

SCOPE OF WORK

E1. INTENT

The intent of this invitation to bid is to establish an annual requirements contract for thermoplastic pavement markings on specified City of Arlington roadways according to City of Arlington and Texas Department of Transportation (TxDOT) specifications. Thermoplastic materials are classified by TxDOT as a Type I pavement marking material, where materials are furnished in accordance with DMS-8220 and tested using Test Method Tex-863-B. The thermoplastic materials shall be homogeneously composed of pigment, filler, resins, and glass reflectorized spheres, and shall be available in yellow and white.

E2. SERVICE LEVEL REQUIREMENTS

Whenever yellow centerline markings are removed and cannot be remarked the same day, contractor shall place temporary tabs to imitate the centerline until permanent markings are in place. In addition, all other existing pavement markings that require being removed and retraced shall not be removed unless contractor is able to replace them within 48 hours, weather permitting. If contractor cannot reinstall pavement markings within 48 hours of their removal, contractor shall place temporary tabs to simulate the proposed markings. Liquidated damages in the amount of \$500 per day beyond the 48 hours can be assessed by the City for failure to either reinstall the markings or ensure temporary tabs are placed.

Contractor shall have a maximum of five (5) business days to be ready to begin placement of pavement markings each time they are contacted by the City. Liquidated damages in the amount of \$500 per day beyond the five (5) business days can be assessed by the City for failure to mobilize crews in the specified time.

E3. QUALITY ASSURANCE

The Engineer reserves the right to require the contractor to perform quality assurance testing necessary to determine compliance with these specifications. Testing required shall be by industry standard and shall be the responsibility of the Contractor and performed at no cost to the City of Arlington.

E4. MATERIALS

1. Type I Marking Materials: Type I markings are thermoplastic type materials that require heating to elevated temperatures for application. Type I marking materials shall conform to current and appropriate TxDOT Materials Specifications. Each container of Type I marking material shall be clearly marked to indicate the color, weight, type of material, manufacturer's name and the lot/batch number.
2. Type II Marking Materials: Type II markings are paint-type materials that are applied at ambient or slightly elevated temperatures. Type II marking materials shall conform to current and appropriate TxDOT Materials Specifications.

3. Source of Supply: All materials, including all glass beads, shall be purchased from a viable and legitimate manufacturer.

E5. EQUIPMENT REQUIREMENTS

1. Be maintained in satisfactory operating condition.
2. Be considered in satisfactory operating condition if it has an average placement rate of 5,000 linear feet per hour of acceptable four-inch solid or broken lines over any five (5) consecutive working days.
3. Meet or exceed the material handling at elevated temperature requirements of TxDOT, the National Board of Fire Underwriters and the Texas Railroad Commission.
4. Be capable of placing a minimum of 40,000 linear feet of four-inch solid or broken markings per working day at the specified thickness.
5. Have production capabilities similar to four-inch marking equipment and shall be capable of placing linear markings up to eight inches (8") in width in a single pass when used for placing markings in widths other than four inches (4").
6. Have production capabilities considered satisfactory by the City of Arlington (Engineer) when used to place markings other than solid or broken lines.
7. Be capable of placing broken and/or continuous white line from both sides.
8. Be capable of placing lines with clean edges and of uniform cross-section and thickness. All lines shall have a tolerance of plus or minus 1/8 inch per four inch (4") width.
9. Have an automatic cut-off device with manual operating capabilities to provide clean, reasonably square marking ends to the satisfaction of the Engineer, and to provide a method of applying broken line in an approximate stripe-to-gap ratio of 10 to 30. The length of the stripe shall not be less than 10 feet or more than 10.5 feet. The total length of any stripe-gap cycle shall not be less than 39.5 feet or more than 40.5 feet.
10. Provide continuous mixing and agitation of the pavement marking materials. The use of pans, aprons or similar appliances, which the die overruns, will not be permitted for longitudinal striping applications.
11. Apply glass beads by an automatic bead dispenser attached to the pavement marking equipment in such a manner that the beads are dispensed uniformly and almost instantly upon the marking as the marking is being applied to the road surface. The bead dispenser shall have an automatic cut-off control, synchronized with the cut-off of the pavement marking equipment.

12. When Type I markings are to be placed, the Contractor shall have a hand-held thermometer on the project. The thermometer shall be capable of measuring the temperature of the pavement marking material to be placed.

