TOURISM INFRASTRUCTURE AND ENTERPRISE ZONE AUTHORITY

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PROJECT SPECIFICATIONS

I. GENERAL CONDITIONS

The work to be undertaken shall include the furnishing of labor, materials, tools and equipment for the **Emergency Works for Compliance with Fire Department Requirement and Temporary Kitchen** located at **Banaue , Ifugao**

A. Scope of Work

The construction work must be executed strictly in accordance with the plans and specifications. The following principal items of work shall include but not limited to the following:

1. General Requirements
    a. Temporary Barracs
    b. Health & Safety
    c. Project Sign Board
2. Masonry Works
3. Carpentry Works
4. Steel Works
5. Doors and Windows
6. Painting Works
7. Plumbing Works
8. Electrical Works
9. Mechanical Works
10. Other items or works as maybe required by plans and related contract documents necessary to satisfactorily complete the project

B. Licenses and Permits

All permits and licenses for the prosecution of the work shall be secured by the Owner including a Certificate of Occupancy from the Office of the Building Officials before and after completion of the project.

C. Siteworks

C.1. Clearing the Site

II. MASONRY WORKS

A. Scope of Work

1. This includes the furnishing of all labor, materials, equipment required to construct all concrete masonry unit walls as shown on the drawings and as specified herein.

2. The work under this section shall include but not be limited to the following:
   a. Concrete hollow blocks
   b. Masonry reinforcing bars for concrete blocks
   c. Grouting
   d. Connecting wall anchors, ties, bolts and related embedded items

B. Standard Specification

1. The following standards are referred to:

ASTM C33	Concrete Aggregates
ASTM C90	Hollow Load-Bearing Concrete Masonry Units
ASTM C144	Aggregate for Masonry Mortar
ASTM C150	Portland Cement
SAO #15-2	Standardization of Concrete Hollow Blocks

C. Protection of Materials

1. All materials for the work of this section shall be delivered, stored and handled so as to preclude damage of any nature.

D. Materials

1. Cement

   Portland cement shall conform to ASTM Specification C150, Type I.

2. Sand for Mortar

   Sand shall be clean, durable particles, free from injurious amounts of organic matter. The sand shall conform to ASTM specification C144 or C33 as required.

3. Water

   Water shall be free from injurious amounts of oils, acids, alkalis, organic matter, and shall be clean and fresh.

4. Concrete Hollow Blocks (CHB)

   Concrete block shall conform to ASTM C90, Grade N, and/or to the Phil. Bureau of Standards SAD No. 15-2.

E. Mortar Mixes

1. Masonry mortar for setting blocks shall be in the proportion of one part cement to 3 parts sand or as otherwise approved by the Project Engineer. Mortars shall be mixed with water in an amount compatible with workability.

2. Mixing shall be done immediately before usage.

F. Execution

1. All masonry shall be laid plumb and true to lines and built to the thickness and bond required with courses level and joints and bond uniform. Masonry shall be carried up in a uniform manner.

2. Concrete blocks shall be laid in running bond, unless otherwise indicated with joints not exceeding 10mm and uniform throughout and finished slightly concave and smooth. All blocks shall be laid in a full bed of mortar applied to shell and webs.

3. All necessary block cutting shall be neatly done by saws.

4. Control joints shall be installed at the locations noted and detailed on the drawings.

G. Lintels, Ties and Miscellaneous Items

1. The contractor shall build in all miscellaneous items specified in other sections to be set in masonry including frames, lintels, reinforcing steel, electrical boxes and fixtures, sleeves, grilles, anchors and other miscellaneous items. All anchorage, attachments, and bonding devices shall be set so as to prevent slippage and shall be completely covered with mortar.

H. Grouting

1. Grout and cement mortar for setting structural columns, railings, frames in walls and where otherwise required shall be done with mortar of 1 part cement to 1 part sand. Before placing grout, thoroughly clean all surfaces. Grout shall be tamped into place with a blunt tool to fill the entire void.

III. CARPENTRY WORKS

A. Scope of Work

1. Furnish materials and equipment and perform labor required to complete wooden framings and related rough carpentry works as indicated in the plans and/or specified herein.

2. Include in the works nailing strips, scaffoldings, plates, straps, joists, hangers, rods, dowels, rough hardware, fasteners, and other miscellaneous iron and steel items pertinent to rough carpentry work.

B. Materials

1. Lumber shall be of approved quality of the respective kinds required for the various parts of the work, well seasoned, thoroughly dry, straight and free from large, loose or unsound knob, sap shakes or other imperfections impairing its strength, durability or appearance.
2. Framing lumber shall be of rough dimensions shown on drawings.
3. All exposed woodwork shall be smoothly dressed and well sand papered.
4. Moisture content shall not exceed 18% unless otherwise specified.
5. All lumber, excluding scaffoldings, are to be pressure treated, conforming to 67% stress grade lumber in accordance to the requirements of the Phil. National Building Code, latest edition.
6. Fastening shall be common nails, glue as specified flat head wood screws, round head wood screws, bolts or log screws where specifically called for.
7. Conceal fastenings as far as possible, where not possible, locate them in inconspicuous place, where nailing is permitted through woodwork face conceal nail heads.

C. Substitution of Lumber

1. Any lumber equally good for the purpose intended may be substituted for kinds specified provided however, that the substitution be authorized in writing by the Project Engineer.

D. Rough Hardware and Metal Fasteners

1. Plates, straps, nails, spikes, bolts, joists, hangers, rods, dowels, fasteners and miscellaneous iron and steel items shall be of sizes and types to rigidly secure member in place.

IV. STEEL WORKS

A. Scope of Work

1. Furnish all materials and equipment and perform labor and services required to complete fabrication and erection of all structural steel and other miscellaneous steel in accordance with the plans.

B. Materials

1. Structural steel shall conform to American Society of Testing Materials (ASTM) A-36, with Fy of 248 MPa.
2. Electrodes for welding shall conform to the latest requirements of the American Welding Society (AWS).

3. Use only approved brand of red lead paint and linseed oil for all shop painting for structural steel.

C. Execution

1. Tighten all bolts to a bolt tension not less than the proof load given in the applicable ASTM Specifications for the type of bolt used.

2. Never let compression members deviate from straightness by more than 1/100 of the axial length between points which are to be laterally supported.

3. Let completed members free from twists, bends, and open joints. Sharp kinks or bends shall be the cause of rejection of materials.

4. Give all steelwork, except those to be encased in concrete, one coat of shop paint.

5. Make all work well formed to shape and size shown and assemble as detailed in the plans.

6. Weld or bolt connections as indicated in the plans. Make all details of assembly strong with sufficient stiffness. Form joints exposed to weather in a manner that excludes water.

