Winning contractor is advised to follow a better-organised way of undertaking the construction work. This is necessary for ensuring timely completion of the work without compromising the quality. Moreover, the better-organised construction works are also cost-efficient as compared to the ones less better-organised. For this, at the very beginning, the contractor is expected to prepare a Work Plan - detailed schedule of necessary works - including those of construction materials for each of the sites under its responsibility. Secondly, the contractor should arrange technical personnel, supervisory resources, tools and equipments and workforce as part of the mobilisation. Prior to starting the work, if there is a need, the contractor or its technical personnel will be briefed on the methodology of construction and specifications to be adopted. When the work begins, there will be stringent overseeing of contractor’s day-to-day activities. The outputs at different stages will be inspected thoroughly. If found non-compliance to the prescribed methods and procedures or the quality of the already achieved output is not acceptable the contractor will have to re-do the concerned part of the work on its own expenses.

**Sequence of Activities and Procedure:**

The contractor is expected to follow the following sequence of construction work plan:

<table>
<thead>
<tr>
<th>Sequence of Activities</th>
<th>Procedure / Methodology</th>
</tr>
</thead>
</table>
| 1 Preparation of the site | • The local community (School Facilities Development Committee), PES and DEB personnel will cooperate and collaborate;  
• Undertake fencing of the site, if necessary;  
• Set up store, guardhouse / supervisor’s temporary shelter;  
• Undertake laying out of the building plan; |
| Stage I | |
| 2 Earthwork for foundation | • Excavation up to specified depth and keeping adequate width for working;  
• Compaction with Optimum Moisture Content;  
• Brick soling on sand; |
| 3 Casting RCC Footing and column up to required ceiling height | • Use of specified quality and quantity of materials only is allowed; For example graded broken stone gravel, river sand, 52 or above grade Portland cement (as specified) and specified magnitude of steel;  
• Machine mixing of concrete is compulsory; No hand mixing of concrete is allowed;  
• If casting of any concrete element, if done in two stages, then there must be a gap of at least three days between the completion of one work and start of the other;  
• Form work, shuttering and placing of reinforced steel requires be inspected before pouring of the concrete; Never pour concrete before permitted to do so by the engineer / site in charge;  
• While concrete is being poured the mass needs to be properly compacted not to leave any voids. Use of vibrator is strongly recommended. The concrete work with voids will not be accepted at all;  
• The freshly casted concrete must be cured for at least 14 days; |
| 4 Earthwork for tie-beam foundation and for outside-support pillars | To be done as provided in the other section of Technical Specification and the Design Drawing |
| 5 Brick masonry and/or PCC work up to DPC tie-beam | • Starting of brick masonry work must be on a levelled and compacted surface. For better compaction and preparing a uniform level a layer of sand may be applied and optimum moisture content of the ground also helps;  
• At the bottom of this foundation wall the width should be about 1.5 times larger than at the bottom of the tie-beam; |
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 6 | **Casting of RCC tie-beam at plinth level and casting of outside-support pillars**  
   - Freshly completed brick masonry work must be properly cured for at least 7 days;  
   - The cement mortar to be used for brick masonry should be rich such as 1:4;  
   - Prepare small proportions to be used immediately. Never get large amount of cement mortar prepared for using over a long hours period.  
   - Must undergo dry-mixing at least three times before pouring the water. After pouring the water the mixing should be at least 3 times before it is actually used.  
   - Follow the relevant methodology noted above; |
| 7 | **Back filling and compaction**  
   - Follow the relevant methodology and procedure noted above as applicable;  
   - Filling of the ditch should be done at least three days after casting of the tie-beam and outside-support pillars;  
   - The filling process should be in layers of “fill and compact” with hand ramming at optimum moisture content;  
   - For filling the earthwork residual material may be used mixed with river sand or other appropriate materials; |
| **Stage II** |   |
| 8 | **Brick masonry for walls all around**  
   - Follow the relevant methodology and procedure noted above as applicable;  
   - The doors and windows frame must be hooked into the masonry wall with rich mortar; |
| 9 | **Simultaneous to rise of brick walls the door and window frame needs to be fixed**  
   - Follow the relevant methodology and procedure noted above as applicable;  
   - The wood work must be done as per specified; |
| 10 | **Casting of horizontal and slanted ceiling beams including the ridge beams**  
   - The wood work must be done as per specified; |
| 11 | **Floor casting in PCC**  
   - Final levelling and compaction of the floor should be done at this stage. On the top of compacted and levelled surface a layer of brick salling should be done and a layer of plain cement concrete (PCC); |
| **Stage III** |   |
| 12 | **Plastering and finishing the floor surface**  
   - The floor surface should be done in two layers of lean mortar and on its top 1:1 cement slurry;  
   - Plastering and floor finish surface must be cured stringently for at least 14 days after the mortar placement;  
   - For the Toilet-Water Unit various plumbing fittings may be done after fitting the doors and windows;  
   - Wiring for electrical fittings and putting into place other fixtures e.g. black board and window glasses;  
   - White wash and painting of the plaster surface as well as wooden surfaces, doors and windows;  
   - Cleaning and removal of surplus materials from the site; |
Detail Technical Specifications

