**WORK ZONE PERFORMANCE PAVEMENT MARKINGS:**

(10/8/16) (10/9/18) (10/13/23) (Rev. 5/20/25)

**Description**

Furnish, install, and maintain Work Zone Performance pavement markings for traffic patterns in work zones during construction as specified in this special provision.

**Materials**

A) General

Use materials that comply with the manufacturer’s recommendations, ensuring durability and minimum retroreflectivity as specified in this special provision for at least 12 months, unless noted otherwise.

Use the following approved materials for Work Zone Performance pavement markings:

1. Polyurea
2. Sprayed Thermoplastic
3. Extruded Thermoplastic
4. Epoxy
5. Cold Applied Plastic (Type IV)
6. Polymer (Single System) – Reapply Polymer (Single System) material every 180 days unless documentation from an independent Mobile Retroreflective Contractor confirming compliance with retroreflectivity requirements is submitted to the Engineer. All costs for retroreflectivity readings to avoid reapplication are the Contractor’s responsibility.

Some Work Zone Performance pavement marking materials are not recommended on specific pavement surface types. The Contractor shall use Work Zone Performance pavement marking materials recommended by the manufacturer for use on the pavement type that the marking will be applied to.

B) Material Qualifications/Certifications

Use Work Zone Performance pavement marking materials, as listed above, which are on the NCDOT APL at the time of installation or otherwise approved by the Engineer.

All Work Zone Performance pavement markings shall incorporate a high performance glass bead, or equivalent, listed on the NCDOT APL.

Submit material certifications in accordance with Articles 106-3 and 1087-8 of the *Standard Specifications*.

**Construction Methods**

A) Surface Preparation

Before installation, sweep and prepare all pavement surfaces receiving Work Zone Performance pavement markings as recommended by the manufacturer.

B) Weather Limitations and Seasonal Limitations

Apply Work Zone Performance pavement markings following the weather limitations and seasonal limitations in accordance with Subarticle 1205-3(C) of the *Standard Specifications*.

In the event a traffic pattern shift must occur when the air and pavement temperatures are below the required minimums, or if a rain event occurs prior to or during a planned traffic shift, and upon approval by the Engineer, the Contractor may install a minimum of 1 application of standard waterborne traffic paint to produce a 4 inch line at 15 mils (wet) thickness as a temporary pavement marking. Reflective media shall be applied to provide proper retroreflectivity in accordance with Article 1205-8 of the *Standard Specifications* until the Work Zone Performance pavement markings can be installed.

Apply Work Zone Performance pavement markings within 30 days of temporary pavement marking installation.

Interim pavement markings may be applied over the temporary pavement markings within 30 days of the initial installation. In such cases, apply Work Zone Performance pavement markings within 60 days of the initial temporary pavement marking installation.

Payment for temporary pavement markings installed due to weather or seasonal limitations will be made at the contract unit price for 4 inch paint pavement marking lines. There will be no payment for interim pavement markings applied to extend the life of the temporary pavement markings.

C) Traffic Pattern Shifts for Contractor Schedule/Coordination Convenience

The Contractor may elect to shift traffic at any time with approval from the Engineer using a minimum of 1 application of standard waterborne traffic paint to produce a 4 inch line at 15 mils (wet) thickness as an interim pavement marking. Reflective media shall be applied to provide proper retroreflectivity in accordance with Article 1205-8 of the *Standard Specifications* until the Work Zone Performance pavement markings can be installed.

Apply Work Zone Performance pavement markings within 30 days of interim pavement marking installation.

Interim pavement markings may be reapplied within 30 days of the initial installation. In such cases, apply Work Zone Performance pavement markings within 60 days of the initial interim pavement marking installation.

There will be no payment for interim pavement markings installed for contractor schedule/coordination convenience.

D) Application Equipment

Use application equipment in accordance with Article 1205 of the *Standard Specifications.*

For applications exceeding 1,000 feet, use truck-mounted application equipment; hand-applied or non-truck-mounted methods are prohibited.

