



Marking: Construction

April 30, 2026

Jeannie Silver



Surface Prep

Needs to be:

Dry

Clean

Free of Dust

Free of Salt

Check temperatures



Temporary Markings- Spec 643

Temporary Waterborne Paint

- Install temporary waterborne paint at a thickness of 12 mils.
- Install type I glass beads at 4-5 pounds per gallons of paint.

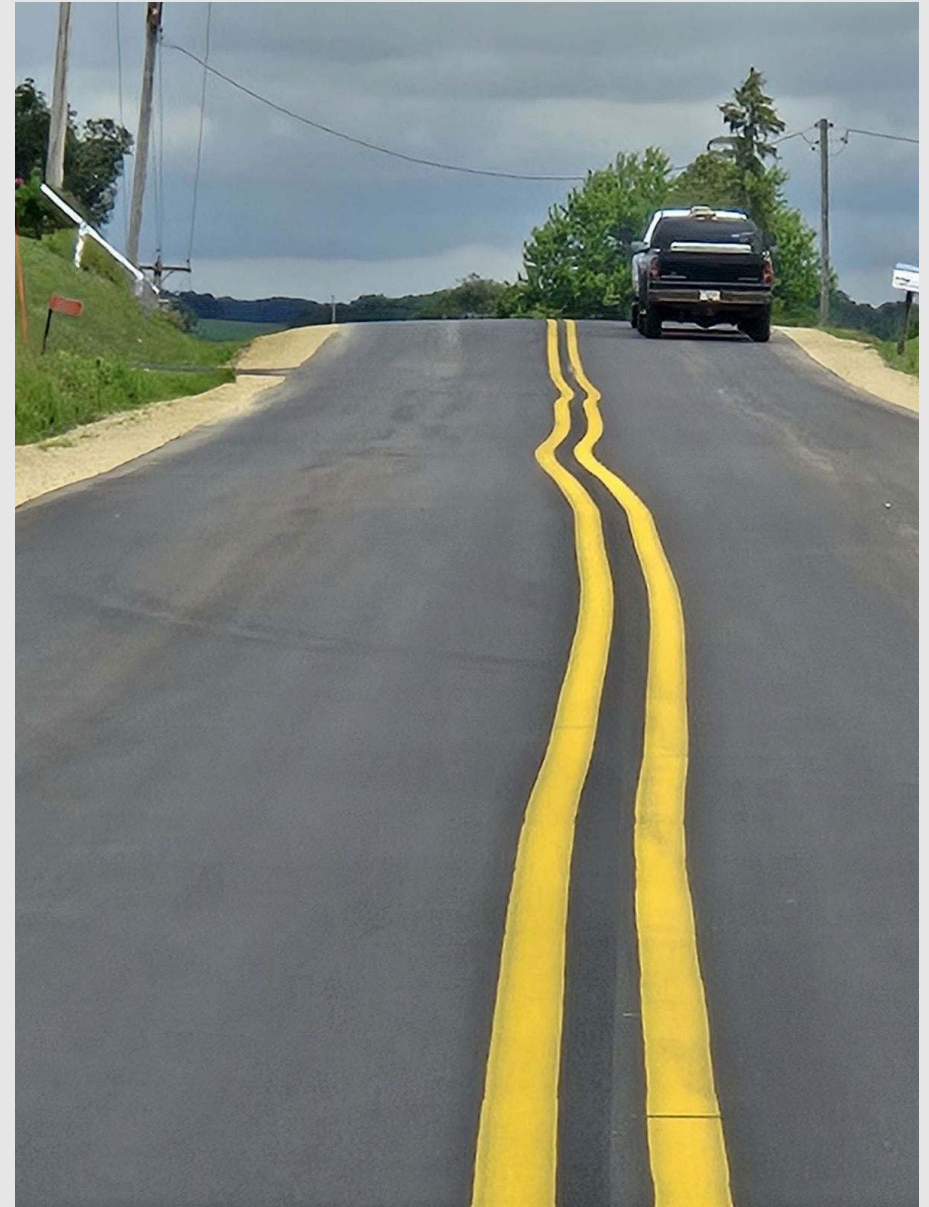
Temporary Epoxy

- Install temporary epoxy at a thickness of 16 mils.
- Install type I glass beads at 12-15 pounds per gallon of epoxy



Temporary Markings

- Intermediate Layers
 - Markings even though they are temporary still need to follow spec and be placed correctly.
 - Maybe offset to be covered when the opposite direction is paved.
- Final Surface
 - Markings should be in the same place as the final markings unless noted in the plans.
- Widths and Thickness need to be met for Temporary as well as Permanent markings.



Incorrect Temporary Markings



- Contractor cannot add a 3rd line to prevent coming back each day to paint the roadway. This violates the MUTCD.
- Ensure temporary markings are installed in the correct location. If not, they need to remove the temporary line at no extra cost.
- Temporary markings include removal.
- Black cannot be sprayed over the line as a permanent fix to an incorrect marking. This violates the MUCTD.



Same Day verse Temporary Markings

Temporary markings are same day markings at a thinner mil thickness.

In most applications temporary marking should be utilized instead of same day.

Same day should be used when that line will become the final line out on the roadway, and it is needed to be installed on the same day the roadway is paved.



Permanent Marking

Spec 646

Waterborne Paint

- Install waterborne paint at a thickness of 16 mils
- Install glass beads at 8-10 pounds per gallon of paint
- Only surface apply paint

Standard Epoxy

- Install standard epoxy at a thickness of 20-25 mils depending on type of surface.
- Install glass beads at 22.5-25 pounds per gallon of epoxy
- Only surface apply epoxy

Grooved Wet Reflective Epoxy (WR Epoxy)

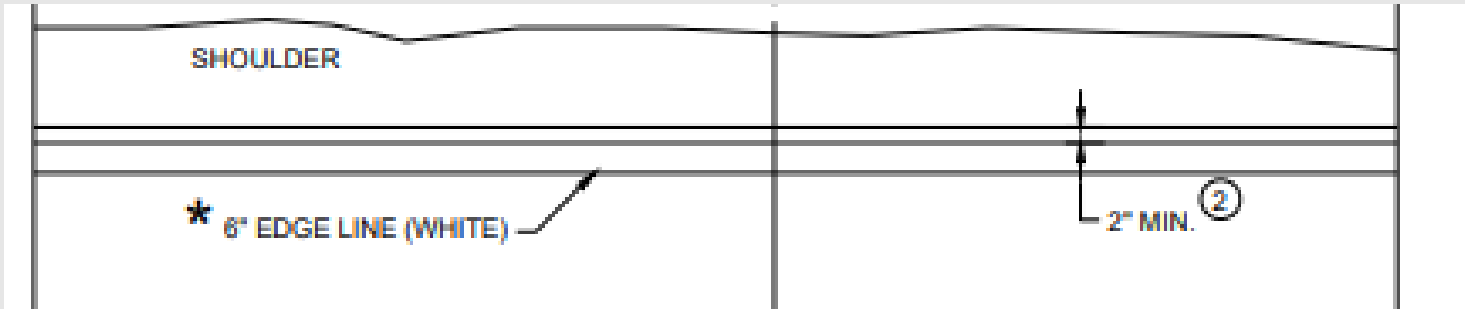
- Install WR Epoxy at a thickness of 20 mils
- Install beads per APL. Rates depend on which type of beads are being used.
- The depth of the groove is 90 +/- 10 mils (~ width of a quarter)

Permanent Tape

- Tape may require adhesive depending on when the tape is installed due to the weather.
- The depth of the groove is 175 +/- 10 mils (~ the width of 1 quarter + 1 penny)

