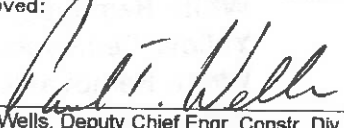


To: SUPERSEDED BY <u>EB 06-004</u> EFFECTIVE 9/7/06		New York State Department of Transportation ENGINEERING INSTRUCTION	EI 96-020
Title: CONSTRUCTION ZONE PAVEMENT MARKINGS			
Distribution: ☐ Manufacturers (18) ☐ Surveyors (33) ☒ Main Office (30) ☒ Consultants (34) ☒ Local Govt. (31) ☒ Contractors/AGC (39) ☒ Regions/Agencies (32) ☐ _____ ()		Approved:  P. T. Wells, Deputy Chief Engr. Constr. Div. 04/10/96 Date  P. J. Clark, Deputy Chief Engr. Design Div. 04/10/96 Date	

This Engineering Instruction supersedes EI 84-039.

Effective with the letting of September 5, 1996, the attached shelf note specifications will be available for general use. Both English and Metric versions are attached. The Regions may elect to substitute these specifications on earlier projects at their discretion.

These specifications are for use in marking detours and other temporary traffic patterns including pavement realignments, median crossovers, lane shifts and lane closures on construction projects. A choice of several marking types is provided so the designer can select the most appropriate material to fit the needs of the individual project. In addition, an "optional" item is provided, which permits the contractor to select the type of material to be used, within certain limitations. Guidelines are provided to assist the designer or EIC in selecting the appropriate marking material item from the choices provided.

Requirements are included that the contractor must maintain these markings in an acceptable condition throughout the life of the detour or the temporary traffic pattern at no additional cost to the State, including raised markers placed at the contractor's option. However, raised markers specified by the Department are not the contractor's responsibility if lost through snowplow action. In that case, the EIC must decide whether, how, and when to replace the lost markers, with payment made under the appropriate items.

Pay items for removable reflectorized pavement markings were issued as a shelf note by EI 84-39, but were never incorporated into the Standard Specifications. EI 84-39 is superseded by this EI, and the following specifications are deleted effective with the letting of September 5, 1996:

- ITEM 15619.1905 White Removable Reflectorized Pavement Stripes
- ITEM 15619.1906 Yellow Removable Reflectorized Pavement Stripes
- ITEM 15619.1907 White Removable Reflectorized Pavement Letters
- ITEM 15619.1908 White Removable Reflectorized Pavement Symbols

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In addition, the following existing metric items which appear in the 1995 Standard Specifications are also deleted by this shelf note, and replaced by the new items:

619.1905 M	White Removable Reflectorized Pavement Stripes
619.1906 M	Yellow Removable Reflectorized Pavement Stripes
619.1907 M	White Removable Reflectorized Pavement Letters
619.1908 M	White Removable Reflectorized Pavement Symbols

The following new items are provided in the shelf note:

619.2101	Construction Zone Pavement Marking Stripes (Optional)
619.2102	Construction Zone Pavement Marking Letters (Optional)
619.2103	Construction Zone Pavement Marking Symbols (Optional)
619.2104	Construction Zone Pavement Marking Stripes - Removable Tape
619.2105	Construction Zone Pavement Marking Letters - Removable Tape
619.2106	Construction Zone Pavement Marking Symbols - Removable Tape
619.2107	Construction Zone Pavement Marking Stripes - Simulated by Raised Markers
619.2108	Construction Zone Pavement Marking Stripes - Supplemented by Raised Markers

619.2101 M	Construction Zone Pavement Marking Stripes (Optional)
619.2102 M	Construction Zone Pavement Marking Letters (Optional)
619.2103 M	Construction Zone Pavement Marking Symbols (Optional)
619.2104 M	Construction Zone Pavement Marking Stripes - Removable Tape
619.2105 M	Construction Zone Pavement Marking Letters - Removable Tape
619.2106 M	Construction Zone Pavement Marking Symbols - Removable Tape
619.2107 M	Construction Zone Pavement Marking Stripes - Simulated by Raised Markers
619.2108 M	Construction Zone Pavement Marking Stripes - Supplemented by Raised Markers

Other Marking Items

It is important for designers and project staff to recognize the difference between these new items, which are intended for use on detours and temporary traffic patterns in the work zone, and other pavement markings items already in the specifications which are generally intended for other purposes. Those other items include:

Short Term Pavement Markings - 619.1502 M (619.1502) - This marking item is intended as the initial marking to be placed on new pavement or a milled surface before nightfall when traffic will be maintained on that pavement. Short term markings are used until the subsequent pavement course is placed, or final markings are

installed, but not to exceed 14 days unless extended by the EIC or supplemented by "temporary pavement markings" as defined in the Standard Specifications. This item is not for use in marking detours or temporary traffic patterns on an ongoing basis.