In addition to the above requirements with respect to sequence of activities and procedures to be followed the construction is required to confirm to the following specification. The dimensions of all and every parts are to be specified in the Design Drawing. Wherever, a dimension is not specified or an alternative dimension is required by the site condition then UNICEF Technical Team should be consulted and strictly only with its permission that a new dimension is adopted.

<table>
<thead>
<tr>
<th>Items</th>
<th>Detailed Description</th>
</tr>
</thead>
</table>
| 1. General: | • This specification covers the requirements for the construction of all or portions of paving, masonry work, foundations and structures with specified type and class of materials applied with specified methods. Lines, levels, grades, and dimensions are to be as shown on the design drawings, and as instructed by the UNICEF Technical Team wherever necessary whenever this specification is not adequate.  
  
  • All testing and inspection services required will be performed by the Contractor at its own expense unless otherwise specified herein. Standard methods of testing will be adopted such as those complying in detail with the applicable ASTM Methods of Tests. |

| 2. Materials: Cement, Water, Coarse Aggregate, Fine Aggregate (sand), Wood | • Cement shall be Portland Cement, TIS 15, Type I, "Specifications of Portland Cement" or ASTM C150, Type I, "Specification of Portland Cement", or Cement Lao P525, unless otherwise specified on the drawings. High early strength cement may only be used with written approval of the Engineer. Cement brands shall be subjected to approval of the Engineer. Only one color cement shall be used throughout the construction.  

  • Coarse aggregate for all types of concrete shall consist of hard, durable naturally occurring stones or crushed rock and conform to the requirements of AASHTO standard M-80. It shall be furnished with separate grading. Coarse aggregate shall meet a maximum size of 25mm.  

  • The grading of coarse aggregates shall be within the limits given below: |

<table>
<thead>
<tr>
<th>AASTHO Sieve</th>
<th>Percent Passing (by weight)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>Designation</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>63</td>
<td>2(\frac{1}{4})</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>50</td>
<td>2(\frac{1}{2})</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>37.5</td>
<td>1(\frac{1}{2})</td>
<td>95-100</td>
<td>100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>25.0</td>
<td>1(\frac{3}{4})</td>
<td>-</td>
<td>95-100</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>19.0</td>
<td>3(\frac{1}{4})</td>
<td>35-70</td>
<td>-</td>
<td>95-100</td>
<td>100</td>
</tr>
<tr>
<td>12.5</td>
<td>3(\frac{1}{2})</td>
<td>-</td>
<td>25-60</td>
<td>-</td>
<td>90-100</td>
</tr>
<tr>
<td>9.5</td>
<td>3(\frac{3}{8})</td>
<td>10-30</td>
<td>-</td>
<td>20-55</td>
<td>40-70</td>
</tr>
</tbody>
</table>
- The fine aggregates shall consist of hard dense uncoated rock fragments, shall be well graded from fine to coarse and shall be free from clay and dirty and shall conform to the requirements of AASHTO Designation M 6-87 and ASTM Standard C 40.

