



Florida Department of Transportation

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JARED W. PERDUE, P.E.
SECRETARY

ROADWAY DESIGN BULLETIN 22-04

(FHWA Approved: 08/03/22)

DATE: October 26, 2022

TO: District Directors of Transportation Operations, District Directors of Transportation Development, District Design Engineers, District Construction Engineers, District Structures Design Engineers, District Maintenance Engineers, District Consultant Project Management Engineers, District Roadway Design Engineers, District Traffic Operations Engineers, Program Management Engineers, District Materials Engineers, District Specifications Engineers, District Estimates Engineers, District Safety Engineers, District Safety Administrators

FROM: Michael Shepard, P.E., Director, Office of Design *Michael A. Shepard*

COPIES: Dan Hurtado, Tim Lattner, Rudy Powell, Ron Chin, Omar Meitin, Stefanie Maxwell, Scott Arnold, Paul Hiers, Vern Danforth, Daniel Strickland, Ryan Gray, Will Potter, Lora Hollingsworth, Brenda Young, Khoa Nguyen (FHWA), Kevin Burgess (FHWA), Gregory Hall (FHWA), Bren George (FHWA)

SUBJECT: **Audible and Vibratory Treatments for Arterials and Collectors**

This Bulletin introduces revisions to the *FDOT Design Manual (FDM)* and *FDOT Standard Plans for Road and Bridge Construction (Standard Plans)* to streamline and improve the Department's criteria and construction details for Audible and Vibratory Treatments (AVTs) on arterials and collectors.

REQUIREMENTS

1. Delete *FDM 210.4.6* and replace with Attachment 'A'.
2. Delete *FDM Exhibit 210-7*.
3. Delete *FDM 230.3.1.2*.
4. Remove the term, "Profiled Thermoplastic, or" from the flowchart in *FDM Figure 230.3.1*.
5. Delete *FDM 325.6.1, Item (7)* and replace with the following:
 - (7) Identify Ground-in Rumble Strips by specifying begin and end limits. Ground-in rumble strips should be labeled with the permanent pavement marking callout labels. It is not necessary to call out the array type (skip or continuous) for arterials and collectors.
6. *Standard Plans, Index 546-010* has been deleted and replaced by *Standard Plans, Interim Revisions IR 546-010-1* and new *Index 546-020* in the *FY 2022-2023 Standard Plans*. See Attachment 'B' for preview copies.

COMMENTARY

Pay Item 701-18-BCD (Profiled Thermoplastic, Asphalt Surfaces) will be blocked and available upon request when approved by the State Roadway Design Engineer.

Pay Item 546-72-2 (Ground-in Rumble Strips, 8” Cylindrical) has been removed because this 8” cylindrical grinding pattern is no longer an option for arterials and collectors.

BACKGROUND

Since the release of [Roadway Design Bulletin 18-03](#), the Department has gained more experience with the use of sinusoidal ground-in rumble strips. The Department has performed further testing and evaluation of various options related to the cost, effectiveness, durability, and potential for noise pollution. With consideration for every category, the sinusoidal ground-in rumble strips have been selected as the Department’s design for all audible and vibratory treatments on arterials and collectors with flexible pavement.

IMPLEMENTATION

The requirements of this bulletin are effective immediately on all design-bid-build projects for which design development is less than 90% complete (Phase III Submittal). These requirements should be employed on projects beyond 90% complete where implementation will not adversely impact the production schedule.

The requirements of this bulletin are effective immediately on all design-build projects for which the final Request for Proposal (RFP) has not been released. Implementation of this bulletin for design-build projects for which the final RFP has been released is at the discretion of the District.

At the discretion of the District, the requirements of this Bulletin may be incorporated into ongoing construction contracts. The addition of this work will require supplemental design details and revisions to be developed for successful implementation. This work should be coordinated between District Transportation Development and Operations.

Reference *Standard Plans, Interim Revisions IR 546-010-1* and *Index 546-020*, as appropriate, in accordance with *FDM 302.8*.

CONTACTS

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MS/gjm

Attachment ‘A’

210.4.6 Audible and Vibratory Treatment

Provide audible and vibratory treatment (AVT) for edge lines and center lines on flush-shoulder roadways with a posted speed of 50 mph or greater. Do not exclude sections of the project where advisory speeds are used due to restricted horizontal or vertical geometry. Do not place AVTs within the limits of crosswalks.

Use sinusoidal ground-in rumble strips on flexible pavements as shown in [Standard Plans, Index 546-020](#).

