

**Project: Construction of New School Building****Location: Haiti****TECHNICAL SPECIFICATIONS**

This set of Specification shall govern the methods of construction and the kinds of materials to be used for the construction of the proposed school building shown in the plans and detail drawings.

The plans, detail drawings and specifications (material and technical) shall be considered as complementing each other, so that what is mentioned or shown in one, although not mentioned or shown in the other, shall be considered as appearing in both. In case of conflict or contradiction between the two, then the same should be referred to the CRS designing Architect or Civil Engineer for resolution.

All parts of the construction shall be finished with specified class of workmanship, to the fullest talent and meaning of the plans and these specifications, and to the entire satisfaction of the Civil Engineer/Site Supervisor.

The construction shall conform to all requirements of the Haitian National Building code, as well as the local rules and regulations of the provinces in Haiti where the school building is located. In case of the absence in provision of the Haitian National Building code, the International Building Code, edition 2015 shall be used to supplement the missing Haitian code provisions.

**1. GENERAL REQUIREMENTS****1.a Mobilization**

CRS shall provide qualified and experienced Civil Engineer to carry out all the Project Management, supervision, and implementation of the school reconstruction project.

CRS and Contractor shall give priority employment to qualified local residents or from the local vicinity area.

**1.b Construction Safety and Health**

The Contractor as part of their scope of work shall provide and maintain throughout the duration of the project, a first aid kit visible at the construction project.

**1.c Temporary Facilities**

Temporary facilities such as covered storage space, temporary power and water supply should be provided at the project site by the Contractor to support their construction activities.

## **1.d Demobilization and Disposal of waste materials**

The Contractor at all times shall provide trash bins to separate biodegradable, non-biodegradable, recyclable, hazardous waste and construction debris to maintain the orderliness and cleanliness at the site.

## **2. EARTHWORKS**

### **2.1 Construction Survey, Staking out of the building line and batter board**

This item shall consist of furnishing the necessary equipment and material to survey, stake, calculate, and record data for the control of work in accordance with this specification and in conformity with the lines, grades and dimensions shown on the Plans or as established by the Contractor's Site Engineer.

The school building lines shall be staked out and all lines and grade/elevation shown in the drawing shall be established prior to the commencement of any excavation. Batter boards and reference marks shall be erected at such places that will not be disturbed during the excavation works and should be strongly staked to prevent unwanted movement that may cause error in the layout.

### **2.2 Structure Excavation**

This Item shall consist of the necessary excavation for foundation of the school building, wall footing and other structures not otherwise provided for in the specifications. Except as otherwise provided, the backfilling of completed structures and the disposal of all excavated surplus materials, shall be in accordance with these specifications and in reasonably close conformity with the plans or as established by the Engineer.

All of excavation shall be made to the grade/ elevation as indicated in the drawings. At the location where the building site is covered with any kind of fill, then the excavation for footing or foundation should be made deeper until the stratum for safe bearing capacity of soils is reached.

All excavated materials, so far as suitable, shall be utilized as backfill or embankment. The surplus materials shall be disposed in such manner as not to obstruct the stream or otherwise impair the efficiency or appearance of the structure. No excavated materials shall be backfilled at any time to endanger the partly finished structure.

After the satisfied curing time of the concrete of foundation and as directed by the Engineer or Site Supervisor, then the excavated materials may be used to backfill the area around the foundations.

Backfills and fills shall be placed layer by layer not exceeding 300 mm thickness, and each layer shall be thoroughly compacted by wetting to a specific water content level and then tamping and or rolling.

### **3 FORMWORKS AND SCAFFOLDING**

This Item shall consist of designing, constructing and removing forms and falsework to temporarily support concrete and other structural elements until the structure is completed to the point it can support itself.

All forms for concrete work shall be properly braced or connected so as to maintain the correct position and shape of the concrete members. Forms shall be constructed sufficiently tight to prevent bulging and seepage or leakage of cement-water.