The Contractor shall not use multiple passes to achieve required material thickness, unless specified otherwise by the manufacturer.

E) Material Application

The Work Zone Performance pavement marking material shall be applied at the minimum thickness recommended by the manufacturer or the following, whichever is greater:

|  |  |
| --- | --- |
| Polyurea | 30 mils (wet) |
| Epoxy | 30 mils (wet) |
| Sprayed Thermoplastic | 60 mils |
| Extruded Thermoplastic | 90 mils |
| Polymer | 30 mils (wet) |
| Cold Applied Plastic (IV) | Per the manufacturer’s recommendations |

Unless otherwise directed by the Engineer, when Work Zone Performance pavement markings are applied to open graded friction course (OGFC) pavements, the Work Zone Performance pavement marking shall be extruded thermoplastic with a minimum thickness of 90 mils to achieve an above pavement thickness great enough to meet the retroreflectivity requirements below.

Work Zone Performance pavement markings are not required on milled surfaces or interim lifts of pavement when additional lifts are scheduled to be installed within the next 30 days or for traffic patterns that will change within 30 days. Under these circumstances, the Contractor shall install a minimum of 1 application of standard waterborne traffic paint to produce a 4 inch line at 15 mils (wet) thickness as a temporary pavement marking. Reflective media shall be applied to provide proper retroreflectivity in accordance with Article 1205-8 of the *Standard Specifications*.

Work Zone Performance pavement marking lines, symbols and characters shall be installed to conform to the sizes, shapes, and thicknesses shown in the transportation management plans.

No track dry times shall be 10 minutes or less. Traffic shall not be placed on any material until it is sufficiently dry/cured to eliminate wheel tracking.

F) Retroreflectivity Requirements

Ensure the selected Work Zone Performance pavement marking system maintains the minimum retroreflectivity levels outlined below for at least 12 months after installation.

|  |
| --- |
| **Retroreflectivity Requirements for Work Zone Performance Pavement Markings** |
| **Color** | **Initial installation to** **1 month after installation** | **Greater than 1 month to 6 months after installation** | **Greater than 6 months to 12 months after installation** |
| White | 325 mcd/lux/m2 | 225 mcd/lux/m2 | 150 mcd/lux/m2 |
| Yellow | 220 mcd/lux/m2 | 120 mcd/lux/m2 | 100 mcd/lux/m2 |

G) Testing Procedures

All Work Zone Performance pavement marking installations may be scanned by the Department through an independent Mobile Retroreflective Contractor. The Work Zone Performance pavement markings may be scanned within 30 days of the last pavement marking installation to ensure the retroreflectivity requirements above in Section F are met. If the Work Zone Performance pavement marking material is not scanned within 30 days of the last pavement marking installation, the 6-month retroreflectivity requirements shall govern.

The Contractor shall notify the Engineer a minimum of 7 days prior to the installation of Work Zone Performance pavement markings for the Engineer to schedule testing.

If the markings appear to be non-performing, the Engineer may request additional retroreflectivity readings. Should the reading indicate noncompliance with Section F in this special provision, the Contractor shall replace the Work Zone Performance pavement markings at no cost to the Department. Retroreflectivity is considered non-compliant when the average falls more than 15% below the requirements in the table. Pay deductions may be applied for deficiencies up to the 15% level.

H) Snowplow Damage

All Work Zone Performance pavement markings shall be durable enough to withstand a single snow event requiring snowplowing without showing excessive fatigue in either bonding or retroreflectivity.

The Contractor shall replace the Work Zone Performance pavement markings if a single snowplow occurrence results in more than 25% of the pavement marking edgelines or skips being physically removed and/or the Work Zone Performance pavement markings do not meet the following minimum retroreflectivity values:

|  |
| --- |
| **Retroreflective Requirements for Work Zone Performance Pavement Markings After a Single Snowplow Occurrence** |
| **Color** | **Minimum** |
| White | 150 mcd/lux/m2 |
| Yellow | 100 mcd/lux/m2 |

Unless the traffic pattern is to be modified within 30 days, the Contractor shall replace all non-compliant Work Zone Performance pavement markings within 30 days of determining they are non-compliant.

