

3.7 Reinforcing Steel

3.7.1 General

Steel reinforcement shall be provided together with all the necessary wire tie chairs, spacers, support and other necessary devices.

3.7.2 Cutting and Bending

Reinforcing steel shall be accurately cut and bent in accordance with the approval detailed reinforcement drawings. Reinforcing steel shall not be straightened or re-bend in a manner that will injure the material. Bars with kink or with bends not shown on the approved detailed reinforcing drawings or with cracks or splits of the bends shall not be used. All the bars shall be bent cold. If Contractor elects to have reinforcing steel cut and bent off the site, he shall provide, maintain and operate a small cutting and bending shop on the site and maintain and representative stock of steel. This provision is to take care of minor revisions and additions in an expeditious manner.

The Project Manager may require the contractor to prepare and submit bar cutting schedule prior to fabrication of reinforcing steel bars.

3.7.3 Placing Reinforcement

Reinforcing steel shall be accurately placed in accordance with approved detailed reinforcement drawings and shall be adequately secured against displacement by using specified tie wires or approved clips at all intersections. After it has been installed, reinforcing steel shall be inspected by the Project Manager for compliance with requirements as to size, shape, length, splicing, position and number. Reinforcing steel shall be supported by concrete or metal supports, spacers or metal hangers, except for surfaces exposed to the ground or to the weather, where supports shall be concrete. Wooden support spreaders shall not be used. At surfaces where attractive appearance is required, the supports shall be of the type, which shall not cause subsequent staining or marring of the exposed surface.

3.8 Joints in Concrete

3.8.1 Construction Joints

Construction joints shall be provided where indicated in the drawing or as directed by the Project Manager. Joints not indicated on the drawings shall be constructed and located as not to impair the strength of structures. When a construction joint is to be made, the surface of the hardened concrete shall be thoroughly cleaned and all laitance removed. In addition, the joint shall be thoroughly wetted and sloshed with a coat of neat cement grout immediately prior to placing of new concrete.

3.8.2 Expansion and Contraction Joints

Expansion and contraction joints shall be provided where indicated and shall be in accordance with details.

3.8.3 Preformed Strips

Preformed strips shall be placed before the adjoining, concrete is poured. The joint sealer shall be applied after concrete on both sides of the joint have poured and after the joint lines have been trued.

3.9 Self-Levelling Concrete

(1) Standards – All aspects of the installation must be in accordance with the requirements of BS 8204 (Installation of Resilient floor coverings) and BS 8203 (Installation of textile floor coverings) and supplementary specifications.

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(2) Preparation – The surface should be free of oil, grease, weak material, laitance and contaminates. All sub-floors, including concrete and highly polished surfaces (e.g. power floated concrete, marble, terrazzo and ceramic tiles), should always be mechanically textured. The floor should then be either vacuumed or swept clean.

(3) Surfaces – All surfaces must be primed with Acrylic Primer (Porous substrates) and Epoxy Primer (non-porous substrates).

(4) Mixture – in single units of the ratio of 20kg powder to 3.6-3.8 liters of water. Do not add extra water because long term performance may be impaired. A 65mm by 40mm flow ring should be filled with pre-mixed Self-levelling compound. Using a Flow chart, a spread ratio of between 230mm and 260mm should be obtained to ensure that a correct mix is passing through the pump. After applying the material onto the primed floor, simply use a hand trowel to spread. Maximum application thickness of 6mm on to epoxy primer.

(5) Protection and Completion – Ensure the screed is not subject to draughts during the first 6 hours of curing as this may lead to cracking and crazing. Take up doorways with polythene to prevent air movement. Prevent contamination by following trades (e.g. plastering), including water spillage.

(6) Cleaning – Immediately after use all tools and equipment should be cleaned with water. Cured material can be removed mechanically or by acid etching.

3.9.1 Methods of Measurement and Basis of Payment

(1) The Project Manager shall be in accordance with the dimension in the plan or as otherwise direct the measurement of completed work. The quantities to be paid for under this section shall be measured as follows:

(a) The volume to be paid for under this item shall be the number of cubic meters of concrete placed and accepted. Payment for concrete shall be constructed to include the cost of forms, false works, curing, fasteners and accessories necessary to complete this item of work.

(b) The quantities for reinforcing steel to be paid for shall be the final quantity placed and accepted in the completed structure. No measurement for payment shall be made for splices added by the Contractor for his convenience. Payment for the accepted quantities for reinforcing steel shall be deemed to include the cost tie wires, separators, wire, supports, hangers, chairs and other materials necessary to complete the work.

The quantities measured as provided above shall be paid for at the contract price for each of the pay item, which price and payment shall be full compensation for furnishing and placing all materials, labor, equipment, tools and incidentals necessary to complete the work.

4.0 MASONRY

4.1 Scope of Work

The work includes furnishing and placing of concrete masonry units in conformity with the lines, grades and cross-sections shown on the drawings and in accordance with the specifications.

4.2 Applicable Documents

The latest edition of the following specifications and standards shall form part of this specification to the extent required by the references thereto.

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- ASTM America Society for Testing Materials
- C144 Standard Specification for Aggregate for Masonry Mortar
- PSA Product Standards Agency Publications (Philippines)
- PNS 16 Specification of Concrete Hollow Blocks

4.3 Material Requirements

4.3.1 Concrete Hollow Blocks

Concrete hollow blocks shall be a standard product of recognized manufacturer to PNS 16, as indicated on the drawings. Exterior and interior masonry units shall be non-load bearing units. However, load-bearing units may be provided in lieu of non-load bearing units. For non-load bearing units, the required compressive strength shall be 25 kg/cm² or 2.48 Mpa.

