

Amend **Section 629 - PAVEMENT MARKINGS** to read as follows:

“SECTION 629 - PAVEMENT MARKINGS

629.01 Description. This section describes furnishing, installing, and removing pavement markings.

629.02 Materials.

White and Yellow Traffic Paint	755.01
Pavement Markers	755.02
Adhesives for Pavement Markers	755.03
Preformed Pavement Marking Tape	755.04
Retroreflective Thermoplastic Compound Pavement Markings	755.05

Pavement markers shall be of uniform composition, free from surface irregularities, and free from other physical damage or defects that affect appearance or performance, or both.

629.03 Construction.

(A) General. Pavement markings shall conform to most recent edition of MUTCD, and as amended; and shall be applied as indicated in the contract documents.

Establish control points and layout pavement markings.

Remove surface moisture and other materials that may adversely affect bonding before applying pavement markings.

If bituminous adhesive is used, apply pavement markers not less than 7 days after completing pavement. If epoxy adhesive is used, apply markers not less than 14 days after completing pavement.

Do not allow more than 1-inch deviation from intended alignment of longitudinal pavement markings on tangents and curves with radii greater than 5,000 feet. Do not allow more than 2-inch deviation from intended alignment of longitudinal pavement markings on curves with radii of 5,000 feet or less. Correct misalignments by removing and reinstalling misaligned portion(s), plus an additional 25-foot segment from each end, within one working day after notification of misalignment by the Engineer.

49 All pavement markings and striping on portland cement concrete
50 pavement shall be surrounded by a 2-inch wide non-reflective black border.
51 Non-reflective boarder shall be Sealmaster Fast-Dry Traffic Paint or an
52 approved equal.
53

54 **(B) Temporary Pavement Markings.** Install temporary pavement
55 markings by end of work day in accordance with Table 629.03-1 - Temporary
56 Pavement Markings when the following conditions exist:
57

58 (1) Permanent pavement markings are not installed after
59 completion of each day's final paving.
60

61 (2) Additional guidance through area is required.
62

63 (3) Markings for special traffic patterns are warranted.
64

65 Install temporary, solid, 4-inch pavement marking tapes on edges of
66 traveled way for newly paved, scarified, or cold-planed surfaces,
67 reconstructed areas, unmarked areas and milled rumble strip areas. Where
68 curbs are present at edges of traveled way, 4-inch pavement marking tapes
69 may be eliminated.
70

71 Maintain and replace temporary pavement markings, flexible
72 delineators, and barricades.
73

74 Remove temporary markings before installing permanent pavement
75 markings.
76

77 Cover or temporarily remove signs that conflict with temporary
78 pavement markings.
79

80 When pavement markings are not installed by the completion of
81 construction operations for each day, the Engineer will suspend work and
82 progress payment in accordance with Subsection 105.01(A) - Authority of the
83 Engineer.
84
85

TABLE 629.03-1 TEMPORARY PAVEMENT MARKINGS	
TYPE	PAVEMENT MARKINGS
Passing Permitted - Both Sides	Broken lines consisting of 10-foot line segments and 30-foot gaps with Type D markers spaced 40 feet on center and located on center of the stripes.
Passing Prohibited - Both Sides	Double solid 4-inch yellow stripes with Type D markers placed 40 feet on center placed consistently on one of the

	4-inch yellow stripes.
Passing Permitted - One Side Only	Single continuous 4-inch yellow stripe and single 4-inch yellow broken lines consisting of 10-foot line segments and 30-foot gaps on passing side with Type D markers placed 40 feet on center on the continuous 4-inch stripe.
Lane Lines - Lane Changing Permitted	Single 4-inch white broken lines consisting of 10-foot line segments and 30-foot gaps with Type C or Type D markers spaced 40 feet on center located on the stripes.
Lane Lines - Lane Changing Prohibited	Double solid 4-inch white stripes with Type C markers placed 40 feet on center consistently on one of the 4-inch white stripes.
Crosswalk	A 10 foot stripe 12 inches in width with 18 inch gap.
Stop Line	Single 12-inch white transverse line.
Note: Paint may be used for temporary markings in areas where final paving is not complete."	

