

**TECHNICAL SPECIFICATIONS**

Name of Project: **REPAIR AND IMPROVEMENT OF DIFFUSED LIGHT YAM STORAGE**  
 Location: **BSU LA TRINIDAD COMPOUND, KM.6, BETAG, LA TRINIDAD, BENGUET**

**B.5 - PROJECT BILLBOARD / SIGNBOARD**

Material Requirements:

Tarpaulin

The design and format of the tarpaulin shall have the following specifications:

- Color: White
- Size: 8 ft. x 8 ft.
- Resolution: 70 dpi
- Font: Helvetica
- Font Size of Main Information : 3 inches
- Font Size of Sub-Information : 1 inch
- Font Color: Black
- Suitable Frame : Rigid wood frame with post; and
- Posting: Outside display at the project location after award has been made.

The information shall contain but not limited to i.) logo of the funding agencies, ii.) the name of implementing agencies, iii.) name of contractor, iv.) project's title, location, cost and description, v.) project details to include duration, date started, target date of completion and project status, and vi.) COA Anti-corruption Hotline.

The display/and or affixture of the picture, image, motto, logo, color motif, initials or other symbol or graphic representation associated with the top leadership of the project proponent or implementing agency/unit/office, on project billboard, is considered unnecessary. (General Guidelines No. 2.2.6)

Post and Frame

Posts and frames/braces shall be made from good lumber with a 2X3 and 2x2 inches size respectively and shall be well-seasoned, straight and free of injurious defects. The frame will be covered with 2 pieces ¼ inch thick marine plywood where the tarpaulin will be attached.

Method of Measurement

The quantities of project billboard shall be in pieces of such signs of the size specified, including the necessary posts and supports erected and accepted.

Basis of Payment

The quantities measured as determined in the Method of Measurement, shall be paid for at the contract unit price for the Pay Items shown in the Bid Schedule which price and payment shall be full compensation for furnishing and installing project billboard, all labor, equipment, tools and incidentals necessary to complete the Item.

Payment will be made under:

Pay Item No.	Description	Unit of Measurement
B.5	Project Billboard / Signboard	Each

**ITEM B.7 – OCCUPATIONAL SAFETY AND HEALTH PROGRAM**

B.7.1 Description

A Company Safety Policy which shall serve as the general guiding principles in the implementation of safety and health on site duly signed by the highest company official or his duly authorized representative who has the over---all control of project execution and should include the contractor's general policy towards occupational safety, worker's welfare and health, and environment.

A Safety policy, which shall include the commitment that the contractor shall comply with DOLE minimum safety requirements, including reporting requirements of the Occupational Health and Safety Standards (OSHS), and other relevant DOLE issuances. These may include, but are not limited to the following:

- Registration (Rule 1020 and DO 18--02)
- Report of Safety Committee Organization (Rule 1040)
- Notification of Accidents and Occupational Illnesses (Rule 1050)
- Annual Work Accident/Illness Exposure Data Report (Rule 1050)
- Application for installation of mechanical/electrical equipment for construction of structure for industrial use (Rule 1070 and 1160)

Annual Medical Report (Rule 1960)

1.2 *Specific Construction Safety and Health Program* shall contain the tendering agency's requirements in addition to the minimum requirements under the appropriate sections of D.O. No. 13 whenever deemed as applicable.

B.7.2 Method of Measurement

Payment shall be made on a proportional basis, calculated by multiplying the percentage rate of physical progress to the total lump sum amount every progress billing.

B.7.3 Basis of Payment

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
B.7	Occupational Safety and Health Program	Lump Sum

**B.9 – MOBILIZATION / DEMOBILIZATION**

B.9.1 Description

This item shall consist of the mobilization and demobilization of equipment needed for the project. In addition, this item also includes the cleaning of the project site including its surroundings before the final inspection.

B.9.2 Method of Measurement

The accepted quantities, measured as prescribed in section B.9.1 shall be paid for at the contract unit price for mobilization/ demobilization which price and payment shall be full compensation for furnishings and placing all materials, including all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this item.

B.9.3 Basis of Payment

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Prepared By:

**SHERIFF JOHN C. LA MADRID**  
 Proj. Dev't. Officer III

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
B.9	MOBILIZATION / DEMOBILIZATION	LUMP SUM

**ITEM 803(1)a – STRUCTURE EXCAVATION (COMMON SOIL)**

803.1 Description

This Item shall consist of the necessary excavation for foundation of the motor pool, and other structures not otherwise provided for in the Specifications.

It shall also include the furnishing and placing of approved foundation fill material to replace unsuitable material encountered below the foundation elevation of structures.

No allowance will be made for classification of different types of material encountered.

803(1)a.2 Construction Requirements

803(1)a.2.1 Clearing and Grubbing

Prior to starting excavation operations in any area, all necessary clearing and grubbing in that area shall have been performed in accordance with Item 100, Clearing and Grubbing.

803(1)a.2.2 Excavation

General, all structures. The Contractor shall notify the Engineer sufficiently in advance of the beginning of any excavation so that cross-sectional elevations and measurements may be taken on the undisturbed ground. The natural ground adjacent to the structure shall not be disturbed without permission of the Engineer.

Trenches or foundation pits for structures or structure footings shall be excavated to the lines and grades or elevations shown on the Plans or as staked by the Engineer. They shall be of sufficient size to permit the placing of structures or structure footings of the full width and length shown in the Structural Plan under Footing Schedule. The elevations of the bottoms of footings, as shown on the Plans, shall be considered as approximate only and the Engineer may order, in writing, such changes in dimensions or elevations of footings as may be deemed necessary, to secure a satisfactory foundation.

