



Republic of the Philippines
Department of Agriculture
Western Visayas
Iloilo City

CONSTRUCTION OF SILAGE FACILITY

DA-NOROS Himamaylan, Sitio Bingig, Brgy. 3,
Himamaylan City, Negros Occidental

(DA-HALAL 2025)

TECHNICAL SPECIFICATIONS

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I. OTHER GENERAL REQUIREMENTS

B.9. MOBILIZATION/DEMOBILIZATION

The Contractor shall mobilize and move into the Project Site the required construction equipment needed for the successful completion of the Contract Work.

Demobilization shall include dismantling and removal from the site of Contractor's, materials, and equipment. The time of demobilization shall also include cleanup of the site after completion of the Contract Work.

MINIMUM EQUIPMENT REQUIREMENT FOR IMPROVEMENT OF GOAT HOUSE

Description	No. of Unit
1. Concrete Mixer 1 bagger	1 unit
2. Bar Cutter & Bender	1 unit
3. Welding Machine	1 unit

B.5. PROJECT SIGNBOARD & COA BILLBOARD

Commission on Audit (COA) Billboard printed of white tarpaulin, 8 ft x 8 ft dimension; resolution 70 DPI; Font: Helvetica; Font Size: Main information – 3 inches; Sub. Information – 1 inches; and Font color: Black.

Department of Agriculture (DA) Billboard shall be on standard billboard measuring 1.2m x 2.4m (4ft x 8ft) using ½ inch plywood or Tarpaulin posted on 3/16-inch plywood. Billboard shall be installed in front of project site.

II. EARTHWORKS

803. STRUCTURAL EXCAVATION

(Refer to Item 103, Part C of Volume II (Blue Book))

ITEM 103 – STRUCTURE EXCAVATION

103.1 Description

This Item shall consist of the necessary excavation for the foundation of the structure.

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 the classification of different types of material encountered.

103.2 Construction Requirements

103.2.1 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 800, Clearing and Grubbing.

103.2.2 Excavation

(1) 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 the 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. 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.

Boulders, logs, and other objectionable materials encountered in excavation shall be removed. After each excavation is completed, the Contractor shall notify the Engineer to that effect and no footing shall be placed until the Engineer has approved the depth of excavation and the character of the foundation material.

103.2.3 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.

103.3 Method of Measurement

103.3.1 Structure Excavation

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

103.3.2 Basis of Payment

The accepted quantities, measured as prescribed in Section 103.3, shall be paid for at the contract unit price for each of the particular pay items listed below that is included in the Bill of Quantities. The payment shall constitute full compensation for the removal and disposal of excavated materials including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
803 (1) a	Structure Excavation	Cubic Meter

804. EMBANKMENT

Description

This Item shall consist of the construction of embankment in accordance with this Specification and in conformity with the lines, grades, and dimensions shown on the Plans or established by the Engineer.

Material Requirements

Embankments shall be constructed of suitable materials, in consonance with the following definitions:

- (a) Suitable Material – Material which is acceptable in accordance with the Contract and which can be compacted in the manner specified in this Item. It can be common material

or rock.

Construction Requirements

General

Prior to the construction of the embankment, all necessary clearing and grubbing in that area shall have been performed in conformity with Item 100, Clearing and Grubbing.

Where shown on the Plans or directed by the Engineer, the surface of the existing ground shall be compacted to a depth of 150 mm (6 inches) and to the specified requirements of this Item.

Compaction

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.

Earth

The Contractor shall compact the material placed in all embankment layers and the material scarified to the designated depth below subgrade in cut sections, until a uniform density of not less than 95 mass percent of the maximum dry density determined by AASHTO T 99 Method C, is attained, at a moisture content determined by Engineer to be suitable for such density. Acceptance of compaction may be based on adherence to an approved roller pattern developed as set forth in Item 106, Compaction Equipment and Density Control Strips. The embankment shall be compacted at 25 % compaction.

Method of Measurement

The quantity of embankment to be paid for shall be the volume of material compacted in place, accepted by the Engineer and formed with material obtained from any source.

Material from excavation per Item 102 which is used in embankment and accepted by the Engineer will be paid under Embankment and such payment will be deemed to include the cost of excavating, hauling, stockpiling and all other costs incidental to the work.

Material for Selected Borrow topping will be measured and paid for under the same conditions specified in the preceding paragraph.

Basis of Payment

The accepted quantities, measured as prescribed in Section 104.4, shall be paid for at the Contract unit price for each of the Pay Items listed below that is included in the Bill of Quantities. The payment shall continue full compensation for placing and compacting all materials including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
804 (1)	Structural backfill (from borrow)	Cubic Meter

1707.LEVELLING COURSE

(Refer to ITEM 200, Part C, Volume II (Blue Book))

ITEM 200 – AGGREGATE SUBBASE COURSE

200.1 Description

This item shall consist of furnishing, placing and compacting an aggregate subbase course on a prepared subgrade in accordance with this Specification and the lines, grades and cross-sections shown on the Plans, or as directed by the Engineer.