Use profiled thermoplastic on rigid pavements. Otherwise, use of profiled thermoplastic for any project including RRR, permits, push-button safety, and restriping projects must be approved by the State Roadway Design Engineer.

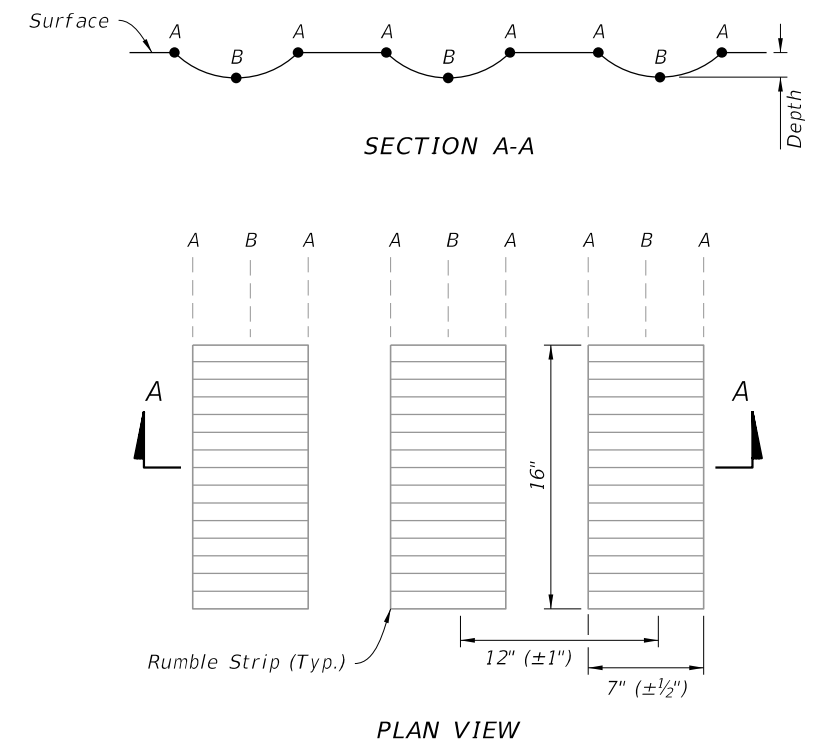
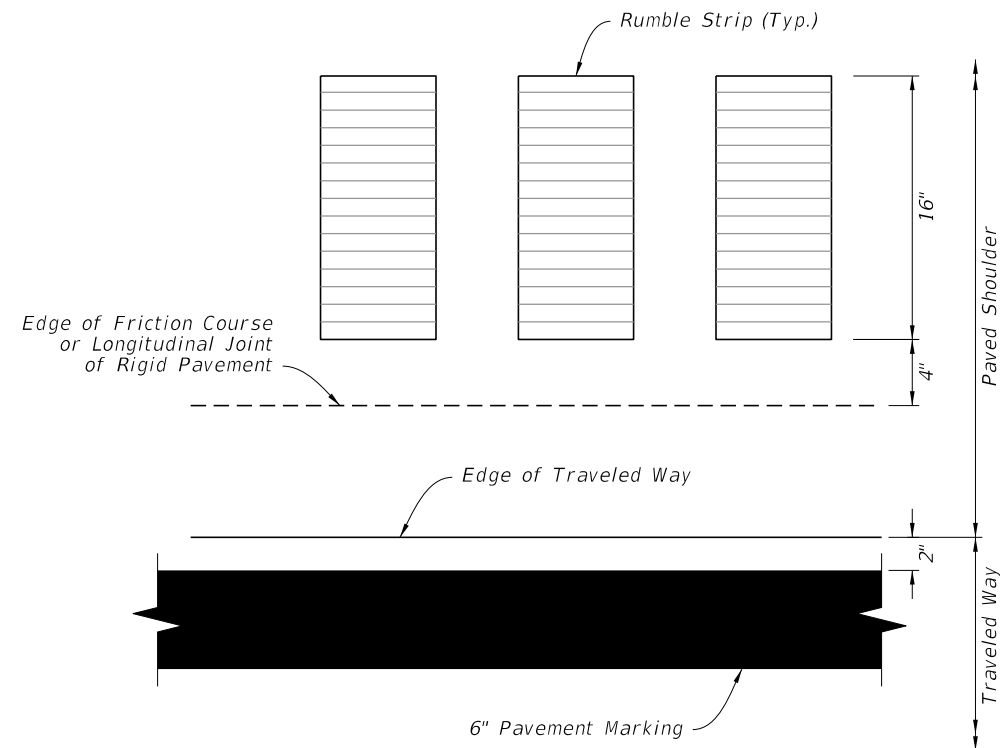
Figure 210.4.4 provides guidance for placement of AVTs. See **FDM 325** for information regarding plan requirements. Ground-in rumble strips are to be quantified in the Signing and Marking Plans component set.

