities. Any honeycombing or other damaged surface shall be carefully filled up with neat cement slurry and rubbed down to finish flush with the surrounding work. Such work shall be prevented from drying too rapidly by the use of damp sacking or similar means to ensure a good key between the concrete and the grout.
  - When the concrete surfaces are to be left exposed, the required surface finish shall be specifically stated in either the Particular Specification or the Bills of Quantities. Standard Specifications for Building Works Part 1 - Section 4 Ministry of Works and Transport 25
  - No rubbing down, repairing of patching of concrete shall be carried out until the surfaces have been inspected by the Project Manager.

– Fair Face and Fine Face Finishes of Concrete
  - When exposed concrete is required to have a "Fair Faced Finish" it means that it is to be finished to a perfectly plane smooth surface free from all blemishes, irregularities, honeycombing, joint or grain marks.
  - The manner of obtaining this type of finish will be left to the discretion of the Contractor but the Project Manager reserves the right to instruct the Contractor to adopt an alternative method where he thinks the method in use is unsatisfactory.
  - Where "Fine Face" concrete finish is specified, the exposed surfaces where produced by formwork shall have all fins and other small protuberances rubbed down but no pittances

nor large fins or other protuberances will be allowed. The face of the concrete shall be finished perfectly smooth and even.

- Form Hole Chases
  - Form all holes, pockets, chases, etc. required for services and other fittings as indicated on the drawings or otherwise by the use of liners, sleeves, cardboard tubes, temporary boxings and timber fillets attached to the framework.
  - Holes and chases shall not be cut in structural concrete after it has set except on the specific instructions of the Project Manager.
- Steel Reinforcement
  - Steel reinforcement shall conform to BS 4449, BS 4492 or BS 4483.
  - Mild steel reinforcement shall consist of plain round mild steel rods as specified in BS 6722.
  - Twisted mild steel reinforcement shall be cold twisted mild steel reinforcement as specified in BS 449.
  - Fabric reinforcement shall be hard drawn steel fabric reinforcement in accordance with BS 4483.
  - All steel reinforcement shall be of approved manufacture and shall be free from loose rust, mill scale, oil and grease or any other material which may impair the proper adhesion of the reinforcement and the concrete or cause corrosion of the reinforcement and subsequent disintegration of the concrete cover. If directed by the Project Manager, all the reinforcement shall be wire brushed to remove such imperfections before concrete is poured around it.
  - The Contractor shall produce Certificates of Manufacture indicating that the material complies with the requirement of the appropriate B.S. or UNBS standards for the inspection of the Project Manager. Random samples from any consignment may be taken for testing at the Central Materials Laboratory of the Ministry responsible for Works and any material found to be brittle, cracked or unsatisfactory in any way whatsoever shall be rejected and removed from the site at once.
  - Reinforcement shall be stored on site in level tiers raised above the ground.
- Bending Reinforcement
  - All steel reinforcement shall be bent cold and shaped as shown on the drawings before placing in position and shall comply with the bending dimensions and tolerance laid down

in BS 8666 or BS 4466 Standard Specifications for Building Works Part 1 - Section 4 Ministry of Works and Transport 26

- An approved former shall be used to produce gradual and even bending and no steel shall, once, bent, be straightened and rebent.
- Bends made whilst the reinforcement is hot or welding either by gas or electricity shall not be carried out without the prior approval of the Project Manager.

– Spacing of RC bars
  - The spacing of bars, amount of reinforcement and the type of fabric, mesh size, disposition, etc. shall be in accordance with the drawings and bending schedules.
– Fixing and Assembly of Reinforcement
  - All reinforcement shall be accurately placed, fixed and maintained in the positions shown on the drawings. Intersecting bars shall be securely wired together with No. 16 gauge (1.626 mm) soft iron tying wired with the ends twisted and turned into the body of the concrete. Binders, links and the like shall make close contact with main reinforcement and shall be securely wired to same.
  - When reinforcement is placed in horizontal of sloping layers whether in beams, slabs or staircases, etc., the distance between each layer shall be carefully maintained by the insertion of sufficient spacer bars to prevent either movement or sagging of the main reinforcement in each layer.
– Cover to Concrete
  - The concrete cover to all reinforcement shall be carefully maintained as shown on the drawings and bending schedules within a tolerance of 3 mm under or over.
  - Cover to underside of soffits may be obtained by the use of accurately made cement mortar blocks.
– Inspection of Reinforcement
  - No concrete shall be poured until the Project Manager has inspected and approved the reinforcement.
  - All reinforcement shall be properly fixed in position and every precaution shall be taken to ensure that no movement takes place whilst the concrete is being poured and compacted and that it is properly surrounded by concrete.

- Any rods which have worked loose during fixing shall be securely retied and any small pieces of rood or fabric shall be removed from the forms before pouring is commenced.

– Formwork
  - The term formwork shall include for any material or mould required for forming the concrete into the desired shape and upholding it until it is set, together with all necessary temporary supports, stagings, bolts, nuts, wedges, clamps, and other fixing, all cutting and waste and the cost of all labour and material in the construction, erection and removal of such formwork.
  - Formwork shall be of timber or other approved material and shall be of such strength as will ensure complete rigidity throughout the placing, compaction, vibration and setting of the concrete and so designed and constructed that it can be easily removed without shock, vibration or damage to the finished concrete.
  - All joints in forms shall be sufficiently tight to prevent leakage of grout and in timber forms, unless otherwise specified, they shall be tongued and grooved. Standard Specifications for Building Works Part 1 - Section 4 Ministry of Works and Transport 27
  - Timber boards for formwork shall be seasoned to 20% moisture content and shall be in widths not exceeding 150 mm or narrower if the Project Manager so directs.
  - The use of internal ties shall be avoided as far as possible, but, if used they shall be reduced to the minimum, of metal and capable of easy removal without damage to the face of the concrete. No part of any metal tie or spacer remaining permanently embedded in the concrete shall be nearer the finished surface of the concrete than the thickness of the general cover dimension as shown on the drawings.
  - When vibrators are used, special care shall be taken to see that all bolts, wedges, clamps, etc. are kept tight so that no distortion of the forms takes place.

– Formwork Non-Exposed Concrete
  - When the surface of the concrete is to be covered with some other finishing material, the forms may be constructed of plain, but jointed sawn timber, unless otherwise instructed by the Project Manager. The boards shall be sufficiently thick to withstand the loading of the concreting operations without deflection so that the finished surface cover specified is maintained.

– Formwork for Exposed Concrete

- When a particular type of finish is required to be produced by formwork on exposed concrete surfaces this will be fully described in the Particular Specifications or Bills of Quantities, and the material to be used to achieve it will be specified, i.e. plywood, hardboard, hessian, polythene paper, strips, panels, etc.
- When wrot formwork is required the boards shall be tongued and grooved and wrot and free from all cracks and irregularities on the face in contact with the concrete.

