



Florida Department of Transportation

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ROADWAY DESIGN BULLETIN 18-07
PROGRAM MANAGEMENT BULLETIN 18-05
(FHWA Approved: June 25, 2018)

DATE: July 10, 2018

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

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SUBJECT: **Temporary and Short-Term Raised Rumble Strip Sets**

This bulletin introduces a new policy for replacement of existing raised rumble strip sets during construction. There are now two different uses for raised rumble strip sets during construction:

1. “Temporary Raised Rumble Strip Sets” are used for temporary lane closures on a two-lane, two-way road (per ***Standard Plans, Index 102-603***).
2. “Short-Term Raised Rumble Strip Sets” are used during construction for replacement of existing raised rumble strip sets located at intersections, approaches to curves, toll plazas, etc. (per ***Standard Plans, Index 546-001***).

REQUIREMENTS FOR STANDARD PLANS

1. **Standard Plans, Index 546-001** has been updated and is released as a ***Standard Plans Interim Revision*** to the ***FY 2018-19 Standard Plans***.

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REQUIREMENTS FOR FDOT DESIGN MANUAL (FDM)

The language for Temporary Raised Rumble Strip Sets has been revised and relocated from Temporary Traffic Control (TTC) Plan Details (**FDM 240.4.2**) to Temporary Traffic Control Devices (**FDM 240.9**). Language for Short-Term Raised Rumble Strip Sets is included under TTC Plan Details (**FDM 240.4.2**).

1. Replace **FDM 240.4.2.16** with the following:

240.4.2.16 Short-Term Raised Rumble Strip Sets

In locations with existing raised rumble strip sets (e.g., intersections, approaches to horizontal curves, toll plazas), maintain or replace the raised rumble strip sets throughout construction. Provide short-term raised rumble strip sets when existing raised rumble strip sets are removed for construction activities, until the permanent raised rumble strip sets are installed. Short-term raised rumble strip sets must be installed prior to opening the road to traffic; therefore, quantities may include multiple applications due to construction phasing. Refer to [Standard Plans](#), [Index 546-001](#) and [Standard Specifications, Section 546](#) for additional requirements and information.

The configuration of the short-term raised rumble strip sets must match the existing configuration. Provide a detail in the TTC plans showing the required configuration during construction if the existing configuration is different from what is shown in **Standard Plans, Index 546-001**.

When short-term raised rumble strip sets are required, show them in the TTC plans, detail the configuration (as necessary), and include quantities in the Summary of Quantities in accordance with the **Basis of Estimates**. Use pay item 546-71-2 (Short-Term Raised Rumble Strip Sets).

2. Add the following to **FDM 240.9**:

240.9.8 Temporary Raised Rumble Strip Sets

Temporary raised rumble strip sets are used as required in conjunction with a lane closure on a two-way, two-lane roadway. Refer to [Standard Plans](#), [Index 102-603](#) and [Standard Specifications, Section 102](#) for additional requirements and information.

When temporary raised rumble strip sets are required, show them in the TTC plans, and include quantities in the Summary of Quantities in accordance with the **Basis of Estimates**. Use pay item 102-909 (Temporary Raised Rumble Strip Sets) for this condition.

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REQUIREMENTS FOR PLANS PREPARATION MANUAL (PPM)

The language for Temporary Raised Rumble Strip Sets has been revised and relocated from Temporary Traffic Control (TTC) Plan Details (***PPM Volume 1, Chapter 10, Section 10.12***) to Temporary Traffic Control Devices (***Section 10.6***). Language for the use of Short-Term Raised Rumble Strip Sets is now included under TTC Plan Details (***Section 10.12***).

1. Add the following to ***PPM Volume 1, Chapter 10, Section 10.6***:

10.6.1 Temporary Raised Rumble Strip Sets

Temporary raised rumble strip sets are used as required in conjunction with a lane closure on a two-way, two-lane roadway. Refer to [Standard Plans, Index 102-603](#) and [Standard Specifications, Section 102](#) for additional requirements and information.

