

# Attachment A

## City of Suffolk Pavement Marking Standards

### Pavement Markings and Markers

#### A. Scope:

The purpose of these Specifications is to provide the minimum requirements of the City of Suffolk for any Pavement Marking activity that goes on in the Public Right of Way. It is in addition to the VDOT Road and Bridge Specifications. All references made to the VDOT Road and Bridge Specifications latest version.

#### B. Materials:

1. All pavement marking materials (including paint, thermoplastic, and glass beads) shall conform to all VDOT Specifications.
2. Type A paint is only to be used by the direction of the office of the City Traffic Engineer.
3. Thermoplastic material shall be of alkyd base binder.

#### C. Section I. Lane, Edge, and Centerline Markings

1. White lane lines, either solid or skip lines will be 4" unless otherwise stated in plans.
2. Lane lines on an approach to a signalized intersection will be solid white for a distance of not less than 150' measured from Stop Bar or equal to the length of the Solid Lane Lines, for adjacent auxiliary (Right and or Left Turn Lane Lines).
3. Lane lines that delineate the edge of the Turn Lane will be 4" solid white lines and they will extend continuously from the beginning of the full width of the turn lane to the Stop Bar. Mini Skips will be extended from the lane line to the end of the transition.
4. Edge Lines, when noted on the plan will be solid white lines 4" wide, but solid yellow lines are to be used when adjacent to a median which separates opposing directions of vehicular traffic. Edge Lines are not to be used with curb and gutter on the outside lane.
5. Centerlines on an undivided highway will be solid double yellow lines 4" wide separated by a 4" space.
6. On minor approaches to an arterial or collector, lane lines, edge lines, and or centerlines will be extended a minimum distance of 150' from the Stop Bar.
7. All Skip Lines will be 10' in length, with a 30' space between them.

#### D. Section II. Crosswalks

1. Crosswalk Lines will be solid white lines, 6" wide, marking both edges of the crosswalk area.
2. Crosswalk Lines will extend from edge of pavement to edge of pavement or edge of shoulder as possible.
3. Lines forming a crosswalk will be parallel
4. The width of a crosswalk will be 8', measuring from center of 6" line to center of 6" line. In heavy traffic areas crosswalks will be 10' in width.
5. In heavy traffic areas outside of the Downtown business area, crosswalks will have 2' wide consecutive white rectangles that will cover the entire width of the

crosswalk perpendicular to the 6" white lines, spacing will be approximately 6' on center. They will be located so as to avoid normal wheel paths.

**E. Section III. Median Markings**

1. Center Lane Left Turn Only (two way left turn lanes or Suicide Lanes) will consist of two sets of one way barrier lines. Ten foot (10') broken yellow lines with 30' space will be located inside solid yellow lines.
2. Transverse median markings will consist of 2' yellow lines

**F. Section IV. Gore Markings**

1. Markings will consist of 2' solid white or yellow transverse lines. Spaced as required by note #3 Section 4.
2. Chevrons will be used when specified in approved plans.
3. 2' Median, Gore, and Chevron markings will be spaced according to the posted speed limits as follows:
  - a. Spacing will match Posted speed limit up to a maximum spacing of 35'.

**G. Section V. Stop Bars**

1. Two feet wide solid white stop bars will completely transverse all traffic lanes on each approach at a signalized intersection, or approaches to an intersection with a "Stop" Sign control at major collectors and arterial roadways.
2. Stop Bars will be located at a minimum of 4' in advance of a crosswalk, unless otherwise specified on an approved plan.

**H. Section VI. Pavement Legends**

1. Legends will be transversely aligned across each lane, the distance between the arrow symbol and the Stop Bar will be 8'
2. Arrows and Legends will not be placed prior to the Solid White Lane Lines.
3. Word Messages will be located in advance of its accompanying symbol by a distance of not less than 32', nor more than 80' from the symbol. After the 5<sup>th</sup> legend in a turn lane the spacing between legends may go to 100' maximum.
4. For Auxiliary Right and or Left turn Lanes on all approaches, legends will be centered within the lane. They will continue the length of the lane beginning and ending with a symbol. Thru lanes will not be installed on an uncontrolled thru street at intersection without a signal
5. Merge Arrows will be spaced according to the posted Speed Limit as follows.
  - a. Posted Speed <35 mph=80'
  - b. Posted Speed >35mph =120'

**I. Section VII. Parking Space Markings**

1. All on street parking spaces will be a minimum of 20' long and a minimum of 8' wide
2. All parking spaces will be marked with 6" lines.

**J. Section VIII. General Notes**

1. Installation and materials for all pavement markings and legends will be in accordance with the City of Suffolk Department of Public Works/Traffic Engineering Division Specifications Set forth in this document unless otherwise stated on the plans, or in contract documents.
2. The contractor will note all special provisions of the contract specifically with the regard to rate of application, maintenance of traffic, restricted working hours, and/or restricted weather conditions.
3. The Contractor will remove all previous pavement markings, which in the opinion of the engineer will conflict with the new pavement markings. All eradication will be in conformance with the VDOT Specifications.
4. Before any markings will be applied in the Right of Way, the City Traffic Engineer's office must be notified 72 hours in advance. If this office is not notified and the markings do not meet with what the City Traffic Engineer's office considers proper, the markings will be removed and replaced at the sole expense of the contractor.
5. No pavement markings will be applied until 48 hours after rainfall, unless otherwise directed by the City Traffic Engineer's office.
6. Snow plowable pavement markers will be installed only by direction of the City Traffic Engineer's office.
7. Only Alkyd Based Thermoplastic is to be used unless otherwise directed by the City Traffic Engineer's Office.
8. All pavement markings installed in the City's Right of Way whether "Temporary or Permanent" will contain glass beads.