If the work zone experiences more than one snow event requiring snowplowing, the retroreflectivity values in the chart above will no longer apply. The Engineer will determine if the pavement markings are performing adequately or if replacement is necessary due to excessive damage caused solely by snowplow activities.

Replace deficient Work Zone Performance pavement markings; however, compensation will only be made at the contract unit price if the deficiency is caused solely by snowplow damage due to multiple snowplow events. Unless the temporary traffic pattern will be modified within 30 days, the Contractor shall replace all Work Zone Performance pavement markings damaged due to multiple snowplow events within 30 days.

**Maintenance**

Replace any Work Zone Performance pavement material that fails prematurely due to debonding or excessive wear, resulting in retroreflectivity levels below the required 12 month standard. Replacement costs for traffic control and Work Zone Performance pavement markings shall be the responsibility of the Contractor, except when excessive damage is caused by snowplowing.

If Work Zone Performance pavement markings are required to remain in place beyond 12 months, they must be scanned at or near the 12-month mark by a Mobile Retroreflective Contractor to verify compliance with minimum retroreflectivity levels. Markings that meet these levels may remain in place. Markings that fail to meet the required level must be replaced by the Contractor within 30 days of the end of the 12-month duration, with replacement compensated at the contract unit price.

If replacement becomes necessary, the same notification procedure described above shall be followed to have the Work Zone Performance pavement markings scanned for the retroreflectivity compliance.

**Measurement and Payment**

*Work Zone Performance Pavement Marking Lines, \_\_\_"* will be measured and paid as the actual number of linear feet of Work Zone Performance pavement marking lines satisfactorily placed and accepted by the Engineer. The quantity of Work Zone Performance pavement marking solid lines will be the summation of the linear feet of solid line measured end-to-end of the line. The quantity of Work Zone Performance pavement marking skip or broken lines will be the summation of the linear feet derived by multiplying the nominal length of a line by the number of broken lines satisfactorily placed.

Reapplications are measured and paid only when applied after 12 months from the initial installation, every 12 months thereafter, or when snowplow damage occurs as specified in Section H in this special provision. Reapplications of Polymer (Single System) materials required to meet the 180-day replacement requirement will not be measured or paid.

*Work Zone Performance Pavement Marking Symbols* will be measured as the actual number of Work Zone Performance pavement marking symbols satisfactorily placed and accepted by the Engineer. Payment for *Work Zone Performance Pavement Marking Symbols* will be made at the contract unit price of the proposed Pavement Marking Symbols to be used on the final wearing surface.

*Work Zone Performance Pavement Marking Characters* will be measured as the actual number of Work Zone Performance pavement marking characters satisfactorily placed and accepted by the Engineer. A character is considered to be one letter or one number of a word message. Payment for *Work Zone Performance Pavement Marking Characters* will be made at the contract unit price of the proposed Pavement Marking Characters to be used on the final wearing surface.

*Paint Pavement Marking Lines, \_\_\_"* will be measured and paid for in accordance with Article 1205-10 of the *Standard Specifications*. There will be no direct payment for interim paint pavement marking applications.

Payment at the contract unit price for the various items in the contract will be full compensation for all the items covered by this section. No direct payment will be made for: the work involved in applying the lines, including surface preparation, reapplication of molten pavement marking crossed by a vehicle, removal of all pavement marking materials spilled on the roadway surface, and repair of markings tracked by a vehicle.

Replacement of Work Zone Performance pavement markings that prematurely deteriorated, failed to adhere to the pavement, lacked reflectorization or were otherwise unsatisfactory during the life of the 12-month observation period as determined by the Engineer will be at no cost to the Department.

Payment will be made under:

|  |  |
| --- | --- |
| **Pay Item** | **Pay Unit** |
| Work Zone Performance Pavement Marking Lines, \_\_\_" | Linear Foot |
| Work Zone Performance Pavement Marking Symbols | Each |
| Work Zone Performance Pavement Marking Characters  | Each |