– Preparation of Formwork before Concreting
  - Unless otherwise directed the inside faces of all formwork shall be coated with lime wash or approved non-retarding mould oil. Care shall be taken to keep reinforcement free of any coating material.
  - Temporary windows shall be cut in the sides of vertical surfaces of forms to ensure that concrete is not poured from a height exceeding 1.5 m.
  - Forms shall be thoroughly scraped and cleaned down between each and before subsequent uses.
  - Prior to depositing concrete, the forms shall be thoroughly cleaned and freed from all sawdust shavings, mud, dust or other debris by hosing with clean water and draining through temporary openings left for this purpose.

– Approval of Formwork
  - All formwork shall be inspected and approved by the Project Manager before pouring of concrete Forms is commenced, but such approval will not relieve the contractor of his overall responsibility for the safety and efficiency of the works. Details of special forms and systems of formwork i.e. self lifting or sliding forms etc. shall be submitted to the Project Manager for his approval before they are put into use.

– Removal of Formwork
  - The removal or striking of formwork shall be carried out in such a manner that the concrete will not be subjected to sudden shock or injury, nor shall it be removed before the concrete is sufficiently set hardened.
  - The foregoing figures are given as a guide for normal cement concrete for average conditions of setting and hardening. For vibrated concrete or extreme climatic conditions or for special surface finishes the above times may be varied on the instructions of the Project Manager.

- Compliance with the requirements of the foregoing shall not relieve the Contractor of his obligations and overall responsibility. Should the removal of the formwork be found to have been carried out prematurely, any damage caused thereby shall be made good entirely at the contractor's own expense.

2. Steel Works

- Contractor shall provide all materials, labor and equipment required to complete the works in every respect, whether such materials are required as part of the permanent structure or a temporary one. These are such that shall be required for fabrication or erection or maintenance including specifically structural steel plates, flats, bars, welding rods, rivets, bolts and nuts, paint, welding sets in the shop and at site. Contractor shall provide all workshop facilities, derricks, cranes, pulley blocks, wire ropes, hemp or manila ropes, winches, erection cleats and temporary braces or supports and all other materials required to deliver the Works completed in every respect.
- The Contractor shall prepare all the necessary fabrication shop drawings and these shall be submitted to the Supervisor Engineer for approval before fabrication is commenced. All such drawings shall show the dimensions of all parts, method of construction, welding and bolting. Also, the Contractor shall submit for approval a list of all material along with the samples and the test certificates.
- The Contractor shall comply with all safety requirements for erection of structural steelwork. For all the works, workmanship shall be of first class quality, through true to line, level and dimension as shown in the drawings or instructed by the Project Manager.
- The welding electrodes shall be of the best quality and of an appropriate grade. All welding electrodes shall be stored properly and kept dry. Any electrode, which has part of its flux coating broken away or is damaged, shall be rejected.
- Bolts and nuts used for the works shall, unless otherwise specified, be black bolts and nuts manufactured by an approved manufacturer.
- For all the works, workmanship shall be of first class quality, through, true to line, level and dimension as shown in the drawings or instructed by the Project Manager. The Contractor shall submit for approval a list of all material along with the samples and the test certificates. Comply with all safety requirements for erection of structural steelwork

- All parts assembled for bolting shall be in close contact over the whole surface and all bearing stiffeners shall bear tightly at top and bottom without being drawn or caulked. The component parts shall be so assembled that they are neither twisted nor damaged. Drilling done during assembling shall not distort the metal or enlarge holes. The butting surfaces at all joints shall be so cut and milled so as to butt in close contact throughout the finished joints.
- Hand flame cutting and punching of holes will not be permitted.
- All welding for the works shall be carried out by first class welders. The Supervisor Engineer may at his discretion order periodic tests for the welder and /or of the welds produced. The Contractor shall carry out all such tests at his cost.
- As much as possible, the welding work shall be done in the shop. The pieces shall be manipulated to ensure down hand welding for all shop joints as far as possible. All parts to be welded shall be arranged so as to fit properly on assembly. After assembly and before the general welding is to commence, the parts are to be tack welded with small fillet or butt welds as the case may be. The tack welding must be strong enough to hold the parts together but small enough to be covered by the general welding. The welding procedure shall be so arranged that the distortion and shrinkage stresses be reduced to a minimum.
- All members of trusses and lattice girders shall be straight throughout their length, unless shown otherwise on the drawings, and shall be accurately set to the lines shown on the drawings. Sheared edges of gussets or other members to be straight ended and dressed where necessary.
- The Contractor shall be responsible for checking the alignment and level of foundation and correctness of foundation bolt centers, well in advance of starting erection work, and shall be responsible for any consequences or for non-compliance thereof. Discrepancies, if any, shall immediately be brought to the notice of the Supervisor Engineer.
- Contractor shall be responsible for accurately positioning, leveling and plumbing of all steelwork and placing of every part of the structure in accordance with the approved drawings and to the satisfaction of the Project Manager. All stanchion base, beam and girder bearings etc. shall be securely supported on suitable steel packs. All reference and datum points shall be fixed near the work site for facilitating the erection work.
- All steelwork shall be erected in the exact position as shown on the drawings. All vertical members shall be truly vertical throughout and all horizontal members truly horizontal, fabrication being

such that all parts can be accurately assembled and erected. No permanent bolting, welding or grouting shall be done until proper alignment has been obtained.

3. Cement Boards

- The Cement Boards will be used in the Partition walls of the Bathrooms, and where indicated in the drawings.
- Minimum Thickness = 9mm.
- Average Compression Strength = 2.6 N/mm^2.
- Apparent Density = 1355.8 kg/m^3.
- Approx. Thermal Conductivity = 0.14 $W/m.^oK$.
- Moisture content = 6-8%.
- Water Tightness: No water droplets at the underside.

4. Painting

- The Contractor shall apply the coverage of paint as per the manufacturer's data for the type of paint to be used and the coverage rate approved by the Supervisor Engineer. All materials shall be applied strictly in accordance with the manufacturer's recommendations. Any additions of thinner must be made under the supervision of the Supervisor Engineer, and as permitted by the manufacturer. Samples of all materials used for the painting work shall be approved by and deposited with the Supervisor Engineer.
- The Contractor shall provide all the equipment required for the paint works, including scaffolding, access platforms, compressors, etc. Brushes, rollers, spray guns and the likes used for carrying out the work shall be kept clean and free from foreign matter, at all times.
- Paint shall not be applied when the relative humidity is 80% or more for both internal, as well as external applications.
- Paint shall be brought to the site in the sealed, labeled containers, stating:
    - Manufacturer's name
    - Date of manufacture
    - Type of paint
    - Color
    - Instructions for thinning, mixing and applying

- Paint shall be stored in sealed containers, according to the manufacturer's recommendations. The paint shall not be subjected to extreme temperatures. Paint shall be used within its stated shelf life or within 18 months, whichever is less.
- Acrylic, Non-Smell Paint to be used; Jotun or any equivalent.

