

SECTION 02855

PAVEMENT MARKINGS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Liquid Traffic Paint Materials.
- B. Plastic Pavement Marking Material.
- C. Surface Preparation.

1.02 REFERENCES

- A. The “PDT Sections” noted herein refer to sections contained in the Commonwealth of Pennsylvania Department of Transportation Specifications Publication 408/90, as supplemented. The references pertain only to materials, construction, equipment, methods and labor. The payment provisions do not apply to work to be performed.
 - 1. PDT 961 – Cold Plastic Pavement Markings or Legends.
 - 2. PDT 962 – Painting Traffic Lines and Markings.
 - 3. PDT 963 – Pavement Parking Removal.
 - 4. PDT 1103 – Traffic Signing and Marking.
- B. Commonwealth of Pennsylvania Code, Title 67, Department of Transportation Chapter 211, Official – Control Devices.
 - 1. Subchapter K – Marking.
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM D711 – Standard Test Method for No Pick-up Time of Traffic Paint.
 - 2. ASTM D868 – Standard Method of Evaluating Degree of Bleeding of Traffic Paint.
 - 3. ASTM D969 – Standard Test Method for Laboratory Determination of Degree of Bleeding of Traffic Paint.
 - 4. ASTM D1309 – Standard Test Method for Settling Properties of Traffic Paint During Storage.

1.03 DESCRIPTION OF WORK

- A. Work consists of furnishing all equipment, labor materials, and performing all operations necessary for application of traffic lines, markers or legends on roadway surfaces, in accordance with specifications and applicable drawings.

1.04 QUALITY ASSURANCE

- A. Traffic line paint materials shall meet the specifications for PA DOT Traffic line Paint – Type I and Type II or the Institute of Transportation Engineers’ (ITE) “A Model Performance Specification For the Purchase of Pavement Marking Paints and Powders”, latest edition.

- B. Certification from the manufacturer, stating that the materials supplied meet PennDOT's specifications, shall accompany delivery of material, and shall be given to the Engineer prior to installation of pavement markings.
- C. Paint materials shall be products of Manufacturers who have supplied traffic line paint for installation in the State of Pennsylvania.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement marking materials to job site in their original, sealed containers or packages with labels intact and legible at time of use.
 - 1. Store paint containers lid-down.
 - 2. If the paint is used within two months after being received, no rotation prior to use is required. If the paint is on hand for more than two months, it shall be rotated several days before use.
- B. Store approved materials at the job site in a suitable and designated area restricted to storage of paint and coating materials and related equipment.
- C. Use all means necessary to ensure safe storage of materials and the prompt and safe disposal of waste. Store paint and coating products protected from weather when such products may be affected by freezing.
- D. Glass beads shall be in units of 50 lbs and packed in moisture-proof bags. The beads shall be stored in a cool dry place.

1.06 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Adhere to manufacturer's data on air and surface temperature limits and relative humidity during application and curing of coatings.
 - 2. Schedule work to avoid dust and airborne contaminants.
- B. Protection:
 - 1. Protect pavement marking materials before, during and after application.
 - 2. Clean up or otherwise remedy without additional cost, damage by paint coatings to public or private property.

1.07 WARRANTY

- A. The Contractor shall guarantee, in writing, to replace, at no expense to the Owner, that portion of the plastic pavement marker or legend material which in the opinion of the Engineer, has not remained within reasonably close proximity to the location placed, or has not remained effective in performing useful daylight and nighttime service, for a period of one (1) year from the date of installation. The required service is as follows:
 - 1. Intersection Units: Ninety percent of an intersection unit where the intersection unit is defined as all material on an approach leg within 150 feet of the intersection.
 - 2. Midblock Unit: Ninety percent of a midblock unit where the midblock unit is defined as each individual legend, symbol, crosswalk or stop line.

