

**ODOT Standard Specification 2002**  
**Section 00862 - Durable Permanent Pavement Striping**  
**Description**

**00862.00 Scope** - This work consists of permanently striping the wearing surface with durable lines within the limits of the Project, as shown or according to the ODOT Traffic Line Manual, and the Manual of Uniform Traffic Control Devices (MUTCD).

For each Project, the striping contractor shall be certified by the marking materials manufacturer to perform the applicable work, prior to beginning the work.

**00862.02 Pre-Striping Meeting** - Prior to starting work, meet with the Engineer and striping subcontractor. At this meeting, do the following:

- Furnish a Traffic Control Plan for approval, including lane restriction time periods.
- Furnish a striping schedule showing areas and timing of work, and placing of materials.
- Discuss placement of materials, potential problems.
- Discuss work plan at off-ramps, on-ramps and any intersections.
- Discuss material handling procedures and procurement.
- Provide a copy of the manufacturer's installation instructions and copies of Material Safety Data Sheets (MSDS).
- Provide a spill recovery plan including:
  - Name, address and phone number of the Contractor's contact with the DEQ
  - Name, address and phone number of persons certified and on call to do cleanup

**00862.08 Traffic Control** - Provide temporary traffic control measures according to Section 00225.

**Materials**

**00862.10 General** - Use materials from the QPL. The Special Provisions will indicate the type of marking to be used for white lines, yellow lines and skip lines.

**00862.11 Reflective Elements** - Furnish traffic paint beads meeting the requirements of 02840.20.

**Equipment**

**00862.20 Equipment** - Use sprayers or extruders approved by the marking material manufacturer and made specifically for the purpose of applying beaded markings to a uniform width and thickness on the roadway surface. Hand units will not be allowed. Use automatic bead applicators that place a uniform layer of beads on the line.

Place double lines using equipment designed to place two parallel lines in one pass.

**Construction**

**00862.40 General** - Install the markings according to the manufacturer's recommendations and the Engineer's instructions.

Lay out a continuous guideline for each line, and receive approval of the layout from the Engineer prior to striping.

For overlays and shoulder widening projects, replace striping to match existing striping unless otherwise directed. If the roadway has been changed significantly by the Project, or is a new roadway, propose variations in standard layouts to handle changed or unusual conditions.

Place lines wider than 100 mm (4 inches) with one pass.

Place permanent striping prior to traffic being allowed on the pavement if the pavement has cured sufficiently. If not, install flexible pavement markers according to Section 00225 prior to final striping.

**00862.41 Pavement Surface** - Prepare the pavement surface as follows:

(a) **New or Existing Asphalt Concrete** - Apply material only when the surface is sufficiently dry, clean and free of contaminants such as surface oils and existing road marking materials. Some products require the asphalt to cure for several weeks prior to placement of certain striping materials.

(b) **Portland Cement Concrete** - Apply material to concrete that has reached a minimum compressive strength of 20.7 MPa (3,000 psi), and only when the surface is sufficiently dry, clean and free of contaminants such as curing agents, laitance, surface oils, and road marking materials.

Remove contaminants by approved mechanical means, such as turbo-blasting or grinding, and dispose of according to 00862.47.

**00862.42 Application** - Use the standard skip cycle of 3.0 m (10 foot) stripe, followed by 9.2 m (30 feet) with no markings until the next skip stripe. Match new skips to the pattern of existing markings on at least one end of the Project.

Monitor the bead application to ensure proper bead embedment and density. Apply reflective elements at a sufficient rate to obtain a minimum reflectivity reading of at least 300 mcd for white and 250 mcd for yellow.

Apply marking materials by one or more of the following methods, appropriate to the pay item(s) in the Schedule of Items:

(a) **Method A: Profiled Markings** - Apply profile markings as shown. Place lines and bumps straight and square.

(b) **Method B: Non-Profiled Markings** - Apply non-profile markings as shown. This method is designed to be done by an extrusion process. A ribbon type application will not be allowed.

(c) **Method C: Inlaid Markings** - Apply inlaid markings as shown. Overfill the slot as shown. Fill the slot edge to edge, and overfill the edges at the top by about 3 mm (120 mils) on each side, making the line flat or slightly convex on top, and about 100 mm (4 inches) wide.

(d) **Method D: Inverted Profile Markings with Bumps** - Apply inverted-profile markings (with bumps) as shown. Place lines and bumps straight and square.

(e) **Method E: Inverted Profile Markings without Bumps** - Apply inverted profile markings as shown.