5. Steel Work Painting

- All steelwork to be painted shall be first cleaned of rust, scale, loose paint, oil, and all deleterious matter before applying primer. The cleaning shall be carried out by approved means, using power driven tools, followed by steel wire brushing and dusting, wherever necessary.
- Metal primer, for application to steel surfaces, shall be either zinc chromate or red oxide-based primer of an approved make.
- Primer for application to galvanized surfaces shall be a suitable metal primer of approved make.
- Priming of surfaces shall be carried out immediately after the preparation of surface. Second coat of primer shall be applied without exposing and as per manufacturer's recommendations.
- One undercoat of oil paint, of approved color, shall be applied to the primed surface. Putty shall be applied at the same time, wherever possible. All edges, angles and projections shall have a stripe undercoat applied as soon as the first coat is dry.
- Priming and undercoats shall be lightly rubbed down with fine sandpaper before subsequent coats are applied.
- Surfaces for painting must be dry and free from dust, dirt, rust, efflorescence or condensation.
- The minimum dry film thickness of the paint coating, including rust protection should be 200 microns. At least two coats of primer and finish paint, each, must be applied.

6. Ceramic Tile

- Tiles shall conform to the relevant International standards or any equivalent. Tiles that are cracked, chipped or warped shall not be used for the works.
- Preparation of surface: All masonry faces shall be cleaned thoroughly by removing dirt, loose mortar, efflorescence etc. The concrete surfaces shall be brushed to remove all laitance and roughened to provide a bond for the bedding.
- Fixing tiles: The masonry and concrete faces shall be given a coat of cement plaster 12mm thick (in proportion 1:4). The surface of the plaster shall be scarified with wire brush for getting a good bond between the tiles and the bedding.

- The tiles shall be soaked in clean water for about half an hour before using. The back of the tile shall be buttered with 1:2 plastic cement mortar to a thickness slightly in excess of the finished thickness required and the tile pressed to the wall and tapped back in position. Alternatively, a rich fatty mortar shall be applied on the bedding and the tile pressed into it, care being taken to ensure that the keys of the tile are buttered up with mortar. Joints shall be uniform, even, straight and as thin as possible in any case not more than 3.0 mm. After the surfaces of tiles have been fixed, the joints shall be cleaned of gray cement and refilled with cement paste of the same shade as that of the tiles. The tiled surface shall be left wet for a period of 7 days.
- The Contractor shall provide the glazed rounded corner convex or concave, as necessary. After the completion of the work, the Contractor shall ensure that the surface is cleaned of all stains.
- Where to installed: Bathroom Flooring, Bathroom walls, Corridor where indicated in the drawings, and at the Roof Terrace area.
- All Ceramic tiles flooring shall be Anti-Slip. The Color and Finishing to be determined by the Supervisor Engineer for his Approval; Submittal is required.
- Well-known brand shall be used for all ceramic tiles (for Walls and floor in the Safe Haven Area).

7. General Installation procedure

- Accessories:
    - Use manufacturer's brackets and accessories where these are available and suitable for the mounting substrate.
- Protection:
    - Deliver fixtures to site protected from damage under site conditions by coatings, coverings and packaging. Remove only sufficient protection to permit installation.
- Inspection:
    - The contractor shall check, review the drawings and visit the site and give sufficient notice so that inspection may be made of the following.
- Submissions:
    - Samples
        - Submit nominated samples for approval of the Engineer.
        - If it is intended to incorporate samples into the works, submit proposals for approval. Only incorporate samples in the works which have been approved.

- Do not incorporate other samples.
- Keep endorsed samples in good condition on site, until practical completion.

- Shop Drawings
  - Submit dimensioned drawings showing details of the fabrication and installation of services and equipment, including relationship to building structure and other services, cable type and size, and marking details.

ANNEX II

SECURITY MEASURES SPECIFICATIONS

I. PURPOSE

THE PURPOSE OF THIS WORK IS TO SUPPLY AND INSTALL THE REQUIRED MATERIAL TO MAKE THE OFFICES READY FOR USE AT NEW BUILDING LOCATED NEAR CURRENT UNFPA BUILDING.

II. SPECIFICATIONS

1. Main Apartment Wooden Door

- This door will use the existing door.
- The Door shall also be provided with Auto Door Closer and Electric Lock with a high quality, and shall be installed as manufacture recommendation and instructions.

Auto Door Closer

- The door shall be spray painting from the outside with the required maintenance, and Epoxy painting three layers from the inside at the steel sheet. The steel shall be presentable at the finishing.
- The quantity will be calculated as a lump sum one item.

2. Office Wooden doors

- The Interior Wooden Doors for the Offices shall be provided with high quality hinges and accessories and shall be made from Solid Wood 50% minimum Filled, in addition to one layers of wood sheet 6mm for each side. And with Plain appearance; The Color shall be as specified by the Supervision.
- The Doors shall be provided with high quality locks for internal use only. Each door shall be supported with 3 hinges made of high quality products.

- The Doors shall be spray painted after cleaning and polishing the wooden surface.
- The quantity will be calculated as a number.

3. WC Wooden Door.

- The WCs doors shall be as specified above in addition to be provided with Aluminum Grill wooden appearance with the size 400x200mm, and provided also with high quality bathroom locks from the inside. Each door shall be supported with 3 hinges made of high quality products.
- The Doors shall be spray painted after cleaning and polishing the wooden surface.
- The quantity will be calculated as a number.

4. Safe Haven Door

- Two safe Haven doors shall be dismantle from the current UNFPA Building, modify the size to suite the new location in the basement, and renovate to be used completely as requested.
- The Roller shall be replaced with new heavy-duty rollers (The quantity of the rollers shall be to carry the door weight with 50% safety). The door shall be provided with Manual Door lock bar (L-shape 10mm Dia); Metal Door Handle.
- The door shall be painted with Epoxy three layers. The steel shall be presentable at the finishing.
- The quantity will be calculated as a number.

Manual Door lock bar (L-shape 10mm Dia)

5. Aluminum Windows

- All Existing Aluminum Windows shall be prepared for pasting the SRF by cleaning and remove any debris on the whole area of the glass.
- These Windows shall be maintained for operation well before using SRF.

- All these Windows shall be covered with double layer of Shelter Resistant Film (SRF) (Thickness = 200 micron) in the vice- versa installation shape.
- All the SRF installation shall be free of bubbles and according to the Manufactures instruction and recommendations.
- All new and Existing Windows shall be equipped with Frame Catcher with 12 mm Dia steel Wire.
- All the New Windows shall be made of high quality aluminum profiles with single layer glass windows.
- The Accessories shall be well-known brands and suitable for the selected profile.
- The New Windows shall be provided with screen mesh with proper size and adjusted horizontally and vertically well.
- The same SRF mentioned in the above paragraph of the Existing will be applied here.
- All the New Windows shall be equipped with Frame Catcher with 12 mm Dia steel Wire.
- The Quantity of new windows will be calculated as a real square meter of the Window without any addition for Screen mesh.
- The Frame Catcher shall be used above and below slab for fixing the Plate, and Tube, then install the Steel wire with its accessories, all the materials shall be from the high quality products.
- The Quantity of SRF will be calculated as a square meter (m2) for each layer.
- The Quantity of frame catcher will be calculated as a weight of steel tubes and plate.
- The Quantity of steel wires along with accessories will be calculated as a linear meter.

6. Aluminum Doors

- The Existing Aluminum Door shall be prepared for pasting the SRF by cleaning and remove any debris on the whole area of the glass.
- This Door shall be maintained for operation well before using SRF.
- This shall be covered with double layer of Shelter Resistant Film (SRF) (Thickness = 200 micron) in the vice- versa installation shape.
- All the SRF installation shall be free of bubbles and according to the Manufactures instruction and recommendations.
- This Door shall be equipped with Frame Catcher with in front of the Aluminum Frame of the Door with SHS 50x50x5mm.

