

629.03

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(1) Permanent pavement markings are not installed after completion of each day's final paving.

(2) Additional guidance through area is required.

(3) Markings for special traffic patterns are warranted.

Install temporary, solid, 4-inch pavement marking tapes on edges of traveled way for newly paved, scarified, or cold-planed surfaces, reconstructed areas, and unmarked areas. Where curbs are present at edges of traveled way, 4-inch pavement marking tapes may be eliminated.

Maintain and replace temporary pavement markings, flexible delineators, and barricades, as ordered by Engineer.

Remove temporary markings before installing permanent pavement markings.

Cover or temporarily remove signs that conflict with temporary pavement markings.

When pavement markings are not installed by the completion of construction operations for each day, the Engineer will suspend work and progress payment in accordance with Subsection 105.01(A) - Authority of the Engineer.

TABLE 629.03-1 TEMPORARY PAVEMENT MARKINGS	
TYPE	PAVEMENT MARKINGS
Passing Permitted - Both Sides	Single 4-inch yellow stripe 5 feet in length spaced 20 feet on center with Type D markers spaced 40 feet on center and located on center of 5-foot length of stripe.
Passing Prohibited - Both Sides	Double solid 4-inch yellow stripes with Type D markers placed 20 feet on center on one of 4-inch yellow stripes selected by the Engineer.
Passing Permitted - One Side Only	Single continuous 4-inch yellow stripe with Type D markers placed on stripe 20 feet on center on no-passing side and single 4-inch yellow stripes 5 feet in length spaced 20 feet on center on passing side.
Lane Lines - Lane Changing Permitted	Single 4-inch yellow or white stripe 5 feet in length spaced 20 feet on center with Type C or Type D markers spaced 40 feet on center.
Lane Lines - Lane Changing Prohibited	Double solid 4-inch white stripes with Type C markers placed 20 feet on center on one of the 4-inch white stripes selected by the Engineer.
Crosswalk	Two 8-inch white transverse lines spaced 8 feet on center or as ordered by the Engineer.
Stop Line	Single 12-inch white transverse line.
Note: Paint may be used for temporary markings in areas where final paving is not complete.	

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(C) Permanent Pavement Markings.

(1) Permanent Pavement Markers. Provide pavement markers conforming to shapes, dimensions, tolerances, types, uses, and layout as indicated in the contract documents.

Submit samples of pavement markers and adhesives for testing and acceptance 10 days before usage. The Engineer will sample and test pavement markers in accordance with Subsection 755.02 – Pavement Markers.

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88 Use bituminous adhesive or standard set type epoxy adhesive
89 to bond pavement markers to pavement.

90
91 Heat and dispense bituminous adhesive from equipment that
92 can maintain required temperature.

93
94 When using epoxy adhesive, mix components by employing
95 two-component type automatic mixing and extruding apparatus.
96 Automatic mixing equipment shall use positive displacement pumps
97 and shall properly meter components in ratio of 1:1, \pm 5 percent by
98 volume. Check ratio in presence of the Engineer at beginning of each
99 day or as ordered by the Engineer.

100
101 Mix only standard set type adhesive manually, and do not mix
102 more than 1 quart.

103
104 Place pavement markers within 60 seconds after mixing and
105 extruding adhesive. No further movement of placed marker will be
106 allowed. Use completely each mixed batch of adhesive within 5
107 minutes after start of mixing. Place adhesive on pavement surface or
108 on bottom of marker, covering entire area of contact, without voids
109 and with uniform thickness, to produce slight excess after pressing
110 marker in place. Place marker in position and apply pressure with
111 slight twisting motion until firm contact is made with pavement. If
112 adhesive cannot be readily extruded from under marker when
113 pressure is applied, discard remaining batch of adhesive.
114 Immediately remove excess adhesive around edge of marker, on
115 surrounding pavement, and on exposed surfaces of markers.

116
117 Remove adhesive from exposed faces of markers, using soft
118 rags moistened with mineral spirits conforming to MIL-PRF-680A(1) or
119 kerosene. Other solvents will not be allowed.

