

## Toole, Deborah

---

**From:** Maxwell, Stefanie  
**Sent:** Wednesday, January 28, 2015 3:54 PM  
**To:** Toole, Deborah; Henson, Chester  
**Cc:** Gentry, Paul; Lewis, Christopher  
**Subject:** Pavement Marking Specs  
**Attachments:** 711-csl.sdm1-26-15.docx; 713-csl.sdm1-26-15.docx; 709-csl.sdm1-26-15.docx; 5460000 Comments2o GJM Admin Changes 01-13-15.smaxwelledits 01-26-15.docx; 701redln715.smaxwelledits1-26-15.docx; 7100000 ind revised 1-26-15.doc

Attached are the pavement marking spec changes that are required as a result of the Roadway Design Bulletin.

*Stefanie D. Maxwell, P.E.*

*Specialty Engineer*

*FDOT, Office of Construction*

*605 Suwannee Street, MS 31*

*Tallahassee, FL 32399*

*Office (850)414-4314*

*Cell (850) 445-3510*



## Florida Department of Transportation

RICK SCOTT  
GOVERNOR

605 Suwannee Street  
Tallahassee, FL 32399-0450

JIM BOXOLD  
SECRETARY

### **ROADWAY DESIGN BULLETIN 15-02**

*(FHWA Approved: January 21, 2015)*

DATE: January 22, 2015

TO: District Directors of Transportation Operations, District Directors of Transportation Development, District Design Engineers, District Consultant Project Management Engineers, District Roadway Design Engineers, District Construction Engineers, District Maintenance Engineers, District Traffic Operations Engineers and Program Management Engineers

FROM: Michael Shepard, P.E., State Roadway Design Engineer 

COPIES: Brian Blanchard, Tom Byron, Duane Brautigam, David Sadler, Lora Hollingsworth, Tim Lattner, Trey Tillander, Robert Robertson, Mark Wilson, Bruce Dana, John Krause, Bob Crim, Rudy Powell, Greg Schiess, Nicholas Finch (FHWA), Chad Thompson (FHWA), and Phillip Bello (FHWA)

SUBJECT: **Pavement Marking Materials Selection**

This bulletin clarifies existing policy on the selection of pavement marking materials and introduces a new policy on Profiled Thermoplastic (previously "Audible and Vibratory") and Rumble Striping as further supported by Roadway Design Bulletin 15-03 and Estimates Bulletin 15-01.