- The Quantity of SRF will be calculated as a square meter (m^2) for each layer. While the Frame Catcher will be calculated as weight of kg.

ALL THE QUANTITY HERE ARE ESTIMATED AND ACTUAL BOQ WILL BE CALCULATED WHEN THE CONTRACTOR SUBMITTED THE WORKS TO THE SUPERVISION TEAM.

7. Emergency Staircase

- The Emergency Staircase will be extended to the Roof, the Emergency Landing will be in each floor.
- The Contractor shall demolish the Parapet by the size of the Emergency Landing, without damage of the existing structures, and repair the Parapet to proper appearance by the acceptance of the Supervisor Engineer.
- Supply and install Emergency Staircase Made and fabricated from Metal Tubes and Steel Structures.
- The Staircase is shown and detailed in the drawings.
- The Staircase shall have a handrail with height of 150-190cm. and shall be provided with Balustrade of Steel Tube SHS 25x25x2.5mm. The Handrail shall be made of SHS 40x40x3mm.
- The Contractor shall make real measurements before Fabrication the Steel, the Height of the Treads shall be between 15-18 cm.
- The Treads shall be made of Galvanized CHECKERED-PLATE with 3mm thickness.
- All Steel Works shall be painted by Epoxy with two layers and shall be cleaned and prepared well before painting.
- All Steels shall be free of rust and debris before welding.
- The Quantity will be calculated as a weight of kg. The concrete base will be embedded in the price of the Steel weight.

8. Fire Alarm System

- The Fire Alarm System will consist of the Smoke Detectors located as mentioned in the drawings, Heat Detector in the Kitchen, and Manual Push Button and Siren with Strobe Light in the Corridor as indicated in the Drawings.
- The FACP will be located in the Ground Floor at the Entrance.
- For Detailed Specification refer to the *ANNEX III*.

9. IP CCTV Surveillance System

- The entire IP surveillance system shall monitor entrances, exits and other selected public areas of the building.
- Three types of cameras shall be installed to monitor the movement of the people as follows:
    - IP fixed camera indoor type, dome.
    - IP fixed camera outdoor type, bullet.
    - Dome Camera outdoor type.
- All cameras shall be true IP camera, 1080p or higher resolution, and Power over Ethernet (PoE).
- All outdoor cameras shall be rated IP 66 or higher.
- All outdoor items for cameras like junction boxes, power supply, media converter etc. shall be in waterproof and dust proof housings.
- Surveillance system shall include centralized recording solution with Video Management Software and Network Video Recorder.
- Approximate camera locations are shown on the drawings. Contractor shall finalize locations based on optimal field of vision and coverage.
- All CCTV cameras shall have connectivity to Owner's PoE-powered dedicated local area network.
- The CCTV surveillance system should consist of IP Fixed cameras (indoor type), fixed cameras (outdoor type), software, server, power supply and cables.
- Video management software shall offer both video stream management and video stream storage management.
- Recording frame rate shall be 15 frames per second or greater.
- Integrated testing and commissioning of CCTV system on LAN to be provided by Contractor.
- Training & handing over of all materials, equipment and appliances.
- Any other items/accessories required for installation, testing and commissioning of CCTV system.
- IP Video System Overview:
    - Transmit and Receive H.264 and/or H.265 video.
    - Video and alarm management software under one single front end and should be on open platform with support to renowned IP camera brands.
    - Support for multi-user and multi-user group environment in addition to user hierarchy.
    - System should allow to be used as a distributed or centralized architecture with support to any number of cameras and any number of clients that may be added in the future.

- System Guarantees Bandwidth & Frame rate control.
- Must provide up to 120 days of motion-based archive footage per CSU guidelines. Provide a local storage solution with the option of cloud-based storage.
- Provides Activity Controlled Frame rate, which in turn reduces bandwidth and storage requirements.
- Provides Broadcast quality Video across IP network including Internet.
- Provides multiple fail-over and network resilience.
- Provides real time recording at 15 or higher fps with no frame loss.
- Supports Multiple IP Video Streams.
- Secured recording for evidence purposes and user authentication to protect data integrity.

– Minimum IP Dome or Bullet Camera
  - Distance from camera: as appropriate for area to be covered.
  - Integrated IR.
  - Outdoor rating: IP66 for outdoor camera locations.
  - Temperature Range: Minimum -4°C – Maximum 45°F.
  - Vandal Resistant: where appropriate
  - Operating voltage: Power over Ethernet (802.3af).
  - Codec: H.264, H.265 with optional smart codec enhancements
  - Recording Mode: motion based.
  - Each stream must allow independent configuration of bit rate, frame rate, I frame interval, rate control mode and motion data.
  - The IP Camera must support Capped Bit Rate (CBR) control, to enable users to keep bandwidth utilization under a certain value without compromise on image quality irrespective of the level of motion in the scene.
  - The IP Camera must support Activity Controlled Frame Rate control to automatically adjust frame rate depending on motion in the scene. During periods of negligible motion, the frame rate must drop to 1fps and when motion occurs the frame rate will return to full frame rate within 100ms. It must be configurable using a Region of Interest editor (ROI) that can select regions of the scene where motion will be ignored.
  - Support network protocol 802.3 and IETF Standards 10/100 Base-T Ethernet, RTP/RTCP, TCP, UDP, ICMP, SNMP, HTTP, FTP, MULTICAST, ARP and IGMP.

- Each stream Bit-rate should be user configurable from 32 to 4096 Kbps or better.
- The IP Camera will have a built in web server, making it accessible for configuration using a standard Internet browser.
- Should be able to detect motion based on localized area, object size & direction.
- It must be possible to reset a unit back to Factory Default configuration without losing IP address information.
- Password protected Web interface for administration.
- System shall be able to use one particular frame rate and resolution at Day time and automatically switch to another frame rate/resolution profile when low light conditions occur.

– Video Operation Codec Management, Recording and Processing Software (VOCMRPS)

- VOCMRPS will be a highly scalable, enterprise level software solution. It must offer a complete Video Surveillance solution that will be scalable from one to hundreds of cameras that can be added as and when required. It should allow for seamless integration of third party security infrastructure where possible. The system shall be capable of working on latest Windows OS and Windows Server platforms. Should support client- server architecture.
- The software must come as one unit and not multiple loadable units and should support free distribution of multiple clients to multiple machines.
- The software must not have operator seat based licensing. It must allow for any number of user seats/installations on the IP video network to be added for future scalability at no management software cost or licensing cost.
- The manufacturer supplied management software pack should be on open platform/standard media player.
- All upgrades and releases should be made available free of cost during the warranty period.
- The VOCMRPS shall provide the following:
- Automatic search of components of proposed system on the network. They can be Cameras, Monitors, Alarm panels, NVRs.
- The system should allow for live view, playback and system configuration of the IP video system.

