

1 Amend **Section 629 - Pavement Markings** to read as follows:  
2

3 **"SECTION 629 - PAVEMENT MARKINGS**  
4

5 **629.01 Description.** This section describes furnishing, installing, and  
6 removing pavement markings.  
7

8 **629.02 Materials.** Materials shall conform to the following requirements:  
9

10 White and Yellow Traffic Paint 708.06  
11

12 Pavement Markers 712.40  
13

14 Adhesives for Pavement Markers 712.41  
15

16 Preformed Pavement Marking Tape 712.53  
17

18 Reflective Thermoplastic Compound Pavement Markings 712.55  
19

20 Materials installed shall be new, best of their respective grades and as  
21 specified below.  
22

23 **629.03 Construction Requirements.**  
24

25 **(A) General.** Pavement markings shall conform to the latest edition  
26 of the MUTCD:  
27

28 Apply the pavement markings according to the contract.  
29 Pavement markings shall be clean cut, uniform, and neat. Correct the  
30 pavement markings according to the contract and at no cost to the State  
31 that:  
32

33 (1) fail the requirements specified or  
34

35 (2) the traffic damages or  
36

37 (3) other causes.  
38

39 Establish control points throughout the project for the layout of  
40 pavement markings. Do the layout and the Engineer will accept the layout  
41 before installing the work.  
42

43 Longitudinal pavement markings shall not deviate more than 1 inch  
44 from the intended alignment on tangents and curves with radii greater  
45 than 5,000 feet. On curves with radii of 5,000 feet or less, the  
46 longitudinal pavement markings shall not deviate more than 2 inches from  
47 the intended alignment. Immediately correct misalignments when

48 specified by the Engineer. Remove and reinstall the misaligned portion(s)  
49 plus an additional 25 feet segment from each end according to the  
50 contract.

51  
52 Before applying the pavement markings, the surface shall be free  
53 of moisture and foreign or other material that may adversely affect  
54 bonding. Thoroughly blast clean the existing surfaces. Clean, newly  
55 placed surfaces need not be blast clean. Clean a prepared surface that  
56 becomes contaminated with moisture, dust, or other foreign matter  
57 before installing the pavement markings.

58  
59 The Contractor may place pavement marking tape and pavement  
60 markers installed with bituminous adhesive immediately after completion  
61 of asphalt concrete pavement or within 14 days hence. Apply other  
62 pavement markings between 7 days and 14 days after completion of the  
63 pavement.

64  
65 **(B) Temporary Pavement Markings.** Immediately install temporary  
66 pavement markings according to Table 629-I when:

67  
68 (1) the Contractor does not install permanent pavement  
69 markings after completion of each day's final paving;

70  
71 (2) the Contractor needs to open the roadway to public traffic for  
72 guidance through the area and as ordered by the Engineer; or

73  
74 (3) the Engineer needs the temporary pavement markings for  
75 special traffic patterns.

76  
77 Install temporary solid 4 inch pavement marking tapes on the edge  
78 of the travelway for newly paved surfaces, scarified, or cold planed  
79 surfaces, reconstructed areas, and unmarked areas for guidance of  
80 motorists.

81  
82 Maintain and replace temporary pavement markings, flexible  
83 delineators and barricades and as specified by the Engineer.

84  
85 Remove temporary markings before installing permanent pavement  
86 markings.

87  
88 Permanently installed PASS WITH CARE, DO NOT PASS, NO  
89 PASSING ZONE, or other signs designated by the Engineer are to be  
90 covered or temporarily removed unless they are in agreement with the  
91 temporary striping.

When failing to install pavement markings according to the contract herein immediately after completion of the construction operations for each day, the Engineer will suspend the work and progress payment according to Subsection 105.01 - Authority of the Engineer.

