ITEM 646 EPOXY PAVEMENT MARKING

646.01 Description. This work consists of furnishing and applying epoxy pavement markings according to Item 641, 740.01, 740.07, 740.09, and the additional requirements specified below.

Store and handle epoxy material according to all the applicable EPA and local environmental regulations and the manufacturer's recommendations.

646.02 Materials. Furnish materials from the City's QPL conforming to:

Epoxy pavement markings 740.07
Glass beads, Type D..... 740.09

The Engineer may obtain random samples from the application equipment.

Furnish the manufacturer's identification information for the sampled liquid materials. The City will test the quality assurance sample for conformance to the manufacturer's production ranges. For samples not meeting the manufacturer's production ranges, re-apply, at no cost to the City, any markings using that sample. The City will consider all other untested batches to be not approved materials and will either require testing or re-application.

Do not apply material that has exceeded the manufacturer's shelf life. Do not use glass beads that are wet.

646.03 Equipment.

A. General. Equip all striping equipment for center line, lane line and edge line markings with a computerized Data Logging System (DLS) conforming to 641.04 when the length of marking exceeds 0.5 miles (0.8 km) of continuous line equivalent.

Furnish written documentation to the Engineer for the equipment's operational capabilities from the equipment manufacturer.

Use equipment to apply epoxy pavement markings that has the following capabilities and features:

1. Capable of mixing the epoxy components in proportions recommended by the manufacturer and applying glass beads simultaneously with line placement.

2. Capable of applying epoxy at the specified thickness, width, and pattern.

3. Individual material reservoirs, or space, for the storage of Part A and Part B of the epoxy.

4. Heating equipment of sufficient capacity to maintain the epoxy components at the manufacturer's recommended temperature, and to produce the required amount of heat at the mixing head and gun tip and maintain those temperatures with the tolerances recommended by the epoxy manufacturer for the spray application.

5. Adequate individual tanks for the storage and dispensing of Size I and Size II glass beads.

6. Individual dispensers for the simultaneous application of Size I and Size II glass beads at specified rates.

7. Individual metering devices on the proportioning pumps (one indicator per pump) and stroke counters to monitor gallon (liter) usage. Ensure that these devices are clearly visible.

8. All the necessary spray equipment mixers, compressors, and other appurtenances to allow for the placement of reflectorized pavement marking systems in a simultaneous sequence of operations.

9. A minimum 24-inch (600 mm) long static mixer unit or an equivalent system that produces properly mixed material.

10. A completely enclosed flush and purge system to clean the lines and the guns without expelling any of the solution into the environment.

B. Long Line Equipment. Furnish a striper to apply long line epoxy markings that is:

1. Truck-mounted and self-contained.

2. Designed to spray the epoxy and glass beads in continuous and skip line.

3. Maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc.

C. Auxiliary Marking Equipment. Furnish application equipment for auxiliary markings by either of the following two methods:

1. Equip the striper with accessories for applying auxiliary markings.

2. Use a portable applicator approved by the Engineer.

D. Documentation Requirements. Furnish the Engineer documentation from the manufacturer that the equipment meets all requirements of 646.03. Demonstrate the equipment has the capability to obtain the manufacturer's required temperature for the mixed components and the required temperature at the lines and gun.

646.04 Cleaning and Surface Preparation.

A. General. Before applying epoxy, clean and prepare the pavement surface in the following sequence:

1. Remove all debris, oil, and any other contaminants that may hinder the adhesion of the epoxy to the pavement.

2. Use a power-broom to clean the pavement.

3. Remove residue and debris with blasts of compressed air.

4. Follow any additional manufacturer's recommendations for surface preparation.

Perform operations in such a manner that the finished pavement surface is not damaged or unnecessarily scarred or left in a pattern that will mislead or misdirect the

motorist and that minimizes airborne dust. Avoid damage to transverse and longitudinal joint sealers.

B. Asphalt Concrete Pavements. In addition to the requirements of 646.04.A, the following apply.

Wait 48 hours after the placement of polymer modified asphalt-concrete pavement before preparing it for epoxy pavement markings.

For any other type of modified asphalt or for open graded friction course asphalts, contact the manufacturer for surface preparation recommendations. Furnish the Engineer copies of the manufacturer's recommendations.

Lightly abrade any new asphalt concrete pavement containing SBS, SBR latex or SMA latex polymer modifiers without scarring the area between the broken lines to the manufacturer's recommendations to remove polymer surface film to ensure proper bonding. In no case shall the removal of the polymer surface film be less than that required for the epoxy to properly bond and adhere.

C. Portland Cement Concrete Pavements. On new portland cement concrete pavements, do not begin cleaning operations until a minimum of 30 days after the placement of concrete, unless otherwise directed by the Engineer. In addition to the requirements of 646.04.A, the following apply.