- The system should allow for creation of multiple users and user groups and assign tasks to each.
- Drag & Drop functions for most functions on the system and also for set up of connection between cameras and monitors and also support to create custom layout by grouping of cameras from different server/ locations into groups for more efficient monitoring.
- It shall be possible to display video and audio bit rates; frame rate and resolutions on each video pane as overlays.
- System setup for pre-defined surveillance tasks to be invoked at predefined times in the day.
- Programming of automatic recording events on NVR, maybe based on events such as alarms and video analysis.
- Remote maintenance of IP Video components.
- Off line construction of site 'tree' and addition of devices.
- The VOCMRPS shall allow the following:
- Live display of cameras
- Playback of archived Video at speeds of x1/4 – x16
- Retrieval of archived Video using normal playback, thumbnails (motion, event or time based)
- Instant Replay of Live Video
- Use of site maps and/or Google map
- Configuration of system settings
- For each camera set up bit rate, frame rate, and resolution shall be set independent of other cameras in the system; altering the setting of one shall not affect the settings of other cameras.
- Should have facilities for play, forward, rewind, pause along with fast forward and rewind for reviewing the recorded videos. The system must support video bookmarks, where the system allows the user to create textual bookmarks at various places in a recorded footage and allow access to these bookmarks through an intelligent bookmark management system.
- The system must allow application of sorting and searching filters on bookmarks for faster retrieval and access to incidents in recorded footage.

- Network Video Recorder
    - The NVR/NAS must be providing for a disk management system which will automatically remove old recordings to overwrite with new ones when max disk usage is reached.

10. External Lighting

- LED Flood Lights with 50W to be installed as indicated in the Drawings outdoor.
- These lighting shall be sufficient to provide average LUX level of not less than 400 lux.
- For Detailed Specification refer to the ***ANNEX III***.

11. Shatter Resistant Film (SRF)

- Material : PET 200 microns
- Adhesive : acrylic polymer 25 gr/m²
- Liner : siliconized PET 23 microns
- Color : Transparent
- Breaking Load : 17,5 da N/cm
- Elongation at Break : 100%
- UVA Transmission : 5%

ANNEX III

MECHANICAL SPECIFICATIONS

I. PURPOSE

THE PURPOSE OF THIS WORK IS TO SUPPLY AND INSTALL THE REQUIRED MATERIAL TO MAKE THE OFFICES READY FOR USE AT NEW BUILDING LOCATED NEAR CURRENT UNFPA BUILDING.

II. SPECIFICATIONS

12. Sanitary wares

- High Quality, well-known brands, Bright White Color free of any cracking or semi cracking.
- Mixer taps are made of brass body and chrome finish, supplied with flexible hoses for hot and cold water. Well-known brands.
- Installed at a proper height and best fit places as manufacture instructions and recommendations.
- Stainless steel hose connected to mixer tap in W.Cs.
- Stainless steel floor drain cover.
- Vandal proof stoppers & S-trap. W.C commodes with flushing cistern in each toilet & Hydro-Auto Closer seat cover. It shall be made of high quality brand.
- Test
    - All Sanitary wares have to be tested before installation, and notice if any scratching or fracture lines appear.
    - If any of previous noticed, the contractor must directly replace with new items without any proposed of their maintenance.
    - The Supervisor Engineer shall approve all the sanitary ware.
- General Installation procedure
    - Use manufacturer's brackets and accessories where these are available and suitable for the mounting substrate.
    - If items are concealed, provide access doors of size required for easy access to the items. Provide access doors per specification.
    - Deliver fixtures to site protected from damage under site conditions by coatings, coverings and packaging. Remove only sufficient protection to permit installation.

- The contractor shall check and review the drawings and visit the site and give sufficient notice.
- Submittals:
  - Submit nominated samples for approval of the Engineer.
  - If it is intended to incorporate samples into the works, submit proposals for approval. Only incorporate samples in the works which have been approved.
  - Do not incorporate other samples.
  - Keep endorsed samples in good condition on site, until practical completion.

13. Air Conditioner

- Supply, installation, commissioning and testing of split ACs using proper tools and procedures.
- Refinishing/closing of all holes/penetrations, done for the installation of the ACs, by the supplier using his material, manpower and tools.
- Supply of O&M manual
- One year onsite servicing and guarantee after installation.
- Guarantee Period: Minimum of 12 months.
- Feature of the required Split Air Conditioner;
  - Capacity: as indicated in the Drawings
  - Inverter Compressor Technology
  - Outdoor Temperature : -7 ˚C (Winter) - +45 ˚C (Summer)
  - Energy Efficiency rating : A
  - Compressor Type: Scroll Type
  - Modes: Dehumidification/ Heating (with Heat Pump)/ Cooling/ Auto Modes
  - Speed Setting: 3 Fan Speed
  - Low Noise Level
  - Control : Microprocessor controlled codeless remote
  - Power Source (V/Hz/O) : 230/50/1
  - Display : LED/LCD
  - Remote control distance : Min 6 meters
- The Contractor shall submit the Brochure/Manual for the selected Brand and Model indicating the above features as minimum characteristics of the AC.

- The AC shall be submitted in its Original Packaging Case without any deflection or renovation Packaging.
- The Drainage of the AC to be installed directly to outside.
- The AC shall be installed according to the manufactures recommendation and instructions.
- Cooper Pipes shall be suitable to the AC as per the manufactures instructions and recommendations; Insulated with high density Armoflex; Gas and Liquid Pipes shall be separately insulated.
- Acceptance of Testing shall be made to the followings;
    - Working 3 hours daily for three days.
    - Noise Level
    - Fan Speed
    - Operation Modes
    - Drainage of condensing water.
    - Remote Control with all features.

14. Exhaust and Fresh Air Fans

- The Fans shall be centrifugal Type, inside a Box, with External Static and Air Flow as indicated in the Drawings.
- From well-known Brands and qualified manufactures.
- The Fans connected with Galvanized Ducts with Flexible Joint to reduce vibration transfer to the Ducts.
- The Ducts shall be supplied with the Outlets with the same size indicated in the drawings; the outlets shall be linear bar grill with White Color, from well-known brands.
- The Fresh Air Fan shall be supplied with G4 Filter in the inlet of the Fan.
- All Galvanized Ducts shall be terminated at high level outside the Basement with 6 meters height, and mesh and elbow at the termination Ends.

15. Solar Water Heater

- Non-pressurized solar water heater uses the principle of thermosiphon to collect heat from the sun and transfer it to hot water for residential and commercial uses.
- High thermal performance, has an easy plug-in installation.
- The system consists of glass evacuated tubes connected to a stainless steel 304 inner tank insulated with high quality polyurethane wrapped with a protection layer suitable in providing hot water.

Tank capacity	249L
No of tubes	30
Tube dimension	ø58mmx1.8m
Inner tank	Stainless steel 304
Outer tank	PVDF zinc coated steel
Insulation foam	Poly urethane 5 cm

16. General Installation procedure

- Accessories:
  - Use manufacturer's brackets and accessories where these are available and suitable for the mounting substrate.
- Protection:
  - Deliver fixtures to site protected from damage under site conditions by coatings, coverings and packaging. Remove only sufficient protection to permit installation.
- Inspection:
  - The contractor shall check, review the drawings and visit the site and give sufficient notice so that inspection may be made of the following.
- Submissions:
  - Samples
    - Submit nominated samples for approval of the Engineer.
    - If it is intended to incorporate samples into the works, submit proposals for approval. Only incorporate samples in the works which have been approved.
    - Do not incorporate other samples.
    - Keep endorsed samples in good condition on site, until practical completion.
  - Shop Drawings

- Submit dimensioned drawings showing details of the fabrication and installation of services and equipment, including relationship to building structure and other services, cable type and size, and marking details.

