

**SECTION 709**  
**TWO REACTIVE COMPONENTS PAVEMENT MARKINGS**

**709-1 Description.**

Apply two reactive components pavement markings in accordance with the Contract Documents.

**709-2 Materials.**

Use only materials listed on the Department's Approved Product List (APL) as an approved system and meeting the following requirements:

Two Reactive Components .....	971-1 and 971-8
Retroreflective Elements* .....	971-1.7
Glass Spheres* .....	971-1 and 971-2

\*Use only retroreflective elements or glass spheres recommended by the manufacturer.

The Engineer will take random samples of the materials in accordance with the Department's Sampling, Testing and Reporting Guide schedule.

**709-3 Equipment.**

Use equipment that will produce continuous uniform dimensions of pavement markings of varying widths and meets the following requirements:

1. Capable of traveling at a uniform, predetermined rate of speed, both uphill and downhill, to produce a uniform application of the two reactive components material and capable of following straight lines and making normal curves in true arcs.
2. Capable of applying retroreflective elements or glass spheres to the surface of the completed line by an automatic retroreflective element dispenser attached to the pavement marking machine such that the retroreflective elements or glass spheres are dispensed closely behind the installed line. Use a retroreflective element or glass sphere dispenser equipped with an automatic cut-off control that is synchronized with the cut-off of the material and applies the retroreflective elements or glass spheres in a manner such that the retroreflective elements or glass spheres appear uniform on the entire pavement markings surface.
3. Capable of providing the manufacturer's recommended mixing ratio between the components in a thorough and consistent manner.

**709-4 Application.**

**709-4.1 General:** Remove existing pavement markings, such that scars or traces of removed markings will not conflict with new pavement markings by a method approved by the Engineer.

Before applying pavement markings, remove any material by a method approved by the Engineer that would adversely affect the bond of the pavement markings.

Offset longitudinal lines at least 2 inches from construction joints of portland cement concrete pavement.

Apply pavement markings to dry surfaces only, and when the ambient air and surface temperature is at least 40°F and rising.

Do not apply two reactive components pavement markings when winds are sufficient to cause spray dust.

Apply two reactive components pavement markings to the same tolerances in dimensions and in alignment specified in 710-5. When applying two reactive components pavement marking over existing markings, ensure that not more than 2 inches on either end and not more than 1 inch on either side of the existing line is visible.

Apply the two reactive components pavement markings to the pavement in accordance with the manufacturer's instructions or as directed by the Engineer.

Conduct field tests in accordance with FM 5-541. Take test readings representative of the pavement marking performance. Remove and replace two reactive components pavement markings not meeting the requirements of this Section at no additional cost to the Department.

Apply all final pavement markings prior to opening the road to traffic.

**709-4.2 Thickness:** Apply two reactive components pavement markings to attain a minimum wet film thickness in accordance with the manufacturer's recommendations as identified on the APL.

Measure, record and certify on a Department approved form and submit to the Engineer, the thickness of white and yellow pavement markings in accordance with FM 5-541.

**709-4.3 Retroreflectivity:** Apply white and yellow two reactive components pavement markings that will attain an initial retroreflectivity of not less than 450 mcd/lx·m<sup>2</sup> and not less than 350 mcd/lx·m<sup>2</sup>, respectively for all longitudinal lines.

Measure, record and certify on the Department approved form and submit to the Engineer, the retroreflectivity of white and yellow two reactive components pavement markings in accordance with FM 5-541.

**709-4.4 Color:** Use materials that meet the requirements of 971-1.

**709-4.5 Retroreflective Elements or Glass Spheres:** Apply retroreflective elements or glass spheres to all white and yellow two reactive components pavement markings, at the rates determined by the manufacturer's recommendations as identified on the APL.

#### **709-5 Contractor's Responsibility for Notification.**

Notify the Engineer prior to the placement of the materials. At the time of notification, submit a certification to the Engineer with the APL number and the batch or Lot numbers of the materials and retroreflective elements or glass spheres to be used. Packaging labels that contain the information required by 971-1.1 will be accepted in lieu of a certification.

#### **709-6 Protection of Newly Applied Pavement Markings.**

Do not allow traffic onto or permit vehicles to cross newly applied pavement markings until they are sufficiently dry. Remove and replace any portion of the pavement markings damaged by passing traffic or from any other cause, at no additional cost to the Department.

#### **709-7 Observation Period.**

Longitudinal pavement markings are subject to a 180 day observation period under normal traffic. The observation period shall begin with the satisfactory completion and acceptance of the work.

The longitudinal pavement markings shall show no signs of failure due to blistering, excessive cracking, chipping, discoloration, poor adhesion to the pavement, loss of retroreflectivity or vehicular damage. The retroreflectivity shall meet the initial requirements of 709-4.3. The Department reserves the right to check the retroreflectivity any time prior to the end of the observation period.

Replace, at no additional expense to the Department, any longitudinal pavement markings that do not perform satisfactorily under traffic during the 180 day observation period.

#### **709-8 Corrections for Deficiencies.**

Correct all deficiencies by removal and reapplication of a one mile section centered around the deficiency, as determined by the Engineer, at no additional cost to the Department.

#### **709-9 Submittals.**

**709-9.1 Submittal Instructions:** Prepare a certification of quantities, using the Department's current approved form, for each project in the Contract. Submit the certification of quantities and daily worksheets to the Engineer. The Department will not pay for any disputed items until the Engineer approves the certification of quantities.

**709-9.2 Contractor's Certification of Quantities:** Request payment by submitting a certification of quantities no later than Twelve O clock noon Monday after the estimate cut-off date or as directed by the Engineer, based on the amount of work done or completed. Ensure the certification of quantities consists of the following:

1. Contract Number, FPID Number, Certification Number, Certification Date and the period that the certification represents.
2. The basis for arriving at the amount of the progress certification, less payments previously made and less any amount previously retained or withheld. The basis will include a detailed breakdown provided on the certification of items of payment.

#### **709-10 Method of Measurement.**

The quantities, authorized and acceptably applied, under this Section will be paid as follows:

1. The length, in gross miles, of solid, 10'-30' skip, and 3'-9' dotted, 6'-10' dotted, 2'-2' dotted, and 2'-4' dotted lines.
2. The area, in square feet, for removal of existing markings acceptably removed. Payment for removal of conflicting markings will be in accordance with 102-5.8. Payment for removal of non-conflicting markings will be paid separately.

The gross mile measurement will be taken as the distance from the beginning of the two reactive component line to the end of the two reactive component line and will include the unmarked gaps for skip and dotted lines. The gross mile measurement will not include designated unmarked lengths at intersections, turn lanes, etc. Final measurement will be determined by plan dimensions or stations, subject to 9-1.3.1.

#### **709-11 Basis of Payment.**

Price and payment will be full compensation for all work specified in this Section, including, all cleaning and preparing of surfaces, furnishing of all materials, application, curing and protection of all items, protection of traffic, furnishing of all tools, machines and equipment, and all incidentals necessary to complete the work. Final payment will be withheld until all deficiencies are corrected.

Payment will be made under:

Item No. 709	Two Reactive Components
	Solid - per gross mile.
	Skip - per gross mile.
	Remove - per square foot.