Trenches or foundation pits for structures or structure footings shall be excavated to the lines and grades or elevations shown on the Plans or as staked by the Engineer. They shall be of sufficient size to permit the placing of structures or structure footings of the full width and length shown. The elevations of the bottoms of footings, as shown on the Plans, shall be considered as approximate only and the Engineer may order, in writing, such changes in dimensions or elevations of footings as may be deemed necessary, to secure a satisfactory foundation.

803(1)a.2.3 Utilization of Excavated Materials

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

803(1)a.3 Method of Measurement

The volume of excavation to be paid for will be the number of cubic meters measured in original position of material acceptably excavated in conformity with the Plans or as directed by the Engineer:

Pay Item Number	Description	Unit of Measurement
803(1)a	STRUCTURE EXCAVATION (COMMON SOIL)	Cu.m.

**ITEM 804 – EMBANKMENT (BACKFILL FROM STRUCTURE EXCAVATION)**

804(1)a.1 Description

This Item shall consist of the backfilling of the excavated footings and preparation of base materials for the slab-on-fill as indicated in the plan and specification.

It shall also include the furnishing and placing of approved foundation fill material to replace unsuitable material encountered below the foundation elevation of structures.

804(1)a.2 Construction Requirements

Embankment for the base of the slab-on-fill of earth material shall be placed in horizontal layers not exceeding 200 mm (8 inches), loose measurement, and shall be compacted as specified before the next layer is placed. However, thicker layer maybe placed if vibratory roller with high compactive effort is used provided that density requirement is attained and as approved by the Engineer. Trial section to this effect must be conducted and approved by the Engineer. Effective spreading equipment shall be used on each lift to obtain uniform thickness as determined in the trial section prior to compaction. As the compaction of each layer progresses, continuous leveling and manipulating will be required to assure uniform density. Water shall be added or removed, if necessary, in order to obtain the required density. Removal of water shall be accomplished through aeration by plowing, blading, discing, or other methods satisfactory to the Engineer.

Throughout the periods when compaction of earthwork is in progress, the Contractor shall adhere to the compaction procedures found from compaction trials for each type of material being compacted, each type of compaction equipment employed and each degree of compaction specified.

804(1)a.3 Method of Measurement

The volume of embankment (Backfill from Structure Excavation) to be paid for will be the number of cubic meters measured in original position of material acceptably backfilled and compacted in conformity with the Plans or as directed by the Engineer:

Pay Item Number	Description	Unit of Measurement
804(1)a	EMBANKMENT (BACKFILL FROM STRUCTURE EXCAVATION)	Cu.m.

**ITEM 804(4) – GRAVEL BEDDING OF FOOTING AND SOF**

804(4).1 Description

This Item shall consist of placing and compacting of gravel bedding materials for the footing and slab-on-fill as indicated in the plan and specification.

It shall also include the furnishing and placing of approved foundation fill material to replace unsuitable material encountered below the foundation elevation of structures.

804(4).2 Material and Construction Requirements

Materials for this item is a G1 Gravel as indicated in the DUPA for this item.

Throughout the periods when compaction of gravel fill is in progress, the Contractor shall adhere to the compaction procedures found from compaction trials for each type of material being compacted, each type of compaction equipment employed and each degree of compaction specified.

804(4).3 Method of Measurement

The volume of G1 gravel for the gravel bedding of footings and slab on fill to be paid for will be the number of cubic meters measured in original position of material acceptably of compacted gravel in conformity with the Plans or as directed by the Engineer:

Pay Item Number	Description	Unit of Measurement
804(4)	GRAVEL BEDDING OF FOOTING AND SOF	CU.M.

**ITEM 900(7) - REINFORCED CONCRETE (3000 PSI @ 28 DAYS)**

900(7).1 Description

This Item shall consist of furnishing, placing and finishing concrete in buildings and related structures in accordance with this specification and conforming to the lines, grades, and dimension shown on the plans.

900(7).2 Materials Requirements

900(7).2.1 Portland Cement

This shall conform to the requirement of ITEM 700, Volume II (Blue Book), Hydraulic cement.

900(7).2.2 Concrete Aggregates

Concrete aggregate shall conform to the requirements of subsection 311.2.2 and 311.2.3 under Item 311 of Volume II, (Blue Book) and ASTM C 33 for lightweight aggregates, except that aggregates failing to meet these specifications but which have been shown by special that or actual service to produce concrete of adequate strength and durability may be used under method (2) of determining the proportion of concrete, where authorized by the Engineer.

Except as permitted elsewhere in this section, the maximum size of the aggregate shall be not larger than one-fifth (1/5) of the narrowest dimensions between sides of forms of the member for which the concrete is to be used nor larger than three-fourths of the minimum clear spacing between individual reinforcing bars or bundles of bars or pretensioning strands.

900(7).2.2.1 Aggregate Tests

Samples of the fine and coarse aggregates to be used shall be selected by the Engineer for tests at least 30 days before the actual concreting operations are to begin. It shall be the responsibility of the contractor to designate the source or sources of aggregate to give the Engineer sufficient time to obtain the necessary samples and submit them for testing.

No aggregate shall be used until official advice has been received that it has satisfactorily passed all test, at which time written authority shall be given for its use.

900(7).2.3 Water

Water used in mixing concrete shall conform to the requirement of subsection 311.2.4 under Item 311, Part E, of Volume II, (BlueBook).

900(7).2.4 Metal Reinforcement

Reinforcing steel bars shall conform to the requirements of the following Specifications:

Deformed & Plain Billet Steel Bars for concrete Reinforcement	(ASTM A 615)
Bars for concrete Reinforcement	AASHTO M 31
Deformed Rail - Steel and Plain Bars for Concrete Reinforcement	ASTM A 616
Deformed A x b - Steel and Plain Bars for Concrete Reinforcement	ASTM A 617

If reinforcing bars are to be welded, these ASTM specifications shall be supplemented by requirements assuring satisfactory weldability.