PART 2 – PRODUCTS

2.01 PAINT MATERIALS

- A. General: Traffic paint shall consist of a ready-mixed pigmented binder in a single package system and shall meet the requirements of ASTM-D868 and ASTM-D1309. When applied at a wet-film thickness of 15 mills, paint shall be suitable for application to traffic bearing surfaces such as Portland cement concrete, bituminous pavements, and plain or vitrified brick surfaces of streets, highways, bridges, tunnels, and parking lots.
- B. Traffic Paint shall consist of either an alkyd resin type or a combination of alkyd resin type modified with chlorinated rubber ready-mixed white and yellow traffic paints, for use on bituminous and Portland cement concrete pavements. These paints shall be reflectorized for night visibility, if specified, by adding reflective spheres before the paint dries or sets, using the drop-on or pressurized methods.
 - 1. Pigments: Except for the yellow pigment, the supplier may use any combination of pigments provided the finished paint meets all the requirements specified herein. Supplier may use any organic yellow pigment provided it does not contain any of the metals listed in Environmental Protection Agency (EPA) Code of Federal Regulations 40, Section 261.24, Table 1. Sufficient suspending and dispersing agents shall be used to prevent excessive settling as specified herein.
 - 2. Binder: The supplier may use any combination of ingredients, except tall oil resins, provided the finished paint meets all the requirements herein. Sufficient amounts of anti-skinning agents shall be used to prevent skinning as specified herein. Sufficient resin solids, compatible thinners and driers, if necessary, shall be used to meet requirements of Table I.
- C. Paint Requirements: The mixed paints shall meet the following requirements specified in Table I for white and yellow paints:

Table I
Requirements of Mixed Paints

<u>Characteristics</u>	<u>Standards</u>	<u>Type I White and Yellow</u>
Pigment, percent by weight		55-60
Nonvolatile vehicle, percent by weight of vehicle		40 Min.
Uncombined water, percent by weight of paint		1.0 Max.
Coarse particles and skins (retained on No. 325 sieve, 1/Percent by weight of pigment)		1.0 Max.
Consistency: Krebs Units		65-70 (Type I) 70-110 (Type II)
Weight per gallon, lbs.	White Yellow	11.7 Min. 12.0 Min.
Fineness of grind, Hegman		2.0 Min.
Contract ratio, dry		0.96 Min.
Directional reflectance:	White Yellow	84 Min. 50 Min.

Characteristics	Standards	Type I White and Yellow
Drying time, No pick-up, minutes (lab)	ASTM D711	30 Max.
Flexibility		No cracking or flaking
Bleeding Test	ASTM D868 and D969	5 Min.
Water Resistance		---
Skinning (48 hours)		None
Storage Stability	ASTM D1309	6 Min.

Color of Yellow Paint - The color of the dry paint film when compared visually shall essentially match Color No. 33538 of Federal Standard 595.

- D. Glass spheres shall meet the requirements of PennDOT Publication 408, Section 1103.14(a)2.

2.02 PLASTIC PAVEMENT MARKINGS

- A. Cold plastic pavement marking material shall consist of a pigmented extruded plastic, 30 mils thick, with reflective glass spheres uniformly distributed throughout its entire cross-sectional area, meeting the requirements of PennDOT Publication 408, Sections 961 and 1103.14(b).
- B. Thermoplastic pavement marking material shall be pigmented, 125 mils thick, preformed, retro-reflective, composed of hydrocarbon resin, aggregates, pigments, binders, and glass beads, conforming to AASHTO M 249-79, and meeting the requirements of the Manual on Uniform Traffic Control Devices for Streets and Highways. Lines, legends, and symbols shall be capable of being affixed to bituminous or Portland Concrete pavements by the use of the normal heat of a propane type of torch. Colors shall be yellow or white as required by project.
1. Material shall be capable of conforming to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures.
 2. Material shall have resealing characteristics and shall be capable of fusing with previously applied thermoplastic markings when heated with the torch.
 3. Material shall be capable of being applied in temperatures down to 32°F without any special storage, preheating or treatment before application.
 4. Graded Glass Beads: Glass beads shall be clear and transparent and shall be distributed throughout the entire cross sectional area. The material shall contain a minimum of 30% graded glass beads by weight with not more than 20% consisting of irregular fused spheroids, or silica. The index of refraction shall not be less than 1.50.
 5. Pigments:
 - a. White: Similar to Federal Highway White, Color No. 17886, as per Federal Standard 595.
 - b. Yellow: Similar to Federal Highway Yellow, Color No. 13655, as per Federal Standard 595. Yellow pigment shall be of organic origin only.

PART 3 – EXECUTION

3.01 SURFACE PREPARATION

- A. Contractor shall clean the surface of the roadway before application of traffic lines or pavement markings to provide a clean, dry roadway surface which is free of loose dirt and other debris, to the satisfaction of the Engineer.
- B. Surface cleaning for Cold Plastic Markings shall include as a last operation the use of compressed air or a fine bristled broom over the application area to provide a dust-free surface.