120
121 Where bituminous adhesive is used, protect marker against
122 impact until adhesive has hardened to the degree designated by the
123 Engineer. Where epoxy adhesive is used, protect pavement markers
124 against impact until adhesive has hardened in accordance with Table
125 629.03-2 – Adhesive Set Time For Epoxy Pavement Markers:

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TABLE 629.03-2 - ADHESIVE SET TIME FOR EPOXY PAVEMENT MARKERS		
Temperature* (Degrees F)	Standard Set Type (Hours)	Rapid Set Type (Minutes)
100	1.5	15
90	2	20
80	3	25
70	4	30
60	5	35
50	7	45
40	No application below 50 degrees F	65
30		85
20		No application below 30 degrees F
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*Either pavement surface temperature or ambient air temperature, whichever is lower.		

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Do not use hardness of epoxy rim around marker as an indication of degree of cure.

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Remove and replace pavement markers that do not meet set time requirements indicated in Table 629.03-2 - Adhesive Set Time For Epoxy Pavement Markers.

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Do not install pavement markers when relative humidity is greater than 80 percent, or when pavement surface is not dry.

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When using Types A and J pavement markers for delineating 10-foot lane stripes, install markers in sets of four, with no fractional sets allowed. Adjust lengths of each 10-foot stripe and each 30-foot gap for skip striping ± 1 foot, to present uniform and balanced pattern.

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143 Do not install pavement markers over longitudinal or transverse
144 joints of pavement surface, pavement marking tape, and thermoplastic
145 extrusion markings.

146
147 **(2) Traffic Paint.** Use wheeled, manually or motor-propelled
148 applicator machine to apply traffic paint at nominal thickness of 0.015
149 inch or at rate of 300 linear feet of single 4-inch stripe for 1 gallon
150 paint. Use applicator having appropriate shields around nozzles to
151 permit sharp stripe definition, and separate nozzle to direct air stream
152 immediately ahead of paint application for clearing debris, dust, and
153 other foreign matter. Immediately remove misted, dripped, and
154 spattered paint from pavements.

155
156 Protect freshly painted pavement markings from traffic until
157 paint will not transfer to tires or other devices.

158
159 Repair or correct pavement markings damaged by traffic and
160 paint marks on pavement caused by traffic crossing wet paint.

161
162 **(3) Thermoplastic Extrusion Pavement Marking.**

163
164 **(a) Equipment.** Apply material to pavement by extrusion
165 method. One side of shaping die shall be pavement surface
166 and other three sides shall be contained by, or shall be part of
167 equipment for heating and controlling flow of material.

168
169 Equipment shall provide continuous mixing and agitation
170 of material. Conveying parts of equipment shall be constructed
171 to prevent accumulation and clogging.

172
173 Mixing and conveying parts, including shaping die, shall
174 maintain material at plastic temperature.

175
176 Equipment shall produce continuously uniform stripe
177 dimensions.

178
179 Applicator shall cleanly and squarely cut off stripe ends.
180 Pans, aprons, or similar appliances that the die overruns will
181 not be allowed.

182
183 Apply beads to entire surface of completed stripe by
184 automatic bead dispenser attached to liner.

185
186 Equip bead dispenser with automatic cutoff control
187 synchronized with cutoff of thermoplastic material.

188
189 Use equipment that provides for varying die widths to
190 produce varying widths of traffic markings.

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Provide kettle for melting and heating composition. Equip kettle with automatic thermoplastic control device so that heating can be done by controlled heat transfer liquid rather than direct flame.

Equip and arrange applicator and kettle in accordance with National Fire Underwriters requirements.

Use mobile and maneuverable applicator that is capable of following straight lines and making curves in true arcs.

Use applicator capable of containing minimum of 125 pounds of molten material.

(b) Application. Clean off dirt, blaze, paint, tape, and grease. Apply thermoplastic extrusion pavement marking only when pavement surface is dry.

Use equipment that can apply material in variable widths from 2 inches to 12 inches. Apply material for full width of stripe in one application or pass.

On concrete pavements, on HMA pavements more than seven days old, and on HMA pavements paved within seven days containing less than 6 percent bituminous asphalt, pre-stripe application area with binder material, primer, or prime seal coat recommended by pavement marker manufacturer.

Line thickness, as viewed from lateral cross section, shall measure not less than 3/32 inch at edges, and not less than 1/8 inch in center.

Take measurements as average throughout 36-inch sections of line. Two thousand pounds of thermoplastic materials supplied in granular or block form shall yield approximately 6,600 feet of 4-inch striping with 90-mil thickness.

