

---

**PROJECT : LAMINAR AIRFLOW HVAC SYSTEM FOR TWO (2) OPERATING THEATERS**  
**(MECHANICAL WORKS)**  
**LOCATION : SPMC Compound, J.P. Laurel Ave., Bajada, Davao City**  
**OWNER : SOUTHERN PHILIPPINES MEDICAL CENTER**  
**ENGINEER :**  
**SECTION 1010 : TECHNICAL SPECIFICATIONS**

---

## TECHNICAL SPECIFICATIONS

### TABLE OF CLAUSES

1.0	General Requirements
2.0	Masonry
3.0	Electrical Works
4.0	Mechanical Works
5.0	Guarantee

#### 1.0 GENERAL REQUIREMENTS

##### 1.1 Scope of Work

This section shall include mobilization and demobilization of Contractor's plant, equipment, material and employee to the site; construction of the Contractor's office and facilities; compliance with the contract requirements.

This section shall include the furnishing of labor, materials, transportation, tools, supplies plant, equipment and appurtenance to complete satisfactorily the construction of the proposed subproject.

##### 1.2 Mobilization and Demobilization

The contractor upon receipt of the notice to proceed shall immediately mobilize and transport his plant, equipment, materials and employees to the site and demobilize or remove the same at the completion of subproject.

##### 1.3 Contractors field Office and Facilities

###### 1.3.1 Field Office

During the performance of the contract, the Contractor shall construct and maintain a field office and facilities at the site of the work at which he or his authorized agent shall be holding office at all times, while the work is in progress. The location, dimensions and layout of such field office shall be subject to approval, Construction shanties, sheds and temporary facilities provided as requires for the Contractor's convenience shall be maintain in good condition and neat appearance including finishes as required.

###### 1.3.2 Temporary Light and Power

The Contractor shall provide and maintain temporary electrical service including installation of temporary power and lighting within the construction site. The electrical service shall be adequate in capacity to supply power to construction tools and equipment without over-loading the temporary equipment and wiring for power and lighting shall be in accordance with the applicable provisions of the local governing cods, At the completion of the construction work all temporary wiring, lighting, equipment and devices shall be removed.

###### 1.3.3 Temporary Toilet

The Construction shall provide and maintain is sanitary condition enclosed toilet for the use of all construction personnel located within the contract limits, complete with fixtures, water and sewer connections and all appurtenances. Installation shall be in accordance with all applicable codes and



regulations of the local authorities having jurisdiction thereof. Upon completion of the work, temporary toilet and their appurtenances shall be removed.

#### 1.3.4 Temporary Water Service

The Contractor shall provide and maintain temporary water supply services, complete with necessary connections and appurtenances. Installed water supply lines shall be used as a source of water for construction purposes subject to the approval of the Project Manager. The Contractor shall pay the cost of operation, maintenance and restoration of the water system. All temporary water service including equipment and piping shall be removed upon completion of work and all worn out and damaged parts of the permanent system shall be replaced and restored in first class condition equal to new.

#### 1.3.5 Security

The Contractor shall provide sufficient security in the construction site to prevent illegal entry or work damaged during nights; holidays and other period when work is not executed; and during working hours. The Contractor shall take ample precautions against fire by keeping away flammable materials, and ensure that such materials are properly handled and stored. Fires shall not be built within the area of construction, except when permitted by the Project Manager.

### 1.4 Compliance with Contract Requirements

#### 1.4.1 Control of on Site Construction

Prior to start of any definable feature of the work, the Contractor must perform the necessary inspection to include as follows:

- (1) Review of Contract Documents to make sure that material, equipment and products have been tested, submitted and approved.
- (2) Physical examination of materials and equipment to assure its conformity to the specification, plans, shop drawing and other data.
- (3) As soon as the work has been started the Contractor shall conduct initial inspection to check and review the workmanship in compliance with the contract requirements for a particular item of work.
- (4) The Contractor shall perform these inspections on a regular basis to assure continuing compliance with the contract requirements until completion of a particular type of work.