200.2 Material Requirements

Aggregate for subbase shall consist of hard, durable particles or fragments of crushed stone, crushed slag, or crushed or natural gravel and filler of natural or crushed sand or other finely divided mineral matter. The composite material shall be free from vegetable matter and lumps or balls of clay, and shall be of such nature that it can be compacted readily to form a firm, stable subbase.

The subbase material shall conform to Table 200.1, Grading Requirements

Table 200.1 – Grading Requirements

Sieve Designation		Mass Percent Passing
Standard, mm	Alternate US Standard	
50	2"	100
25	1"	55 – 85
9.5	3/8"	40 – 75
0.075	No. 200	0 - 12

The fraction passing the 0.075 mm (No. 200) sieve shall not be greater than 0.66 (two thirds) of the fractions passing the 0.425 mm (No. 40) sieve.

The fraction passing the 0.425 mm (No. 40) sieve shall have a liquid limit not greater than 35 and plasticity index not greater than 12 as determined by AASHTO T 89 and T 90, respectively.

The coarse portion, retained on a 2.00 mm (No. 10) sieve, shall have a mass percent of wear not exceeding 50 by the Los Angeles Abrasion Tests as determined by AASHTO T 96.

The material shall have a soaked CBR value of not less than 25% as determined by AASHTO T 193. The CBR value shall be obtained at the maximum dry density and determined by AASHTO T 180, Method D.

200.3 Construction Requirements

200.3.1 Preparation of Existing Surface.

The existing surface shall be graded and finished as provided under Item 105, Subgrade Preparation, before placing the subbase material.

*SUBTOPIC REFERENCES FOR ITEM 1707

Item 105 – SUBGRADE PREPARATION

105.3.3 Subgrade in Common Excavation

Unless otherwise specified, all materials below subgrade level in earth cuts to a depth 150 mm or other depth shown on the Plans or as directed by the Engineer shall be excavated. The material, if suitable, shall be set side for future use or, if unsuitable, shall be disposed off in

accordance with the requirements of Subsection 102.2.9.

Where material has been removed from below subgrade level, the resulting surface shall be compacted to a depth of 150 mm and in accordance with other requirements of Subsection 104.3.3.

All materials immediately below subgrade level in earth cuts to a depth of 150 mm, or to such greater depth as may be specified, shall be compacted in accordance with the requirements of Subsection 104.3.3.

200.3.2 Placing

The aggregate subbase material shall be placed at a uniform mixture on a prepared subgrade in a quantity which will provide the required compacted thickness. When more than one layer is required, each layer shall be shaped and compacted before the succeeding layer is placed.

The placing of material shall begin at the point designated by the Engineer. Placing shall be from vehicles especially equipped to distribute the material in a continuous uniform layer or windrow. The layer or windrow shall be of such size that when spread and compacted the finished layer be in reasonably close conformity to the nominal thickness shown on the Plans.

200.3.3 Spreading and Compacting

When uniformly mixed, the mixture shall be spread to the plan thickness, for compaction.

Where the required thickness is 150 mm or less, the material may be spread and compacted in one layer.

The moisture content of subbase material shall, if necessary, be adjusted prior to compaction by watering or by drying out, as required in order to obtain the required compaction.

Immediately following final spreading and smoothening, each layer shall be compacted to the full width by means of approved compaction equipment. Any irregularities or depressions that develop shall be corrected by loosening the material at these places and adding or removing material until surface is smooth and uniform.

If the layer of subbase material, or part thereof, does not conform to the required finish, the Contractor shall, at his own expense, make the necessary corrections.

200.3.4 Tolerances

Aggregate subbase shall be spread uniformly and compacted according to the designed level and transverse slopes as shown on the Plans.

200.4 Method of Measurement

Aggregate Subbase Course will be measured by the cubic meter (m³). The quantity to be paid for shall be the design volume compacted in-place as shown on the Plans, and accepted in the completed course. No allowance will be given for materials placed outside the design limits shown on the cross- sections.

200.5 Basis of Payment

The accepted quantities, measured as prescribed in Section 200.4, shall be paid for at the contract unit price for Aggregate Subbase Course 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.

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
200	Aggregate Subbase Course	Cubic Meter

804. STRUCTURAL BACKFILL

(Refer to Item 104, Part C of Volume II (Blue Book))

ITEM 104 – EMBANKMENT

104.2 Description

This Item shall consist of the construction of embankment in accordance with this Specification and in conformity with the lines, grades, and dimensions shown on the Plans or established by the Engineer.

104.3 Material Requirements

Embankments shall be constructed of suitable materials, in consonance with the following definitions:

1. Suitable Material – Material which is acceptable in accordance with the Contract and which can be compacted in the manner specified in this Item. It can be common material or rock.

104.4 Construction Requirements

104.3.1 General

Prior to the construction of the embankment, all necessary clearing and grubbing in that area shall have been performed in conformity with Item 100, Clearing and Grubbing.

