

I. INTRODUCTION

The drawings and the Specification are complementary to each other. Drawings are graphic means of showing works to be done. They are particularly suited to showing where materials are located. Thus, drawing exists essentially to show sizes, location, and placement. Not all works, however, can be presented in the drawings. Generalized works are usually in statement form; hence the Contractor is strongly advised to read the specification carefully.

Specification on the other hand, is used to describe the materials, construction techniques, samples, shop drawings, guarantee, and the other contract requirements. Together, the Drawings and the Specification are used to inform the contractor. In cases where specified brand carries with it the manufacture's specifications, the manufacture's specification shall hold the precedence over this specification.

II. THE LANGUAGE OF THE SPECIFICATIONS:

The specifications are the abbreviated type and include incomplete sentences. The selection of sentence structure depends on the underlying principles of the specifications:

a. That the technical specifications are only one part of the Contract Document.

b. That the contract is between the Owner and the General Contractor; and

c. That the General Contractor is the only party responsible for completing the work in accordance with the Contract Document

Therefore:

A. Only the General Contractor is referred to in the specification so as not to violate the intent of the contract and so as not to undermine the proper chain of command.

B. Any reference to Specialty Trade Contractors in the technical Specifications is made only in so far a selection of specialty Trade Contractors is made through bidding. Once the Specialty Trade Contractions are selected and assigned to the General Contractor, the General Contractor assumes all responsibilities for the execution of the whole project in accordance with the Contract Documents. Therefore, in the contract between the Owner and the General Contractor, the Specialty Trade Contractor, the Specialty Trade Contractor is not referred to the entire Contract Document, the work "Contractor" referred to the General Contractor.



C. The omission of the phrase "the contractor shall" is intentional because the whole specifications are directed to the Contractor. Omitted words or phrases shall be supplied by the interference in the same manner, as they are when a "note" occurs in the drawings.

D. Where "as shown", "as intended", "as detailed", or words similar import are used, it shall be understood that the reference in the drawings accompanying the specifications is made unless otherwise stated.

E. Where "as directed", "as required", "as permitted", "as authorized", "as approved", "as accepted", or other words similar import are used, it shall be understood that the direction, requirements, permission, authorization, approval, or acceptance of the Architect is intended unless otherwise stated.

F. As used herein, "provide" shall be understood to mean "provide complete in place" that is "furnished and installed".

III. GENERAL REQUIREMENTS:

1. The contractor shall secure from the government agencies all necessary licenses and permits needed.

2. Cleanliness shall be maintained at all times within the job site and its immediate premises.

3. If errors or omissions appear in the drawings, specifications or other documents, these shall be referred to the designing architect.

4. The building site shall be filled up to the required grade.

5. All fills shall be in layers of 0.15m in thickness, each layer being thoroughly compacted by wetting and tamping.

6. All applicable provisions of the different divisions of the specification for each work trade shall apply for all items cited in this summary.

7. Materials deemed necessary to complete the work but not specifically mentioned in the specification, working drawings, of in the Contract Document, shall be supplied and installed by the Contractor without extra cost to the Owner. Such material shall be of the highest quality available and install and applied in a workmanlike manner at prescribed or appropriate locations.

8. Materials specifically mentioned in this Summary shall be installed following efficient and sound Engineering and Construction practice, and especially as per Manufacture's application and installation specification, which shall govern over all works, alluded in this Specification.



9. The Contractor shall clean the site and dispose waste after the completion of the project.

IV. PREPARATION OF SITE:

- 1. The owner shall take out the building accurately and shall establish grades according to plans and specifications.
- 2. Basic batter board references as directed by the project engineer shall be erected at such places where they will not be disturbed during construction.

V. SPECIFICATION OUTLINE:



WORK ITEM PER DPWH STANDARD

B.7 Occupational Safety and Health Program

Description

This item is to protect every worker against the dangers of injury, sickness or death through safe and healthful working conditions, thereby assuring the conservation of valuable manpower resources and prevention of loss or damage of lives and properties.

Construction Requirements

A. The owner shall be held responsible for any liabilities under the Work men; Compensation Act. He shall be responsible for all direct accidents on the job and for all injuries to persons and damages of materials when caused by him or his workmen. An emergency kit must be available to be used readily in case of minor injury.

B. Workers must work in accordance with accepted practices and standards established by the employer and reports by unsafe conditions and practices to the foreman/supervisor.

C. Building premises shall have adequate fire, emergency or danger sign and safety instructions visible at all times. A safe covered walkway shall be constructed over the sidewalk for use by pedestrians in a building construction work less than 2.3 meters (7 ft.) from sidewalk or public road.

D. Every employer shall at his own expense furnish his workers with protective equipment for the eyes, face, hands and feet, protective shields and barriers whenever necessary by reason of hazardous nature of the process or environment.

- a. Eye protection shall be provided where the proves or operations presents hazards of flying objects, liquids, injurious radiation, glare or a combination of these hazards.
- b. Hard hats for the protection of workers from impact penetrations from falling or flying objects, blows and from limited electric shock and burns shall be provided where there is reasonable probability of exposure to such hazards.
- c. Workmen working form under guarded surface six (6) matters (20 ft.) or more above water or temporary or permanent floor platform, scaffold construction or where otherwise exposed to the possibility of falls hazardous to life or limb, shall be secured by safety belts and lifelines.
- d. Workers shall be provided with approved safety shoes and led protection whenever necessary as determined by the nature of work.

E. Welding or cutting operations shall be permitted in rooms or areas containing combustible materials or in proximity to explosives or flammable materials. All workers or persons directly engaged in welding or cutting operations shall be provided with following personal protective equipment; googles, helmets or head shields fitted with suitable filter lenses and hand shields and suitable aprons.

F. Safety Personnel: To ensure that the construction Safety and Health Program is duly followed and enforced at the construction site, each construction project site is required to have the minimum required Safety Personnel.

G. Emergency Occupational Health Personnel and Facilities. The Project Owner or his duly authorized representative shall be providing competent emergency health personnel within the work site duly complementary by adequate medical supplies, equipment and facilities, based on the total number of workers in the site.



H. Construction Safety Signage: Construction Safety Signage must be provided to warn the workers and public hazard existing in the workplace. Signage shall be posted in prominent positions at strategic locations and, as far as practicable, be in the language, understandable to most of the workers employed.

Unit of Measurement used is by Month CIVIL WORKS

801 Removal of Structures and Obstructions

Referring to Item 101, Part C of Volume II (Blue Book):

Description

This item shall consist of the removal wholly or in part, and satisfactory disposal of all buildings, fences, structures, old pavements, abandoned pipe lines, and any other obstructions which are not designated or permitted to remain, except for the obstructions to be removed and disposed off under items in the Contract. It shall also include the salvaging of designated materials, and backfilling the resulting trenches, holes and pits.

General Construction Requirements

The Contractor shall perform the work described above, within and adjacent to the roadway, on Government land or easement, as shown on the Plans or as directed by the Engineer. All designated salvable material shall be removed, without unnecessary damage, in sections or pieces which may be readily transported, and shall be stored by the Contractor at specified places on the project or as otherwise shown in the Special Provisions. Perishable material shall be handled as designated in Subsection "Clearing and Grubbing". Non-perishable material may be disposed off outside the limits of view from the project with written permission of the property owner on whose property the material is placed. Copies of all agreements with property owners are to be furnished to the Engineer. Basements or cavities left by the structure removal shall be filled with acceptable material to the level of the surrounding ground and, if within the prism of construction, shall be compacted to the required density.

Method of Measurement

When the Contract stipulates that payment will be made for removal of obstructions on lump-sum basis, the pay item will include all structures and obstructions encountered within the roadway. Where the contract stipulates that payment will be made for the removal of specific items on a unit basis, measurement will be made by the unit stipulated in the Contract.

Whenever the Bill of Quantities does not contain an item for any aforementioned removals, the work will not be paid for directly, but will be considered as a subsidiary obligation of the Contractor under other Contract Items.

Basis of Payment

The accepted quantities, measured as prescribed in Method of Payment, shall be paid for at the Contract unit price or lump sum price bid for each of the Pay Items listed below that is included in the Bill of Quantities which price and payment shall be full compensation for removing and disposing of obstructions, including materials, labor, equipments, tools and incidentals necessary to complete the work prescribed in this item. The price shall also include



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backfilling, salvaging of materials removed, their custody, preservation, storage on the right-ofway and disposal as provided herein.

Payment will be made under:

	Payment Item	Item	Unit of
	Number	Description Meas	urement
	101(1)	Removal of Structures and Obstruction Lun	np Sum
	101(2)	Removal of actual structures/obstruction	Each
	101(3)	Removal of actual structures/obstruction	Square
Meter Meter	101(4)	Removal of actual structures/obstruction	Linear

902 Reinforcing Steel

Description

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.

Material Requirements

Reinforcing steel shall meet the requirements of Item 710, Reinforcing Steel and Wire Rope.

Construction Requirements

Protection of Reinforcing Steel

Steel reinforcement shall be stored above the surface of the ground upon platforms, skid or other supports and shall be protected as far as practicable from mechanical injury and surface deterioration caused by exposure to conditions producing rust. When placed in the worked, reinforcement shall be free from dirt, detrimental rust, loose scale, paint, grease, oil, or other foreign materials. Reinforcement shall be free from injurious defects such as cracks and laminations. Rust, surface seams, surface irregularities or mill scale will not be cause for rejection, provided the minimum dimension, cross sectional area and tensile properties of the material meets the physical requirements for the size and grade of steel specified.

Bending

All reinforcing bars requiring bending shall be cold-bent to the shapes shown on the Plans or required by the Engineer. Bars shall be bent around a circular pin having the following diameter (D) in relation to the diameter of the bar (d):

Bends and Hooks

Nominal diameter, (d), mm

Pin diameter (D)

10 to 20

6d



25 to 28	8d
32 and greater	10d

Placing and Fastening

All steel reinforcement shall be accurately placed in the position shown on the Plans and firmly held there during the placing and setting of the concrete. Bars shall be tied at all intersections except where spacing is less than 300 mm in each direction, in which case, alternate intersections shall be tied. Ties shall be fastened on the inside. Distance from the forms shall be maintained by means of stays, blocks, ties, hangers, or other approved supports, so that it does not vary from the position indicated on the Plans by more than 6 mm. Blocks for holding reinforcement from contact with the forms shall be precast mortar blocks of approved shapes and dimensions. Layers of bars shall be separated by precast mortar blocks or by other equally suitable devices. The use of pebbles, pieces of broken stone or brick, metal pipe and wooden blocks shall not be permitted. The minimum distance between bars shall be 40 mm. Reinforcement any member shall be placed, inspected and approved by the Engineer before the concrete begins. Concrete placed in violation of this provision may be rejected and removal may be required.

Splicing

All reinforcement shall be furnished in the full lengths indicated on the Plans. Splicing of bars except where shown on the Plans will not be permitted without the written approval of the Engineer. Splices shall be staggered as far as possible and with a minimum separation of not less than 40 bar diameters. Not more than one-third of the bars may be spliced in the same cross-section, except where shown on the Plans.

Unless otherwise shown on the Plans, bars shall be tapped a minimum distance of:

	Splice	Grade 40	Grade 60	But not less than
Tension		24 bar dia.	36 bar dia	300 mm
Compression		20 bar dia	24 bar dia	300 mm

In tapped splices, the bars shall be placed in contact and wired together. Lapped splices will not be permitted at locations where the concrete section is insufficient to provide minimum clear distance of one and one-third $(1 \ 1/3)$ the maximum size of coarse aggregate between the splice and the nearest adjacent bar. Welding of reinforcing steel shall be done only if detailed on the Plans or if authorized by the Engineer in writing. Spiral reinforcement shall be spliced by lapping at least one and a half turns or by butt welding unless otherwise shown on the Plans.

903 Forms and Falsework



Formwork Construction

Concrete forms shall be mortar-tight, true to the dimensions, lines and grades of the structure and with sufficient strength, rigidity, shape and surface smoothness as to leave the finished works true to the dimension shown on the Plans or required by the Engineer and the surface finish as specified.