3.02 EQUIPMENT

- A. Line painting machine shall be of type that it shall not impede the traffic flow in adjacent lanes while painting of centerlines. One lane shall remain open to traffic while painting edgelines.
- B. Equipment used shall be capable of simultaneous application of two parallel lines in either a solid or broken pattern in forming the centerline and be capable of automatic dispensing of glass beads onto the painted surface at the required application rate, by the pressurized glass gun method.
- C. Equipment shall be capable of providing paint lines in 4-inch, 6-inch and 8-inch widths.
- D. Equipment used to apply centerlines and edgelines shall be equipped with a measuring device which automatically and continuously measures to the nearest foot, the length of each line placed.
- E. Legends shall be applied with equipment approved by the Owner's Representative; hand brushes or rollers are not permitted. Glass beads may be hand applied.

3.03 APPLICATION

- A. General:
 - 1. Centerline:
 - a. Where existing centerlines are visible and properly located, the new centerlines shall be applied directly over the existing pattern.
 - b. Where centerlines do not exist, or existing centerlines are improperly located, as determined by the Owner's Representative, the new centerlines shall be applied at the correct location. If the existing markings have to be removed to allow correct placement of the new markings, such work shall be done in accordance with PDT Section 963 at no cost to the Owner.
 - c. On two-lane roadways, the centerline shall evenly divide the roadway, however, if a portion of the roadway on either or both sides is to be utilized for parking, the centerline shall evenly divide the traveled way.
 - d. Any centerline pattern placed more than six (6) inches from the center of the roadway or traveled way shall be removed and replaced by the Contractor at no cost to the Owner.

2. Edgeline: Contractor shall field-check all roadways which require application of edgelines. Only those roadway sections which are 20 feet or greater in width for more than 50 percent of their length shall be painted with edgelines. The Owner's Representative will determine the eligibility of each roadway for edgeline application.
- B. Liquid Traffic Paint Application:
1. Paint: Paint shall be dispensed in a wet film thickness of 15 ± 1 mils. The rate of application of paint on bituminous surface treatment roads may be 25% greater. The Owner's Representative will determine whether roadways require an increased application rate.
 2. Glass Beads: Glass beads shall be applied at a rate of six (6) pounds per gallon of paint.
 3. Painted traffic lines and markings shall not be placed when the ambient temperature is less than 40°F.
- C. Cold Plastic Pavement Marking Material Application:
1. General: Cold plastic pavement markers or legends shall mold themselves to pavement contours, breaks, faults, etc., merely by traffic action of normal pavement temperatures. They shall have resealing characteristics capable of mending cracks due to pavement flexing and shall fuse with previously applied material.
 2. An adhesive activator primer sealer shall be applied to the plastic pavement marking material or roadway surface depending on the manufacturer's recommendations immediately prior to installation.
 3. Inlaid: Application of pavement markers or legends as part of an asphaltic resurfacing job. The material is properly placed on the roadway just before final compaction, and rolled into the new surface during final compaction. The result is that the pavement markers or legends will be essentially flush with the finished surface.
 4. Surface Applied: Application of pavement markers or legends onto the existing surface of asphaltic roadways. Installation of pavement markers or legends shall require only moderate pressure.
 5. Cold plastic markers or legends shall be applied only when the surface temperature is 60°F or higher unless otherwise directed by the Owner's Representative.
- D. Thermoplastic Pavement Marking Material Application:
1. Asphalt: The materials shall be applied using the propane torch method recommended by the manufacturer. The material shall be applied at ambient and road temperatures no less than 32°F without any preheating of the pavement to a specific temperature.
 2. Portland Concrete: The same application procedure shall be used as described under Paragraph 1, above. However, a compatible primer sealer may be applied before application to assure proper adhesion.
 3. Additional glass beads shall be applied on the surface after application of marking if directed by Owner's Representative.
- E. Standard Marking Details:
1. Markings, unless otherwise specified, shall be detailed and placed in accordance with the Pennsylvania Department of Transportation regulations set forth in Subchapter K of the current edition of PennDOT Publication 68 -- Pavement Markings.

3.04 PROTECTION OF PAINTED SURFACES

- A. Crosswalks, stop bars, symbols, legends, centerlines, and lane lines applied with conventional paint shall require coning (wet line protection) for a minimum of 30 minutes or until the paint becomes track free from vehicular traffic.

END OF SECTION