Bar and rod mats for concrete reinforcement	ASTM A 187
Cold-Drawn Steel Wire for concrete reinforcement	(ASTM A 82) AASHTO M 32
Welded steel wire fabric for concrete reinforcement	(ASTM A 185) AASHTO M55 except that the weld shear strength requirement of those specification shall be extended to include a wire size differential up to and including six gages.
Wire and Strands for prestressed concrete	ASTM A 416 ASTM A 421
Used in making strands for post-tensioning shall be cold- drawn and either stress-relieved in the case of uncoated strands, or hotdip galvanized in the case of galvanized strands.	

High strength alloy steel bar for post- tensioning shall be proofstressed to 90 % of the granted tensile strength. After proofstressing, the bars shall conform to the following minimum properties:

Tensile strength fs'	1000 MPa
Yield strength (0.2 offset)	0.90 fs'
Elongation at rupture in 20 diameter	4 percent
Reduction of area at rupture	25 percent
Structural steel	ASTM A 36
Steel Pipe for concrete-filled pipe columns	ASTM A 53
Cast-Iron Pipe for composite columns	ASTM A 377

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900(7).2.5 Admixtures

Air-entraining admixtures, if used, shall conform to ASTM C 260.

Water-reducing admixtures, retarding admixtures, water-reducing and retarding admixtures and water reducing and accelerating admixtures, if used, shall conform to the requirements of ASTM C 494.

900(7).2.6 Storage of Materials

Cement and aggregates shall be stored in such a manner as to prevent their deterioration or the intrusion of foreign matter. Cement shall be stored, immediately upon arrival on the site of the work, in substantial, waterproof bodegas, with a floor raised from the ground sufficiently high to be free from dampness. Aggregates shall be stored in such a manner as to avoid the inclusion of foreign materials.

900(7).3 Construction Requirements

Notations: The notations used in these regulations are defined as follows:

$f_c$  = compressive strength of concrete

$F_{sp}$  = ratio of splitting tensile strength to square root of compressive strength.

900(7).3.1 Concrete Quality

All plans submitted for approval or used for any project shall clearly show the specified strength,  $f_c'$ , of concrete of the specified age for which each part of the structure was designed.

Concrete that will be exposed to sulfate containing or other chemically aggressive solutions shall be proportioned in accordance with "Recommended Practice for Selecting Proportions for Concrete (ACI 613)" and Recommended Practice for Selecting Proportions for Structural Lightweight Concrete (ACI 613A)."

900.3.2 Methods of Determining the Proportions of Concrete

The determination of the proportions of cement, aggregate, and water to attain the required strengths shall be made by one of the following methods, but lower water-cement ratios may be required for conformance with the quality of concrete.

Method 1, Without preliminary test

Where preliminary test data on the materials to be used in the concrete have not been obtained the water-cement ratio for a given strength of concrete shall not exceed the values shown in Table 900.1. When strengths in excess of 281 kilograms per square centimeter (4000 pounds per square inch) are required or when light weight aggregates or admixtures (other than those exclusively for the purpose of entraining - air) are used, the required water-cement ratio shall be determined in accordance with Method 2.

Method 2. For combination of materials previously evaluated or to be established by trial mixtures.

Water-cement ratios for strengths greater than that shown in Table I 900(7).1 may be used provided that the relationship between strength and water-cement ratio for the materials to be used has been previously established by reliable test data and the resulting concrete satisfies the requirements of concrete quality.

Where previous data are not available. Concrete trial mixtures having proportions and consistency suitable for the work shall be made using at least three different water-cement ratios (or cement content in the case of lightweight aggregates) which will produce a range of strengths encompassing those required for the work. For each water-cement ratio (or cement content) at least three specimens for each age to be tested shall be made, cured and tested for strength in accordance with ASTM C 39 and C 192.

The strength test shall be made at 7, 14 and 28 days at which the concrete is to receive load, as indicated on the plans. A curve shall be established showing the relationship between water-cement ratio (or cement content) and compressive strength. The maximum permissible water-cement ratio for the concrete to be used in the structure shall be that shown by the curve to produce an average strength to satisfy the requirements of the strength test of concrete provided that the water-cement ratio shall be no greater than that required by concrete quality when concrete that is to be subjected to the freezing temperatures which weight shall have a water-cement ratio not exceeding 6 gal per bag and it shall contain entrained air.

Where different materials are to be used for different portions of the work, each combination shall be evaluated separately.

TABLE 900(7).1 MAXIMUM PERMISSIBLE WATER-CEMENT RATIOS FOR CONCRETE (METHOD NO.1)

Specified compressive strength at 28 days, psi $f_c$	Maximum permissible water-cement ratio			
	Non air-entrained concrete		Air-entrained concrete	
	U.S. gal. per 42.6 kg. bag of cement	Absolute ratio by weight	U.S. gal per 42.6 kg. bag of cement	Absolute ratio by weight
2500	7 ¼	0.642	6 ¼	0.554
3000	6 ½	0.576	5 ¼	0.465
3500	5 ¾	0.510	4 ½	0.399
4000	5	0.443	4	0.354

900(7).3.3 Concrete Proportions and Consistency

The proportions of aggregate to cement for any concrete shall be such as to produce a mixture which will work readily into the corners and angles of the form and around reinforcement with the method of placing employed on the work, but without permitting the materials to segregate or excess free water to collect on the surface. The methods of measuring concrete materials shall be such that the proportions can be accurately controlled and easily checked at any time during the work.