When temporary raised rumble strip sets are required, show them in the TTC plans, and include quantities in the Summary of Quantities in accordance with the ***Basis of Estimates***. Use pay item 102-909 (Temporary Raised Rumble Strip Sets) for this condition.

2. Replace ***PPM Volume 1, Chapter 10, Section 10.12.16*** with the following:

10.12.16 Short-Term Raised Rumble Strip Sets

In locations with existing raised rumble strip sets (e.g., intersections, approaches to horizontal curves, toll plazas), maintain or replace the raised rumble strip sets throughout construction. Provide short-term raised rumble strip sets when existing raised rumble strip sets are removed for construction activities, until the permanent raised rumble strip sets are installed. Short-term raised rumble strip sets must be installed prior to opening the road to traffic; therefore, quantities may include multiple applications due to construction phasing. Refer to [Standard Plans, Index 546-001](#) and [Standard Specifications, Section 546](#) for additional requirements and information.

The configuration of the short-term raised rumble strip sets must match the existing configuration. Provide a detail in the TTC plans showing the required configuration during construction if the existing configuration is different from what is shown in ***Standard Plans, Index 546-001***.

When short-term raised rumble strip sets are required, show them in the TTC plans, detail the configuration (as necessary), and include quantities in the Summary of Quantities in accordance with the ***Basis of Estimates***. Use pay item 546-71-2 (Short-Term Raised Rumble Strip Sets).

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REQUIREMENTS FOR BASIS OF ESTIMATES MANUAL (BOE)

1. The BOE pay item for Raised Rumble Strip Set has been revised as follows:

Pay item 546-71- A Raised Rumble Strip Set, Each

1 (Permanent), EA

2 (Short-Term), EA

Details:

Permanent and short-term raised rumble strip sets shall be constructed as called for in the plans. They must be used in accordance with Standard Plans, Index 546-001 and Standard Specification, Section 546.

A quantity of 1 EA includes one of the following (any of which are acceptable per the Specification):

- i. 6 strips of the asphalt set, or
- ii. 4 strips of the preformed thermoplastic set, or
- iii. 4 strips of the removable polymer striping tape set.

COMMENTARY

Raised rumble strips provide audible and vibratory feedback to warn drivers of an upcoming decision point that is critical to safety; e.g., remote intersections, approaches to sharp horizontal curves, toll plaza approaches, temporary lane closure approaches. Timely installation of raised rumble strip sets during construction projects is essential.

IMPLEMENTATION

The requirements of this bulletin are effective on all projects with lettings on or after January 1, 2019.

These requirements may be implemented earlier at the discretion of the Districts. Early implementation requires incorporation of revised ***Standard Specification, Sections 546 and 711*** by Modified Special Provision (MSP) through the District Specifications Offices. See Attachment 'A' for a draft of this MSP. These revisions will be published in the ***January 2019 Standard Specifications***.

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ATTACHMENT 'A'

SECTION 546 RUMBLE STRIPS

546-1 Description.

Construct rumble strips in accordance with the details shown in the Plans and Standard Plans, Index 546-001.

546-2 Materials for Raised Rumble Strips.

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

546-2.1.1 Preformed Thermoplastic: Use only materials listed on the Department's Approved Product List (APL), meeting the following requirements:

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.

546-2.1.2 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.

546-2.2 Short-Term Raised Rumble Strips: Construct short-term raised rumble strips meeting the requirements of 546-2.1, or by using removable polymer striping tape meeting the requirements of 990-9.

546-3 Application.

546-3.1 Permanent 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 Short-Term Raised Rumble Strips: Install short-term raised rumble strips before opening to traffic, and in accordance with 546-3.1. Maintain and remove short-term raised rumble strips until permanent raised rumble strips are installed.

546-3.3.2 Ground-In Rumble Strip:

546-3.3.2.1 General: Grind rumble strips that have well-defined edges and smooth interiors without tearing the finished pavement.

On a daily basis, before opening the adjacent lane to traffic, ensure that all debris generated by the grinding process is removed and disposed of 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 (RAP).

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.