E6. CONSTRUCTION METHODS

1. General: When required by the Engineer, the Contractor and the Engineer shall review the sequence of work to be followed and the estimated progress schedule.

Markings may be placed on roadways either free of traffic or open to traffic. On roadways already open to traffic, the markings shall be placed under traffic conditions that exist with a minimum of interference to the operations of the facility. Traffic Control shall follow the guidelines set forth in the City of Arlington Work Area Traffic Control Manual. All markings placed under open-traffic conditions shall be protected from traffic damage and disfigurement.

Guides to mark the lateral location of pavement markings shall be established as shown on the plans or as directed by the Engineer. The Contractor shall establish the pavement marking guides and the Engineer will verify the location of the guides.

Markings shall be placed in proper alignment with the guides. The deviation rate in alignment shall not exceed one inch (1") per 200 feet of roadway. The maximum deviation shall not exceed two inches (2") nor shall any deviation be abrupt.

Markings shall essentially have a uniform cross-section. The density and quality of markings shall be uniform throughout their thickness. The applied markings shall have no more than five percent (5%), by area, of holes or voids and shall be free of blisters.

Markings, in place on the roadway, shall be reflectorized both internally and externally. Glass beads shall be applied to the materials at a uniform rate sufficient to achieve uniform and distinctive retro reflective characteristics when observed in accordance with current TxDOT methods and specifications.

The Contractor's personnel shall be sufficiently skilled in the work of installing pavement markings.

Markings placed that are not in alignment or sequence shall be removed by the Contractor at the Contractor's expense. Removal shall be in accordance with current TxDOT specifications. Guides placed on the roadway for alignment purposes shall not establish a permanent marking on the roadway.

2. Surface Preparation: New Portland cement concrete surfaces shall be cleaned in accordance with current TxDOT standards and specifications necessary to remove curing membrane, dirt, grease, loose and/or flaking existing construction markings, and other forms of contamination.

Older Portland cement concrete surfaces and asphaltic surfaces that exhibit loose and/or flaking existing markings shall be cleaned in accordance with the following section "Pavement Surface Preparation for Markings," to remove all loose and flaking markings.

Apply markings on pavement that is completely dry and passes the following tests:

- a. Type I Marking Application—Place a sample of Type I marking material on a piece of tarpaper placed on the pavement. Allow the material to cool to ambient temperature, and then inspect the underside of the tarpaper in contact with the pavement. Pavement will be considered dry if there is no condensation on the tarpaper.
- b. Type II Marking Application--Pavement shall be considered dry if, on a sunny day after observation for 15 minutes, no condensation occurs on the underside of a one foot (1') square piece of clear plastic that has been placed on the pavement and weighted on the edges.

3. Application of Type I Markings: New Portland cement concrete surfaces shall be further prepared for Type I markings, after cleaning, by placing a Type II marking as a sealer in accordance with this section. When placing Type I markings in new locations on asphaltic surfaces three (3) years old or older or any Portland cement concrete surfaces, a Type II marking shall be used as a sealer. Unless otherwise shown on the plans, existing Portland cement concrete and asphaltic surfaces to be restriped will not require Type II markings as a sealer; existing markings may be used as a sealer in lieu of Type II markings. Type II markings shall be placed a minimum of two (2) and a maximum of 30 calendar days in advance of placing Type I markings. Type II markings which become dirty due to inclement weather or road conditions shall be cleaned by washing, brushing, compressed air or other means approved by the Engineer, prior to application of Type I markings. If washing is used, the surface of Type II markings must be thoroughly dry before placing Type I markings. Color, location and configuration of Type II markings shall be the same as that of Type I markings.

Type I pavement marking material shall be applied within temperature limits recommended by the material manufacturer. Application of Type I pavement markings shall be done only on clean, dry pavement having a surface temperature above 50°F. Pavement temperature shall be measured in accordance with Test Method Tex-829-B of TxDOT Manual of Testing Procedures.

When Type I pavement marking application is by spray, and operations cease for five (5) minutes or more, the spray head shall be flushed by spraying pavement marking material into a pan or similar container until the pavement marking material being sprayed is at the proper temperature for application.

Unless otherwise directed by the Engineer, Type I pavement marking materials shall not be placed on roadways between September 30 and March 1, subject to temperature and moisture limitations specified herein.