900(7).3.4 Sampling and Testing of Structural Concrete

As work progress, at least one (1) set of samples consisting of three (3) concrete cylinder test specimens, 150 x 300 mm shall be taken from each class of concrete placed each day, and each set to represent not more than 75 cu m of concrete.

900(7).3.5 Consistency

Concrete shall have a consistency such that it will be workable in the required position. It shall be such a consistency that it will flow around reinforcing steel but individual particles of the coarse aggregate when isolated shall show a coating or mortar containing its proportionate amount of sand. The consistency of concrete shall be gauged by the ability of the equipment to properly place it and not by the difficulty of mixing water shall be determined by the Engineer and shall not be varied without his consent. Concrete as dry as it is practical to place with the equipment specified shall be used.

900(7).3.6 Strength Test of Concrete

When strength is a basis for acceptance, each class of concrete shall be represented by at least five test (10 specimens). Two specimens shall be made for each test at a given age, and not less than one test shall be made for each 150 cu yd of structural concrete, but there shall be at least one test for each days concreting. The Building Official may require a reasonable number of additional tests during the progress of the work. Samples from which compression test specimens are molded shall be secured in accordance with ASTM C 172. Specimens made to check the adequacy of the proportions for strength of concrete or as a basis for acceptance of concrete shall be made and laboratory-cured in accordance with ASTM C 31. Additional test specimens cured entirely under field conditions may be required by the Building Official to check the adequacy of curing and protection of the concrete. Strength tests shall be made in accordance with ASTM C 39.

The age for strength tests shall be 28 days of, where specified, the earlier age at which the concrete is to receive its full load or maximum j stress. Additional test may be made at earlier ages to obtain advance information on the adequacy of strength development where age-strength relationships have been established for the materials and proportions used.

To conform to the requirements of this Item:

1. For structures designed in accordance with the working stress design method of this chapter, the average of any five consecutive strength tests of the laboratory-cured specimens representing each class of concrete shall be equal on or greater than the specified strength,  $f_c'$ , and not more than 20 percent of the strength test shall have values less than that specified.

2. For structures designed in accordance with the ultimate strength design method of this chapter, and for prestressed structures the average of any three consecutive strength test of the laboratory, cured specimens representing each class of concrete shall be equal to or greater than the specified strength,  $f_c'$  and not more than 10 percent of the strength tests shall have values less than the specified strength. When it appears that the laboratory-cured specimens will fail to conform to the requirements for strength, the Engineer shall have the right to order changes in the concrete sufficient to increase the strength to meet these requirements. The strengths of the specimens cured on the job are intended to indicate the adequacy of protection and curing of the concrete and may be used to determine when the forms may be stripped, shoring removed, or the structure placed in service. When, in the opinion of the Building Official, the strengths of the job-cured specimens, the contractor may be required to improve the procedures for protecting and curing the concrete, or when test of field-cured cylinders indicate deficiencies in protection and curing, the Engineer may require test in accordance with ASTM Specification C 42 or order load tests as outlined in the load tests of structures for that portion of the structure where the questionable concrete has been placed.

900(7).3.7 Splitting Tensile Test of Concrete

To determine the splitting ratio,  $F_{sp}$ , for a particular aggregate, test of concrete shall be made as follows:

1. Twenty-four (24) 15 cm. dia. by 30 cm long (6 in. dia. by 12 in. long) cylinders shall be made in accordance with ASTM C 192, twelve at a compressive strength level of approximately 210 kilograms per square centimeter (3000 psi) and twelve at approximately 280 kilograms per square centimeter (4000 psi) or 350 kilograms per square centimeter (5000 psi). After 7 days moist curing followed by 21 days drying at 23C (73F) and 50 percent relative humidity, eight of the test cylinders at each of the two strength levels shall be tested for splitting strength and four for compressive strength.

2. The splitting tensile strength shall be determined in accordance with ASTM C 496, and compressive strength in accordance with ASTM C 39. The ratio,  $F_{sp}$ , of splitting tensile strength to the square root of compressive strength shall be obtained by using the average of all 16 splitting tensile test and all 8 compressive tests. Minimum Strength, Concrete other than fill, shall have a minimum compressive strength at 28 days of 140 kilograms per square centimeter (2000 psi).

900(7).3.8 Batching

Batching shall conform to the requirements of Item 405, Structural Concrete.

900(7).3.9 Mixing and Delivery

Mixing and delivery shall conform to the requirements of Item 405, Structural Concrete.

900(7).4 Concrete Surface Finishing: General

This shall be in accordance with Item 407, Concrete Structures.

900(7).5 Curing Concrete (See subsection 407)

900(7).6 Acceptance of Concrete

The strength of concrete shall be deemed acceptable if the average of 3 consecutive strength test results is equal to or exceed the specified strength and no individual test result falls below the specified strength by more than 15 %.

Concrete deemed to be not acceptable using the above criteria may be rejected unless contractor can provide evidence, by means of core tests, that the quality of concrete represented by the failed test result is acceptable in place. Three (3) cores shall be obtained from the affected area and cured and tested in accordance with AASHTO T24.

Concrete in the area represented by the cores will be deemed acceptable if the average of cores is equal to or at least 85 % and no sample core is less than 75 % of the specified strength otherwise it shall be rejected.

900(7).7 Method of Measurement

The quantity of concrete to be paid shall be the quantity shown in the Bid Schedule, unless changes in design are made in which case the quantity shown in the Bid Schedule will be adjusted by the amount of the change for the purpose of payment. No deduction will be made for the volume occupied by the pipe less than 101 mm (4") in diameter nor for reinforcing steel anchors, weep holes or expansion materials.

900(7).8 Basis of Payment

The accepted quantities of gravel bedding completed in place will be paid for at the contract unit price for cubic meter as indicated on the Bid Schedule.

