OKLAHOMA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISIONS
FOR
TRAFFIC STRIPE (MULTI-POLYMER)

These Special Provisions revise, amend, and where in conflict, supersede applicable sections of the 2009 Standard Specifications for Highway Construction, English and Metric.

856.02 MATERIALS

A. Physical Properties of the Mixed Compound

(Replace Table 856:1 with the following:)

Table 856:1
Color Requirements

Federal 595 Color		Chromaticity Coordinates								Brightness (Y)
		1		2		3		4		
		x	y	x	y	x	y	x	y	
White	17886	0.355	0.355	0.305	0.305	0.285	0.325	0.335	0.375	80 min
Yellow	13538	0.560	0.440	0.490	0.510	0.420	0.440	0.460	0.400	60 min - 70 min

B. Multi-Polymer Composition

(Replace Table 856:4 with the following:)

Table 856:4
Multi-Polymer Composition

Pigment Composition	Percent by Weight
White:	
Titanium Dioxide Rutile (94% minimum purity, ASTM D476, Type III)	33 - 38
Multi-Polymer Resin	60.0 - 82.0
Yellow:	
Organic Non-Lead Yellow	7.0 - 8.0
Titanium Dioxide (ASTM D476, Type III)	14.0 - 17.0
Multi-Polymer Resin	77.0 - 79.0

C. Sampling and Certification *(Replace with the following:)*

Submit a Type A certification to the Department's Materials Division for each batch of stripe used on every project along with the Pretest Report for the glass beads.

- The Engineer may require a one (1) qt sample representing each batch of multi-polymer resin material be submitted to the Department's Materials Division.
- Ensure the manufacturer's multi-polymer striping is listed on the Department's Traffic Engineering Division's Qualified Products List (QPL).
- If the manufacturer makes any formulation changes to the multi-polymer striping material, ensure the manufacturer submits a written explanation of the changes to the formulation, the new physical and chemical properties for the resin, and a new material safety data sheet (MSDS) for the stripe to the Department's Traffic Engineer for re-evaluation and approval at least 30 days prior to its use.

D. Non-Reflectorized Contrast or Shadow Markings *(Replace with the following:)*

Ensure the marking material used for the contrast or shadow marking conforms to the same formulation, material, and pre-approved sampling requirements, except for the following items:

- Color pigments used
- Color requirements listed
- Use 24 lb per 100 ft^2 min [10.8 kg per 10 m^2], of a black, color-fast, medium mesh, anti-skid material

856.03 EQUIPMENT *(Add the following:)*

Use equipment fitted with a functional data logging system equipment listed on the Department's qualified products list (http//www.okladot.state.ok.us/traffic/qpl/index.php). Ensure the data logging system is operational, calibrated, and in use prior to striping operations. Provide the Engineer with a certification that the data logging system equipment meets the manufacturer's recommended calibration, along with the manufacturer's recommendations for equipment calibration frequency.

856.04 CONSTRUCTION METHODS

A. Surface Preparation *(Replace with the following:)*

Remove foreign material from the road surface before applying the dual component material. Ensure the pavement surface is dry.

Use abrasive blasting, grinding, or high-pressure water jet to remove existing, temporary, or permanent traffic markings until at least 95 percent of the underlying pavement is visible, unless otherwise specified by the manufacturer. Minimize interference between temporary pavement markings and the permanent dual-component pavement marking materials.

Remove the curing compound at least 1 in [25 mm] beyond the width of the marking. After removing the curing compound, sweep and use a high-pressure air spray.

B. Pavement Temperature and Condition *(Replace with the following:)*

Apply dual component pavement markings to Portland cement concrete pavement surfaces at least 30 calendar days after paving, and new asphalt concrete pavement a minimum of three (3) calendar days after paving under the following conditions:

- On a dry roadway (no standing water or significant dampness),
- At a pavement surface temperature of at least 40 °F [4.4 °C] and rising, and
- At wind chill temperature of at least 35 °F [1.7 °C].

Measure the pavement surface temperatures 30 minutes before beginning striping installation. If critical temperatures exist, as determined by the Engineer, measure the pavement surface temperature every 1 hr to 2 hr, or at shorter intervals as directed by the Engineer, until the end of the day. Measure the pavement surface temperature with a standard surface temperature or infrared non-contact thermometer.

In the event that temperatures and conditions are not conducive to the installation of permanent pavement markings within the specified time frame, including time for curing of PC pavement, the Engineer may allow and accept the installation of temporary pavement markings in lieu of permanent markings at no additional cost to the Department until such time as the permanent markings can be installed. Maintain the temporary markings until temperatures and conditions are conducive for permanent striping. Furthermore, the Engineer may suspend the contract and/or milestone time until temperatures and/or conditions improve such that the permanent markings can be placed. In order for time suspension to be considered all contract work which is unaffected by the inability to place the permanent paving markings must be completed.

C. Application *(Replace with the following:)*

Apply large glass beads at a coverage rate of at least 12 lb per 100 ft^2 [5.4 kg per 10 m^2] before applying standard beads. Apply standard glass beads at a coverage rate of at least 12 lb per 100 ft^2 [5.4 kg per 10 m^2]. For hand-machine applied markings, apply large glass beads at a coverage rate of at least 12 lb per 100 ft^2 [5.4 kg per 10 m^2] before applying standard beads. Apply standard glass beads at a coverage rate of at least 12 lb per 100 ft^2 [5.4 kg per 10 m^2].