- The grading of fine aggregates shall be within the limits given below:

<table>
<thead>
<tr>
<th>Sieve size (inch)</th>
<th>Cumulative Percentage by weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 38 (9.5 mm)</td>
<td>100</td>
</tr>
<tr>
<td>No. 4 (4.75 mm)</td>
<td>95-100</td>
</tr>
<tr>
<td>No. 16 (1.18 mm)</td>
<td>45-80</td>
</tr>
<tr>
<td>No. 50 (0.3 mm)</td>
<td>10-30</td>
</tr>
<tr>
<td>No. 100 (0.15 mm)</td>
<td>2-10</td>
</tr>
<tr>
<td>No. 200 (0.075 mm)</td>
<td>0-4</td>
</tr>
</tbody>
</table>

- Water for use with cement in mortar or concrete shall be clean and free from salts, oil, acid, vegetable or other substance injurious to the finished product.

- Reinforcing steel shall be VSI steel and shall conform to the following standard:

<table>
<thead>
<tr>
<th>Reinforcing steel</th>
<th>Strength (kg/cm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round bar</td>
<td>Yield point:</td>
</tr>
<tr>
<td></td>
<td>not less than 2,100</td>
</tr>
<tr>
<td>Deformed bar</td>
<td>Yield point:</td>
</tr>
<tr>
<td></td>
<td>not less than 3,900</td>
</tr>
</tbody>
</table>

- Steel shall be free from loose scale, grease or other foreign matter. Using steel non-conforming to the above is not permitted.

- Reinforcing bars shall be cut and bent cold to the dimensions shown on the drawings.

- All reinforcement bar that have to be bent shall be bent at a minimum radius of 5 times the diameter of the bar and shall have a straight length before and after the bend of at least 5 times the diameter of the bar. Bending shall be executed cold, unless approved otherwise by the Engineer in writing.

- If required, but only after approval of the Engineer, reinforcement bars may be welded. Welding shall not be allowed at places where large bending moments will occur. The welding of reinforcement bars shall be continuous and the length shall not be less than 40 times the diameter of the largest bar to be welded.

- Joining of reinforcement bars will only be allowed on the approval of
the Engineer. Overlap length shall be at least 40 times the largest diameter reinforcement. Overlaps will not be allowed at points where large bending moments will occur.

- Steel reinforcement shall be accurately fixed and maintained as shown on the drawings.
- Precaution shall be taken to ensure that the reinforcement remain in their correct positions and properly surrounded with placed concrete. No welding shall be permitted.

### 3. Site Clearance:
- The sites need to be cleared of unnecessary trees and vegetation, old structures and anything that obstructs the construction works. The sites are primarily cleared already by the local community. The contractor will accept the sites as they are and will undertake further clearing work if necessary.
- Further clearing requirement are those of the Contractors responsibilities. For which operations may consist of the cutting, removal, and disposal of trees, grass, trees and bush roots, rubbish, debris, and refuse on or protruding above the ground. Specified objects such as bushes, shrubs, and trees, marked as exemptions, shall remain and shall be protected from damage during the progress of the work.

### 4. Earth work:
**Excavation for footing, trench for brick masonry, filling and back filling.**
- Operations shall be conducted in such a manner that all properties, facilities, utilities and improvements on or near the project site will not be damaged.
- The Contractor shall take such precautions as are necessary to ensure positive drainage at all time of all areas affected by the work. If it is necessary to interrupt existing drainage, the Contractor shall provide temporary drainage facilities that will prevent damage to public and private interests, and to the work in progress, and shall restore the original drainage as soon as the work permits.
- If the excavation, through error, is made more than what is required by the design the Contractor shall provide the necessary materials, labor, and equipment as required correcting such an error to the satisfaction of the Engineer. Such corrections shall be made at no additional cost to the UNICEF.
- The Contractor shall notify the Engineer sufficiently in time, before any further work is commenced on the particular site, of any excavation so that the excavated area can be inspected for proper location, proper dimentions and workmanship.
- Trenches and foundation pits for structures and structure footings shall be excavated to the lines, grades and elevations shown on the drawings.
- Boulders, logs and other objectionable material encountered in excavation shall be removed.
- For footing excavations, special care shall be taken not to lessen the bearing capacity of the soil. When, in the opinion of the Engineer the foundation fill material is required, it shall be placed in layers not more than 20 cm thickness and compacted to 90% of maximum dry density as determined by AASHTO method T - 99.
- All excavation surfaces and surfaces of backfill material against which concrete is to be placed shall be smooth and firm and true to line and level.