ANNEX IV

ELECTRICAL & IT SPECIFICATIONS

I. PURPOSE

THE PURPOSE OF THIS WORK IS TO SUPPLY AND INSTALL THE REQUIRED MATERIAL TO MAKE THE OFFICES READY FOR USE AT NEW BUILDING LOCATED NEAR CURRENT UNFPA BUILDING.

II. SPECIFICATIONS

17. Server/Communication Cabinet

- 48U x 2
- Has a transparent impermeable cover with lock and key
- Equipped with fan and two power multi sockets
- Shelf included
- With a locking, reversible front door and locking, removable side panels.
- The enclosure shall meet meets all requirements toward PCI DSS compliance.
- The top and bottom panels of the Cabinet shall be furnished with vents designed to help remove warm air from the enclosure and draw in cool air by convection.
- The top and bottom panels shall be provided with ports for cable routing.
- The Vendor shall provide a Data sheet, catalog or brochure for the offered Item.

18. Data Patch Panel

- The Panel shall be 24 port x 11
- The Panel shall be Category 6 hardware patch panel when loaded with RJ45 K6 jacks, shall be compatible with jacks having keystone mounting, and optimized for the K6 and K5e range.
- The Panel shall be Dust protected ports when loaded with K6 or K5e jacks, and shall be in compact modular form, and provide cable management tray.
- The Panel shall include Flexible labelling facilities – port by port, according EIA/TIA 606.
- It shall include the fixing screws, cage nuts, earthing bolt, cable ties...etc.

19. Camera Network switch

- Ethernet Switch - 24 Ports - Manageable - 24 x POE - 2 x Expansion Slots - 10/100/1000Base-T, 10/100Base-TX - PoE Ports.

- Qty = 2

20. 16A Schuko German Standard Socket Outlets

- All sockets shall be 16A Schuko Type F, from a well-known brand. The Sockets shall be installed within 3, 4 or 6 modules according to the other sockets beside.
- All flush-mounting boxes, support frames and plates shall be provided from the same brand selected, and suitable for the function and appearance.
- Wherever the Sockets are installed in the Existing Masonry Block, the Flush Mounting Boxes shall be used and the Sockets shall be installed within 3, 4 or 6 modules according to the other sockets beside.
- The Sockets shall meet the below Specifications table;

ITEM	VALUE
Number of Gangs	1
Colour	As specified by the Supervision Team
Switched	No
Socket Type	Type F - German Schuko
Mounting Style	Flush Mount
Current Rating	16A
Voltage Rating	230V ac
Material	Plastic
Number of Modules	2
Terminal Type	Screw
Faceplate Mounting Type	Clip in
Fixing Standard	Schuko
Earth Terminal	Yes
International Protection Rating	IP40

- The Vendor shall provide a Data sheet, catalog or brochure for the offered Item.

21. RJ45 socket UTP CAT6

- The Socket shall take AWG 22 single-core cables up to AWG 26 and AWG multicore cables, and the contacts marked with dual color code and wiring schemes T568 A and T 568 B.
- The Socket shall Conform to standards ISO/IEC 11801 Ed. 2.0, amendment 2, EN 50173-1 and TIA/EIA 568 C. Or any other equivalent standards
- All flush-mounting boxes, support frames and plates shall be provided from the same brand selected, and suitable for the function and appearance.
- Wherever the Sockets are installed in the Existing Masonry Block, the Flush Mounting Boxes shall be used and the Sockets shall be installed within 3, 4 or 6 modules according to the other sockets beside.
- The Data Sockets shall include labeling for identification purposes. In addition, they shall have the shutter in the front of faceplate.
- This Socket will also be applied for Voice Sockets.
- The RJ45 jack shall be frontal (not facing the ceiling or the ground).
- The RJ45 Cat.6 UTP Connector shall be provided separately and from the same brand. "The integrated RJ45 Cat.6 with the Socket will not be acceptable".
- The Vendor shall provide a Data sheet, catalog or brochure for the offered Item.

22. Patch Cords

- The RJ45 to RJ45 patch cords shall consist of stranded UTP Cat.6a, 4-pair cable and shall be tested to 100% in compliance with TIA/EIA-568-B. The required colors are blue and white; the supervisor engineer has the right to change the color as required.
- The required length is 0.5m.
- The Material and work specified herein shall comply with the applicable requirements of:
    - ANSI/TIA/EIA – 568-B Telecommunications Cabling Standard.
    - FCC Part 68
    - ISO/IEC 11801 2nd Edition
    - Or any other equivalent standards

23. CAT.6 Cables

- The Cables shall be according to EIA/TIA 568-C.2 CAT6a CABLE; UTP for Internal Installation and SFTP for External Installations.

- CAT.6a UTP Cables to be connected and terminated from the Data and Voice patch panels from one side to the outlets on the other side as per the drawing (Data outlets terminated to Data patch panels and Voice outlets to Voice patch panel).
- CAT.6a UTP Cables to be extended and terminated from the each Indoor Cameras in the Third Floor from One side to the 8 Ports Network Switch and to the NVR respectively.
- CAT.6a SFTP Cables to be extended and terminated from each Outdoor Camera, from One side to the 24 Ports Network Switch and to the NVR respectively.
- When laying the Cables, extension of 0.5m shall be applied for each Data/Voice Socket, 1m for each Camera, and 1.5m in the Data Cabinet.
- The Quantity will be calculated in meter.

24. Conduits and Trunking

- The Distance between each one shall be allowed for installing, maintenance and not affecting each other signaling.
- The Cable Trays shall be G.I Metal, with thickness capable for handling the weight of the installed Cables with Safety Factor of 50%.
- The Conduits, Trunking and Flexible Tubes shall be made from high Quality products and ensure proper strengthen when installation and pulling the cables. They shall be with the proper size to fit all the installed cables with 50% free space.
- The Trunking shall be installed as noted in the Drawings. Perfect appearance shall be applied.
- Coordination shall be applied wherever needed and for all MEP installation.

25. UPS

- Type: Online
- Form factor: Rack mounted
- To be installed in the Data Cabinet in the First Floor.
- Qty : 4
- The UPS shall meet the following Specifications:

Rated Power

kVA	3
Capacity	3000W

AC INPUT

AC Input voltage	230 VAC + 20 %
AC Input Frequency	50 Hz +/- 6 %
AC Input Power factor	1

DC CHARGER

Battery Voltage	36V or 48V
Rectifier	IGBT based PFC Type

AC OUTPUT

Technology	Mosfet Based Double Conversion PWM
Output voltage	230 VAC +/- 1 %
Output Frequency	50 Hz +/-0.5 %
Output Power factor	0.8 to 1 lag
Output waveform	PWM Sine wave
Galvanic Isolation	Inbuilt Galvanic Isolation Transformer Provided
Harmonic Distortion	Less than 3 % on Linear Load
Transient Recovery	.+ 4 % from 0 to Full load and corrected within 60 msec.
Inverter Efficiency	85 % - 90 % Depending on DC voltages

INDICATIONS & ALARMS

Indications	Mains on, Inverter On, Battery Low, Over Load, Output Under Voltage, Output Over Voltage, DC Over Voltage
Audible Alarm	Intermittent beep for 30 sec. On mains fail. Battery low pre-alarm at 80 % of Battery discharge. Intermittent Beep for all other Trip Conditions

PROTECTIONS

Protections	Output Overload, Output short circuit, Battery low trip, DC over voltage, Output under voltage / over voltage.