Forms shall not be removed until the concrete has attained sufficient strength to support its own weight any loads that may be placed on it. Side forms of beams may be removed earlier than the bottom forms, but additional post or shoring must be placed under the beams and suspended slab until they have attained their strength.

### **4 REINFORCING STEEL**

This Item shall consist of furnishing, bending, fabricating, and placing of steel reinforcement of the type, size, shape and grade required in accordance with this specification and in conformity with the requirements shown on the plans or as directed by the Engineer or Site Supervisor.

Steel reinforcing bars to be used in the construction should be grade 275 ( $f_y = 40$  ksi), shall consist of deformed bars with lugs or projections on their sides to provide a greater bond between the concrete and the steel. All steel reinforcing bars to be used shall be new and free from rust.

All steel reinforcing bars shall accurately place and secure against displacement by tying them together at each bar intersection by using Gauge No.16 galvanized iron wire.

The steel reinforcing bars indicated for footings, columns, slabs, beams, girders and other concrete members shall all conform to the number, size and spacing as indicated in the drawings and or schedule of steel reinforcements.

No steel reinforcement shall be installed in place unless it is free from rust, scale, or other coatings, which will destroy or reduce the bond of steel bars and concrete.

### **5. STRUCTURAL CONCRETE**

This Item shall consist of furnishing, placing and finishing concrete in all structures except pavements in accordance with this Specification and conforming to the lines, grades, and dimensions shown on the Plans. Concrete shall consist of a mixture of Portland cement, fine aggregate, coarse aggregate, admixture when specified, and water mixed in the proportions specified or approved by the Engineer or Site Supervisor.

All concrete shall be according to material specification. Proportioning of the Concrete mix for all structural elements such as slab, beam, columns, ramp and stair are 1:2:3 (one part cement, 2 part sand and 3 part gravel) or equivalent to  $f_c' = 21\text{Mpa}$  or 3000 psi, and shall be mixed thoroughly until there is a uniform

distribution of cement and aggregates, and should be deposited as nearly as practicable in its finish position. Care shall be taken to avoid the segregation of the aggregates.

Water to be used for mixing concrete shall be clean and free from injurious amount of oil, acid, alkalis, salt, and other organic materials. Water cement ratio should be 0.53.

All newly placed concrete shall be cured in accordance with this Specification, unless otherwise directed by the Engineer. The concrete shall be kept continuously wet by the application of water for a minimum period of 3 days after the concrete has been placed.

The entire surface of the concrete shall be kept damp by applying water with an atomizing nozzle. Cotton mats, rugs, carpets, or earth or sand blankets may be used to retain the moisture. At the expiration of the curing period the concrete surface shall be cleared of the curing medium.

## **6. CONCRETE HOLLOW BLOCKS**

Concrete masonry blocks may be rectangular or segmented and, when specified, shall have ends shaped to provide interlock at vertical joints.

All party/common walls shall be 150 mm or 6 inches thick CHB, non-load bearing with a minimum compressive strength of 500 psi.

Hollow blocks shall conform to the requirements of ASTM C 90, grade as specified.

The CHB for walls shall be laid, and cells to be filled with cement mortar consisting of 1-part Portland cement type 1P and 6 parts of coarse sand by volume. They shall be reinforced with round deformed bars of 10 mm diameter spaced shall be 0.90 m for vertical bars and at every 3 layers for horizontal bars.

## **7. FLOOR FINISHES**

The floor finishes are direct cement finish using power float machine. Prior to concrete pouring, the power float machine should be readily available on site. No pouring of slab will be conducted without the power float equipment.

## **8. WALL FINISHES/ PLASTERING**

All exposed surfaces of CHB walls finishes indicated in the drawings shall be plastered with cement mix 1 part of cement and 3 parts of fine sand. Material to be used shall be Portland Cement with Class "A" mixture, 16mm thick minimum and 25mm thick maximum.