Attachment 'B'

NOTES:

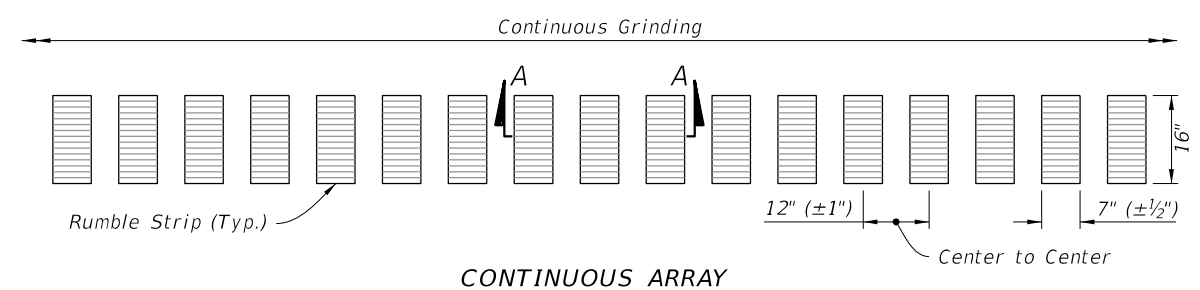
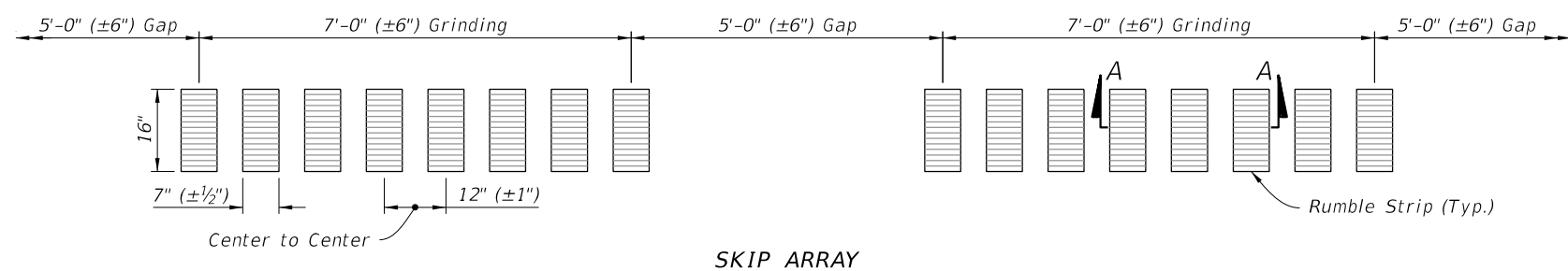
1. When friction course extends more than 8" beyond the edge of the traveled way, blade off the extended friction course to the 8" line prior to rumble strip grinding.
2. Use the continuous array on both inside and outside shoulders 1,000 feet in advance of bridge ends or back to the gore recovery area for mainline interchange bridges. Use the skip array for all other locations.
3. Exclude rumble strips at the following locations:
 - A. At mainline tolling areas, terminate rumble strips at the end of the mainline normal section.
 - B. At All Electronic Tolling (AET) facilities, terminate rumble strips within 50 feet of the centerline of the overhead gantry.
 - C. On outside shoulders of entrance ramp terminals, terminate rumble strips at the point of the physical gore and resume at the end of the acceleration lane taper.
 - D. On outside shoulders of exit ramp terminals, terminate rumble strips at the start of the deceleration lane taper and resume at the point of the physical gore.
 - E. On approaches to bridges, terminate rumble strips at the approach slab joint.

RUMBLE STRIP DEPTH TABLE	
LOCATION	DEPTH FROM SURFACE (IN.)
A	0
B	$\frac{9}{16}$ ($\pm\frac{1}{16}$)



RUMBLE STRIP PLACEMENT
(Plan View)

RUMBLE STRIP DETAILS



RUMBLE STRIP ARRAY DETAILS

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LAST REVISION
10/2022

DESCRIPTION:
Revised Index to only include cylindrical rumble strips for limited access facilities.