The inside surfaces of form shall be cleaned of all dirt, mortar and foreign material. Forms which will later be removed shall be thoroughly coated with form oil prior to use. The form oil shall be of commercial quality form oil or other approved coating which will permit the ready release of the forms and will not discolor the concrete.

Concrete shall not be deposited in the forms until all work in connection with constructing the forms has been completed, all inspected and approved said forms and materials. Such work shall include the removal of all dirt, chips, sawdust and other foreign material from the forms.

The rate of depositing concrete in forms shall be such to prevent bulging of the forms or form panels in excess of the deflections permitted by this Specification. Forms shall have sufficient strength to withstand the pressure resulting from placement and vibration of the concrete, and shall be maintained rigidly in correct position

Removal of Forms and Falsework

Forms and falsework shall not be removed without the consent of the Engineer. The Engineer's consent shall not relieve the Contractor of responsibility for the safety of the work. Blocks and bracing shall be removed at the time the forms are removed and in no case shall any portion of the wood forms be left in the concrete.

Falsework removal for continuous or cantilevered structures shall be as directed by the Engineer or shall be such that the structure is gradually subjected to its working stress.

When concrete strength tests are used for removal of forms and supports, such removal should not begin until the concrete has attained the percentage of the specified design strength shown in the table below;

Table 414.1 -	Requirements	for	Removal	of Forms
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Element	Minimum Time	Minimum Percentage Design Strength
Centering under beams frames or arches, girders	14 days	80 %
Floor slabs:	14 days	70 %
Walls	1 day	70 %
Columns	2 days	70 %
Sides of Beams and all other vertical surfaces	1 day	70 %

Forms and falsework shall not be released from under concrete without first determining if the concrete has gained adequate strength without regard to the time element. In the absence of strength determination, the forms and falsework are to remain in place until removal is permitted by the Engineer.



To facilitate finishing, forms used on ornamental work, railing, parapets and exposed vertical surfaces shall be removed in not less than 12 or more than 48 hours, depending upon the weather condition of concrete in columns, forms shall always be removed from them before the removal of shoring from beneath beams and girders. The Unit of Measurement is Cubic meter.

1046 Masonry Works

Description

The work includes all labor, materials, tools and equipment necessary to install concrete masonry and all appurtenant work in connection with the work as shown on the Drawings and Specifications.

Materials Requirements

Concrete masonry unit work of the type indicated shall be provided and shall be properly coordinated with the work of their trades. The source of supply of materials, which will affect the appearance of the finished work, shall be changed after the work has started.

Concrete Hollow Blocks

Concrete hollow blocks shall be standard machine fabricated and shall have fine and even texture and well-defined edges. CHB shall conform to the requirements of ASTM Specifications C 90, grade with minimum compressive strength of 2.45 MPa (350 psi) (average of 5 specimens). Samples shall be tested and submitted to the Engineer. Dimensions and tolerances shall be as individually specified on the Plans.

Mortar and Grout

Unless otherwise indicated on the Plans, masonry mortar shall be composed of one (1) part Portland cement, and two (2) parts fine aggregate by volume to which hydrated lime has been added in an amount equal to ten (10) mass percent of the cement. For masonry walls not exceeding 1,8 m (1.6) in height, a mortar composed of one (1) part masonry cement and two (2) parts fine aggregate by volume maybe substituted for the above mixture of Portland cement, lime and fine aggregate. Grout shall be of the same materials and proportion as mortar to which additional water shall be added to produce a consistency for pouring without segregation. Masonry cement shall conform to the requirements of AASHTO M 150 – 74 (ASTM C 91). Fine aggregate shall conform to the requirements of AASHTO M 45 (ASTM C 144). Water shall conform to the requirements of Item 714, Water.

CHB Wall Reinforcement

1. Vertical and Horizontal Reinforcement

Unless otherwise specified, the vertical and horizontal reinforcements for CHB shall be 10mm diameter at 400 for all wall thick nesses. Lap splices shall be 300 mm long (minimum).

2. Dowels



Where CHB walls adjoin R.C. columns and beams provide dowels on R.C. column and beams prior to pouring to match CHB wall reinforcement size and spacing. Dowels shall be 600 mm long unless noted otherwise.

- 3. Movement Gaps
 - Where the top of CHB wall adjoins a beam provide 50 mm gap to be filled with a soft material like styrophor.
 - Where the sides of a CHB wall adjoin a column provide 50 mm gap to be filled with soft material like styropor. Rebars shall be retained for stability.
- 4. Anchors

Where columns and beams poured without the CHB wall dowels, provide 16 mm diameter expansion bolts to match CHB reinforcement spacing. These anchors shall be drilled and hammered in placed. No chipping off of concrete columns and beams is allowed unless otherwise permitted by the Engineer.

Construction Requirements

Workmanship

Units shall be set plumb and true to line with level horizontal joints. Hollow units shall be laid with full mortar coverage on horizontal and vertical face shells, and at least 50 percent of the cells shall be filled with grout, the cells containing vertical reinforcements to be among those to be filled up. All cells of CHB walls from footing up to at least the ground floor level shall be filled up. Solid units shall be laid with full head and bed joints. Joints shall be uniform and approximately 10 mm wide unless otherwise indicated.

Unless otherwise shown on the drawings, joints of exterior concrete masonry units that will be exposed and painted shall be cut flush and tooled finished with a 6.5 mm dept "V" joint for horizontal joints. Vertical joints between the horizontal joints shall be tooled flush. Joints of interior concrete masonry units shall be cut flush, and the blocks shall be given a cement plaster finish except as otherwise shown on the Drawings. The minimum of cement plaster shall be 10 mm.

Placing Reinforcing Bars and Grouting

All reinforcing steel, except dowels in concrete, shall be accurately set in strict accordance with the Drawings and the notes thereon. Vertical steel shall be secured firmly in place by means of frames or other suitable devices. Horizontal steel may be placed as the work progresses. In any core containing reinforcement, the distance between any masonry and the reinforcement shall be at least 12.7 mm (1/2 in) at all points. The masonry contractor shall furnish all tiles, spacers and supports required to hold steel in position during grouting. Cores shall be grouted in lifts not exceeding 1.22 m (4 ft) in height. Grout shall be thoroughly rodded. Splices in reinforcing bars shall be lapped at a distance sufficient to develop the stress in the bar, but not less that 40 bar diameters.

Concrete hollow blocks shall be laid with all cells completely grouted from the wall footing up to the ground level. The rest of the concrete hollow blocks above ground shall have at least 50 percent of the cells grouted, including those containing the vertical reinforcements.



Method of Measurement

All masonry works shall be measured in square meters installed complete with plastering, mortar and grout and installing reinforcing bars as shown on the drawing and prescribed in the specification.

Basis for Payments

The accepted quantities measured as prescribed in Sub-Section 901.4 shall be paid for at the appropriate contract unit price for the pay item listed below as shown in the Bill of Quantities, which

price and payment shall be full compensation for furnishing all materials, including all form and false work; for mixing, placing, furnishing, and curing the concrete; and for all labor, materials, equipment, tools and incidentals to complete the item.

Payment shall be made under:

Pay Item No.	Description	Unit of Measurement
414 (2)	100 mm thick CHB Walls	square meter (m ²)
	With Cement plaster finish	

1027 Cement Plaster Finish

1027.1 Description

This Item shall consist of furnishing all cement plaster materials, labor, tools and equipment required in undertaking cement plaster finish as shown on the Plans and in accordance with this Specification.

1027.2 Material Requirements

Manufactured materials shall be delivered in the manufacturer's original unbroken packages or containers which are labeled plainly with the manufacturer's name and trademark.

1027.2.1 Cement



- a) Brown coat mortar mix shall be applied with sufficient pressure starting from the lower portion of the surface to fill the grooved and to prevent air pockets in the reinforced concrete/ masonry work and avoid mortar mix drooping. The brown coat shall be lightly broomed/ or scratch before surface had properly set and allowed to cure.
- b) Finish coat shall not be applied until after the brown coat has seasoned for seven days and corrective measures had been done by the Contractor on surfaces that are defective. Just before the application of the finish coat, the brown coat surface shall be evenly moistened with potable water. Finish coat shall be floated first to a true and even surface, then trowel in a manner that will force the mixture to penetrate into the brown coat. Surfaces applied with finish coat shall then be smooth with paper in a circular motion to remove trowel marks, checks and blemishes. All cement plaster finish shall be 10 mm. thick minimum, on vertical concrete and/ or masonry walls.

Whenever indicated on the Plans to be "simulated red brick finish", the Contractor shall render brick design on plaster surface before brown coat had properly set and then allowed to dry. Cement plaster shall not be applied directly to:

a) Concrete or masonry surface that had been coated with bituminous compound and,

b) Surfaces that had been painted or previously plastered.

1027.3.4 Workmanship

Cement plaster finish shall be true to details and plumbed. Finish surface shall have no visible junction marks where one (1) day's work adjoins the other. Where directed by the Engineer or shown on the Plans vertical and horizontal groove joints shall be 25 mm wide and 10 mm deep.

1027.4 Method of Measurement

All cement plaster finish shall not be measured in square meters or part thereof for work actually completed in the building.

1027.5 Basis of Payment

The work quantified and determined as provided in the Bill of Quantities shall be paid for at the Contract Unit price which price constitutes full compensation including labor, materials, tools and equipment and incidentals necessary to complete this Item.



Payment will be made under:

Pay Item No.	Description Ur	nit of Measurement
1027 (a)	Cement plaster finish	Square Meter (m ²)
1027 (b)	Simulated red brick (Wall)	Square Meter (m ²)

1010 Wooden Doors

TEM 1010 - WOODEN DOORS AND WINDOWS

1010.1 Description

This Item shall consist of furnishing all materials, hardware, plant, tools, labor and services necessary for complete fabrication and installation of wooden doors and windows of the type and size as shown on the Plans and in accordance with the following specifications and applicable specifications under Item 1003 on Carpentry and Joinery Works.

1010.2 Material Requirements

1010.2.1 Lumber

Lumber of doors, windows and jambs, and panels when required, shall be kiln-dried with moisture content of not more than 14% and shall be of the specie indicated on the Plans and/or specified under Item 1003 on Carpentry and Joinery Works.

1010.2.2 Plywood

Plywood for venner of solid core and hollow core flush doors shall be 3-ply, rotary cut, 6mm thick ordinary plywood. Class B grade: Marine or waterproof plywood, rotary cut, 3-ply, 6 mm thick shall be used for flush doors at toilets and bathrooms or at places where these are exposed to moisture.

1010.2.3 Adhesive

Adhesive shall be water resistant resins and shall be non-staining.



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1010.2.4 Glass

Glass for window panes shall be 3 mm thick, smoked or Industrix type unless otherwise shown on the Plans or indicated in the Schedule of Doors and Windows.

1010.2.5 Capiz Shells

Capiz shells, when required for window sashes, shall be of selected quality, free from dirt or blemishes and shall be large enough to obtain flat square piece.

1010,2.6 Hardware

Hardware shall be as specified under Item 1004 on Building Hardware.

1010.3 Construction Requirements

1010.3.1 Fabrication

Wooden doors and windows, including frames, shall be fabricated in accordance with the designs and sizes shown on the Plans. The fabricated products shall be finished square, smoothly sanded and free from damage or warpage.

a. Flush Type Hollow Core Doors

Flush type hollow core doors shall be adequately framed with stiles and top and bottom rails having a minimum thickness of 44 mm and width of 75 mm. Two intermediate rails at least 44 mm wide shall be provided for stiffness.

The stiles and the top and bottom rails shall be rabbeted at least 10 mm wide to receive the 6 mm thick plywood veneer. A lock block shall be provided at each stile, long enough to connect to the two intermediate rails and at least 75 mm wide for mounting the lockset.

The plywood veneer shall be glued and nailed to the framing with 25 mm long finishing nails space at not more than 150 mm on centers.

b. Flush Type Solid Core Doors

Flush type solid core doors shall be fabricated in the same manner as the hollow core type except that spaces between stiles and rails shall be filled and fitted with wood blocks of the same specie and of uniform thickness thinner by about the thickness of the piywood veneers. The filler blocks shall be secured to either stiles or rails by nails. Stiles and rails of flush type doors shall be joined by means of blind mortise and tenon joint, tightly fitted, glued and locked with bamboo pin 5 mm round.

c. Panel doors

Stiles and rails of panel doors shall have a minimum thickness of 44 mm and width of 140 mm.