4.3.2 Cement, Reinforcing Steel and Water

Cement, reinforcing steel and water shall be as specified in Section 3.0.

4.4 Construction Requirements

4.4.1 Workmanship

Masonry walls shall be placed level and plumb all around. One section of the walls shall not be placed in advance of the others, unless specifically approved. Unfinished work shall be stepped back for joining with the new work; tooting shall not be permitted. Heights of masonry work shall be checked with an instrument at sills and heads of openings, to maintain the level of the walls. Door and window frames, louvered openings, anchors, pipes and conduits shall be installed carefully and neatly as the masonry work progresses. Spaces around door frames shall be filled solidly with mortar. Drilling, cutting, fitting and patching to accommodate the work of others, shall be performed by skilled workers. Bolts, anchors, inserts, plugs, ties and miscellaneous metal work specified elsewhere shall be placed in position as the work progress. Chases of approved dimensions for pipes and other purposes shall be provided, where indicated or necessary. Top of exposed walls and partitions, not being worked on, shall be covered with a waterproof membrane, well secured in place. Wall and partitions shall be structurally bonded or anchored to each and to concrete wall beams, and columns.

4.4.2 Mortar Mixing

Mortar materials shall be measured in approved container to insure that the specified proportions of materials are controlled and accurately maintained during the progress of the work. Unless specified otherwise, mortar shall be mixed in such a manner that the materials will be disturbed uniformly throughout the mass. A sufficient amount of water shall be added gradually and the mass further mixed, not less than 3 minutes, until a mortar of the plasticity required for the purpose intended shall be obtained. The mortar shall be mixed in a manner such that the quality of water can be controlled accurately and uniformly. Mortar boxes, pans of mixing drums shall be kept clean and free of debris or dried mortar. The mortar shall be used before the initial setting of the cement has taken place; retempering of mortar in which cement has started set shall not be permitted.

4.4.3 Proportion of Mortar Grout

Fine mortar grout shall be mixed in the volumetric proportion of one part Portland cement, ¼ part hydrated lime and 3 parts sand. Coarse grout shall be mixed in proportion of one part Portland cement, ¼ hydrated lime, 3 parts sand and 3 parts pea gravel passing a 3/8-inch sieve.

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4.4.4 Use of Fine and Coarse Grout

Fine grout shall be used in grout spaces less than 50 mm in any horizontal dimension or when clearance between reinforcement and masonry is more than 17mm.

4.4.5 Mortar Joints

Mortar joint shall be uniform in thickness, and the average thickness of any three consecutive joints shall be 9.50 mm. "Gage rods" shall be made and approved prior to starting the work and shall be used throughout the work. Changes in coursing or bonding after the work has started shall not be permitted. The jointer shall be slightly larger than the width of the joints, so that complete contact is made along the edge of the units, compressing and sealing the surface of the joint. Joints in masonry, which will not be exposed, shall be stuck flush. Joints shall be brushed to remove all loose and excess mortar. All horizontal joint shall be on level and vertical joints shall be plumbed and aligned from the top to the bottom of the wall with a tolerance of plus or minus 12 mm.

4.4.6 Concrete Masonry Unit

The first course of concrete masonry unit shall be laid in full bed of mortar, for the full width of the unit; the succeeding courses shall be laid with broken joints. Concrete masonry units with the cells verticals shall have bed-joints formed by applying the mortar to the entire top of the surface of the inner and outer face shall, and the head joints formed by applying mortar of a width of about 25 mm to the ends of the adjoining units lay previously. The mortar for joints shall be smooth, not furrowed, and shall be of such thickness that it will be forced out of joints as the units are being placed in position. Where anchors, bolts, ties and reinforcing bars occur within the cell of the units, such cells shall be solidly filled with mortar or grout as the work progress.

4.4.7 Reinforcement

Horizontal tie reinforcement shall be provided where indicated. Reinforcement shall be continuous and provided in the longest available lengths. Reinforcement above and below openings shall extend and be embedded into the columns, unless otherwise shown on the drawings. Spices shall overlap not less than 150 mm. Reinforcement shall be embedded in the mortar joints in the manner that all parts shall be protected by mortar. The two top courses of filler block walls shall have their cores filled with grout when placed in position.

Unless otherwise shown on the drawings, the size and spacing of bars shall be as follows:

For Vertical Bars:

150 mm (6") CHB - 10 mm (3/8") dia. At 600 mm
(24") on centers

100 mm (4") CHB - 10 mm (3/8") dia. At 600 mm

For horizontal bars: - 10 mm (3/8") dia at 600 mm

(24") on center (every third Course)

for 150 mm

(6") and 100 mm (4") CHBs.

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4.4.8 Bounding and Anchoring

Masonry walls and partitions shall be accurately anchored or bonded at points where they intersect, and where they abut or adjoin the concrete frame of the building. All anchors shall be completely embedded in mortar.

4.4.9 Grout Placement

Grout shall be performed on the interior side of wall, except as approved otherwise, sills, ledges, offsets and other surfaces to be left exposed shall be protected from grout falling on such surfaces and be and shall be removed immediately. Grout shall be stirred before placing to avoid segregation of the aggregate and shall be sufficiently fluid to flow into joints and around the reinforcement without leaving any voids. Grout shall be placed by pumping or pouring from buckets equipped with spouts, in lifts not exceeding 1.2 meters high. Grout shall be puddle thoroughly to eliminate voids without displacing the masonry units from its original position. Masonry units displaced by grouting operation shall be removed and re-laid to its proper alignment using fresh mortar grout.

