SECTION 2

TECHNICAL WORK SPECIFICATION FOR SCHOOL CONSTRUCTION

1. PREPARATION OF SITE

The site shall be completely stripped of all vegetation. In particular no soil filling shall be laid where there is any remaining vegetation. If any demolition work is to be performed.

All materials of value shall remain the property of the school.

2. CONCRETE WORKS

All Concrete works performed will be to a strength grade as specified in this document and the plan. A sample may be taken by employer at any time during the construction process for testing.

3. FOUNDATIONS

3.1 Excavations

Soil shall be excavated for pedestal footing to regular shape in accordance with te drawings. The excavation for the pad footing must be at least 200mm bigger then the sizes of footings with a depth of 1100mm.

3.2 Base Preparation

All Foundation shall be constructed on top of a layer of clean compacted 4 x 6 stone laid to a depth of 100mm and leveled off with a mortar building, mix with 150 kg/m3 of cement.

3.3 Concrete Pad

All pad footing shall be constructed from reinforced in accordance with the drawings. Steel reinforcing must not be laid flat on the stone base but must be supported by steel bar chairs or pieces of clean square concrete to provide a minimum of 50 mm above the concrete for later connection to the columns. Timber formwork shall be used for the construction of reinforced concrete footing pads to ensure the construction quality and

provide regular and clean side faces.

3.4 Retaining Wall

A double layer of solid brick (200mm thick) will be constructed in accordance with the drawings. The retaining walls shall be laid on top of 4 x 6 compacted stone with 100 mm thick, mix with 150 kg/m3 of cement. Brick shall be made of burnt clay and be of first quality in strength and appearance. Solid bricks shall be regular in shape and of sized 45 mm x 90mm x 190mm.

3.5 Soil Fill

Soil fill must not contain any vegetation or degradable materials. Soil must be added one layer at a time to a depth no greater than 1560 mm before being wetted and thoroughly compressed before adding the next layer.

3.6 Floor

The concrete slap shall be laid on top of 4 x 6 stone compacted to 75 mm. The slaps reinforcing must be elevated above the stone so that is has a concrete coverage of at least 15 mm. Where steel overlaps it should do so for at least 250 mm.

3.7 Walkway

The Walkway around building shall be laid on 4 x 6 stone compacted at least 75 mm. It shall be made of 50 mm thick concrete, grade 150 kg/m2. It will be laid with construction joints approximately 4000mm apart. The walkway must also be sloped away from the building (3 degrees) to evacuate water.

4. MAIN STRUCTURAL FRAME

4.1 Ground Beam

The Ground beams shall be constructed from reinforced concrete and have the dimensions of 200mm x 250mm.

Steel reinforcing will have a minimum of 25 mm concrete cover.

Where steel bar overlaps it should do so for at least 500mm.

Formwork shall be left in place for at least 7 days after pour.

4.2 Columns

The area of footing where the columns is to be constructed must be broken to a depth of 15mm before the formwork for the footings must be lapped and tied 500mm over the reinforcing for the column. Where reinforcing steel overlaps in the columns is the column it should do so for 500mm. All reinforcing in the column will be covered by at least 25mn of concrete. Column reinforcing shall be extended 500mm centers. Formwork will be left in place for at least 4 days after the pour.

4.3 Roof Beams

The face of column where to roof beam is to be connected shall broken to a depth of 15mm to provide a rough surface for connection.

Steel from columns and beam must be lapped and tied for at least 500mm.

6mm steel rafter tie shall extend 400mm from the roof beam.

Minimum concrete cover for all steel reinforcing is 25mm.

Formwork must be left in place for at least 7 days after the pour.

4.4 Lintel Beams

The face of columns where the lintel beam will connect shall be broken out for 15mm to provide a rough surface for connection.

Steel reinforcing must be covered by 20mm of concrete.

Where steel reinforcing overlaps it should do so for at least 400mm.

Formwork will be left in place for at least 7 days after the poor.

4.5 Columns and beams general

All columns must be straight and horizontal.

Formwork must be supported so that there is no twisting or bending.

All must be constructed in accordance with the plans and these specifications. The maximum tolerance for error in size for columns and beams is + or - 15mm.

Anything not to specification will be knocked down and done again.

5. DAMP PROOF COURSE

A bituminous fabric will be laid before the brick wall are laid to prevent rising damp.

6. Brick Wall

To be constructed from a single layer of "hollow brick ". The burnt clay brick must be of uniform shape and appearance, under cooked or soft bricks will not be accepted. The bricks must be laid true and straight and wetted before being placed. Mortar joints will be a normal 15mm in depth. Brick laying mortar will be straight grade 75kg/cm2. The mortar must be thoroughly mechanically mixed. The sand must not contain clay or foreign particles.