Where shown on the Plans or directed by the Engineer, the surface of the existing ground shall be compacted to a depth of 150 mm (6 inches) and to the specified requirements of this Item.

104.3.2 Compaction

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.

Earth

The Contractor shall compact the material placed in all embankment layers and the material scarified to the designated depth below subgrade in cut sections, until a uniform density of not less than 95 mass percent of the maximum dry density determined by AASHTO T 99 Method C, is attained, at a moisture content determined by Engineer to be suitable for such density. Acceptance of compaction may be based on adherence to an approved roller pattern developed as set forth in Item 106, Compaction Equipment and Density Control Strips.

104.5 Method of Measurement

The quantity of embankment to be paid for shall be the volume of material compacted in place, accepted by the Engineer and formed with material obtained from any source.

Material from excavation per Item 102 which is used in embankment and accepted by the Engineer will be paid under Embankment and such payment will be deemed to include the cost of excavating, hauling, stockpiling and all other costs incidental to the work.

Material for Selected Borrow topping will be measured and paid for under the same conditions specified in the preceding paragraph.

104.6 Basis of Payment

The accepted quantities, measured as prescribed in Section 104.4, shall be paid for at the Contract unit price for each of the Pay Items listed below that is included in the Bill of Quantities. The payment shall continue full compensation for placing and compacting all materials including all labor, equipment, tools and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
804 (1)	Structural backfill (from borrow)	Cubic Meter

III. REINFORCED CONCRETE WORKS

902(1)a. REINFORCING STEEL BAR (DEFORMED)

Description

Steel reinforcing bars to be used for this project shall consist of standard deformed structural bars meeting ASTM specifications.

The steel reinforcements for concrete shall be formed accurately according to the sizes of the columns, beams, and girders, footings, slabs, etc., where they are to be used. They shall be tied together at each bar extension with Gauge No. 16 G.I. wire.

No steel reinforcement should be installed unless it is free from rust, scale, or another coating that would destroy or reduce the bond with concrete. The reinforcement bars must be positioned such that there is space between the steel at the sides and bottom of the forms.

900.1.1 Metal Reinforcement

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

Plain Billet Steel Bars for Concrete Reinforcement
Bars for concrete Reinforcement

(ASTM A 615)
AASHTO M 31

Deformed A x b - Steel and Plain
Bars for Concrete Reinforcement

ASTM A 617

(Refer to Item 400, Part F of Volume II (Blue Book))

ITEM 404 REINFORCING STEEL

404.1 Description

This Item shall consist of furnishing, bending, fabricating, and placing of steel reinforcement of the type, size, shape, and grade required in accordance with this Specification and in conformity with the requirements shown on the Plans or as directed by the Engineer.

404.2 Material Requirements

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

4.4.3 Construction Requirements

404.3.1 Bending

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

Nominal diameter, d, mm	Pin diameter (D)
10 to 20	6d

Bends and hooks in stirrups or ties may be bent to the diameter of the principal bar enclosed therein.

404.3.2 Placing and Fastening

All steel reinforcement shall be accurately placed in the position shown on the Plans or required by the Engineer and firmly held there during the placing and setting of the concrete. Bars shall be tied at all intersections except where spacing is less than 300mm in each direction, in which case, alternate intersections shall be tied. Ties shall be fastened on the inside.

404.4 Method of Measurement

The quantity of reinforcing steel to be paid for will be the final quantity placed and accepted in the completed structure.

When there is no item for reinforcing steel in the Bill of Quantities, costs will be considered as incidental to the other items in the Bill of Quantities.

404.5 Basis of Payment

The accepted quantity, measured as prescribed in Section 404.4, shall be paid for at the contract unit price for Reinforcing Steel which price and payment shall be full compensation for furnishing and placing all materials, including all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this Item.

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
902(1)a	Reinforcing Steel (Deformed)	Kilogram

414. FORMWORKS

ITEM 414 FORM AND FALSEWORKS

414.1 Description

This Item shall consist of designing, constructing, and removing forms and falsework to temporarily support concrete, girders and other structural elements until the structure is completed to the point it can support itself.

Forms for all reinforced concrete shall be adequately supported and braced or tied together to maintain the correct positions of poured concrete. Wooden forms shall be constructed sufficiently tight to prevent the bulging of concrete members upon pouring or leaking/drainage of water during curing.

The forms shall not be removed until the concrete has attained sufficient strength to support its own weight and any temporary loads placed on it.

414.2 Material Requirements

414.2.1 Formwork

The materials used for smooth form finish shall be 1/2" x 4ft x 8 ft plywood capable of producing the desired finish for form-facing materials. Form-facing materials with raised grain, torn surfaces, worn edges, patches, dents, or other defects that will impair the texture of concrete surfaces shall not be permitted. No form-facing material shall be specified for rough form finish.

414.2.1.1 Formwork accessories

Formwork accessories that are partially or wholly embedded in concrete, including ties and hangers, shall be commercially manufactured. The use of non-fabricated wire form ties shall not be permitted. Where indicated in the Contract, use form ties with integral water barrier plates in walls.