Rails minimum thickness of 44 mm and width of 140 mm. Rails shall be framed to stiles by mortise and tenon joints. Rabbets or grooves of stiles by mortise and tenon joints. Rabbets or grooves of stiles and rails to receive panels shall be 6.5 mm wide and 20 mm deep. Integral mouldings formed on both faces of stiles and rails traming the panels shall be true to shape and well defined. Intersections of mouldings shall be mitered and closely fitted.



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Panels of the same specie and having a minimum thickness of 20 mm shall be bevelled around its edges up to a minimum width of 50 mm, both faces. The bevelled edges shall closely fit into the grooves of stiles and rails, but free to move to prevent splitting when shrinkage occurs.

d. Window Sashes with Glass Panes or Wood Panels

Window sashes shall be fabricated in conformity with the design, size and type of installation shown on the Plans. Unless otherwise shown on the Plans, stiles and rails shall be Tanguile with minimum thickness of 30 mm and width of 70 mm. Jointing of stiles and rails shall be mortise and tenon secured with glue and bamboo pin. Stiles and rails shall rabbeted at the exterior face for mounting glass panes or wood panels. Integral mouldings formed as frames for panes or panels shall be true to shape, sharply defined and mitered at joints. Separate mouldings of the same design shall be provided for fixing glass panes and wood panel from the outside.

e. Window Sashes with Capiz Shells

Stiles and rails shall be of the same sizes specified under Item 1010.3.1 (d) and assembled with mortise and tenon joint. Unless otherwise indicated on the Plans, lattices for framing capiz shall be tanguile, 8 mm thick and 15 mm wide, spaced at not more than 60 mm on centers bothways. Grooves 2 mm wide and 5 mm shall be made at sides of lattices to receive the preformed capiz shells.

The lattices shall be assembled with half lap joints at their intersections and the assembled lattices containing the capiz shells shall be framed into the stiles and rails.

Selected capiz shells shall be washed to remove dirt and blemishes and drier under the sun for bleaching effect. Capiz shells shall be cut square to required sizes with sharp bench cutter to produce non-serrated and non-peeling edges.

f. Sliding Type Window Sashes

Stiles of sliding type window sashes shall be framed to the top and bottom rails with mortise and tenon joints. Tenons shall be formed on the stiles. Joints shall be tightly fitted, glued and locked with bamboo pins. Top and bottom rails shall be 10 mm wider than the stiles. Top rails shall be rabbeted to form tongue flush with the outer face, with width of 8 mm and height of 10 mm. The stiles and rails shall be rabbeted as specified under Item 1010.3.1 (d) to receive glass panes or wood panels.

5. Awning Type Window Sashes

Tenons of rails shall be fitted into the mortises formed on the stiles and the joints glued and locked. The stiles and rails shall be rabbeted as specified under Item 1010.3.1 (d) for mounting of glass panes. Series of sashes to be installed vertically shall have their meeting rails rabbeted for half lapping when in closed position.

h. Casement Type Window Sashes

Rails of casement type window sashes shall be fitted to stiles with mortise and tenon joint. Tenons shall be formed in the rails. Meeting rails shall be rabbeted to provide for half lapping when in closed position. The stiles and rails shall be rabbeted as specified under item 1010.3.1 (d) for mounting of glass panes or wood panels.



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i. Door and Window Frames

Framing of the specie(s) specified under item 1003 shall be fabricated in conformity with the profile and sizes shown on the Plans. Frames shall be assembled with tightly fitted tongue and groove joint mitered at both sides, and nailed. The assembled frames shall be finished square and flat on the same plane. Assembled frames shall be braced temporarily to prevent their distortion during delivery to the site and installation.

1010.3.2 Installation

a. Frames shall be set plumb and square in concrete/masonry work or framework of walls or partitions. Frames set in concrete or masonry shall be painted with hot asphalt at its contact surface and provided with two rows of common wire nails 100 mm long for anchorage. The nails shall be staggered and spaced at 300 mm on center along each row. Frame set in concrete shall be installed in place prior to concrete work.

Frames set in masonry work may be installed after laying of hollow concrete blocks, bricks or adobe. Space between frames and masonry shall be fully filled with cement mortar proportioned 1:3.

b. Hinged Doors

Hinged doors, whether panel or flush type with standard height of 2100 mm and width of not more than 900 mm shall be hung with four toose-pin butt hinges, 100 mm x 180 mm. Swing out exterior doors shall be hung with four fast-pin butt hinges. Two hinges shall be fitted 150 mm trom top and bottom edge of door. The other two hinges shall be fitted at third points between top and bottom hinges. Care should be taken to ensure that the hinges are fitted such that their pins are aligned for ease of pin insertion and smoothness of operation. For added smoothness pins should be lightly greased. Hammering of hinges to attain proper alignment shall not be allowed.

For wider and heavier doors such as narra panel doors, an additional hinge shall be fitted 100 mm below the top hinge to counteract the door tilting action.

Mounting screws shall be screwed in place in their entire length, not forced into place by hammering. Hammering of screw into place shall not be permitted.

c. Sliding Doors

Overhead tracks, standard, locally manufactured as per Plans shall be installed level and mounting bracket secured in place with lag screws scoplied with the set. Bracket shall be spaced 1000 mm on centers. Hangers, two each per door leaf, shall be perfitted and bolted to the door rail. For panel doors the hangers shall be centered or whe door stiles. For flush doors, the hangers shall be centered 100 mm from the edges of the door. If there is no adequate space for installing the door with its attached rollers, through either end of the track the perfitted hangers shall be disassembled for connection to the rollers.

After installation on the track, set the door plumb and in alignment by means of the adjustment mechanism integrated with the roller assembly.



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d. Lock Installation

Locks of doors shall be fitted at the same height, centered 1000 mm above the finished floor level. Locks shall be installed in conformity with the templates and instructions supplied with locksets. Holes for mounting locks shall be properly formed to provide snug fit and rigid attachment of the locks to the doors. Strike plates shall be fitted on the door frame in true alignment with the lock latch.

e. Sliding Type Window Sashes

Sashes shall be trimmed to fit height of opening. A clearance of 2 mm shall be provided between the tongue's base at the top rail and the bottom of the window head. The same clearance shall be provided between the sash tongue and the groove at the window head. Paraffin wax shall be applied to contacts of sliding sufaces. The bottom rails shall be fitted with standard brass guided spaced 75 mm from both ends of the rail, mounted flush with the inner face and secured with three brass screws each guide.

f. Casement Type Window Sashes

Sashes shall be trimmed to fit size of opening, with provision for half lapping of meeting stiles. Right side sash shall lap onto the left side sash. Sashes shall be titted with two brass-plated narrow hinges, 50 mm x 75 mm, spaced 150 mm from top and bottom of stiles. In lieu of hinges, sashes maybe hung with cadmium-plated steel casement adjusters 200 mm long, subject to prior approval of the Engineer. The top and bottom rails of casement type window sashes shall be milled to provide for the installation of adjusters.

g. Awning Type Window Sashes

Installation of awning type sashes shall be by means of casement adjusters specified under Item 1010.3.2 (f).

1010.4 Measurement and Payment

Frames of doors and windows shall be measured and paid for on the basis of number of sets completely installed and accepted by the Engineer.

Doors and windows shall be measured and for based on the number of square meters involved in the completed and accepted installation. Payment per square meter shall include cost of required hardware and all incidental expenses, but exclusive of locks for doors. Locks shall be paid for per set completely installed.

The different pay items under Wooden Doors and Windows shall be designated the following number, description and unit of measure:

Pay Item Number	Description	Unit of Measurement
1010 (a)	Frames (Jambs, sills, head transoms and mullions	set
1010 (b)	Doors (Flush or panel)	m'
1010 (c)	Window Sashes	m,
1010 (d)	Door Locks	set



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Item 1032 – Painting, Varnishing and Other Related Works

ITEM 1032 - PAINTING, VARNISHING AND OTHER RELATED WORKS

1032.1 Description

This Item shall consist of furnishing all paint materials, varnish and other related products, labor, tools, equipment and plant required in undertaking the proper application of painting, varnishing and related works indicated on the Plans and in accordance with this Specification.

1032.2 Material Requirements

1032.2.1 Paint Materials

All types of paint material, varnish and other related product shall be subject to random test as to material composition by the Bureau of Research and Standard, DPWH or the National Institute of Science and Technology. (Use the following approved and tested brand name: Boysen, Davies, Dutch Boy, Fuller O Brien, or any approved equal).

1032.2.2 Tinting Colors

Tinting colors shall be first grade quality, pigment ground in alkyd resin that disperses and mixes easily with paint to produced the color desired. Use the same brand of paint and tinting color to effect good paint body.

1032.2.3 Concrete Neutralizer

Concrete neutralizer shall be first grade quality concentrate diluted with clean water and applied as surface conditioner of new interior and exterior walls thus improving paint adhesion and durability.

1032.2.4 Silicon Water Repellant

Silicon water repellant shall be transparent water shield especially formulated to repell rain and moisture on exterior masonry surfaces.

1032.2.5 Patching Compound

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

1032.2.6 Varnish

Varnish shall be a homogeneous solution of resin, drying oil, drier ind solvent. It shall be extremely durable clear coating, highly resistant to wear and tear without cracking, peeling, whitening, spotting, etc. with minimum loss of gloss for a maximum period of time.

1032.2.7 Lacquer

Lacquer shall be any type of organic coating that dries rapidly and solely by evaporation of the solvent. Typical solvent are acetates, alcohols and ketones. Although lacquers were generally based on intrecellulose, manufacturers currently use, vinyl resins, plasticizers and reacted drying oils to improve adhesion and elasticity.



Portland cement shall conform with the requirements as defined in Item 700 – Hydraulic Cement.

1027.2.2 Hydrated Lime

Hydrated lime shall conform with the requirements as defined in Item 701 – Hydrated Lime.

1027.2.3 Fine Aggregates

Fine aggregates shall be clean, washed sharp river sand and free from dirt, clay, organic matter or other deleterious substances. Sand derived from crushed gravel or stone may be used with the Engineer's approval but in no case shall such sand be derived from stone unsuitable for use as coarse aggregates.

1027.3 Construction Requirements

1027.3.1 Mixture

- a) Mortar mixture for brown coat shall be freshly prepared and uniformly mixed in the proportion by volume of one (1) part Portland Cement, three (3) parts sand and one fourth (1/4) part hydrated lime.
- b) Finish coat shall be pure Portland cement properly graded conforming to the requirements of Item 700, Hydraulic Cement and mixed with water to approved consistency and plasticity.

1027.3.2 Surface Preparation

- a) After removal of formworks reinforced concrete surfaces shall be roughened to improve adhesion of cement plaster.
- b) Surfaces to receive cement plaster shall be cleaned of all projections, dust, loose particles, grease and bond breakers. Before any application of brown coat is commenced all surfaces that are to be plastered shall be wetted thoroughly with clean water to produce a uniformly moist condition.

1027.3.3 Application



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1032.2.8 Shellac

Shellac shall be a solution of refined lac resin in denatured alsohol. It dries by evaporation of the alcohol. The resin is generally furnished in orange and bleached grades.

1032.2.9 Sanding Sealer

Sanding sealer shall be quick drying lacquer, formulated to provide quick dry, good holdout of succeeding coats, and containing sanding agents such as zinc stearate to allow dry sanding of sealer.

1032.2.10 Glazing Putty

Glazing putty shall be alkyd-type product for filling minor surface unevenness.

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1032.2.11 Natural Wood Paste Filler

Wood paste filler shall be quality filler for filling and sealing open grain of interior wood. It shall produced a level finish for following coats of paint varnish/lacquer and other related products.