546-3.3.2.2 Inspection: For limited access roadways, measure depth every one mile. For arterial and collector roadways, measure depth every 500 feet. Measure depth as distance from pavement grade to top of ground-in grooves at the transverse and longitudinal centerline of the grinding prior to the placement of longitudinal thermoplastic pavement markings. Measure, record and certify on a Department approved form and submit to the Engineer.

546-4 Method of Measurement.

The quantity of raised rumble strip sets to be paid for under this Section will be the Plan quantity per seteach, constructed and accepted.

The quantity of ground-in rumble strips to be paid for under this Section will be the plan quantity in gross miles, constructed and accepted. No deduction will be made when the skip array is used.

546-5 Basis of Payment.

Price and payment will be full compensation for all work specified in this Section, including all surface cleaning and preparation, all debris disposal, furnishing of all materials, application, curing and protection of all items, protection of traffic, furnishing of all tools, machines, labor, 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 - eachper-set.

Item No. 546- 72- Ground-In Rumble Strips - per gross mile.

SECTION 711 THERMOPLASTIC PAVEMENT MARKINGS

711-4 Application.

711-4.1 General: Remove existing pavement markings such that scars or traces of removed markings will not conflict with new pavement markings by a method approved by the Engineer. Cost for removing conflicting pavement markings during maintenance of traffic operations to be included in Maintenance of Traffic, Lump Sum.

Before applying pavement markings, remove any material that would adversely affect the bond of the pavement markings by a method approved by the Engineer.

Before applying pavement markings to any portland cement concrete surface, apply a primer, sealer, or surface preparation adhesive of the type recommended by the manufacturer. Offset longitudinal lines at least 2 inches from any longitudinal joints of Portland cement concrete pavement.

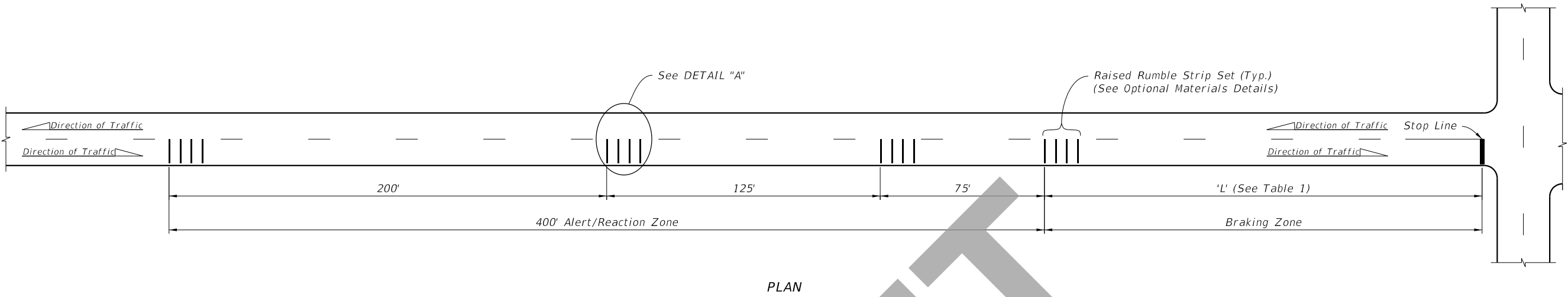
Apply pavement markings to dry surfaces only, and when the ambient air and surface temperature is at least 50°F and rising for asphalt surfaces and 60°F and rising for concrete surfaces.

Apply pavement markings to the same tolerances in dimensions and in alignment specified in 710-5. When applying pavement markings over existing markings, ensure that no more than 2 inches on either end and not more than 1 inch on either side of the existing line is visible.

Apply thermoplastic material to the pavement by extrusion or other means approved by the Engineer.

Conduct field tests in accordance with FM 5-541. Take test readings representative of the pavement marking performance. Remove and replace pavement markings not meeting the requirements of this Section at no additional cost to the Department.

With the exception of short-term raised rumble strips, wait at least 14 days after constructing the final asphalt surface course to place thermoplastic pavement markings. Installation of thermoplastic on concrete requires a clean, dry surface. Follow the manufacturer's recommendations for surface preparation for thermoplastic on concrete. Provide temporary pavement markings during the interim period prior to opening the road to traffic.