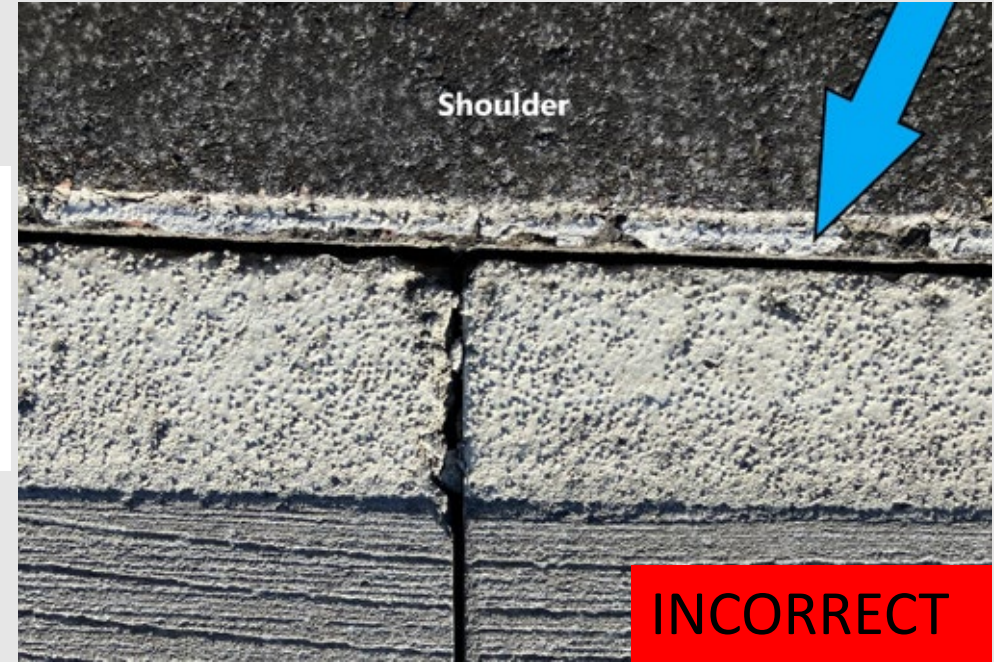
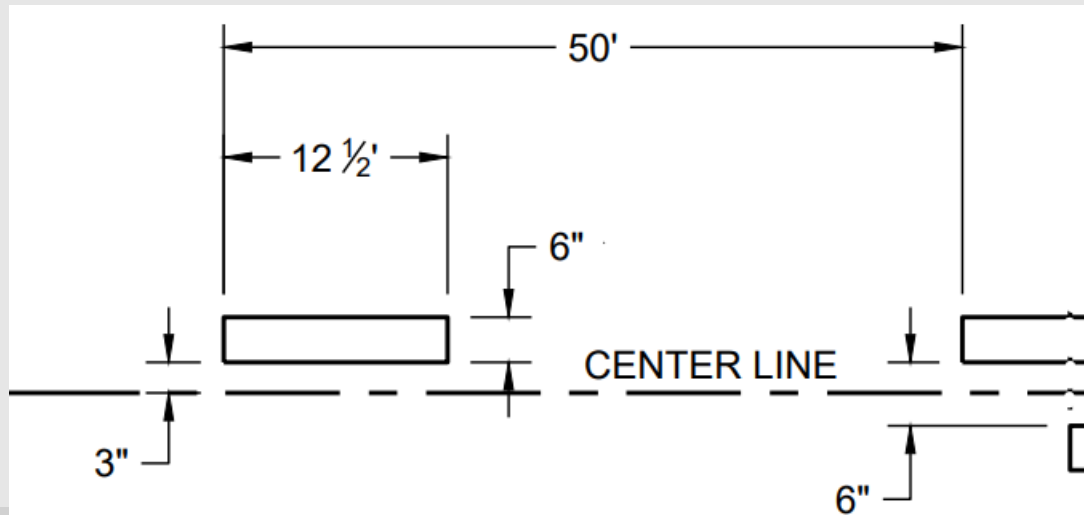


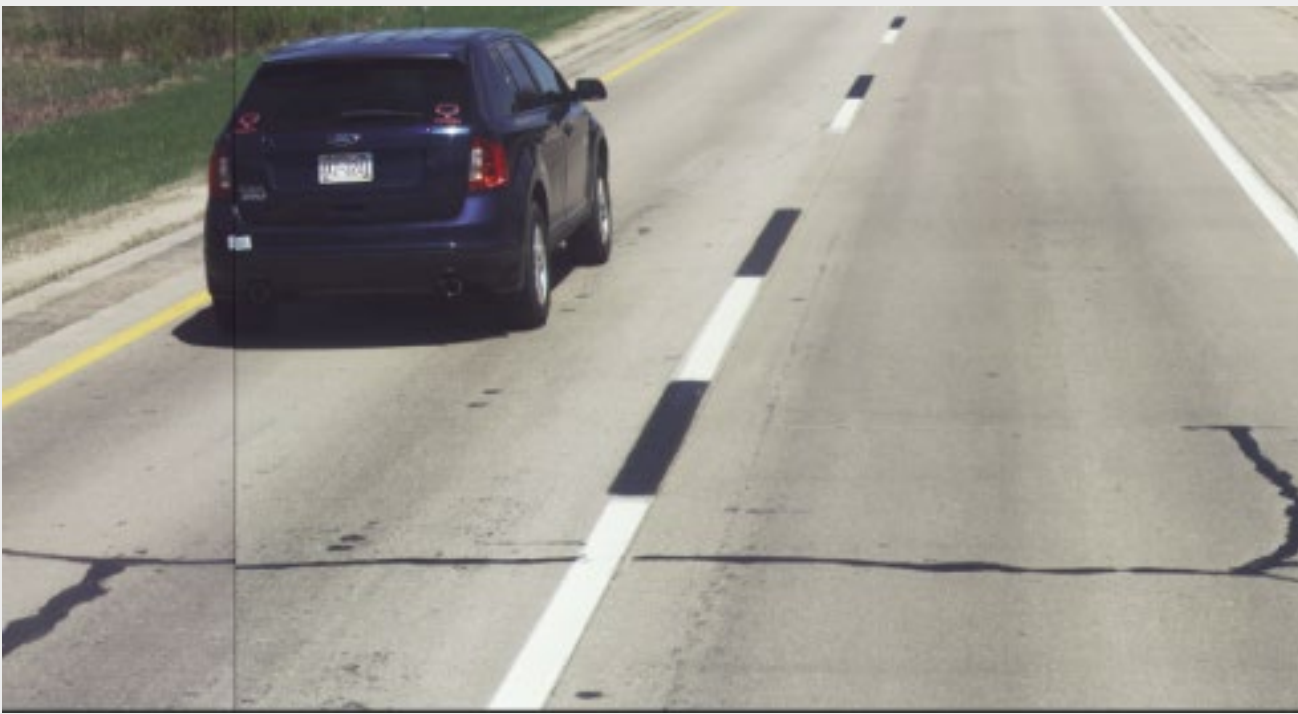
Proper Line Location



Ensure Edgeline markings are 2" from joint ([SDD 15C8a](#)). This allows for crack filling operations to occur without covering the line.

*Note: To keep lane width sometimes this may not happen.





Permanent Pavement Marking

- If the roadway is open to traffic and tabs/same day pavement marking and signage are placed, install permanent pavement marking within 7 days of completing mainline paving.
- All surface applied products use AASHTO M247 beads (Type I with 80% rounds/spheres)
- All special markings are white unless otherwise noted.



Groove Depths

INCORRECT



To narrow for wet reflective epoxy



INCORRECT

To deep for wet reflective epoxy



INCORRECT

Uneven Grooves. Grooves should be consistent from one side to the other.

(1) Provide a groove depth as follows:

PRODUCT
Grooved Wet Reflective Epoxy
Grooved Tape

GROOVED DEPTH

90 +/- 10 mils

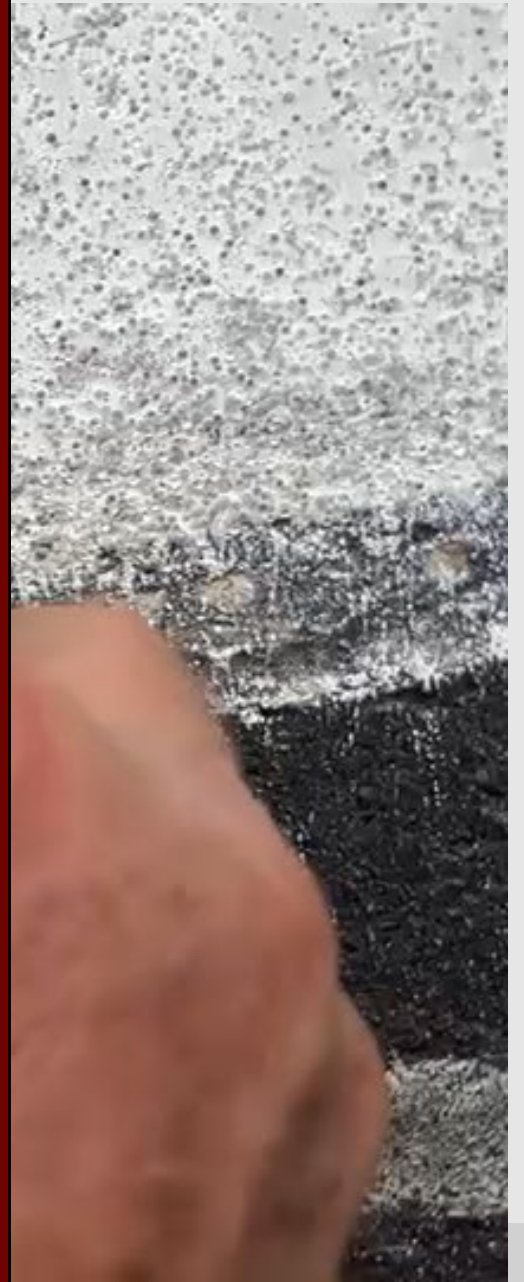
175 +/- 10 mils



Groove Depth Gauges

- To request a set, contact your region marking coordinator or Jeannie Silver.
- There are 2 for each product type. One is the minimum groove depth, and one is for the maximum groove depth.
- Place in groove **prior to marking** or a space where no marking exists.