(f) **Method F: Spray Markings** - Apply spray markings as shown. The actual thickness may vary slightly. At least two passes are required to obtain the thickness specified. Place additional passes squarely on top of the first pass, within  $\pm 2$  mm (1/16 inch).

**00862.43 Quality of Work** - Place markings and beads on the roadway in proper alignment with existing markings. Make skips parallel and true to line, with skip ends square and clean. Immediately clean up dribbling of markings beyond the cutoff.

(a) **Test Stripe** - Prior to starting, and in the presence of the Engineer, place a 50 m (150 feet) test stripe on roofing felt or other approved material or location, to demonstrate the pavement marking application process. If the Project involves only inlaid applications, this test stripe is not required. Do not place permanent materials without receiving the Engineer's approval of the test performance. Repeat the performance test until the Engineer is satisfied that the Contractor has suitable skills to place the materials accurately and properly. Any delay due to this test requirement will be at the Contractor's expense.

(b) **Allowable Tolerances** - Record the following readings, and the locations where they were taken, for evaluation by the Engineer:

- For inlay applications, record the depth of the slot every 100 m (300 feet) during the grinding operation.
- For all other applications, measure the thickness of the lines (above the pavement surface), at the time of application, at intervals not to exceed 100 m (300 feet).

Inspect the line initially, and again two weeks after placement, to ensure the material has cured properly. Remove all soft spots or abnormally darkened areas and replace with specification material.

Allowable tolerances for installation are:

- **Side-to-Side** - 12 mm (1/2 inch) maximum on tangent, 25 mm (1 inch) on curves
- **Space between parallel (double) lines** -  $\pm$  10 mm (3/8 inch)
- **End-to-end on skips (for re-trace)** - 50 mm (2 inch) overlap
- **Length of Skip** - 3.00 m  $\pm$  50 mm (10 feet  $\pm$  2 inches)
- **Length of Gap** - 9.20 m  $\pm$  50 mm (30 feet  $\pm$  2 inches)
- **Width of lines** - 2 mm (1/16 inch), + 10 mm (3/8 inch)
- **Divergence of parallel double lines** - 10 mm (3/8 inch) maximum

If existing pavement markers are to be left in place, adjust skip spacing to place skips midway between pavement markers, or as directed.

If it is determined that the material is being placed too thin, or otherwise not to specification, make immediate adjustments to correct the problem. Do not allow the top of the line to be cupped, or lower than the wearing surface.

Durable permanent pavement markings applied by any method will be unacceptable if:

- The marking is not straight, not wide enough, or not true to line.
- The thickness of the line is inconsistent or less than specified.
- The top of the line is not smooth and uniform.
- Any lines or profile bumps are damaged prior to curing.
- Retro-reflectivity is too low.
- The material is uncured.
- The substrate is visible in the striped areas.
- Any profile bumps are missing or miss-shaped.
- Two or more profile bumps in a row are more than 3 mm (120 mils) deficient in height, measured above the wearing surface.
- Profile bump lead-in or lead-off is not present.
- The inlay slot is not ground deep enough.
- The inlay slot is not filled slightly over-full as specified.
- Grooves in inverted-profile lines are not square and properly shaped.
- Successive spray passes are not aligned over the previous pass.

**(c) Retro-reflectivity** - Measure the retro-reflectivity of each line, using a MiroLux 12, a 30 m (100 foot) retro-reflectometer, or similar device, mobile or hand-held, at intervals not exceeding 300 m (1,000 feet) of road distance. Record the location of each test. Perform testing within 48 hours of curing. Make results available to the Engineer immediately.

Prior to acceptance of the Project, the initial retro-reflectivity may also be tested by the Engineer for compliance. This testing will take place at least two days, but not more than 90 days, after the Project is complete. Notify the Engineer as soon as possible when the lines are ready to measure.

If the retro-reflectivity is less than 250 mcd for white and 200 mcd for yellow, the affected materials will be considered unacceptable. The Engineer may elect to use the Contractor's retro-reflectivity readings for the initial retro-reflectivity.

**(d) Repairs to the Work** - Perform repairs using equipment similar to the equipment initially used to place the material. Do not perform repairs in a "patch-work" manner. If more than one repair is required in a single 100 m (300 foot) section, grind and repair the entire section.

**00862.44 Public Safety and Convenience** - Provide for the safety and convenience of the public according to Section 00220 and the following:

- Be responsible for protecting all applied markings from traffic until sufficiently dry to prevent damage or tracking by traffic movements. At a minimum, place cones or tubular markers by all

skips, and barricades by all areas where cross traffic is anticipated. Additional protection may be necessary and will be considered Incidental.