TABLE 629-I TEMPORARY PAVEMENT MARKING	
TYPE	PAVEMENT MARKING
Passing Permitted - Both Sides	Single 4-inch yellow stripe 5 feet in length spaced 20 feet on centers with Type D markers spaced 40 feet on centers and located on the center of the 5 foot length of stripe.
Passing Prohibited - Both Sides	Double solid 4-inch yellows stripe with Type D markers placed 20 feet on centers on one of the 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 the stripe 20 feet on centers on the no-passing side and single 4-inch yellow stripes 5 feet in length spaced 20 feet on centers on the passing side
Lane Lines - Lane Changing Permitted	Single 4-inch yellow or white stripe 5 feet in length spaced 20 feet on centers with Type C or Type D markers spaced 40 feet on centers
Lane Lines - Lane Changing Prohibited	Double solid 4-inch white stripes with Type C markers placed 20 feet on centers on one of the 4-inch white stripes selected by the Engineer
Crosswalk	Two 4-inch white traverse lines spaced 8 feet on centers or as specified by the Engineer
Stop Line	Single 4-inch white traverse line
Notes:	
a. The Contractor may use paint for temporary markings in areas where the Contractor has not completed final paving.	
b. The temporary striping schedule shall be designated by the Engineer	

### (C) Permanent Pavement Markings

#### (1) Pavement Markers. Pavement Markers shall be:

- (a) of uniform composition,
- (b) free from surface irregularities and
- (c) free from other physical damage or defects that affect appearance and/or performance.

The shape, dimensions, tolerances, types, uses, and layout shall be according to the contract.

Submit samples of the pavement markers and bituminous adhesives and/or epoxy adhesives to the Engineer for testing and acceptance 10 days before usage. Sampling and testing of the pavement markers shall be according to Subsection 712.40.

120 Use Bituminous Adhesive for Pavement Markers according  
121 to Subsection 712.41 to cement markers to the pavement. When  
122 accepted by the Engineer, the Contractor may use Standard Set  
123 epoxy adhesive according to Subsection 712.41 at no additional  
124 cost to the State.

125  
126 Heat and dispense the bituminous adhesive from an  
127 acceptable equipment that can maintain the required temperature.  
128 Placement of markers using bituminous adhesive shall be similar to  
129 placement of markers using epoxy adhesive.

130  
131 When using epoxy adhesive, mix the components by a  
132 two-component type automatic mixing and extruding apparatus for  
133 use on the project. Automatic mixing equipment shall use positive  
134 displacement pumps and shall properly meter the components in  
135 the ratio of one to one  $\pm$  5 percent by volume. Check the ratio in  
136 the presence of the Engineer at the beginning of each day or as  
137 ordered.

138  
139 The Contractor may mix only Standard Set Type adhesive  
140 manually and shall not mix more than one quart by volume.

141  
142 When using two component adhesives, carry out the work  
143 quickly and efficiently due to the short pot life of the adhesive.  
144 Place the pavement markers within 60 seconds after mixing and  
145 extruding the adhesive. The Engineer will not allow further  
146 movement of the marker. Use up each mixed batch of adhesive  
147 within five minutes completely after the start of mixing. Place the  
148 adhesive on the pavement surface or on the bottom of the marker  
149 in complete coverage of the area of contact, without voids and with  
150 a uniform and adequate thickness to produce a slight excess after  
151 pressing the marker in place. Place the marker in position and  
152 apply pressure with a slight twisting motion until making firm  
153 contact with the pavement. If the Contractor cannot extrude the  
154 adhesive from under the marker applying pressure, discard the  
155 remaining batch of adhesive. Immediately remove the excess  
156 adhesive:

- 157  
158 (a) around the edge of the marker,  
159  
160 (b) on the pavement, and  
161  
162 (c) on the exposed surfaces of the markers.

The Contractor may use soft rags moisten with mineral spirits conforming to Federal Specification TT-T-291 or kerosene to remove adhesive from the exposed faces of the markers. Do not use other solvents.

Protect the pavement markers against impact until the adhesive has hardened sufficiently. The Contractor may use the following table as a guide for the determination of sufficient hardening:

Temperature (degrees F)	Standard Set Type (Hours)	Rapid Set Type (Minutes)
100	1-1/2	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.
10		

\*The temperature is either pavement surfaces or air temperature whichever is lower.

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

Immediately reset the pavement markers implanted with improperly mixed adhesives requiring unusually long curing time as specified by the Engineer.

Do not install pavement markers when:

- (a) the relative humidity is greater than 80% or
- (b) the pavement surface is not dry.

Install the pavement markers according to contract as specified by the Engineer. When using Types A and J pavement markers for delineating 10-foot lane stripes, install them in sets of four with no fractional sets allowed. The Contractor may adjust the lengths of each 10-foot stripe and each 30-foot gap for skip striping  $\pm$  one foot to present a uniform and balanced arrangement.