7. WINDOW PARAPETS

The minimum concrete cover for the reinforcing steel is 15mm.

Any overlapping steel must do so for at least 250mm.

Formwork must be left in place for at least 28 days after the pour.

8. MORTAR RENDERING

All brickwork will be rendered with 15mm of mortar.

The mortar will contain cement, sand and lime putty.

The sand must be thoroughly washed and sharp and angular in shape.

The sand must not contain clay.

9. STEP

To be constructed by solid bricks and rendered with mortar of grade 150kh/cm2

The steps will be tied to the ground beam with 6mm steel.

10. ROOF

The steel roof structure shall be constructed in accordance with the drawings.

The rafters are made of C-section steel with the size of 50mm x 100mm x 2.3 mm.

The rafter shall be 666mm apart. They shall be tied down and electrically welded

With the steel rods extending out from the roof support beams.

The steel battens are made of L- section steel with the size of 25 mm x 25 mm x 3 mm.

The distance from the batten to another shall be 320 to 340mm.

All steel roof structure shall be painted with red anti-rust paint before applying two coasts of grey oil-based paint.

Roof tiles shall be of first quality Thai tiles CPAC Monier in red color. The batch of tiles

used shall be uniform in appearance, texture and color. The sides and profiles of all tiles shall be straight and regular and free of any undulations. All tiles to be submitted by the contractor for approval by the employer before it is used. The roof tiles used in construction of the building shall be the same type as the sample tile present.

11. DOORS AND WINDOWS

11.1 Doors

Doors shall be constructed according to the sizes and styles as shown in the drawings.

Doors shall be constructed from first quality˝ Duong Chem, Kor Ki, Thnorng, Phchek, and Sokrom˝ timber. Corner joints shall be made square and good with both timber sleeve and dowel pins and steel corner plate. The steel corner plate shall be set flush with the timber surface and shall be fixed by crews using 30mm screws. Other joints be tween doorplates shall made with a timber sleeve and dowel pins and the joint shall be square and light. The timber used for the fabrication of all doors shall be seasoned by storage and air-dried for minimum of 45 days before fabrication. Door handles shall be located at a height of 1000mm. Doors shall be fitted with locks of lever type, door handle and locking mechanism. The doors handle shall be finish in bright chrome plating. Barrel bolts shall be fitted to the top 400mm and bottom 140mm of the left hand side door in twin door sets.

11.2 Windows

Windows shall be constructed as per the sizes and styles as shown in the drawings.

Windows shall be constructed from first quality˝ Duong Chem, Kor Ki, Thnorng, Phchek, and Sokrom˝ timber. Corner joints shall be made square and good with both timber sleeve and dowel pins and steel corner plate. The steel corner plate shall be set flush with the timber surface and shall be fixed by crews using 30mm screws. Other joints between window plates shall made with a timber sleeve and dowel pins and the joint shall be square and light. The timber used for the fabrication of all windows shall be seasoned by storage and air-dried for minimum of 45 days before fabrication. Window shutter shall be provided with steel handles that are finished in chrome plate. Latches

shall be provided on the bottom windowsill to hold the shutters in the open position. Barrel bolts shall be provided at the top and bottom of all window shutters.

11.3 Doors and windows Sets

A door set includes all material and equipment required for the operation of doorway.

The door set includes the doorframe, door panels, handle and locking mechanism, and the barrel bolts to hold the door panel in the fully closed position.

A window set includes all materials and equipment required for the operation of a window. The window sets includes the window frame, window shutter panels, louvers, security, bars, laches, hinges and bottom, of window shutter.

11.4 Doors and Windows Frames

All doors and window frames shall be constructed from first quality˝ Duong Chem, Kor Ki, Thnorng, Phchek, and Sokrom˝ timber. The timber used for the fabrication of all windows and door frames shall be seasoned by storage and air-dried for minimum of 45 days before fabrication. Corner joints shall be rectangular, dovetails and nailed. The size of frame timbers shall be given in the drawings. Window frames shall be fitted with iron rod security grilles. The bards shall be made from 14mm diameter steel round bars and shall be pained with two coats of red oxide rust proofing paints.

11.5 Frame installation and Fixing

The works will be installed and adjust with correctness at their right place. During the installation and the temporary fixing all cautions required to insure the correct perpendicularity horizontality and alignment will be taken. The temporary fixing will be made with care as to guarantee the fixing while insuring the definitely fixing method selected by the builder will be submitted to the Engineer for approval.