- Immediately correct striping problems that impair traffic, such as improper alignment, broken equipment, or spilled product, at the Contractor's expense, including appropriate traffic control. Provide documentation from DEQ indicating proper cleanup. Blacking out or covering up lines will not be allowed, except in a short-term emergency when approved.
- Do not open up any work area to traffic that is not adequately striped and suitable for safe driving.

**00862.47 Disposal of Waste** - Waste material becomes the property of the Contractor. This includes all grindings and all removed marking material. Do not dispose of or store stripe removal waste material on Agency property. Dispose of waste material according to applicable State, federal and local regulations.

### Finishing and Cleaning Up

**00862.70 Removal or Repair of Unacceptable Work** - Remove or repair all unacceptable work and dispose of according to 00862.47, at no expense to the Agency. Repair or replace unacceptable work immediately if it causes a safety problem. Remove unacceptable materials by an effective method, such as grinding if material has hardened. The removed material becomes the property of the Contractor (see 00862.47). If additional traffic control is required for removal of unacceptable material, provide it as directed and at no cost to the Agency.

**00862.75 Warranty** - The warranty of 00170.85(b) applies to work under this Section. See the Special Provisions for details.

### Measurement

**00862.80 General** - The quantity of durable permanent pavement striping will be the length, to the nearest meter (foot), complete and in place as specified. For skip stripes, measurement will be for the actual stripe, excluding the gap between skip stripes. The standard application width is considered to be 100 mm (4 inches). If wider lines are specified, the length of those lines will be adjusted by converting them to an equivalent length of 100 mm (4 inch) line on a proportionate area basis.

Thickness will be measured from the top of the marking to the top of the wearing surface. Marking material placed in a depression left by pavement line removal will not be included in measuring the thickness of the line.

Temporary flexible pavement markers required by 00862.40 will be measured on the unit basis when a pay item is included in the Schedule of Items. When no pay item is provided, there will be no separate measurement of temporary flexible pavement markers.

### Payment

**00862.90 General** - The accepted quantities will be paid for at the Contract unit price per meter (foot) for the pay items listed below when in the Schedule of Items:

- |   |   |
|---|---|
| Method A (Profile):                     | (a) Methyl Methacrylate, Profile, 2.3 mm (90 mils), Extruded      |
|   | (b) Methyl Methacrylate, Profile, 3.0 mm (120 mils), Extruded     |
|   | (c) Thermoplastic, Profile, 2.3 mm (90 mils), Extruded            |
|   | (d) Thermoplastic, Profile, 3.0 mm (120 mils), Extruded           |
| Method B (Non-Profile):                 | (e) Methyl Methacrylate, Non-Profile, 2.3 mm (90 mils), Extruded  |
|   | (f) Methyl Methacrylate, Non-Profile, 3.0 mm (120 mils), Extruded |
|   | (g) Thermoplastic, Non-Profile, 2.3 mm (90 mils), Extruded        |
|   | (h) Thermoplastic, Non-Profile, 3.0 mm (120 mils), Extruded       |
| Method C (Inlaid):                      | (i) Methyl Methacrylate, Inlaid                                   |
| Method D (Inverted Profile with Bumps): | (j) Thermoplastic, Inverted Profile w/ Bumps                      |

Method E (Inverted Profile): (k) Thermoplastic, Inverted Profile

Method F (Spray):  
(l) Methyl Methacrylate, Non-Profile, 2.3 mm (90 mils), Sprayed  
(m) Methyl Methacrylate, Non-Profile, 3.0 mm (120 mils), Sprayed  
(n) Thermoplastic, Non-Profile, 2.3 mm (90 mils), Sprayed  
(o) Thermoplastic, Non-Profile, 3.0 mm (120 mils), Sprayed

Payment for items (a) through (o) will be payment in full for furnishing all materials, equipment, labor, and incidentals necessary to complete the work as specified, and includes payment for the following:

- Laying out the alignment
- Checking dimensional tolerance
- Removing and disposing of unacceptable materials
- Furnishing a striping schedule
- Placing a test stripe
- Removing existing pavement markings and other waste materials
- Testing retro-reflectivity

There will be no separate or additional payment for the following:

- Over-runs of material caused by the variation of the gradation of the asphalt
- Additional material required to apply markings on open-graded pavement
- Additional material placed at the top of inlay slots, for item inlaid markings
- Disposal of stripe removal waste material

Temporary flexible pavement markers required by 00862.40 will be paid for according to Section 00225, if a pay item is provided. If no pay item for temporary flexible pavement markers is in the Schedule of Items, payment will be incidental to the permanent pavement striping pay item(s) and no separate payment will be made.