V. DOORS AND WINDOWS

A. Scope of Work

1. This item includes furnishing all the materials, hardware, tools, labor and services necessary for the complete fabrication and installation of doors and windows in accordance with the Plans and the specifications. Provide shop drawings of fabricated items showing sizes of all members, details of connections, fabrication, and installation and submit corner section samples for doors and jambs all for the approval of the Architect/Contractor.

B. Doors

1. Erect all frames square and true to line and level with secure fastening to structures and anchors. Install formed steel stiffeners and reinforcement within frames at all points where top screw fastenings are used in connections with embedded strap anchorage.

2. All lumbers for wooden doors including door bars, cabinet and closet doors and all woodwork of similar nature shall be kiln-dried with not more than 14% moisture content.

3. Have all pre-fabricated doors installed by authorized representative of the manufacturer, but not before all plastering are completed.

4. Cut, trim, and fit each door to its frame and hardware accurately.

5. Give allowance for painter's finish and possible swelling or shrinkage.

6. Clean all surfaces and test all framing and hardware. Make all repairs and adjustment to the work, leaving it in a satisfactory condition.

7. All doors shall operate freely and watertight and all hardware shall be properly installed and functioning.

8. All doors must be guaranteed against warping, twisting, and cracking. The contractor is obligated to replace entirely any or all defective doors.

C. Windows

1. Factory fabricate all frames for pre-fabricated windows in accordance with the design and dimensions indicated in the plans.

2. Set and anchor frames as shown in details and/or in approved shop drawings.

3. Set frames plumb and square and brace where necessary to prevent distortion.

4. Adjust all frames and attach hardware before glazing.

5. Secure all windows to be watertight and all hardware operating free and easy.

D. Hardware

1. Furnish all the hardware necessary for the installation and completion of doors and windows.

2. Submit samples of locksets, hinges, door pulls, door stops, door closers, and other finish hardware and accessories for Architect's/Contractor's approval.

3. Install hardware to fill details shown in the plans and as per manufacturer's specifications. Supply all necessary templates and instructions required.

E. Materials

PWD access to second floor (Lift Elevator)

1. Use (0.60 m x 1.76 m) 1/8"thk French type Window with complete accessories and 2"x 5" Wood jamb.

Public Toilet

1. For D-1, use (2.1m x 0.8m) Semi-solid panel type swing door with wood frame.

2. For D-2, use (1.8m x 0.9m) 18mm thk. Phenolic board swing door (Natural wood grain design).

3. For D-3, use (0.7m x 0.6m) Swing-up door and double swing door.

4. For W-1, use (1.2m x 0.6m) Jalousie blades, 4mm thk glass on aluminum analok frame.

5. For W-2, use (1.65m x 0.55m) Awning window with ¼" thk. smoke glass on 2" x 4" Aluminum analok frame.

6. For W-3, use (5.02m^2) Awning window with fixed window head with ¼" thk. Smoke glass on 2" x 4" aluminum analok frame.

VI. Painting

1. Scope of Work

   a. This item consists of furnishing all paint materials, varnish, and other related products, tools, equipment, and labor required in undertaking the proper application of painting, varnishing, and related works indicated on the plans. See drawings for location, quantity, and extent of surfaces to receive paint and varnish.

2. Materials

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

   b. 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.

   c. Silicon water repellent shall be transparent water shield especially formulated to repel rain and moisture on exterior masonry surfaces.

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

   e. Varnish shall be a homogeneous solution of resin, drying oil, drier and solvent. It shall be extremely durable clear coating, high resistant to wear and tear without cracking, peeling, whitening, spotting.
   f. Sanding sealer shall be quick drying lacquer, formulated to provide quick dry, good holdout of succeeding coats, and containing sanding agents to allow dry sanding of sealer.
   g. Glazing putty shall be alkyd-type product for filling minor surface unevenness.

   f. Painting Schedule:
   For New Concrete/ Masonry Surfaces:

One coat of Acrylic Flat base paint
Two coats of Acrylic Semi-Gloss base paint

3. Execution

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.

b. 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 desire 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 and re-installed after completion of the work.

VII. PLUMBING WORKS

A. Scope of Work

1. Furnish all materials, tools, equipment, and fixtures as required in the plans for the satisfactory performance of the entire plumbing system and perform labor in accordance with the latest edition of the National Plumbing Code, Mechanical Code of the Philippines, and this specification.

2. All sanitary/plumbing works shall be done under the supervision of a Mechanical/Sanitary Engineer and in strict accordance with these specifications and of the methods as prescribed by the latest edition of the Philippine Plumbing Code, Sanitary Code of the Philippine and the Mechanical Code of the Philippines.

B. Materials

1. Soil and waste pipe shall be "Branded" conforming to ASTM-D1784 and made from class 12454 with dimensions of pipe and fitting conforming to ISO 161/1 and ISO 3606 and furnished in standard cutting length of 3 meters with sockets designed for rubber O-ring seal.
2. Galvanized iron piping shall be schedule 40, type ERW ASTM A-120 or A-53 and fitting ASTM A-126.

3. Gate valves and hose bibs shall be bronze as per ASTM B-62 "Great Volume".

4. Faucets shall be chrome plated with stem length suitable for its intended location. Faucets and other accessories shall be approved brand.

5. Trap each fixture trap, except those cast integral or in combination with fixture in which the top seal is readily accessible for is the trap is removable shall have an accessible brass trap screw of ample size.

6. Clean-out shall be of the same size and materials as soil and waste pipe.

7. Pipe sleeves shall be galvanized iron pipe schedule 40.

8. Pipe support shall be fabricated from flat bar, round bar or angular bar of approximate sizes.

9. Water closet shall be approved brand and approved model, for all units.

10. Lavatories shall be pedestal lavatories, approved brand and approved model for all units.

C. Installation

1. Install all plumbing fixtures free and open in a manner to afford access in cleaning.

2. Water piping shall intended to all fixtures, outlets and equipment from the gate valve installed in the branch near the riser.

3. All piping above ground shall run parallel with the line of the buildings unless otherwise shown in the drawings.

4. All soil and drainage pipe shall be pitched at 2% but in no case flatter than 1%.

5. All joints shall be air and water tight.

6. Roughing-in for pipes and fixtures shall be carried along the line of building constructor correctly located opening of proper sizes shall be provided where required in the wall and floor for the passage of the pipes. All items to be embedded in concrete shall be thoroughly clean.

7. Every plumbing fixture or equipment requiring connection to the drainage system shall be equipped with a trap, which shall be placed as near to the fixture as possible. No fixture shall be double trapped.