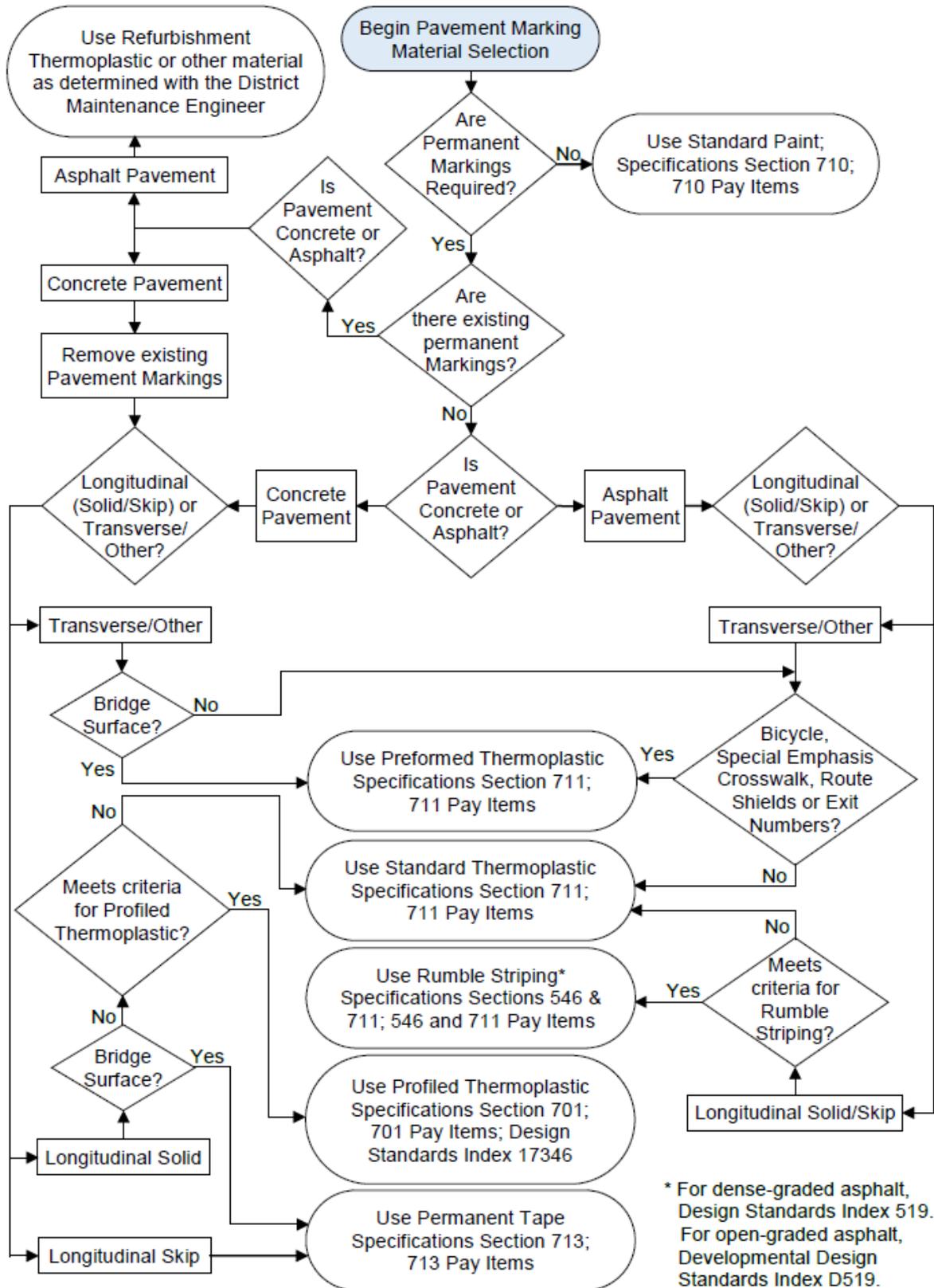
### **REQUIREMENTS**

1. Meet the requirements of Roadway Design Bulletin 15-03 and Estimates Bulletin 15-01.
2. A [\*Design Standards Revision \(DSR\)\*](#) for Index 17346, Sheets 1, 2, 13 and 14 is released.
3. Delete *PPM*, Volume 1, Section 7.6 and replace it with the following:

#### **7.6 Pavement Markings**

##### **7.6.1 Pavement Marking Materials Selection**

Use the following flowchart as a tool for selection of the appropriate pavement marking material.



Once the pavement marking material is selected from the flowchart above, verify the project meets the following criteria for the selected pavement marking material.

### 7.6.1.1 Standard and Refurbishment Thermoplastic

Use Standard Thermoplastic material for all lines and markings not meeting the criteria for Rumble Striping, Profiled Thermoplastic, Preformed Thermoplastic or Permanent Tape.

Where there are existing permanent pavement markings on concrete pavement, include the removal pay item for the existing material.

Where there are existing permanent pavement markings on asphalt pavement, coordinate with the District Maintenance Engineer to determine if Refurbishment Thermoplastic or other pavement marking is warranted and to evaluate the existing markings to determine if they need to be removed. If it is determined that the existing markings are to be removed, include the removal pay item for the existing material.

For existing asphalt pavement, contact the District Maintenance Engineer to determine if contrast is required for skip lines, messages and arrows. If required, use black paint for contrast.

Modification for Non-Conventional Projects: Delete the last three paragraphs above and see the RFP.
--

*Commentary: This is Standard Thermoplastic, not the Hot Spray Thermoplastic used by Maintenance.*

*Standard Thermoplastic is not used on bridges with concrete riding surfaces due to vibration/durability.*

*The performance of Refurbishment Thermoplastic has been evaluated by the Department for a period of 36 months.*

### 7.6.1.2 Rumble Striping

Use Rumble Striping on asphalt pavement for edge lines and center lines on all rural, two-lane and multi-lane, flush shoulder, non-limited access facilities, where posted speed is 50 mph or greater. This includes areas on rural facilities where the posted speed has been reduced due to restricted horizontal or vertical geometry. For dense-graded asphalt, use **Design Standards** Index 519; for open-graded asphalt, use **Developmental Design Standards** Index D519.