Pay Item Number	Description	Unit of Measurement
900(7)	REINFORCED CONCRETE (3000 PSI @ 28 DAYS)	Cu.m.

Such prices and payment shall be full compensation for furnishing all materials, including metal water stops, joints, joint fillers, weep holes, and rock backing and timber bumpers; for all form and false work; for mixing, placing, furnishing, and curing the concrete; and for all labor, materials, equipment, tools and incidentals necessary to complete the item, except that reinforcing steel shall be paid for at the contract unit price per kilogram for reinforcing steel metal pipes and drains, metal conduits and ducts, and metal expansion angles shall be paid for as structural steel that when the proposal does not include an item for structural steel these miscellaneous metal parts shall be paid for as reinforcing steel.

**ITEM 1046(2)a1 – CHB NON-LOAD BEARING, 100mm (INCLUDING REINFORCING STEEL)**

1046(2)a1.1 Description

This item shall consist of the laying of CHB including concrete mortar fill and reinforcing bars to the proposed dormitory.

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Proj. Dev't. Officer III



1046(2)a1.2 Method of Measurement

The accepted quantities, measured as prescribed in section 1046(2)a1.1 shall be paid for at the contract unit price for the laying of CHB including concrete mortar fill and reinforcing bars which price and payment shall be full compensation for furnishings and placing all materials, including all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this item.

1046(2)a1.3 Basis of Payment

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
1046(2)a1	CHB NON-LOAD BEARING, 100mm (INCLUDING REINFORCING STEEL)	SQ.M.

**ITEM 1027(1) - CEMENT PLASTER FINISH**

1027(1).1 Description

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

1027(1).2 Material Requirements

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

1027(1).2.1 Cement

Portland cement shall conform to the requirements as defined in Item 700, Hydraulic Cement.

1027(1).2.2 Hydrated Lime

Hydrated lime shall conform to the requirements as defined in item 701, Hydrated Lime.

1027(1).2.3 Fine Aggregates

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

1027(1).3 Construction Requirements

1027(1).3.1 Mixture

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

1027(1).3.2 Surface Preparation

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

1027(1).3.3 Application

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

Wherever indicated on the Plans to be "Simulated Red Brick Finish", the Contractor shall render brick design on plaster surface before brown coat had properly set and then allowed to dry. Cement plaster shall not be applied directly to:

- a) Concrete or masonry surface that had been coated with bituminous compound and,
- b) Surfaces that had been painted and previously plastered.

1027(1).3.4 Workmanship

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

1027(1).4 Method of Measurement

All cement plaster finish shall be measured in square meters or part thereof for work actually completed in the building.

1027(1).5 Basis of Payment

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

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
1027(1)	CEMENT PLASTER FINISH	SQ.M.

**ITEM SPL.1 – ROOFING WORKS**

SPL.1 Description

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Proj. Dev't. Officer III

This work shall consist of steel structures and the steel structure portions of composite structures, constructed in reasonably close conformity with the lines, grades and dimensions shown on the Plans or established by the Engineer.

The work will include the furnishing, fabricating, hauling, erecting, welding and painting of structural metals called for in the Special Provision or shown on the Plans. Structural metals will include structural steel, rivet, welding, special and alloy steels, steel forgings and castings and iron castings. This work will also include any incidental metal construction not otherwise provided for, all in accordance with these Specifications, Plans and Special Provisions.

**SPL.2 Material and Construction Requirements**

Materials shall meet the requirements of Item 712, Structural Metal; Item 409, Welded Structural Steel, and Item 409, Welded Structural Steel; and Item 709, Paints.

**SPL.3 Method of Measurement**

Pay Item Number	Description	Unit of Measurement
SPL.1	ROOFING WORKS	Lump Sum

**ITEM 1014 – PRE-PAINTED METAL SHEETS**

**1014.1 Description**

This Item shall consist of furnishing all pre-painted metal sheet materials, tools and equipment, plant including labor required in undertaking the proper installation complete as shown on the Plans and in accordance with this Specification.

**1014.2 Material and Construction Requirements**

All pre-painted metal sheet and roofing accessories shall be oven baked painted true to profiles indicated on the Plans.

**1014.2.1 Pre-Painted Roofing Sheets**

Pre-painted roofing sheets shall be fabricated from cold rolled galvanized iron sheets specially tempered steel for extra strength and durability. It shall conform to the material requirements defined in PNS 67: 1985. Profile section in identifying the architectural moulded rib to, be used are as follows: Regular corrugated, Quad-rib, Tri-wave, Rib-wide, twin-rib, etc. Desired color shall be subject to the approval of the Architect/Engineer.

1014.2.2 Gutters, Valleys, Flashings Hip and Ridge roll shall be fabricated from gauge 24 (.600 mm thick) cold-rolled plain galvanized iron sheets specially tempered steel. Profile section shall be as indicated on the Plans.

1014.2.3 Fastening hardware shall be of galvanized iron straps and rivets. G.I. straps are of .500 mm thick x 16 mm wide x 267 mm long (gauge 26 x 5/8" x 10-1/2") and standard rivets.

1014.2.4 Base metal thickness shall correspond to the following gauge designation available locally as follows:

Base Metal Thickness	Designated Gauges
.400 mm thick	Gauge 28
.500 mm thick	Gauge 26
.600 mm thick	Gauge 24
.800 mm thick	Gauge 22

  

b) Protective Coatings	Thickness
1. Zinc	34.4 microns (244 gm/m <sup>2</sup> )
2. Paint coatings	
Top coat 15.20 microns	
Bottom coat 6.8 microns	

Overall thickness with protective coats

.400 mm	.428-451 mm
.500 mm	.532-551 mm
.600 mm	.638-651 mm

Length of roofing sheets - available in cut to length long span length up to 18.29 meters

Special length and thickness are available by arrangements.