Alternatively, for Portland cement concrete pavement apply a non-reflectorized contrast marking, of the same dimensions as the white skip lines shown on the plans, immediately after each upstream white skip line.

Use a computerized data logging system for monitoring the application of multi-polymer stripe to measure the thickness of the multi-polymer stripe. Collect data for any pavement marking application of 1,000 linear feet or greater. Report the following data as an average for each 1,000 feet:

- Application speed to the nearest 0.1 mph

- Weight (lbs) and/or volume (gallons as measured through a piston displacement pump mechanism) amount of material used by color
- Weight (lbs) of glass beads/elements used
- Pavement surface temperature (°F)
- Air temperature (°F)
- Dew point (°F)
- Humidity (%)
- Material application rates and film thickness over the section painted.

In addition to the above data, record the highway number with the beginning and ending reference point rounded to the nearest hundredth of a mile, project number, and job piece number.

Provide an electronic or printed record of the data to the Engineer daily. The Engineer may determine that more frequent submission is necessary, particularly if equipment malfunctions occur. Produce either the printed or electronic records in their final form prior to the records being removed from the striping equipment (i.e. the Contractor presents this to the Engineer in the field). If only one record is produced at the striping equipment, the other may be produced in an office. However, present the first record to the Engineer prior to any of the data entering an office environment. Ensure the electronic record is a comma or space delimited text file, adequate for insertion into a computerized spreadsheet software package, or a spreadsheet format acceptable to the Engineer.

Provide the Engineer the above records for all longitudinal non-handwork line painted.

Prior to the start of striping operations, travel a distance of 100 ft to verify the consistency of physical and electronic measurements of distance traveled.

Ensure longitudinal and edge line markings meet the minimum mil thickness values in accordance with Table 856:5 for concrete pavement, and Table 856:6 for asphalt pavement:

Table 856:5
Minimum Mil Thickness (PC Pavement)

mils	Contract Unit Price Adjustment
≥ 20	100%
19 - 18	90%
17 - 16	75%
15 - 14	50%
< 14	Remove and replace

Table 856:6 Minimum Mil Thickness (AC Pavement)	
mils	**Contract Unit Price Adjustment**
≥ 25	100%
24 - 23	90%
22 - 21	75%
20 - 19	50%
< 19	Remove and replace

E. Retro-reflectivity *(Replace with the following:)*

Measure stripes with a portable reflectometer that uses 30 m geometry in accordance with ASTM E1710 and the manufacturer recommendations. Ensure the manufacturer calibrates the reflectometer annually. Keep the annual calibration certification with the reflectometer. All reflectometer readings must be in conjunction with line thickness gauge measurements.

(1) Minimum Retro-reflectivity

Ensure longitudinal markings on Portland cement concrete and asphalt concrete pavement surfaces meet the minimum retro-reflectivity values in accordance with Table 856:7.

(2) Measurement

Measure retro-reflectivity of markings within 7 to 21 calendar days of placement, after removing loose beads.

Measure marking retro-reflectivity in the direction of traffic, except the Department will allow yellow skip stripes to be measured in either direction of travel. One measurement (multiple readings) will represent each 2,500 ft [762 m] lot of single-color longitudinal stripe. The Department will not allow readings for adjacent lots to be taken closer than 1,000 ft [305 m] from each other.

For solid longitudinal stripes, one measurement represents the average of five readings per lot, taken at 3 ft [1 m] intervals along a randomly selected 15 ft [4.5 m] section of solid stripe.

For longitudinal skip stripes, one measurement represents the average of six readings per lot, two readings taken from each of three adjacent skip stripes. The Department will not allow readings taken within the first or last 1 ft [0.3 m] of skip stripes.

For non-compliant measurements, the Engineer will require additional measurements to determine the extent of non-compliance.

The Department will not require measurements of the following:

- Stop-bars, crosswalks, gores, words, symbols;
- Longitudinal striping installed using hand line machines; and
- Projects less than 1 mi [1.6 km] long.

Obtain the Engineer's approval in writing before using a mobile retro-reflectometer system as an alternative measurement method.

(3) Acceptance

(Replace Table 856:6 with the following:)

Table 856:7 **Minimum Retro-reflectivity (PC Pavement)**			
White		**Yellow**	
mcd/m²/lx	**Pay Adjustment**	**mcd/m²/lx**	**Pay Adjustment**
≥ 500 *	100%	≥ 325 *	100%
450 - 499 *	75%	275 - 324 *	75%
300 - 449 *	50%	225 - 274 *	50%
< 300	Remove and replace	< 225	Remove and replace

* The Contractor has the option to replace the stripe at no additional cost to the Department, or take the deduction.

(Add the following:)

Table 856:8 **Minimum Retro-reflectivity (AC Pavement)**			
White		**Yellow**	
mcd/m²/lx	**Pay Adjustment**	**mcd/m²/lx**	**Pay Adjustment**
≥ 400 *	100%	≥ 250 *	100%
350 - 399 *	75%	225 - 249 *	75%
200 - 349 *	50%	175 - 224 *	50%
< 200	Remove and replace	< 175	Remove and replace

* The Contractor has the option to replace the stripe at no additional cost to the Department, or take the deduction.

856.05 BASIS OF PAYMENT *(Replace the second paragraph with the following:)*

The Department will consider the cost of preparing the pavement to be included in the contract unit price for the relevant pay item.