Reflectorized Pavement Marking Paint - Section 640 - These items are for use where traffic paint is to be installed under the contract as permanent pavement markings. They may also be used on detours to provide permanent markings that will remain in place after the route is no longer used as a detour.

For projects where significant lengths of pavement will carry traffic in the normal traffic patterns, and the standard pavement markings for that pavement must be maintained for an entire construction season or longer, the contractor should not be expected to maintain those markings under the requirements of §619.01. For such situations, Section 640 items may be used to reimburse the contractor for the cost of maintaining painted markings for extended periods and lengths of pavement, when the Region determines not to have these markings maintained by the Regional Highway Maintenance Group. In such cases, sufficient quantities must be provided to accommodate anticipated restriping that will be necessary over the life of the project.

Guidelines For Construction Zone Pavement Markings - These items are intended for use in marking detours and temporary traffic patterns. The following recommendations are provided to assist the designer or project staff in selecting the appropriate marking type to fit various project situations and traffic needs. More than one marking type may be used to delineate a particular work zone phase or traffic pattern, with each item placed where it is needed. For example, a short temporary roadway realignment around a bridge replacement site may appropriately utilize removable tape at the transition to the existing pavement which will remain in place after project completion, optional pavement marking stripes through the realignment, and supplemental raised markers on the curved portions of the realignment.

Optional Construction Zone Pavement Markings -- Where there is no specific need to specify a particular marking type, according to the following guidelines, the appropriate choice is to specify the optional pavement marking items. This permits the contractor to select the appropriate combination of materials based on initial cost, durability, anticipated duration of the temporary traffic pattern, ease of installation, and ease of removal. The specifications place limited restrictions on traffic paint to ensure that its use does not result in unacceptable scarring or damage to pavements that remain in place without overlaying.

The specification requires the contractor to maintain the optional pavement markings in satisfactory condition throughout the duration of the temporary pattern, regardless of the material selected. In most cases, it is anticipated that contractors will select traffic paint to minimize initial cost, but they may elect to use other materials where easy removal and/or extremely good durability is important.

Preformed Removable Marking Tape -- This material is intended for use on pavement that is to remain in place without overlaying after the temporary traffic pattern is removed, where scarring of the pavement surface would be objectionable. Typical examples include temporary traffic patterns at an angle to the permanent pattern, because pavement marking scars crossing permanent lanes at an angle would create confusion for traffic and an unacceptable appearance on the finished pavement. These materials are relatively expensive, and may not adhere well to existing pavement if applied to dirty or dusty surfaces. They should be specified primarily in situations where easy removal with minimal scarring is essential. This material provides excellent durability, excellent daytime visibility, good night visibility under dry conditions, and can remain in place during winter months. Thus it can also be specified where added durability is desirable to ensure that the markings remain in good condition over an extended period.

Raised Markers -- These markers are appropriate for use where extremely effective nighttime delineation (especially under rainy conditions) is important. Appropriate situations include lane closure and lane shift tapers, median crossovers, and narrow roadways on curved alignments, especially where design speeds through the temporary pattern are significantly less than on the approach.

Raised markers used to simulate stripes may be used for temporary patterns on pavement that is to remain in place, because they can be removed with only minimal scarring. However, daytime visibility of stripes simulated by raised markers is generally less than that of solid stripes.

Supplemental raised markers used with other marking items is an appropriate choice where excellent daytime visibility as well as wet-night visibility is important. To enhance wet-night delineation on temporary traffic patterns striped with the optional item, with removable marking tape, or with existing markings, supplemental raised markers may be added. This is an especially good choice on curved or narrow alignments with lower design speeds than the surrounding highway sections.