#### 1.4.2 Pre-Construction Meetings

Prior to the start of construction, Contractor's material men whose presence is required must attend pre construction meetings as directed for the purpose of discussing the execution of work. In this conference the contractor determine the necessary precautions in mitigating the effect of construction on environmental aspect and medical services.

#### 1.4.3 Progress Meetings

Progress meetings shall be called upon by the following for the purpose of discussing the implementation of the work:

- (1) When called upon by the Project Manager of DOH or his representative for the purpose of discussing the execution of work. Contractor's material men whose presence is necessary or requested must attend progress meetings. Each of such meeting shall be held at the time and place designated by the Project Manager or his representative. Decisions and instructions agreed in these meetings should be binding and conclusive on the contract. Minutes of these meetings shall be recorded and reasonable number of copies shall be furnished to the Contractor for distribution to various materials men and vendors involved.
- (2) The Contractor may also call for a progress meeting for the purpose of coordinating, expediting and scheduling the work. In such meeting Contractor's material men or vendors, whose presence is necessary or requested to attend.

#### 1.4.4 Progress Report

The Contractor shall prepare and submit progress reports to the project manager every 30 days after the start of the project up to its completion, showing the work completed, work remaining to be done, status of construction equipment and materials at the site, as stipulated in Section 4 of the General Conditions of Contract.

#### 1.4.5 Survey Data

The Contractor shall layout his work from established base lines and benchmark indicated in the drawing and shall be responsible for all measurement in connection therewith. The Contractor shall



furnished, at his own expense, all stakes, templates, platforms, equipments, tools, materials and labor as may be required in laying out any part of the work, out of established base lines and bench mark. It shall be the responsibility of the Contractor to maintain and preserve all stakes and other marks until he is authorized to remove them. If the Contractor through his negligence prior to the authorized removal destroys such marks, they shall be replaced at the expense of the Contractor.

#### 1.4.6 Shop Drawing

The Contractor shall submit and furnish shop drawings and samples accompanied with the provision of the Conditions of Contract. The term "Shop Drawing" as used herein shall be understood to include detailed design calculations, construction drawings, lists, graphs supplemental specifications and others.

- (1) Transmittal forms shall be filled out in typewritten or ink with no alterations or inter line actions unless initialized dates before submittal. Shop drawings shall be submitted as the same size as the contract drawing when practicable, but in no case it shall exceed dimension of the contract drawings. The Contractor shall make preliminary check of all shop drawings for compliance with the contract documents and he shall stamp each print with statement of compliance with the requirements. The contractor may authorize his supplier to deal with the Project Manager with regard to the shop drawings, however ultimate responsibility for accuracy and completeness in the submittal shall remain with the Contractor.
- (2) The said shop drawing and transmittal shall be submitted at time sufficiently early, to allow review of the same by the Project Manager and to accommodate the rate of construction progress required under the contract. The contractor shall submit print copies of show drawing with transmittal forms, and copies of brochures with transmittal forms as required by the Project Manager.
- (3) Any shop drawing and samples submitted not accompanied by transmittal forms of where all applicable items on the forms are not completed would be returned for resubmission. The Project Manager who will check and evaluate mentioned shop drawing would retain print copy for his file and return the rest to the Contractor with notation. Returned show drawing marked "No Exceptions Taken" or "Make Corrections Noted", means formal revision of said drawings will not be required. If it is remarked "Amend Resubmit" or "Rejected-Resubmit", the Contractor shall revise said drawing and shall submit revised drawing to the Project Manager.
- (4) The Project Manager shall process the submission and indicate the appropriate action on the shop drawing and transmittal forms. Construction of an item shall not commenced before the Project Manager has reviewed the pertinent shop drawing and returned it to the Contractor, marked as mentioned above. Revisions indicated on shop drawing shall be considered as changes necessary to meet the requirements of the contract drawings and specifications, and shall not be taken as the bases of claims of extra work. The Contractor shall have no claim for damages or extension of time due to any delay, resulting from having Contractors make the required revisions, unless review by the Project Manager was delayed beyond reasonable period of time and unless the Contractor can establish that such delay in revision in delay of the project.
- (5) Resubmitted procedure shall follow the same procedure as the initial submittal.

