

SECTION 02620 - RUNWAY AND TAXIWAY MARKING

PART - 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The General Provision of the contract, including the General Provisions for Construction Projects (2016), Special Provisions, and General Requirements of the Specifications, apply to the work specified in this section.
- B. This Section shall be in accordance with FAA Specification Item P-620 – Runway and Taxiway Marking, as included as an attachment to this Section.

1.2 SUMMARY

Work under this Section includes laying out, furnishing and installing temporary and permanent pavement striping and markings for the runways, taxiways, and other airfield pavement surfaces, including glass beads and pavement markings. In addition, pavements damaged during paint and striping removals shall be repaired with an asphalt seal coat.

1.3 REFERENCES

- A. FAA Specification Item P-620 – Runway and Taxiway Marking, as modified herein.
- B. Section 02401, Asphalt Mix Pavement, Surface Course.
- C. Section 02403, Asphalt Mix Pavement, Base and Surface Course.
- D. FAA Advisory Circular (AC) 150/5340-1M, Change 1, Standards for Airport Markings
- E. Federal Specifications TT-P-1952F, and TT-B-1325D.

1.4 SUBMITTALS

Prior to commencing the Work in this Section, the Contractor shall submit the following information according to Section 01300, Submittals.

- A. Pavement Paint Removal Plan including the following:
 - 1. Descriptions of the proposed method of accomplishing the pavement paint removal.
 - 2. Descriptions of the proposed equipment.

- B. Pavement Painting Materials Product Information including the following:
 - 1. Certificates of Compliance: Paint material information and application requirements
 - 2. Manufacturer's specifications and certifications of compliance for pavement paint
 - 3. Manufacturer's specifications and certifications of compliance for pavement beads
- C. Certification of Pavement Surface Preparation

PART - 2 PRODUCTS

2.1 MATERIALS

- A. Paint shall conform to FAA Specification Item P-620, and as modified herein.
- B. Reflective media (glass beads) shall conform to FAA Specification Item P-620, and as modified herein.

PART - 3 EXECUTION

3.1 APPLICATION

- A. The Contractor shall apply markings and striping at locations shown on the Plans, in conformance with FAA Specification Item P-620, and as modified herein.
- B. The application rates for permanent and temporary markings shall be as per Table 1, Marking Materials in Paragraph 620-2.2 of FAA Specification Item P-620.
- C. All pavement markings shall include a 6" wide minimum black border on existing and new asphalt pavements.

3.2 PAINT REMOVAL

The Contractor shall remove markings and striping by water blasting or other methods approved by the Engineer.

- A. Protection of Pavement: The Contractor shall take all necessary care to protect existing pavement, center line and other lights, and electrical circuits embedded in pavement (direct burial cables have been sealed in the pavement with an epoxy material). Should the Engineer determine that damage or excess site erosion results from Contractor's operations, the Engineer will direct the Contractor to perform additional work or revised procedures as necessary for adequate protection of pavement, at no extra cost to the HDOTA.

- B. Non-Propagation of Existing Defects: The Contractor shall be aware of existing minor pavement defects and patches, including cracks, slurry seal coatings and patches, etc. The Contractor is obligated to protect such areas from further damage and may be held liable for all damages caused by inappropriate operation of the water blasting equipment.
- C. Removal Equipment: Removal equipment shall be an ultra-high pressure water blasting unit with an estimated maximum pressure of between 10,000 psi and 40,000 psi, with variable pressure control and vacuum recovery.
- D. Clean-Up: The Contractor shall insure that any residue from the removal operation is removed in a manner acceptable to the Engineer.

3.3 EMULSIFIED ASPHALT SEALCOAT

The Contractor shall apply emulsified asphalt sealcoat in areas where markings and striping have been removed by high-pressure water, and shall comply with FAA Specification Item P-608 under Section 02608, and as modified herein.

PART - 4 MEASUREMENT AND PAYMENT

4.1 METHOD OF MEASUREMENT

- A. Method of measurement and payment shall be in accordance with FAA Specification Item P-620, paragraph 620-4.1.

4.2 BASIS OF PAYMENT

- A. Basis for payment shall be in accordance with FAA Specification Item P-620, paragraph 620-5.1.

PART - 5 ATTACHMENTS

5.1 FAA SPECIFICATIONS

- A. P-620, Runway and Taxiway Marking

END OF SECTION 02620

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ITEM P-620 RUNWAY AND TAXIWAY MARKING

DESCRIPTION

620-1.1 This item shall consist of the preparation and painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, in accordance with these specifications and at the locations shown on the plans, or as directed by the Resident Project Representative (RPR). The terms “paint” and “marking material” as well as “painting” and “application of markings” are interchangeable throughout this specification.

Two (2) coats of paint is required for pavement markings on the new asphalt pavement and seal coat. The initial coat shall be placed after the completion of paving operation or after seal coat has cured, and prior to reopening of the runway/taxiways to aircraft operations. A period of 30 days shall elapse before the application of second coat of paint. Both coats of paint shall have glass beads.