(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.

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

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

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

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

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

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

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

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

10		below 30 degrees F
*Either pavement surface temperature or ambient air temperature, whichever is lower.		

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

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.

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

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.

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

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

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

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

(3) Thermoplastic Extrusion Pavement Marking.

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

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

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

Equipment shall produce continuously uniform stripe dimensions.

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

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

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

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

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.

(c) Profiled marking Profiled thermoplastic markings shall be produced in one continuous integral process consisting of an extruded base line with raised ribs positioned at regular and predetermined intervals. The product shall be available in standard widths and standard colors of white and yellow.

The base line shall consist of thermoplastic materials extruded to a thickness of not less than 100 mils nor more than 125 mils. The width of the line shall be in accordance with the plans. The edges of the lines shall be well defined and free from waviness.

The raised ribs shall be positioned at regular 36 inch intervals when measure center to center. The general shape of the ribs approximates a trapezoid when viewed from a profile aspect. The raised rib shall stand a minimum of 400 mils above the extruded base line. The length of the raised rib shall be a minimum of 2.5 inches measured at the widest portion of the crown of the rib. In addition, the ribs shall be approximately rectangular in shape.

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

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

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

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

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

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

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

(5) Thermoplastic Hot Spray Pavement Marking.

(a) Equipment. Use equipment constructed for preparation and application of thermoplastic hot spray pavement marking.

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

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

Provide kettle for melting and heating composition. Equip kettle with automatic thermostat 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.

Mixing and conveying parts, including the spray gun, shall maintain material at molten temperature.

323
324 Apply beads to entire surface of completed stripe by
325 automatic bead dispenser attached to hot spray applicator.
326

327 Equip bead dispenser with automatic cutoff control
328 synchronized with cutoff of thermoplastic material.
329

330 Use equipment that provides for varying spray widths to
331 produce varying widths of traffic markings.
332

333 Use mobile and maneuverable applicator that is capable
334 of following straight lines and making curves in true arcs.
335

336 **(b) Application.** Clean off dirt, debris, blaze, paint,
337 tape, and grease. Apply thermoplastic hot spray
338 pavement marking only when pavement surface is dry.
339

340 Use equipment that can apply material in variable
341 widths from 2 inches to 12 inches. Apply material for full
342 width of stripe in one application or pass.
343

344 On concrete pavements, on HMA pavements more
345 than seven days old, and on HMA pavements paved within
346 seven days containing less than 6 percent bituminous
347 asphalt, pre-stripe application area with binder material,
348 primer, or prime seal coat recommended by pavement
349 marker manufacturer.
350

351 Line thickness, as viewed from lateral cross section,
352 shall measure not less than 3/32 inch at edges, and not less
353 than 1/8 inch in center.
354

355 Where required by the contract documents to apply new
356 markings over existing markings, bond new line over old line so
357 that no splitting or separation takes place during its useful life.
358

359 Provide finished lines with well-defined edges, free of
360 waviness.
361

362 **(D) Removal of Existing Pavement Markings.** Remove and dispose of
363 existing pavement markings as directed by the Engineer before performing
364 the following activities: applying temporary or permanent traffic paint,
365 thermoplastic extrusion pavement marking, or preformed pavement marking
366 tape; and making changes in traffic pattern. Dispose of material in
367 accordance with Subsection 201.03(F) - Removal and Disposal of Material.
368 Use one of the following removal methods:
369
370

371 (1) **Grinding.** Feather edges of grinding to make smooth
372 transition to existing roadway surface. Limit feathering to 3 inches
373 beyond edge of existing striping to be removed. Vary feathered
374 edges to differentiate them from traffic stripes. Coat ground asphalt
375 pavement with rapid-setting slurry.
376

377 (2) **Burning.** Burn off existing painted pavement markings using
378 excess oxygen method.
379