For existing asphalt pavement, contact the District Maintenance Engineer to determine if the remaining service life of the asphalt warrants the use of Rumble Striping.

Modification for Non-Conventional Projects: Delete the paragraph above and see the RFP.
--

*Commentary: Rumble Striping provides an audible and vibratory effect and is used on asphalt pavement as a countermeasure for lane departures and center line crossover crashes. Rumble Striping is created by utilizing the rumble striping process as specified in Specifications Section 546 and **Design Standards Index 519** or **Developmental Design Standards Index D519**. Standard Thermoplastic markings are installed over the ground-in rumble strips producing “Rumble Striping”. No contrast is used with Rumble Striping.*

### **7.6.1.3 Profiled Thermoplastic**

Use Profiled Thermoplastic on concrete pavement for edge lines and center lines on all rural, two-lane and multi-lane, flush shoulder, non-limited access facilities, where posted speed is 50 mph or greater. This includes areas on rural facilities where the posted speed has been reduced due to restricted horizontal or vertical geometry. Use **Design Standards Index 17346**.

*Commentary: Profiled Thermoplastic provides an audible and vibratory effect and is used on concrete pavement as a countermeasure for lane departure and center line crossover crashes. Permanent Tape markings are typically used on bridges with concrete riding surfaces due to vibration/durability. However, Profiled Thermoplastic markings may be used on bridges with narrow shoulders as a measure to reduce the number of impacts to the barriers. No contrast is used with Profiled Thermoplastic markings.*

### **7.6.1.4 Preformed Thermoplastic**

Use Preformed Thermoplastic for the following markings on asphalt pavement:

- Bicycle Markings shown on **Design Standards Index 17347**
- Special Emphasis Crosswalks
- All Route Shields
- Exit Numbers for Ramps

Use Preformed Thermoplastic for the following markings on concrete pavement (including bridges with concrete riding surfaces):

- Bicycle Markings shown on **Design Standards Index 17347**
- Special Emphasis Crosswalks
- All Route Shields
- Exit Numbers for Ramps
- White dotted Lines (2’-4’) with trailing black contrast (2’ white preformed thermoplastic + 2’ black preformed thermoplastic). Use only the alternating skip pattern.
- Arrows, Messages and Symbols. Black contrast border is required for design speeds 45 mph and less, and black contrast block is required for design speeds 50 mph and greater. Provide a detail in the plans. Contact the Roadway Design Office for guidance.

### 7.6.1.5 Permanent Tape

Use Permanent Tape for the following conditions on concrete pavement:

- White skip lines (10'-30') with trailing black contrast (10' white tape + 10' black tape). Use only the alternating skip pattern.
- White dotted lines (6'-10') with trailing black contrast (6' white tape + 6' black tape). Use only the alternating skip pattern.
- White dotted lines (3'-9') with trailing black contrast (3' white tape + 3' black tape). Use only the alternating skip pattern.
- Yellow skip lines. Do not use contrast.
- Center lines and edge lines of bridges with concrete riding surfaces. Do not use contrast.

Include the removal pay item when installing permanent tape on concrete pavement.

### 7.6.1.6 Two Reactive Components

Two Reactive Components may be used as an alternative to Standard Thermoplastic markings for edge lines and skip lines on asphalt pavement and edge lines only on concrete pavement.

The use must be approved by both the District Maintenance Engineer and the District Construction Engineer on a project specific basis.

For existing asphalt pavement, contact the District Maintenance Engineer to determine if contrast is required for skip lines, messages and arrows. If required, use black paint for contrast.

Modification for Non-Conventional Projects: Delete the last two paragraphs above and see the RFP.
--

*Commentary: The cost of Two Reactive Components pavement markings has historically been greater than Standard Thermoplastic pavement markings and the service life is unknown. The equipment for installation of Two Reactive Components pavement markings is not readily available. Two Reactive Components pavement markings may be feasible for larger projects.*

### 7.6.1.7 Standard and Durable Paint

Use Standard Paint for work zone markings on asphalt and concrete pavement.

Use Durable Paint for refurbishment markings on asphalt pavement where the longer service life of Refurbishment Thermoplastic is not required. Contact the District Maintenance Engineer to determine if Durable Paint is acceptable.