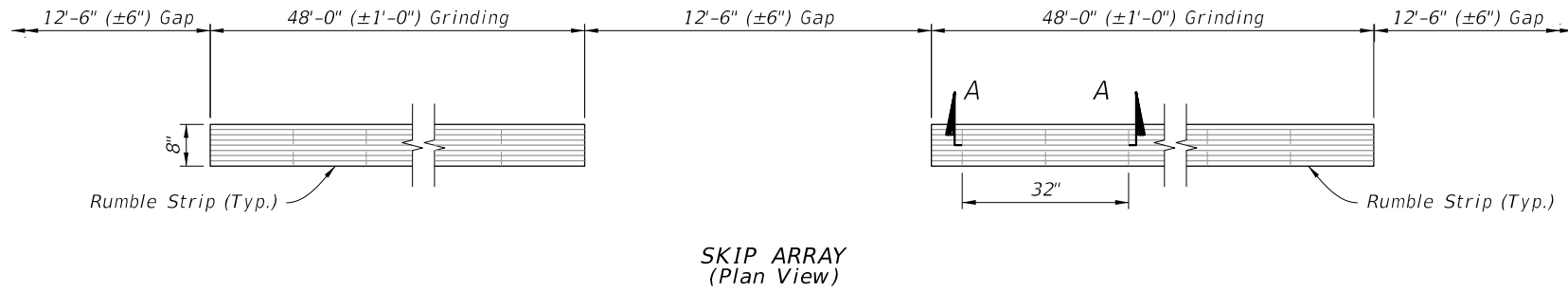


FY 2022-23
STANDARD PLANS

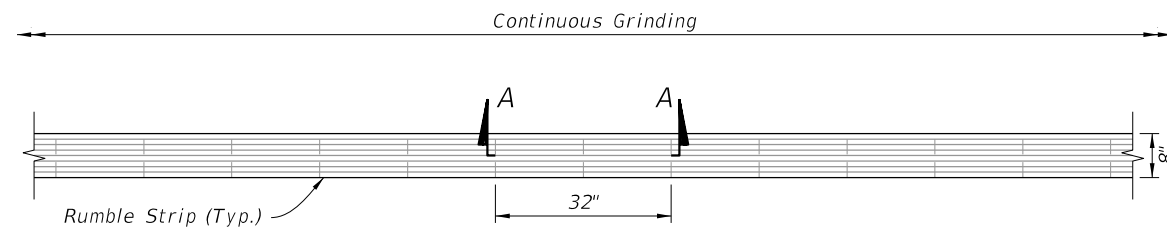
GROUND-IN RUMBLE STRIPS - LIMITED ACCESS

INDEX
546-010-1

SHEET
1 of 1

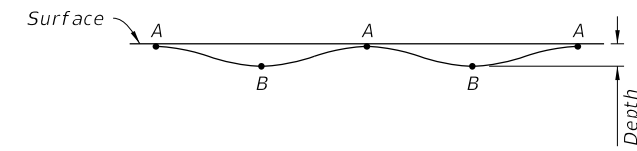


SKIP ARRAY
(Plan View)



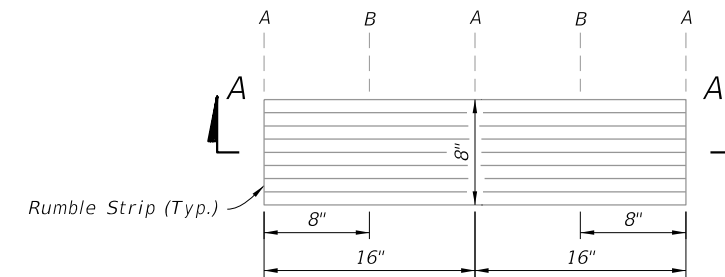
CONTINUOUS ARRAY
(Plan View)

LOCATION	DEPTH FROM SURFACE (IN.)
A	$\frac{1}{16}$
B	$\frac{9}{16}$



SECTION A-A
(Sinusoidal Pattern)

Rumble Strip Placement	Array
Outside Shoulder with Buffered Bike Lane	Skip
Outside Paved Shoulder Width Greater than or Equal to 5'-0"	Skip
Outside Paved Shoulder Width Greater than 0'-0" and Less Than 5'-0"	Skip
Outside Paved Shoulder Equal to 0'-0"	Continuos
Inside Paved Shoulder Width Greater Than or Equal to 1'-0"	Continuos
Inside Paved Shoulder Width Greater Than 0'-0" and Less Than 1'-0"	Continuos
Inside Paved Shoulder Width Equal to 0'-0"	Continuos
One - Direction Passing Centerline	Continuos
Two - Direction Passing Centerline	Continuos
Two - Direction No-Passing Centerline	Continuos