380 (3) **Sandblasting.** As work progresses, immediately remove sand
381 and other material deposited on pavement.
382

383 (4) **Other.** Remove preformed pavement marking tape by
384 methods recommended by manufacturers. Eradication of existing
385 markings by painting over them will not be allowed.
386

387 **629.04 Measurement.**

388
389 The Engineer will measure for removing and disposing of pavement striping
390 per linear foot.
391

392 The Engineer will measure for removing and disposing of crosswalk and yield
393 line markings per lane.
394

395 The Engineer will measure for removing and disposing of pavement markers,
396 pavement word, and pavement arrow per each.
397

398 The Engineer will measure removing and disposing of temporary striping per
399 linear foot.
400

401 The Engineer will measure removing and disposing temporary pavement
402 markers per each.
403

404 The Engineer will measure for furnishing and installing pavement striping per
405 linear foot.
406

407 The Engineer will measure for furnishing and installing crosswalk and yield
408 line markings per lane.
409

410 The Engineer will measure for furnishing and installing pavement arrow,
411 pavement word, and pavement markers per each.
412

413 **629.05 Payment.**

414
415 The Engineer will pay for the accepted pavement striping at the contract unit
416 price per linear foot. The price includes full compensation for cleaning the existing
417 surface, furnishing and applying the pavement striping, and furnishing labor,
418 materials, equipment, tools, and incidentals necessary to complete the work.

419
420 The Engineer will pay for the accepted crosswalk and yield line markings at
421 the contract unit price per lane. The price includes full compensation for cleaning
422 the existing surface, furnishing and applying the crosswalk and yield line markings,
423 and furnishing labor, materials, equipment, tools, and incidentals necessary to
424 complete the work.

425
426 The Engineer will pay for the accepted pavement arrow and pavement word
427 at the contract unit price per each. The price includes full compensation for
428 cleaning the existing surface, furnishing and applying the pavement arrow and
429 pavement word, and furnishing labor, materials, equipment, tools, and
430 incidentals necessary to complete the work.

431
432 The Engineer will pay for the accepted pavement markers including
433 adhesives at the contract unit price per each. The price includes full
434 compensation for cleaning the existing surface, submitting samples; applying
435 adhesives; furnishing, installing and protecting the pavement markers, and
436 furnishing labor, materials, equipment, tools, and incidentals necessary to
437 complete the work.

438
439 The Engineer will pay for the accepted removal and disposal of existing
440 pavement markers, words, and arrows at the contract unit price per each. The
441 price includes full compensation for removing and disposing the existing pavement
442 markers, words, and arrows; and furnishing labor, materials, equipment, tools,
443 and incidentals necessary to complete the work.

444
445 The Engineer will pay for the accepted removal and disposal of existing
446 crosswalks and yield lines at the contract unit price per lane. The price includes full
447 compensation for removing and disposing the existing crosswalks and yield lines;
448 and furnishing labor, materials, equipment, tools, and incidentals necessary to
449 complete the work.

450
451 The Engineer will pay for the accepted removal and disposal of existing
452 pavement striping at the contract unit price per linear foot. The price includes full
453 compensation for removing and disposing the existing pavement striping and
454 furnishing labor, materials, equipment, tools, and incidentals necessary to
455 complete the work.

456
457 The Engineer will pay for the accepted removal and disposal of temporary
458 pavement striping at the contract unit price per linear foot. The price includes full
459 compensation for removing and disposing the temporary pavement striping and
460 furnishing labor, materials, equipment, tools, and incidentals necessary to
461 complete the work.