197 Do not install the pavement markers over longitudinal or  
198 transverse joints of the pavement surface, pavement marking tape,  
199 and thermoplastic extrusion markings.  
200

201 **(2) Traffic Paint.** Use a wheeled applicator machine that is  
202 manually or machine propelled to apply at a nominal thickness of  
203 0.015 inch or at a rate of 300 linear feet of single 4 inch stripe for  
204 one gallon paint. The applicator shall have appropriate shields  
205 around the nozzles to permit sharp stripe definition. The applicator  
206 shall have a separate nozzle to direct an air stream immediately  
207 ahead of paint application for clearing away debris, dust and other  
208 foreign matter. Immediately remove misted, dripped and spattered  
209 paint on pavements as specified by the Engineer.  
210

211 The Contractor may manually paint pavement arrows,  
212 symbols, words, and curb markings upon acceptance by the  
213 Engineer.  
214

215 Protect freshly painted pavement markings from traffic until  
216 the paint is sufficiently dry and will not transfer to tires or other  
217 devices. The Contractor may use cones or other acceptable traffic  
218 control devices for this purpose.  
219

220 Repair or correct pavement markings damaged by traffic and  
221 paint marks on the pavement caused by traffic crossing wet paint  
222 according to Subsection 629.03(D).  
223

224 **(3) Thermoplastic Extrusion Pavement Marking.**  
225

226 **(a) Equipment.** Apply the material to the pavement by  
227 an extrusion method. One side of the shaping die is the  
228 pavement and the other three sides are part of the  
229 equipment.  
230

231 The equipment shall provide continuous mixing and  
232 agitation of the material. Construct conveying parts of the  
233 equipment to prevent accumulation and clogging. Parts of  
234 the equipment that come in contact with the material shall  
235 easily be accessible and exposable for cleaning and  
236 maintenance.  
237

238 Mixing and conveying parts, including the shaping  
239 die, shall maintain the material at the plastic temperature.  
240

241 The equipment shall assure continuous uniformity in  
242 the dimensions of the stripe.  
243

244 The applicator shall cleanly cut off square stripe ends  
245 and apply "skip" lines. The Engineer will not permit the use  
246 of pans, aprons or similar appliances that the die overruns.  
247

248 Apply beads to the surface of the completed stripe  
249 over the entire surface of the stripe and by an automatic  
250 bead dispenser attached to the liner.  
251

252 Equip the bead dispenser with an automatic cutoff  
253 control synchronized with the cutoff of the thermoplastic  
254 material.  
255

256 Construct the equipment to provide for varying die  
257 widths to produce varying widths of traffic markings.  
258

259 Provide a special kettle for melting and heating the  
260 composition. Equip the kettle with an automatic  
261 thermoplastic control device so that the Contractor can do  
262 the heating by controlled heat transfer liquid than direct  
263 flame.  
264

265 Equip and arrange the applicator and the kettle  
266 according to the Nation Fire Underwriters requirements.  
267

268 The applicator shall be mobile and maneuverable so  
269 that the Contractor can follow straight lines and make  
270 normal curves in a true arc.  
271

272 The applicator shall contain a minimum of 125  
273 pounds of molten material.  
274

275 **(b) Application.** Clean off dirt, blaze, paint, tape and  
276 grease and ordered by the Engineer.  
277

278 The Contractor may apply the material in variable  
279 widths from 2 inches to 12 inches. Apply the material for  
280 the full width of stripe in one application or pass. For  
281 example, form an 8 inch stripe with an 8 inch die.  
282

283 On concrete pavements and pavements containing  
284 less than 6% bituminous asphalt, pre-stripe the application  
285 area with a binder material, primer or prime seal coat  
286 recommended by the manufacturer.  
287

288 The minimum installed thickness of the line as viewed  
289 from a lateral cross section shall be:  
290

(a) not less than 3/32 inch at the edges, and

(b) not less than 1/8 inch in the center.

Take the measurements as an average throughout 36 inch sections of the line. 2,000 pounds of thermoplastic materials supplied in granular or block form will yield approximately 6,600 feet of 4 inch striping with a 90-mil thickness.

The new line, when applied over an old line of compatible material, shall bond itself to the old line so that no splitting or separation takes place during its useful life.