Raised markers will be quickly removed by snowplows at the onset of winter. Therefore, stripes simulated by raised markers should not be specified for temporary traffic patterns that must remain in place during winter. Supplemental raised markers may be specified for such situations, but it is important to recognize that they will be lost at the onset of winter. If supplemental delineation is required during winter, post-mounted delineators or other devices must also be specified. In some situations, it may be appropriate to provide sufficient quantities of supplemental raised markers to replace them in the second season of a project.

A decision of whether to replace raised markers in the spring should be based on the work zone requirements at that time, including duration of work remaining, traffic patterns, other markings and delineation devices present, etc.

The attached shelf note will be incorporated into the next addendum to the Standard Specifications. In the meantime, it will be inserted into all contracts containing these items. The designer guidance in this EI will be incorporated into Chapter 16 of the Highway Design Manual.

Project plans or drawings by EIC's should show the layout and type of construction zone pavement markings to be used at each location, and clarify how they are paid.

Questions concerning this EI should be directed to James E. Bryden in the Construction Division (518-485-1834), or Stephen Witham in Design Quality Assurance Bur. (518-457-7284).

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Construction Zone Pavement Markings (Metric)

Make the following **changes** to the Standard Specifications of January 2, 1995:

Page 6-76 - Add the following after line 42:

Short-term pavement markings are intended for use on any new pavement or milled surface until the subsequent pavement course is placed or the final pavement markings are installed.

Page 6-77 - Delete Subsection 619-1.14, lines 25-28, in its entirety and **substitute** the following:

"619-1.14 Construction Zone Pavement Markings. The Contractor shall furnish, apply, maintain and remove construction zone pavement markings conforming to the NYSMUTCD at the locations, and in accordance with the patterns, indicated in the contract documents or directed by the Engineer. These pavement markings are intended for use in detours, temporary pavement realignments and crossovers, lane shifts and closures, and other temporary traffic patterns associated with the construction activities."

Page 6-83 - Delete Subsection 619-2.10, lines 4-11, in its entirety and **substitute** the following:

"619-2.10 Construction Zone Pavement Markings. These markings shall consist of reflectorized pavement marking paints, removable reflectorized pavement marking tape, or removable raised reflectorized pavement markers. Pavement marking paints shall meet the material requirements of §640-2. Removable reflectorized pavement marking tape and raised reflectorized pavement markers shall meet the requirements of §727.02 and shall be selected from the Department's Approved list of "Removable Reflectorized Pavement Markings." All longitudinal line segments shall be not less than 100 mm nor more than 150 mm in width and colors shall be as specified in the MUTCD and shown on the plans.

The type of pavement marking material to be supplied shall be as required by the pay item. In the case of the "Optional Construction Zone Pavement Markings" pay items, the contractor may select the type of material to be used from the choices permitted in the preceding paragraph, except that reflectorized pavement marking paint shall not be used on any top pavement course that is to remain in place without overlaying at the completion of the project, except where the location of those markings coincide with final painted pavement markings. Raised reflectorized pavement markers shall not be used to simulate marking letters or symbols."

Page 6-96 - Delete Subsection 619-3.12, lines 18-46, in its entirety and **substitute** the following:

"619-3.12 Construction Zone Pavement Markings. All pavement markings and patterns shall be placed as shown on the plans, or directed by the Engineer, and in accordance with the MUTCD.

Except when other spacings are permitted by the plans or proposal, raised reflectorized pavement markings shall be spaced as required in this paragraph. When raised reflectorized pavement markers are used in place of a solid or broken line, they shall be spaced at 1500 mm to simulate a solid line, and 4 equally spaced markers shall be used to simulate a 3 m broken line. Other line patterns shall be as specified in the MUTCD. When used to supplement a solid or broken line, markers shall be spaced a maximum of 24 m on tangents and a maximum of 12 m for curves with a radius less than 860 m.

The application of pavement markings on roadways open to traffic shall be done in the direction of traffic.

When required by the Engineer, the Contractor shall establish marking line points at 9 m intervals as necessary to control the lateral position of the line.

A. **Application.** All pavement marking materials shall be installed in accordance with the manufacturer's instructions. In addition, pavement marking paints shall be installed according to the provisions of §640-3.