Unless otherwise shown on the plans, Type I marking minimum thickness shall be 0.060 inches (60 mils) for edge line markings and 0.090 inches (90 mils) for stop-bars, legends, symbols, gore and center-line/no-passing barrier-line markings, when measured in accordance with Test Method Tex-854-B of TxDOT Manual of Testing Procedures. The maximum thickness of all Type I markings shall be 0.180 inches (180 mils). The markings shall be of uniform thickness throughout their lengths and widths.

4. Application of Type II Markings: The application of Type II marking materials shall be done only on surfaces with a minimum surface temperature of 50°F.

The application rate for Type II marking material shall be between 15 and 20 gallons per mile of solid four inch (4") line and between 30 and 40 gallons per mile for solid eight inch (8") line except that for new surface treatment projects the application rate shall be between 25 and 30 gallons per mile of solid four inch (4") line and between 40 and 50 gallons per mile for solid eight inch (8") line.

Pavement markings for new surface treatment projects shall be applied in two (2) applications each approximately one-half the application rate. The first application shall not contain glass beads. The interval between the first and second applications shall be a minimum of one (1) hour.

When, in the case of impending inclement weather, and the Engineer directs the Contractor to apply water-based traffic paint, the markings are damaged by subsequent rain, sleet, hail, etc., the Contractor will be paid for the initial placement and the replacement markings. However, if the Contractor places the markings at his option, the Contractor is responsible for all costs associated with the replacement markings.

E7. PERFORMANCE PERIOD FOR TYPE I MARKINGS

Type I pavement markings shall meet all requirements of this specification for a minimum of 365 calendar days after installation. Pavement markings that fail to meet all requirements of this specification shall be removed and replaced by the Contractor at the Contractor's expense. The Contractor shall replace all pavement markings failing the requirements of this specification within 30 calendar days following notification by the Engineer of such failing. All replacement markings shall also meet all requirements of this specification for and during the original time-line of 365 calendar days.

E8. PAVEMENT SURFACE PREPARATION FOR MARKINGS

1. DESCRIPTION: This item shall govern for surface preparation of pavement surface areas prior to placement of pavement markings or raised pavement markers.
2. MATERIALS: Abrasive blasting medium, when used, shall be a quality commercial product capable of producing the specified surface cleanliness without the deposition of deleterious materials on the cleaned surface. Water used in blasting operations shall be potable.

3. **EQUIPMENT:** Equipment shall be in good condition. Air compression equipment shall utilize moisture and oil traps, in working order, of sufficient capacity to remove contaminants from blasting air and prevent the deposition of moisture, oil or other contaminants on the roadway surface.

4. **CONSTRUCTION METHODS:** Widths, lengths and shapes of the prepared surfaces shall only be of sufficient size to include the full area of pavement markings or raised pavement markers shown on the plans.

Surface preparation of Portland cement concrete surfaces shall be sufficient to remove contaminants. Damage to the roadway surface due to over-blasting shall be held to a minimum. Asphaltic pavement surfaces shall be cleaned by brushing, washing, compressed air, high pressure water or any combination thereof to remove all forms of contamination and loose materials. All other surfaces are to be cleaned by approved pavement surface preparation methods which are sweeping, air blasting, flail milling, and blast cleaning unless otherwise specified on the plans. All surfaces shall be cleaned sufficiently to remove loose and flaking materials from the roadway surface.

For concrete pavement surfaces, in addition to the above, air blast after the removal of contamination or existing material and just prior to placing the stripe. Perform the air blasting with a compressor that is capable of generating compressed air at a minimum of 150 cfm and 100 psi using 5/16-in. or larger hosing for the air blast.

When existing markings are encountered, they shall be cleaned sufficiently to remove all loose and flaking materials. Small spots of old markings or contaminants of up to 0.5 square inch in area may remain if the contaminant is not removed by the following test:

Air-blast the surface to be tested to simulate blasting during application of markings. Firmly press a ten-inch (10") long, two-inch (2") wide strip of monofilament tape onto the surface to be tested, leaving approximately two inches (2") free. Grasp the free end and remove the tape with a sharp pull.

Blasting pressure and technique shall be controlled to prevent damage to the pavement surface. Portland cement concrete surfaces shall not be cleaned by grinding.

E9. MEASUREMENT

This item will be measured by the linear foot (LF), by each of the various words, symbols or shapes, or by any other unit as shown on the plans.

Type II pavement markings requiring two (2) applications on new surface treatments will be measured as one (1) marking.

Type II pavement marking materials, when used as a sealer for Type I markings will be considered as part of Type II markings.