## **9. FRAMES**

All steel frames for windows and doors shall be done with carefully fitted full weld joints. All doors and windows frame to be installed on stiffener columns, lintel beams and other masonry walls shall be anchored with 76 mm (3") common wire nails all around the contact surfaces. And all such contact surfaces shall first be painted with red primer paint or other equal quality brand before the frame installed in place.

## **10. DOORS AND DOORS' FRAMES**

Doors and doors' frames shall conform to the size, designs and kind of materials shown in the details of doors, schedule of doors as shown in the drawings and bill of materials.

All doors shall be hung on at least 3 pieces of 73 mm x 75 mm (3" x 3") loose- pin bearing template hinges.

Door locksets and hinges to be used shall be yale brand or equivalent as specified in the material specification.

## **11. LOUVRE WINDOWS**

Louver windows to be installed shall conform to the detail drawings or schedule of louver blocks, or as per bill of materials. The Contractor Site Supervisor will submit material sample for approval by the CRS Engineer prior to purchase.

## **12. ROOFING**

The roof shall be covered with pre- painted long span Galvanized Iron sheet or corrugated galvanized iron sheet as shown in the plan and drawings. The roofing sheet shall be secured to the wood purlin with 2" long umbrella roof nail.

Ridge rolls, hip rolls, and valleys to be used shall be those compatible with the long span or CGI roofing sheet Gauge 29, as indicated in the plans and drawings. They shall lap the roofing sheets at least 1 ½ corrugation. Ridge rolls, hip rolls and valleys shall be nailed to the roofing sheets.

## **13. STEEL AND STEEL WORKS**

All steel shall be indicated in this item shall be free from rust and of the best quality. All steel sizes, dimensions and specifications shall be based on the plans. The Engineer or Site Supervisor shall be responsible for the quality of work for the fabrication and installation of steel rafter, ridge beam, purlins and others. All steel shall be painted with Red Oxide Primer to prevent any rust formation.

Steel C-Purlins, Angle bars and other steel for this project shall be A36 or fy value of 248 MPa.

#### **14. ELECTRICAL WORKS (where it applies)**

The electrical installation shall be done in accordance with the approved plans and under the direct supervision and control of licensed Professional Electrical Engineer or Master Electrician.

All electric works and materials shall conform to the provisions of the latest edition of the Haitian National Electric Code (EDH code).

Electrical wiring shall be based on the plans and BOQ. It shall also conform to ISO dimension.

#### **15. PLUMBING WORKS**

All plumbing works for this project shall be done in accordance with the approved plans and drawings under the supervision and control of licensed Sanitary Engineer or Master Plumber.

Piping shall be properly graded or pitch (2%) to ensure easy circulation, gravity flow and prevent water hammer and noise.

The plumbing installation shall conform with the provisions of the latest National Plumbing Code of Haiti and the rules and regulations enforced in the locality.

Piping for drain, wastewater and vent shall be done using uPVC sanitary pipes series 1000. For the water supply installation Blue uPVC Pipes shall be used.

The “Grey water” from the washing station, excessed (overflow) water from the Rainwater Harvesting System (RHS), shall be flowed and connected to the tap stand soak away pit or designed drainage canal.

#### **16. STORM DRAINAGE**

All downspouts from roof gutters, and or from outflow of the RHS shall end in concrete catch basins, leading to the newly constructed soak away pit.

#### **17. PAINTING**

Painting materials shall be stored in one place in the house/ building to kept neat and clean. Care being taken in storage of paints, oils, etc. to prevent danger of fire. Oily rags shall be kept in metal containers and shall be removed from the house every end of the working day.

Prior to the commencement of painting, all surfaces to be painted shall be cleaned, smoothed and freed from dust, dirt, grease, mortar, rust and other foreign substances. All parts where paint remover has been used shall be washed off with paint or lacquer thinner. All paints shall be spread evenly and carefully.

Paint shall be the best Haitian brand, Matpar or equivalent.