4.4.10 Tests and Test Reports

The testing requirements stated herein or incorporated in referenced contract documents may be waived provided certified copies of report of tests from approved laboratories performed on previously manufactured materials are submitted and approved. Test reports shall be accompanied by notarized copies from the manufacturer certifying that the previously tested material is of the same type, quality manufacturer, and make.

4.5 Method of Measurement and Basis of Payment

In measuring the quantity of masonry units for payment, the dimensions to be used shall be as shown on the plans or as directed by the Project Manager in writing. Projections extended beyond the faces of the wall shall not be included. The area to be paid for in this section shall be the number of square meters of concrete masonry wall and partition placed and accepted in accordance with the plans and specifications. Payment of accomplished work shall be deemed to include the cost of mortar grout, reinforcing steel, tie wires, false work and other necessary works to complete this item.

The quantity of concrete masonry walls and partition shall be paid for at the contract unit price shown in the bid schedule, which payment shall be full compensation for furnishing and placing all materials, labor, equipment, tools and incidentals necessary to complete the work.

5.0 METALS

5.1 Scope of Work

The work includes the furnishing, fabrication, erection or installation of structural steel roof framing, Stainless Handrails and miscellaneous metal work in accordance with this specification and as shown in the drawings.

5.2 Applicable Specifications & Standard

The latest edition of the following specifications and standards referred to hereinafter by basic designation only, shall form part of the specification:

ASTM American Society for Testing and Materials

A36/A36M Specification for Structural Steel

A53 Steel Pipe Zinc Coated Welded and Seamless Black and Hot-Dip

A307 Bolts and Studs, 60, 000 psi Tensile Strength

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A325	Standard Specification, high Strength Bolts for Joints
A570	Hot-rolled Carbon Steel Sheet and Strip, Structural Quality
A611	Steel, Cold-Rolled Steel, Carbon, Structural Quality
AWS	American Welding Society
D1.1	Structural Welding Code, Steel
AISC	American Institute of Steel Construction, Specification for the Design, Fabrication, Erection of Structural Steel for Buildings.
AISI	American Iron Steel Institute, Specification for the Design of Light Gage Cold-Formed Steel Structural Members

5.3 Material Requirement

5.3.1 Structural Steel Shapes Plates and Bars

Unless otherwise shown or specified on the drawing, structural steel shapes plates and bars shall conform to ASTM specification A36/A6M.

5.3.2 Hot-Formed Steel Sheet and Strip

Unless otherwise shown or specified on the drawings, hot-formed steel and strip shall conform steel and strip shall conform to ASTM A570.

5.3.3 Bolts, Nuts and Washer

It shall conform to specification STM A370, with a minimum yield point of 33, 000 psi, unless otherwise shown in the drawings. Heavy hexagonal structural bolts, heavy hexagonal nuts and hardened washers, shall be quenched and tarpapered medium-carbon steel bolts, nuts and washers complying with ASTM A325.

5.3.4 Screw and Expansion Bolts

Screw and Expansion bolts be of standard commercial grade, and of the sizes and types indicated as approved by the

5.3.5 Electrodes

Electrodes for are welding shall be E60, or E70, AWS D1.1

5.3.6 Galvanizing

Unless otherwise specified, galvanizing shall be of standard quality, hot-dipped process of 1.25 ounces per square foot of coating. Galvanized surface that are damaged prior to final acceptance shall be repaired using and approved repair compound to the satisfaction of the Project Manager.

5.3.7 Railings/Handrails

Handrails sizes and material composition are those specified in the approved drawings as well as with the vertical railings. Joints and surfaces that are damaged prior to final acceptance shall be repaired using and approved repair compound to the satisfaction of the Project Manager.

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5.3.8 Miscellaneous Metals

Miscellaneous metals including fastenings, anchorage's and incidentals not specifically mentioned herein or in other section of this specifications but are required to complete the work, for which there are no detailed drawings, shall be provided and installed in accordance with standard practice of the trades as approved by the Project Manager.

5.3.9 Delivery, Storage and Handling

Fabricated materials delivered to job site shall be stored in clean and protected dry areas in manufacturer's protective package. Structural steel materials to be stored shall be placed on skids above the ground. It shall be kept clean and properly drained. Skids placed near enough together to prevent injury from deflection shall support long members, such as purlins and chords. The Contractor shall check the quantity and quality of materials turned over to him against the delivery list and report promptly in writing any shortage or damage discovered.

5.4 Construction Requirements

5.4.1 General

Fabrication and erection of structural steel shall be in accordance with AISC specification for the design. Fabrication and erection of structural steel for buildings, except as specified herein. The Contractor shall submit to the Project Manager for approval shop drawings showing the proposed method of fabrication and installation of all metal work. No work shall be started until the shop drawings have been approved. And all work shall conform to the approved shop drawings.

5.4.2 Fabrication of Steel Structure

The work shall be well formed at the shape and size shown and assemblies as detailed. Structural members shall be fabricated and assembled in the shop to the greatest extent as possible. Shearing and punching shall be produced in clean, true lines and surfaces with burrs removed. Nuts shall be drawn up tight. Joints, which are to be exposed to the weather, shall be weather lights. Holes shall be cut, drilled or punched at right angles to the surface of the metal and shall not burn or enlarge made or. Holes in base or bearing plates shall be drilled.

(1) Welding

Structural steel shall be welded in accordance with the standard code of Arc and Gas Welding in Building Construction of the American Welding Society. Qualified welders shall perform all welding work only.