Modification for Non-Conventional Projects: Delete the paragraph above and see the RFP.
--

*Commentary: The performance of Durable Paint products on the APL have been evaluated by the Department for a period of 18 months. The performance of Standard Paint products on the APL have been evaluated by the Department for a period of 6 months.*

*For refurbishment markings, consider the following factors:*

- *Service life of pavement*
- *Thickness and conditions of existing markings*
- *Traffic volumes*
- *Cost of markings*
- *Other special requirements such as contrast needs or rumble striping*

### **7.6.2 No-passing Zones**

The procedures required by the Department for determining the limits of no-passing zones are contained in the *Manual on Uniform Traffic Studies, (MUTS)*. The requirements of this manual must be followed.

Limits of pavement markings for no-passing zones shall be established by one of the following methods:

1. On projects where existing roadway conditions (vertical and horizontal alignments) are to remain unaltered by construction, the no-passing zones study shall be accomplished as part of the design phase. This will be either by in-house staff or included in design consultant contracts.

The limits of the no-passing zones shall be included in the contract documents, and a note to this effect shown on the plans.

2. On projects with new or altered vertical and horizontal alignments, limits for no-passing zones shall be established during construction. The required traffic study and field determination of limits shall be performed through the design consultant as a post design service, or as part of a district wide consultant contract for such services.

When this service is included as part of post design services, sufficient time shall be included to accomplish the required field operations without delaying or interfering with the construction process.

### **COMMENTARY**

These criteria and guidelines were developed by a Department wide task team to clarify and agree on the proper pavement marking material selection for each application.

The ***Design Standards Revision (DSR)*** for ***Design Standards*** Index 17346, Sheets 1, 2, 13 and 14 is released to accommodate the change to the naming conventions. Revisions to Sheets 13 and 14 were required to accommodate the name change from “Audible and Vibratory” markings to “Profiled Thermoplastic” markings. This is necessary due to the implementation of Rumble Striping which is another type of the Department’s standardized audible and vibratory pavement markings. The distinction between the two types of audible and vibratory markings is required to provide clear and consistent criteria, guidance and specifications. This ***DSR*** includes updates to the notes and figures to provide additional clarifications.

***Standard Specification*** Sections 546, 701, 709, 710, 711, 713 and 971 are being revised for the July 2015 Workbook to align terminology to be consistent with the PPM.

### **IMPLEMENTATION**

The requirements of this bulletin are effective for all projects with LET dates after July 1, 2015.

To meet the requirements of this bulletin, when Profiled Thermoplastic markings are to be used on the project insert the revised ***Design Standards*** Index drawings in the Plans as described in the ***PPM, Vol. 2, Section 3.6.1.***

### **CONTACT**

Gevin McDaniel, P.E.  
Roadway Design Standards Administrator  
Florida Department of Transportation  
605 Suwannee Street, MS-32  
Tallahassee, FL 32399-0450  
Phone (850) 414-4284  
[gevin.mcdaniel@dot.state.fl.us](mailto:gevin.mcdaniel@dot.state.fl.us)

MAS/GJM/CAH



## Florida Department of Transportation

RICK SCOTT  
GOVERNOR

605 Suwannee Street  
Tallahassee, FL 32399-0450

JIM BOXOLD  
SECRETARY

### ROADWAY DESIGN BULLETIN 15-03

### ESTIMATES BULLETIN 15-02

(FHWA Approved: January 21, 2015)

DATE: January 22, 2015

TO: District Directors of Transportation Operations, District Directors of Transportation Development, District Design Engineers, District Consultant Project Management Engineers, District Roadway Design Engineers, District Construction Engineers, District Maintenance Engineers, District Traffic Operations Engineers and Program Management Engineers

FROM: Michael Shepard, P.E., State Roadway Design Engineer  
Phillip G. Davis, P.E., State Estimates Engineer

Handwritten signature of Michael Shepard in blue ink.

Handwritten signature of Phillip G. Davis in blue ink.

