

## 640 PAVEMENT MARKING

### ITEM 641 - PAVEMENT MARKING- GENERAL

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**641.01 Description.** These specifications include general requirements for pavement markings regardless of the type of pavement marking material used. Deviations from these general requirements will be covered in the specific requirements for each material.

This work shall consist of furnishing all materials, equipment and labor necessary for the required pavement preparation and application of uniformly retro-reflective pavement marking materials in accordance with the plans or as described herein. All pavement markings shall conform with the requirements of the "Ohio Manual of Uniform Traffic Control Devices for Streets and Highways".

**641.02 Materials.** Minimum material performance requirements and chemical and physical properties are stated in Section 740 and the Invitation for Samples for the service test performed in accordance with ODOT Supplement 1047.

Materials shall conform to the following:

|                                    |                   |
|------------------------------------|-------------------|
| Traffic paint (642) .....          | 740.02 or 740.02A |
| Polyester (643) .....              | 740.03            |
| Thermoplastic (644) .....          | 740.04 or 740.04A |
| Preformed (645) .....              | 740.05 or 740.05A |
| Heat applied preformed (645) ..... | 740.06 or 740.06A |
| Glass beads (642, 643).....        | 740.10 or 740.10A |
| Glass beads (644, 645).....        | 740.20 or 740.20A |

A material safety data sheet for each material, including resin, catalyst, primer, adhesive, activator, glass beads and cleaning solvent, to be used on the project shall be furnished by the Contractor to the Engineer prior to material delivery. The applicator

shall maintain current material safety data sheets for all materials present with this work in an immediately accessible location.

**641.03 General.** Lines shall be applied as solid, dashed or dotted stripes, either singly or in combination, as shown on the plans. Dashed lines shall be applied in a 40 foot (12.2 m) cycle consisting of a 10 foot (3.0 m) dash and a 30 foot (9.1 m) gap between dashes, unless otherwise shown on the plans. The Contractor shall use an accurate dashing mechanism, which is capable of being easily adjusted to retrace existing dashed markings or to apply new materials at the correct spacing. Dashed lines which are to be applied over plainly visible existing dashed lines shall begin within 6 inches (152 mm) of the beginning of the existing dash, unless otherwise directed by the Engineer. Dotted lines shall be applied in a 6 foot (1.8 m) cycle consisting of a 2 foot (0.6 m) dot and a 4 foot (1.2 m) gap between dots.

Gaps not marked as a result of template use for auxiliary markings shall be filled with marking material after template removal.

Pavement markings shall be free of uneven edges, overspray, or other readily visible defects which detract from the appearance or function of the pavement markings.

Lines shall be sharp, well defined, and uniformly retro-reflective. The width of line applied shall be the width specified plus or minus 1/4 inch (6.4 mm). Fuzzy lines, excessive overspray, or non-uniform application are unacceptable. Lines shall be inspected at night by the Engineer to verify proper retroreflectivity. Pavement markings which are improperly applied, located, or reflectorized shall be corrected. Lines applied with insufficient material quantities shall be properly reapplied or shall be subject to acceptance with deduction as provided in Section 641.11. Improperly located lines shall be removed in accordance with Section 641.10; new lines shall then be applied in the correct locations at the Contractor's expense, including the furnishing of approved materials. Material dropped in spaces between dashes shall be removed in accordance with 641.10 at the Contractor's expense.

Methods and equipment used for pavement preparation, marking, and marking removal shall be subject to the approval of the Engineer. Glass beads shall be kept dry during storage and prior to use.

The Contractor shall furnish to the Engineer copies of current manufacturer's instructions and recommendations for application of any marking material, including primer, activator, catalyst and adhesive, called for in the plans. Other construction work such as shoulder paving, seeding and mulching shall be scheduled and performed in a manner to avoid damage to applied pavement markings.