(2) Shop Painting

Unless otherwise specified or indicated in the drawings, all structural steel work (except galvanized surfaced and surfaces that will be painted with epoxy) shall be given a shop coat of red lead or zinc chromate primer.

5.4.3 Erection

The steel structure shall be erected true to line and grades. Bracing's and supports shall be installed whenever necessary to take care of all the loads to which the structure may be subjected. Such bracings shall be left in place as long as may be required for safety. As erection progress, the work shall be securely bolted to take care of all the dead loads, wind and erection stresses. No reaming of undersize bolt holes shall be permitted, and erection bolts shall not be used for lining up members.

(1) Drift Pins

Drift pins may be used only to bring together several parts; they shall not be used in such a manner as to distort or damage the metal.

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(2) Gas Cutting

The use of gas cutting torch in the fields for correcting fabrication errors shall not be permitted on any major member in the structural framing. Its use may be permitted only when the member is not under stress, and subject to the approval of the Project Manager.

(3) Base Plates and Bearing Plates

Base plates and large bearing plates shall be supported in steel wedges or shims until the supported members have been plumbed, following which the entire bearing are shall be grouted with no-shrink cement grout.

(4) Grouting Mortar for Setting Base Plates

Concrete grout shall be a non-shrinking type grouting mortar. The mortar subject to the approval by the Project Manager can either be a mixture of Portland cement, well graded fine aggregate, aluminum powder; and water or an approved commercial grouting mortar containing non-metallic chemical oxidizing agent. If adopted, the approved product shall be delivered to the site of the work in original sealed container bearing the trade name of the manufacturer. Surfaces to receive the mortar shall be clean and shall be clean and shall be moistened thoroughly before placing the mortar. Exposed surfaces of mortar shall be water cured we burlap for at least seven (7) days.

(5) Setting Up

Steel shall be erected plumb, level and properly guyed. In setting or erecting structural steel, the individual piece shall be considered plumb or level where the error does not exceed 1 to 500.

(6) Inspection

The Contractor shall give the Project Manager at least fifteen (15) days notice prior to the start of work at the mill shop, so that the required inspection may be made. The term "mill" means any rolling mil, shop or foundry where material for the work is to be manufactured or fabricated. No materials shall be rolled or fabricated until the said inspection has been provided.

The Contractor shall furnish the Project Manager with copies of the certificate mill reports of the structural steel structure preferably before but not later than the delivery of steel structure to the job site.

The Contractor shall furnish all facilities for inspection and the Project Manager shall be given free access to the mill or shop and premises at all times. The Contractor shall furnish without charge all labor; machinery, materials and tools necessary to prepare test specimens.

Inspection at the mill or shop is intended as a means of facilitating work and avoiding errors. It is expressly understood that it will not relieve the Contractor form any responsibility for imperfect materials or workmanship and the necessity for replacing the same. The acceptance of any materials or furnished member at the mill or shop by the Project Manager shall be preclude their subsequent rejections if found defective before final acceptance of the work. Inspection of welding works will be in accordance with the provision of Section 5 of the "Standard Code for Arc and Gas Welding in Building Construction" of the American Welding Society.

5.5 Method of Measurement and Basis of Payment

(1) The quantity of structural steel roof framing to be paid for shall be the number of kilograms completed in place and accepted. Payment for the accepted quantities shall be deemed to include the cost of steel plates, anchor bolts buckles, sag rods, cross bracing, purlins mounting accessories and other works necessary to complete this work item.

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(2) The quantity to be paid for stair nosing and railing shall be the number of linear meter placed and accepted. Payment shall be construed to include the cost of false work, anchors, and other materials used in mounting this item and including the wooden handrails (where indicated in plans).

The quantity determined as provided above shall be paid for the contract price for each of the pay item listed in the bid schedule, which price and payment shall be full compensation for furnishing and placing all materials, labor, equipment, tools and incidentals necessary to complete the work.

6.0 CARPENTRY AND JOINERY

6.1 Scope of Work

This section includes all rough and finish carpentry and joinery works, as shown in the drawings and in accordance with this specification.

6.2 Material Requirements

6.2.1 Lumber

All lumber shall be in accordance with the accepted commercial standard and shall be of the approved quality of each kind and shall be of the following species and grades as shown in the drawings.

<u>Use</u>	<u>Specie</u>	<u>Grade</u>
Lumber in contract with concrete, masonry and cement plasters	Yakal	Good
Jambs, transoms, mullions headers, sills, frames and wood base of detachable partition	Yakal	Clear
Ceiling joist, studs, roof framing and nailers	Apitong or Tanguile or Metal Furring	Good
Wood trims, wooden planks and wood vent, handrails and frames	Tanguile	Clear

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(1) Quality of Lumber

All lumber shall be of the approved quality of each kind required for the various parts of the work, well seasoned, thoroughly dry and free from large, loose or unsound knots, saps, shakes and other imperfections impairing its strength, durability and appearance. Jambs, transoms, mullions, headers, sills, frames and wood base shall be air dried and well seasoned for at least two (2) months before use.

(2) Substitutions

Any lumber equally for the purpose any may be substituted for the kinds specified, provided that the substitution shall be acceptable to the Project manager.

(3) Moisture Content

Except where otherwise specified, lumber shall be sun-dried, or kiln-dried. At time of installation, the maximum moisture content, expressed as a percentage of the oven-dry wood, shall be as follows:

(a) Rough Carpentry and Framing

Framing lumber 2 inches and less in thickness: 19 percent

Framing lumber over 2 inches thick: 25 percent

Boards: 19 percent

Interior millwork, finish and trim: 17 percent

6.2.2 Plywood/Fiber Cement Board

Ceiling and partition shall be to 6-mm thick marine plywood or 3.5mm fiber cement board as specified in the plans or in the scope of work.