1032.2.12 Schedule

Exterior

1

a) b) c) d)	Plain cement plastered finish to be painted Concrete exposed aggre- gate and/or tool finish Ferrous metal Galvanized metal	-	3 coats Acrylic base masonry paint 1 coat water repellant 1 coat primer and 2 coats enamel paint 1 coat zinc chromate primer and
e) f)	Wood painted finish Wood varnished finish	-	2 coats portland cement paint 3 coats oil based paint vamish water repellant
	Interior		
a) b)	Plain cement plastered finish to be painted Concrete exposed aggre- gate and/or tool finish	-	2 coats acrylic base masonry paint clean surface
2)	Ferrous metal	-	1 coat primer and 2 coats
3)	Woodwork sea-mist	-	3 coats of 3 parts thigher 1 part lacquer
€)	Woodwork varnish	-	1st coat, of one part sanding sealer to one part solvent 2nd coat of 2/3 sanding sealer to 1/3 solvent
)	Woodwork painted finish	-	3 coats of oil base paint



g) Ceiling boards textured finish 1 coat oil based paint allow to dry then patch surfaces unevenness and apply textured paint coat

1032.3 Construction Requirements

The Contractor prior to commencement of the painting, vamishing, and related work shall examine the surfaces to be applied in order not to jeopardize the quality and appearances of the painting varnishing and related works.

1032.3.1 Surface Preparation

All surfaces shall be in proper condition to receive the finish. Woodworks shall be hand-sanded smooth and dusted clean. All knotholes pitch pockets or sappy portions shall be sealed with natural wood filler. Nail holes, cracks or defects shall be carefully puttied after the first coat, matching the color of paint.

Interior woodworks shall be sandpapered between coats. Cracks, holes of imperfections in plaster shall be filled with patching compound and smoothed off to match adjoining surfaces.

Concrete and masonry surfaces shall be coated with concrete neutralizer and allowed to dry before any painting primer coat is applied. When surface is dried apply first coating. Hairline cracks and unevenness shall be patched and sealed with approved putty or patching compound. After all defects are corrected apply the finish coats as specified on the Plans (color scheme approved).

Metal shall be clean, dry and free from millscale and rust. Remove all grease and oil from surfaces. Wash, unprimed galvanized metal with etching solution and allow it to dry. Where required to prime coat surface with Red Lead Primer same shall be approved by the Engineer.

In addition the Contractor shall undertake the following:

- Voids, cracks, nick etc. will be repaired with proper patching material and finished flushed with surrounding surfaces.
- Marred or damaged shop coats on metal shall be spot primed with appropriate metal primer.
- Painting and varnishing works shall not be commenced when it is too hot or cold.
- 4. Allow appropriate ventilation during application and drying period.
- All hardware will be fitted and removed or protected prior to painting and varnishing works.

1032.3.2 Application

Paints when applied by brush shall become non-fluid, thick enough to lay down as adequate film of wet paint. Brush marks shall flawed out after application of paint.

Paints made for application by roller must be similar to brushing paint. It must be nonsticky when thinned to spraying viscosity so that it will break up easily into droplets.

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Paint is atomized by high pressure pumping rather than broken up by the large volume of air mixed with it. This procedure change the required properties of the paint.

1032.3.3 Mixing and Thinning

At the time of application paint shall show no sign of deterioration. Paint shall be thoroughly stirred, strained and kept at a uniform consistency during application. Paints of different manufacture shall not be mixed together. When thinning is necessary, this may be done immediately prior to application in accordance with the manufacturer's directions, but not in excess of 1 pint of suitable thinner per gallon of the paint.

1032.3.4 Storage

All material to be used under this Item shall be stored in a single place to be designated by the Engineer and such place shall be kept neat and clean at all time. Necessary precaution to avoid fire must be observed by removing oily rags, waste, etc. at the end of daily work.

1032.3.5 Cleaning

All cloths and cotton waste which constitute fire hazards shall be placed in metal containers or destroyed at the end of daily works. Upon completion of the work, all staging, scaffolding and paint containers shall be removed. Paint drips, oil, or stains on adjacent surfaces shall be removed and the entire job left clean and acceptable to the Engineer.

1032.3.6 Workmanship in General

- a) All paints shall be evenly applied. Coats shall be of proper consistency and well brushed out so as to show a minimum of brush marks.
- All coats shall be thoroughly dry before the succeeding coat is applied.
- c) Where surfaces are not fully covered or cannot be satisfactorily finished in the number of coats specified such preparatory coats and subsequent coats as may be required shall be applied to attain the desired evenness of surface without extra cost to the owner.
- d) Where surface is not in proper condition to receive the coat the Engineer shall be notified immediately. Work on the questioned portion(s) shall not start until clearance be proceed is ordered by the Engineer.
- e) Hardware, lighting fixture and other similar items shall be removed or protected during the painting varnishing and related work operations and re-installed after completion of the work.

1032.3.7 Procedure for Sea-Mist Finish

- a) Depress wood grain by steel brush and sand surface lightly.
- b) Apply sanding sealer.
- c) Apply two coats of industrial lacquer paint.
- Spray last coat of industrial lacquer paint mixed with sanding sealer.



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- Apply wood paste filler thinned with turpentine or paint thinner into the wood surface.
- Wipe off wood paste filler immediately.
- g) Spray flat or gloss lacquer whichever is specified.

1032.3.8 Procedure for Varnish Finish

- a) Sand surface thoroughly.
- b) Putty all cracks and other wood imperfections with wood paste filler.
- c) Apply oil stain.
- d) Apply lacquer sanding sealer.
- e) Sand surface along the grain.
- f) Spray three (3) coats of clear dead flat lacquer.
- g) Polish surface coated using cloth pad.
- h) Spray gloss lacquer or flat lacquer whichever is desired or specified.

1032.3.9 Procedure for Ducco Finish

- a) Sand surface thoroughly.
- b) Apply primer surface white or gray by brush or spray.
- c) Apply lacquer spot putty in thin coat. Allow each coat to become thoroughly dry before applying next coat.
- Apply primer surfaces and then allow to dry in two (2) hours before applying the next coat.
- e) Apply a coat of flat tone semi-gloss enamel as per color scheme submitted and approved by the Engineer.

1032.4 Method of Measurement

The areas of concrete, wood and metal surfaces applied with varnish, paint and other related coating materials shall be measured in square meters as desired and accepted to the satisfaction of the Engineer.

1032.5 Basis of Payment

The accepted work shall be paid at the unit bid price, which price and payment constitute full compensation for furnishing all materials, labor, equipment, tools and other incidental necessary to complete this ltem.

Payment will made under:

Pay Item Number	Description	Unit of Measurement
1032 (a)	Painting works	m ²
1032 (b)	Varnishing	m ²
1032 (c)	Sea-mist Finish	m ²
1032 (d)	Ducco Finish	m ²
1032 (e)	Texture Finish	m ²



Item 1018 Ceramic Tile

ITEM 1018 - CERAMIC TILES

1018.1 Description

This Item shall consist of furnishing all ceramic tiles and cementitious materials, tools and equipment including labor required in undertaking the proper installation of walls and floor tiles as shown on the Plans and in accordance with this Specification.

1018.2 Material Requirements

1018.2.1 Ceramic tiles and trims shall be made of clay, or a mixture of clay and other materials which is called the body of the tile. Tile bodies are classified by ASTM C 242 as to their degree of water absorption. Ceramic tiles and trims are manufactured either by dust-pressed process in which the clays are ground to dust mixed with a minimum of water shaped in steel dies and then fired or by plastic process in which the clays are made plastic by mixing with water, shaped by extrusion or in molds and then fired.

1018.2.1.1 Glazed Tiles and Trims

Glazed tiles and trims shall have an impervious face of ceramic materials fused onto the body of the tiles and trims. The glazed surface may be clear white or colored depending on the color scheme approved by the Engineer. Standard glazes may be bright (glossy) semimatte (Less glossy) matte (dull) or crystalline (mottled and textured; good resistance to abrasion). Glazed tiles are used principally for walls; crystalline glazed tiles may be used for floors provided however that these are used as lightduty floors.

1018.2.1.2 Unglazed Tiles

Unglazed tiles shall be hard dense tile of homogeneous composition. Its color and characteristics are determined by the materials used in the body, the method of manufacture and the thermal treatment. It is used primarily for floors and walks.

1018.2.1.3 Trims

Trims are manufactured to match wall tile color, texture and to coordinate with it in dimension. These are shaped in various ceramic trim units such as caps, bases, coves, bullnoses, comers, angles, etc. that are necessary for edging or making a transition between entersecting planes.



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1018.2.1.4 Accessories

Accessories like some soap holders and shall be made wall mounted type with colors to reconcile with the color of the adjacent wall tiles.

1018.2.1.5 Cement

Cement shall be portland conforming to the specification requirements defined in Item 700, Hydraulic Cement.

1018.2.1.6 Sand

Sand shall be well graded fine aggregate clean river sand, free from soluble safts and organic impurities.

1018.2.1.7 Lime

Lime shall be hydrated lime with free unhydrated oxide and magnesium oxide content not to exceed 8 percent by weight.

1018.3 Construction Requirements

Tile work shall not be started until roughing-ins for plumbing, electrical and other trades have been completed and tested. The work of all other trades shall be protected from damage.

1018.3.1 Surface Preparation

a) Mortar mix for scratch coat and setting bed shall consist of one part portland cement 1/4 part lime and 3 parts sand by volume. Surface to receive tile must be level, true to elevation, dry, free from dirt, oil and other ointments. Allow at least seven days curing of scratch coat and setting bed.



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Installation work shall not be allowed to proceed until unsatisfactory conditions are corrected.

b) Bond coat shall be portland cement paste.

1018.3.1.1 Thoroughly dampen surfaces of masonry or concrete waits before scratch coat is applied.

1018.3.1.2 On masonry or concrete surface first apply a thin coat with pressure, then bring it out sufficiently to compensate for the major irregularities of the surface to a thickness not less than 10 mm. at any point.

1018.3.1.3 Evenly rate scratch coat to provide good mechanical key before the mortar mix has fully hardened.

1018.3.2 Installation Procedure

Ceramic tiles shall be soaked in clean water prior to installation for a minimum of one hour

1018.3.2.1 Ceramic Glazed Wall Tiles

- a) Determine and mark layout of ceramic tiles, joint location, position of trims and fixtures so as to minimize cut less than one-half tile in size.
- b) Thoroughly dampen surface of wall but do not saturate surface.
- c) Apply a bond coat mix with consistency of cream paste 1.5 mm thick to the wall surface or to the back of the tile to be taid.
- Lay the lifes true to profile then exert pressure and tamp tile surface before the bond coal mix has initially set.
- e) Continue with the next full tile to be laid and pressed firmly upon the setting bed tamped until flush and in place of the other tiles.
- Intersections and returns shall be formed accurately using the appropriate trims.
- g) All lines shall be kept straight and true to profiles, plumbed and internal corners rounded using the appropriate trims.



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1018.3.2.2 Vitrilied Unglazed Floor Tiles

- a) Before tire is applied the floor surface shall be tested for levelness or uniformity of slope by flooding it with water. Area where water ponds are filled or levelled, shall be retested before the setting bed is applied.
- b) Establish lines of borders and center of the walls at the field work in both direction to permit the pattern to be laid with a minimum of cut files.
- c) Clean concrete subfloor then moisten but do not soak. Then sprinkle dry cement over the surface and spread the mortar on the setting bed.
- d) Apply and spread mortar mix for setting bed and tamp to assure good bond over the entire area to be laid with tite.
- e) Pitch floor to drain as shown on Plans or as directed by the Engineer.
- Allow the setting bed to set sufficiently to be worked over then spread a bond coat over the surface and lay tile in accordance with Items 1019.3.2.1 a, b, c, d, e, f, g.

1018.3.3 Grouting and Pointing

1013.3.3.1 Tiles shall have laid in place for at least 24 hours before grouting of the joints is started. Grouting mortar shall be white portland cement or blended with pigments to acquire the color appropriate for the ceramic tile.

1018.3.3.2 Grouting mortar shall be applied over the tile by float or squeegee stroked diagonally accross the joints. Remove excess mortar with a wet sponge stroked diagonaily or in a circular motion after 12-15 minutes. Follow with a barely damp or dry sponge to remove remaining haze while smoothing all grouted joints.

1018.3.4 Cleaning

- Clean ceramic tile surfaces thoroughly as possible upon completion of grouting.
- b. Remove all grout haze, observing tile manufacturers recommendations as to use of acid or chemical cleaners.
- Rinse tile thoroughly with clean water before and after using chemical cleaners.
- d. Polish surface of tile with soft cloth.