The finished lines shall have well defined edges and be free of waviness.

**(4) Preformed Pavement Marking Tape.** The Contractor may apply the preformed pavement marking tape manually or with the tape applicators acceptable by the tape manufacturer. Apply the markings according to the tape manufacturer's recommendations and according to the contract.

Install either temporary or permanent preformed pavement marking tape according to the contract or specified by the Engineer.

Do not apply the preformed pavement marking tape over other markings. Remove the old markings and prepare the surface for tape application according to Subsection 629.03(A).

The minimum temperatures for the applications of preformed pavement marking tape shall be 60 degrees F. for air and 70 degrees F. for roadway surfaces, with both temperatures rising. The maximum temperature shall be 150 degrees F. for surfaces.

Before applying the permanent preformed pavement marking tape, prime the existing roadway surfaces with an acceptable primer as recommended by the tape manufacturer and ordered by the Engineer.

Apply the primer in one thin coat extending at least 1 inch beyond the tape edges. Allow the primer to dry until the primer feels tacky and will not lift or string.



337 The Contractor may use tapes of different widths to form a  
338 specified stripe width. For example, the Contractor may use two  
339 4-inch wide tapes to form an 8-inch wide stripe). The Engineer will  
340 make payment for the specified stripe width according to the  
341 contract.

342  
343 Use butt splices only and shall not overlap the tape material.

344  
345 Tamp the markings thoroughly with an acceptable  
346 mechanical tampers. Also, slowly drive a truck on the newly  
347 applied markings several times.

348  
349 Areas marked with preformed pavement marking tape shall  
350 be ready for traffic immediately after application.

351  
352 **(D) Removal of Existing Pavement Markings.** Remove the existing  
353 pavement markings according to the contract and as specified by the  
354 Engineer. Resolve the conflicts between existing and new markings by  
355 removing the existing as specified by the Engineer and according to the  
356 following:

357  
358 (1) remove the existing pavement markings before applying the  
359 traffic paint, thermoplastic extrusion or preformed pavement  
360 marking tape;

361  
362 (2) remove the existing markings so that the Contractor can  
363 make a smooth transition between existing and new markings; and

364  
365 (3) remove the unnecessary markings before making changes  
366 in the traffic pattern.

367  
368 Use removal methods that will cause the least possible damage to  
369 the pavement and its surface. Do not cause impressions of old markings  
370 to remain after the removal operations. Repair the damage to the  
371 pavement or its surface caused by removal operations including  
372 impressions of old markings at no cost to the State. Make the reparations  
373 as specified and accepted by the Engineer.

374  
375 The Engineer will not permit eradication of existing markings by  
376 painting over them. The Engineer will permit burning off existing paint  
377 markings provided the Contractor uses an acceptable method using  
378 excess oxygen. Do not burn nor ground off the preformed pavement  
379 marking tape. Remove the preformed pavement marking tape and  
380 thermoplastic extrusion markings by methods recommended by the  
381 manufacturer and acceptable by the Engineer.

The Engineer will permit sandblasting for paint removal. Remove the sand or other material deposited on the pavement due to removal operations as work progresses. The Engineer will not permit accumulation. Immediately remove excess sand or other material deemed hazardous to traffic when specified by the Engineer.

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

**629.05 Basis of Payment.** The Engineer will pay for the accepted pay items listed below on a contract lump sum basis, as shown in the proposal schedule. Payment will be full compensation for the work prescribed in this section and the contract documents.

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

Pay Item	Pay Unit
_____-Inch Pavement Striping (Thermoplastic Extrusion)	Lump Sum
_____-Inch Pavement Striping (Tape, Type _____)	Lump Sum
_____-Inch Pavement Striping (Tape, Type _____ or Thermoplastic Extrusion)	Lump Sum
Crosswalk Marking (Tape, Type III or Thermoplastic Extrusion)	Lump Sum
Pavement Arrow (Tape, Type _____ or Thermoplastic Extrusion)	Lump Sum
Pavement Word (Tape, Type _____ or Thermoplastic Extrusion)	Lump Sum
Pavement Symbol (Tape, Type _____ or Thermoplastic Extrusion)	Lump Sum
Type _____ Pavement Marker	Lump Sum

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

**END OF SECTION 629**