- All fill and backfill material shall be free from roots, wood scrap material, and other vegetable matter or refuse.

- Backfilling material for footing shall be suitable material (laterite) or mixed material of sand, clay and aggregate.

- Filling material for floor embankment before concrete slab to be placed shall be suitable material (laterite) or mixed material of sand, clay and aggregate.

- Sand filling 10 cm thickness against filled material and shall be watered to make the surface smooth before concrete slab to be placed.

- Fill and backfill shall be placed in layers not more than 20 cm loose thickness except as specified otherwise herein, and each layer shall be compacted thoroughly and evenly. Fill and backfill adjacent to structural elements have been completed and accepted.

- Backfilling against concrete foundation shall be placed in layer not more than 20 cm thickness and shall be compacted thoroughly and evenly to 90% of maximum dry density as determined by AASHTO method T-99.

- Fill and/or backfill under concrete floor slabs, spread footings not supported by piles shall be compacted to not less than 90 percent of the maximum density as determined by AASHTO T-99. The moisture content of the fill and/or backfill material prior to and during compaction shall be within 2 percent of optimum.

5. Concrete Works: Mixing, casting and compacting

- Lean concrete, if not specified otherwise, is to be of class 150 kg / m³ or mix proportion of cement 1 part, sand 3 parts, and aggregate 5 parts by volume.

- Reinforced concrete for structures such as foundations, columns, tie beams, roof beams, use concrete class 350 kg / m³ or mix proportion of Cement 1 part, Sand 2 parts and Aggregate 3 parts by volume.

- Reinforced concrete stud and lintel beam use concrete class 350 kg / m³ or mix proportion of Cement 1 part, Sand 2 parts and Aggregate 3 parts by volume.

- Concrete shall be composed of Portland Cement, fine aggregate, coarse aggregate, water, as specified, and shall be mixed at the site of the construction, except as otherwise authorized in wiring by the Engineer.

- Concrete should be batched by weight where possible. If batching is by volume, the batching must be carried out in accurately sized containers.

- Concrete shall be mixed thoroughly to an uniform consistency in mechanical batch mixers. Mixers shall be attached with a manufacturer’s plate showing the capacity of the drum in terms of volume of mixed concrete and the speed of rotation of the mixing drum.
The ratio of Concrete Mixes by volume are given as below:

**Lean Concrete (150 / 400 / 800):** 1 (one) part cement + 3 (three) parts sand + 5 (Five) parts coarse aggregate;

**High Quality Concrete (350 / 400 / 800):** 1 (one) parts cement + 2 (two) parts sand + 3 (three) parts coarse aggregate;

The water cement ratio w/c (by weight) shall not be more than 0.5;

All concrete shall be prepared in accordance with the above quality classifications. Unless indicated otherwise in the Drawings or the BOQ, the concrete shall be Normal Concrete. Concrete which has not been prepared in accordance with these specifications and / or the quality classifications shown on the Drawings or the BOQ will not be accepted. Such work shall be removed and replaced, to the satisfaction of the Engineer, with the correct concrete at the expense of the Contractor.

Hand mixing shall only be carried out with the permission of the Engineer. The mixing shall be done on a clean water tight, non-absorbent platform approved by the Engineer.

The cement content shall be increased by 10% over the required content for machine mixing.

The platform for mixing shall be emptied before a subsequent batch is mixed and thoroughly cleaned if not in use for more than 20 minutes before the batch is prepared.

Compaction of concrete shall be through mechanical vibration and shall be executed in accordance with the method described below.