#### 1.4.7 Construction Photographs

The Contractor shall take photographs during the process of the work once a month, all taken where directed by the Project Manager. At the completion of the project final photographs shall be sent to the LGU or Project Manager. The photographs shall be neatly labeled, dated and identified in a little box in the lower right hand corner, showing the date of exposure, project name, location and direction of view.

All negatives shall be retained by the Contractor until completion of the work at which time they shall become the property of the LGU.

#### 1.4.8 Cleaning-up

The Contractor shall at all times keep the construction area including storage are used by him free accumulations of waste material or rubbish. Upon completion of construction, the Contractor shall leave the work and premises in clean, neat workmanlike conditions satisfactory to the LGU.

#### 1.4.9 Documents to be submitted

The Contractor shall submit the following documents prior to final payment and before issuance of final certificate of payment in accordance with the provisions of the conditions contract.



- (1) The guarantee required by the Conditions of Contract and any other extended guarantees stated in the technical sections of the specifications.
- (2) A set of As-Built drawing shall be submitted showing accurate record of changes or deviations from the contract documents and the shop drawings indicating the work as actually installed. Records shall be arranged in order, in accordance with various sections of the specifications and properly indexed with certifications of endorsement thereof, that each of the revised print of drawings and specifications are complete and accurate. Prior to the application for final payment, and as a condition to its approval by the Project Manager of LGU, the Contractor shall deliver the records, drawings and specifications arranged in proper order, indexed and endorsed herein specified.

#### 1.5 Method of Measurement and Basis of Payment

Cost incurred in providing and maintaining Contractor's field office, temporary light and power, temporary toilet, water and security services, including cost mobilization and demobilization, and cost incurred in the compliance of contract requirements shall not be measured and paid separately, same shall be deemed to be included in the cost of other items work, as part of the Contractor's construction overheads.

### 2.0 MASONRY

#### 2.1 Scope of Work

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

#### 2.2 Applicable Documents

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

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

#### 2.3 Material Requirements

##### 2.3.1 Concrete Hollow Blocks

Concrete hollow blocks shall be a standard product of recognized manufacturer to PNS 16, as indicated on the drawings. Exterior and interior masonry units shall be non-load bearing units. However, load-bearing units may be provided in lieu of non-load bearing units. For non-load bearing units, the required compressive strength shall be 25 kg/cm<sup>2</sup> or 2.48 Mpa.

##### 2.3.2 Cement, Reinforcing Steel and Water

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

#### 2.4 Construction Requirements

##### 2.4.1 Workmanship

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

##### 2.4.2 Mortar Mixing

Mortar materials shall be measured in approved container to insure that the specified proportions of materials are controlled and accurately maintained during the progress of the work. Unless



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

2.4.3 Proportion of Mortar Grout

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

2.4.4 Use of Fine and Coarse Grout

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

2.4.5 Mortar Joints

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

2.4.6 Concrete Masonry Unit

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

2.4.7 Reinforcement

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

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

For Vertical Bars:

150 mm (6") CHB For Exterior Walls	-	12 mm (1/2") dia. At 600 mm (24") on centers
---------------------------------------	---	-------------------------------------------------

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

For horizontal bars:	-	12 mm (1/2") dia at 600 mm (24") on center (every third Course) for 150 mm (6") and 100 mm (4") CHBs.
----------------------	---	----------------------------------------------------------------------------------------------------------------