1018.3.5 Protection from Construction Dirt

- a. Apply a protective coat of neutral cleanser solution diluted with water in the proportion of 1:4 or 1 liter cleanser concentrate to 1 gallon water.
- In addition, cover tile flooring with heavy-duty nonstaining construction paper, taped in place.
- c. Just before final acceptance of the work remove paper and rinse protective coat of neutral cleaner from tile surface. Do not let protective paper get tom or removed.



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1018.4 Method of Measurement

All works performed under this Item shall be measured in square meters for areas actually laid with ceramic tiles and accepted to the satisfaction of the Engineer.

1013.5 Basis of Payment

Ceramic tile work determined and provided in the Bill of Bill of Quantities shall be paid for based at the unit bid price which price and payment constitute full compensation for furnishing all materials, tools, equipment and other incidentals necessary to complete this Item.

Payment shall be made under:

Pay Item Number	Description	Unit of Measurement
1018.2.1.1	Glazed tiles and trims	ന²
1018.2.1.2	Unglazed tiles	ന²

ITEM 1003 - CARPENTRY AND JOINERY WORKS

1003.1 Description

The work under this Item shall consist of furnishing all required materials, fabricated woodwork, tools, equipment and labor and performing all operations necessary for the satisfactory completion of all carpentry and joinery works in strict accord with applicable drawings, details and these Specifications.

1003.2 Material Requirements

1003.2.1 Lumber

Lumber of the different species herein specified for the various parts of the structure shall be well seasoned, sawn straight, sundried or kilndried and free from defects such as loose unsound knots, pitch pockets, sapwood, cracks and other imperfections impairing its strength, durability and appearance.

1003.2.1.1 Grades of Lumber and Usage

a. Stress grade is seasoned, close-grained and high quality lumber of the specified specie free from defects and suitable for sustaining heavy loads.

Stress grade lumber shall be used for wooden structural members subject to heavy loads, and for sub-floor framing embedded or in contact with concrete or masonry.

b. Select grade lumber of the specified specie is generally of high quality, of good appearance, without imperfections, and suitable for use without waste due to defects and suitable also for natural finish.

Select grade lumber shall be used for flooring, sidings, facia and base boards, trims, mouldings, millwork, raitings, stairs, cabinet work, shelvings, doors, windows and frames of openings.

c. Common grade lumber has minimum tight medium knot not larger than 25 mm in diameter, with minimal imperfections, without sapwood, without decay, insect holes, and suitable for use with some waste due to minor defects and suitable also for paint finish.



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Common grade lumber shall be used for light framework for wall partitions, ceiling joist and nailers.

1003.2.1.2 Lumber Species and Usage

Unless otherwise specified on the Plans, the following lumber species shall be used as indicated:

a. Yacal (stress grade) for structural member such as post, girders, girts, steepers door and window frames set or in contact with concrete or masonry.

b.Guijo (select grade) for door and window frames set in wooden framework, for stairs, for root framing supporting ceramic or cement tiles, for floor joists and other wooden structural parts.

c. Apitong (common grade) for roof framing supporting light roofing materials such as galvanized iron, aluminum or asbestos sheets, for wall framing, ceiling joists, hangers and nailers.

d. Tanguile (select grade) for doors and windows, facia and base boards, trims, mouldings, millwork, railings, stairs, cabinet, work, shelvings, flooring and siding.

e. Narra (sefect grade) for stair railings, flooring boards, wall panels base boards, trims, mouldings, cabinet work, millwork, doors and windows when indicated as such in the Plans.

f. Dao (select grade) for parts of the structure as enumerated under Section 1003.2.1.2 (e), when indicated as such on the Plans.

1003.2.1.3 Moisture Content

Rough lumber for framing and siding boards shall be air-dried or sun-dried such that its moisture content shall not exceed 22 percent. Dressed lumber for exterior and interior finishing, for doors and windows, millwork, cabinet work and flooring boards shall be kiln-dried and shall not have a moisture content in excess of 14 percent at the time of installation in the structure.

1003.2.1.4 Substitution in Lumber Specie

Any lumber equally good for the purpose intended may be substituted for the specified kind subject to the prior approval of the Engineer, provided the substitution shall be of an equal or better speciel acceptable to the Engineer. In case of substitution with a better specie, no additional cost therefore shall be allowed to the contractor.

1003.2.2 Plyboard

Plyboard shall be good grade and made of laminated wood strips of uniform width and thickness bounded together with water resistant resin glue. The laminated core shall be finished both faces with select grade tanguile or red lavan veneers not less than 2 mm thick similarly bonded to the core. The plyboard of not less than 19 mm thick shall be free from defects such as solit in veneer, buckling or warping.

1003.2.3 Plywood

Plywood shall conform to the requirements of the Philippine Trade Standards 531-02. Thickness of a single layer laminae shall not be less



than 2 mm. The laminae shall be superimposed in layers with grains crossing at right angles in successive layers to produce stiffness. The face veneers shall be rotary cut from select grade timber. The laminae and face veneers shall be bonded with water resistant resin glue, hot pressed and pressure treated. Ordinary tanguile or red layan plywood with good quality face veneers, 6 mm thick shall be used for double walling and ceiling not exposed to moisture; waterproof or marine plywood shall be used for ceiling exposed to moisture such as at toilets and eaves, and ceiling to be finished with acrytex,

1003.2.4 Lawanit

Lawanit, when required per plans, shall be 6 mm thick, tempered or oil impregnated for moisture/water resistance. Texture of lawanit shall be subject to the approval of the Engineer.

1003.2.5 Materials Other Than Lumber

1003.2.5.1 Plastic Sheet

When required for counter top, plastic sheet such as Formica shall not be less than 1.50 mm thick and shall have hard, durable and glossy surface resistant to stain, abrasion and heat. Color and design shall be as selected from the manufacturer's standard and approved by the Engineer,

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1003.2.5.2 Glue

Give shall be from water resistant resins which, upon hardening, shall not dissolve nor lose its bond or holding power even when soaked with water for extended period.

Glue in powder form be in sealed container and shall be without evidence of tumping or deterioration in quality.

1003.2.5.3 Fastenars

Nails, screw, bolts and straps shall be provided and used where suitable for fixing carpentry and joinery works. All fasteners shall be brand new and of adequate size to ensure rejutity of connections.

a. Nails of adequate size shall be steel wire, diamond-pointed, ribbeoshank and bright finish.

 b. Screws of adequate size shall be cadmum or brass plated steel with slotted head.

c. Lag screws of adequate size, for anchoring heavy timber training in concrete or masonry, shall be galvanized steel.

d. Bolts and nuts shall be of steel having a yield point of not less than 245 MPa. Bolts shall have square heads and provided with standard flat steel washers and hexagonat nuts. Threads shall conform to American coarse thread series. The threaded pontion shall be long enough such that the nut can be lightened lagainst the bolted members without any need for blocking. The bolt's threaded end shall be finished smooth for ease of engaging and turning of the nut.



e. Wrought iron straps or angles, when required in conjunction with bolts or lag screws to provide proper anchorage, shall be of the shape and size shown on the Plans.

1003.3 Construction Requirements

1003.3.1 Quality of Materials

All materials to be incorporated in the carpentry and joinery works shall be of the quality specified under Section 2. Before incorporation in work, all materials shall have been inspected/accepted by the Engineer or his authorized representative.

1003.3.2 Storage and Protection of Materials

Lumber and other materials shall be protected from dampness during and after delivery at the site. Materials shall be delivered well in advance of actual need and in adequate quantity to preclude delay in the work. Lumber shall be piled in orderly stack at least 150 mm above ground and at sheltered place where it will be of least obstruction to the work.

1003.3.3 Shop Drawings

Shop drawings complete with essential dimensions and details of construction, as may be required by the Engineer in connection with carpentry and joinery work, shall be submitted for approval before proceeding with the work.

1003.3.4 Rough Carpentry

Hough carpentry covers timber structural framing for roof, flooring, siding, partition and ceiling.

a. Framing shall be stress grade or common grade lumber of the specie specified under Section.

b. Rough carpentry shall be done true to lines, levels and dimensions. It shall be squared, aligned, plumbed and well fitted at joints.

c. Trusses and other roof framing shall be assembled, fitted and set to exact location and slope indicated on the Plans.

 a. Fasteners, connectors and anchors of appropriate type and number shall be provided and fitted where necessary.

e. Structural members shall not be cut, bored or notched for the passage of conduits or pipes without prior approval of the Engineer. Members damaged by such cutting or boring shall be reinforced by means of specifically formed and approved steel plates or shapes, otherwise, damaged structural members shall be removed and replaced to the satisfaction of the Engineer.

f. Timber framing in contact with concrete or masonry shall be treated with termite-proofing solution and after drying coated with bituminous paint.

1003.3.5 Finished Carpentry

Finished carpentry covers works on flooring, siding and ceiling boards, stairs, cabinets, fabricated woodwork, millwork and trims.



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a. Framing lumber shall be select grade, free from defects and where exposed in finished work, shall be selected for color and grain.

b. Joints of framing shall be tenoned, mortised or doweled where suitable, closely fitted and secured with water resistant resins glue. Exterior joints shall be mitered and interior angles coped.

c. Panels shall be fitted allow for contraction or expansion and insure that the panels remain in place without warping, splitting and opening of joints.

d. Plyboard shall be as specified under Section 1003.2.3 unless otherwise indicated on the Plans.

e. Plywood shall be specified under Section 1003.2.4.

I. Exposed edges of plywood of plywood for cabinets shall be provided with select grade hardwood strips, rabbetted as necessary, glued in place and secured with finishing naits. To prevent splitting, hardwood for trims shall be drilled before fastening with nails or screws.

g. Fabricated woodwork shall be done preferably, at the shop. It shall be done true to details and profiles indicated on the Plans.

Where set against concrete or masonry, woodwork shall be installed when curing is completed.

h. Exposed wood surfaces shall be free from disfiguring defects such as raised grains, stains, uneven planning, sanding, tool marks and scratches.

Exposed surfaces shall be machine or hand sanded to an even smooth surface, ready for finish.



1002 Plumbing

ITEM 1002 - PLUMBING

1002.1 Description

This Item shall consist of turnishing all materials, tools, equipment and fixtures required as shown on the Plans for the satisfactory performance of the entire plumbing system including installation in accordance with the latest edition of the National Plumbing Code, and this Specification.

1002.2 Material Requirements

All piping materials, fixtures and appliances fitting accesories whether specifically mentioned or not but necessary to complete this item shall be furnished and installed.

1002.2.1 Cast Iron Soil Pipes and Fittings

a. Pipes and fitting materials shall comply with the specification requirements defined in PNS/SAO 4-1: 1974. The material description and standards of manufacture are herein described:

1. Cast Iron - the casting shall be made of gray iron which shall be sound, free from cracks, sand holes and blow holes. They shall be uniformly low hardness that permits drilling and cutting by ordinary methods. Pipes and fittings shall be true to pattern and of compact closed grained structure.

2. Quality of Iron - the iron shall be made by the cupola, air fumace, electric fumace or other processes which shall be checked by regular chemical and physical control test. The resultant shall be gray iron of good quality.

3. Manufacture - the pipes shall be made with hub and spigot ends or hub ends only. All hubs for pipes and fittings shall be provided with held lead grooves and all spigot ends shall be made with beads or plain if machine cast centrifugally. Plugs shall be wrought or cast, machined to the dimensions required and shall be free from defects.

4. Freedom from defects - pipes and fittings shall be true, smooth and cylindrical, their inner and outer surfaces being as nearly concentric as practicable. They shall be in all aspects, sound and good casting free from laps, pin holes or other imperfections and shall be neatly dressed and carefully fettled. The ends shall be finished reasonably square to their axes.

b. Clean-outs shall be made of heavy cast brass ferrule with counter sunk screw cover same diameter as the pipe except that they shall not be larger than 100mm diameter.

c. Caulking lead shall be of molten type peg lead conforming to specification requirements defined in ASTM B-29.

d. Oakum shall be twisted or braided hemp or abaca fibers slightly impregnated with oil.