414.2.2 Falsework

The materials to be used in the falsework construction shall be of the quantity and quality necessary to withstand the stresses imposed; it shall be of lumber. The workmanship shall be of such quality that the falsework will support the loads imposed on it without excessive settlement or take-up beyond as shown on the falsework drawings.

414.3 Construction Requirements

414.3.1 Design

Falsework and Formworks design and drawings shall be in accordance, with Item 407 Concrete Structure subsection 407.3.9 and 407.3.12 respectively.

414.3.3 Falsework Construction

The falsework construction shall be in accordance whenever applicable, with Item 407 Concrete Structure subsection 407.3.10 Falsework Construction.

414.3.3.1 Falsework Foundations

All ground elevations at the proposed foundation location shall be verified before design. The edge of the footing shall not be located closer than 300 millimeters from the Intersection of the bench and the top of the slope.

When falsework is supported by footings placed on pave. well-compacted slopes of berm fill, do not strut the falsework to columns unless the column is founded on rock or supported by piling. The spread footings to support the footing design load at the assumed bearing capacity of the soil shall be designed without exceeding anticipated settlements. Steel reinforcement shall be provided in concrete footings. Protect the foundation from adverse effects for the duration of its use.

414.3.6 Removal of Forms and Falsework

The removal of forms and falsework shall be in accordance whenever applicable with Item 407 Concrete Structure subsection 407.3.11 Removing falsework and subsection 407.3.14 Removal of forms and falsework.

414.3.6 Acceptance

Forms and falsework (including design, construction, and removal) shall be evaluated and approved by the Engineer. When the falsework installation is complete and before concrete placement or removal begins, the falsework shall be inspected by the Engineer.

414.4 Method of Measurement

Whenever the Bill of Quantities does not contain an item for form and falsework, the work will not be paid directly but will be considered as a subsidiary obligation of the contractor under other Contract Items.

414.5 Basis of Payment

The accepted quantities measured as prescribed in subsection 414.4, shall be paid for at the Contract lump-sum price for Forms and Falsework which price and payment shall be full compensation for designing, constructing and removing forms and falsework, all materials and accessories needed and for furnishing all labor equipment tools and incidentals necessary to complete the item.

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
414	Forms & Falsework	Square meter

900(1)b2. **STRUCTURAL CONCRETE (FOOTING AND SLAB)- 900 (1)b2**

900(1). **STRUCTURAL CONCRETE (COLUMNS AND BEAMS)- 900(1)**

ITEM 900 - REINFORCED CONCRETE

900.1 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 dimensions shown on the plans.

900.2 Materials Requirements

900.2.1 Portland Cement

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

900.2.2 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)

900.2.3 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).

900.2.4 Metal Reinforcement

Refer to Item No. 1046 of this Specification

900.2.5

900.2.6 Storage of Materials

(Refer to Item 311.2.10)

900.3 Construction Requirements

900.3.1 Concrete Quality

Class A concrete mix shall be used in all structural members and it shall be a mixture of part 1 cement, 2

parts fine aggregate, and parts coarse aggregate by volume, plus enough water to make the mixture into a pliable paste.

900.3.2 Sampling and Testing of Structural Concrete

As work progress, at least one (1) set of a sample 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.

900.3.3 Consistency

Concrete should be mixed thoroughly such that there is uniform distribution among the cement and aggregates.

900.3.4 Mixing and Delivery

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

900.4 Concrete Surface Finishing: General

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

900.5 Curing Concrete (See subsection 407)

900.6 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.

900.7 Basis of Payment

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

Pay Item and Description	Unit of measurement
Structural Concrete	Cubic Meter

Such prices and payment shall be full compensation for furnishing all materials, including metal, and rock backing; 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.

*SUBTOPIC REFERENCES FOR ITEM 900

ITEM 700 (Part I of Volume II (Blue Book))

ITEM 700 – HYDRAULIC CEMENT

700.1 Portland Cement and Masonry Cement

Cement shall conform to the requirements of the following cited Specifications for the type specified or permitted.

Type	Specifications
Portland Cement	AASHTO M 85 (ASTM C 150) Blended Cement AASHTO M 150-74 (ASTM C 91)

Unless otherwise permitted by the Engineer, the product of only one mill of any one brand and type of Portland cement shall be used on the project.

The Contractor shall provide suitable means of storing and protecting the cement against dampness. The cement which, for any reason, has become partially set or which contains lumps of caked cement will be rejected. Cement salvaged from discarded or used bags shall not be used.

ITEM 311.2.4 - WATER

Water to be used for mixing concrete shall be clean and free from injurious amounts of oil, acids, salt, alkalis, and other organic materials.

ITEM 405 – STRUCTURAL CONCRETE

405.1 Description

405.1.1 Scope

This Item shall consist of furnishing, bending, placing, and finishing concrete in all structures except pavements in accordance with this Specification and conforming to the lines, grades, and dimensions shown on the Plans. Concrete shall consist of a mixture of Portland cement, fine aggregate, coarse aggregate, admixture when specified, and water mixed in the proportions specified or approved by the Engineer.