One (1) coat of paint is required for refreshing existing pavement markings or for temporary markings. Refreshing existing markings and temporary markings shall have glass beads.

MATERIALS

620-2.1 Materials 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. This certification along with a copy of the paint manufacturer’s surface preparation; marking materials, including adhesion, flow promoting and/or floatation additive; and application requirements must be submitted and approved by the Resident Project Representative (RPR) prior to the initial application of markings. The reports can be used for material acceptance or the RPR may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the RPR upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers that are easily quantifiable for inspection by the RPR.

620-2.2 Marking materials.

Table 1. Marking Materials

Paint¹				Glass Beads²	
Type	Color	Fed Std. 595 Number	Application Rate Maximum	Type	Application Rate Minimum
Permanent Airfield Waterborne Type II	White	37925	115 ft ² /gal	Type III	10 lb/gal
Permanent Airfield Waterborne Type II	Yellow	33538 or 33655	115 ft ² /gal	Type III	10 lb/gal
Permanent Airfield Waterborne Type II	Red	31136	115 ft ² /gal	Type IA	5 lb/gal
Permanent Airfield Waterborne Type II	Black	37038	115 ft ² /gal	No beads	No beads
Permanent Roadway Waterborne Type II	White	37925	115 ft ² /gal	Type IA	7 lb/gal

¹ See paragraph 620-2.2a

² See paragraph 620-2.2b

a. Paint. Paint shall be in accordance with the requirements of this paragraph. Paint colors shall comply with Federal Standard No. 595.

Waterborne. Paint shall meet the requirements of Federal Specification TT-P-1952F, Type II. The non-volatile portion of the vehicle for all paint types shall be composed of a 100% acrylic polymer as determined by infrared spectral analysis.

b. Reflective media. Glass beads for white and yellow paint shall meet the requirements for Federal Specification TT-B-1325D Type I, Gradation A or Type III as shown in Table 1.

Glass beads for red and pink paint shall meet the requirements for Type I, Gradation A

Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment.

Glass beads shall not be used in black and green paint.

Type III glass beads shall not be used in red and pink paint.

CONSTRUCTION METHODS

620-3.1 Weather limitations. Painting shall only be performed when the surface is dry, and the ambient temperature and the pavement surface temperature meet the manufacturer's recommendations in accordance with paragraph 620-2.1. Painting operations shall be discontinued when the ambient or surface temperatures does not meet the manufacturer's recommendations. Markings shall not be applied when the wind speed exceeds 10 mph unless windscreens are used to shroud the material guns. Markings shall not be applied when weather conditions are forecasts to not be within the manufacturers' recommendations for application and dry time.

620-3.2 Equipment. Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray-type or airless type marking machine with automatic glass bead dispensers suitable for application of traffic paint. It shall produce an even and uniform film thickness and appearance of both paint and glass beads at the required coverage and shall apply markings of uniform cross-sections and clear-cut edges without running or spattering and without over spray. The marking equipment for both paint and beads shall be calibrated daily.

620-3.3 Preparation of surfaces. Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other contaminants that would reduce the bond between the paint and the pavement. Use of any chemicals or impact abrasives during surface preparation shall be approved in advance by the RPR. After the cleaning operations, sweeping, blowing, or rinsing with pressurized water shall be performed to ensure the surface is clean and free of grit or other debris left from the cleaning process.

a. Preparation of new pavement surfaces. The area to be painted shall be cleaned by broom, blower, water blasting, or by other methods approved by the RPR to remove all contaminants, including PCC curing compounds, minimizing damage to the pavement surface.

b. Preparation of pavement to remove existing markings. Existing pavement markings shall be removed by rotary grinding, water blasting, or by other methods approved by the RPR minimizing damage to the pavement surface. The removal area may need to be larger than the area of the markings to eliminate ghost markings. After removal of markings on asphalt pavements, apply a fog seal or seal coat to 'block out' the removal area to eliminate 'ghost' markings.

For areas designated on the Plans to remove existing pavement markings, obliterate 95% of the existing paint markings, and remove foreign substances/contaminates from existing pavement that will affect the bond of the new paint including at least 90% of rubber deposits.

Removal methods used shall not cause major damage to the pavement, or to any structure or utility within or adjacent to the work area. Major damage is defined as changing the properties of the pavement, removal of pavement causing the aggregate to ravel, or removing pavement over 1/8 inch (3 mm) deep. If it is deemed by the RPR that damage to the existing pavement is caused by operational error, such as permitting the application method to dwell in one location for too long, the Contractor shall repair the damaged area without compensation and as directed by the RPR.

No material shall be deposited on the pavement shoulders or infield areas. All wastes shall be immediately collected and disposed-of off airport property.

c. Preparation of pavement markings prior to remarking. Prior to remarking existing markings, loose existing markings must be removed minimizing damage to the pavement surface, with a method approved by the RPR. After removal, the surface shall be cleaned of all residue or debris.