Contrast

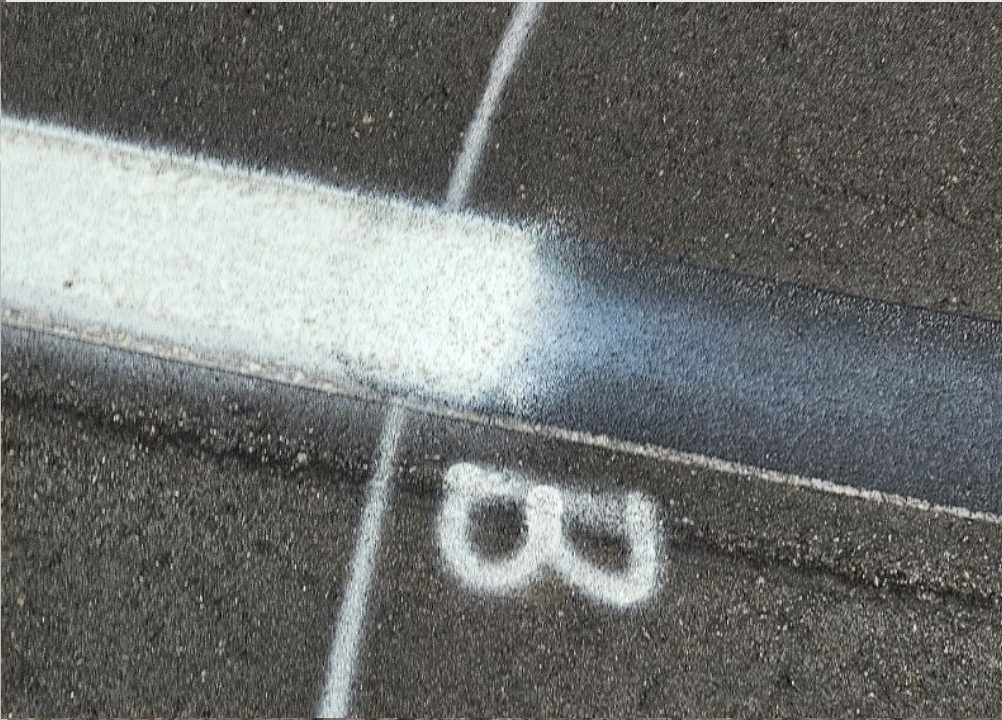
- All contrast markings shall be the lag marking.
- Apply black aggregate or beads to the black pavement marking.
- Contractors can install the black either before, after or at the same time as the white marking. However, tracking and overlap needs to be prevented.

Grooving

- Grooving depth has been an issue. Make sure the groove is not too deep or too shallow.
- The groove can be up to 1" wider than marking and up to 4" longer than marking.
- Completely install the marking within the groove.
- Grooves must be clean and dry before install the marking.
- Gores can be tricky with the shoulder joint.



Depth Gauges
are available
upon request.



Common Lag Issues

- Do NOT overlapping
- Make sure skips are 12' 6" long
- Watch for tracking.

Permanent Tape

- If grooves are wet or damp, DO NOT place marking
- Only cut taps at joints.
- Do not forget to tamp markings.



DO NOT Install Tape under 50 degrees

Use the product specific bead application rate for wet reflective epoxy specified on the [APL](#).

646.3.1.3 Cold Weather Marking

Revise 646.3.1.3(1) to change from ambient or pavement temperature to ambient and pavement temperature for cold weather marking.

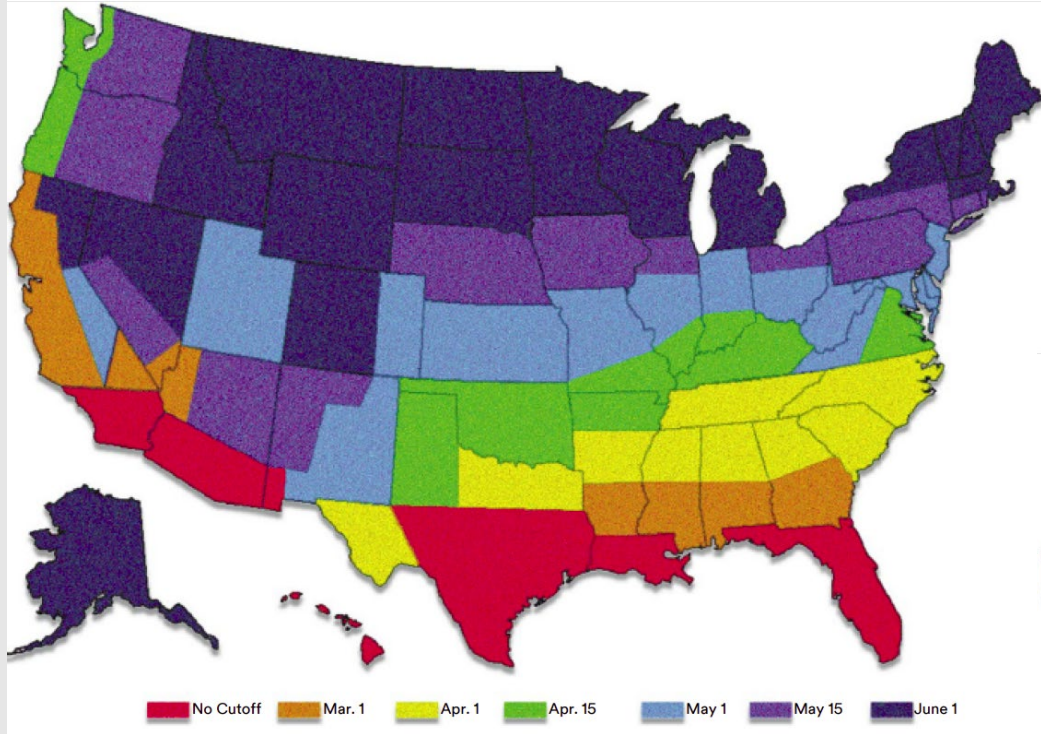
- (1) Do not place permanent **paint** or permanent **tape** marking if the ambient **and** pavement temperature **are below 50 F**. Choose an epoxy marking compatible with field conditions when placed. Do not place permanent **epoxy** marking if the ambient **and** pavement temperature **are below 35 F** unless the engineer allows in writing.
- (2) If the engineer allows or requires marking below the specified minimum temperatures, apply epoxy from the [APL](#) in the exact location and width where permanent marking would be installed. Place epoxy at the mil thickness and the glass bead application rate specified for permanent epoxy. Maintain until weather permits permanent placement.
- (3) Using the failure criteria specified in [646.3.1.5](#), perform corrective maintenance whenever the failure rate exceeds 25 percent of any section of marking. Completely remove and replace cold weather marking with permanent marking when weather permits. Cold weather markings within a pavement rumble may remain in place. The proving period for the final marking begins after replacement.

646.3.1.4 Pavement Marking



Folder 5.7 and Climate Guide

3M Climate Guide Start Dates



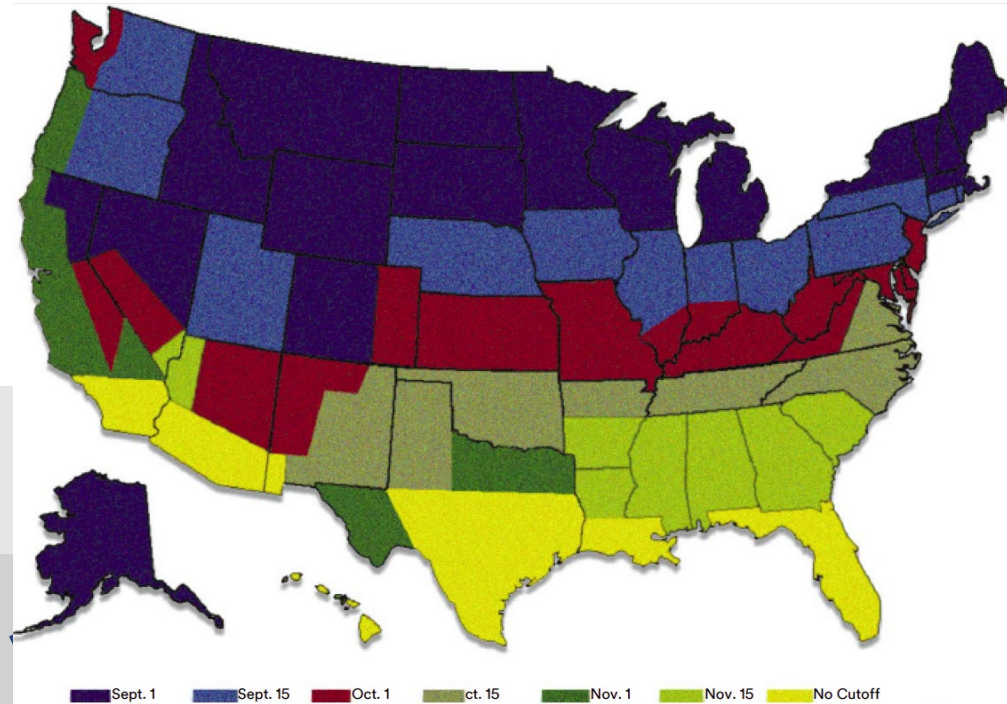
Adhesive needs to be evenly distributed or it does not dry properly.

