

Attachment 3.9b

Pavement Markings

PAVEMENT MARKINGS

All Pavement Markings on the 495 Express Lanes and on 495 Express Lanes ramps shall be installed in accordance with the applicable Standards and Specifications in Attachment 1.5a and the following requirements.

- 1.1. Recess all pavement markings on the 495 Express Lanes and on 495 Express Lanes ramps utilizing the following procedures.
- 1.2. Recess the pavement marking utilizing the following equipment and details:

A. Recessing Equipment

1. For pre-formed tape, the recessing shall be performed by a self-propelled machine equipped with gang stacked diamond cutting blades mounted on a floating head with controls capable of providing uniform depth and alignment. The cutting heads shall consist of stacked 1/8 inch to 3/8 inch wide diamond tipped cutting blades. The spacers between each blade must be such that the raise in the bottom of the finished recess between the blades is less than 25% of the recessed depth. The resulting bottom of the recess shall have a fine corduroy finish. If a coarse tooth pattern is present, increase the number of blades and/or decrease the thickness of the spacers on the cutting head.
2. For all other materials, the recessing shall be performed by either:
 - a) a self-propelled machine equipped with gang stacked diamond cutting blades mounted on a floating head with controls capable of providing uniform depth and alignment. The cutting heads shall consist of stacked 1/8 inch to 3/8 inch wide diamond tipped cutting blades. The spacers between each blade must be such that the raise in the bottom of the finished recess between the blades is less than 25% of the recessed depth. The resulting bottom of the recess shall have a fine corduroy finish. If a coarse tooth pattern is present, increase the number of blades and/or decrease the thickness of the spacers on the cutting head; or
 - b) a self-propelled machine equipped with carbide cutting blades with controls capable of providing uniform depth and alignment. The equipment shall be capable of recessing the total width of the recess in one pass or be capable of recessing uniform depths with multiple passes. The maximum number of passes is detailed below. If multiple passes are used, the ridge between passes shall be mechanically removed prior to recess cleaning and pavement marking application.
3. The equipment shall be capable of recessing double lines simultaneously or parallel lines to a uniform depth with two passes.

Execution Version

4. The equipment shall be self-vacuuming and leave the cut recess ready for pavement marking installation. Dry cut recessing without a vacuum will only be allowed if markings run perpendicular to the roadway, such as Stop Bars. Use the equipment and method approved by the pavement marking manufacturer.

B. Recessing Details

The recessing shall be performed within the following tolerances. Failure to meet these tolerances will result in the suspension of work until the Design-Builder can demonstrate that these tolerances can be met to the satisfaction of the Concessionaire. The pavement marking system shall be applied so that it is centered within the recess.

RECESS WIDTH AND MAXIMUM NUMBER OF PASSES		
MARKING WIDTH	RECESS WIDTH	MAX NUMBER OF PASSES
4 inches	5" ± 1/8"	1
6 inches	7" ± 1/8"	1
8 inches	9" ± 1/8"	1
12 inches	13" ± 1/8"	2
24 inches	25" ± 1/8"	3

FULL DEPTH RECESS LENGTHS	
Full Depth Recess Length (Broken Line)	10 feet ± 3 inches
Space Between Double Lines	4 inches ± 1/4 inch

For preformed tape, provide a recess depth of 110 mil ± 10 mil.

1. Since pavements are irregular, the depth of recess across the width may vary. To compensate for this, the depth of the recess shall be measured from the bottom of the recess to a straight edge extended over the recess from the pavement surface opposite the pavement joint.
2. Place the recess 2 in ± 1 in from the edge of joints or seams along edge or centerline, unless otherwise indicated in the Plan.
3. Recess alignment deviations from the control guide or existing lines specified by the Engineer shall not exceed 2 inches.
4. Clean the recess completely prior to pavement marking application, using an air

Execution Version

compressor with at least 185 CFM air flow and 120 PSI air pressure. The compressor must be equipped with a moisture and oil trap, and cannot have more than 50 feet of $\frac{3}{4}$ inch ID hose between the compressor and the air nozzle. The air nozzle must have an inside diameter of $\frac{1}{2}$ inch or greater.

5. Place all pavement markings to be recessed in accordance with pavement marking or element manufacturer's instructions, except for recess depth. Do not construct a recess in new bituminous pavement within a minimum 10 days of the placement of the final course of pavement, unless otherwise directed by the Concessionaire.
6. If the pavement markings are to be installed in the same location where there are existing pavement markings, the Design-Builder may cut the recess and remove the existing marking in a simultaneous operation.