405.1.2 Classes and Uses of Concrete

Five classes of concrete are provided for in this Item, namely: A, B, Each class shall be used in that part of the structure as called for on the Plans.

The classes of concrete will generally be used as follows:

Class A – All structural members. The important parts of the structure included are slabs, beams, columns, and reinforced footings

405.2 Material Requirements

405.2.1 Portland Cement

It shall conform to all the requirements of ITEM 700.

405.2.2 Fine Aggregate

It shall conform to all the requirements of Subsection 311.2.2.

405.2.3 Coarse Aggregate

It shall conform all the requirements of Subsection 311.2.3 except that gradation shall conform to Table 405.1.

Table 405.1 – Grading Requirements for Coarse Aggregate

Sieve	Designation	Mass Percent Passing				
		Class A	Class B	Class C	Class P	Class Seal
Standard Mm	Alternate US Standard					
63	2-1/2"		100			
50	2"	100	95 – 100			
37.5	1-1/2"	95 – 100	-			100
25	1"	-	35 – 70		100	95 – 100
19.0	3/4"	35 – 70	-	100	95 – 100	-
12.5	1/2"	-	10 – 30	90 – 100	-	25 – 60
9.5	3/8"	10 – 30	-	40 – 70	20 – 55	-
4.75	No.4	0 - 5	0 - 5	0 – 15*	0 – 10*	0 – 10*

* The measured cement content shall be within plus (+) or minus (-) 2 mass percent of the design cement content.

405.2.4 Water

It shall conform to the requirements of Subsection 311.2.4

405.2.5 Reinforcing Steel

It shall conform to the requirements of Item 710, Reinforcing Steel and Wire Rope.

405.2.11 Storage of Cement and Aggregates

Storage of cement and aggregates shall conform to all the requirements of Subsection 311.2.10.

405.3.2 Consistency

(Refer to Item 900.3.5)

405.3.4 Mixing and Delivery

Concrete should be mixed at the site of construction. The mixing of concrete shall be in accordance with the appropriate requirements of AASHTO M 157.

For batch mixing at the site of construction, a batch mixer of an approved type shall be used. Mixer having a rated capacity of less than a one-bag batch shall not be used. The volume of concrete mixed per batch shall not exceed the mixer's nominal capacity as shown on the manufacturer's standard rating plate on the mixer except that an overload up to 10 percent above the mixer's nominal capacity may be permitted, provided concrete test data for strength, segregation, and uniform consistency are satisfactory and provided no spillage of the concrete takes place. The batch shall be so charged into the drum that a portion of the water shall enter in advance of the cement and aggregates. The flow of water shall be uniform and all water shall be in the drum by the end of the first 15 seconds of the mixing period. Mixing time shall be measured from the time all materials, except water, are in the drum. Mixing time shall not be less than 60 seconds. If timing starts, the instant the skip reaches its maximum raised position, 4 seconds shall be added to the specified mixing time. Mixing time ends when the discharge chute opens.

The mixer shall be operated at the drum speed as shown on the manufacturer's nameplate on the mixer. Any concrete mixed less than the specified time shall be discarded and disposed off by the Contractor at his own expense.

The timing device on stationary mixers shall be equipped with a bell or other suitable warning device adjusted to give a clearly audible signal each time the lock is released. In case of failure of the timing device, the Contractor will be permitted to continue operations while it is being repaired, provided he furnishes an approved timepiece equipped with minute and second hands. If the timing device is not placed in good working order within 24 hours, further use of the mixer will be prohibited until repairs are made. Re-tempering concrete will not be permitted.

ITEM 407- CONCRETE STRUCTURES

407.1 Description

This Item shall consist of the general description of the materials, equipment, workmanship and construction requirements of dimensions and details shown on the Plans and in accordance with the Specifications for piles, reinforcing steel, structural steel, structural concrete and other items which constitute the completed structure. The class of concrete to be used in the structure or part of the structure shall be as specified in Item 405, Structural Concrete.

407.2 Material Requirements

1. Concrete and Concrete Ingredients

Concrete and concrete materials shall conform to the requirements in Item 405, Structural Concrete. Unless otherwise shown on the Plans or specified in Special Provisions, concrete shall be of Class A.

2. Reinforcing Steel

Reinforcing steel shall conform to the requirements in Item 404, Reinforcing Steel.

3. Structural Steel

Structural steel shall conform to the requirements of corresponding materials in Item 403, Metal Structures.

407.2.1 Proportioning and Strength of Structural Concrete

(Refer to Item 900.3.2)

407.2.2 Sampling and Testing

(Refer to Item 900.3.2)

407.3 Construction and Requirements

407.3.1 Handling and Placing Concrete: General

Concrete shall not be placed until forms and reinforcing steel have been checked and approved by the Engineer.