Pavement marking materials shall not be applied to the prismatic reflector unit housed in the casting of a plowable pavement marker. The Contractor shall interrupt the application of the pavement marking line at each raised pavement marker where marking material would when otherwise be applied to the marker prismatic reflector. The

maximum gap in the marked line at each marker shall be 18 inches (457 mm) when pavement marking material has been applied to a prismatic reflector surface, the reflector shall be replaced at the Contractor's expense the same working day.

Drawings describing a device developed by the Ohio Department of Transportation, to detect and interrupt marking at a plowable raised pavement marker are available from the ODOT Bureau of Traffic. This device is compatible with commercial pavement marking application equipment employing electropneumatic valves to control material flow.

**641.04 Equipment.** The Contractor shall be responsible for measurement of the work in accordance with the following requirements. The Contractor's pavement marking equipment, other than for preformed material, shall be equipped with an odometer graduated to one-one hundredth of a mile. The Engineer will determine the degree of accuracy of the Contractor's odometer and establish an adjustment factor as may be required to accurately determine the pay item quantities. The Engineer will periodically check the odometer operation to assure maintenance of accurate measurements.

Failure of the odometer to function properly shall be cause to stop the work until the odometer is made to function properly. On short projects, the Engineer may approve alternate methods to accurately measure the length of various types of markings applied. When measuring lane, edge and center line marking, the odometer shall be started at the first marked line and remain in operation until the end of section being marked, where it shall be shut off and the reading of the odometer recorded.

Electrical foot counters shall be provided and installed on the striper. The counters shall individually tabulate the amount of footage applied by each striping gun whether solid or dashed. The counters shall be 6 digit type with a reset feature.

**641.05 Pavement Preparation.** The Contractor shall clean all visible loose or foreign material from the surface to be marked. The pavement marking equipment shall be equipped with an air jet to remove all debris from the pavement in advance of the applicator gun. The air jet shall operate when marking material is being applied and be synchronized with marking material application. The Contractor shall power broom clean all surfaces where gore markings or edge lines are to be applied. When required by the Engineer, other surfaces shall also be power broom cleaned. Marking shall not be applied to Portland cement concrete until the concrete in the areas to be marked is clean of membrane curing material and is dry.

**641.06 Layout and Premarking.** The Contractor shall lay out the locations of all lines, words and other symbols to assure their proper placement. The layout and premarking lines shall be approved by the Engineer before marking operations are started. When applying longitudinal or transverse lines, the Contractor shall use existing lines, construction joints or premarking to guide his marking equipment.

On projects where resurfacing or other operations will result in obliteration of the existing pavement markings, the Contractor shall establish reference points to assure proper placement of restored markings. When existing markings are to be retraced, it shall be the responsibility of the Contractor to verify any adjustment in the location with the Engineer.

"T" marking of no-passing zones shall be established by the Contractor in accordance with the contract plans or a no-passing zone log provided by the Engineer.

Premarking shall be located from survey data or reference points and offset so as to parallel the theoretical edge of the marking lines at a maximum distance of 1 inch. Templates are required for the layout of arrows, words and other symbols. Premarking for longitudinal lines shall be placed at a maximum of 40 foot (12.2 m) intervals and shall not exceed 2 inches (50 mm) in width or 12 inches (305 mm) in length. Premarking for auxiliary markings shall be located from the plans or schematic forms provided by the Engineer.

**641.07 Line Placement Tolerances.** Pavement marking lines shall be straight or smoothly curved, true to the alignment of the pavement, and shall not deviate laterally from the proper location at a rate of more than 2 inches (50 mm) in 100 feet (30.5 m). No deviation greater than 3 inches (76 mm) will be permitted.

**641.08 Line Types.** Marking materials shall be applied at the rate specified herein and shall, except for parking lot stall markings, be uniformly retro-reflective.

**Edge Lines.** Edge lines shall be continuous stripes, 5 inches (127 mm) in width. Center of stripe shall be located 6 inches (152 mm) from the edge of the pavement.