**1014.3 Construction Requirements**

Before any installation work is commenced, the Contractor shall ascertain that the top faces of the purlins are in proper alignment. Correct the alignment as necessary in order to have the top faces of the purlins on an even plane.

**1014.3.1 Handling/Lifting/Positioning of Sheets**

Sheets shall be handled carefully to prevent damage to the paint coating. Lift all sheets or sheet packs on to the roof frame with the overlapping down-turned edge facing towards the side of the roof where installation will commence, otherwise sheets will have to be turned end-to-end during installation.

**1014.3.2 Installation Procedure**

1014.3.2.1 Start roofing installation by placing the first sheet in position with the downturned edge in line with other building elements and fastened to supports as recommended.

1014.3.2.2 Place the downturned edge of the next sheet over the edge of the first sheet, to provide side lap and hold the side lap firmly in place. Continue the same procedure for subsequent sheets until the whole roofing area is covered and/or (Adopt installation procedure provided in the instruction manual for each type of Architectural molded rib profile section).

1014.3.2.3 For walling applications follow the procedure for roofing. Allow a minimum end lap of 100 mm (4") for vertical walling.

**1014.3.3 Gutters, Valleys, Flashing ridge and Hip rolls**

Gutters, valleys, flashing ridge and hip rolls shall be fastened where indicated on the Plans by self-tapping screws or galvanized iron straps and rivets.

**1014.3.4 End Laps**

In case handling or transport consideration requires to use two or more end lapped sheets to provide full length coverage for the roof run, install each line of sheets from bottom to top or from eave line to apex of roof framing. Provide 150 mm minimum end lap.

**1014.3.5 Anchorage/Fastening**

1014.3.5.1 Pre-painted steel roofing sheets shall be fastened to the wood purlins with standard length G.I. straps and rivets.

1014.3.5.2 For steel frame up to 4.5 mm thick use self-drilling screw No. 12 by 35 mm long hexagonal head with neoprene washer.

**TECHNICAL SPECIFICATIONS**

REPAIR AND IMPROVEMENT OF DIFFUSED LIGHT YAM STORAGE  
BSU LA TRINIDAD COMPOUND, KM.6, BETAG, LA TRINIDAD, BENGUET

Prepared By:

**SHERIFF JOHN C. LA MADRID**  
Proj. Dev't. Officer III

1014.3.5.3 For steel support up to 5 mm thick or more use thread cutting screw No. 12 by 40 mm long hexagonal head with neoprene washer.

1014.3.5.4 Side lap fastener use self-drilling screw NO.10 by 16 mm long hexagonal head with neoprene washer.

1014.3.5.5 Valley fastened to lumber and for walling use self-drilling wood screw No. 12 by 25 mm long hexagonal head with neoprene washer.

1014.3.5.6 Valleys fastened to steel supports use self-drilling screws, hexagonal head with neoprene washer. Drill size is 5 mm diameter.

1014.3.6 Cutting of Sheets

1014.3.6.1 In cutting pre painted steel roofing sheets and accessories to place the exposed color side down. Cutting shall be carried out on the ground and not over the top of other painted roofing product.

1014.3.6.2 Power cutting or drilling to be done or carried out on pre-painted products already installed or laid in position, the area around holes or cuts shall be masked to shield the paint from hot fillings.

1014.3.7 Storage and Protection

Pre-painted steel roofing, walling products and accessories should be delivered to the jobsite in strapped bundles. Sheets and/or bundles shall be neatly stacked in the ground and if left in the open it shall be protected by covering the stack materials with loose tarpaulin.

1014.4 Method of Measurement

The work done under this Item shall be measured by actual area covered or installed with pre-painted steel roofing and/or walling in square meters and accepted to the satisfaction of the Engineer/Architect.

1014.3 Method of Measurement

Pay Item Number	Description	Unit of Measurement
1014	PRE-PAINTED METAL SHEETS	SQ.M.

**ITEM 1003(17) - CARPENTRY AND JOINERY WORKS**

1003(17).1 Description

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

1003(17).2 Material Requirements

1003(17).2.1 Lumber

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

Grades of Lumber and Usage

a. Stress grade is seasoned, close-grained and high quality lumber 1~ of the specified specie free from defects and suitable for sustaining heavy loads. Stress grade lumber shall be used for wooden structural members, subject to heavy loads, and for sub-floor, framing embedded or in contact with concrete or masonry.

b. Select grade lumber of the specified specie is generally of high quality, of good appearance, without imperfections, and suitable for use ff without waste due to defects and suitable also for natural finish. Select grade lumber shall be used for flooring; sidings, facia and it base boards, trims, mouldings, millwork, railings, stairs, cabinet work, shelvings, doors, windows and frames of openings.

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

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

1003(17).2.1.2 Lumber Species and Usage

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

- a. Yacal (stress grade) for structural member such as post, girders, girts, sleepers door and window frames set or in contact with concrete or masonry.
- b. Guijo (select grade) for door and window frames set in wooden framework, for stairs, for roof framing supporting ceramic or cement tiles, for floor joists and other wooden structural parts.
- c. Apitong (common grade) for roof framing supporting light roofing materials such as galvanized iron, aluminum or asbestos sheets, for wall framing, ceiling joists, hangers and nailers.
- d. Tanguile (select grade) for doors and windows, facia and base boards, trims, mouldings, millwork, railings, stairs, cabinet, work, shelvings, flooring and siding.
- e. Narra (select grade) for stair railings, flooring boards, wall panels base boards, trims, mouldings, cabinet work, millwork, doors and windows when indicated as such in the Plans.
- f. Dao (select grade) for parts of the structure as enumerated under Section 1003.2.1.2 (e), when indicated as such on the Plans.