D. Septic Vault and Catch Basin

1. All concrete works, steel works, and masonry works for the septic vault and grease trap shall conform to these specifications. Concrete Hollow Blocks shall be machine made and shall have a nominal size of 150mm (6") thick x 200mm (8") x 400mm (16") conforming to the requirements of ASTM C 90.

E. Fixtures and Accessories

Public Toilet

1. Use 1 1/2"Ø Stainless Steel Grab Rail for PWD.

2. Use Undercounter lavatory w/ single faucet hole and lever type faucet w/ complete accessories

3. Use Compact elongated close-coupled dual Flush button water closet with bidet spray, with complete accessories

DUCT WORK AIR DISTRIBUTION AND ACCESSORIES

PART ONE MECHANICAL GENERAL SPECIFICATIONS

1.1 SCOPE AND EXTENT OF DUCTWORK

This section covers the requirements needed for the construction and fabrication of air duct, and air distribution system components and its applied accessories.

1.2 REFERENCE STANDARDS

A. Sheet Metal and Air- Conditioning Contractor's National Association (SMACNA Publications:

410 – 81	Forced Circulation Air- Cooling and Air- Heating Coils
880 – 83	Air Terminals
1062 R4	Equipment Test Code

B. American Society of Heating, Refrigerating and Air- Conditioning Engineers (ASHRAE) Publications:

52 – 76	Methods of Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter

C. American Society for Testing and Materials (ASTM) Publications:

A 527 – 80	Steel Sheet, Zinc- Coated (Galvanized) by the Hot- Dip Process, Lock- Forming Quality
E 437- 85	Industrial Wire Cloth and Screens (square opening series)

D. National Fire Protection Association (NFPA) Publication:

90A – 78	Installation of Air- Conditioning and Ventilating Systems

E. Sheet Metal and Air- Conditioning Contractor's National Association (SMACNA) Publications:

(1976)	Low Pressure Duct Construction Standards (LPDCS)

F. Transverse Duct Connector System (Addendum to SMACNA HVAC Rectangular Duct Construction Standards)

G. Underwriter's Laboratories, Inc. (UL) Publications:

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G. Underwriter's Laboratories, Inc. (UL) Publications:

H. British Standard (B.S.), Japanese Industrial Standards (JIS), International Electro Technical Commission (IEC) or equivalent internationally accepted reference standards.

1.3 GENERAL REQUIREMENTS

A. Submittals

A.1 Manufacturer's Data

A.1.1 Volume Air Dampers
A.1.2 Sound Reducers (Attenuator) and Air Duct Attenuators
A.1.3 Flexible Air Ducts]
A.1.4 Insulation and Vapor Barriers
A.1.5 Air Louvers
A.1.6 Air Filters
A.1.7 Mesh Screens (for birds and insects intrusions)
A.1.8 Air Diffusers, Linear Air Registers, and Linear Air Grilles

A.2 Standard Compliance

A.2.1 Fire Dampers
A.2.2 Air Filters

B. SMACNA Duct Construction Manuals:

The SMACNA Transverse Duct Connector System (Addendum to HVAC Construction Standards) recommendations shall be considered as mandatory requirements. Substitute the word "shall" for the word "should" in this manual.

1.4 RECTANGULAR DUCT GAUGE

DIMENSION LONGEST SIDE (MM)	SHEET METAL GAGE (ALL FOUR SIDES)		MINIMUM REINFORCING ANGLE SIZE AND LONGITUDINAL SPACING BETWEEN TRANSVERSE JOINT AND INTERMEDIATE REINFORCING
	GAGE NO.	THICKNESS	
DOWN TO 300 MM	26	0.5	NONE REQUIRED
301 MM TO 750 MM	24	0.6	25 MM X 25 MM 3 MM AT 1200 MM
751 MM TO 1350 MM	22	0.6	38 MM X 38 MM 3 MM AT 1200 MM
1351 MM TO 2100 MM	20	1.00	38 MM X 38 MM 3 MM AT 1200 MM
2101 MM TO 2450 MM	18	1.20	38 MM X 38 MM 3 MM AT 600 MM
OVER 245 MM	18	1.20	50 MM X 50 MM 3 MM AT 600 MM

PART TWO PRODUCTS

2.1 SHEET METAL MATERIALS

A. Galvanized Steel Sheets: ASTM A 527; weight of galvanized coating shall Be not less than 320 g total for both sides of one square meter of sheet.

B. Galvanized Steel Hot Dipped After Fabrication: ASTM 123

C. Corrosion Resistance (stainless) Steel Sheets: ASTM 167

2.2 LOW PRESSURE DUCTS

Construction and fabrication, metal gage, and reinforcements shall conform with SMACNA LPDCS and NFPA 90A. Ductwork shall be airtight and shall not vibrate or pulsate when the system is in operation. Except as modified herein, air leakage shall be less than 5 percent (5%) of the system capacity. Construct and fabricate ductwork of galvanized steel.

A. Curved Elbows

Make a centerline radius not less than 1 ½ times the width or diameter of the air duct.

B. Joints

Make substantially airtight. No dust mark from air leaks shall show at air duct joints or connections to air grilles, air registers, and air diffusers.

C. Laps

Make laps at joints in the direction of air flow. Button- punch or bolt- connection in standing seams shall be spaced at fixed centers not greater than 6-inches. Horizontal locks or seams, known as "Button Punch Snap- Lock" may be used in lieu of Pittsburgh Lock.

D. Fittings:

Elbows, vane elbows, take-offs, branch connections, transitions, splitters, volume dampers, fire dampers, flexible connections, and access door shall conform with Section II, SMACNA LPDCS. Test holes shall be factory fabricated, airtight, and non- corrosive with screw cap and gasket

2.3 CASINGS AND PLENUMS

A. Field- Fabricated Components

Unless otherwise indicated, metal thickness, reinforcements, joint sealing, and fabrication and erection of equipment casings ad plenums shall conform with the SMACNA and LPDCS.

B. Factory- Fabricated Components

Factory- fabricated and insulated sheet metal may be used if conforming to paragraph "Field- Fabricated Components". The panels shall be of modular designed pre-tested for structural strength, the thermal control, condensation control, and acoustical control. The panel joints shall be sealed and access doors shall be gasket sealed to prevent air leakage. Fasteners shall be corrosion resistant.

2.4 AIR DIFFUSERS, LINEAR AIR REGISTERS, AND LINEAR SIDE AIR GRILLES

A. Materials and Finishes

Construct air diffusers, air registers, and air grilles of aluminum, Exterior and exposed edges shall be rolled, or otherwise stiffened and rounded. Steel parts shall be factory zinc- phosphate treated prior to primer and paint application or have a baked-on enamel finish. Colors shall be selected or approved by the Project Construction Management.