2.4.8 Bonding and Anchoring

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

2.4.9 Grout Placement



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

#### 2.4.10 Tests and Test Reports

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

#### 2.5 Method of Measurement and Basis of Payment

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

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

### 3.0 ELECTRICAL WORKS

#### 3.1 WORK INCLUDED

- 1) To secure and pay for the electrical permits, certificates, and other related permits.
  - 2) To secure and pay for the service charges and other fees required by the local electric utility company for the energization of the proposed transformer bank.
  - 3) Roughing-in and wiring for lighting, power,
  - 4) Supply, installation, testing and commissioning of grounding system.
  - 5) Supply and installation of boxes, pull boxes, auxiliary gutters, wire gutters, bus bar gutters, circuit breaker gutters and the like.
  - 6) Supply and installation of lighting fixtures, switches, ceiling fans, and power outlets.
- 3.1.16(a) As per regulations of the local telephone company, the electrical contractor shall secure and pay for the required fees for the installation of the service entrance wires and its subsequent connection.
- 7) Supply and installation of Cable TV system. TV sets and mounting brackets are not included.
- 3.1.17(a). As per regulation of the local CATV company, the electrical contractor shall secure and pay for the required fees for the installation of service entrance wire and splitters/connectors needed for the connection of the CATV system.
- 8) Supply, installation, termination, testing and commissioning of complete CCTV system, nurse call system, paging system, and fire alarm system.
  - 9) Supply and installation of hangers and supports of conduits for power, feeder and sub-feeder system and auxiliary system.
  - 10) Painting of electrical works covering conduits, boxes, hangers, gutters, and the like.
  - 11) Testing for electrical system:
    - Insulation resistance test
    - Ground resistance test
    - Continuity test
    - Operational test
    - Polarity check
    - Phase balancing check
- 3.1.21 Anything that has been omitted in any of work or materials usually furnished which are necessary for the completion of the works as outlined herein shall be undertaken or supplied by the contractor included in this division of work and must be included in the bid proposal.



### 3.2 CODE REGULATIONS

All materials and equipments to be used in the electrical installations and construction shall be in accordance with the provisions of the latest edition of the Philippine Electrical Code and the pertinent ordinances of the municipality wherein the project is located.

All work shall comply with the rules and regulations of the local power utility company in so far as they are concerned in providing the respective permanent services to the building.

### 3.3 DRAWINGS AND SPECIFICATIONS

The electrical plans and these specifications are meant to be complementary to each other, and what is called for in one shall be as binding as if called for by both.

Any permanent conflict between the electrical plans and these specification and any unclear points of controversial matter in either shall be referred to the owner's assigned representative for final decision.

Upon final completion of the work herein described, the electrical contractor shall furnish the Owner two (2) copies of the "As-built" plans for future reference and maintenance purposes.

The electrical plans indicate the general layout of the complete electrical system, arrangement of feeders, circuit outlets, switches, controls, panel boards, service equipment and other work. Field verification of the scale dimensions on the plane must be made, since actual locations, distances and levels will be governed by actual field conditions.

The Electrical Contractor shall check architectural, structural and plumbing plans if necessary to resolve such conflicts. The Electrical Contractor shall notify the architect and secure approval and agreement on necessary adjustments before installation is started.

### 3.4 PERMITS AND INSPECTION

The Electrical Contractor shall obtain all necessary permits and certificates of electrical inspection from the proper government authorities concerned, required both for the performance of the work involved and the operation of the system upon completion of the work.

The Electrical Contractor shall pay all the fees necessary to secure the above-mentioned permits and certificates.

The Electrical Contractor shall at his own expense, reproduce the electrical plans to the necessary scale and size, complete them with all the necessary information and requirements as maybe required by the government authorities concerned with the approval of plans.

The Electrical Contractor shall coordinate with the local power company regarding the power facilities and secure approval of the power requirements.

### 3.5 MATERIALS AND WORKMANSHIP

All materials to be used shall be brand new, with trade name, unused, and shall in every case be the best where such standards have been established for the particular type of materials used.

Trade/brand name of materials indicated in the specifications are recommendatory in nature and are included for the purpose of uniformity in bids. If trade/brand names other than those indicated are to be used during construction, brochures and samples shall be submitted to the owner's representative for approval.

Only skilled workmen using proper tools and equipment shall be employed during the entire course of the installation work. All workmanship shall be of the best quality and all works shall be done in accordance with the best engineering practice of the trade involved.

### 3.6 WIRING METHOD

Lighting and Power Branch Circuit – uPVC pipes concealed in ceilings and double walls and/or embedded in concrete walls/slabs. All uPVC pipes ran underground outside of buildings shall be buried not less than 40mm below nat. grd. line and enclosed in concrete envelope. All concrete envelopes passing under roadways or areas accessible to vehicles shall be steel reinforced up to 1.0m from the edge of the roadway.

All Other Auxiliary Layout – uPVC pipes concealed in ceilings/double walls and/or embedded in concrete walls/slabs.