11.6 Security Grills

Security grilles shall be constructed according to the sizes and style as shown in the

drawings. Window frames shall be fitted with iron rod security grills. The bars shall be

made from diameter 14 mm steel bars and shall be painted with one of red oxide rust proofing paint and two costs of oil pant.

11.7 Door Locking Mechanisms

All door should be provide with good quality padlocks, with dimensions 40 x 55 x 20mm, door handle and locking mechanism. The door handle shall be finished in bright chrome plating. Barrel bolts shall be fitted to the top and button of the left-hand side door in twin door sets. For each installed lock, the builder shall finish 3 keys to the supervisor upon completion of the works or handover of the premises.

11.8 Door Hinges

Where new replacement door and window panels are required, they shall be hinged in three locations as shown in the drawings, Hinges shall be of minimum thickness of 3mm and shall be inserted flush with the surface of the timber. The hinges shall be made of zinc anodized steel and shall be fixed to the timber with screws of a minimum length 30mm.

The tinges shall be straight and the doors and windows shall be hung so that they are true in both open and the closed positions.

11.9 Barrel Bolts

Barrel bolts shall be provide at the top and bottom of all window shutters. The top barrel bolts for the windows shall be 400mm in the length and the bottom bolts shall be 150mm. Barrel bolts shall be provided at the top and bottom, of all left hand side door panels. The tops barrel bolts for doors shall be 400mm in length and the bottom bolts shall be 250mm in length. Barrel bolts shall be finished in zinc anodized furniture steel. Barrel bolts shall be fixed to the frames by timber screws of 30mm length. A hole to match the barrel bolts shall be drilled in the timber frames and concrete floor so that the bolts can be inserted for a minimum of 20mm.

11.10 Installation of Hardware Doors and Windows

Hardware (handles, barrel bolts etc…)shall be installed for fitting purposed the

removed before the door and window panels are pained. This action shall prevent painting onto hardware or marking of pained surface during the initial installation of the hardware.

12. CONCRETE AND REINFORCING

12.1 Cement

Unless otherwise approved by Employer, Elephant, Diamond or requivalent cement will be used. Employer reserves the right to check the cement at the point of supply before it is transported to the site.

12.2 Sand

The sand must not contain any vegetation and be clean washed sand, sharp and angular in shape and free from clay. When compressed in the hand it should not leave a yellow stain.

12.3 Stone

The stone should be of uniform size (1x2), hard and free from dust and fines.

12.4 Water

The cleanest possible water should be used. Where supply is a problem all possible measures should be undertaken to purify the available supply. The contractor and Employer shall check each site and decide together the appropriate measure to be taken.

12.5 Batching and Mixing

Concrete should be batched using a gauge box and not a shovel. It should be thoroughly mixed, mechanically wherever possible.

12.6 Pouring

The surface of formwork must be clean and free from foreign materials. Once pouring of any component is under way it must not stop until that component is completed. In other word columns, beams etc. are to be complete in one go. The concrete shall be

vibrated mechanically to free it of air and voids. Care must be taken not to displace the steel reinforcing.

12.7 Steel reinforcing

All shall be free from rust scale and larger than 10mm shall be ‘‘deformed bar’’

12.8 Steel reinforcing

After initial hardset concrete must be kept wet for at least seven days. This is best done by covering with wet jute bags.

13. PAITING

13.1 Steel Surface

All steel surface shall be rubbed down with sandpaper to provide a smooth and clean surface before application of any paint. One layer of red oxide is painted on all steel surface before painting of 2 layer of oil paint. All layer shall be smoothly painted before they can be accepted. All window security grills and steel roof structure shall be pained in grey.

13.2 Masonry Surface

All masonry surface to be pained shall be rubbed down to provide a smooth and solid surface free of any loose or foreign material. All surface must be clean and dry before any paint coat is applied. The whitewash mix shall be made of gum and limewater. Lime rock and water shall be left standing after mixing to ensure good quality lime putty. The mix ratio shall be 5kg of gum to 100kg of lime. Only first quality gum and quicklime shall be used. Where coloring is required the ochre of the color chosen shall be added to the whitewash mix. The whitewash mix shall be filtered to remove any solid particles before being use for painting. Three applications of whitewash shall be applied by paint brush to the masonry surface. A minimum of 24 hours shall be allowed between each application of

whitewash. The whitewash pain shall be by proper tradesman and paint brushed in a uniform manner to achieve an even coverage

13.3 Timber Surface

All surface must be rubbed down with sandpaper to provide a clean and smooth surface. Surface will be painted with an undercoat and then 2 of oil-based paint.