B. **Maintenance of Pavement Markings.** The contractor shall be responsible for maintaining the construction zone pavement markings for the duration of the temporary traffic pattern or detour. Any marking material that fails to provide for any reason, both satisfactory daytime and nighttime delineation, in the opinion of the Engineer, shall be replaced immediately by the contractor at no additional cost to the State. Replacement shall, as a minimum, be required for the following degrees of material loss:

Removable tape - any gap exceeding 15 m in length in a solid line, or loss of shorter segments exceeding 10 percent of the total length in any 250 m segment of solid line, or more than two consecutive segments of broken line.

Raised markers - loss of more than 2 markers used to simulate a 3 m broken line; loss of more than 3 consecutive markers used to simulate a solid line, or more than 5 percent of the markers within a 250 m segment of solid line; when used to supplement a line, loss of 2 or more consecutive markers or more than 5 percent of the markers within a 1000 m segment of solid or broken line.

Traffic paint - abrasion of the line such that more than 10 percent of the underlying pavement is visible within any segment of broken line or within any 100 m section of solid line; failure of any line to be clearly visible at night under low-beam headlamp illumination when viewed from a distance of 60 m.

If the contractor elects to use raised pavement markers as the marking material under the optional construction zone pavement markings items, the contractor shall be responsible for maintaining these markings in acceptable condition during winter months, including loss of markers by snowplows. The contractor shall either replace lost markers between storms, or place an alternate marking material as allowed by this specification to maintain all markings in acceptable condition, subject to the approval

of the Engineer. No additional payment shall be provided for such replacement of lost markers.

The contractor shall not be responsible for snowplow damage or loss of raised markers provided under pay items requiring the use of these markers. In the event that such markers are damaged or lost, the Engineer shall decide whether to replace the lost markers in kind or with other marking materials at the time the loss occurs. Payment shall be provided under the appropriate item for any markers replaced, or for alternate marking materials installed.

C. Removal of Pavement Markings. Construction zone pavement markings used to delineate temporary traffic patterns shall be removed at the completion of that phase of the work and prior to the installation of the next temporary pattern, or return to the permanent pattern.

Traffic paint shall be removed by mechanical means subject to their ability to achieve satisfactory results. After removal, there shall be no paint residue or pavement scarring that conflicts with successive pavement markings under any viewing conditions - wet or dry, day or night.

Marking tapes and raised markers shall be removed, intact or in large pieces, using manual methods or a mechanical roll-up device. The use of heat, solvents or other chemicals, grinders, or blasters will not be allowed on top-course pavement that is to remain in place without overlaying, or on other pavement surfaces where subsequent temporary traffic patterns are to be placed. After removal, there shall be no resultant damage to or permanent marks or scars on the pavement surface.

Temporary adhesive residues that will eventually be worn from the pavement will be allowed to remain, providing that they are not left in a pattern that will mislead or misdirect motorists. The Engineer will be the sole determiner of misleading temporary marks.

The removal of construction zone pavement markings shall not be required from detours or other areas directed by the Engineer where they do not conflict with permanent markings at the completion of the work. Removal shall be required where it is necessary to transition pavement marking patterns on the detour into permanent markings at the completion of the detour phase.

D. Damage to Pavement Surfaces. Any damage to the finished pavement surface, any permanent marks or scars on the finished pavement surface (including remaining pavement marking material), or any adhesive residues left in a pattern that may mislead or misdirect traffic, that results from the removal of pavement markings shall be removed or repaired as directed by and to the satisfaction of the Engineer at no expense to the State, including complete removal and/or replacement of the damaged pavement section if necessary. The Engineer shall be the sole determiner of satisfactory repair."

Page 6-99 - Delete Subsection 619-4.14 in its entirety and substitute the following:

"619-4.14 Construction Zone Pavement Markings. Pavement striping will be measured by meter along the centerline of the pavement stripe, and will be based on a 100 mm wide stripe. When raised pavement markers are used to simulate or to supplement a pavement marking, they shall be measured as the number of linear meters of simulated or supplemented pavement stripe (e.g. a 3 meter longitudinal line segment is simulated by four, or more, individual marker units; the pavement striping will be measured as 3 meters, regardless of the number of markers installed.) Measurement for striping with a plan width greater than the basic 100 mm as shown on the plans or as directed by the Engineer, will be made by the following method:

$$\frac{\text{Plan Width of Striping (millimeters)} \times \text{Number of Meters}}{100 \text{ (millimeters)}}$$

No measurement will be made for the number of meters of gaps between broken and dotted line segments. All payments for longitudinal lines shall be made on the basis of the theoretical required plan quantity.