For interior walls or partitions as shown in the plans or as required, fiber cement board shall be installed in accordance with the manufacturers' specifications:

Wall Framing (galvanized steel section) Standard materials are C-Stud, U-Track, Rivet or wafer screw, expansion bolt 6mm, drywall screw 25, 38, 40mm, corner metal bead or corner super bead.

6.2.3 Framing

Wooden frames for detachable partitions shall be kiln-dried, tanguile or use metal framing as specified in plan or scope of works.

6.2.4 Fasteners

Fasteners shall be of the type and size best suited for the purpose as shown in the drawing. Fasteners shall be zinc coated regular commercial size as indicated and shall conform to ASTM specification A307

6.3 Construction Requirements

6.3.1 Workmanship

Lumber for framing and other carpentry or metal framing shall be fitted closely, set accurately to the required lines and levels, and shall be secured in a place in a rigid and substantial manner. Spiking, nailing and bolting shall be done in an approved manner. Spikes, nails and bolts shall be of the proper size, and care shall be taken so as

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not to split the members. All frames coming in contact with concrete or masonry shall be anchored by means of nails metal screws with tox spaced sufficiently apart all around the contact surfaces. Bolt holes shall be drilled accurately and shall have a diameter of 3 mm more than the bolt size. All exposed wood surfaces shall be smoothly dressed and if so required, shall be well sand papered to an even smooth surface ready for finishing.

6.3.2 Finish Framing

Grades and species of wood shall be as specifies. Interior finish shall be set plumb, level, square and in true alignment and joints shall be tight and formed to conceal shrinkage. All finish framing, shall be done as much as possible with carefully fitted mortise and tendon joints as much as possible, if not possible locate them in inconspicuous places where nailing is permitted on wood surfaces. Nailing and blocking shall be provided as necessary.

6.3.3 Rough Framing

Framing and other rough carpentry shall be fitted closely and set accurately to the required line and levels and shall be secured in place in a rigid and substantial manner. Framing members shall not be spliced between bearing points and shall be provided as necessary for the proper completion of the work. Nailing shall be done in an approved manner, so as not to split the framing members.

6.3.4 Protection of Work

The Contractor shall protect all finished woodwork and millwork from injury after it has been set in place until completion and final acceptance.

6.3.5 Hardware

Items of hardware to be installed shall be as directed or as shown in the drawings and fitted carefully attached securely. Care shall be exercised not to mar or injure the work.

7.0 ROOFING

7.1 Scope of Work

This section includes the furnishing of all plant, tools, equipment, materials and other in the installation of waterproofing and roofing, including miscellaneous sheet metal works as required providing a waterproof installation.

7.2 Description

The work includes installation of pre-painted Rib-type Long Span roofing (0.5mm thk) complete with hardware and accessories.

7.2.1 General

The work includes furnishing all materials and requirements performing all operations to provide a long span corrugated twin ribbed roofing and miscellaneous roofing work as required to provide an acceptable installation. Surfaces to which metal formed roofing sheets are to be applied shall be thoroughly cleaned and prepared, free from any defects that may affect the application. Metal formed roofing shall be locked and lapped and installed as applicable. Details shall be in accordance with manufacturer's recommended installation practice.

Metal formed roofing and sheets and accessories shall be carefully handled at all times in strong and handling to prevent damage to the surfaces, edges and ends and shall be slightly elevated for drainage.

Metal formed roofing and sheets and accessories shall be delivered to the site in the original sealed container or packages bearing the manufacturer's name and brand designated where materials are covered by a reference specification number, type and class as applicable.

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7.3 Installation

Lay and install the first sheet with turned down edge towards the outside of the area to be covered. Overlap the next sheets to the previous sheet in such a manner that the exposed edge is turned down and the covered edge is turned up. Side up fasteners should be done by rivets and washers spaced from 300mm to 450mm on centers.

Care should be exercised in the proper anchorage of all roof frames.

Ridge strips for ridge rolls and ridge flashings are attached to the roofing sheets by means of rivets. Other flashings are to be fabricated from plain sheets of the same materials as the roofing in accordance with the details and/or site requirements. These are also attached to roofing sheets by means of rivet.

7.3.1 Temporary Protection

Metal formed roofing sheets surfaces requiring protection from stains, discoloration, surface abrasion and other construction abuses shall be suitably protected in accordance with the manufacturer's recommendations.

7.3.2 Final Clearing

Upon completion, the Contractor shall clean the metal formed roofing sheets surfaces and drain line of burrs, leaves, stones and other foreign matter that may impair the flow of water. Surface shall be kept clean by periodic inspection.

7.4 Elastomeric Waterproofing Membrane (Roof Deck Slab, Shear Wall, Comfort Rooms and Other locations where necessary)

7.4.1 Scope of Work

The Contractor shall furnish and install all materials and labor required to provide waterproofing on designated locations.

7.4.2 Material

Elastomeric water proofing membrane shall be liquid applied single component and made by a reputable manufacturer.

7.4.3 Preparation

All surfaces to be waterproofed should be clean, sound and dry. Concrete surfaces should have a light steel-trowel followed by a fine hair-broom or equivalent finish that is dry and free from dust, oil and other contaminants. Remove all high spots. Moss and lichen must be removed physically followed by treatment with fungal wash down through and allowed to dry. Lattence should be removed from concrete by grit blasting, wire brushing or wet jet blasting and allowing to dry.