If lean concrete is required in the Plan or as directed by the Engineer prior to placing of reinforcing steel bar, the lean concrete should have a minimum compressive strength of 13.8 MPa (2,000 psi)..

In preparation for the placing of concrete all sawdust, chips and other construction debris and extraneous matter shall be removed from inside the formwork, struts, stays and braces, serving temporarily to hold the forms in correct shape and alignment, pending the placing of concrete at their locations, shall be removed when the concrete placing has reached an elevation rendering their service unnecessary. These temporary members shall be entirely removed from the forms and not buried in the concrete.

No concrete shall be used which does not reach its final position in the forms within the time stipulated under "Time of Handling and Placing Mixed Concrete".

Concrete shall be placed to avoid segregation of the materials and the displacement of the reinforcement. The use of long troughs, chutes, and pipes for conveying concrete to the forms shall be permitted only on written authorization of the Engineer. The Engineer shall reject the use of the equipment for concrete transportation that will allow segregation, loss of fine materials, or in any other way will have a deteriorating effect on the concrete quality.

The concrete shall be placed as nearly as possible to its final position and the use of vibrators for moving of the mass of fresh concrete shall not be permitted.

407.3.2 Compaction of Concrete

The concrete should be compacted and its forms should be tapped as it is deposited to its final position, to prevent formation of voids in the concrete member which will weaken the building. The compaction shall be done by hand compaction through rodding. By poking with 2m long, 16 mm diameter rod at sharp corners and edges. The thickness of layers for rodding should be 15 to 20 cm.

407.3.8 Curing Concrete

All newly placed concrete shall be cured in accordance with this Specification.

ITEM 311.2.2 FINE AGGREGATE

It shall consist of natural sand, stone screenings or other inert materials with similar characteristics, or combinations thereof, having hard, strong and durable particles. Fine aggregate from different sources of supply shall not be mixed or stored in the same pile nor used alternately in the same class of concrete without the approval of the Engineer.

It shall not contain more than three (3) mass percent of material passing the 0.075 mm (No. 200 sieve) by washing nor more than one (1) mass percent each of clay lumps or shale. The use of beach sand will not be allowed without the approval of the Engineer.

The fine aggregate shall be free from injurious amounts of organic impurities. If subjected to the colorimetric test for organic impurities and color darker than the standard is produced, it shall be rejected. However, when tested for the effect of organic impurities of strength of mortar by AASHTO T 71, the fine aggregate may be used if the relative strength at 7 and 28 days is not less than 95 mass percent.

The fine aggregate shall be well-graded from coarse to fine and shall conform to Table 311.1

Table 311.1 – Grading Requirements for Fine Aggregate

Sieve Designation	Mass Percent Passing
9.5 mm (3/8 in)	100
4.75 mm (No. 4)	95 – 100
2.36 mm (No. 8)	-
1.18 mm (No. 16)	45 – 80
0.600 mm (No. 30)	-
0.300 mm (No. 50)	5 – 30
0.150 mm (No. 100)	0 – 10

ITEM 311.2.3 COARSE AGGREGATE

It shall conform all the requirements of Subsection 311.2.3 except that gradation shall conform to Table 405.1.

Only one grading specification shall be used from any one source.

ITEM 311.2.10 STORAGE OF CEMENT & AGGREGATE

All cement shall be stored, immediately upon delivery at the Site, in a weatherproof building which will protect the cement from dampness. The floor shall be raised from the ground. The buildings shall be placed in locations approved by the Engineer. Provisions for storage shall be ample, and the shipments of cement as received shall be separately stored in such a manner as to allow the earliest deliveries to be used first and to provide easy access for identification and inspection of each shipment. Storage buildings shall have the capacity for storage of a sufficient quantity of cement to allow sampling at least twelve (12) days before the cement is to be used. Bulk cement, if used, shall be transferred to elevated air-tight and weatherproof bins. Stored cement shall meet the test requirements at any time after storage when the Engineer orders a retest. At the time of use, all cement shall be free-flowing and free of lumps.

The handling and storing of concrete aggregates shall be such as to prevent segregation or the inclusion of foreign materials. The Engineer may require that aggregates be stored on separate platforms at satisfactory locations.

In order to secure greater uniformity of concrete mix, the Engineer may require that the coarse aggregate be separated into two or more sizes. Different sizes of aggregate shall be stored in separate bins or in separate stockpiles sufficiently removed from each other to prevent the material at the edges of the piles from becoming intermixed.

IV. MASONRY WORKS

1027(1) Cement Plaster Finish

PLASTERING: Clean and evenly wet surfaces. Apply scratch coat with sufficient force to form good keys. Cross scratch coat upon attaining its initial set; keep damp. Apply brown coat after scratch coat has set at least 24 hours after scratch coat application. Lightly scratch brown coat; keep moist for 2 days; allow to dry out. Do not apply finish until brown coat has seasoned for 7 days. Just before applying coat, wet brown coat again. Float finish coat to true even surface; trowel in manner that will force sand particles down into plaster, with final growling, leave surfaces barnished smooth, free from rough areas, trowel marks, checks, other blemishes. Keep finish coat moist for at least 2 days; thereafter protect after rapid drying after properly, thoroughly cured.