Use flexible metal pipe for connection between junction boxes inside ceiling and lightings and other fixtures using approved fittings.

All boxes, cabinets and other equipments shall be flush-mounted unless specified/approved otherwise.



All boxes for lighting outlets, convenience outlets, tumbler switches and other devices shall be galvanized pre-painted and approved products of reputable manufacturers. Cut ends of conduits shall be reamed and cleaned to remove burr and sharp edges. Threads cut on conduits shall be the same thread dimensions as factory cut conduit threads. Conduits joints shall be made straight and true. Elbows and offsets and changes in direction and runs shall be uniform. Bends shall be made without kinking or destroying the cross-sectional contours of the conduits. Conduit terminals shall be provided at outlet boxes and cabinets with locknuts and bushing. Conduits shall be continuous from outlet and from outlet to pull boxes and cabinets in the manner that the conduit system shall be electrically continuous.

Where conduit runs are exposed, they shall be supported at an interval of not more than 0.75 m maximum with proper clamps and bolts or expansion shields or other means of support.

All splices, taps, junction in wires larger than 8.0 sq.mm. shall be done with solderless connectors of suitable sizes and properly insulated with rubber tapes and protected by friction tapes, so that the insulation strength shall at least be equal to the insulation of the conductors they join.

Unless otherwise specified, the type of wires to be used shall either be THW or THHN. Smallest size of wire to be used for lighting and power unless otherwise indicated shall be 3.5 sq.mm.

### 3.7 FEEDERS

Feeders shall be laid out in accordance with the riser diagram shown in the electrical plans.

Unless otherwise specified type THW or THHN wires shall be used for feeder lines. The wires and conduits sizes shown in the electrical plans shall be the minimum sizes to be used.

### 3.8 WALLS SWITCHES AND RECEPTACLES

All wall switches shall be flush type and mounted 1.40 meters above finish floor line unless otherwise specified.

Convenience outlets shall be grounding type, wall flushed, mounted 0.30 meter above finished floor line or finished counters unless otherwise specified in the plan. Ground fault circuit interrupter protected convenience outlets shall be used in bathrooms, lavatories, sinks, laundry areas and the like.

### 3.9 MAIN SWITCHES, TRANSFER SWITCHES, PANELBOARDS

The cabinets for the above shall be of standard sizes and shall be gauge #16. Circuit breakers shall be 250 Volts, AC, rated 75C, interrupting ratings specified in the plan shall be followed at all times.

### 3.10 LIGHTING FIXTURES

Install all lighting fixtures and lamps as specified and as shown on plans, Fluorescent lamps shall either be 48 inches/40 watts or 24 inches/20 watts, standard cool white or daylight with the minimum light output of 3,000 lumens. Use high power factor ballast.

All fluorescent fixtures housing shall be of US Gauge 22 minimum.

Submit one sample of each type of fixtures to the Architect for approval prior to manufacturing and installation.

### 3.11 WATER PUMP

The Electrical Contractor shall install a complete wiring and conduit system including circuit breaker.

The Electrical contractor shall; supply, install, test and commission the water pump and accessories such as motor, starter, ground fault protection, water level controller, etc.

### 3.12 AUXILIARY SYSTEMS

The Electrical Contractor shall supply, install, test, and commission a complete system for closed circuit TV, nurse call, paging, and fire alarm system as specified in the plan.

The Electrical Contractor shall supply and install a complete system for Cable TV, and PABX/Telephone system, and at his expense shall coordinate with the local telephone and cable TV providers to ensure the complete operation and connection of the said systems.

The Electrical Contactor shall, after completion, submit a complete schematic wiring diagram of the above to the owner's representative.

### 3.13 DISTRIBUTION TRANSFORMER \



The Electrical Contractor shall supply and install distribution transformers, pole line hardware for the receiving pole and pole at midspan, transformer pads and grounding system as indicated/specified in the plan. He shall also supply service metering instruments and accessories, and at his expense, shall submit these to the local electric utility company for connection. Materials for the works mentioned above shall be from manufacturers accredited/acknowledged by the local electric utility company.