B. Sound Pressure Level

1062 R4, in decibel (dB) of noise criterion (NC) based on sound power level minus 10 dB in each octave band. Conform with the following permissible room sound pressure levels.

C. Drop

Maximum drop of air stream shall not be so great that is within 1.5 meters of the floor at the end of the throw.

D. Schedule Submittal
Submit a schedule of all inlets and outlets indicating:

1. Location
2. Catalogue Model Number
3. Manufacturer
4. Dimension Information
5. Nominal Rated Volumetric Flow Rate L / S (CFM)
6. Neck of Face Velocity at Specified L / S (CFM)
7. Total Sound Power at Specified CFM
8. Pressure Drop at Specified L / S

9. Throw and Drop for Outlets

10. Maximum and Minimum Flow Modulation Range for Diffuser / Register.

E. Plenum Slot Supply Diffuser

Complete with insulated casing and volume controller that allows full 180° air discharge direction shall be the same for return except for insulated casing.

F. Linear Air Registers

Double deflection supply registers. Provide manufacturer – furnished air volume dampers. Air volume dampers shall be of the group-operated, opposed- blade type and key adjustable by inserting key through face of air register. Operating mechanism shall not project through any part of the air register face. Automatic volume control devices will be acceptable. Provide exhaust and return as specified for supply air register, except that they shall have a single set of non- directional face bars or vanes having the same appearance as the supply air registers.

G. Linear Air Grilles

Construct and finish as specified above for air register, except that air volume dampers shall be omitted.

H. Return Air Inlets

Return air inlets where located in the same visible area as the supply air outlets, shall be of identical appearance as the supply air outlets unless specified or indicated otherwise.

Return air inlets shall be sized to ensure that the specified air return quantity can be achieved. The sizing shall take into consideration the total resistance to air return to machine room.

Generally, manual adjustable air dampers are not required unless they are essential for the proper air balancing of air duct system.

2.5 OTHER AIR RELIEF PROVISIONS

A. Due to aesthetic requirements, normal return air grilles are not shown on certain areas. In these areas return air slots in false ceilings and walls, louvers in doors and partitions, etc., are required. The Air Duct Contractor shall lease with the Main Contractor and ensure that all these air relief provisions are allowed for the necessary air return. Where the Air Duct Contractor is not clear in the size or exact location acceptable for these air relief openings, the Main Contractor shall immediately contact the Project Manager for a decision.

2.6 ACOUSTIC DUCT PLASTER

A. Where the finish is specified to be cement plaster, this shall mean not less than 15 mm thickness cement brought to a true and fine finish, all around surfaces to be truly circular, all flat surfaces truly plane and parallel, and all edges straight and sharp.

Where cement plaster is applied 15 mm mesh x 20 s.w.g. galvanized wire netting shall be incorporated in the cement for reinforcement.

Insulation on fan ceilings and air ductwork shall be neatly finished around access doors, hand holes and the line in manner which, will allow withdrawal of the removed part without damage to adjacent insulation.

2.7 HARDWARE

A. Rolled Steel Angles:

Rolled steel angle shall be mild steel.

B. Rivets:

Rivets shall be galvanized tinsmith's rivets or expanding solid end type rivets of 5 percent magnesium alloy, approved brand.

Rivets fixing sheet metal to sheet shall be 3 mm (1/8 in) in diameter and rivets fixing rolled steel angles to sheet metal shall be 5 mm (3/16 in) in diameter.

B. Self Tapping Screws

Self tapping screws shall be of bright zinc plated steel and shall only be used where specified.

C. Bolts

Bolts, runs and washers shall be of bright zinc plated steel to B.S.W. Standards or the equivalent approved standard.

D. Fittings

Air duct fittings, e.g. bearing housings, air damper quadrants, etc., shall be made from any of the following materials;

1. Mild steel galvanized or electro zinc plated

2. Bronze- good quality cast or rolled

3. Aluminum alloy die castings

4. Zinc alloy die castings

2.8. CORROSION PROTECTION OF ANGLE FLANGES STIFFENINGS AND HANGERS

A. Refer to Section on Corrosion Protection and Painting of this Specification.

2.9 ERECTION OF EXPOSED DUCTWORK

A. Where two or more ducts are installed adjacent to each other and are in view, angle flanges and stiffeners shall be in line to present a neat appearance. Where space limitations prevent the lining up of angle flanges and stiffeners, they shall be nested together.

2.10 MAIN AIR DUCT

A. Provide main air duct with duct liner inside at least a minimum of 4500 mm to prevent and control sound emission from the air-handling unit. Likewise, it will prevent also for the duct condensation when there is mixing of outdoor and indoor air in the internal duct chamber/ area particularly on the ceiling that produces warmth temperature.

2.11 DAMPERS AND LOUVERS

A. Construct dampers and louvers with two gauges heavier than ducts in which installed. Except as modified herein, the construction shall be of aluminum or galvanized steel with Interlocking edges and maximum 250 mm (10- inches) blade width. Conform with SMACNA HVAC DCS. Dampers shall be opposed blade type.

1. Manual Volume Dampers

   Balancing, Factory – Fabricated Type. Equip dampers with accessible mechanism such as quadrant operators or 4.5 mm (3 / 16 inch) rods brought through the side of ducts with locking setscrew and bushing. Where quadrant operators are used they shall be chrome plated or enamel painted with all exposed edges rounded.

2. Fire Dampers: UL (Underwriters Laboratory) 555 Listed

3. Back Draft Dampers (Gravity Dampers or Shutters):
   Factory – fabricated, with statically and dynamically balanced blades that open automatically when the fan starts and closes by gravity when the fan stop. Provide the edges of blades with felt or rubber strips to prevent rattling.

4. Automatic Smoke – Fire Dampers
Multiple blade type, 180 degrees F fusible fire damper link; smoke damper assembly to include electrically powered operator. Listed per UL 555 as a 1 1/2 – hour rated fire damper; further qualified under UL 555 as a leakage rated damper. Leakage rating under UL 555 shall be no higher than Class II or III 10 cfm per square foot at one – inch water gauge (w.g.) at an elevated temperature Category B (250 degrees F for 30 minutes). Allow minimum pressure drops of 0.1 inch w.g. in the damper open position with average duct velocities of 2500 fpm.

5. Automatic Smoke Dampers
UL listed multiple blade type, supplied by smoke damper manufacturer, with electric damper operator as part of assembly. Qualified under UL 555S with a leakage rating no higher than Class II or III 10 cfm per square foot at one – inch w.g. at an elevated temperature category B (250 degrees F for 30 minutes). Allow maximum pressure drops of 0.1 inch w.g. in the damper open position with average duct velocities of 2500 fpm.