Overlay Product Application Requirements

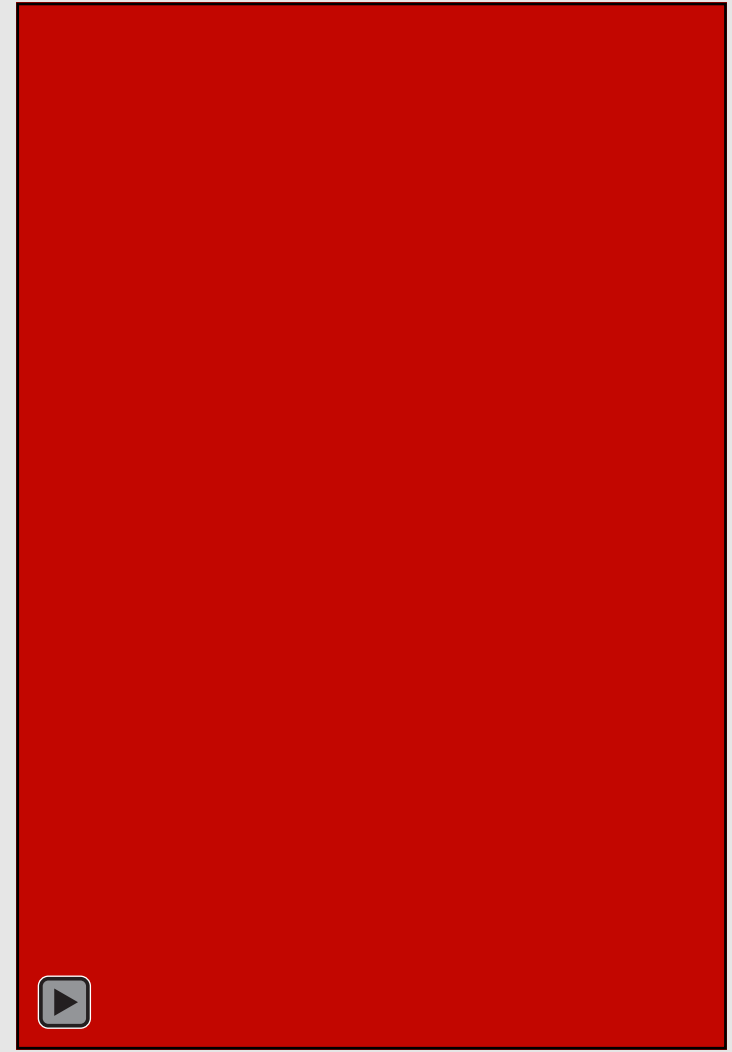
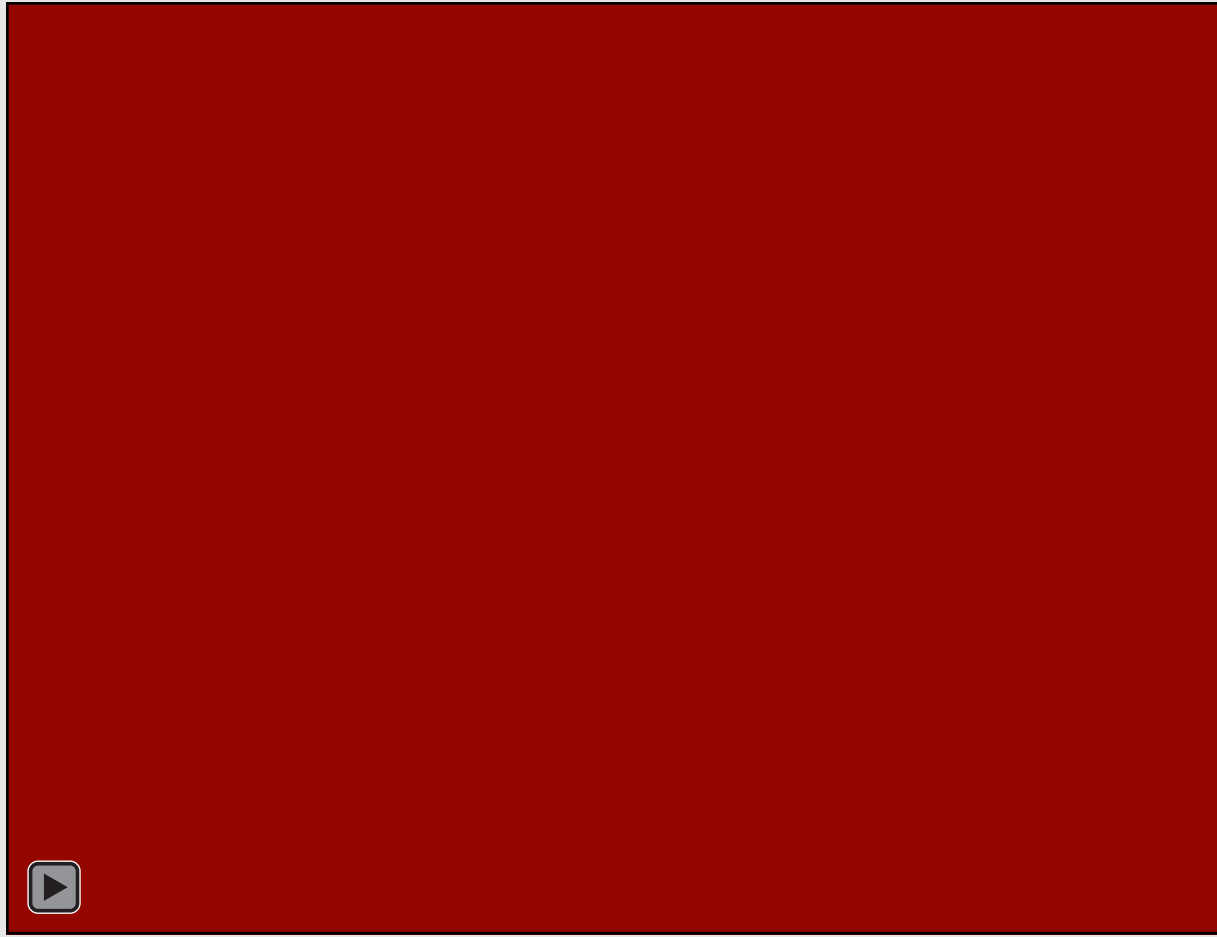
The following general requirements apply to all Stamark tape applications:

- **Temperatures**
Air and Surface Temperature: Minimum 40°F (4°C) and rising.
Overnight Air Temperature: Minimum 40°F (4°C) the night before tape application is recommended. If the temperature falls below 40° F, inspect the pavement surface for visible signs of moisture (dew, frost, etc.).
- Overlay applications must be completed within the seasonal start and end dates for a particular region as indicated in the 3M Climate Guide for 3M™ Stamark™ Pavement Marking Tapes.
- If outside your seasonal start or end date, you must use 3M™ Low VOC Surface Preparation Adhesive SPA60 or 3M™ Stamark™ Surface Preparation Adhesive P-50 when air and surface temperature is 40°F and rising.