Letters and symbols will be measured by each unit applied. A unit will consist of one letter or one symbol. Example: "SCHOOL" would be measured as six units. Double and triple headed arrows will be measured as a single unit, each "R" in a railroad grade crossing marking will be measured as a single unit, but the "X" in railroad grade crossing markings (MUTCD figure 263-33) will be measured by the number of meters of 100 mm stripe."

When raised pavement markers are used to supplement a pavement marking stripe, the supplemental raised pavement markers will be measured and paid separately from the appropriate pavement marking stripe."

Page 6-100- Line 7 - revise "Removable Reflectorized Pavement Marking" to "Construction Zone Pavement Markings".

Line 18 - revise "Removable Reflectorized Pavement Marking" to "Construction Zone Pavement Markings".

Page 6-103 - Line 36 - revise to read:

"619-5.16 Construction Zone Pavement Markings."

Add the following at the end of line 39: "When raised pavement markers are used to supplement a pavement marking stripe, payment shall be made for each item."

Page 6-104 - Delete the following payment items:

Item No.	Item	Pay Unit
619.1905 M	White Removable Reflectorized Pavement Stripes	Meters
619.1906 M	Yellow Removable Reflectorized Pavement Stripes	Meters
619.1907 M	White Removable Reflectorized Pavement Letters	Each
619.1908 M	White Removable Reflectorized Pavement Symbols	Each

Add the following payment items after line 22

Item No.	Item	Pay Unit
619.2101 M	Construction Zone Pavement Marking Stripes (Optional)	Meters
619.2102 M	Construction Zone Pavement Marking Letters (Optional)	Each
619.2103 M	Construction Zone Pavement Marking Symbols (Optional)	Each
619.2104 M	Construction Zone Pavement Marking Stripes - Removable Tape	Meters
619.2105 M	Construction Zone Pavement Marking Letters - Removable Tape	Each
619.2106 M	Construction Zone Pavement Marking Symbols - Removable Tape	Each
619.2107 M	Construction Zone Pavement Marking Stripes - Simulated by Raised Markers	Meters
619.2108 M	Construction Zone Pavement Marking Stripes - Supplemented by Raised Markers	Meters

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Construction Zone Pavement Markings (English)

Make the following changes to the Standard Specifications of January 2, 1990, as amended by ADDENDUM NO. 1 (Adopted November 18, 1993).

Page VI-23 - Add the following after §619-1.06 Short-Term Pavement Markings:

Short-term pavement markings are intended for use on any new pavement or milled surface until the subsequent pavement course is placed or the final pavement markings are installed.

Page 6-54 - Add the following after §619-1.13 Flashing Arrow Board:

"619-1.14 Construction Zone Pavement Markings. The Contractor shall furnish, apply, maintain and remove construction zone pavement markings conforming to the NYSMUTCD at the locations, and in accordance with the patterns, indicated in the contract documents or directed by the Engineer. These pavement markings are intended for use in detours, temporary pavement realignments and crossovers, lane shifts and closures, and other temporary traffic patterns associated with the construction activities."

Page 6-57 - Add the following above §619-3 CONSTRUCTION DETAILS:

"619-2.10 Construction Zone Pavement Markings. These markings shall consist of reflectorized pavement marking paints, removable reflectorized pavement marking tape, or removable raised reflectorized pavement markers. Pavement marking paints shall meet the material requirements of §640-2. Removable reflectorized pavement marking tape and raised reflectorized pavement markers shall meet the requirements of §727.02 and shall be selected from the Department's Approved list of "Removable Reflectorized Pavement Markings." All longitudinal line segments shall be not less than 4 inches nor more than 6 inches in width and colors shall be as specified in the MUTCD and shown on the plans.