GENERAL

Bypass Facility	Manual / Static Bypass Switch*
Audible Noise	Less Than 50 dB at 1 meter
Design ambient	0-50^{o}C
Relative Humidity	Max. 95 % Non Condensing
Enclosure	M.S. Powder coated with castor wheels.

26. Fire Alarm System

- The Fire Alarm System will consist of the Smoke Detectors located as mentioned in the drawings, Heat Detector in the Kitchen, and Manual Push Button and Siren with Strobe Light in the Corridor as indicated in the Drawings.
- All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling (fire alarm) system.

- All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.
- All Equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.
- Equipment shall be manufactured by an ISO 9001 Certified Company.
- Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.
- Conduit fill shall not exceed 40% of interior cross sectional area where three or more cables are contained within a single conduit.
- Cable must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per NEC Article 760-29.
- Wiring for 24 volt control, alarm notification, emergency communication and similar power limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
- Conduit shall not enter the Fire Alarm Control Panel, or any other remotely mounted Control Panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
- Conduit shall be 3/4-inch (19.1 mm) minimum.
- Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and Signaling Line Circuits, and 14 AWG (1.63 mm) for Notification Appliance Circuits.
- All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
- Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR).

- Wiring used for the multiplex communication loop shall be twisted and shielded and installed in conduit unless specifically excepted by the fire alarm equipment manufacturer. The system shall permit use of IDC and NAC wiring in the same conduit with the communication loop.
- All field wiring shall be completely supervised.
- All boxes and cabinets shall be UL listed for their use and purpose.
- The Contractor shall link all the new components with the existing Fire Alarm Control Panel along with testing and commissioning the new installation, complete with Cabling and Trunkings.
- Main Fire Alarm Control Panel:
    - The FACP shall contain a microprocessor based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: addressable detectors, addressable modules, printer, annunciators, and other system controlled devices.
    - The control panel shall provide, or be capable of expansion to 318 addressable detectors and 318 monitor or control modules (636 addressable devices).
    - The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel that shall include a backlit, 80-character Liquid Crystal Display, individual, color coded system status LEDs, and an alphanumeric keypad for the Field Programming and control of the Fire Alarm System.
    - All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the Fire Alarm Control Panel.
    - The FACP shall provide the following features: Maintenance Alert to warn of excessive detector dirt or dust. Detector sensitivity read/test information and System Status Reports to display or print. Smoke Detector Alarm Verification. Pre-signal, meeting NFPA 72 requirements. Rapid manual station reporting (under 3 seconds). Periodic Detector Test, conducted automatically by the control panel every two hours. March time, temporal (ANSI Cadence) and California Code coding options. Walk Test will check for two detectors set to same address.
    - The main CPU shall contain Form-C relay contacts rated at 2.0 amps/30VDC for the following: Alarm, Trouble, Supervisory.

- The CPU shall contain two Class B or A (NFPA Style Y or Z) programmable Notification Appliance Circuits.
- The Microprocessor shall communicate with, monitor, and control all external interfaces with the control panel. It shall include EPROM for system program storage; non-volatile memory for building-specific program storage; and a "watch dog" timer circuit to detect and report microprocessor failure.
- The Microprocessor shall contain and execute all programming for specific action to be taken if an alarm condition is detected by the system. Such programming shall be held in non-volatile programmable memory and shall not be lost if both the system primary and secondary power failure occurs.
- The Microprocessor Unit shall also provide a Real- Time Clock for time annotation of system displays, printer, and history file.
- 4The Microprocessor Unit shall contain flash memory capabilities for easy upload/download for upgrades of software.
- All clock, date and history files shall be maintained during power loss.
- The Display shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.
- The Display shall include status information and custom alphanumeric labels for all Addressable Detectors, Addressable Modules and Software zones.
- The Display shall provide a 80-character backlit alphanumeric Liquid Crystal Display (LCD). It shall also provide 9 Light-Emitting-Diodes (LEDs), consisting of and not limited to the following: AC POWER, FIRE ALARM, SUPERVISORY, SYSTEM TROUBLE, MAINTENANCE, ALARM SILENCED, DISABLED, BATTERY, and GROUND.
- The Display shall provide a 25-key touch key-pad with control capability to command all system functions, entry of any alphabetic or numeric information, and field programming. Two different password levels shall be provided to prevent unauthorized system control or programming.
- The Display shall include the following operator switches: ACKNOWLEDGE/STEP ALARM SILENCE, DRILL, and SYSTEM RESET (also serving as a lamp test switch).

- The SLC (Signaling Line Circuit) Interface shall provide power to, and communicate with, all of the Addressable Detectors and Addressable Modules over a single pair of wires. This SLC Loop shall be capable of NFPA Style 4, Style 6, or Style 7 operation.
- The SLC interface shall receive information from all Addressable Devices. This information shall be processed to determine whether normal, alarm, or trouble conditions exist for each detector. This information may also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.
- The Signaling Line Circuit shall be capable of distances of 10,000 feet (@ 12 AWG, twisted). For retrofit applications, the system shall support up to 3,000 feet of untwisted, unshielded wire. (Loop 1 only)
- An EIA-232 interface between the Fire Alarm Control Panel and UL Listed Electronic Data Processing (EDP) peripherals shall be provided. The EIA-232 interface shall allow the use of printers, or for an interface to an off-line PC programmer.
- An EIA-485 port shall be available for the serial connection of optional remote led-type annunciators. EIA-485 in terminal mode shall allow serial connection of optional LCD, English language remote system displays. LED (per zone or point) annunciators shall also be provided. The maximum distance to the furthest annunciator shall be 3,000 feet. The system shall support a maximum of 32, remote annunciators on a single twisted, shielded pair. The maximum distance to the furthest annunciator shall be 6,000 feet.
- A PS2/PC keyboard connection shall be provided to support the connection of a PC keyboard for local programming of the fire alarm system.
- The control panel shall be housed in a UL listed cabinet suitable for surface or semi-flush mounting. Cabinet and front shall be corrosion protected.
- The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators.
- An optional semi-flush trim ring shall be available for a neat cabinet dress.
- All interfaces and associated equipment are to be protected so that they will not be affected by voltage surges or line transients consistent with UL standard 864.
- Optional plug-in modules shall be provided for NFPA 72 auxiliary and remote station fire alarm systems as well as a Digital Alarm Communicator Transmitter for NFPA 72 Central

Station systems. The DACT shall meet all current UL requirements for delayed AC fail reporting and shall be capable of reporting individual signals for all 636 points.