3M Climate Guide End Dates



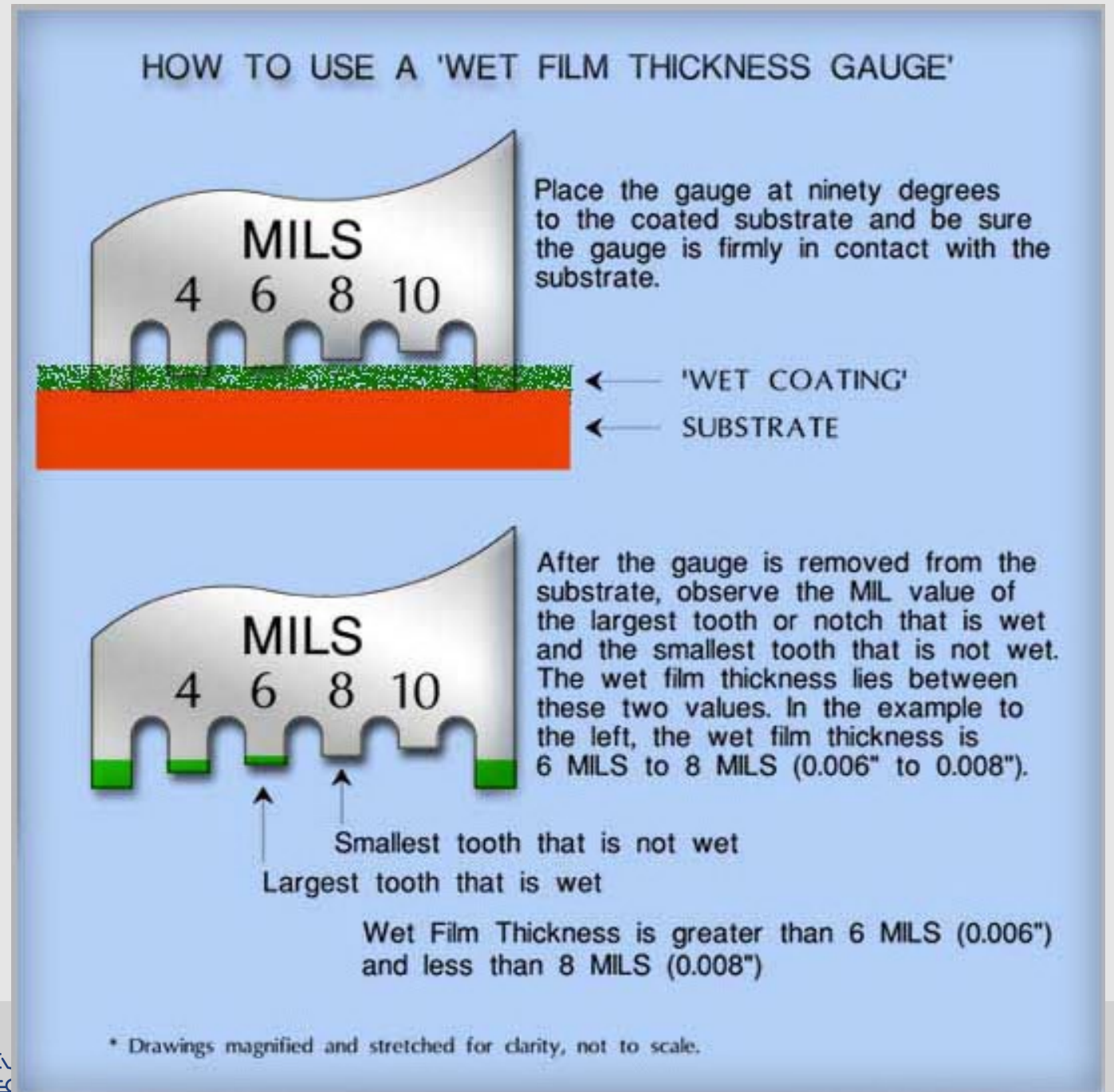
Tape Failures



How to measure the wet mil thickness of a Pavement Marking

- Spec is based on a **wet** mil thickness. Pavement marking shrinks when it dries and beads will add additional height resulting in an inaccurate mil thickness.
- Panels and gauges are available upon request.
- Measure **without** beads.

[How to use a Wet Film Thickness Gauge](#)
start at 1 minute



Centerline Spacing Issues

Why is centerline spacing and placement important?

- Markings need to be in the center of the road
- Place markings partially outside the rumble to allow for visibility if the rumbles are filled with water.
- Too narrow and crack filling operations will cover our markings.
- Spray in one pass.

Correct Spacing

- Should be 6" of marking, 6" gap, 6" of marking.
- Standard Rumbles are 7" wide.
 - ½" in, 5 ½" out
- Sinusoidal Rumbles are 10" wide.
 - 2" Marking in, 4" out





INCORRECT



INCORRECT



ACCEPTABLE

Width of Lines

- 6" Lines means 6" Lines
- Do not count overspray



CLARUS LL
BLACK - 20 MILS

CLARUS LL BLACK.
20 MILS + 30 LBS/GAL BLACK SLAG.



CLARUS LL BLACK
20 MILS + DURALUX 334 BLEND
9 LBS/GAL

CLARUS LL BLACK
20 MILS + 10 LBS/GAL BLACK SLAG.



- Make sure to install the black aggregate at the correct rate.



Please Limit Scarring

- Verify temporary marking contractors are using the correct cycle.



The Importance Of Beads

General

Beads are added to lines to increase the visibility of the lines at night. The beads help reflect light from a vehicle back to the driver as shown in the picture to the right.

Figure 1: No Beads

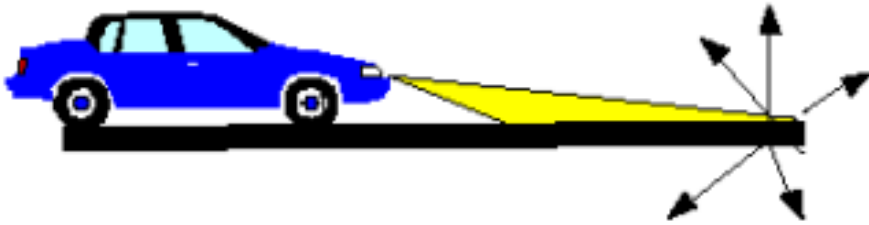
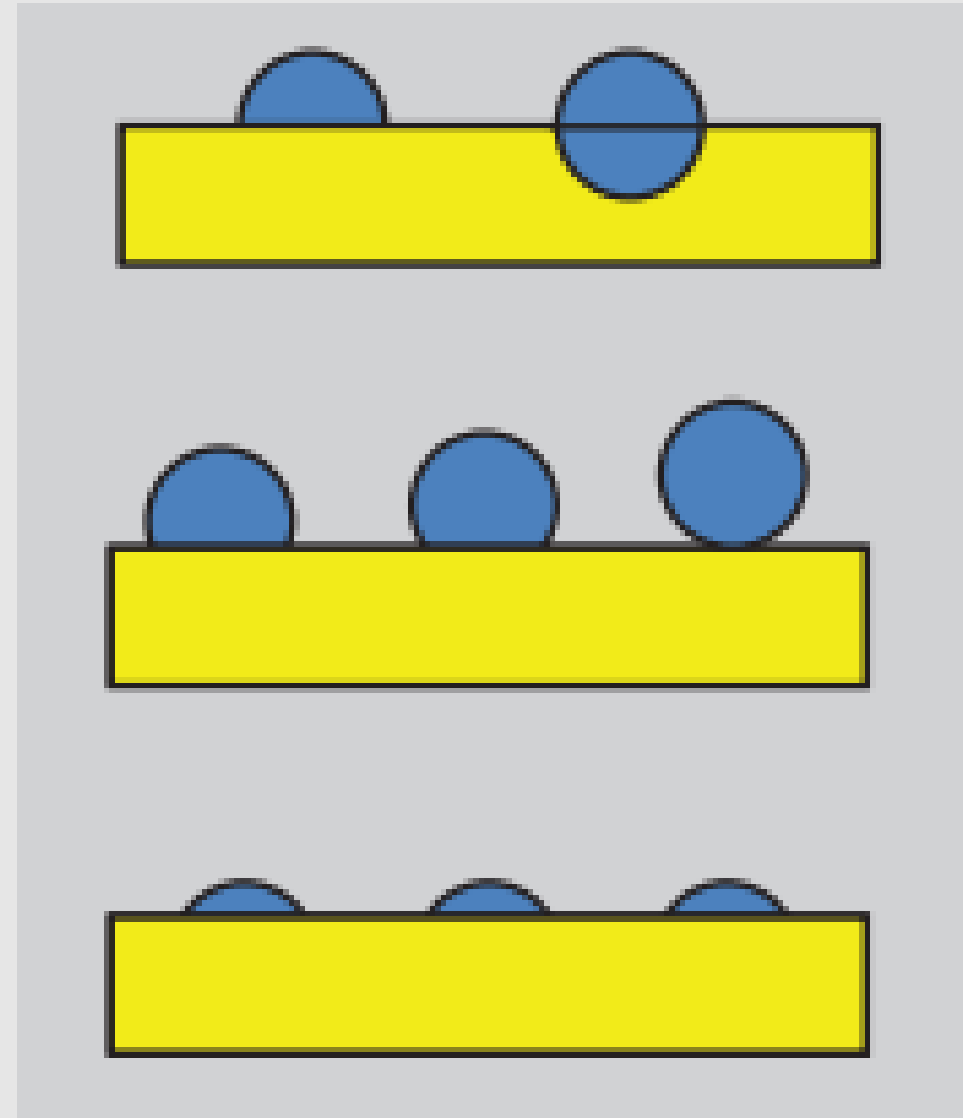


Figure 2: Beads added



Bead Embedment

- 60% bead embedment will give you the best reflectivity and longest life.
- Less than 60% bead embedment will cause the beads to pop out and less beads will be able to reflect light back to the driver.
- More than 60% bead embedment will cause beads to be covered by paint and not reflect light back to the driver.
- Excessive number of beads will cause there to not be enough material to properly hold the beads in place.