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1002.2.2 Water Supply Pipes and Fittings

a. Pipes shall be galvanized iron pipe schedule 40 conforming to specification requirements defined in ASTM A-120 with threaded connection. Under roads where necessary shall be suitably protected as shown on the Plans.

Fittings shall be malleable iron Type II, galvanized iron conforming to specification requirements defined in ASTM A338.

b. Valves

Valves for water supply shall be bronze body with threaded ends rated 21.0 kgt/cm. square. All valves shall be gate valves unless otherwise specified. Gate valves shall have solid wedge body and discs conforming to specification requirements defined in ASTM B-62. Globe valves shall have plug type discs with ferrule threaded ends and bronze body.

c. Unions

Unions on ferrous pipe 50mm in diameter and, smaller shall be malleable iron.

d. Water Meter

Water meter where required to be furnished by the Contractor shall be of the type tested and approved by MWSS.

1002.2.3 Approved Alternate Pipes and Fittings

Pipes and fittings for sanitary and potable water lines as approved alternate shall be Unplasticized Polyviny) Chloride Pipes and Fittings (UPVC).

Pipes and fittings shall be made of virgin materials conforming to specification requirements defined in ASTM D-2241 and PNS 65: 1986. Fittings shall be molded type and designed for solvent cement joint connection for water lines and rubber O-ring seal joint for sanitary lines.

1002.2.4 Septic Tarik

The septic tank shall shall be provided as shown on the Plans including all pipe vents and fittings. The various construction materials such as concrete masonry work shall conform to the corresponding items of this Specifications. Inlet and outlet pipes shall conform to the latest edition of the National Plumbing Code.

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1002.2.5 Plumbing Fixtures and Fittings

All fittings and trimmings for fixtures shall be chromium-plated and polished brass unless otherwise approved. Exposed traps and supply pipes for fixtures shall be connected to the roughing in; piping system at the wall unless otherwise indicated on the Plans. Built-in fixtures shall be watertight with provision of water supply and drainage outlet, fittings and trap seal. Unless otherwise specified, all plumbing fixtures shall be made of vitreous china complete with fittings.



a. Water closet shall be vitreous china, free standing toilet combination, round front bottom outlet siphonic washdown bowl with extended rear self and closed coupled tank with cover complete with fittings and mounting accessories. Model make and color shall be submitted for approval prior to delivery at jobsite by the Engineer.

b. Lavatory shall be vitreous china, wall-hung with rear overflow and cast-in soap dishes, pocket hanger with integral china brackets, complete with twin faucets, supply pipes, P-trap and mounting accessories. Where indicated on the Plans to be counter top model make and color shall be approved by the Engineer.

c. Urinal shall be china vitreous, wall-hung wash-out urinal with extended shields and integral flush spreader, concealed wall-hanger pockets, 19mm top spud complete with fitting and mounting accessories. Model make and color shall be approved by the Engineer.

1002.2.6 Bathroom and Toilet Accessories

a. Shower head and fitting shall be movable, cone type with excutcheon arm complete with stainless steel shower valve and control lever, all exposed surface to be chromium finish.

b. Grab bars shall be made of tubular stainless steel pipe provided with safety grip and mounting flange.

c. Floor drains shall be made of stainless steel beehive type, measuring 100mm x 100mm, and provided with detachable stainless strainer, expanded metal lath type.

d. Toilet paper holder shall be vitreous china wall mounted. Color shall reconcile with the adjacent fixture and facing tiles.

e. Soap holder shall be vitreous china wall mounted. Color shall reconcile with the adjacent tile works.

f. Faucet(s) shall be made of stainless steel for interior use.

g. Hose-bib(s) shall be made of bronze cast finish.

1002.2.7 Special Plumbing Fixtures

a. Kitchen sink shall be made of stainless steel self rimming, single compartment complete with supply fittings, strainer traps, dual control lever and other accessories.

b. Laboratory sink shall be made of cast iron metal with white porcelain finish with single compartment, flat rim ledge, 762mm x 533mm complete with supply littings, strainer, trap and other accessories.

c. Scrub-up sink shall be made of cast iron metal with white porcelain finish measuring 610mm x.610mm complete with supply fittings, strainer, trap and wall mounting accessories.

d. X-ray developing tank shall be made of cast iron white porcelain finish with three (3) compartment x-ray processing tank, drain plug, open standing drain, 19mm IPS inlet spud complete with stand and mounting accessories.

e. Squat bowl(s) shall be vitreous china, wash down squat bowl with integral foot treads, pail flush type. Color, make and type to be approved by the Engineer.

f. Grease traps shall be made of cast bronze with detachable cover and mounting accessories.

1002.2.8 Roof Drains, Downspout, Overflow Pipes and Steel Grating

The Contractor shall provide, fit and/or install necessary drains with strainers, where shown on the Plans. Each drain with strainer shall fit the size of the corresponding downspout (or roof leader) over which it is to be installed and in conformity with the following schedule:

a. Scrupper drains (for balconies, parapet) shall be made of bronze base with flashing. Flange threaded outlet and convex with integral flashing clamp bolted to flange.

b. "Josam" type drains shall be made of bronze base semi-dome with large free area, flashing clamp and integral gravel stopper. To be used at roof decks, canopies, gutters, and elsewhere indicated on the Plans.

c. Downspouts when encased in concrete, unless otherwise shown on the Plans shall be polyvinyl chloride (PVC). Whether indicated or or specified to be cast iron or galvanized iron the same shall meet the specification requirement as herein described.

d. Overflow pipes shall be made of galvanized iron pipe measuring at least 13mm diameter and spaced 200mm on center.

e. Steel grating shall be made of wrought iron metals of design on shop drawings approved and surfaces to be coated with shop finish.

1002.2.9. Fire Protection System

a. Fire hose cabinets shall be locally available consisting of 38mm diameter valve hose rack with nipple 30mm rubber lined hose cable with standing 4268 kg/cm square, nozzle 38mm diameter brass, chromium plated.

b. Fire standpipe system shall consists of risers and hose valves. Pipe shall be extra strong black iron. Valves to be high grade cast bronze mounted withstanding 79.40 kg. working pressure as indicated on the Plans.

c. Fire extinguisher shall be portable, suitable for Class A, B, C fires, mounted inside cabinet. Cabinet shall be full flush mounting door with aluminum trim for glass plate, frame and box shall be made of gauge 14 galvanized iron sheet with white interior and red exterior baked enamel finish over primer. Cabinet to be wall mounted and size to be able to accomodate the defined components.

d. Yard hydrant where shown on the Plans shall match the Integrated Fire Department requirements. Outlet shall be single 63mm diameter gate valves with chain connected caps.

1002.2.10 Built-in appliances such as urinal trough, lavatory and slope sink shall be made as indicated on the Plans, exposed surfaces to be tile wainscoating complete with fitting accessories required as practiced in this specialty trade. Alubijid Cagayan de Oro Claveria Jasaan Oroquieta Panaon

1002.3 Construction Requirements

The Contractor before any installation work is started shall carefully examine the Plans and shall investigate actual structural and finishing work condition affecting all his work. Where actual condition necessitates a rearrangement of the approved pipe layout, the Contractor shall prepare Plan(s) of the proposed pipe layout for approval by the Engineer.

1002.3.1 Installation of Soil, Waste, Drain and Vent Pipes

a. All cast iron soil and drainage pipes shall be pitch 6mm per 300mm but in no case flatter than 3mm per 300mm.

b. Horizontal lines shall be supported by well secured length heavy strap hangers. Vertical lines shall be secured strongly by hooks to the building frame and a suitable brackets or chairs shall be provided at the floor from which they start.

c. All main vertical soil and waste stacks shall be extended full size to and above the root line to act as vents, except otherwise indicated on the Plans.

d. Vent pipes in roof spaces shall be run as close as possible to under side of roof with horizontal piping pitched down to stacks without forming traps. Vertical vent pipes may be connected into one main vent riser above the highest vented fixtures.

e. Where an end or circuit vent pipe from any fixtures is connected to a vent line serving other fixtures, the connections shall be at least 1.20 m above the floor on which the fixtures are located.

f. Horizontal waste line receiving the discharge from two or more fixtures shall be provided with end vents unless separate venting of fixtures is noted on the Plans.

g. All changes in pipe sizes on soil and waste lines shall be made with reducing fittings or recessed reducers. All changes in directions shall be made by appropriate use of 45 degrees wyes, half wyes, long sweep quarter bends or elbows may be used in soil and waste lines where the change in direction of flow is from the horizontal to the vertical and on the discharge from waste closets. Where it becomes necessary to use short radius fittings in other locations the approval of the Engineer shall be obtained prior to installation of the same.

 All joints of cast iron pipes in bell and spigot shall be firmly packed with oakum or hemp and caulked with pig lead at least 25 mm deep.

i. Cleanouts at the bottom of each soliistack, wastestack, interior downspout and where else indicated shall be the same size as the pipe up to and including 102 mm. 152 mm, for larger pipes.

Cleanouts on floors shall be cast iron ferrule caulked into cast hub and fitted with cast brass screw plug flush with floor. Cleanouts for threaded pipes shall be installed at the foot of soil, waste and drain stacks and on each building drain outside the building.

j. Vent pipe shall be flashed and made watertight at the root with ferrule lead sheet. Flashing shall be turned down into pipes.

k. Each fixtures and place of equipment requiring connection to the drainage system except fixtures with continous waste shall be equipped with a trap. Each trap shall be placed as near to the fixture as possible.





Traps installed on threaded pipe shall be recessed drainage pattern.

I. Overhead horixontal runs of pipes shall be hung with adjustable wrought iron pipe hanger spaced not over 3.04 m apart except hub and spigot soit pipe which shall have hanger spaced not over 1.50 m apart and located near a hub.

1002.3.2 Water Pipes, Fittings and Connections.

All water pipings inside the building and underground, 100 mm. diameter and smaller shall be galvanized iron threaded pipe with malleable iron fittings.

a. The water piping shall be extended to all fixtures, outlets, and equipment from the gate valves installed in the branch near the riser.

b. The cold water system shall be installed with a fall towards a main shutoff valve and drain. Ends of pipes and outlets shall be capped or plugged and left ready for future connections.

c. Mains and Branches

1. All pipes shall be cut accurately to measurements and shall be worked into place without springing or forcing. Care shall be taken so as not to weaken the structural portions of the building.

2. All piping above the ground shall be run parallel with the lines of the building unless otherwise indicated on the Plans.

3. All service pipes, valves and fittings shall be kept at sufficient distance from other work to permit finished covering not less than 12.5mm from such work or from finished covering on the different service.

4. No water piping shall be buried in floors, unless specifically indicated on the Plans and approved by the Engineer.

5. Changes in pipes shall be made with reducing littings.

d. Drain Cocks

1. Pipe drain indicated on the drawings shall consist of 12 mm globe valve with renewable disc and installed at low points on the cold water piping so that all piping shall slope 100 mm in 30.5 m.

e. Threaded Pipe Joints

1. All pipes shall be reamed before threading. All screw joints shall be made with graphite and oil or with an approved graphite compound applied to make threads only. Threads shall be full cut and not more than three threads on the pipe shall remain exposed.

f. Expansion and Contraction of Pipes

Accessible contraction expansion joints shall be made whenever necessary. Horizontal runs of pipe over 15m in length shall be anchored to the wall to the supporting structure about midway on the run to force expansion and contraction equally toward the ends or as shown on the Plans.



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g. Fire Standpipe System

Fire standpipe system shall consist of risers and hose valve. Pipe shall be extra strong black iron. Valves to be underwriter's approval high grade cast bronze mounted.

h. Valves and Hose Bibs

 Valves shall be provided on all supplied fixture as herein specified.
The cold water connections to the domestic hot water heater shall be provided with gate valves and the return circulation connection shall have gate and a check valve.

3. All connection to domestic hot water heaters shall be equipped with unions between valve and tanks.

4. Valve shall not be installed with its stem below the horizontal. All valves shall be gate valves unless otherwise indicated on the Plans.

5. Valves up to and including 50 mm diameter shall be threaded ends, rough bodies and finished trimmings, except those on chromium plated brass pipe.

6. Valves 63 mm in diameter and larger shall have iron bodies, brass mounted and shall have either screws or flange ends.