COPIES: Brian Blanchard, Tom Byron, Duane Brautigam, David Sadler, Lora Hollingsworth, Tim Lattner, Trey Tillander, Robert Robertson, Mark Wilson, Bruce Dana, John Krause, Bob Crim, Rudy Powell, Greg Schiess, Nicholas Finch (FHWA), Chad Thompson (FHWA), and Phillip Bello (FHWA)

SUBJECT: **Rumble Striping**

This bulletin introduces a new method of creating an audible and vibratory effect that is used on asphalt pavements as a countermeasure for lane departures and center line crossover crashes. The new method is called “rumble striping”. Rumble striping will be used for the center line and edge line pavement markings on all rural, two-lane and multi-lane, flush shoulder, non-limited access facilities where the posted speed is 50 mph or greater. Rumble striping is created by utilizing the same shoulder grinding process as used on limited access facilities. However, with rumble striping, the ground-in rumble strips are in line with the center line and edge line pavement markings. Pavement markings are installed over the ground-in rumble strips producing “rumble striping”.

### REQUIREMENTS

1. Meet the requirements of Roadway Design Bulletin 15-02
2. The following [Design Standards Revisions \(DSR\)](#) are released:
  - A. The new *Design Standards* Index 519 (Rumble Striping) is released.
  - B. The new IDS-519 (Rumble Striping) is released.

3. The following [Developmental Design Standards](#) are released:
  - A. The new Index D519 (Rumble Striping) is released.
  - B. The new IDDS-519 (Rumble Striping) is released.
  
4. The *Basis of Estimates Manual* pay item structure for **Rumble Strips, 546- 72- AB** has been revised to include:

<b>A = Type</b>	<b>B =</b>
5 (Ground-in)	2 (16" Center Line)
	3 (8" Edge Line)
	4 (Non Standard)
	5 (16" Shoulder)

### COMMENTARY

The *Design Standards* Index 519 and its associated *Instructions for Design Standards* (IDS-519) is to be used for rumble striping on dense-graded friction courses on an unrestricted basis.

The *DDS* Index D519 is to be used for rumble striping on open-graded friction courses. The Roadway Design Office will monitor the installations for a period of time to ensure the specified milling depth produces the desired field depths when used with various FC-5 design mixes.

*Standard Specification* Section 546 has been revised to address construction of rumble striping. The revised specification will be implemented with the July 2015 Workbook.

### IMPLEMENTATION

The requirements of this bulletin are effective for all projects with LET dates after July 1, 2015.

To meet the requirements of this bulletin, when rumble striping is to be used on the project insert the revised *Design Standards* Index drawings or the *Developmental Design Standards* Index drawings in the Plans as described in the *PPM, Vol. 2, Section 3.8*.

### CONTACT

Gevin McDaniel, P.E.  
Roadway Design Standards Administrator  
Florida Department of Transportation  
605 Suwannee Street, MS-32  
Tallahassee, FL 32399-0450  
Phone (850) 414-4284  
[gevin.mcdaniel@dot.state.fl.us](mailto:gevin.mcdaniel@dot.state.fl.us)

MAS/GJM/CAH



## *Florida Department of Transportation*

RICK SCOTT  
GOVERNOR

605 Suwannee Street  
Tallahassee, FL 32399-0450

JIM BOXOLD  
SECRETARY

### MEMORANDUM

**DATE:** February 2, 2015

**TO:** Specification Review Distribution List

**FROM:** Daniel Scheer, P.E., State Specifications Engineer

**SUBJECT:** Proposed Specification: **5460000 Rumble Strips - REVISED.**

In accordance with Specification Development Procedures, we are sending you a copy of a proposed specification change.

This initial changes were proposed by Chester Henson to add section for installation of rumble stripes and add revised method of measurement since rumble stripes are measured differently than rumble strips.

With the release of Development Design Standard Index No. D519, Roadway Design Bulletin 15-02 and Roadway Design Bulletin 15-03 on January 22, 2015, additional changes were proposed to include an additional method of creating an audible and vibratory effect called "rumble striping". The bulletins, new Design Standard Index , and the proposed specification changes clarify the materials, application, method of measurement, and basis of payment for rumble strips and rumble striping.

Please share this proposal with others within your responsibility. Review comments are due within **two weeks** and should be sent to Mail Station 75 or online at <http://www2.dot.state.fl.us/SpecificationsEstimates/Development/IndustryReview.aspx> . Comments received after **February 13, 2015**, may not be considered. Your input is encouraged.

DS/dt  
Attachment

**RUMBLE STRIPS.**(REV ~~5-1546-16-141-30-15~~)

SECTION 546 is deleted and the following substituted:

**SECTION 546  
RUMBLE STRIPS****546-1 Description.**

Construct ~~R~~umble ~~S~~trips in accordance with the details shown in the Plans and Design Standards.

