- Batch deliveries shall not exceed the rated capacity specified for the mixer by its manufacturer. The Contractor shall submit affidavits for the approval of the Resident Engineer from the ready mix concrete suppliers, certifying that the proposed mix to be supplied shall satisfy the requirements of this specification.

- All concrete shall be ready mixed unless approved otherwise by the Resident Engineer in writing. Concrete not ready mixed shall comply with the National Structural Code for Buildings.

- The surfaces of measuring, mixing, and transporting equipment that will be in contact with concrete shall be clean at the commencement of the mixing operation.

- The accuracy of weighing equipment and the accuracy of batching shall comply with the applicable requirements of ASTM C-94 and its reference standards. The materials shall be as measured as to give the required mixed proportions.

- Cements and aggregates shall be measured by weighing or any method approved by the Resident Engineer.

- The device employed to measure and discharge the amount of water for the mixture shall be capable of adjustment and checking.

- Water carried by aggregate, in excess of those giving saturated surface-dry conditions shall be considered as part of the required mixing water.

- Mixing shall be done in mixer of approved type.

- Concrete shall be mixed until the material are uniformly distributed and shall be discharged completely before the mixer is recharged.

- The time of mixing shall not be less than one and one half (1 ½) minutes after all ingredients are in the mixer, unless it is shown that the uniformity requirements of the appropriate reference standards are met by an alternative time that shall be agreed to by the Resident Engineer and confirmed in writing.

- No concrete shall be placed until the depth and character of the foundation materials, the forms and false work and the placement of the steel reinforcement had been inspected and approved by the Resident Engineer. Before depositing concrete, all debris, foreign matter, dirt and water shall be removed from the forms, and the surface of any concrete previously placed shall be cleaned and brushed with cement paste.

- No concrete shall be placed on filled ground until the Resident Engineer has approved the standard of compaction of the sub-grade.

- All concrete shall be placed in daylight or under such lighting condition that may be approved by the Resident Engineer.

- The method and manner of placing concrete shall be such as to avoid the possibility to segregation of the concrete materials or the displacements of the reinforcement. Where troughs or chutes are used in placing concretes, their angle

of inclination with respect to the horizontal shall not exceed thirty (30) degrees. When a pipe is used, it shall be kept full of concrete with its discharged and submerged.

- Concrete shall not be allowed to drop into place from a height exceeding one (1) meter.

- The placing of concrete shall be evenly regulated to avoid the depositing of a large quantity at any one point. Concrete in horizontal layers shall be deposited as near practicable to its final position in the forms.

- Concrete shall be deposited in a continuous operation as far as it is practicable to do so and shall avoid initial set starting in any part of the work before fresh concrete can be placed against it.

- Compaction of concrete shall be by approved immersion type vibrators. Vibration shall be limited to the time necessary to produce thorough compaction of the concrete without segregation. Under no circumstances shall vibrators be used to move concrete laterally, nor shall it be allowed to penetrate concrete in the prior lift.

- During placing and until curing as specified is completed all new concrete shall be protected against the harmful effects of exposure to the elements and to running water either as specified or as directed by the Resident Engineer.
- When concrete hardens sufficiently it shall be covered with damp, close-woven burlap or similar material, or clean sand, which shall be kept thoroughly saturated over a period of ten to fourteen days. Where wood forms are used they shall be kept wet for the same period to prevent openings at the joints and drying out of the concrete.

- Precautions shall be taken to avoid premature stiffening of the fresh mix and to reduce water absorption and evaporation losses.

- If the temperature of the surrounding air is higher than 32 C, the following shall be applied unless otherwise documented by the Resident Engineer.

- The formwork shall be continually sprayed with cold water in advance of the concreting and excess water shall be removed from the inside of the forms immediately prior to the placement of concrete.

- The reinforcement and the formwork if metal forms are used shall be protected from the effects of hot winds and direct sunlight.

- Suitable barriers shall be provided to protect the freshly placed concrete from wind, until the concrete is hardened sufficiently to allow it to be covered,

- The concrete shall be held to a temperature of 32 C when being poured.

- The concrete shall be mixed, transported, placed and compacted as rapidly as possible and shall be then covered with an impervious membrane and shall kept wet for curing.

Finishing In Concrete

- Allowable deviations from plumb or level and from the alignment, profile grades and dimensions shown on the drawings are defined as "tolerances" and are to be distinguished from irregularities in finish. Surface irregularities are classified as abrupt or gradual. Off-sets caused by displaced or misplaced from sheeting, from lining, form section, loose knots or otherwise defective form timber will be considered as abrupt irregularities and will be tested either by a straight edge or its equivalent for curved surfaces.

- Immediately after removal of forms all pins and loose materials shall be removed. "Honey-combing" aggregate pockets, voids and holes shall be cut back to solid concrete. All repair of imperfection in concrete shall be completed within twenty-four (24) hours after removal of forms.

- Dry pack concrete shall be used for filling holes having at least one surface dimension, little if any, greater than the hole depth and for narrow slots out for repair or cracks.

- Mortar filling shall be used for repairing defects which are too wide for dry pack filling, too shallow for concrete filling and too deeper than the far side of the reinforcement that is nearest to the surface.