The type of pavement marking material to be supplied shall be as required by the pay item. In the case of the "Optional Construction Zone Pavement Markings" pay items, the contractor may select the type of material to be used from the choices permitted in the preceding paragraph, except that reflectorized pavement marking paint shall not be used on any top pavement course that is to remain in place without overlaying at the completion of the project, except where the location of those markings coincide with final painted pavement markings. Raised reflectorized pavement markers shall not be used to simulate marking letters or symbols."

Page 6-63 - Add the following above §619-4 METHOD OF MEASUREMENT:

"619-3.12 Construction Zone Pavement Markings. All pavement markings and patterns shall be placed as shown on the plans, or directed by the Engineer, and in accordance with the MUTCD.

Except when other spacings are permitted by the plans or proposal, raised reflectorized pavement markings shall be spaced as required in this paragraph. When raised reflectorized pavement markers are used in place of a solid or broken line, they shall be

spaced at 5 ft. to simulate a solid line, and 4 equally spaced markers shall be used to simulate a 10 ft. broken line. Other line patterns shall be as specified in the MUTCD. When used to supplement a solid or broken line, markers shall be spaced a maximum of 80 ft. on tangents and a maximum of 40 ft. for curves with a radius less than 2865 ft.

The application of pavement markings on roadways open to traffic shall be done in the direction of traffic.

When required by the Engineer, the Contractor shall establish marking line points at 30 ft. intervals as necessary to control the lateral position of the line.

A. Application. All pavement marking materials shall be installed in accordance with the manufacturer's instructions. In addition, pavement marking paints shall be installed according to the provisions of §640-3.

B. Maintenance of Pavement Markings. The contractor shall be responsible for maintaining the construction zone pavement markings for the duration of the temporary traffic pattern or detour. Any marking material that fails to provide for any reason, both satisfactory daytime and nighttime delineation, in the opinion of the Engineer, shall be replaced immediately by the contractor at no additional cost to the State. Replacement shall, as a minimum, be required for the following degrees of material loss:

Removable tape - any gap exceeding 50 ft. in length in a solid line, or loss of shorter segments exceeding 10 percent of the total length in any 1000 ft. segment of solid line, or more than two consecutive segments of broken line.

Raised markers - loss of more than 2 markers used to simulate a 10 ft. broken line; loss of more than 3 consecutive markers used to simulate a solid line, or more than 5 percent of the markers within a 1000 ft. segment of solid line; when used to supplement a line, loss of 2 or more consecutive markers or more than 5 percent of the markers within a 1/2 mile segment of solid or broken line.

Traffic paint - abrasion of the line such that more than 10 percent of the underlying pavement is visible within any segment of broken line or within any 300 ft. section of solid line; failure of any line to be clearly visible at night under low-beam headlamp illumination when viewed from a distance of 200 ft.

If the contractor elects to use raised pavement markers as the marking material under the optional construction zone pavement markings items, the contractor shall be responsible for maintaining these markings in acceptable condition during winter months, including loss of markers by snowplows. The contractor shall either replace lost markers between storms, or place an alternate marking material as allowed by this specification to maintain all markings in acceptable condition, subject to the approval of the Engineer. No additional payment shall be provided for such replacement of lost markers.

The contractor shall not be responsible for snowplow damage or loss of raised markers provided under pay items requiring the use of these markers. In the event that such markers are damaged, or lost, the Engineer shall decide whether to replace the lost markers in kind or with other marking materials at the time the loss occurs. Payment shall be provided under the appropriate item for any markers replaced, or for alternate marking materials installed.

- C. **Removal of Pavement Markings.** Construction zone pavement markings used to delineate temporary traffic patterns shall be removed at the completion of that phase of the work and prior to the installation of the next temporary pattern, or return to the permanent pattern.

Traffic paint shall be removed by mechanical means subject to their ability to achieve satisfactory results. After removal, there shall be no paint residue or pavement scarring that conflicts with successive pavement markings under any viewing conditions - wet or dry, day or night.

Marking tapes and raised markers shall be removed, intact or in large pieces, using manual methods or a mechanical roll-up device. The use of heat, solvents or other chemicals, grinders, or blasters will not be allowed on top-course pavement that is to remain in place without overlaying, or on other pavement surfaces where subsequent temporary traffic patterns are to be placed. After removal, there shall be no resultant damage to or permanent marks or scars on the pavement surface.

