



Republic of the Philippines
Department of Transportation
MACTAN-CEBU INTERNATIONAL AIRPORT AUTHORITY
Lapu-lapu City



Project Title:

MCIA RUNWAY ASPHALT OVERLAY – SEGMENT 5
PAINTING OF AIRFIELD PAVEMENT MARKINGS

Location:

Mactan-Cebu International Airport, Lapu-lapu City

GENERAL SPECIFICATIONS

Table of Contents

1.0	Scope	3
2.0	Examination of site.....	3
3.0	Protection.....	3
4.0	Description.....	3
5.0	Materials	3
6.0	Construction methods.....	9
7.0	Duration and Timeline of work	11

1.0 Scope

1.1 Work included:

Furnish all labor, materials, equipment, plant and other facilities and the satisfactory performance of all work necessary to complete the painting of airport airside pavement markings.

2.0 Examination of site

- 2.1 Visit the site of the work and examine the premises to fully understand all existing conditions relative to the work.
- 2.2 No increase in cost or extension of performance time will be considered for failure to know its condition.

3.0 Protection

- 3.1 Workmen: Provide adequate measures to protect workmen and passersby by the site.
- 3.2 Surrounding area: Adjacent property shall be protected throughout the operation.
- 3.3 After application of the paint, all markings shall be protected from damage until the paint is dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings of paint.

4.0 Description

- 4.1 This item shall consist of the painting of numbers, markings, and stripes on the surface of runways and taxiways, in a accordance with these specifications and at the locations shown on the plans, or as directed by the engineer.

5.0 Materials

5.1 Materials and acceptance

The Contractor shall furnish manufacturer's certified test reports for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. The reports can be used for material acceptance or the engineer may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the engineer upon arrival of a shipment of materials to the site.

5.2 Waterborne Paint

5.2.1 Description

- 5.2.1.1 This item shall consist of placing markings on the finished pavement. The work shall include the furnishing of reflective pavement marking paint
- 5.2.1.2 The paint shall be applied to the size, shape and location of the markings shown on the plans, or as required by the Engineer.
- 5.2.1.3 Paint applied on the center of the Runway, Taxiway and other areas specified in the Plans and program.
- 5.2.1.4 Paint shall be Waterborne and shall meet the requirement of Federal Specification TTP-1952D Type II. Paint shall be furnished in the following types with Federal Standard No. 595.
 - White - 37925
 - Yellow- 33538 or 33655
 - Black - 37038
- 5.2.1.5 Waterborne black paint should be used to outline a border at least six inches (6" or 150mm) wide around markings on all pavements not receiving an asphalt pavement surface.

5.2.2 Materials Requirements

- 5.2.2.1 Paint shall be mixed at factory, ready for application without the necessity of using thinners and shall be of smooth uniform quality. It shall be mill-ground. Paint sample shall be submitted by the Contractor prior to application for the Engineer's Approval.
- 5.2.2.2 Beads shall be of good quality, optically clear, lead-free glass with not less than 90% reasonably spherical and free from flaws. The beads shall contain not more than one percent of sharp angular particles and not more than one half percent of foreign matters and shall be free from flowing under normal atmospheric conditions.
- 5.2.2.3 The grading of ballotini shall be as follows:

US Standard Sieve	Percentage	Passing
Mm	Alternative	By Weight
1.18	No. 16	100
0.850	No. 20	65-75
0.600	No. 30	45-55
0.300	No. 50	15-25
0.180	No. 80	0

- 5.2.2.4 The proportion of the balloting to paint shall be not less than 500 grams per liter of paint

5.2.3 Construction Requirements

- 5.2.3.1 The painting of lane markers and strips shall include the cleaning of the pavement surfaces, the application, protection and drying of the paint coatings, the protection pedestrians, vehicular or other traffic, the protection of all parts of the runway pavement structure and its appurtenances against disfigurement by spatters, splashes or smirches of paints or of paint materials and the supplying of all tools, labor, and waterborne paint necessary for the entire work.
- 5.2.3.2 The paint shall not be applied during rain or wet weather or when the air is misty, or when in the opinion of the Engineer, conditions are unfavorable for the work. Paint shall not be applied upon damp pavement surfaces, or upon pavement which has absorbed heat sufficient to cause the paint to blister and produce a porous film of paint
- 5.2.3.3 The application of paint shall preferably be carried out by a machine specially made for this purpose but where brushes are used; only round or oval brushes not exceeding 100 mm in width will be permitted. The paint shall be so produce a uniform, even coating in close contact with the surface being painted.
- 5.2.3.4 Paints shall be applied to the pavement at the rate of 0.33L/m² and shall dry sufficiently to be free from cracking-in from 15 to 30 minutes

5.2.4 Method of Measurement

- 5.2.4.1 The quality of pavement markings to be paid for shall either be the length as shown on the Plans of painted traffic line of the stated width or the area as shown on the Plans of symbols, lettering, hatchings and the like, completed and accepted. Separate item shall be provided for cold laid reflectorized paint.