6. Automatic Dampers :
Allow maximum leakage of 10 cfm per square foot of damper face area at 2 – inch w.g. pressure difference.

2.12 DUCT SLEEVES AND PREPARED OPENINGS

A. Duct Sleeves and Closure Collars : Fabricate from minimum 20 – gauge galvanized steel. Where sleeves are installed in bearing walls, provide structural steel sleeves as indicated.

B. Prepared Openings : Provide one – inch clearance between the duct and the sleeve.

2.13 DEFLECTORS

A. Factory- fabricated and factory or field- assembled units consisting of curved turning vanes or scoop type extractors for uniform air distribution and change of direction with minimum turbulence and pressure loss. Provide curved vanes for square elbows for round ducts taking off from rectangular ducts, provide factory fabricated galvanized sheet metal, spin- in fittings. These fittings shall have scoop extractors, butterfly dampers, and locking quadrant operators. Construct dampers and louvers with two gauges heavier than ducts in which installed. Except as modified herein, the construction shall be of aluminum or galvanized steel with Interlocking edges and maximum 250 mm (10- inches) blade width. Conform with SMACNA HVAC DCS. Dampers shall be opposed blade type.

1. Rivets shall be galvanized tinsmith's rivets or expanding solid end type rivets of 5 percent magnesium alloy, approved brand.

Rivets fixing sheet metal to sheet shall be 3 mm (1/8 in) in diameter and rivets fixing rolled steel angles to sheet metal shall be 5 mm (3/16 in) in diameter.

2. Self Tapping Screws

Self tapping screws shall be of bright zinc plated steel and shall only be used where specified.

3. Bolts

Bolts, runs and washers shall be of bright zinc plated steel to B.S.W. Standards or the equivalent approved standard.

4. Fittings

Air duct fittings, e.g. bearing housings, air damper quadrants, etc., shall be made from any of the following materials;

5. Mild Steel Galvanized or Electro Zinc Plated

6. Bronze- Good Quality Cast or Rolled

7. Aluminum Alloy Die Castings

8. Zinc Alloy Die Castings

PART THREE EXECUTION

3.1 DUCT CONSTRUCTION

A. General: The construction of ductwork unless specified otherwise, shall be in accordance with the recommendations duct construction standards published by "SMACNA or Sheet Metal And Air- conditioning Contractors National Association, Inc. of America ". Copies of the above standards are available at the office of the Project Manager during normal office hours.

B. Duct Fittings: Duct fittings shall be constructed to the recommendations set out by SMACNA. In general, the following requirements must be adhered to;

1. Radius Elbows: Radius elbows shall be have an inside radius equal to its width. Splitters shall be provided where shown in the drawings or call for elsewhere in the specification.

2. Square Throat Elbows: Square throat elbows shall include turning vanes constructed to arrangement given sketch for vanes and vane runner. These vanes must be securely mounted to withstand the force of air flow plus the

expansion of the elbow itself due to internal air pressure. Double thickness type vane shall be installed unless consent to otherwise is given by the Project Manager.

3. Transition: Transitions should be followed by a section of straight duct and with axis of the two connected duct section coincide to reduce pressure losses.

4. Expansion and Contraction: The diverging and converging slopes should be as gradual as possible.

5. Branch Take- Offs: Velocity of air entering the branch of a divided flow fitting shall be kept as low as possible to reduce pressure losses. Arrangement of branch connection shall follow sketch on recommended branch connections.

6. Tapers and Offsets: In low velocity duct work tapers and off sets in duct work shall be carried out in accordance with the appropriate details shown on the Shop Drawing on Duct Fittings.

7. Stream Liners: Where it is impossible to off- set a low velocity duct around an obstruction such as pipe or small beam or around a small building column, the obstruction may be encompassed with a two- piece stream liner as shown in the drawing on Duct Fittings.

8. Obstruction In Contact With Air Stream: An obstruction may pass through a low velocity duct provided that it does not decrease the duct area by more than 20 percent except that where the obstruction is of circular cross section up to and including 75 mm (3- inches) outside diameter the decrease of duct area due to the obstruction may exceed 20 percent.

   A slotted hole shall be cut in one section of the duct work to permit installation of the duct work around the obstruction. The slotted hole shall be patched as shown before the flange is riveted in place.

9. Restrictions: Where one side or a corner of a low velocity duct is obstructed by part of a structure and space is restricted, the duct may be locally reduced to clear the obstruction, provided that the reduction of duct area does not exceed 20 percent of the initial area of the duct.

   The tapers on the duct diverging and converging sections shall comply with that of tapers and offset fittings.

   In arranging a local reduction, the effect of the building obstruction shall be done in mind when selecting types and locations of

   assembled cross joints or that the joint can be satisfactorily assembled without clashing with the obstruction.

3.2 HANDHOLE COVERS

A. Adjacent to all dampers and elsewhere shown on the shop drawings, ducts shall be provided with 305 mm square hand hole/ access service hand hole or where is not possible the length of one side of the hand hole may be 51 mm narrower than the side of the duct in which the hand hole is located.

1. Hand holes shall be constructed that no part of the hand hole or cover shall project into the air stream and the cover when shut shall be flush with the inside surface of the duct.

2. The edges of the hole shall be turned back to make a rounded edge or alternatively a piece of pressed galvanized steel shall be fitted to obtain a similar result.

3. Hand hole covers in low velocity low pressure ducts shall be made form galvanized steel sheet of thickness one gauge higher than the duct work or a minimum 18 mm gauge. Covers shall be attached to the duct with 3 mm diameter self tapping screw. M.S. angle shall be used for edge reinforcement. Covers shall be bolted by nuts to opening frame steel bolts.

4. Doors and covers shall be sealed air tight to the duct with rubber or neoprene gaskets, which shall be securely fixed to either the door, cover, or the duct.

3.3 DUCT HANGERS AND SUPPORTS

A. SMACNA HPDCS. Unless otherwise indicated, provide not less than two one- by 1/16 inch galvanized strap iron hangers spaced one each side of duct. Anchor risers in the center of vertical run to allow ends of riser free vertical movements. Attach supports not only to structural framing members and concrete slab. Do not anchor supports to metal decking unless a means is provided and approved for preventing the anchors from puncturing the metal decking. Where supports are required between the structural framing member, provide suitable intermediate metal framings. Where C- clamps are used, used retainer clips.

3.4 FLEXIBLE CONNECTIONS

A. Flexible connections shall be air tight and resistant to fire, water and mild dew and shall be made with tight weave asbestos free factory attached to a galvanized steel strip.

B. Flexible connections shall be fitted to isolate fan and/ or air conditioner casings from duct work. The connections shall be arranged to permit the renewal of the connections without disturbing the duct work or the machine plant.