Each layer of 15 cm of concrete shall be compacted by vibrating separately as follows:

Insert the vibrator (while vibrating) every 50 to 75 cm for 5 to 10 seconds. Withdraw the vibrator slowly while still vibrating. The vibration (at the point of insertion) is completed when the mortar just begins to flush to the surface, adjacent to the vibrator. The vibrator shall be inserted over the full depth of the previous layer (8-10 cm), if any, to establish a good bond. Under no circumstance should the vibrator be held against the shuttering.

The Contractor may propose another method of compaction but it shall only be used if approved by the Engineer.

Concrete during the early stages of setting shall be protected from sun, wind and rain until it has set properly and in accordance with sound method in use.

The concrete shall be cured by water curing, wet gunny bags curing. Curing shall commence within 45 minutes of placing the concrete after which the concrete shall be kept continuously moist for at least 14 days.

The Contractor shall inform the Engineer of the method of curing before any concrete work is started.

6. Form Works:

Form works shall include all temporary moulds for forming concrete to the required shape, together with all temporary construction required for support of such moulds. It shall be constructed in such a way which
permits their removal without shock or vibration to the concrete.

- Removal of forms without approval of the Engineer is not permitted and shall be carried out in such a manner as will not injure the concrete. No form shall be removed until the concrete has been sufficiently set.

### 7. Masonry Work:

- This specification covers the requirement for furnishing and installation of all masonry work as shown on drawings and as specified herein.

- Common bricks, where used, shall be good, sound, hard, durable and uniformly burned, solid rectangular and uniform in shape and size and of compact texture, free from defects that will affect service - ability or strength, and shall be of the best local manufacture.

- Size of brick: 5cmx8cmx18cm

- Cement shall be mixed Portland cement conforming to Lao Cement P-425. One color of cement shall be used throughout the work. The batch of cement use shall be for the use intended in accordance with the written approved recommendation of the manufacture.

- Fine aggregate shall consist of granular material conforming to the requirement of AASHTO Designation M 6-87 and ASTM Standard C40. Aggregate shall be clean, hard, durable, uncoated particles free from dust and other deleterious materials.

- Water for mortar preparation shall be free from injurious amounts of oils, alkalis, organic matter, or other deleterious substances.

- Masonry mortar for setting block shall be in proportion as follows:
  - Cement: 1 part (by volume)
  - Sand: 3 part (by volume)
  - Water: Sufficient to make a Plastic Mix that can be troweled and will develop a complete bond.

- Masonry mortar shall not be mixed in advanced of the time it is to be used in the work. Mortar that is not used within one hour shall be discarded. Retempering of mortar in which cement has started to set will not be permitted.

- The mixing of mortar by hand is permitted but mortar boxes shall be cleaned out at the end of each day's work and all tools shall be kept clean.

- Cement and other cementations materials shall be delivered to the jobsite and stored in unbroken bags, barrels, or other approval containers, plainly marked and labeled with the manufacturer's names and brands. Mortar materials shall be stored and handled in a manner which will prevent the inclusion of foreign materials and damage by water or dampness. Masonry unit shall be handled and stored with care to avoid chipping and breakage. Masonry materials shall be protected from contact with the earth and exposure to the weather, and shall be kept dry until used.

- Masonry walls shall be carried up level and plumb. Unfinished work shall be stepped back for joining with new work; toothing will not be permitted, unless otherwise approved. Door and window openings shall be built in carefully and neatly as the masonry work progresses. Drilling, cutting fitting, and patching, to accommodate the work of
others, shall be performed by experienced personnel. Top of exposed walls and partitions, not being worked on, shall be covered with a waterproof membrane, secured in place. No one portion shall be raised more than a meter above adjacent portions.

- Common Brick shall be wetted prior to lying, and shall be laid in running bond with stretchers breaking joints with the course below. Use full size bricks to the greatest extent possible in lieu of broken bricks. Bricks shall be laid with joints approximately 1 cm thick.