1003(17).2.1.3 Moisture Content

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

1003(17).2.1.4 Substitution in Lumber Specie



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

#### 1003(17).2.2 Plyboard

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

#### 1003(17).2.3 Plywood

Plywood shall conform to the requirements of the Philippine Trade Standards 631-02. Thickness of a single layer laminae shall not be less than 2 mm. The laminae shall be superimposed in layers with grains crossing at right angles in successive layers to produce stiffness. The face veneers shall be rotary cut from select grade timber. The laminae and face veneers shall be bonded with water resistant resin glue, hot pressed and pressure treated. Ordinary tanguile or red lauan plywood with good quality face veneers, 6 mm thick shall be used for double walling and ceiling not exposed to moisture; waterproof or marine plywood shall be used for ceiling exposed to moisture such as at toilets and eaves, and ceiling to be finished with acrytex.

#### 1003(17).2.4 Lawanit

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

#### 1003(17).2.5 Materials Other Than Lumber

##### 1003(17).2.5.1 Plastic Sheet

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

##### 1003(17).2.5.2 Glue

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

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

##### 1003(17).2.5.3 Fasteners

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

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

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

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

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

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

#### 1003(17).3 Construction Requirements

##### 1003(17).3.1 Quality of Materials

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

##### 1003(17).3.2 Storage and Protection of Materials

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

##### 1003(17).3.3 Shop Drawings

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

##### 1003(17).3.4 Rough Carpentry

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

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

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

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

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

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

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

1003(17).3.5 Finished Carpentry

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

- a. Framing lumber shall be select grade, free from defects and where exposed in finished work, shall be selected for color and grain.
- b. Joints of framing shall be tenoned, mortised or doweled where suitable, closely fitted and secured with water resistant resins glue. Exterior joints shall be mitered and interior angles coped.
- c. Panels shall be fitted allow for contraction or expansion and ensure that the panels remain in place without warping, splitting and opening of joints.
- d. Plyboard shall be as specified under Section 1003.2.3 unless otherwise indicated on the Plans.
- e. Plywood shall be specified under Section 1003.2.4.
- f. Exposed edges of plywood or plywood for cabinets shall be provided with select grade hardwood strips, rabbetted as necessary, glued in place and secured with finishing nails. To prevent splitting, hardwood for trims shall be drilled before fastening with nails or screws.
- g. Fabricated woodwork shall be done preferably at the shop. It shall be done true to details and profiles indicated on the Plans. Where set against concrete or masonry, woodwork shall be installed when curing is completed.
- h. Exposed wood surfaces shall be free from disfiguring defects such as raised grains, stains, uneven planning, sanding, tool marks and scratches. Exposed surfaces shall be machine or hand sanded to an even smooth surface, ready for finish.

1003(17).4 Basis of Payment

The work actually completed and accepted as measured in lump sum shall be paid for at the Unit Price or contract price which price constitute full compensation including labor, materials, tools and incidentals necessary to complete this Item.

Payment shall be made under:

Pay Item Number	Description	Unit of Measurement
1003(17)	CARPENTRY AND JOINERY WORKS	SQ.M.

ITEM 1011 – ROLLING UP DOORS

1011.1 Description

This item shall consist of furnishing all plant, labor, tools, equipment and rolling up door required as shown on the Plans and in accordance with this Specification.

1011.2 Material Requirements

Rolling up door shall be surfaced mounted type designed for exterior service opening as indicated on the Plans. Component parts shall conform with the following material specifications:

1. Curtain – shall be manufactured of interlocking curved or flat slats, rolled from galvanized and bonderized steel, aluminum or stainless steel as the case maybe. Slats shall be of size and thickness to withstand 0.957 KPa windload.

Curtain is composed of:

- a) Interlocking slats shall roll up on a drum supported at head of opening on brackets and shall be balanced by helical springs.
- b) End locks – shall be malleable iron riveted to each ends of slats. These are called continuous when they reinforce both ends of all slats, alternate when every other slat.
- c) Bottom bar – shall be manufactured from two equal sized angles, minimum 3 mm thick bolted back to back with appropriate half slat at lowest edge of curtain. In addition, exterior door shall have compressible and replaceable rubber or vinyl weather seal attached to bottom rail.

2. Counter balance barrel assembly – shall include spring barrel which serves as load carrying beam encases counter balance mechanism and provide axis around curtain coils. As it arises barrel rings are involute shapes of malleable iron to assure proper counter balance for all points of travel. Oil tempered torsion type counter balance springs are wound from heat treated steel, to provide accuracy in balancing door.

3. Hood – shall be manufactured from 0.60 mm thick (minimum) galvanized sheet metal, flanged at top for attachment to header and flanged at bottom to provide longitudinal stiffness. Hood shall enclose curtain coil and counter balance mechanism.

4. Brackets – shall be made of precisely formed plate with permanently sealed ball bearings, designed to enclose end of the curtain coil and provide support for counter balance pipe at each end.

5. Guides – shall be fabricated from structural steel angles or precision roll formed channels and angles. Especially adaptable for doors exposed to heavy wind pressure. Designed with groove depths varying from 50 mm to 150 mm depending upon the width of the door, and set cut from the face of the wall to facilitate the travel of the curtain.

1011.3 Construction Requirements

Doors shall be mechanically operated and with provision for manual operation by means of hand chain. Accessories needed for the satisfactory performance of the door shall be built-in with the unit.