C. The metal parts of connected equipment shall be separated by not less than

100 mm (4 – inches) and installed with sufficient slack to compensate for free movement of fans or spring vibration isolators.

D. Flexible connectors in supply air ducts surrounded by unconditioned air shall be insulated by 13 mm thick of closed cell flexible insulation such as "Armaflex", "Aeroflex", "Insulflex" or approved equivalent securely glued and clamped to the outside of the flexible connection.

3.5 FLASHING

A. All ducts passing through the roof shall be flashed by the assigned mechanical contractor. However, this shall not include any up-stands or around roof opening which will be provided by the other trade.

3.6 CLEANING OF DUCT WORK AND PROTECTION DURING CONSTRUCTION

A. Air Conditioning and Ventilating Duct Work:

1. All ducts shall be thoroughly cleaned inside to the satisfaction of the Project Manager at the site, before starting fans. Covers shall be provided during the installation to prevent accumulated building material or debris entering the ducts and fans.

3.7 DUCTS THROUGH WALLS

A. Provide properly sized, fabricated, located, and trade coordinated sleeves and prepared openings, for duct mains, branches, and other item penetrations, during the construction of the surface to be penetrated.

B. Provide sleeves for items 375 mm (15- inches) and smaller and prepared openings for all square or rectangular duct. Fabricate sleeves form 20 – gauge, 1.0 mm thick mill galvanized sheet metal. Where sleeves penetrate load bearing surfaces, construct sleeves of standard weight galvanized steel pipe.

C. Provide framed openings as specified and indicated and in accordance with the approved Shop Drawings.

E. Provide not less than 25 mm (1- inch) clearance between penetrating and penetrated surfaces. Fill clearance space with bulk fibrous glass or mineral wool or approved equivalent and seal/ close as required. Penetration shall be watertight, fire proof where surfaces are penetrated or as indicated and vapor tight to prevent vapor transmission to conditioned spaces.

F. Sealant shall be elastomeric type or foamed silicone type applied to oil free

surfaces to not less than 10 mm depth.

G. Closure collar not less than 100 mm (4- inches) wide, unless otherwise indicated, shall be provided for exposed ducts and items on each side of penetrated surface, except where equipment is installed. Install collar tight against the surface, fit tightly and securely around penetrating item without contact. Sharp edges shall be ground smooth to prevent any possible damage to the penetrating surface.

H. Collars for shall be fabricated from 20- gauge, 1.0 mm nominal/ minimal thickness, mill galvanized steel. Collars for square and rectangular ducts with minimum dimension over 375 mm (15- inches) shall be fabricated from 18- gauge. 1.31 mm in nominal/ minimal thickness, mill galvanized steel.

I. Collars shall be installed with fasteners on maximum 150 mm (6- inches) centers.

J. Where ducts pass through walls and are in view, cover plates shall be provided. Such cover plates shall be of extruded aluminum angle or approved equivalent, pop riveted/ bolted to duct wall or sheathing to approval.

3.8 SHUT OFF AND VOLUME CONTROL DAMPERS

A. General

The following clauses set out the requirements for volume control dampers. These requirements apply to single blade dampers which may be used in ducts up to 200 mm (8- inches) width and to multi- blade dampers which shall be used in all other cases.

1. Multi- blade dampers shall be of the opposed blade type.

2. All multi- blade dampers shall be of a product of a reputable manufacturer/ fabricator. Sample dampers shall be submitted for approval prior to their manufacture/ fabrication.

3. Where dampers are smaller than duct size, blanking plates shall be provided unless convergent or divergent duct sections are shown on the Shop Drawings.

4. Manually operated dampers shall be full duct size unless otherwise shown on the Shop Drawings.

5. Angle flanged cross joints shall be provide on the duct for connection of the dampers. Damper frames shall be drilled to fir bolt holes on the angle flanges.

6. Single blade dampers in Low Velocity Ducts up to 500 mm (20- inches x 200 mm (8- inches) may be installed directly in the duct without separate frames or flanges, provided such dampers are only required for throttling and not for tight shut off.

B. Damper Frames

1. Frames shall be constructed of 10- gauge galvanized steel sheet folded to channel sections not less than 150 mm (6- inches) wide. Frames shall be welded at the corners and painted with primer.

2. Mullions shall be constructed of 16- gauge galvanized sheet folded to channel and riveted into box section.

C. Damper Blades

1. Blades shall be fabricated from 16- gauge galvanized sheet and shall Interlock with adjacent blades.

2. Blades shall not be more than 250 mm (10- inches) wide and shall not exceed 1200 mm (48- inches) between supports. Neoprene rubber or felt sealing strips shall be bonded to the tips of the blades to prevent air leakage.

3. Damper leakage shall not exceed 5 percent of the maximum design air quantity for the particular damper.

D. Bearings and Spindles

1. Bearings shall be of ball bearing type self oiling sintered bronze. The housing of bearings shall be riveted or where approved spot welded to the damper side frames.

2. Spindle shall be 16 mm diameter and shall be securely fixed to the center fold of the blades. Spindles may be of the stub type or may run the full length of the blades. Spindle shall be cadmium or brass plated steel material.

E. Linkages

1. Dampers shall be linked with tie bars and links arranged to give rotating action. Tie bars and links shall be fabricated from bright steel flat or round bar cadmium plated and shall be drilled. Drilling shall be carried out before plating. Link pins shall be held in position with circular clips.

2. Where two sets of dampers are operated from one motor, the linkage shall be such as to allow either damper to be adjusted as to position and/ or amount of movement without affecting the adjustment of the other.

3. The linkages used with manually operated dampers shall incorporate a means for positioning, locking and indicating the position of the dampers.

4. For dampers over two (2) blades wide, linkages shall be of an approved proprietary type ensuring positive control and alignment of the damper blades.

F. Mounting and Linking of Damper Motors:

1. Damper motors shall be rigidly mounted on robust fabricated steel bars or brackets supported from the duct or building structure so as to prevent any movement of the motor relative to the dampers.

2. Motor–to– Damper Linkages shall be of proprietary type, incorporating cadmium plated mild steel rods and ball swivel type joints. Where the length of the rods and / or the force extended by the motor in the opinion of the Engineer caused buckling of the rod, tubular linkages made of 13 mm galvanized mild steel pipe, with solid rods bronze – welded in at both ends, shall be used.

3.9 FIRE DAMPERS

A. Access To Fire Dampers: Access panels complying with Clause 3.2 for hand hole cover but with dimension to enable easy access to Fire Dampers shall be provided in ducts to permit their resetting and replacement of fusible links.