SPACING OF RAISED RUMBLE STRIP SETS AT INTERSECTIONS
(Preformed Thermoplastic Set Shown, Others Similar)

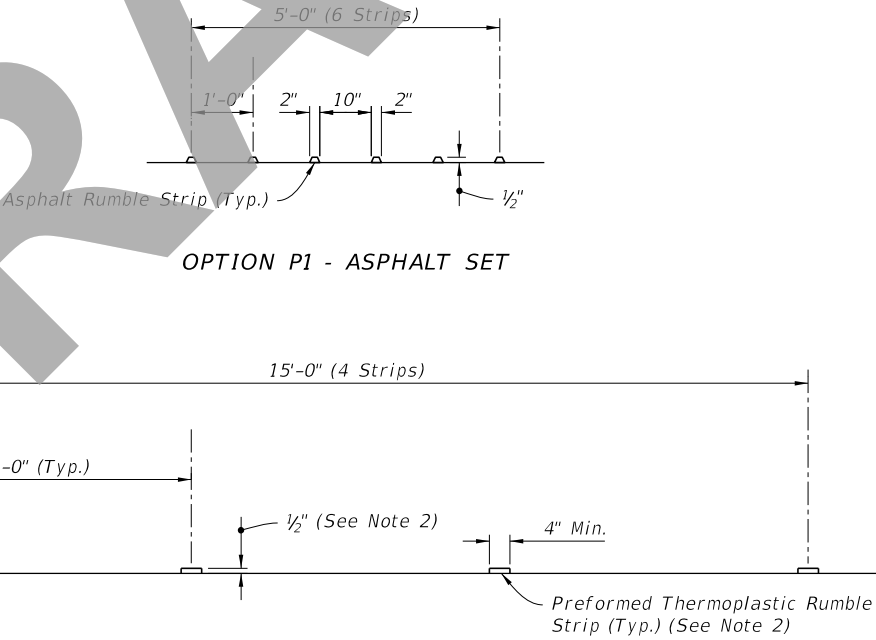
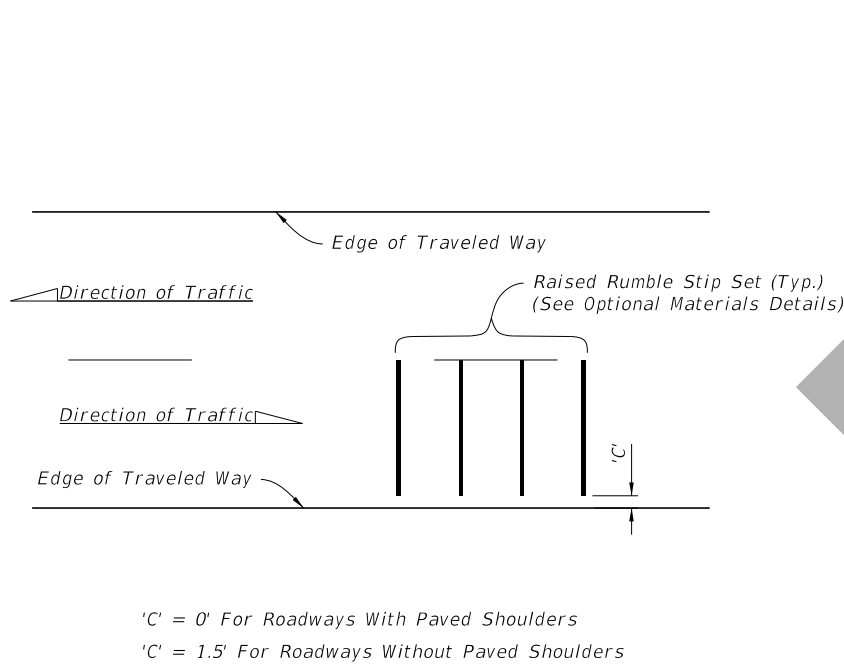
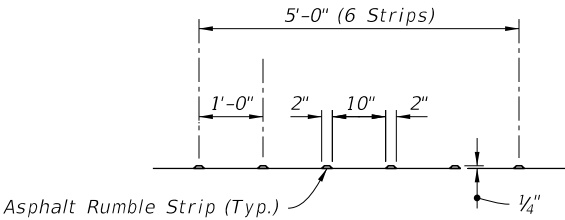