7. Hose bibs shall be made of brass with 12.5 mm inlet threads. hexagon shoulders and 19 mm male.

1002.3.3 Fixtures, Equipment and Fastenings

a. All fixtures and equipment shall be supported and fastened in a safe and satisfactory workmanship as practiced.

b. All fixtures, where required to be wall mounted on concrete or concrete hollow block wall, fasten with brass expansion bolts. Expansion bolts shall be 6 mm diameter with 20 mm threads to 25 mm into solid concrete, litted with loose tubing or sleeves of proper length to acquire extreme rigidity.

c. Inserts shall be securely anchored and properly flushed into the walls. Inserts shall be concealed and rigid.

d. Bolts and nuts shall be horizontal and exposed. It shall be provided with washers and chromium plate finish.

1002.3.4 Pipe Hangers, Inserts and Supports

a. Pipe hangers shall be wrought iron or malleable iron pipe spaced not more than 3m apart for horizontal runs or pipe, except hub and spigot soil pipe which shall have hanger spaced not over 1.50 m apart located near the hub.

b. Chains, straps perforated turn-buckles or other approved means of adjustment except the turn-buckles may be omitted for hangers on soil or waste lines or individual toilet rooms to maintain stacks when spaced does not permit.

c. Trapeze hangers may be used in lieu of separate hangers on pipe running parallel to and close to each other.

 d. Inserts shall be cast steel and shall be of type to receive a machine bolt or nut after installation. Insert may be permitted adjustment



of the bolts in one horizontal direction and shall be installed before pouring of concrete.

e. Wrought iron clamps or collars to support vertical runs of pipe shall be spaced not more than 6 m apart for as indicated on the Plans.

1002.3.5 Plates and Flashing

a. Plates to cover exposed pipes passing through floor finished walls or ceiling shall be fitted with chromium plated cast brass plates or chromium plated cast iron or steel plates on ferrous pipes.

b. Plates shall be large enough to cover and close the hole around the area where pipes pass. It shall be properly installed to insure permanence.

c. Roof areas penetrated by vent pipes shall be rendered watertight by lead sheet flashing and counter flashing. It shall extend at least 150 mm above the pipe and 300 mm along the roof.

1002.3.6 Protection and Cleaning

a. During installation of fixtures and accessories and until final acceptance, protect items with strippable plastic or other approved means to maintain fixtures in perfect conditions.

b. All exposed metal surfaces shall be polished clean and rigid of grease, dirt or other foreign materials upon completion.

c. Upon completion, thoroughly clean all fixtures and accessories to leave the work in polished condition.

1002.3.7 Inspection, Warranty Test and Disinfection

All pipes, fittings, traps, foctures, appurtenances and equipment of the plumbing and drainage system shall be inspected and approved by the Engineer to insure compliance with all requirement of all Codes and Regulations reffered to in this Specification.

1002-3.7.1 Drainage System Test

a. The entire drainage and venting system shall have all necessary openings which can be plugged to permit the entire system to be filled with water to the level of the highest stack vent above the roof.

b. The system shall hold this water for a full 30 minutes during which time there shall be no drop greater than 102 mm.

c. Where only a portion of the system is to be tested, the test shall be conducted in the same manner as described for the entire system except that a vertical stack 3.00 m highest norizontal line to be tested may be installed and filled with water to maintain sufficient pressure or water pump may be used to supply the required pressure.

d. If and when the Engineer decides that an additional test is needed, such as an air to smoke test on the drainage system, the Contractor shall perform such test without any additional cost. 1002.3.7.2 Water Test on System

a. Upon completion of the roughing-in and before connecting fixtures the entire cold water piping system shall be tested at a hydrostatic pressure 1 1/2 times the expected working pressure in the system during operation and remained tight and leak-proofed.

b. Where piping system is to be concealed the piping system shall be separately in manner similar to that described for the entire system and in the presence of the Engineer or his duly designated representative.

1002.3.7.3 Defective Work

a. All defective materials replaced and tested will be repeated until satisfactory performance is attained.

b. Any material replaced for the satisfactory performance of the system made shall be at the expense of the Contractor.

c. Caulking of screwed joints or holes will not be permitted.

1002.3.7.4 Disinfection

a. The entire water distribution system shall be thoroughly flushed and treated with chlorine before it is operated for public use.

b.Disinfection materials shall be liquid chlorine or hypochlerite and shall be introduced in a manner approved as practiced or approved by the Engineer into the water distribution system.

c. After a contact period of not less than sixteen hours, the heavenly chlorinated water shall be flushed from the system with potable water.

d. Valves for the water distribution system shall be opened and closed several times during the 16 hours chlorination treatment is done.

1002.3.8 As-Built Drawings

Upon completion of the work, the Contractor shall submit two sets of prints with all as-built changes shown on the drawings in a neat workmanship manner. Such prints shall show changes or actual installation and conditions of the plumbing system in comparison with the original drawings.

1002.4 Method of Measurement

The work done under this Item shall be quantified per length and/or number of units as provided in the Bill of Quantities, tested and accepted to the satisfaction of the Engineer.

1002.5 Basis of Payment

The quantified items, installed in place shall be the basis for payment, based from the unit bid price for which prices and payments shall constitute full compensation including labor, materials and incidentals necessary to complete this Item.



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Payment shall be made:

Pay Item Number	Description	Unit of Measurement
1002 (a)	Cast Iron Soil Pipes and Fittings	pieces/length
1002 (b)	Galvanized Iron Pipes and Fittings	pieces/length
1002(c) 1002 (d)	Plumbing Fixtures Roof Drain with Strainer	set set

1100 Conduit, Boxes, and Fitting

ITEM 1100 - CONDUITS, BOXES & FITTINGS

1100.1 Description

This Item shall consist of the furnishing and installation of the complete conduit work consisting of electrical conduits; conduit boxes such as junction boxes, pull boxes, utility boxes, octagonal and square boxes; conduit fittings such as couplings, locknuts and bushings and ohter electrical materials needed to complete the conduit roughing-in work of this project.

1100.2 Material Requirements

All materials shall be brand new and shall be of the approved type meeting all the requirements of the Philippine Electrical Code and bearing the Philippine Standard Agency (PSA) mark.

Conduits

Conduits shall be standard rigid steel, zinc coated or galvanized. Intermediate metal conduit may be used if shown or specified on the approved Plans. PVC conduits if required shall be Schedule 40. Enamel coated steel conduits and conduits with rough inner surfaces are not acceptable.

Conduit Boxes

All conduit boxes shall be Code gauge steel and galvanized. Outlet boxes shall be galvanized pressed steel of standard make. In general, outlet boxes shall be at least 100 mm square or octagonal, 53 mm deep and 16 mm minimum gauge.

Conduit Fittings

All conduit fittings such as locknuts and bushings shall be galvanized of standard make.

1100.3 Construction Requirements

All works throughout shall be executed in the best practice in a workmanlike manner by qualified and experienced electricians under the immediate supervision of a duly licensed Electrical Engineer.

Conduits

Conduits should be cut square with a hacksaw and reamed. Bends shall be made with the required radius. In making bends only conduit bending apparatus will be used. The use of a pipe tee or vise for bending conduits shall not be permitted. Conduits which have been crushed, deformed or flattened shall not be installed. No running thread shall be allowed. Conduit runs crossing construction joints of the building shall be provided with standard expansion filtings of the approved type.



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No conduits shall be used in any system smaller than 12 mm diameter electric trade size nor shall have more than four (4) 90-degree bends in any one run and where necessary, pull boxes shall be provided.

All ends of conduits which are left empty in cabinets and conduit boxes shall be plugged with lead or approved pipe caps so as to prevent the entranceof white ants and dirt within the conduit system. Pull wires shall be inserted in the empty ducts before they are closed with lead or pipe caps and shall be left therein for future use.

On exposed work, all pipes and outlet boxes shall be secured by means of galvanized metal clamps which shall be held in place by means of machine screws. When running over concrete surfaces, the screws shall be held in place by means of expansion sleeves for big pipes and rolled lead sheet for small pipes. All pipes shall be run at right angles to and parallel with the surrounding walls. No diagonal run shall be allowed and all bends and offsets shall be avoided as much as possible. Conduits shall be supported at 1,500 mm intervals maximum.

Conduit Boxes & Fittings

Provide conduit boxes for pulling and splicing wires and outlet boxes for installation of wiring devices.

As a rule, provide junction boxes or pull boxes in all runs greater than 30 metres in length, for horizontal runs. For ohter lengths, provide boxes as required for splices or pulling. Pull boxes shall be installed in inconspicuous but accessible locations.

Support boxes independently of conduits entering by means of bolts, red hangers or other suitable means.

Conduit boxes shall be installed plumb and securely fastened. They shall be set flush with the surface of the structure in which they are installed where conduits are run concealed.

All convenience and wall switch outlet boxes for conceated conduit work shall be deep, rectangular flush type boxes. Four-inch octagonal flush type boxes shall be used for all ceiling light outlets and shall be of the deep type where three or more conduits connect to a single box.

Floor mounted outlet boxes required shall be waterproof type with flush brass floor plate and brass bell nozzle.

All boxes shall be painted with antirust red lead paint after installation. All conduits shall be fitted with approved standard galvanized bushing and locknuts where they enter cabinets and conduit boxes.

Junction and pull boxes of code gauge steel shall be provided as indicated or as required to facilitate the pulling of wires and cables.

1100.4 Method of Measurement

The work under this Item shall be measured either by lengths, pieces, pairs, lot and set actually placed and installed as shown on the approved Plans.

1100.5 Basis of Payment

All works performed and measured and as provided for in the Bill of Quantitites shall be paid for at the Unit Bid or Contract Unit Price which payment shall constitute full compensation including labor, materials, tools and incidentals necessary to complete this Item.

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Payment shall be made under :

Pay Item	Description	Unit of
Number		Measurement
(1)	RSC Conduit Pipe - mm dia., with couplings	length
(2)	Locknut & Bushings	8340
(3)	Condulet type	pairs
(4)	Conduit pine elbow	pieces
(5)	Connector	pieces
(6)	Conduit clamp	pieces
(7)	PVC adapter	pièces
(8)	GL Wire GA # 14	pieces
(9)	Hacksow Blade	kilos
(10)	PVC Tapo 10 dia unto	pieces
(11)	Bubber Tang 10 mm dia x 18 mm	Trolls
(12)	PVC Solvert Common dia x 227 g	rolls
(13)	PVC End Pall	cans
(14)	Ostossal in the	pieces
(15)	Utility Development Doxes	pieces
(15)	Utility Boxes	pieces
(10)	Metal Pull Box	pieces
(17)	Square Box	Pieces
(18)	Telephone Cabinet	set
(19)	Reinforced Concrete Pedestal	
(0.0)	Pole	lot
(20)	Red Lead Point	lot
(21)	Weatherhead with type "F"	
	condulet	dieces
(22)	Grounding Rod copperweld	proces
	20 mm dia x 3 m	enoth
(23)	Apitong or Approved equal	longin
	creosoted wood pole	Dieces
(24)	Anchor Rod - mm dia	niecas
(25)	Anchor Log - mm dia	Diecos
(26)	Powerload Studs with nuts	Pieces
		180.85

1100.6 General Specifications

The work to be done under this division of specifications consists of the fabrication, furnishing, delivery and installation; complete in all details of the electrical work, at the subject premises and all work materials incidental to the proper completion of the installation, except those portions of the work which are expressly stated to be done by other fields. All works shall be done in accordance with the rules and regulations and with the specifications.

1100.7 Specifications on:

1. Lighting fixtures and lamp

All lighting fixtures and lamps are as specified and listed on lighting fixture schedule.



For flourescent lamp, it shall be 40-watt rapid start cool-white. All flourescent ballast shall be 230 volt, high power factor, of good quality materials and approved by the Bureau of Product Standards (BPS).

- 2. Material Requirements
 - All materials to be used shall conform to the BPS specification.
- 3. Construction Requirements

All grounding system installation shall be executed in accordance with the approved plans.

Grounding system shall include building perimeter ground wires, ground rods, clamps, connectors, ground wells amd ground wire taps as shown in the approved design.

1100.8 Auxiliary Systems

All auxiliary systems such as telephone and intercom system, time clock system, fire alarm system and public address/nurse's call/paging system installations shall be done in accordance with the approved design.