#### 4.0 - MECHANICAL

##### 4.1 - AIR CONDITIONING AND REFRIGERATION SYSTEM

This item shall consist of furnishing and installation of air conditioning, refrigeration and ventilation systems, inclusive of necessary electrical connections, ductworks, grilles, pipes and condensate drains and all other necessary accessories, ready for service in accordance with the Plans and Specifications.

The types, sizes, capacities, quantities and power characteristics of the compressor, evaporator, condenser chilled water pump and condenser water pump shall be as specified or as shown on the Plans.

##### Refrigerant Pipes

Refrigerant pipes shall be copper tubing, type L or K black steel pipe, Schedule 40 for size of 100mm diameter and smaller. Pipe over 100mm shall be black steel pipe Schedule 40.

Black steel pipes shall be standard seamless, lap-welded, or electric resistant welded for size of 50mm diameter and larger, screw type for size 38mm diameter and smaller, fittings for copper tubing shall be cast bronze fitting designed expressly for brazing.

##### Pipes for Cooling Water

Chilled and condenser cooling water pipes shall be black steel pipe, Schedule 40. Pipes and fittings for size 50mm diameter and smaller shall be screwed type. Pipes and fittings for size 62mm diameter and larger shall be welded or flanged type.

##### Pipe Insulation

Insulation shall be performed fiberglass or its equivalent. The insulating materials shall be covered with 100mm x 13mm thick polythelene film, which shall be overlapped not less than 50mm. Pipe insulation shall be adequately protected at point of support by means of suitable metal shield to avoid damage from compression. Insulated pipes, valves and fittings located outdoors shall be provided with metal jackets.

##### Ductworks

Ducts shall be galvanized sheet steel of not less than the following gauges:

1. No. 26 for 300mm wide and smaller
2. No. 24 for 350mm to 750mm wide
3. No. 22 for 775mm to 1500mm wide
4. No. 20 for 1525mm to 2250mm wide
5. No. 18 for 2275mm to 2500mm or larger
6. For aluminum sheets use one gage higher.

Joints and stiffeners if ducts using slip joints shall be as follows:

- a. 300 mm wide and smaller, without bracing
- b. 325 mm to 750 mm wide, brace with 25mm x 25mm x 3mm steel angles.
- c. 775 mm to 1500 mm, brace with 31mm x 31mm x 3mm steel angles
- d. 1525 mm up, brace with 38mm x 38mm x 3mm steel angles

Stiffeners shall be located not more than 1200mm from each joint.

##### Ductwork Insulation

The application insulation materials shall be rigid board made of styropor or equivalent 25mm thick for ground and top floor, 13mm thick for intermediate floor.



Galvanized metal bands for ducts shall be secure and spaced 300mm minimum center to center and corners shall be protected with galvanized metal angles.

#### Dampers

Dampers shall be of same materials as duct, at least one gauge heavier and shall have accessible location, complete with locking device for adjusting and locking damper in position.

Where necessary, splitters, butterflies and louvers damper deflecting vanes for control of air volume and direction and for balancing the system shall be provided whether or not they are indicated on the Plans.

#### Equivalent Foundation

Foundation shall be provided and shall conform to the recommendation of the manufacturers of the equipment. Equipment shall be leveled on foundation by means of jacks or steel wedges. All spaces between equipment bases and concrete foundation shall be filled with cement mortar.

#### Electrical Works

Power supply shall be provided by the Contractor at the pull box installed inside the machine room and shall furnish and install the main circuit breaker and starter with suitable ratings and capacities, conduits, wiring, fittings, devices and all other equipment and electrical connections needed to complete the electrical installation of the system. All electrical works shall comply with the latest edition of the Philippine Electrical Code, with the applicable ordinance of the local government and all the rules and requirements of the local power company.

#### Construction Requirements

The air conditioning system shall be entirely automatic in operation and shall not require the presence of an attendant except for periodic inspection for lubrication. All equipment and materials shall be inspected upon delivery and shall be tested after installation. Piping shall not be buried, concealed, or insulated until it has been inspected, tested and approved. Walls, floors and other parts of the building and equipment damaged by contractor in the prosecution of the work shall be replaced as shown on the Plans.