PLAN VIEW

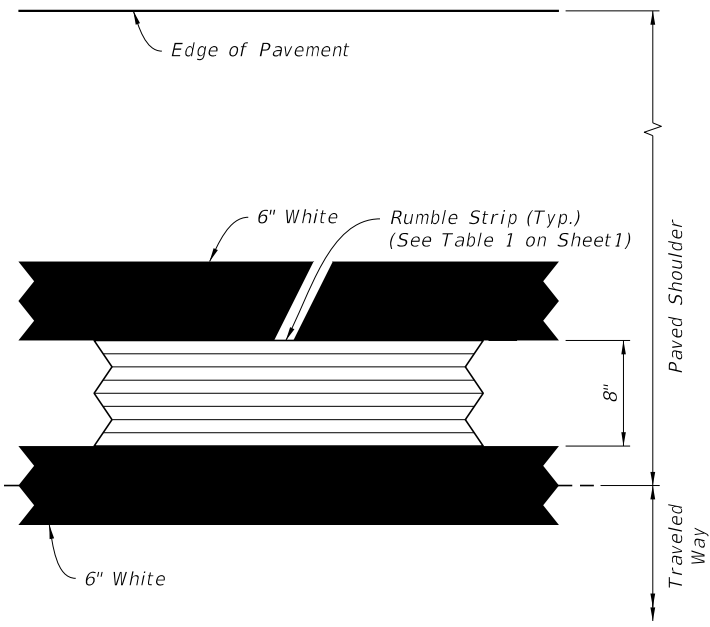
RUMBLE STRIP ARRAY DETAILS

RUMBLE STRIP DETAILS

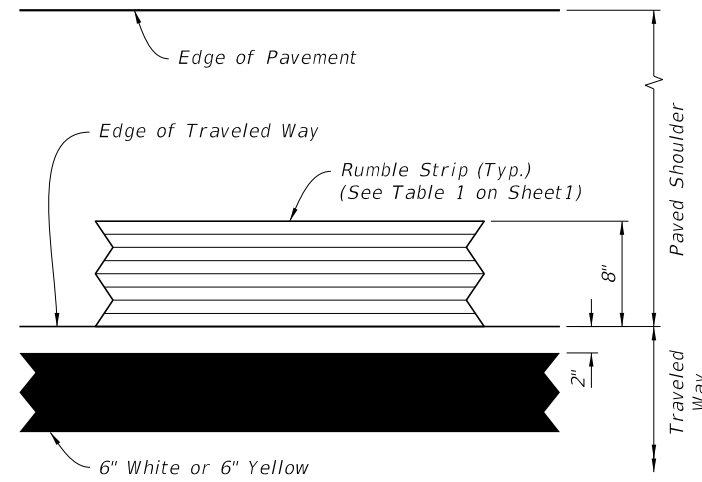
GENERAL NOTES:

1. Straightness tolerance of ground-in rumble strips in the roadway longitudinal direction is plus or minus 1/2".
2. At intersections and major driveways:
 - A. Terminate outside shoulder rumble strips at the radius return.
 - B. Terminate median shoulder rumble strips at the radial return of median nose.
 - C. Terminate centerline rumble strips on undivided highways at the termination of centerline striping.
 - D. Terminate rumble strips at auxiliary lane tapers.

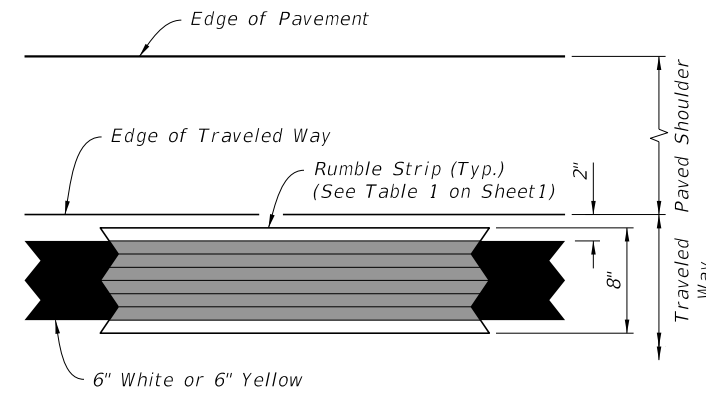
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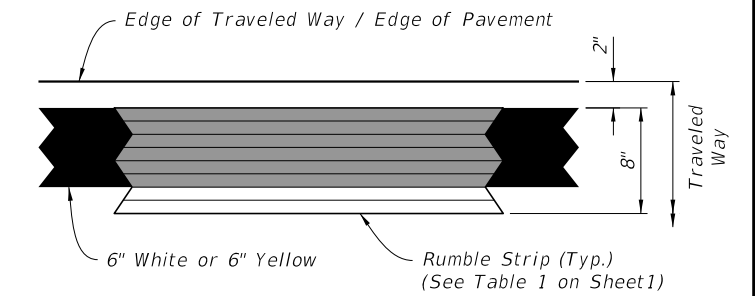
Outside Shoulder with Buffered Bike Lane