- Concrete filling shall be used for holes extending entirely through concrete sections for holes that are greater in area than 0.1 square meters and deeper than 100 mm and for holes in reinforced concrete which are greater in area than 0.1 square meter and which extend beyond the reinforcement.

- Surfaces of work carried out in accordance with this specification above shall be prepared by thoroughly roughening and cleaning so that all loose or soft material, free water, foreign matter and laitance are removed. At the time of placement of the fresh concrete, the joint surfaces of the hardened concrete shall be damped but there shall be no water.

Section 03100 Concrete Forms and Accessories

- The Contractor shall be responsible for the design, erection and adjustment of all formwork and false work in accordance with Section 5.06, "National Structural Code for Buildings".

- All materials used in construction and support of formwork shall be of timber. Alternative materials shall only be used with the Resident Engineer's approval.

- It shall be the Contractor's responsibility to ensure that the forms are placed to the shape, lines and dimensions as indicated on the drawings, and they shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete. The Contractor shall ensure that the forms are maintained rigidly in position and be sufficiently tight to prevent excessive leakage of mortar.

- All debris particularly chipping, shavings and sawdust, shall be removed from the interior of the forms before the concrete is placed. All form surfaces shall be cleaned and thoroughly wetted before pouring of concrete.

- Before the placement of any concrete, the Resident Engineer shall inspect the formwork and may, at his discretion, reject any materials or forms that do not conform to this specification.

- The deflection of forms between joints and/or studs shall not exceed one five-hundredth (1/500) of the joints or stud spacing.

- The recommended minimum stripping for horizontal slabs shall be twenty-four (24) hours after the approval of the Resident Engineer prior to the removal of any forms.

Section 03200 Concrete Reinforcement

- All steel bars to be used during construction should be in accordance with the guidelines of National Structural Code for Buildings.

- The support and tolerance in placing of reinforcement shall comply with section 5.07 of National Structural Code of Buildings.

- Lap splicing and or welding of reinforcement shall comply with section 5.07 "National Structural Code of Buildings".

- Welding of reinforcement shall not be carried out unless shown on the drawings, specified, or otherwise approved by the Resident Engineer.

- Welding if approved shall not be carried out within 75mm of a bend having internal diameters, or any part of a bar that has been bent in reverse direction or straighten.

- All reinforcing bars shall be high tensile strength (Grade 60) except and ground floor slab rebars which shall be structural grade (grade 33).

- Prior to installation of ground floor rebars, 0.3mm thick polyethylene plastic shall be laid above gravel base after application of soil poisoning.

Division 4 – Masonry

Scope of Work

- The work covered by this Item shall consist of furnishing all masonry work requirements in accordance with Plan and/or standard detail and as herein specified.

Material Requirements

- Use Portland cement which conforms to the requirements of ASTM C-150 Type for normal Portland cement.
- Use fine aggregates which shall be free from injurious amount of clay loam and deleterious materials and shall conform to ASTM C-33 or C-330.
- Concrete hollow blocks, 4"and 6", shall be standard manufacture, machine vibrated, and shall have fine and even texture, and well defined edges. Mortar, filler and plastering shall be Class "A" mixture.
- Deformed steel bars shall conform to ASTM A-305. It shall be clean and free from loose, rust, scales and any coatings that will reduce bond.
- #16 tie wire shall be used for reinforcing bars connections.

Construction Requirements

- Provide CHB wall with 10 mm dia. deformed round bars at 0.60 m on centers both ways. Verify actual location.
- All cells shall be solidly filled with grout.
- Concrete mixture shall be class "A".
- Provide the plastering at 16 mm thick using class "A" mixture.
- Follow plan for details.

Division 5 – Metal and Steel

Section 05500 Metal Fabrication

Scope of Work

- This item shall consist of fabrication/installation of additional roof truss/framing & new purlins, new roof sheets and metal stair access & railings including labor, tools, equipment, and the satisfactory performance in undertaking the proper installation of the system as shown on the Plans and in accordance with this Specifications.

Material Requirements

- ST 2" x 6" x 1/4" x 6.00m
- ST 2" x 3" x 3/16" x 6.00m
- 3/8" x 6m square bar
- 75mmø x 6.00m Ga # 24 G.I. pipe
- 50mmø x 6.00m Ga # 24 G.I. pipe
- 2" x 4" x 3/16" x 6m thick Tubular pipe
- 12mmø x 6.00m Sag rods
- 3" x 3" x 6.00m Angular Bar
- Ga # 14 2" x 6" Z-purlins
- Ga # 24 Pre-painted G.I. sheets (eff. width 1.07m)
- Ga # 26 Plain G.I. sheets (Pre-painted)
- 2" x 2" x 6m tubular steel
- 12mm dia. anchor bolts
- 12mm base plate

Submittals

- Shop Drawings: Submit shop and erection drawings clearly showing each piece required for fabrication and erection. Drawings shall include material grade, camber, holes and other pertinent data, Indicate welds by standard AWS symbols showing size, length, and type of each weld.

- Coordination drawings and templates: Provide anchor setting drawings clearly showing location of all anchor bolts and embedded plates to be anchored in concrete and masonry construction. Provide templates for anchor bolts.

Quality Assurance

Welding

- Performed by certified welders in compliance with Welder's Qualification Test Certificate, AWS D1.1 and or ASME IX.
- Welders shall be duly qualified (test passed in the preceding 12 months) in the