1011.3.1 Erection/Installation

- a) Set and install structural steel angels properly aligned, plumb, level, square true to profile section and rigidly anchored with adjacent concrete surface walls.
- b) Allow all adjacent items of work to be completed before any installation work is started except the installation of structural steel angels.
- c) Assemble rolling up doors in accordance with the manufacturer’s instruction manual or as indicated in the shop drawing approved.
- d) All anchors and insets for guide, brackets and other accessories shall be located accurately.
- e)

1011.3.2 Locking Devices

Curtain shall be located at each end of bottom bar by concealed slide bolts which shall engage a lock wedge in each guide. A plunger type cylinder lock is provided as standard equipment.

1011.3.3 Warranty

Upon completion and before final acceptance of the equipment; the Contractor shall furnish the DPWH/Owner a written guaranty stating that the rolling up door equipment and accessories are free from defects. The guaranty shall be for the period of one (1) year from the date of final acceptance of the work. Any part of the equipment that becomes defective during the term of the guaranty shall be replaced and made good by the Contractor at his own expense a manner satisfactory to the DPWH/Owner.

#### 1011.3.4 Method of Measurement

The work executed under this item shall be measured by actual units of rolling up door installed at jobsite complete and ready for service. The computed unit shall bear type o materials and area of opening covered and shall be accepted by the Engineer.

#### 1011.3.5 Basis of Payment

The accepted work qualified and provided in the Bill of Quantities shall be paid for at the unit Bid price which constitutes full compensation for furnishing all materials, labor, tools, equipment and other incidentals necessary to complete this Item.

Payment shall be made under:

Pay Item Number	Description	Unit of Measurement
1011 (a)	Rolling up door	/set

### ITEM 1200 - AIR CONDITIONING AND REFRIGERATION SYSTEM

#### 1200.1 Description

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.

#### 1200.2 Material Requirements

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.

##### 1200.2.1 Refrigerant Pipes

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

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

##### 1200.2.2 Pipes for Cooling Water

Chilled and condenser cooling water pipes shall be black steel pipe, Schedule 40.

Pipes and fittings for size 50 mm diameter and smaller shall be screwed type. Pipes and fittings for size 62 mm diameter and larger shall be welded or flanged type.

##### 1200.2.3 Pipe Insulations

Insulations shall be pre-formed fiberglass or its equivalent.

The insulating materials shall be covered with 100 mm x .13 mm thick polyethylene film which shall be overlapped not less than 50 mm. Pipe insulations 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.

##### 1200.2.4 Ductworks

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

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

Joints and stiffeners of 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 25 mm x 25 mm x 3 mm steel angles
- c. 775 mm to 1500 mm, brace with 31 mm x 31 mm x 3 mm steel angles
- d. 1525 mm up, brace with 38 mm x 38 mm x 3 mm steel angles

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

##### 1200.2.5 Ductwork insulation

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

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

##### 1200.2.6 Diffusers

The type, shape, capacity, size and location shall be as shown in the Plans.

Diffusers shall be complete with frame and gasket, equalizing deflector and volume control as indicated or specified and shall have factory-applied prime coat of paint.

Samples of supply and return air diffusers shall be submitted for approval before mass fabrication and installation.

##### 1200.2.7 Dampers

Dampers shall be of same materials as duct, at least one gage 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.

#### TECHNICAL SPECIFICATIONS

REPAIR AND IMPROVEMENT OF DIFFUSED LIGHT YAM STORAGE  
BSU LA TRINIDAD COMPOUND, KM.6, BETAG, LA TRINIDAD, BENGUET

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### 1200.2.8 Fire Damper

Main duct shall be provided with proper fire dampers of the fusible link actuated type.  
Access door shall be provided in ductwork for renewal of fusible link and to reset damper.

### 1200.2.9 Equivalent Foundation

Foundation shall be provided and shall conform to the recommendation of the manufacturer 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.

### 1200.2.10 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, wirings, 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.

### 1200.3 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. Pippings 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.

#### 1200.3.1 Operating Tests

Refrigerating equipment shall be tested for 8-hours per day for three consecutive days or longer when so directed, under the supervisions of manufacturers qualified and authorized representative, who will make necessary adjustments 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.

#### 1200.3.2 Guarantee and Service

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.

### 5.0HP Inverter Floor Mounted Aircon Specifications:

Power supply	Outdoor unit		1 Phase / 220-230V / 60Hz		
Cooling Capacity <sup>1,2</sup> Rated (Min. - Max.)	kW		12.5 (5.7-14.0)		
	Btu/h		42,700 (19,500-47,800)		
Power consumption	Cooling	kW	4.48		
COP		W/W	2.79		
CSPF		Wh/Wh	4.67		
Indoor unit	Colour				
	Airflow rate (H / M / L)	m <sup>3</sup> /min	28 / 26 / 24		
		cfm	988 / 918 / 847		
	Sound pressure level <sup>3</sup> (H / M / L)		dB(A)	51 / 48 / 46	
	Dimensions (H×W×D)		mm	1,850×600×350	
	Machine weight		kg	50	
Certified Operation range		°CWB	14 to 25		
Outdoor unit	Colour		Ivory white		
	Coil	Type	Micro channel		
	Compressor	Type	Hermetically sealed swing type		
		Motor output	kW	2.40	
	Refrigerant charge (R32)		kg	1.9(Charged for 30 m)	
	Sound pressure level <sup>3</sup>	Cooling	dB(A)	52	54
		Night quiet mode	dB(A)	45	
	Dimensions (H×W×D)		mm	990×940×320	
	Machine weight		kg	64	
Certified Operation range		°CDB	21 to 46		
Piping connections	Liquid (Flare)		mm	φ9.5	
	Gas (Flare)		mm	φ15.9	
	Drain	Indoor unit	mm	VP20 (I.D.φ20×O.D.φ26)	
		Outdoor unit	mm	φ26.0 (Hole)	
Max. interunit piping length		m	50 (Equivalent length 70)		
Max. installation level difference		m	30		
Heat insulation		Both liquid and gas piping			