7.4.4 Water Testing

All waterproofed surfaces, roof, siding, gutter and downspout system shall be tested for water tightness by flushing or flooding, with water as directed by the Consultant. Floodwater shall be kept on gutters, downspouts for a minimum time of twenty-four (24) hours. If any leak occurs, the works shall be repaired or reconstructed. Test shall be repeated until satisfactory result has been attained.

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7.5 Methods of Measurement and Basis of Payment

The accepted quantities measured as prescribed in the bill of quantities shall be paid for at the appropriate contract unit price for the pay item listed as shown in the bid schedule, which price and payment shall be full compensation for placing all materials, labor, equipment, tools and incidentals to complete the work.

8.0 DOORS AND WINDOWS

8.1 Scope of Work

This section calls for the furnishing, fabrication and installation of doors and windows in accordance with the plans and specifications.

8.2 Material Requirements

8.2.1 Wood Doors

(1) General

Doors schedule, color and design shall be in accordance with the plans. Door panels shall have 44-mm thickness, unless otherwise specified or shown on plans, except for counter doors, which shall be 31 mm thick.

(2) Door Types

(a) Hollow Core Doors

Except as otherwise specified, flush door shall be done in accordance with the detail as shown on the plans. The plywood edge protection shall be around and into the outside frame of the door in order to prevent "peeling off" of the plywood veneers at the edges.

(3) Lumber

Lumber for doors shall be of commercial grade, of the approved quality of each kind, well seasoned, thoroughly dry and free from loose or unsound knots, shakes, pitch pockets, or other imperfections affecting its strength, durability or appearance.

(a) Door frames in contact with concrete shall be yakal, good grade of design size and thickness as indicated in the drawings. Application of black coal tar between contact surfaces shall be provided.

(b) Door studs, nailed and frames shall be tanguile, S4S and kiln dried with not more than fourteen percent (14%) moisture content.

(4) Plywood

Plywood for interior flush doors shall be tanguile, first class and of commercial standard. For toilets and baths, use marine plywood.

(5) PVC Doors

PVC doors for interior shall be of best quality. PVC doors shall be 44 mm. thick. and shall also be provided with bottom louvered portions as indicated in the plans.

(6) Flush Doors (Wooden Hollow-core Flush Doors)

Wooden Hollow-Core Flush Doors shall be 44 mm. thick. And use 6 mm thick marine plywood. Provide paint finish.

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(7) Steel Doors

Various steel doors shall be conformant with the approved schedule of doors and windows.

(8) Windows

Windows shall be awning-type Analok windows with clear glass and security grill. Refer to approved schedule of doors and windows for exact requirement of windows.

8.2.2 Hardware

Hardware for doors and windows shall be acceptable foreign and local products of the types, materials, sizes and mechanism as indicated on the drawings, and shall be free from any mark or other defect. Submit samples for Construction Officer's or Architect's approval.

Hinges and door closer shall be the type size and capacity as indicated on the drawings, however, the Contractor shall verify each hardware item as to weight and other load of doors and windows, and minor modifications may be made without change in construction cost.

Each vent shall be a solid bronze, polished, cam locking handle and strike.

8.2.3 Painting

Refer to the Section entitled PAINTING.

8.3 Construction Requirements

8.3.1 Installation of Doors

Doors shall be installed only after the completion of other works, which may affect the moisture content of the door. Doors shall be fitted and trimmed as required by the opening they will cover. Doors shall have a clearance of 3 mm at the side and top and shall have a bottom clearance of 6 mm over thresholds or as shown on details. The lock edge shall be leveled at the rate of 3-mm in 50 mm. Cuts made on the jambs shall be sealed immediately after cutting, using a clear water-resistant varnish or sanding sealer.

Doors with surfaces receive paint finish may be furnished factory primed, and doors with natural finish may be furnished factory pre-finished. Final furnishing shall be done in site in accordance with painting and varnishing specifications.

8.3.2 Installation of Builders Hardware

(1) Door knobs, lock and larch strikes

All lock and latch strike shall be installed in door frames at the same height from the floor. Door knobs shall be so located that the center of the knob is 0.90 m from the finished floor.

(2) Butt Hinges

Each panel of hinged door shall be provided with two (2) butts for doors 1.50 m or less in height; three (3) butts, over 1.50 m high and not over 2.10 m in height. Doors of a greater height than 2.10m, unless otherwise specified, shall be provided with an additional one- (1) butt for each 0.65-m or fraction thereof.

Size of the Butt Hinges required as follows:

Thickness of Door	Width of door	Size of Butt Hinges
21 mm or 25 mm	Verify to plan	63 mm (2-1/2")

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(7/8" or 1")		
28 mm (1-1/8")	Verify to plan	75 mm x 75 mm (3" x 3")
44 mm (1-3/4")	Verify to plan	100mm x 100mm (4" x 4")
56 mm x 63 mm (2-1/4" x 2-1/2")	Verify to plan	125 mm x 125 mm (5" x 5")

8.4 Method of Measurement and Basis of Payment

(1) The quantities for doors to be paid for shall be the number of square meter and/or number of units of door panel completed and accepted. Payment of this item shall be deemed to include the cost of jambs, heads, door frames, nailers, glass pane (if any), lockset, hinges and finish hardware.

(2) The quantities accomplished for steel or aluminum casement and glass jalousie windows shall be measured in square meters of area and/or number of units completed and accepted. Payment of this item shall be construed to include the cost of window jambs, sill, transom, mullions, glass jalousie, aluminum frames, mouldings and finished hardware.