**Lane Lines.** Lane lines shall be 5 inch wide (127 mm) white stripes between contiguous lanes of pavement carrying traffic in the same direction. They shall be dashed unless specified solid. They shall be offset to the left of the longitudinal joint, if present, or the theoretical line lying between contiguous lanes, if a joint is not present. The nearer edge of the stripe shall be 2 inches (50 mm) to the left of the joint or line.

**Center Lines.** Center lines shall be single or double yellow stripes between contiguous lanes of pavement carrying traffic in opposite directions. Center line marking shall also include two-way left-turn lane striping and the outline of left-turn island. Each stripe shall be 5 inches (127 mm) wide, solid or dashed, with a 5 inch (127 mm) space between lines.

**Channelizing Lines.** Channelizing lines shall be continuous white stripes 10 inches wide.

**Stop and Crosswalk Lines.** Stop lines shall be solid white stripes 20 inches (508 mm) wide. Crosswalk lines shall be solid white stripes 10 inches (254 mm) wide.

**Transverse Lines.** Transverse lines shall be solid stripes 20 inches (508 mm) wide, of the color specified, and placed at a 45 degree angle to the direction of travel.

**Curb and Island Marking.** Exposed surfaces and curbs and paved islands shall be prepared in accordance with 641.05. In addition, the Contractor shall remove all visible loose or foreign material, including vegetation, on and immediately contiguous to surfaces to be marked.

**Symbol Markings.** Railroad and school symbol markings shall be white stripes and letters. The railroad symbol marking shall include the crossbuck, two Rs, two transverse lines and a stop line. The school symbol marking shall include the word SCHOOL and two transverse lines.

**Parking Lot Stall Marking.** Parking lot stall marking lines shall be continuous white stripes, 4 inches (102 mm) in width.

**Lane Arrows.** Lane arrows shall be white markings.

**Words on Pavement.** Words on pavement shall be white markings.

**Dotted Lines.** Dotted lines shall be markings of the width and color specified.

**641.09 Two-Way Radio Communications.** Where two-way radio equipment is required, the Contractor shall furnish and maintain radio equipment necessary for the voice communication between the Contractor's striping and the City Inspector's vehicle at all times during the pavement marking operation. This equipment shall be capable of transmitting and receiving normal voice communications for a minimum of 4 miles (6.4 kilometers).

**641.10 Removal of Pavement Markings.** When indicated on the plans, pavement markings shall be removed. The markings shall be removed by high pressure water blast, sand blast, high temperature burning with excess oxygen, or other methods, with the approval of the Engineer. Care shall be exercised during marking removal not to scar, discolor or otherwise damage the pavement surface. Overpainting or the use of unapproved methods of covering markings in lieu of removal shall not be permitted. 3M black detour grade removable tape, or approved equal, which is specifically designed for this purpose, may be used to cover existing markings.

**641.11 Deduction for Deficiency.** The amount of marking material (including resin, catalyst, primer, adhesive or activator) and glass beads, applied per unit of measurement will be computed each day by the Engineer. A tolerance of 6 percent for deficiency of marking material (including resin, catalyst, primer, adhesive or activator) or glass beads shall be permissible without deductions. If computations reveal that the 6 percent tolerance has been exceeded and an insufficient quantity of marking materials or glass beads has been applied, the contract unit price shall be reduced in direct proportion to the percent of deficiency of marking materials or glass beads as called for in the

application section of each pavement marking material up to 20 percent for each material deficient; only the greater deficiency shall be used to compute the deduction.

If the deficiency of any material is 20 percent or more, the work shall be considered unsatisfactory and shall be replaced at the expense of the Contractor, including all labor, equipment, and material requirements.

**641.12 Method of Measurement.** Pavement marking will be measured complete in place in the units designated. Line quantities will be the length of completed marking, including the gaps, intersections, and other sections of pavement not normally marked. Removal of pavement markings will be in the units designated.

Two-way radio equipment will be paid for at the lump sum bid price, which price will be full compensation for furnishing, installing and maintaining this item.

**641.13 Basis of Payment.** All work performed and measured as prescribed above will be paid for as provided in the respective items for each type. Payment shall include all labor, equipment and materials necessary to complete the work.