Outside Paved Shoulder Width
Greater Than or Equal to 5'-0"
or
Inside Paved Shoulder Width
Greater Than or Equal to 1'-0"

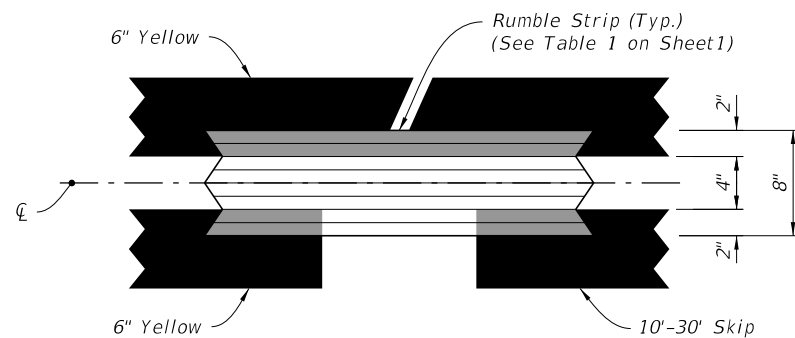


Outside Paved Shoulder Width
Greater Than 0'-0" and Less Than 5'-0"
or
Inside Paved Shoulder Width
Greater Than 0'-0" and Less Than 1'-0"

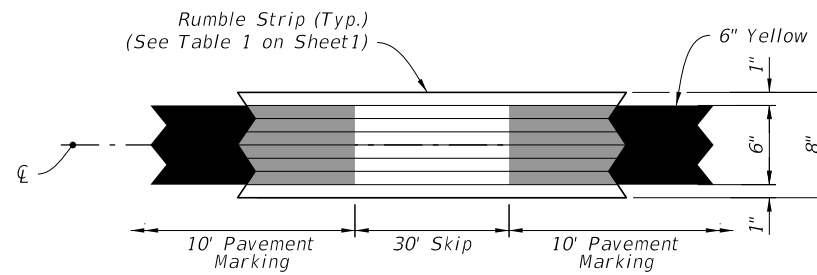


Outside or Inside Paved Shoulder Width Equal to 0'-0"

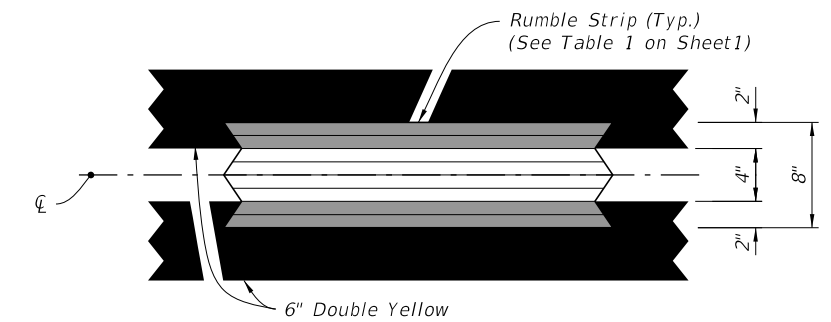
EDGE LINE AND SHOULDER RUMBLE STRIP PLACEMENT
(Plan View)



ONE-DIRECTION PASSING CENTERLINE



TWO-DIRECTION PASSING CENTERLINE



TWO-DIRECTION NO-PASSING CENTERLINE

CENTERLINE RUMBLE STRIP PLACEMENT
(Plan View)

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LAST REVISION 10/2022

REVISION DESCRIPTION:
New Index to only include sinusoidal rumble strips for arterials and collectors.



FY 2023-24
STANDARD PLANS

GROUND-IN RUMBLE STRIPS -
ARTERIALS AND COLLECTORS

INDEX
546-020

SHEET
2 of 2