- Brick masonry shall be tied to adjoining columns with anchors sufficiently long to extend into the masonry not less than 20 cm and spaced at 35 cm on centers or every sixth course whichever is the lesser.

- In joining to existing masonry work, all loose mortar shall be removed and the existing work wetted before laying new work thereon. Brick masonry upon which plaster is to be applied shall have joints raked slightly to provide proper bond for plaster.

- All masonry shall be protected from damage until completion and acceptance of the work.

### 8. Pastering:

This specification covers the requirement for furnishing and construction of all Portland cement plastering work on exterior and interior surfaces as shown on drawings and as specified herein.

- Cement shall be mixed Portland cement conforming to Lao Cement P-42.5. One color of cement shall be used throughout the work. the branch of cement use shall be for the use intended in the accordance with the written approved recommendation of the manufacture.

- Fine aggregate shall consist of granular material conforming to the requirement of AASHTO Designation M 6-87 and ASTM Standard C 40. Aggregate shall be clean, hard, durable, uncoated particles free from dust and other deleterious materials.

- Water shall be free from injurious amounts of oils, alkalis, organic matter, or other deleterious substances.

- Plaster shall cover all holes, joints, and other surface defects without changing of the architectural lines. Plaster shall resist flaking and peeling due to thermal contraction and expansion of materials.

- Surface to receive plaster shall be clean and free from defects, oil, grease, acids, and organic and other injurious matter. Masonry or concrete surfaces to receive plaster shall be damp when the plaster is applied.

- Masonry or concrete surfaces to receive plaster shall have finish coat. Total thickness of coat work shall be approximately 12 mm.

- Portland cement plaster shall be in proportion by volume as follows:
  
  - Cement: 1 part (by volume)
  - Sand: 3 part (by volume)
  - Water: Sufficient to make a plastic Mix that can be troweled and will develop a complete bond.

- Plaster materials, specified on a volume basis, shall be measured accurately in approved containers that insure the specified proportions and will be controlled and maintained during the progress of work. Plaster shall be mixed with fine aggregates of uniform moisture, and the cement, shall be dry-mixed to a uniform color before water is added. Plaster which has begun to set before it is used shall be
discarded, retempering of plaster will not be permitted. Mixing boxes and tools shall be cleaned after each batch is mixed, and kept free of old plaster.

- Before applying plaster coat, the brick surface shall again be wetted evenly. The plaster coat shall be approximately 12 mm thick. The plaster coat shall be protected against rapid drying until properly and thoroughly cured.

- Plaster containing cracks, blisters, pits, checks, or discoloration will not be acceptable. Such plaster shall be removed and replaced with approved plaster. Patching of defective work will be permitted only when approved and such patchwork shall match existing work in texture and color.

- Upon completion of the plasterwork, all debris arising from the work shall be removed and all surfaces defaced during the progress of the work shall be cleaned and restored as required.

9. Carpentry: The requirements for finishing and installation of rough and finished carpentry, structural timberwork and related items as shown on drawings and as specified herein.

a) Soft wood shall be heartwood of the following species, or other as approved. The wood shall be relatively light in texture, unresisting to impact and easily worked.
   - May yang
   - May Pek

b) Medium wood shall be heartwood of the following species, or other as approved. The wood shall be relatively heavy, close-grained and resistant to impact.
   - May Khen Hua
   - May Khen Hin
   - May Phao

c) Hardwood shall be hard wood of the following species, or other as approved. The wood shall be heavy, close-grained and resistant to impact.
   - May Du
   - May Tai Ka
   - May Chick
   - May Hang
   - May Deng

- For roofing structures such as rafter and purlin shall be hard wood or at least medium wood as shown on drawings and as specified herein. The wood shall be applied with termite protection chemical.
  
  Rafter : 5x10 cm
  Purlin : 4x8 cm

- For ceiling shall be medium wood or at least soft wood as shown on drawings and as specified herein. The wood must dry before being installed.
  
  Ceiling plank : 1.5x10 cm

- For ceiling frame shall be hard wood or at least medium wood as shown on drawings and as specified herein. The wood shall be applied with termite protection chemical.
  