(3) The quantities accomplished for each type of steel window shall be paid in square meters of area and/or number of units completed and accepted for each item of work. Payment for these items shall be considered to include the cost of steel frames, glass panels, finished hardware, grills, mouldings and glazing and incidental works.

(4) The quantities accomplished for doors/windows screen shall be paid in square meters of area and/or number of units completed and accepted for each item of work. Payment for this item shall include the cost of aluminum frames, screen, accessories and other incidental works necessary to complete the work.

The quantities measured as stipulated above, shall be paid for at the contract unit price for each item, which price and payment shall be fully compensation for furnishing and placing all materials, labor, equipment, tools and incidentals necessary to complete the work described on this section.

9.0 FINISHES

9.1 Scope of Work

This section covers all works required in connection with surface finished on wood, metal, masonry and concrete surfaces in accordance with this specification and as shown in the drawings.

9.2 Material Requirement

9.2.1 Plastering Works

(1) Portland Cement

Cement shall conform to ASTM standard C150, Type 1

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(2) Sand

Fine aggregates for plastering shall be natural sand and shall be retained between No. 50 and No. 100 sieves.

(3) Lime

It shall be dehydrated lime where the free (un-dehydrated) calcium oxide and magnesium oxide in the hydrated product shall not exceed 8 percent by weight.

(4) Water

Water used in mixing, shall be reasonably clean and free of oil, salt, acids, alkali, grass or other substances injurious to the finished product.

9.2.2 Tile Works

(1) Floor Tiles

Tiles shall be standard grade, unglazed vitrified tiles, and 6 mm thick. Color and pattern shall be as specified in the drawing or as approved by the Project Manager.

For all other floor finishes not indicated below, refer to schedule or call-out specifications of finishes indicated in the plan.

- 600 mm x 600 mm Glazed Wall Tiles;
- 600mm x 600mm Homogenous Floor Tiles;
- 600mm x 600mm Non-Skid Floor Tiles;
- Granite (verify dimension on plan).

Accessories – soap holders and paper holders shall be recessed type to follow color specified.

Vinyl floor tile wherever indicated in the drawing shall be 2.0mm thick or otherwise specified in the plans. Verify color, design and pattern.

Rubber Nosing shall be installed on all stair steps.

9.2.3 Seamless Vinyl (Rolled Vinyl)

DESCRIPTION

Total Thickness	EN 428	mm	2.00
Weight	EN 430	g/sq. m	2750
Width of sheet	EN 426	cm	200
Length of sheet	EN 426	lm	20
Coverage	-	sq. m	40
Tile size	EN 427	mm	-

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CLASSIFICATION

Norm/Product Specification	-	-	EN 649
ASTM F 1913-04	-	Compliant	
European Classification	EN 685	class	34-43
Fire rating	AS ISO9239	kW/m ²	10.4
	Smoke%/min	90	
Slip resistance	AS4586-2013 (App A)	group	P4
AS4586-2013 (App D)	group	R9	
Static electrical propensity	EN 1815	kV	<2

PERFORMANCE

Wear resistance	EN 660.2	mm ²	≤2.0
Wear group	EN 649	group	T
Type binder content	ISO 10581	type	I
Dimensional stability	EN 434	%	≤0.40
Residual indentation	EN 433	mm	~0.02
Castor chair test (type W)	EN 425	-	OK
Thermal conductivity	EN 12 524	W/(m.K)	0.25
Colour fastness	EN 20 105 – B02	degree	≥6
Surface treatment	-	-	Evercare™
Chemical product	EN 423	class	OK
resistance(1)			
Anti-bacterial activity	ISO 22196	-	>99%
(E. coli – S. aureus-MRSA)(2)			inhibits growth

ENVIRONMENT/INDOOR AIR QUALITY

VOC	ASTMD5116	mg/m ² /hr(24hr)	<0.005
Certification	-	-	Floorscore®

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9.2.4 Grout Materials

As required by the Project Manager or as follows:

Portland Cement Grout:

Scratch Coat: 1 part Portland cement to 5 parts damp sand to 1/5 part hydrated lime.

Mortar Bed: 1 part Portland cement to 5 parts sand to 1/2 part hydrated lime.

Bond Coat: neat Portland cement paste.

9.2.5 Wall and Wainscoting Tiles

It shall be 6-mm thick, standard grade, glazed vitrified tiles. Color and pattern shall be as shown in the drawing or as approved by Tiles shall be free from lamination, serrated edges, chipped off corners and other imperfections affecting their quality, appearance and strength.

9.3 Paints

This item shall consist of furnishing all paints, enamels, varnishes and other products to be used including labor, tools and equipment required as shown on the Plans and in accordance with this Specifications.

9.3.1 Material Requirements

All paint materials shall meet the requirements of the Standard Specifications of the Standardization Committee on supplies.

All paint materials shall be delivered on the job-site in their original containers with labels and seals unbroken.

Manufacture or brand of painting materials to be used shall be any of the leading brands or approved certified by the design Architect.

Tinting Color, tinting colors shall first be grade pigments ground in alkyd resin, which disperse and mix easily with paint to produce the colors desired.

9.3.2 Preparation of Surfaces

Inspect all surfaces in regard to their suitability to receive a finishing. In the event that imperfection due to materials or workmanship appear on any surfaces after the application of the paint the coat of any correction shall be borne by the contractor. Damage to any painted finished due to carelessness or negligence of other shall be corrected.

Neutralizer shall quality surface conditioner to be diluted with water neutralize lime activity in new exterior and interior concrete surfaces improving paint adhesion and durability.