For troubleshooting tips refer to TEOpS 3-25-1

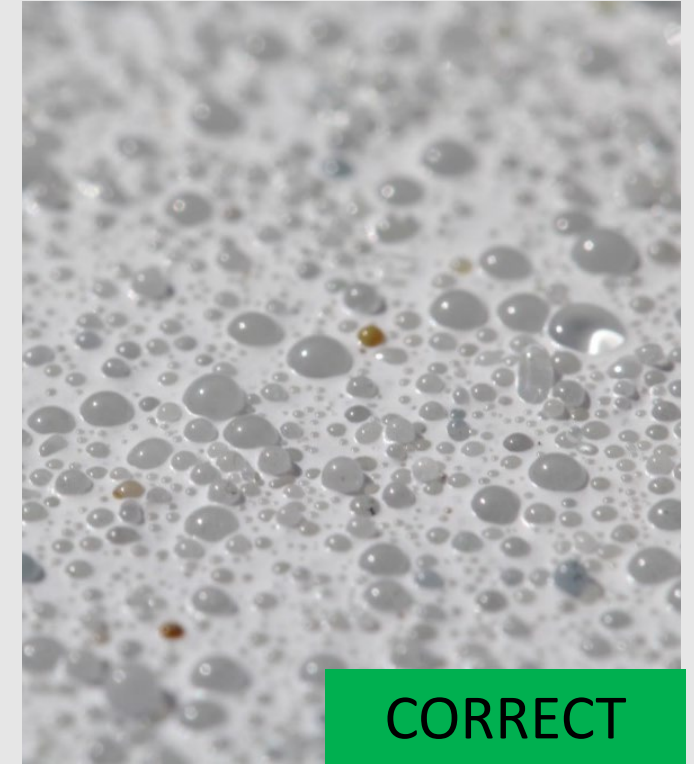




Missing Beads

Bead Distribution

- Use your phone and take a picture of the markings. Zoom in for a better view of the markings.
- Make sure the beads are evenly distributed.



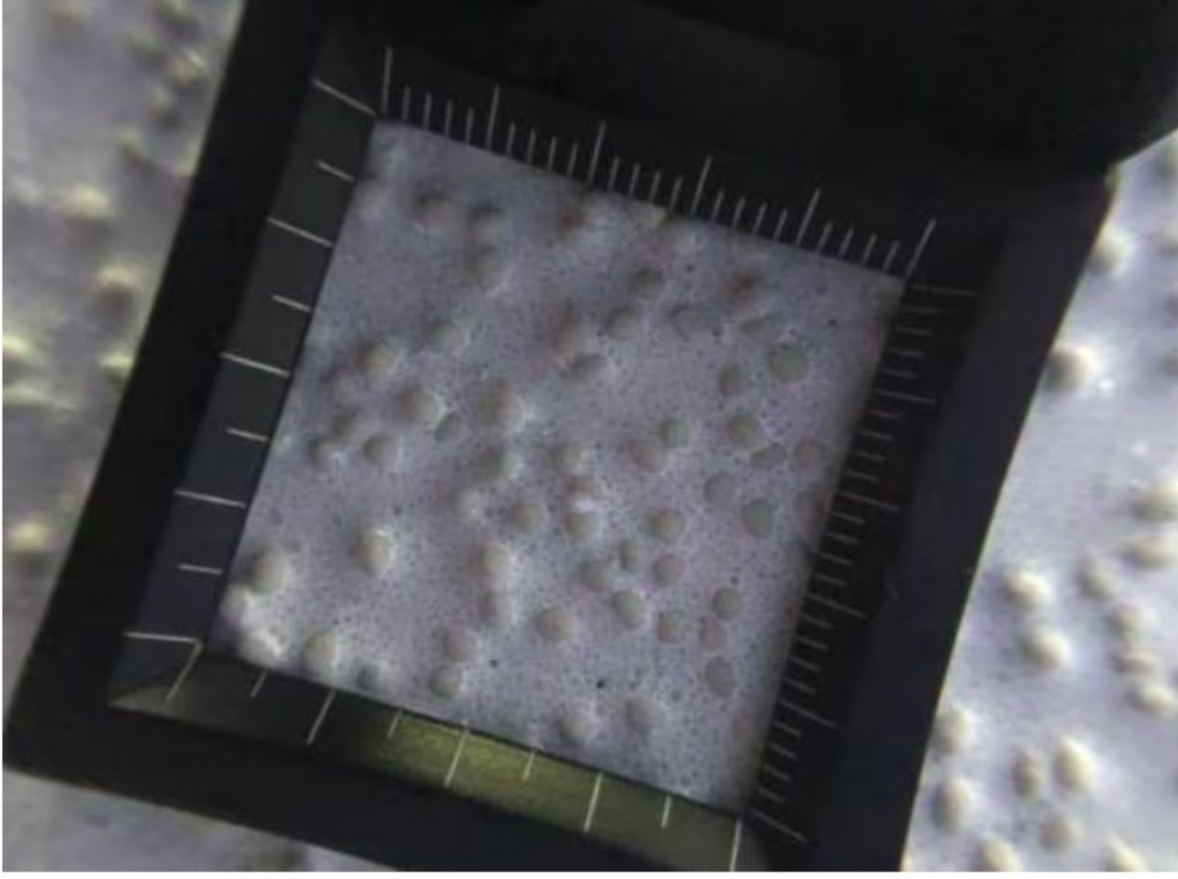
Wet Reflective/Recoverable Beads

Wet Reflective/Recoverable Elements				
Manufacturer	Drop 1		Drop 2	Approval Date
	Product	Application Rate	Application Rate	
3M	3M Wet Reflective Elements Series 70E/71E	*4.2 lbs/gal of 3M Wet Reflective Elements *Use 4.1 lbs/gal prior to May 2026 Letting	18-22 lbs/gal	October 2024
Potters	VisiUltra EP	8 lbs/ gal of VisiUltra	6 lbs/gal	October 2024

*Drop 2 Beads Gradation: 65-80% must pass the #18 seive and be at least 80% rounds. Less than 50% passing the #30 sieve.



3M Elements



35-40 elements per square inch.





Polymer Overlay- CMM 650

- Polymer Overlays **DO NOT** groove in Markings
- Any other bridge deck **DO** groove in Markings



Common Issues

Wet Reflective beads are installed using a double drop system. You cannot simply turn off one gun to install special markings.

- The big beads will shear off with snowplows

Too shallow of Grooves

- The beads will shear off with snowplows

Too deep of grooves

- Water will sit in the grooves

Too many beads

- Not enough paint to hold the beads in place

Driving to fast (typical speed are less than 12 mph)

- Beads will role covering them in epoxy



Permanent Marking – Spec 646



If more than 10% of the pavement markings do not meet the minimum requirements above, remove and replace that section.

A section is classified as each edge line, lane line or center line measured through any half mile section, each gore, each turn lane, or each roundabout.

180 Day Issues



Delamination



10% or more failing



10% or more failing



Placing Markings Out of Specification

- **DO NOT** place permanent pavement marking out of specification
 - If marking needs to be placed out of specification, please use the cold weather marking bid item.
 - If the cold weather marking item is not included, the department will pay for the initial marking, maintenance, and removal as extra work.
 - Do not install Tape and Paint **under 50 degrees**.
 - Epoxy is the preferred cold weather marking.
- In the Spring- **Remove** Cold Weather Marking before final marking is placed.



Approved Products List (APL)

- MMA and Thermos installed on local projects are not covered by our APL.
- Make sure products are on the APL at the date the project was LET
 - Products will have a removal date for a year. At the end of the year the removed items will be taken off the APL.
 - Products may be added throughout the year and they can only be used if the LET date was after the approval date.