All materials to be used shall conform to the Bureau of Product Standards (BPS) specifications.

1100.9 Important requirement regarding supervision of the work and submission of certificate of completion.

All wiring installation herein shall be done under the direct supervision of a licensed Electrical Engineer at the expense of the Contractor. The contractor shall submit the certificate of completion duly approved by the owner's representative.

1100.10 Test and guarantee

Upon completion of the electrical construction work, the contractor shall provide all test equipment and personnel and to submit written copies of all test results.

The contractor shall guarantee the electrical installation are done and in accordance with the approved plans and specifications. The contractor shall guarantee that the electrical systems are free from all grounds and from all defective workmanship and materials and will remain so for a period of one year from date and acceptance of works. Any defect shall be remedied by the Contractor at his own expense.



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TEM 1101 - WIRES AND WIRING DEVICES

1101.1 Description

This Item shall consist of the furnishing and installation of all wires and wiring devices consisting of electric wires and cables, wall switches, convenience receptacles, heavy duty receptables and other devices shown on the approved Plans but not mentioned in these specifications.

1101.2 Material Requirements

Wires and cables shall be of the approved type meeting all the requirements of the Philippine Electrical Code and bearing the PSA mark

Unless specified or indicated otherwise, all power and lighting conductors shall be insulated for 600 volts.

All wires shall be copper, soft drawn and annealed, smooth and of cylindrical form and shall be centrally located inside the insulation.

All wining devices shall be standard products of reputable electrical manufacturers. Wall switches shall be rated at least 10A, 250 volts and shall be spring operated, flush, tumbler type. Duplex convenience receptacies shall be rated at least 15A, 250 volts, flush, parallel siots. Single heavy duty receptacles shall be rated at least 20A, 250 volts. 3-wire, flush, polarized type.

1101.3 Construction Requirements

Conductors or wires shall not be drawn in conduits until after the cement plaster is dry and the conduits are thoroughly cleaned and free from dirt and moisture. In drawing wires into conduits, sufficient stack shall be allowed to permit easy connections for fixtures, switches, receptacles and other wiring devices without the use of additional splices.

All conductors of convenience outlets and lighting branch circuit homeruns shall be wired with a minimum of 3.5 mm in size. Circuit homeruns to panelboards shall not be smaller than 3.5 mm but all homeruns to panelboard more than 30 meters shall not be smaller than 5.5 mm. No conductor shall be less than 2 mm in size.

All wires of 14mm and larger in size shall be connected to panels and apparatus by means of approved type lugs or connectors of the solderless type, sufficiently large enough to enclose all strands of the conductors and securely fastened. They shall not loosen under vibration or normal strain.

All joints, taps and splices on wires larger than 14 mm shall be made of suitable solderless connectors of the approved type and size. They shall be taped with rubber and PVC tapes providing insulation not less than that of the conductors.

No splices or joints shall be permitted in either feeder or branch conductors except within outlet boxes or accessible junction boxes or pull boxes. All joints in branch circuit wiring shall be made mechanically and elactrically secured by approved splicing devices and taped with rubber and PVC tapes in a manner which will make their insulation as that of the conductor.

All wall switches and receptacles shall be litted with standard bakelite face plate covers. Device plates for flush mounting shall be installed with all four edges in continuous contact with finished wall surfaces without the use of coiled wire or similar devices. Plaster fillings will not be permitted. Plates installed in wet locations shall be gasketed.

When more than one switch or device is indicated in a single location, gang plate shall be used.

1101.4 Method of Measurement

The work under this Item shall be measured either by meters, rolls, pieces, set, actually placed and installed as shown on the Plans.



1101.5 Basis of Payment

All work performed and measured and as provided for in this Bid of Quantities shall be paid for at the Unit Bid or Contract Unit Price which payment shall constitute full compensation including labor, materials, tools and incidentals necessary to complete this Item.

Payment shall be made under:

Pay Item Number	Description	Unit of Measurement
(1)	Electric Wire	meter of rolls
(2)	Single pole tumbler switch	pieces
(3)	Two-gang tumbler switch	Dieces
(4)	Three-gang tumbler switch	Dieces
(5)	Three-way tumbler switch	pieces
(6)	Duplex Convenience receptacles	set
(7)	Heavy Duty Convenience receptacles	set
(8)	Standard Telephone outlet bakelite cover with 9.52 center hole	pieces
(9)	Window type air conditioning outlet 3-prong polarized type	pieces
(10)	Bare copper wire	metore
(11)	Grounding clamps for electric wires	pieces
(12)	Messenger wire	motore
(13)	Guy wire	meters
(14)	Vibrating Bell	set
(15)	Traffic Light Control Panel	set
(16)	Traffic Light metal enclosures complete with red and green light provided with reflectors and 152 mm diameter vibrating bell	set

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1102 Power Lo ad Center, Switch Gear and Panel Boards

TEM 1102 - POWER LOAD CENTER, SWITCHGEAR AND PANELBOARDS

1102.1 Description

This Item shall consist of the furnishing and installation of the power load center unit substation or low voltage switchgear and distribution panelboards at the location shown or the approved Plans complete with transformer, circuit breakers, cabinets and all accessories, completely wired and ready for service.

1102.2 Material Requirements

All materials shall be brand new and shall be of the approved type. It shall conform with the requirements of the Philippine Electrical Code and shall bear the Philippine Standard Agency (PSA) mark.

Power Load Center Unit Substation

The Contractor shall turnish and install an indoor-type Power Load Center UNit Substation at the location shown on the approved Plans if required. It shall be totally metal-enclosed, dead front and shall consist of the following coordinated component parts:

High Voltage Primary Section:

High voltage primary incoming line section consisting of the following parts and related accessories:

- (a) One (1) Air-filled Interrupter Switch, 2-position (open-close) installed in a suitable air filled metal enclosure and shall have sufficient interrupting capacity to carry the electrical load. It shall be provided with key interlock with the cubicle for the power fuses to prevent access to the fuses unless the switch is open.
- (b) Three (3)-power fuses mounted in separate compartments within the switch housing and accessible by a binged door.
- (c) One 1) set of high voltage potheads or 3-conductor cables or three single conductor cables.
- (d) Lightning arresters shall be installed at the high voltage cubicle if required.

Items (a) and (b) above could be substituted with a power circuit breaker with the correct rating and capacity.

Transformer Section

The transformer section shall consist of a power transformer with ratings and capacities as shown on the plans. It shall be oil liquid-filled non-flammable type and designed in accordance with the latest applicable standards.

The transformer shall be provided with four (4 approximately 2 1/2 % rated KVA taps on the primary winding in most cases one (1) above and three (3) below rated primary voltage and shall be changed by means of extarnally gang-operated manual tap changer only when the transformer is de-energized. Tap changing under load is acceptable if transformer has been so designed.

The following accessories shall be provided with the transformer, namely: drain valve, sampling device, filling connection, oil liquid level gauge, ground pad, top filter press connection, lifting lugs, diagrammatic nameplate, relief valve, thermometer and other necessary related accessories.

The high-voltage and low-voltage bushings and transition flange shall be properly coordinated for field connection to the incoming line section and low voltage switchboard section, respectively.



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Low-Voltage Switchboard Section

The low-voltage switchboard shall be standard modular-unitized units, metal-built, dead front, safety type construction and shall consist of the following:

(a) Switchboard Housing

The housing shall be heavy gauge steel sheet, dead front type, gray enamel finish complete with frame supports, steel bracings, steel sheet panelboards, removable rear plates, copper busbars, and all other necessary accessories to insure sufficient mechanical strength and safety. It shall be provided with grounding bolts and clamps.

(b) Secondary Metering Section

The secondary metering section shall consist of one (1) ammeter, AC, indicating type; one (1) voltmeter, AC, indicating type, one (1) ammeter transfer switch for 3-phase; one (1) voltmeter transfer switch for 3-phase; and current transformers of suitable rating and capacity.

The above-mentioned instruments shall be installed in one compartment above the main breaker and shall be complete with all necessary accessories completely wired, ready for use.

(c) Main Circuit Breaker

The main circuit breaker shall be draw-out type, manually or electrically operated as required with ratings and capacity as shown on the approved Plans.

The main breaker shall include insulated control switch if electrically operated, manual trip button, magnetic tripping devices, adjustable time overcurrent protection and instantaneous short circuit trip and ail necessary accessories to insure safe and efficient operation.

(d) Feeder Circuit Breakers

There shall be as many feeder breakers as are shown on the single line diagram or schematic riser diagram and schedule of loads and computations on the plans. The circuit brakers shall be drawout or molded case as required. The circuit breakers shall each have sufficient interrupting capacity and shall be manually operated complete with trip devices and all necessary accessories to insure safe and efficient operation. The number, ratings, capacities of the feeder branch circuit breakers shall be as shown on the approved Plans.

Circuit breakers shall each be of the indicating type, providing "ON" - "OFF" and "TRIP" positions of the operating handles and shall each be provided with nameplate for branch circuit designation. The circuit breaker shall be so designed that an overload or short on one pole automatically causes all poles to open.

Low-Voltage Switchgear

* (For projects requiring low-voltage switchgear only)

The Contractor shall furnish and install a low-voltage switchgear at the location shown on the plans. It shall be metal-clad, dead front, free standing, safety type construction and shall have copper busbars of sufficient size, braced to resist allowable root mean square (RMS) symmetrical short circuit stresses, and all necessary accessories.

The low-voltage switchgear shall consist of the switchgear housing, secondary metering, main breaker and feeder branch circuit



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breakers and all necessary accessories, completely wired, ready for service.

Grounding System:

All non-current carrying metallic parts like conduits, cabinets and equipment frames shall be properly grounded in accordance with the PHilippine Electrical Code, latest edition.

The size of the ground rods and ground wires shall be as shown on the approved Plans. The ground resistance shall not be more than 5 ohms.

Panelboards and Cabinets

Panelboards shall conform to the schedule of panelboards as shown on the approved Plans with respect to supply characteristics, rating of main lugs or main circuit breaker, number and ratings and capacities of branch circuit breakers.

Panelboards shall consist of a factory completed dead front assembly mounted in an enclosing flush type cabinet consisting of code gauge galvanized sheet steel box with trim and door. Each door shall be provided with catch lock and two(2) keys. Panelboards shall be provided with directories and shall be printed to indicate load served by each circuit.

Panelboard cabinets and trims shall be suitable for the type of mounting shown on the approved Plans. The inside and outside of panelboard cabinets and trims shall be factory painted with one rustproofing primer coat and two finish shop coats of pearl gray enamel paint.

Main and branch circuit breakers for panelboards shall have the rating, capacity and number of poles as shown on the approved Plans. Breakers shall be thermal magnetic type. Multiple breaker shall be of the common trip type having a single operating handle. For 50-ampere breaker or less, it may consist of single-pole breaker permanently assembled at the factory into a multi-pole unit.

1102.3 Construction Requirements

The Contractor shall install the Power Load Center Unit Substation or Low-Voltage Switchgear and Panelboards at the locations shown on the approved Plans.

Standard panels and cabinets shall be used and assembled on the job. All panels shall be of dead front construction furnished with trims for flush or surface mounting as required.

1102.4 Method of Measurement

The work under this Item shall be measured either by set and pieces actually placed and installed as shown on the approved Plans.

1102.5 Basis of Payment

All works performed and measured and as provided for in the Bill of Quantities shall be paid for at the Unit Bid or Contract Unit Price which payment shall constitute full compensation including labor, materials, tools and incidentals necessary to compelte this Item.



Payment shall be made under :

Pay Item Number	Description	Unit of Measurement
(1),	Panelboard (Circuit Breaker Type)	set
(2)	Panelboard (Safety Switch Type)	set
(3)	Low-Voltage Switchgear (LVS) complete with metering devices and accessories	set
(4)	Power Fuses '	pieces
(5)	Lightning Arresters	pieces
(6)	Air Break Switch	set
(7)	Enclosed ACB NEMA Type I	set
(8)	Enclosed ACB NEMA Type 3R	set
(9)	Automatic Transfer Switch	set
(10)	Manual Transfer Switch without fuses	pieces
(11)	Motor Controller	set