1046(2) CHB (Including Reinforcing Steel)

A. Materials:

- Concrete Hollow Blocks shall have a minimum face thickness of 1" (0.25) nominal size shall be 100 x 200 x 400 and 150 x 200 x 400mm. and have minimum compressive strength shall be as follows:
Class "A" - 900 psi
Class "B" - 750 psi

2. Wall Reinforcement shall be 12mmØ Deformed Bars.
3. Sand shall be river sand, clean, hard and free from loam, silt or other impurities.
4. Cement shall be standard Portland Cement, ASTM C-150 - 68 Type (1) One.
5. Mortar - Mix Mortar from 3 to 5 minutes in such quantities as needed for immediate use, retempering will not be permitted if mortar stiffens because of premature setting.

Proportioning: Cement mortar shall be one (1) part Portland cement and two (2) parts sand by volume but not more than one (1) part Portland cement and three (3) parts sand by volume.

B. ERECTION

All masonry shall be laid plumb, true to line, with level and accurately spaced courses and with each course breaking joint with the source below. Bond shall be kept plumb throughout, corners and reveals shall be plumb and true. Units with greater than 12% absorption shall be wet before laying. Work required to be built in with masonry, including anchors, wall plugs and accessories, shall be built in as the erection progresses.

V. ROOFING WORKS

VI. STRUCTURAL STEEL (TRUSS AND C-PURLINS)

1047(1) Structural Steel(Steel Support and Roof framing)

All works shall be performed and computed in accordance with generally accepted and modern practice of roof and roof framing. Use materials as specified in the plan. All welding shall be done by approved, competent, experienced and fully qualified welders. Surfaces to be welded shall be smooth, uniform and free from fins, tears and other defects, which would adversely affect the quality of the weld. The contractor shall remove and replace or correct as instructed and welds found to be defective or deficient. The skilled welders shall also replace all methods found to produce inferior results with methods that will produce satisfactory work. Use GI tubular steel material.

Welding, shearing, gas cutting, chipping and all other works involved in the fabrication of structural steel shall be done with accuracy and of the highest quality of workmanship within the allowable tolerance prescribe In the AISC Specifications.

All materials and accessories shall be free from rust or any other form of corrosion. Rafter shall be done in accordance with the plans and drawings, all plates, Tubular channel and C-Channel and other roof framing materials shall be pre-painted to installation and re-painted on welded joints. Roofing materials shall be multi-tile pre-painted long span or its equivalent with similar design and quality sheets should be kept dry when stacked, store clear of the ground and under cover should sheets become wet, they must be dried and fillet stacked to allow air circulation. Storage should be kept to a minimum; all sheets shall be installed in accordance to the manufacturer's specification and by persons specializing on the same. Stainless Steel materials must undergo buffing procedure upon installation.

1013(1). CORRUGATED METAL ROOFING 1013(1)

1013.1 Description

This Item shall consist of furnishing all plant equipment, tools, materials, and labor required to properly perform and complete the corrugated metal roofing, together with related accessories such as ridge/hip rolls, and flashing when called for on Plans all in conformity with his Specifications.

1013.2 Material Requirements

1013.2.1 Corrugated Galvanized Iron Sheets

All Corrugated roofing sheets shall be 0.551mm thick.

1013.2.3 Rivets, Washers and Burrs

Rivets and washers shall be galvanized with mild iron. Rivets shall not be less than 5 mm in diameter and

10 mm in length. Washers shall not be less than 1.5 mm thick and 20 mm in outside diameter. Washers inside diameter shall provide snug fit to the rivet.

1013(2). FABRICATED METAL ROOFING ACCESSORY (RIDGE ROLL)

1013.2.5 Fabricated Metal Roofing Accessories

Ridge rolls and fascia flashing shall be fabricated from plain G.I. sheets and shall be 0.701mm thick.

1013.3 Construction Requirements

1013.3.1 Preparatory Work

Preparatory Work to the installation of the corrugated G.I. roofing, purlins should have been placed and spaced properly to fit the length of roofing sheets to be used such that the centerline of the purlins at end laps are 150 mm from the bottom line of end laps and intermediate purlins are placed equidistantly. The top of the purlins should be at the same plane.

1013.3.2 Installation of Corrugated G.I. Sheets

Installation of corrugated G.I. sheets with end laps shall start at the lower part of the roof and proceed towards the direction of monsoon wind with side laps of two-and-a-half (2-1/2) corrugations. End laps shall be 250 mm minimum. Each sheet shall be fastened temporarily by 1.83mm diameter by 25 mm long galvanized flat-head nails at valleys of corrugations covered by side or end laps.

Succeeding upper rows of corrugated G.I. sheets shall be installed in the same manner until the entire roof area is covered.