Prior to the application of markings, the Contractor shall certify in writing that the surface is dry and free from dirt, grease, oil, laitance, or other foreign material that would prevent the bond of the paint to the pavement or existing markings. This certification along with a copy of the paint manufacturers application and surface preparation requirements must be submitted to the RPR prior to the initial application of markings.

620-3.4 Layout of markings. The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall be shown on the plans.

620-3.5 Application. First coat of markings shall be painted to allow reopening of the runway or taxiway. A period of 30 days shall elapse between placement of surface course or seal coat and application of the second coat of paint markings. 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 RPR.

The edges of the markings shall not vary from a straight line more than 1/2 inch (12 mm) in 50 feet (15 m), and marking dimensions and spacing shall be within the following tolerances:

Marking Dimensions and Spacing Tolerance

Dimension and Spacing	Tolerance
36 inch (910 mm) or less	±1/2 inch (12 mm)
greater than 36 inch to 6 feet (910 mm to 1.85 m)	±1 inch (25 mm)
greater than 6 feet to 60 feet (1.85 m to 18.3 m)	±2 inch (50 mm)
greater than 60 feet (18.3 m)	±3 inch (76 mm)

Pavement markings or striping with edges that undulate or wavy are not acceptable.

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rate shown in Table 1. The addition of thinner will not be permitted.

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 that is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate shown in Table 1. Glass beads shall not be applied to black paint or green paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Different bead types shall not be mixed. Regular monitoring of glass bead embedment and distribution should be performed.

New permanent markings are comprised of a first coat of markings at the application rate shown in Table 1 with glass beads; then a second coat of markings at the application rate shown in Table 1 with glass beads. The second paint coat is applied after the period of time as indicated under Paragraph 620-3.5. The first and second coats of paint are considered as one application of the markings for payment.

Refresh or re-painting of existing markings shall be a single coat applied with application rate shown in Table 1 with glass beads.

620-3.6 Application--preformed thermoplastic airport pavement markings.

Preformed thermoplastic pavement markings not used.

620-3.7 Control strip. Prior to the full application of airfield markings, the Contractor shall prepare a control strip in the presence of the RPR. The Contractor shall demonstrate the surface preparation method and all striping equipment to be used on the project. The marking equipment must achieve the prescribed application rate of paint and population of glass beads (per Table 1)

that are properly embedded and evenly distributed across the full width of the marking. Prior to acceptance of the control strip, markings must be evaluated during darkness to ensure a uniform appearance.

620-3.8 Retro-reflectance. Reflectance shall be measured with a portable retro-reflectometer meeting ASTM E1710 (or equivalent) provided by the Contractor. A total of 6 reading shall be taken over a 6 square foot area with 3 readings taken from each direction by the Contractor in the presence of the RPR. The average shall be equal to or above the minimum levels of all readings which are within 30% of each other.

Minimum Retro-Reflectance Values

Material	Retro-reflectance mcd/m ² /lux		
	White	Yellow	Red
Initial Type I	300	175	35
Initial Type III	600	300	35
Initial Thermoplastic	225	100	35
All materials, remark when less than ¹	100	75	10

¹ Prior to remarking determine if removal of contaminants on markings will restore retro-reflectance

620-3.9 Protection and cleanup. After application of the markings, all markings shall be protected from damage until dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris, waste, loose reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the RPR. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and federal environmental statutes and regulations.

METHOD OF MEASUREMENT

620-4.1 All work under this section will not be measured for payment.

BASIS OF PAYMENT

620-5.1 Items covered by this section will be paid by lump sum. The contract price paid shall be for full compensation for furnishing and placing all materials and all labor, equipment, tools, and incidentals necessary for each of the construction phases.

Payment will be made under:

<u>Item No.</u>	<u>Description</u>	<u>Unit</u>
02620.1A	Pavement Markings Including Removals (Phases 0 through 3)	Lump Sum
02620.1B	Pavement Markings Including Removals (Phase 4)	Lump Sum

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D476	Standard Classification for Dry Pigmentary Titanium Dioxide Products
ASTM D968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1652	Standard Test Method for Epoxy Content of Epoxy Resins
ASTM D2074	Standard Test Method for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D2240	Standard Test Method for Rubber Property - Durometer Hardness
ASTM D7585	Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments
ASTM E303	Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester
ASTM E1710	Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer
ASTM E2302	Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

Code of Federal Regulations (CFR)

40 CFR Part 60, Appendix A-7, Method 24

Determination of volatile matter content, water content, density,
volume solids, and weight solids of surface coatings

29 CFR Part 1910.1200 Hazard Communication

Federal Specifications (FED SPEC)

FED SPEC TT-B-1325D Beads (Glass Spheres) Retro-Reflective

FED SPEC TT-P-1952F Paint, Traffic and Airfield Marking, Waterborne

FED STD 595 Colors used in Government Procurement

Commercial Item Description

A-A-2886B Paint, Traffic, Solvent Based

Advisory Circulars (AC)

AC 150/5340-1 Standards for Airport Markings

AC 150/5320-12 Measurement, Construction, and Maintenance of Skid Resistant
Airport Pavement Surfaces

END OF ITEM P-620

END OF SECTION 02620