# Attachment C

## Proficiency Checklists

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1. Test for Moisture in the Pavement with Thermoplastic Application
2. Test for Determining the Film Thickness for Thermoplastic Markings
3. Test for Determining Application Rate of Glass Beads – Method 1
4. Visual Inspection

<b>Test for Moisture in the Pavement with Thermoplastic Application</b>
<b>Equipment Needed:</b>
#15 Tar paper
Duct tape
<b>Procedure:</b>
1. Select a location where markings are to be applied.
2. Place the tar paper on the pavement surface and secure the tar paper to the surface with duct tape that it will not be displaced when thermoplastic is applied.
3. Apply the thermoplastic to the tar paper.
4. Wait approximately one (1) minute to allow any moisture in the pavement to condense onto underside of the tar paper.
5. Carefully remove the tar paper from the pavement.
6. Inspect the underside of the tar paper for condensation of moisture.

**What does moisture on tar paper mean?**

**Moisture in the pavement**

**What steps should be taken?**

**Wait 1 hour and retest.**

<b>Determining the Film Thickness for Thermoplastic Markings</b>	
<b>Equipment needed:</b>	
Calipers accurate to .001 inch	
Sample plate (sheet metal – 4"x6", 40 to 60 mils thick)	
Duct tape	
<b>Procedure:</b>	
1.	Select a location in the path of where the markings are to be applied. Place the plate on the pavement surface and secure it with duct tape.
2.	Make sure the glass bead gun or dispenser is turned off prior to application of the marking material to the sample plate.
3.	Apply the marking material to the sample plate using the equipment being evaluated.
4.	Wait until the sample cools sufficiently to be moved without flowing. Carefully remove the sample plate from the pavement.
5.	Using calipers, measure the total thickness of the thermoplastic and the sample plate.
6.	Measure and record the thickness of the sample plate.
7.	Subtract the panel thickness from the total thickness to obtain the thickness of the applied material.

Total thickness of material and panel  
Thickness of the panel  
Thickness of the thermoplastic

<b>Test for Determining Application Rate of Glass Beads – Method 1</b>	
<b>Equipment needed:</b>	
Calibrated 1 gallon bucket.	
Stop watch or watch with second hand	
<b>Procedure:</b>	
1.	Determine the time required to dispense the specified quantity of beads from Table 1. Find vehicle speed, Go to column on right for time needed to dispense 6 lbs of beads.
2.	Position the bucket under the bead gun such that all beads dispensed will be caught in the bucket.
3.	Turn on the bead gun for the time increment from Table 1 (The pressure must be at the same setting that is used while applying markings,)
4.	Compare the level of beads in the bucket with the appropriate graduation.

Is there a difference of ½ inch or greater between the level of the beads and the calibration mark in the bucket what would you do?

Make adjustments to the equipment to close this gap.

How is bucket calibrated?

Pour 6 pounds of glass beads into bucket and mark depth on bucket by using indentions, drilled holes or marks. Then add 1 pound increments of beads, marking on side of bucket after each addition.

<b>Time to Dispense Specified Quantity of Glass</b>	
<b>Vehicle Speed</b>	<b>Beads</b>
<b>Mph</b>	<b>(seconds)</b>
4	54.5
5	43.6
6	36.4
7	31.2
8	27.3
9	24.2
10	21.8
11	19.8
12	18.2
13	16.8
14	15.6
15	14.5
16	13.6
17	12.8
18	12.1

# Attachment D

## Visual Inspection Guidelines

Knowing material quantities does not assure that everything was distributed correctly. This procedure provides guidelines for the visual inspection of pavement markings. Marking which do not meet the criteria stated below, fail this procedure and should be rejected. Visual inspections are made with regard to one of two (2) items; the marking itself or the glass beads.

### 1) The Marking

- a. The location of markings should be compared with the plans and/or the Manual of Uniform Traffic Control Devices (MUTCD). Markings that do not conform to these requirements are unacceptable.
- b. Markings must be of the specified width.
- c. Markings must be checked for even thickness. This may be done by either inspecting the samples taken for thickness measurements or viewing the marking directly on the pavement. With either method, look for uneven thickness in the cross-section of the marking.

### 2) The Glass Beads

Visual inspection of glass bead application is either with regard to distribution or embedment.

#### Distribution

- a. Beads should cover the entire marking.
- b. Beads should be evenly distributed across the entire marking.
- c. All beads should either be embedded into or onto the marking with little or no loss onto the adjacent pavement.

#### Embedment

- a. Visual evaluation of bead embedment should be made on the marking after application to the road surface. The specifications for bead embedment are general. It is not feasible to obtain exact percentages of buried vs. non-buried beads.

Generally, a marking that fails the visual inspection for bead embedment exhibits one of the following conditions:

- 1) Most of all the beads are buried in the marking material
- 2) Beads are insufficiently buried (most or all beads are on the surface of the marking).
- 3) "Pulsed" beads – This is caused by rapid fluctuations in the delivery of the beads to the gun.
- 4) Most or all beads are on side of the marking.