  Ceiling frame : 4x8 cm

- Doors and windows frame and panel shall be hard wood or at least medium wood as shown on drawings and as specified herein. The
<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
</table>
| **10. Fittings and hardware installation:** | - All the doors and windows fittings and other hardware fixtures are to be of standard quality meeting minimum requirements. The Contractor shall include a list of all these fittings with all the details and their prices in its Detail Cost Estimate part of the Bid Form.  
- Any fittings and hardware fixtures must be in accordance to what will be provided for in the Contract Agreement and the items must be verified and approved by UNICEF Technical Team before they are installed. |
| **11. Ceiling installation:** | - Board for ceiling panel shall be of plank wood 1.5x10 cm dried, fixed on medium wood frame 4x8 cm. Ceiling units shall be free from imperfections and blemishes that affect their appearance or service ability. The exposed surfaces shall be full without marred or broken surfaces.  
- Joints shall be straight and true to line, and the exposed surfaces shall be flush and level. Units shall be tightly butted and neatly joined to connecting work. Along the perimeter of the units for each room, space, or panel, medium wood shall be provided, unless otherwise indicated.  
- Following installation, all dirty or discolored surfaces of ceiling units shall be cleaned and left free from defects. Units that are damaged or improperly applied shall be removed and replaced. |
| **12. Construction of Roofing:** | - All Galvanize iron sheeting shall conform to VXP Trimdek Standard 770 mm width, Zincalume color. Sheets shall be formed with inside and outside radius and same so that all sheets shall rest snugly at laps.  
- Unless otherwise shown on the drawing, the size of sheets shall be 770 mm width, 0.35 mm thickness, and unbroken length.  
- Accessories: Ridge capping flashing installation shall be used with the sheets. Accessories shall be of the same basic material and color as the sheets. They shall be formed as recommended by the manufactures of the sheets.  
- For Roof structures such as rafter and purlin shall be hard wood or at least medium wood as shown on drawings and as specified herein. The wood shall be applied with termite protection chemical. |
| **13. Painting Works:** | - This term "paint" as used herein, includes emulsions, enamels, paints, stains, varnishes, sealers, cement- emulsion filler and other coatings, whether used as prime, intermediate, or finish coats. Surface cleaning and painting not specified in other sections shall be as specified hereinafter.  
- This specification intent to require the architectural painting of building and structure exposed sign, unless otherwise specified. The omission of minor items in the painting schedule shall not relieve the Contractor of this obligation to include such items where they come within the general intent of the specifications as stated herein.  
- All materials shall be delivered to the joist in unbroken, sealed and labelled containers of the paint manufacturer, and shall be subject to inspection by Company. Labels shall clearly state name of manufacture, designated name formula, type, colour, quantity, date of |
manufacture and manufacturer's directions, all of which shall be plainly legible at the time of use.

- Materials shall conform to the specifications and to the requirements hereinafter specified.

- Paint products shall be as manufactured by U-90, or approved equal.

- Where although shop priming must be done with primers other than specified herein, they should be approved by the paint manufacturer of the finish coats, which must be, field applied to them.

- Work areas designated for storage and mixing of all painting materials shall be subject to approval by the Engineer.

- All painting shall be done strictly in accordance with manufacture's specification and recommendations.

- Work areas will be designated by the Engineer for storage and mixing of all painting materials. Painting material shall be stockpiled in neat manner to facilitate fiddling them and preventing their loss or misuse. Painting wastes shall be disposed of promptly in proper containers outside the building. No plumbing fixture or drainage system shall be used for disposal.

- Each coat of paint shall be so applied as to produce film of uniform thickness. The coverage of paint must remain the same, whatever method of application shall be used. Each coat of paint shall be in different tint to the succeeding one. Special attention shall be given to insure that all surfaces including edges, corners, crevices, welds, and rivets receive a film thickness equivalent to that of adjacent painted surfaces.

- On all surfaces, first coat shall be applied by brush, except that where the item has been shop primed or field primed, the first coat and subsequent coats may be applied by brush, roller, or spray.