#### Operating Tests

Refrigerating equipment shall be tested for 8-hours per day for three consecutive days or longer when so directed, under the supervision of manufacturers qualified and authorized representative, who will make necessary adjustment and instruct designated plant operating personnel for each operation and maintenance of refrigerating equipment and controls.

Operating test of complete air conditioning system shall be 6 hours minimum for each system. Tests of air flow, temperature and humidity shall be made to demonstrate that each complies with the requirements of the Plans and Specifications.

#### Miscellaneous

The owner shall be provided with three (3) bound copies "AS BUILT" diagram, shop drawings, parts lists, serial number and inventory of equipment including manufacturers and maintenance manuals.

All standard tools and equipment shall be furnished for proper and regular maintenance of installed equipment.

#### Method of Measurement

The work under this Item shall be measured either by set, piece, length, square meter actually placed and installed as shown on the Plans.

Compressor, condenser and evaporator shall be measured by set; grilles, diffusers and valve by piece, pipe by length, duct and insulation by square meter.

#### Basis of Payment

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

#### 565Foundation

Refer to sub-section 1200.2.9 Air Conditioning System

#### Electrical Work



Refer to sub-section 1200.2.10, Air Conditioning System

#### Construction Requirements

#### Acceptance Tests

System operation and maintenance chart shall be submitted to the Owner upon completion of the Contract. This shall include the locations of control valves and care of the new equipment.

Marked instruction and identification sign boards: These sign boards shall be made of #14 gauge B.I. sheet with baked enamel finish paint and letter instruction are shown on the Plans. Additional signboards as may be required and not specified herewith shall be furnished at no extra cost. Signboards shall be mounted on the equipment or wall nearest the equipment or wall nearest the equipment for easy identification and reading. Paints shall be basically gloss fire red and white.

- A. Conduct of Tests - shall be by the Sprinkler System Contractor in the presence of an inspector or Authority having jurisdiction.
- B. Flushing if Underground Connections - To remove foreign materials, which may have entered the piping during installation of same as required before, sprinkler piping is connected.
- C. Hydrostatic Test
  - 1. The Pressure - All systems, including piping shall be tested hydrostatically at not less than 1378 kPa pressure for two (2) hours, or at 344.5 kPa in excess of 1033.5 kPa.
  - 2. Operating Test - All control valves shall be fully closed and opened under water pressure to insure proper operation. Use clean, non-corrosive water.
  - 3. Fire Department Connection - Piping between the check valve in the fire department inlet pipe and the outside connection shall be tested the same as the balance of the system.
- D. Test of Drainage Facilities - Test of drainage facilities shall be made while the control valve is wide open. The main drain valve shall be opened and remain open until the system pressure stabilizes.
- E. Test Certificate - Upon completion of work, inspection and test made by the contractor's representative and witnessed by an owner's representative, a test certificate shall be filled out and signed both representative.

#### Maintenance Service

- a) The contractor shall provide free of charge, maintenance service of the system for a period of at least one (1) year reckoned from the date of acceptance of the work by the Engineer.
- b) Upon completion of the work and all tests, the services of one or more qualified engineers shall be provided by the contractor for period of not less than five (5) working days to instruct and train the representative of the owner in the operation and maintenance of the fire protection system.

#### Miscellaneous

Refer to sub-section 1200.3.3, Air Conditioning System

#### Method of Measurement

The work under this Item shall be measured either by set, piece, length actually placed and installed as indicated on the Plans. Fire pump and jockey pump shall be measured by set, sprinkler heads, valves and fittings by piece, pipes by length.

### **5.0 GUARANTEE**

All equipment, materials and workmanship shall be guaranteed for a period of one (1) year from date of acceptance at any time within the period of guarantee and upon notification, the contractor shall repair and rectify the deficiencies, including replacement of parts or entire units. Under such guarantee, the Contractor shall make good any defect due to faulty materials or workmanship caused by him without any additional cost to the Owner for the period specified.

**NOTE: Contractors' proposal covers all items and other incidental works necessary to complete each item of works mentioned above.**



READ AND ACCEPTED AND GOOD FOR AGREEMENT

CONTRACTOR / BIDDER