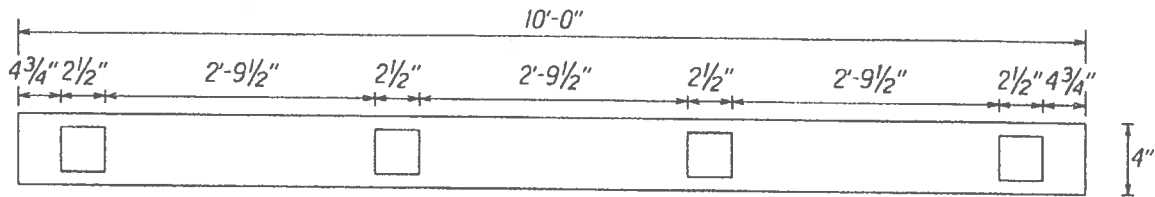
462
463 The Engineer will pay for the accepted removal and disposal of temporary
464 pavement markers at the contract unit price per each. The price includes full
465 compensation for removing and disposing the temporary pavement markers and
466 adhesives, cleaning the existing surface, and furnishing labor, materials,

equipment, tools, and incidentals necessary to complete the work.

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

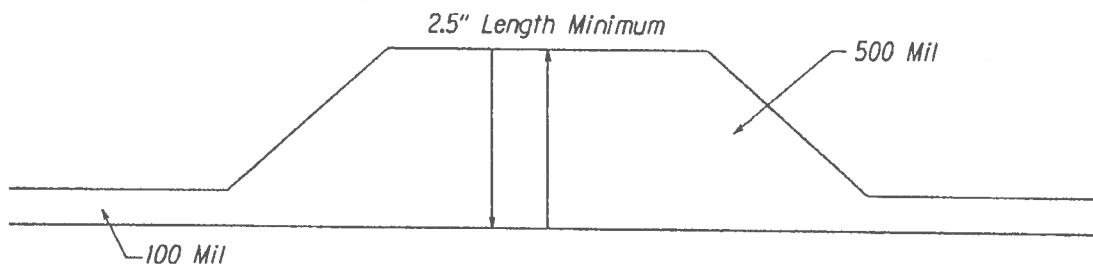
Pay Item	Pay Unit
_____-Inch Pavement Striping (Thermoplastic Extrusion)	Linear Foot
_____-Inch Pavement Striping (Thermoplastic Hot Spray)	Linear Foot
Crosswalk Marking (Thermoplastic Extrusion)	Lane
Yield Line (Thermoplastic Extrusion)	Lane
Pavement Arrow (Thermoplastic Extrusion)	Each
Pavement Word (Thermoplastic Extrusion)	Each
Type _____ Pavement Marker	Each
Removing and Disposing _____	Linear Foot
Removing and Disposing _____	Lane
Removing and Disposing _____	Each"

END OF SECTION 629

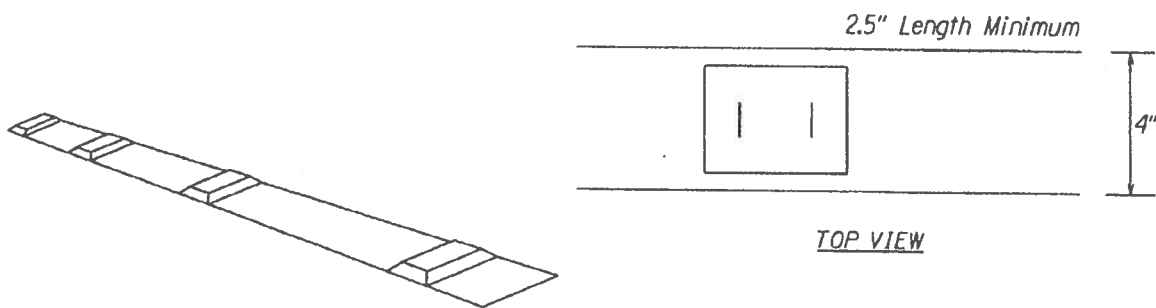


TOP VIEW
LANE LINE

Profiles placed on 36" o.c.
500 mil height, including 100 mil baseline.
Width equal to approximately baseline width.



SIDE VIEW



PERSPECTIVE VIEW

TOP VIEW

PROFILED THERMOPLASTIC STRIPING Not to Scale

HSIP-0700(079)R
629-13a

ADDENDUM NO. 1
r3/7/19