Riveting at intermediate purlins between end laps shall be done at every fourth corrugation. Rivet shall be provided with a galvanized mild iron washer below and one lead and one galvanized iron washer above the sheet. Rivet shall be sufficiently long to permit forming a hemispherical head. Riveting shall be done such that the lead washer shall be compressed to provide a watertight fit around the rivet.

1013.3.3 Installation of Roofing Accessories

a) End Flashing

Flashing, of 0.701mm thick pre-cut G.I. sheets, unless otherwise specified, shall be installed as shown on Plans. Flashing running parallel to sheet corrugation shall lap at least two corrugations with edge turned down. Flashing across sheet corrugation or at an angle thereto, shall lap at least 250 mm and the edge of flashing turned down at each corrugation.

1013.3.5 Roof Installation on Metal Purlins

Installation on metal purlins shall follow the same procedure as that on metal purlins, except that fastening shall be done with thread-cutting, zinc-coated steel screws, No. 12 by 50 mm. having hexagonal heads and provided with neoprene washers. Screw holes shall be drilled using 5 mm (13/64") diameter bit.

1013.4 Method of Measurement

Roofing sheets shall be measured and paid for on an area basis in square meters or part thereof, such roofing sheets including all laps, fasteners and rivets as installed complete and accepted.

Ridge rolls and flashings shall be measured in linear meter of completed and accepted work such measurement shall include necessary straps and fixings required for complete installation.

The different pay items under roofing work shall be designated the following number, description and unit of measure:

Pay Item Number	Description	Unit of Measurement
1013 (1)	Corrugated roofing, gauge 26	Square meter
1013 (2)	Fabricated metal roofing accessories (Ridge Roll)	l.m

1013.5 Basis of Payment

Payment for completely installed and accepted roofing sheets and required fabricated metal roofing accessories shall be based on actual measurement and the corresponding contract unit price thereof. Payment

based on contract unit price shall constitute full compensation.

VI. METAL STRUCTURES AND OTHER ACCESORIES

403.1 Material Requirements

Other Metal Structures:

- i. WALL FRAMING
 - 1. Shall be made of mm 1" X 1" X 3/16" ANGLE BAR.
- ii. Walls
 - 1. Walls shall be made of gauge no. 6 with 50mm X 50mm aperture steel matting.
- iii. Steel Door
 - 1. Shall refer to the detailed plan for the materials specification and dimension
- iv. Wood Planks and PVC drain
 - 1. Wood Planks shall be a good lumber with free from defects and deterioration
 - 2. PVC drain shall be 2 " diameter PVC pipe minimum.

VII. PAINTINGS

10312. PAINTINGS

1032.1 Description

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

1032.2 Material Requirements

1032.2.1 Paint Materials

All types of paint material, varnish, and other related products shall be subject to random test as to material composition by the Bureau of Research and Standard, DPWH or the National Institute of Science and Technology. (Use the following approved and tested brand name: Boysen, Davies, Dutch Boy, Fuller 0 Brien, or any approved equal).

1032.2.12 Schedule

Exterior	
a) TRUSS	- 1 coats Red Oxide
b) C-PURLINS	- 1 coats Red Oxide
c) WALL FRAME	- 1 coats Red Oxide
d) DOOR	- 1 coats Red Oxide
e) STEEL MATTING	- 1 coats Red Oxide

1032.3 Construction Requirements

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

1032.3.1 Surface Preparation

All surfaces shall be in proper condition to receive the finish. Metal shall be clean, dry, and free from mill scale and rust. Remove all grease and oil from surfaces. Wash unprimed galvanized metal with etching solution and allow it to dry.

1032.3.2 Application

Paints when applied by brush shall become non-fluid, thick enough to lay down as adequate film of

wet paint. Brush marks shall flow out after application of paint.

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

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

1032.3.3 Mixing and Thinning

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

1032.3.4 Storage

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

1032.3.5 Cleaning

Upon completion of the work, all staging, scaffolding and paint containers shall be removed. Paint drips, oil, or stains on adjacent surfaces shall be removed and the entire job left clean and acceptable to the Engineer.

1032.3.6 Workmanship in General

- a) All paints shall be evenly applied. Coats shall be of proper consistency and well brushed out so as to show a minimum of brush marks.
- 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 desired evenness of surface without extra cost to the owner.
- d) Where surface is not in proper condition to receive the coat, the Engineer shall be notified immediately. Work on the questioned portion(s) shall not start until clearance be proceed is ordered by the Engineer.
- e) Hardware, lighting fixture and other similar items shall be removed or protected during the painting varnishing and related work operations and re-installed after completion of the work.

1032.4 Method of Measurement

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

1032.5 Basis of Payment

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

Payment will made under:

Pay Item Number	Description	Unit of Measurement
1032 (a)	Painting works	square meters

References:

- 1) DPWH – Standard Specifications for Public Works Structures Volume III (Buildings, Ports and Harbors, Flood Control and Drainage Structures and Water Supply Systems)
- 2) DPWH – Standard Specifications for Public Works and Highways Volume II (Highways, Bridges and Airports)