3.10 FIELD TESTS

A. Air Duct Leakage Test: Test air ducts, plenums, and casing for air leakage at 375 Pa. prior to application of insulation, subject the new duct work to smoke test or flood light test and repair all leakage based on the result of the field test conducted between the Mechanical Contractor and the designated Project Management for Mechanical Division.

3.11 HANGER SCHEDULE

A. HANGER ROD SCHEDULE AND SPACING

HANGER ROD SPACING			
PIPE SIZE	3/4" OR SMALLER	1"THRU 1 1/4"	11/2"& LARGER
STEEL PIPE	8' - 0"	10' - 0"	10' - 0"
COPPER PIPE	5' - 0"	8' - 0"	8' - 0"

HANGER ROD SCHEDULE		
PIPE SIZE	ROD SIZE	REMARKS
UP TO 2"	3/8" Ø	PLAIN ROUND BAR COATED WITH RED LEAD PRIMER

2 1/2" TO 3"	1 / 2" Ø	PLAIN ROUND BAR COATED WITH RED LEAD PRIMER
4" TO 5"	5 / 8" Ø	PLAIN ROUND BAR COATED WITH RED LEAD PRIMER
6" TO 7"	3 / 4" Ø	PLAIN ROUND BAR COATED WITH RED LEAD PRIMER
8" TO 12"	7 / 8" Ø	PLAIN ROUND BAR COATED WITH RED LEAD PRIMER
14" AND OVER	1 " Ø	PLAIN ROUND BAR COATED WITH RED LEAD PRIMER

D. Painting

1. Scope of Work

a. This item consists of furnishing all paint materials, varnish, and other related products, tools, equipment, and labor required in undertaking the proper application of painting, varnishing, and related works indicated on the plans. See drawings for location, quantity, and extent of surfaces to receive paint and varnish.

2. Materials

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

b. 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.

c. Silicon water repellent shall be transparent water shield especially formulated to repel rain and moisture on exterior masonry surfaces.

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

e. Varnish shall be a homogeneous solution of resin, drying oil, drier and solvent. It shall be extremely durable clear coating, high resistant to wear and tear without cracking, peeling, whitening, spotting.

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

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

f. Painting Schedule:
For New Concrete/ Masonry Surfaces:
One coat of Acrylic Flat base paint
Two coats of Acrylic Semi-Gloss base paint

3. Execution

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.

b. 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 desire 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 and re-installed after completion of the work.

ELECTRICAL SPECIFICATIONS

I. GENERAL CONDITIONS

The work of the contractor consists of furnishing of all tools, labor, equipment, and materials and performing all operations in connection with the electrical system shown on the drawing, their tests and inspections, complete and in accordance with these specifications and drawings and subject to the terms and conditions of the contract, and all other labor and materials not specifically mentioned under sections, to bring into operating condition and be ready for use by the end user the electrical works of the project.

The works covered by these specifications shall be governed by the requirements of the Philippine Electrical Code, US Federal Specifications, and NEMA standard.

A. Scope of Work

The installation work must be executed strictly in accordance with the plans and specifications. The principal items of work shall include but not limited to the following:

1. Supply, delivery, installation, testing and commissioning of lighting fixtures, of the lighting system of the project.
2. Supply & Installation of electrical conduits, fittings and power cables.
3. Supply & Installation of electrical Panelboard and circuit breakers.
4. Other items or works as maybe required by plans and related contract documents necessary to satisfactorily complete the project.

B. Licenses and Permits

All permits and licenses for the execution of the work shall be secured by the Contractor including Wiring installation Permit as well as Construction Permit from the Office of City Engineer of Imus, Cavite having jurisdiction over the area. All permit fees shall be paid by the Contractor in relation to the implementation of the whole project.

C. Plans and Specifications

All that is mentioned in the plans and specifications shall be considered complimentary. Any omitted labor and materials in one but mentioned in the other must be furnished. If no numerical indications appear on the plans, all measurements must be based on the scale of the drawing.

II. ELECTRICAL WORKS

A. Scope of Work

The installation work must be executed strictly in accordance with the plans and specifications. To supply properly the power requirements of the project, the principal items of work shall include but not limited to the following:

1. Supply and Installation of Protective Devices
2. Supply and Installation of Power Cable, Conduits and Standard Accessories.
3. Supply and installation of lighting fixtures.

4. Testing & commissioning of the whole electrical installation.

B. Materials & Electrical Hardware

1. PVC electrical conduit shall be supplied in standard effective lengths of 3.0m, and conforming to PNS/ISO 3126.
2. Wires and cables shall be insulated for 600 volts. Feeder and branch circuit wires and cables shall be type THHN or THWN, as required by the drawings and as manufactured by a reputable manufacturer.
3. Conduits & fittings shall be US Underwriters Laboratories (UL) listed or approved local equivalent.
4. Pull boxes thickness shall be not less than gauge #16.
5. Circuit breakers for panel boards shall be molded case circuit breaker, rated 600VAC, bolt-on, with quick-made, quick-break, trip-free mechanisms. They shall meet US Federal Specifications and NEMA standard with a minimum interrupting capacity of 10kaic.

C. Workmanship/Installation

1. All materials for the work of this project shall be delivered, stored and handled so as to preclude damage of any nature.
2. Distribution voltage shall be 230VAC, 3-phase, 3-wire + (G), 60 Hz. Feeder conductors shall be continuous and without splices between terminals.
3. Circuit Breaker. It shall be installed in a workmanlike manner. Observe and follow properly the circuit allocations indicated on the drawings.
4. Wires and boxes. No wire shall be drawn into the raceway until works, which may cause injury to the wires, is completed and assure that the wire and cable is free from abrasions during installation. Only powdered lubricant not injurious to cable insulation and raceways shall be used when lubrication is necessary.
5. Conduit System. Not more than four 90 degrees bend shall occur in any run. Where it becomes necessary to have more than four 90 degrees bends in any run, an intermediate pullbox shall be installed to facilitate pull-in wires.
   All conduits run shall be as called for on the drawings.
6. Electrical wiring shall include all both internal and external electrical wiring of the lighting fixtures including that for the drivers, supply lines up to the distribution panels.
7. To ensure that the lighting fixtures and other equipment operate at maximum efficiency, the total voltage drop from the beginning of the feeder to the farthest outlet on a branch circuit should not exceed 5%.
8. Commissioning and Testing.
   a) Ground test – The entire installation shall be free from improper ground and from short circuits. Each panel shall be tested with means connected. Lamps removed or omitted from the sockets and all switches closed. Each lighting equipment shall be connected for proper and intended operation. In no case shall the resistance be less than that

allowed by the Regulations for electrical equipment of building. Failures shall be corrected in any manner satisfactory to the Project Engineer.

b) Performance test – The Electrical Contractor shall test all system of entire electrical installation of the project for proper operating conditions. These conditions shall apply to the power and lighting installation, voltage drop, grounding defects.