<https://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrcs/tools/appr-prod/default.aspx>

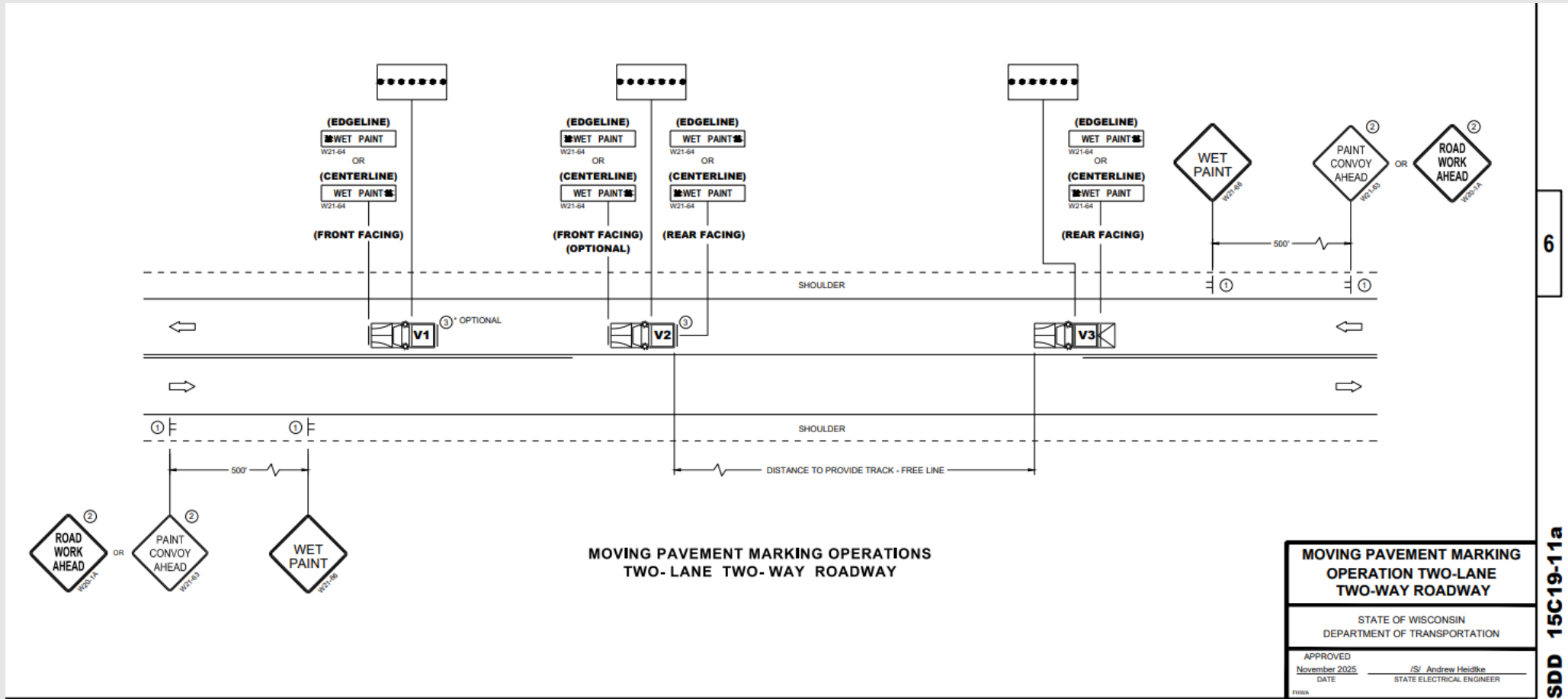


Moving operations follow SDD 15C-19

- 2-3 Vehicle Convoy
- 2 Flashing/Revolving Yellow Lights
- Wet Paint Signs
- 48" Fluorescent Signs Every 3 Miles or After Major Intersections
- If Message Boards are used, words such as "CAUTION" "HAZARDOUS" and "DANGER" cannot be used

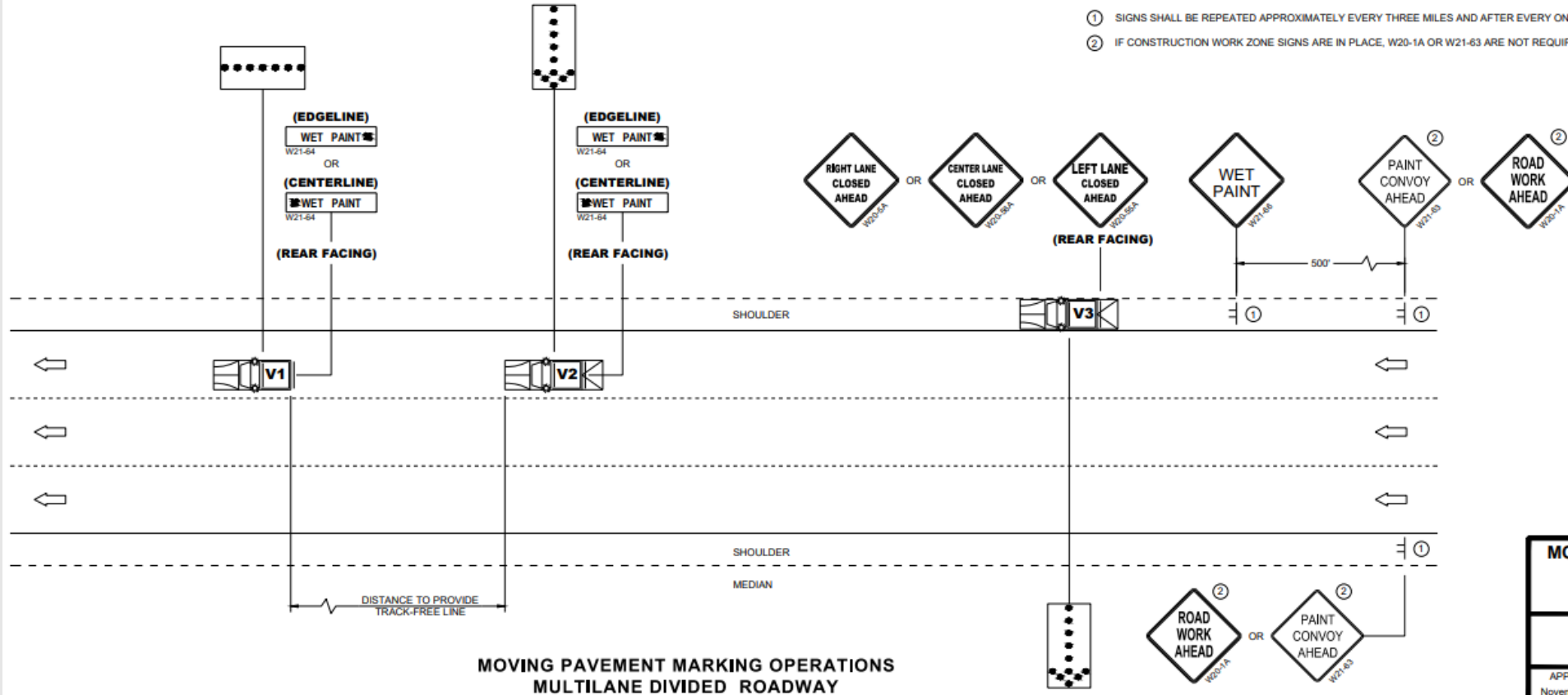


SDD 15C19

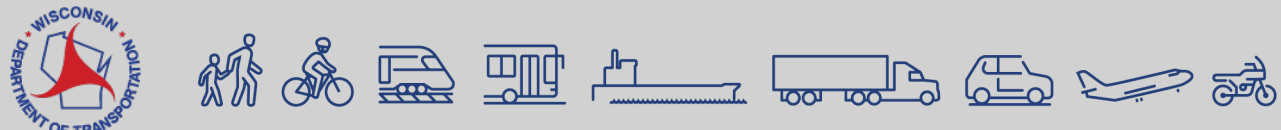


SDD 15C19

- ① SIGNS SHALL BE REPEATED APPROXIMATELY EVERY THREE MILES AND AFTER EVERY ON RAMP.
- ② IF CONSTRUCTION WORK ZONE SIGNS ARE IN PLACE, W20-1A OR W21-63 ARE NOT REQUIRED.



MOVING PAVEMENT MARKING OPERATION MULTI-LANE DIVIDED ROADWAY	
STATE OF WISCONSIN DEPARTMENT OF TRANSPORTATION	
APPROVED November 2025 DATE	/s/ Andrew Heidtke STATE ELECTRICAL ENGINEER





TMAs

- They are required no if, ands or buts.
- Nobody can work off of the primary TMA vehicle.



Work Zone Requirements



- To protect wet pavement markings, use cones at 100' spacing until the markings no longer track on a vehicle.
- Use a minimum of 28" tall cones with 2 reflective bands.