- Rollers for applying enamels shall have a short nap. This application shall be done by rolling the second coat at right angles roller, or spray.

- Brushes used for emulsion paint shall be soaked in water for a period of 2 hours prior to brushing. The primary movement of the brush shall describe a series of small circles to thoroughly fill irregularities in the surface after which the coatings shall be smoothed and thinned by a series of parallel strokes.

- Sprayer shall be permitted only in the areas approved. Any equipment located in such areas shall be completely enclosed in a manner satisfactory to COMPANY. Spray equipment shall be at all times kept clean and in good working order. Spray guns shall be operated to the type of paint specified, and shall be operated with orifices, nozzles and air pressure adjusted to consistency. Respirators shall be worn by persons engaged or assisting in spray painting.

- At time of application, paint shall show no signs of hard settling, excessive skinning, livening, or other deterioration. Paint shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Paints of different manufacturers shall not be mixed together. Where necessary to surface, temperature, weather, and method of application in accordance with the manufacturers approved
directions. The use of thinner for any reason shall not relieve the Contractor from obtaining complete cover.

- Surfaces that have been cleaned, pre-treated, and/or otherwise prepared for painting shall be given a coat of the specified first coat material as soon as practicable after such preparation has been completed, but in any event prior to any deterioration of the surface preparation.

- Paints other than water-thinned coatings shall be applied only to surfaces that are completely free of surface moisture as determined by sight or touch.

- The Contractor shall provide the Engineer with color charts and/or chips of the various approved paints for selection of colors. Colors and tints including shades of stain, shall match the respective color specimens selected by the Engineer.

- Cloth and cotton waste that might constitute a fire hazard shall be placed in closed metal containers or destroyed at the end of each day. Upon completion of the work, staging, scaffolding, and approved manner. Paint spots, oil, or stains upon adjacent surfaces shall be removed and the entire job left clean and acceptable.

- The Contractor shall provide and maintain quality control for architectural painting. Contractor shall ensure conformance to specifications and drawings with respect to construction, workmanship, finish and functional performance; and record the inspection of all operations, including but not limited to the operations listed below. Duplicate copies of inspection as well as the records of corrective action taken shall be furnished as required by the Engineer.

- Check and ensure all materials comply with the approved samples immediately upon delivery to the site. Materials that do not comply shall not be permitted to be unloaded but immediately removed from the site.

- Check and ensure the coats requiring fungicide have had proper amounts of fungicide added by the manufacture.

- Prepare list of all surfaces requiring paint. List the surface preparation, type of paint, color, number of coats required on each surface as specified, and use this checklist to insure that specifications are being followed.

- Check and ensure exterior emulsion paint for concrete and plastered surfaces is mixed strictly in accordance with the specifications.

- Check and ensure that plaster surfaces are properly aged and dried before the application of paint materials.

- Check and ensure that coating failures are satisfactorily corrected.

14. Plumbing System: Requirements for furnishing and installation of complete plumbing systems as described herein and as shown on the drawings.

- The contractor shall carefully examine the drawing and shall be responsible for the proper fitting of materials and equipments in each building (For toilet only).

- The contractor shall provide all necessary labour, equipment, tools and materials to complete the sanitary work requirements of the project. Roughing-in for all pipes and fixtures shall be carried along with the
building construction. Correct location of the pipes shall be observed as specified.

- All offsets, some fitting and accessories that may be required may not be indicated on the drawing. The contractors shall carefully investigate the structural and finish condition affecting all his work and shall arrange his work (furnishing such fitting, traps, valves and accessories) as may be required to meet such conditions.

- The materials uses plumbing system shall be in accordance with anyone of these following standards:
  
  Thai Industrial Standard (TIS)  
  American Water Work Association (AWWA)  
  British Standard Specification (BS)  
  Japan Industrial Standards (JIS)  
  Australian Standard (AS)

  All sizes of PVC pipe to be used are as follows:
  
  Cold water pipe: dia. 18 mm  
  Air vent pipe: dia. 25 mm  
  Waste pipe: dia. 50 mm  
  Seewage pipe: dia. 100 mm