TABLE 1 - BRAKING ZONE	
Posted Speed (mph)	'L' (Feet)
≤ 30	150
35	200
40	250
45	300
50	350
55	410
60	470
65	550

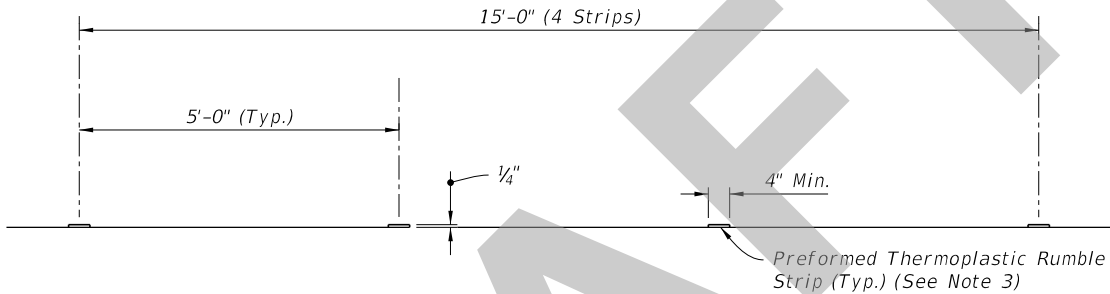
- NOTES:
- Construct permanent raised rumble strips where shown in the Plans and in accordance with Specification 546.
 - Preformed Thermoplastic Set:
 - Use multiple applications to achieve desired 1/2" thickness.
 - Use color white.

PERMANENT RAISED RUMBLE STRIPS

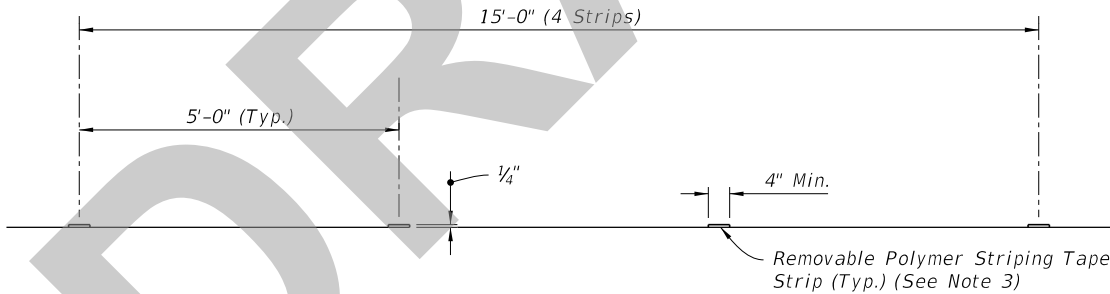
LAST REVISION 04/23/18	REVISION	DESCRIPTION:	FDOT FY 2019-20 STANDARD PLANS	RAISED RUMBLE STRIPS	INDEX 546-001	SHEET 1 of 2
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OPTION ST1 - ASPHALT SET



OPTION ST2 - PREFORMED THERMOPLASTIC SET



OPTION ST3 - REMOVABLE POLYMER STRIPING TAPE SET

OPTIONAL MATERIALS DETAILS

- NOTES:
- 1. Construct short-term raised rumble strips where noted in the Plans and in accordance with Specification 546.
 - 2. See Sheet 1 for placement and additional details.
 - 3. Use color white for Preformed Thermoplastic and Removable Polymer Striping Tape Sets.

SHORT-TERM RAISED RUMBLE STRIPS

LAST REVISION 04/23/18	REVISION	DESCRIPTION:	 FY 2018-19 STANDARD PLANS	RAISED RUMBLE STRIPS	INDEX 546-001	SHEET 2 of 2
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