Touch all knots, pitch streaks and sappy spots with shellac or other approved sealer. Putty nail holes, cracks, etc., after the first coat with non-shrinking putty of a color to match that of the finish.

Prepare masonry works surfaces to be painted by removing all dirt, dust, oil and grease stain and efflorescence. Masonry surfaces to be painted shall be free from alkali and thoroughly dry before paint is applied. Before applying succeeding coats, primers and undercoats shall be completely integral and performing the function for which they are specified. Properly prepare and touch up all scratches, abrasions, or any other disfigurement and remove any foreign matter before proceeding with following coat. Do not apply final coat on interior work until after other trades are finished with their work in any given area in normal sequence and all materials and debris removed and the premises left in satisfactory broom clean condition as approved. Remove or protect hardware accessories plates, lighting, fixtures and similar items placed prior top paintings, reposition or remove protection upon completion of each space. Disconnect equipment adjacent to walls where necessary move to permit painting wall surfaces, and following completion of painting, replace and reconnect. Except where otherwise noted or specified all paints shall

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be applied in three (3) coats (priming body and finish coats). Each coat shall be roller applied (except as otherwise noted) spread evenly and in full covering body.

Patching Compound, patching compound shall be fine powder material that can be mixed into putty consistency with oil base primers and paints to fill minor surface dents and imperfections.

Natural Wood Paste Filler, wood paste filler shall be quality filler ready mixed in can for filling and sealing open grains of interior wood. It shall produce a level finish for succeeding coats of paints, lacquer and other related products.

9.3.3 Application

Paints when applied by brush shall be non-fluid, thick enough to lay down an adequate film of wet paint. Brush marks shall flaw out after the application of paint. Paints prepared for application by roller must be similar to brushing paint. It must be non sticky when thinned to spraying viscosity to break up easily into droplets. Paint is atomized by high pressure pumping rather than broken up by the large volume of air mixed with it. This procedure might change the required properties of the paint. Experienced and skilled craftsmen to assure finished work of first class quality, appearance and durability shall perform all works. All paints and other coatings shall be mixed and applied strictly in accordance with the manufacturers printed instructions.

9.3.4 Paint Schedule

The type of paint specified are intended to illustrate the quality and are taken from paint catalogue equivalent materials from manufacturers listed herein, which the contractor desires to use other than those specified should accompany proposal with such request in writing for approval of the Architect or Engineer. After the award, no substitution of materials for those mentioned in the accepted proposal will be permitted.

Exterior walls

Cement plaster over concrete use:

Preparation of exterior and interior concrete walls

Prepare masonry surface to be painted by removing all dirt, dust, oil and grease stains and efflorescence. Treat with masonry Neutralizers # 44 or approve equivalent. Mix one liter of Masonry neutralizer with 16 liters of water, then apply liberally by brush and let dry overnight before rinsing with water. Let dry.

Coat concrete primer and sealer

Coats textures paint

Coat semi gloss latex paint

Exterior and interior Work

Frames steel windows and grating use:

Wash all metal surfaces with mineral sprints or detergents to remove any dirt or grease before applying materials. Where rust or scale is present, wire brush or sand paper clean before painting. Treat rusty portions with Metal Etching Solution # 71 or approve equivalent. Rinse and let dry.

Coat PRIMER paint

Coats QD Enamel

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Interior Work

Plywood/gypsum/fiber cement boards Ceiling/walling use: (Roller Painted)

1 priming coat flat washable paint

2 finish coat semi gloss paint.

Cabinets

Ducco or semi-ducco finish or as specified in the plans.

9.4 Construction Requirements

9.4.1 Cement Finish on Masonry Walls

(1) General

The work consists of furnishing all materials, labor and performing all operations in connection with plastering masonry wall surfaces, complete in every respect as shown in the drawings and as specified herein. Plastering work shall be protected properly from being damaged during plastering operations. Scaffolding shall be amply strong, well braced, tied securely and inspected regularly. Overloading of scaffolding shall not be permitted.

(2) Mixing of Plaster

Except where hand mixing of small patches is an approved mechanical mixer of an approved type shall be used for the mixing of plaster. Materials shall be accurately measured by a device that will maintain the specified proportions within a plus or minus tolerance not in excess of 5% by volume. Plaster materials shall be accurately measured in approved containers to insure the specified proportions. Caked and mixing each batch and kept free of plaster from previous mixes. Plaster materials shall be thoroughly mixed with the proper amount of water until a uniform color and consistency is attained. Tempering shall not be permitted and all plaster that has begun to stiffen shall be discarded.

(3) Proportioning Plaster

Portland Cement plaster shall be a two-coat application, the base and the finish coat. Each coat shall be proportioned as follows: One part by volume of Portland, to three parts sand. Hydrated lime may be used as directed by the Consultant.

Portland Cement plaster shall be a two-coat application, the base and finish coat. Each coat shall be proportioned as follows: One part by volume of Portland, to three parts sand. Hydrated lime may be used as directed by the Consultant.

(4) Application of Plaster

Surface to receive plaster must be free from structural defects and shall be thoroughly dampened prior to application of plaster.

Plaster base coats shall be applied with sufficient pressure and the plaster shall be sufficiently plastic to provide good bond on masonry base. The base coat shall be compacted and straightened to a true surface without the application of water and the entire surface shall be floated to receive the finish coat. The finish coat shall be applied to a thickness approximately 3 mm before the scratch coat has set. Maximum finish free from blemishes or irregularities. Trowling shall be continued until the finish surface sets. Immediately after setting, surfaces shall be sanded vigorously with clean burlap or cement bag paper or brush to remove the sheen finish produced by trowling.

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