5.2.5 Basis of Payment

- 5.2.5.1 The quantities measured and, Method of Measurement, shall be paid for at the appropriate contract unit price for the pay items shown in the Bid Schedule which price and payment shall constitute full compensation for furnishing and placing all materials, sampling and packing, for the preparation of the surface, and for all labor, equipment, tools and incidentals necessary to complete the Item.
- 5.2.5.2 Payment will be made under:

Description	Unit of Measurement
Reflective Pavement Markings (Cold Laid)	Square Meter

5.3 Thermoplastic Paint

5.3.1 Description

5.3.1.1 This standard specifies the requirement for reflectorized thermoplastic pavement striping material that is applied to the pavement surface in a molten state by mechanical means with surface application of glass beads at a rate of not less than 350 g/L of glass beads having a size range of drop-in type and will produce an adherent reflectorized stripe of specified thickness and width capable of resisting deformation by traffic.

5.3.1.2 The Paint applied at the edge of the Runway, edge of Taxiway, overrun, numbers and to other specified areas in accordance with the plan.

5.3.2 Materials Requirements

5.3.2.1 Reflectorized Thermoplastic Pavement Material shall be homogeneously composed of pigment, filler, resins and glass reflectorizing spheres.

5.3.2.2 The thermoplastic material shall be available to both white and yellow.

5.3.2.3 Glass Beads (Pre-mix) shall be uncoated and shall comply with the following requirements:

Refractive Index, min. – 1.50

Spheres, Percent, min. – 90

Gradation:

Sieve mm	Mass Percent Passing
0.850	100
0.600	75 – 95
0.425	-
0.300	15 – 35
0.180	-
0.150	0 - 5

5.3.3 General Requirements

5.3.3.1 Composition

The pigment, beads and filler shall be uniformly dispersed in the resin. The material shall be free from all skins, dirt and foreign objects and shall comply with the requirements as specified in Table 6.1

Table 6.1 – Composition Requirements

Component	White	Yellow
Binder, min	18.0	18.0
Glass Beads:		
Min.	30.0	30.0
Max	40.0	40.0
Titanium		
Dioxide, min.	10.0	
Chrome Yellow, Medium,min.		10.0
Calcium Carbonate		
and inert Fillers, max.	42.0	42.0

5.3.3.2 Quantitative

The material shall conform to the quantitative requirements as specified in Table 6.2

Table 6.2 – Quantitative Requirements

Property	Requirements	
	White	Yellow
Specific Gravity, max.	2.15	
Drying Time, minutes,max.	10	
Bond Strength to Portland Cement		
Concrete after heating for four hours ± 5 min. @ 218°C Mpa, max.	1.24	
Cracking Resistance @ low temp. after heating for four hours ± 5 min. @ 218 \pm 2°C,	No Cracks	
Impact Resistance after heating for four hours ± 5 min. @ 218 \pm 2°C and forming test specimens, mm/kg. min.	115	
Softening Point after heating for four hours ± 5 min. @ 218°C, $\pm 2^\circ\text{C}$.	102.5 \pm 9.5°C	
Daylight reflectant @ 45 degrees - 0 degrees,%, min.	75	75

5.3.3.3 Application Properties

5.3.3.3.1 The material shall readily extrude at a temperature of $211 \pm 7^\circ\text{C}$, from approved equipment to produce a line 3.2 to 4.8 mm thick which shall be continuous and uniform in shape having clear and sharp dimensions.

5.3.3.3.2 The material shall not exude fumes which are toxic, obnoxious or injurious to persons or property when heated during applications.

5.3.3.3.3 The application of additional glass beads by drop-in methods shall be at the rate of not less than 350 g/L of glass beads having a size range for drop-in type. The typical size range of spheres of drop-in type paint is as follows.

Passing 850 μm (#20) sieve and
retained on 250 μm (#60) sieve, % 80 -100

5.3.3.4 Sampling

A minimum weight of 10 kg. of Reflectorized Thermoplastic paint shall be taken for every 100 bags of fraction thereof.

5.3.3.5 Testing

The material shall be tested in accordance with AASHTO T250 or with the appropriate method in ASTM designation.