Temporary adhesive residues that will eventually be worn from the pavement will be allowed to remain, providing that they are not left in a pattern that will mislead or misdirect motorists. The Engineer will be the sole determiner of misleading temporary marks.

The removal of construction zone pavement markings shall not be required from detours or other areas directed by the Engineer where they do not conflict with permanent markings at the completion of the work. Removal shall be required where it is necessary to transition pavement marking patterns on the detour into permanent markings at the completion of the detour phase.

- D. **Damage to Pavement Surfaces.** Any damage to the finished pavement surface, any permanent marks or scars on the finished pavement surface (including remaining pavement marking material), or any adhesive residues left in a pattern that may mislead or misdirect traffic, that results from the removal of pavement markings shall be removed or repaired as directed by and to the satisfaction of the Engineer at no expense to the State, including complete removal and/or replacement of the damaged pavement section if necessary. The Engineer shall be the sole determiner of satisfactory repair."

Page 6-63 - Add the following after §619-4.13 Tubular Markers.

"619-4.14 Construction Zone Pavement Markings. Pavement striping will be measured by foot along the centerline of the pavement stripe, and will be based on a 4 inch wide stripe. When raised type markers are used to simulate or to supplement a pavement marking, they

shall be measured as the number of linear feet of simulated or supplemented pavement stripe (e.g. a 10 ft. longitudinal line segment is simulated by four, or more, individual marker units; the pavement striping will be measured as 10 feet, regardless of the number of markers installed.) Measurement for striping with a plan width greater than the basic 4 inches as shown on the plans or as directed by the Engineer, will be made by the following method:

$$\frac{\text{Plan Width of Striping (inches)} \times \text{Number of Feet}}{4 \text{ inches}}$$

No measurement will be made for the number of feet of gaps between broken and dotted line segments. All payments for longitudinal lines shall be made on the basis of the theoretical required plan quantity.

Letters and symbols will be measured by each unit applied. A unit will consist of one letter or one symbol. Example: "SCHOOL" would be measured as six units. Double and triple headed arrows will be measured as a single unit, each "R" in a railroad grade crossing marking will be measured as a single unit, but the "X" in railroad grade crossing markings (MUTCD figure 263-33) will be measured by the number of feet of 4 inch stripe.

When raised pavement markers are used to supplement a pavement marking stripe, the supplemental raised pavement markers will be measured and paid separately from the appropriate pavement marking stripe."

Page 6-63- In §619-5, BASIS OF PAYMENT, General, insert "Construction Zone Pavement Markings" in the fifth line of the first paragraph.

Page 6-64- Insert "Construction Zone Pavement Markings" in the 3rd line of the first paragraph.

Page 6-66- Add the following after §619-5.15 Flashing Arrow Board.

"619-5.16 Construction Zone Pavement Markings. The unit price bid shall include the cost of furnishing all labor, materials, and equipment necessary to install, maintain, and remove pavement markings as required by §619-3.12. No payment shall be made under these items for short term pavement markings installed to meet the requirements of §619-3.06. When raised pavement markers are used to supplement a pavement marking stripe, payment shall be made for each item.

The non-payment and Liquidated Damage provisions of §619-5 Basis of Payment - General shall apply to these items of work.

Progress payments will be made. Quantities will be measured for payment when the pavement striping is satisfactorily installed and payment will be 75%. The remaining 25% will be measured for payment following satisfactory removal of the pavement striping."

Page 6-66 - Under §619-5 Payment will be made under, add the following:

Item No.	Item	Pay Unit
619.2101	Construction Zone Pavement Marking Stripes (Optional)	Feet
619.2102	Construction Zone Pavement Marking Letters (Optional)	Each
619.2103	Construction Zone Pavement Marking Symbols (Optional)	Each
619.2104	Construction Zone Pavement Marking Stripes - Removable Tape	Feet
619.2105	Construction Zone Pavement Marking Letters - Removable Tape	Each
619.2106	Construction Zone Pavement Marking Symbols - Removable Tape	Each
619.2107	Construction Zone Pavement Marking Stripes - Simulated by Raised Markers	Feet
619.2108	Construction Zone Pavement Marking Stripes - Supplemented by Raised Markers	Feet

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