- The Power Supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP.
- A 240 VAC, 50 Hz version shall be available where required.
- It shall provide a minimum of 6.0 amps of usable Notification Appliance power.
- It shall provide a battery charger for 24 or 60 hours of standby using dual-rate charging techniques for fast battery recharge.
- It shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults on sensitive addressable modules.
- It shall be power-limited using fuse-less, quick-acting electronic circuitry meeting the latest UL requirements.
- Operators Controls
    - Acknowledge Switch:
        - Activation of the control panel Acknowledge switch in response to new Alarms and/or Troubles shall silence the local panel piezo electric signal and change the Alarm and Trouble LEDs from flashing mode to steady-ON mode. If multiple Alarm or Trouble conditions exist, depression of this switch shall advance the 80-character LCD display to the next Alarm or Trouble condition.
        - Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.
    - Signal Silence Switch: Activation of the Signal Silence Switch shall cause all programmed Notification Appliances and relays to return to the normal condition after an alarm condition. The selection of Notification circuits and relays that are silence-able by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit, auto-silence timers, and an option to silence horns and keep strobes flashing.
    - System Reset Switch: Activation of the System Reset Switch shall cause all electronically latched initiating devices, appliances or software zones, as well as all

associated output devices and circuits, to return to their normal condition. Holding the RESET switch shall perform a Lamp Test function.

- Drill (Evacuate) Switch: Press and hold of the Drill switch shall activate all Silenceable Notification Appliance circuits. The Drill function shall latch until press of Signal Silence or Reset.

- Field Programming
  - The system and its respective devices (i.e. smoke detectors and modules) shall be programmable, configurable and expandable in the field without the need for special tools or electronic equipment and shall not require field replacement of electronic integrated circuits.
  - All programming may be accomplished through the standard FACP built-in keypad. As well through using a PC keyboard (connection provided on UNIMODE-9600 main circuit board.)
  - All field-defined programs shall be stored in non-volatile memory and shall not be lost if AC mains and/or battery is lost.
  - The programming function shall be enabled with a password that may be defined specifically for the system when it is installed. Two levels of password protection shall be provided in addition to a key-lock cabinet. One level is used for status level changes such as zone disable or manual on/off commands. A second (higher-level) is used for actual change of program information.
  - Program edit shall not interfere with normal operation and fire protection. If a fire condition is detected during programming operation, the system shall exit programming and perform fire protection functions as programmed.
  - A special program check function shall be provided to detect common operator errors.
  - An Auto-Program (self-learn) function shall be provided to quickly program initial functions within several seconds. During this operation, smoke detectors connected to the Signaling Line Circuit shall be automatically installed without labor intensive operator key commands and the using additional electronic equipment to program each individual detector.

- For flexibility, an optional off-line programming function, with batch upload/download, shall also be available.

– System Components:
  - Audible/Visual Combination Devices:
    - For Audible
      - Electronic sounders shall operate on 24 VDC nominal.
      - Electronic sounders shall be field programmable without the use of special tools, to provide slow whoop, continuous, or interrupted tones (Temporal Pattern) with an output sound level of at least 90 dBA measured at 10 feet from the device.
      - Shall be flush or surface mounted as shown on plans.
    - For Visual
      - Shall operate on 24 VDC nominal.
      - Shall meet the requirements of the ADA (Americans with Disabilities Act) as well as UL Standard 1971.
  - Addressable Manual Pull Box
    - Addressable Manual Stations shall be provided to connect to the Fire Alarm Control Panel Signaling Line Circuit (SLC) Loops. Up to 159 addressable manual stations may be connected to each SLC loop.
    - The Manual Pull Box shall, on command from the Control Panel, send data to the panel representing the state of the manual switch. Manual Fire Alarm Stations shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
    - All operated stations shall have a positive, visual indication of operation that cannot be reset without the use of a key.
    - Manual Stations shall be constructed of LEXAN (or polycarbonate equivalent) with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches or larger.
    - Stations shall be suitable for surface mounting, or semiflush mounting as shown on the plans, and shall be installed in accordance with ADA and local codes.

- The Manual Station shall provide address-setting means using decimal switches. Addressable manual stations that use binary address setting methods, such as a dipswitch, are much more difficult to install and are subject to installation error, and are not allowable substitutes.

- Addressable Photoelectric Detectors
  - Smoke detectors shall be addressable and shall connect with two wires to the Fire Alarm Control Panel Signaling Line Circuit. Up to 318 addressable detectors may connect to two separate SLC loops.
  - The detectors shall use the photoelectric (light-scattering) principal to measure smoke density.
  - The detectors shall be low profile ceiling-mount and shall include a twist-lock base.
  - The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a switch) or initiated remotely on command from the control panel.
  - The detectors shall provide address-setting means on the detector head using decimal switches. Because of the possibility of installation error, systems that use binary jumpers on dipswitches to set the detector address are not acceptable. The detectors shall also store an internal identifying code that the control panel shall use to identify the type of detector.
  - The detectors shall provide an alarm and power LED. The LED shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel. The LED is placed into steady illumination by the control panel indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED.

27. Access Control System

- Access Control System shall be **MIFARE** Technology with full installation and termination with Data and Power Cables and installation.
- To be installed in the Main doors of the apartments in the building.

28. Lighting Fixtures

- The Lighting Fixtures shall be according to the Drawings and specified as LED.
- The Wattage for each luminaire Type shall be as indicated in the Drawings.
- The Contractor shall provide samples before submission, and Data sheet/ Photo in his Offer.
- Wherever the Lighting Fixtures installed External or in a wet area, the IP shall be not less than IP45.
- The Contractor shall provide 4 Fixtures Units for each Type as a spare except for the Flood Light (50W).
- All External Lighting shall be IP66 or better, and ensure proper Water-proof casing.
- All the Lighting Fixtures shall be controlled manually from a switch, except the Entrance, it shall be controlled two occupant sensors with override switch; one sensor will be mounted above the Main Door, and the other at the bottom of the Staircase.

29. Emergency Lighting

- Emergency Exit Sign and Routes shall be 5W, LED, and the base shall be recessed in the False ceiling.
- Battery-operated emergency lights shall use only reliable types of rechargeable batteries provided with suitable facilities for maintaining them in properly charged condition.
- Maintenance-free, rechargeable Ni-Cad battery “Other Options may be applied depends on the availability in the market”.
- Internal solid-state transfer switch automatically connects the internal battery to LED Board for minimum 90-minute emergency illumination.
- Charge rate/power “ON” LED indicator light and push-to test switch.
- Fully automatic solid-state, two-rate charger initiates battery charging to recharge a discharged battery in 24 hours.
- The connected power shall be from nearest power supply socket.

III. GENERAL TERMS AND REMARKS

- All IT equipment provided should have a one Year warranty.
- Printed labeling for Data, Voice and Cameras outlets and cables.
- Printed labeling for the patch panel, patch cords, cameras, Access pints and all data & voice outlets.
- Cameras locations could be adjusted if needed.

- Contractor is required to provide weekly progress report on all items.
- Contractor might advise on solutions that reduces cables and conduits' quantities.
- The Quantity may be increased or decreased according to the current conditions and installations.