Remove all curing compound and laitance on the concrete surface and in any textured pavement valleys.

Round the profiles of the peaks of textured pavement and remove sharp edges and irregularities.

Acceptable removal methods are:

1. Sand blasting with containment.

2. Lightly abrading the surface without scarring the surrounding surface. This must be demonstrated before the application and approved by the Engineer.

3. Blast track cleaning.

4. High-pressure water blasting (greater than 5000 psi [34 450 kPa]) with or without abrasives and with sufficient time to allow the pavement to dry before applying epoxy markings.

5. Other methods approved by the Engineer.

Contain and dispose of all the removal debris.

D. Removal of Existing Markings. When placing epoxy markings in the same place as existing pavement markings, remove at least 95 percent of the existing pavement markings. Use a removal method that results in little or no color and texture changes in the surrounding pavement.

E. Preparation Area.

1. Lines. Prepare an area that is the width of the new pavement marking, or existing line, plus 1-inch (25 mm) on each side and the length of broken lines plus 12 inches (300 mm) on each end.

2. Arrows, Letters, and Symbols. When cleaning for letters and symbols, prepare an area that is sufficiently large to accommodate the new marking, or to remove the existing marking.

646.05 Application. Apply epoxy only when the surface is clean and dry and when the pavement and air temperature are above 50 ºF (10 ºC). Transfer the entire contents of each material container to the striper tanks. Keep the epoxy thoroughly mixed at all times during application. Before any application, test and record the pavement surface temperature, air temperature. Retest and record every 4 hours of operation. Demonstrate to the Engineer the testing devices including DLS are accurate and operational.

Apply epoxy uniformly to the surface to be marked at a rate specified below. To achieve the rate, ensure that the thickness of the applied epoxy is 20 mils (0.51 mm).

20 Mil Thickness	Line Width (inch)				
	4	5	10	20	24
	Gallon per Mile of Line				
Solid Line	22	27.5	55	110	132
Broken Line	5.5	6.88	13.75	27.5	33
Dotted Line	5.5	6.88	13.75	27.5	33
Areas, Symbols, Words	1.25 gallon per 100 square feet				

0.51 mm Thickness	Line Width (mm)				
	100	127	254	508	600
	Liter per Kilometer of Line				
Solid Line	50	62.5	125	250	300
Broken Line	12.5	15.75	31.5	63	75
Dotted Line	12.5	15.75	31.5	63	75
Areas, Symbols, Words	0.51 L/m²				

Do not dilute the epoxy.

Apply enough glass beads to the uncured epoxy so that the beads completely fill the epoxy film from the film-pavement interface to the top surface of the film to the extent that there are loose beads on the surface of the uncured line. Apply glass beads at a minimum rate of 31 pounds per 100 square feet (15 kg per 10 m^2) of epoxy to achieve uniform retroreflectivity. Drop glass beads onto the epoxy in a double-drop system with the large gradation (Size I) first and the regular gradation (Size II) second in the same pass of the equipment. Apply the beads in equal amounts by weight.

Cease operations when any of the following conditions are observed:

A. The marking does not consistently dry to a no-track condition.

B. The marking has cyclical soft spots.

Resume marking operations when the Engineer is satisfied the problem is corrected.

Replace unsatisfactory markings according to 641.11.

Furnish the Engineer daily, biweekly and final DLS reports according to 641.04.

646.07 Basis of Payment. The cost of cleaning and surface preparation according to 646.04 is included in the unit bid cost for the various pavement markings.

646.07

The City will pay for accepted quantities at the contract prices, or prices adjusted according to 641.11, measured according to 641.12, with the provisions specified in 641.13, and as follows:

Item	Unit	Description
646	Mile (Kilometer)	Edge Line
646	Mile (Kilometer)	Lane Line
646	Mile (Kilometer)	Center Line
646	Foot (Meter)	Channelizing Line
646	Foot (Meter)	Stop Line
646	Foot (Meter)	Crosswalk Line646 Foot (Meter) Transverse/Diagonal Line
646	Foot (Meter)	Curb Marking
646	Square Foot (Square Meter)	Island Marking
646	Each	Handicap Symbol Marking
646	Each	Railroad Symbol Marking
646	Each	School Symbol Marking, ___ inch (___ mm)
646	Foot (Meter)	Parking Lot Stall Marking
646	Each	Lane Arrow
646	Each	Lane Drop Arrow
646	Each	Word on Pavement, ___ inch (___ mm)
646	Foot	Dotted Line
646	Each	Bike Marking
646	Each	Speed Hump Marking
646	Each, Foot, (Meter) Square Foot (Square Meter)	Removal of Pavement Marking
646	Lump Sum	Two-Way Radio Equipment