Where required by the contract documents to apply new markings over existing markings, bond new line over old line so that no splitting or separation takes place during its useful life.

Provide finished lines with well-defined edges, free of waviness.

238 **(4) Preformed Pavement Marking Tape.** Apply temporary or
239 permanent preformed pavement marking tape manually or with tape
240 applicators, in accordance with tape manufacturer's recommendations
241 and the contract documents. Install preformed pavement marking
242 tape only when pavement surface is dry.

243
244 Do not apply preformed pavement marking tape over other
245 markings. Remove existing pavement markings and prepare surface
246 for tape application in accordance with Subsection 629.03(A) -
247 General.

248
249 Apply preformed pavement marking tape only when ambient air
250 temperature is at least 60 degrees F and rising, and roadway surface
251 temperature is at least 70 degrees F and rising. Application of
252 preformed pavement marking tape will not be allowed when roadway
253 surface temperature exceeds 150 degrees F.

254
255 Before applying preformed pavement marking tape, prime
256 existing roadway surfaces with primer in accordance with tape
257 manufacturer's recommendations.

258
259 Use tapes of specified width or use tapes of different widths to
260 form specified stripe width. The Engineer will pay for specified width
261 of stripe when different tape widths are used to form specified width.

262
263 Use butt splices only. Tape material shall not be overlapped.

264
265 Areas marked with preformed pavement marking tape shall be
266 ready for traffic immediately after application.

267
268 **(D) Removal of Existing Pavement Markings.** Remove and dispose of
269 existing pavement markings before performing the following activities:
270 applying temporary or permanent traffic paint, thermoplastic extrusion
271 pavement marking, or preformed pavement marking tape; and making
272 changes in traffic pattern. Dispose of material in accordance with Subsection
273 201.03(F) - Removal and Disposal of Material. Use one of the following
274 removal methods:

275
276 **(1) Grinding.** Feather edges of grinding to make smooth transition
277 to existing roadway surface. Limit feathering to 3 inches beyond edge
278 of existing striping to be removed. Vary feathered edges to
279 differentiate them from traffic stripes. Coat ground asphalt pavement
280 with rapid-setting slurry.

281
282 **(2) Burning.** Burn off existing painted pavement markings using
283 excess oxygen method.

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285 **(3) Sandblasting.** As work progresses, immediately remove sand
286 and other material deposited on pavement.

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288 **(4) Other.** Remove preformed pavement marking tape by
289 methods recommended by manufacturers. Eradication of existing
290 markings by painting over them will not be allowed.

291
292 **629.04 Measurement.** Pavement striping, pavement marker, crosswalk marking,
293 pavement arrow, pavement word, and pavement symbol will be paid on a lump sum
294 basis. Measurement for payment will not apply.

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296 **629.05 Payment.** The Engineer will pay for the accepted pay items listed below
297 at the contract price per pay unit, as shown in the proposal schedule. Payment will
298 be full compensation for the work prescribed in this section and the contract
299 documents.

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301 The Engineer will pay for each of the following pay items when included in the
302 proposal schedule:

304 Pay Item	305 Pay Unit
306 _____ -Inch Pavement Striping (Thermoplastic Extrusion)	Lump Sum
307 _____ -Inch Pavement Striping (Tape, Type _____)	Lump Sum
308 _____ -Inch Pavement Striping 309 (Tape, Type _____ or Thermoplastic Extrusion)	Lump Sum
310 Crosswalk Marking (Tape, Type III or Thermoplastic Extrusion)	Lump Sum
311 Pavement Arrow (Tape, Type _____ or Thermoplastic Extrusion)	Lump Sum
312 Pavement Word (Tape, Type _____ or Thermoplastic Extrusion)	Lump Sum
313 Pavement Symbol (Paint, Tape, Type _____ or 314 Thermoplastic Extrusion)	Lump Sum
315 Type _____ Pavement Marker	Lump Sum
316 Curb, Type _____ Markings (Paint)	Lump Sum

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319 The Engineer will not pay for temporary pavement markings, flexible
320 delineator posts with reflector markers, Type I Barricades, Type II Barricades with
321 marker lights, and temporary signs separately and will consider the cost of these as
322 included in the contract prices for the various pavement marking contract pay items.
323 The cost is for the work prescribed in this section and the contract documents.

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