c) The Contractor shall conduct testing and commissioning and submit result to the Project Engineer duly signed and sealed by the Professional Electrical Engineer

9. Grounding

The following shall be grounded in accordance with the Drawings and the requirements of the Philippine Electrical Code for standard grounding practices.

a. Metallic conduit and raceway.
b. Non- current carrying metal parts of all electrical equipment including fluorescent fixtures and panel boards

D. Warranty

1. The Contractor warrants that the Goods supplied under the Contract are new, unused, made of the most recent or current models and incorporated all recent improvements in the design and materials.
2. The Contractor further warrants that all Goods supplied under the Contract shall have no defects, arising from the design of luminaires, materials or workmanship or from any act or omission of the Contractor that may develop under normal use of the supplied Goods in the conditions prevailing in the country of final destination.
3. The Contractor shall bear all materials, transportations and engineering costs as well as other charges that may be incurred in connection with the defects in the design, materials and workmanship appearing within the warranty period.
4. The supplies delivered are free from patent and latent defects and all condition under this Contract have been fully met.
5. In order to assure that the manufacturing defects shall be corrected by the Contractor, a warranty shall be required from the Contractor for a minimum period of three (3) years for all lighting equipments.
6. The lamp depreciation must be kept to its original illumination level within its warranty period. If the lamp illumination depreciation found to be below 50% of its original illumination level, it should be replaced immediately by the Contractor without any cost to the client or TIEZA.

Prepared by:

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Junrieh Papeliras
Electrical - Estimator

Checked By:

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Manager / PMD

Noted By:

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Manager , PEPD

TOURISM INFRASTRUCTURE AND ENTERPRISE ZONE AUTHORITY

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MANPOWER AND EQUIPMENT

Project : Emergency Works for Compliance with Fire Department Requirement and Temporary Kitchen
Location : BHYH, Banaue, Ifugao
Mode of implementation : By contract
Duration of the Project : 150 Calendar days

Minimum Required Manpower	Quantity
Project Manager	1
Project Engineer	1
Materials Engineer	1
Safety Officer	1
First Aider	1
Foremen	1
Skilled Workers	7
Helpers/Laborers	14

Minimum Required Equipment	Quantity
basic construction tools	1
welding machine	2

Prepared By :

DOMINGO P. SANCHEZ
Estimator

Checked By :

ENGR. JEOFFREY L. MACALALAD
Manager, PMD

Noted :

ENGR. AMELITA S. CAGANDA
Manager, PEPD

BILL OF QUANTITIES

Project : Emergency Works For Compliance With Fire Department Requirement And Temporary Kitchen
Location : BHYH , Banaue , Ifugao

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT COST	AMOUNT
I.	EMERGENCY REQUIREMENTS				
	A. MAIN WATER'S STATION	m^2	59.84		
	B. BAKESHOP PREPARATION AREA	lot	1.00		
	C. STORE ROOM AND PURCHASING OFFICE	lot	1.00		
	D. PREPARATION / DISHWASHING AREA	lot	1.00		
	E. CHEF'S OFFICE	lot	1.00		
	F. LOADING /UNLOADING AREA	m^2	38.11		
	G. SEWER AND WATER LINE	lot	1.00		
	H DOORS AND WINDOWS	lot	1.00		
	I. MULTI-PURPOSE HALL	lot	1.00		
	J. ADDITIONAL LABOR COST	lot	1.00		
	K. CEILING WORKS	lot	1.00		
	L. LPG STOCK ROOM	lot	1.00		
	M. FIRE EXIT LADDER / ALARM	lot	1.00		
II.	TEMPORARY KITCHEN	lot	1.00		
	N. DEMOLITION,CLEANING & DISPOSAL OF EXISTING				
	COLD STORAGE	m^2	14.70		
	O. RELOCATION OF KITCHEN EQUIPMENT FROM				
	EXISTING KITCHEN TO ACCOUNTING OFFICE	lot	1.00		
	P. REPLACEMENT/REMOVAL/DEMOLITION OF				
	EXISTING DOORS,WINDOWS AND PARTITION				
	1 ACCOUNTING OFFICE	lot	1.00		
	2 COLD STORAGE ROOM	lot	1.00		
	3 COLD STORAGE PARTITION	lot	1.00		
	Q. REPAIR OF LEAK (2ND FL. CR ABOVE STOCK RM.	Lot	1.00		
	R. REPLACEMENT, CLEANING,DISPOSAL & INST. OF	Lot	1.00		
	NEW CEILING				
	1 ACCOUNTING OFFICE	m^2	170.00		
	2 COLD STORAGE	m^2	34.25		
	3 STOCK ROOM	m^2	27.50		
	S. PAINTING OF WALL & CEILING	m^2	242.00		
	T. INST. OF WALL CABINET w/ PAINTING WORKS	lot	1.00		
	U. RE-TILING	m^2	65.00		
	V. PLUMBING WORKS	lot	1.00		
	W. MECHANICAL WORKS	lot	1.00		
	X ELECTRICAL WORKS	lot	1.00		
III.	MECHANICAL WORKS (Kitchen Area)				
	1 VENTILATION EQUIPMENT	lot	1.00		
	2 VENTILATION DUCTWORKS	Lot	1.00		
	3 HANGERS AND SUPPORTS	Lot	1.00		
	4 STAINLESS RANGEHOOD COMPLETE W/ AIR				
	FILTERS AND ACCESSORIES	lot	1.00		
	5 KITCHEN GAS LINE	lot	1.00		
IV.	ELECTRICAL WORKS				
	3 Masonry	m^2	77.04		
	4 Roofing	m^2	41.00		

BILL OF QUANTITIES

Project : Emergency Works For Compliance With Fire Department Requirement And Temporary Kitchen
Location : BHYH , Banaue , Ifugao

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT COST	AMOUNT
	5 Carpentry	lot	1.00		
	6 Painting	m^2	56.84		
	7 Finishing	lot	1.00		
	8 Plumbing	lot	1.00		
	9 Electrical Works	lot	1.00		
V.	GENERAL REQUIREMENTS				
	A. SIGNBOARD	lot	1.00		
	B. HEALTH AND SAFETY PROGRAM	lot	1.00		
	C. TEMPORARY ENCLOSURE	lot	1.00		
	D. TEMPORARY BARRACKS	lot	1.00		
		In Words: Pesos			

Submitted By

Name of the Representative of the Bidder

Position

Name of the Bidder

BILL OF QUANTITIES

PROJECT :

ITEM NO.	DESCRIPTION	UNIT	QTY.	UNIT COST	AMOUNT
	•Other Matters/Special Provisions				