5.3.3.6 Packing the Material

The material shall be packed in a suitable container to which it will not adhere during shipment and storage. The blocks of cast thermoplastic material shall be approximately 300 x 925 by 51 mm and shall weigh approximately 23 kg. Each container label shall designate the color, manufacturer's name, batch number and date of manufacture. Each batch manufactured shall have its own separate number. The label shall warn the user that the material shall be heated to $211 \pm 7^\circ\text{C}$ during application

5.3.4 Method of Measurement

5.3.4.1 The quality of pavement markings to be paid for shall either be the length as shown on the Plans of painted traffic line of the stated width or the area as shown on the Plans of symbols, lettering, hatchings and the like, completed and accepted. Separate item shall be provided for cold laid and hot laid reflectorized paint.

5.3.5 Basis of Payment

5.3.5.1 The quantities measured and, Method of Measurement, shall be paid for at the appropriate contract unit price for the pay items shown in the Bid Schedule which price and payment shall constitute full compensation for furnishing and placing all materials, sampling and packing, for the preparation of the surface, and for all labor, equipment, tools and incidentals necessary to complete the Item.

5.3.5.2 Payment will be made under:

Description	Unit of Measurement
Reflective Pavement Markings (Hot Laid)	Square Meter

5.4 Reflective media

Glass beads shall meet the requirements of Federal Specs. TT-B-1325, Type I-Gradation A. Glass beads shall be treated with adhesion promoting and/or flotation coatings as specified by the manufacturer of the paint.

6.0 **Construction methods**

6.1 Weather limitations

The painting shall be performed only when the surface is dry and when the surface temperature is at least 45 degrees F (7 degrees C) and rising and the pavement surface temperature is at least 5 degrees F (2.7 degrees C) above the dew point.

6.2 Equipment

Equipment shall include the following apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine as may be necessary to satisfactorily complete the job. The mechanical marker shall be an atomizing spray type marking machine suitable for application of traffic paint. It shall produce an even and uniform film thickness at the required coverage and shall apply markings of uniform cross sections and clear-cut edges without running or spattering and without over spray.

6.3 Preparation of surface

Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other foreign material which would produce the bond between the paint and the pavement. The area to be painted shall be cleaned by sweeping and blowing or by other methods as required to remove all dirt, laitance, and loose materials. Paint shall not be applied to Portland cement concrete pavement until the areas to be painted are clean of curing

material. Sandblasting or high pressure water shall be used to remove curing materials.

6.4 Layout of markings

6.4.1 The proposed markings shall be laid out in advance of the paint application.

6.4.2 The locations of markings to receive glass beads shall be shown on the plans.

6.5 Application

Paint shall be applied at the locations and to the dimensions and spacing shown on the plans. Paint shall not be applied until the layout and condition of the surface has been approved by the engineer. The edges of the markings shall not vary from a straight line more than $\frac{1}{2}$ inch (12mm) in 50 feet (15 meters) and marking dimensions and spacing shall be within the following tolerances:

DIMENSION AND SPACING	TOLERANCE
36 inches (910mm) or less	+/- $\frac{1}{2}$ inch (12mm)
Greater than 36 inches to 6 feet (910mm to 1.85 meters)	+/- 1 inch (25mm)
Greater than 6 feet to 60 feet (1.85meters to 18.3meters)	+/- 2 inches (51mm)
Greater than 60 feet (18.3meters)	+/- 3 inches (76mm)

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine. The additional of thinner will not be permitted. A period of 14 days shall elapse between placement of a bituminous surface course or seal coat and application of the paint.

Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished which is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate(s) shown in Table 1. Glass beads shall not be applied to black paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made.

All emptied containers shall be returned to the paint storage area for checking by the engineer. The container shall not be removed from the airport or destroyed until authorized by the engineer.

6.6 Method of measurement

The quantity of pavement markings to be paid for shall be the number of square meters of painting performed in accordance with the specifications and accepted by the engineer.

6.7 Basis for payment

Payment shall be made at the respective contract price per square meter for airport painting and for reflective media. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

6.8 Testing requirement

ASTM C146	Chemical analysis of glass sand
ASTM C371	Wire-cloth sieve analysis on non-plastic ceramic powders
ASTM D92	Test method for flash and fire points by Cleveland Open Cup
ASTM D711	No-pick up time of traffic paint

7.0 Duration and Timeline of work

7.1 Works shall be done with-in One (1) Year or 360 Calendar Days and as specified in the plan.

7.2 The Works on the First Quarter shall be applied as follows:

7.2.1 Waterborne Paint - 90 C.D.

7.2.2 Thermoplastic Paint - 90 C.D.

7.3 The 2nd, 3rd, and Fourth Quarters shall be for the application of the Waterborne applied areas only.

7.4 Thermoplastic paint shall be applied at least five (5) years after its last application or depending on the wear and tear of the applied material.