**546-2 Materials for Raised Rumble Strips.**

**546-2.1 General:** Construct ~~Raised~~ ~~raised~~ ~~Rumble~~ ~~rumble~~ ~~Strips~~ ~~strips~~ using one of the following:

~~(a)~~ **546-2.1.1 Preformed Thermoplastic:** *Use only* materials listed on the *Department's Approved* ~~Qualified~~ Products List (~~Q~~APL), meeting the *following* requirements:

~~of Preformed Thermoplastic ..... -971-1 and 971-6.~~

Ensure that the material used can be restored to its original dimensions by using a self bonding overlay meeting these requirements. Submit a certified test report to the Engineer indicating that the materials meet all requirements specified.

~~Before applying thermoplastic materials on portland cement concrete surfaces, apply a primer sealer recommended by the manufacturer.~~

~~(b)~~ **546-2.2.2 Asphalt:** Any plant-mixed hot bituminous *asphalt* mixture meeting the requirements of a job-mix formula issued by the Department, except open-graded friction course.

~~Prior to the application of any plant mixed hot bituminous material, apply a tack coat meeting the requirements of 300-2.3.~~

~~The mixture will be accepted on the basis of visual inspection by the Engineer with no further testing required.~~

**546-3 Application.**

**546-3.1 Raised Rumble Strips:** Notify the Engineer before the placement of raised rumble strips. Apply raised rumble strips having well defined edges. Remove and replace any raised rumble strips not meeting the requirements of the Contract Documents at no additional cost to the Department.

Before applying raised rumble strips, remove any material that would adversely affect the bond of the raised rumble strips by a method approved by the Engineer.

Apply raised rumble strips only to dry surfaces, and only when the ambient air and surface temperature is at least 55°F and rising.

*Before applying thermoplastic materials on portland cement concrete surfaces, apply a primer sealer recommended by the manufacturer.*

*Prior to the application of any plant-mixed hot bituminous material, apply a tack coat meeting the requirements of 300-2.3.*

*The mixture will be accepted on the basis of visual inspection by the Engineer with no further testing required.*

**546-3.2 Ground-In Rumble Strips for Shoulders:** *Construct ground-in rumble strips on asphalt pavement surfaces only.* Before the construction of any ground-in rumble strips, demonstrate to the Engineer that the equipment to be used can achieve a depression having well defined edges and a smooth interior finish without snagging or tearing the finished pavement.

Before opening the adjacent lane to traffic, ensure that all debris generated by the grinding process is removed and disposed of daily by vacuum or a method approved by the Engineer. Do not dispose of the debris within the right of way. Do not use the debris generated by the grinding process in recycled asphalt.

Restore any pavement to the satisfaction of the Engineer at no additional cost to the Department, when ground-in rumble strips do not meet the requirements of the Contract Documents.

**546-3.3 Ground-In Rumble Stripeing for Centerlines and Edge Lines:** *Construct ground-in rumble strips in accordance with 546-3.2. Apply the ~~thermo~~plastic pavement markings in accordance with Section 711 over the top of the ground-in rumble strip as shown in Design Standards, Index No. 5189.*

#### **546-4 Method of Measurement.**

The quantity of raised rumble strips to be paid for under this Section will be the ~~p~~Plan quantity per set, constructed and accepted.

The quantity of ground-in *shoulder* rumble strips to be paid for under this Section will be the plan quantity in *gross* miles, constructed and accepted. ~~The pPlan quantity will be determined based on the roadway length minus bridge lengths for each shoulder on which rumble strips are to be constructed. No deduction will be made when the skip array is used.~~

*The quantity of centerline and edge line ground-in rumble strips will be the length, in net gross miles, of ground-in rumble strip, constructed authorized and accepted ably applied. No deduction will be made when the skip array is used.*

#### **546-5 Basis of Payment Compensation.**

Prices and payments will be full compensation for all work specified in this Section, including, all cleaning and preparing of surfaces, disposal of all debris, furnishing of all materials, application, curing and protection of all items, protection of traffic, furnishing of all tools, machines and equipment, and all incidentals necessary to complete the work. Final payment will be withheld until all deficiencies are corrected.

Payment will be made under:

- Item No. 546- 71- *Raised* Rumble Strip Sets - per set.
- Item No. 546- 72- *Ground-In* Rumble Strips - per *gross* mile.