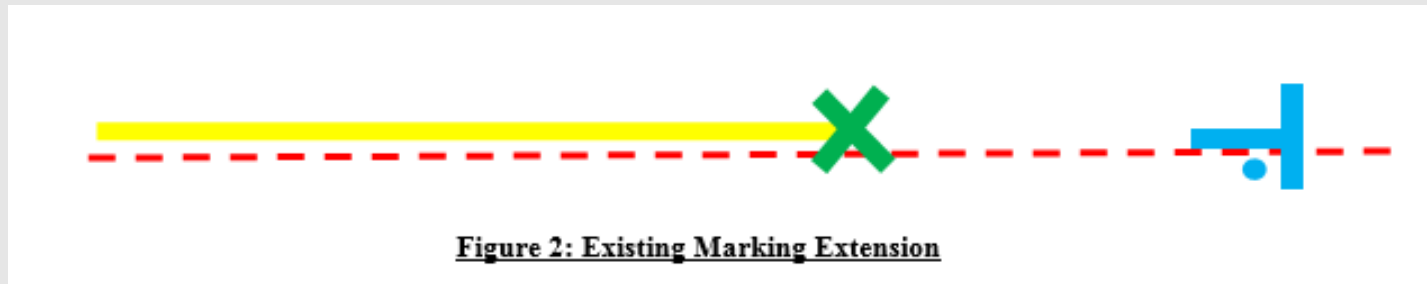
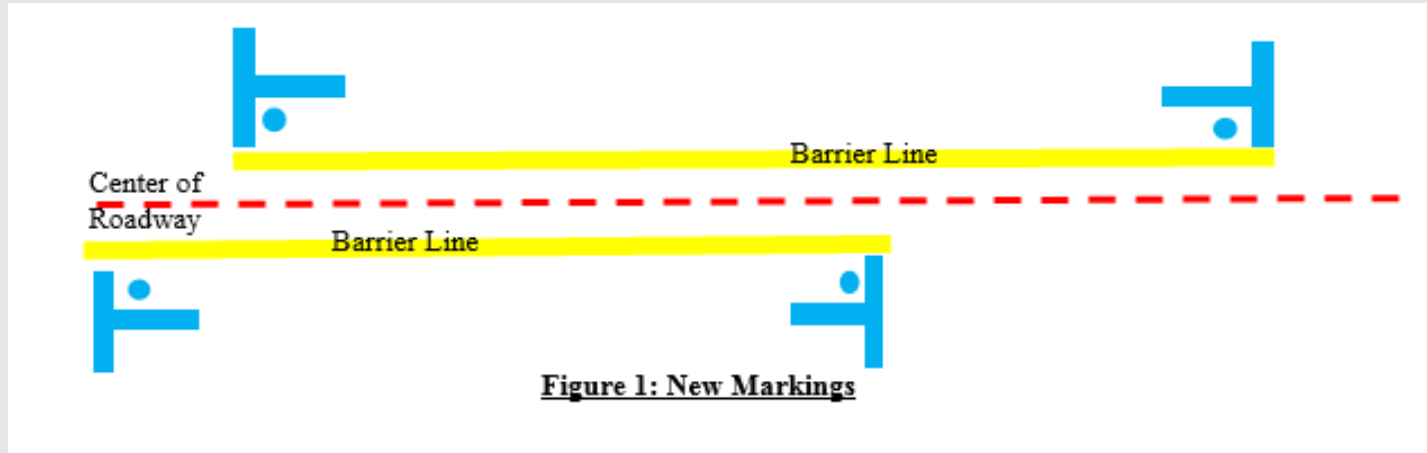
Why Protect the Lines

- Increased paint claims
- Can cause confusion
- A tire track will push the beads into the paint which reduces the reflectivity of the beads



No Passing Zones Bid Item

- Fill out the no passing zone logs DT2124 when the spotting is completed and send to PM/BTO/Region Marking Coordinator.
- If something does not look correct, contact Region Marking Engineer/Coordinator



Certifications

- Collect certs and verify that each product is on the [APL](#).
- VisiUltra, P18+4, Utah, or 3M should **NOT** be used on surface applied markings
 - Type 1s are dual coated.

Removable Tape			
Manufacturer	Product	Color	Approval Date
Advanced Traffic Markings	ATM MaxVision 200 Yellow	Yellow	November 2025
	ATM MaxVision 200 White	White	November 2025
Brite-Line Technologies	Brite-Line Series 100	Yellow	Removed Effective with April 2025 Letting
	Brite-Line Series 100	White	Removed Effective with April 2025 Letting
	Delta-Line TWR	Yellow	JANUARY 2017
	Delta-Line TWR	White	JANUARY 2017
	Deltaline BTR	Black	JANUARY 2017
	TWR-HCL (Contrast) Removable	White with black	JANUARY 2017
	TWR-HCL (Contrast) Removable	Yellow with black	JANUARY 2017
3M*	3M Stamark Wet Reflective Removable Tape 711	Yellow	JANUARY 2017
	3M Stamark Wet Reflective Removable Tape 710	White	JANUARY 2017
	3M Stamark Mask Tape Removable 715	Black	JANUARY 2017
	3M Stamark W.R. Removable Tape 711-5 (Contrast)	Yellow with black	JANUARY 2017
	3M Stamark W.R. Removable Tape 710-5 (Contrast)	White with black	JANUARY 2017
	3M Stamark 711IR	Yellow	March 2024
	3M Stamark 710IR	White	March 2024

*Must include certification letter dated September 30, 2025 stating it is the old formula.



Construction Check List

- Check width, length and gap of line
- Check mil thickness
- Check bead rate and distribution
- Ensure proper bead embedment
- Check grooved depth, if applicable
- Check spelling of words
- Check color of line
- Check No Passing Zone Lines
- Check to ensure proper lane width is achieved before install or grooving markings.
- No breaks in Words or Symbols
- Proper Traffic Control



Question 1: Why is this Incorrect? Select all that apply.

- A. Spelling
- B. Stencil Gaps
- C. Wrong Color
- D. No issues



Question 2: Why is this Incorrect? Select all that apply

- A. Bead distribution
- B. Stencil Gaps
- C. No issues



Question 2: Why is this Incorrect? Select all that apply

A. Bead distribution

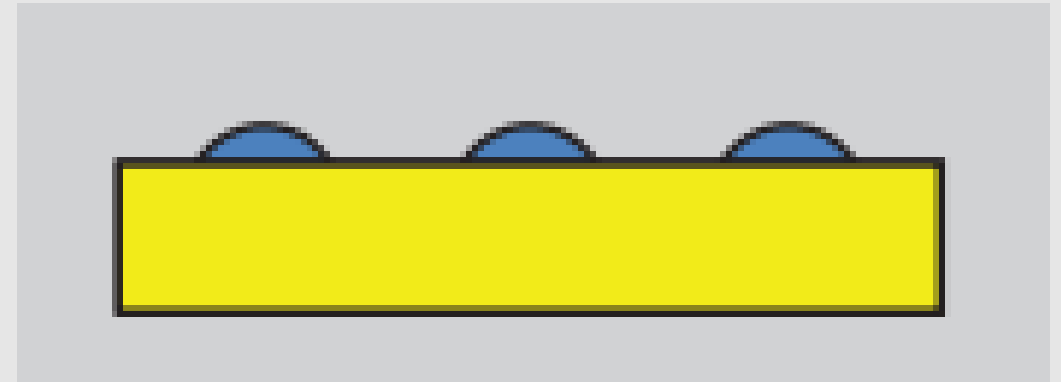
B. Stencil Gaps

C. No issues



Question 3: Why is this Incorrect? Select all that apply

- A. Poor Embedment
- B. Excessive Embedment
- C. Correct Embedment

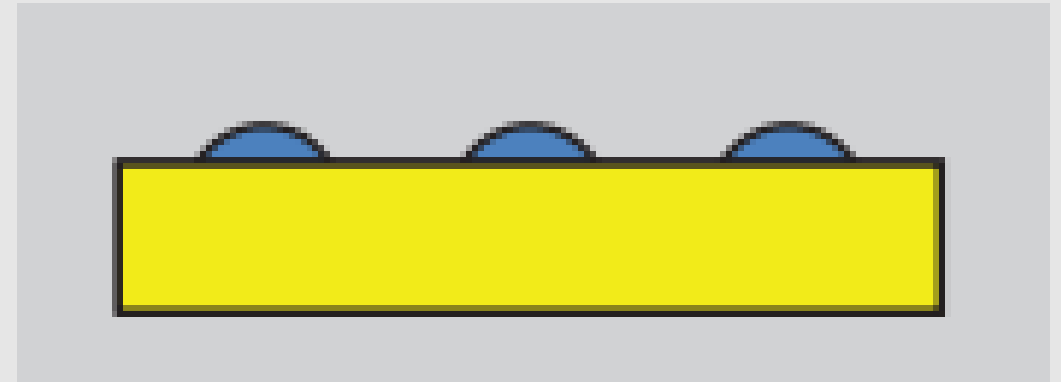


Question 3: Why is this Incorrect? Select all that apply

A. Poor Embedment

B. Excessive Embedment

C. Correct Embedment



Question 4: When is a traffic mounted attenuator required for marking operations?

- A. Never
- B. In a Closed Lane
- C. When the lane is open to traffic.
- D. Always



Question 4: When is a traffic mounted attenuator required for marking operations?

A. Never

B. In a Closed Lane

C. When the lane is open to traffic.

D. Always



Bureau of Traffic Operation Contacts

- Matt Rauch – Signing, Marking, Work Zone Supervisor
 - High Level Signing, Marking & Work Zone Issues
- Jeannie Silver – State Marking Engineer
 - Marking Policy, Procedures, and Products
- DOTBTOMarking@dot.wi.gov
 - Send NPZ Logs
 - Cc Jeannie and PMs
- DOTSignMarkWZMaterials@dot.wi.gov
 - Send Material Questions
 - Cc Jeannie and PMs

