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September 27, 2011

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SCOTT E. BENNETT  
DIRECTOR OF  
HIGHWAYS AND TRANSPORTATION

Mr. Edwin C. Levy  
Chair-Bicycle Friendly Community Committee  
City of Little Rock  
101 S. Spring Street  
Little Rock, AR 72201

Dear: Mr. Levy:

Reference is made to the enclosed draft Policy for the Use of Rumble Strips on State Highways in Arkansas.

The Arkansas State Highway and Transportation Department drafted this Policy in furtherance of the goals and objectives of the Arkansas Strategic Highway Safety Plan and in compliance with guidance provided by the Federal Highway Administration. Research has proven the effectiveness of both shoulder rumble strips and centerline rumble strips in reducing fatal and/or serious injury roadway departure crashes. The intent of this Policy is to enhance safety by guiding the installation of these safety features on the State Highway System.

Please take a few minutes to review this draft Policy and provide any comments in writing or by e-mail no later than October 17, 2011 to the following address:

Mr. Alan Meadors  
Planning and Research Division  
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P.O. Box 2261  
Little Rock, AR 72203-2261  
[Alan.Meadors@arkansashighways.com](mailto:Alan.Meadors@arkansashighways.com)

If additional information is needed, please advise.

Sincerely,

Scott E. Bennett  
Director of Highways  
and Transportation

Enclosure

c: Deputy Director and Chief Engineer  
Assistant to the Director  
Assistant Chief Engineer – Planning  
Assistant Chief Engineer – Design  
Planning and Research

# Arkansas State Highway and Transportation Department Policy for the Use of Rumble Strips

## Introduction

In 2008 there were 552 fatal crashes involving 600 fatalities on all Arkansas roadways in the State. A crash analysis showed that of these total fatal crashes, 440 fatal crashes involving 476 fatalities were classified as roadway departure crashes. Based on crash analyses, 80 percent of all fatal crashes in Arkansas were classified as roadway departure crashes. The Federal Highway Administration (FHWA) has defined a roadway departure crash as “a non-intersection crash which occurs after a vehicle crosses an edge line or a center line or leaves a roadway.”

Arkansas’ Strategic Highway Safety Plan (SHSP) was adopted by the Arkansas State Highway Commission by Minute Order 2007-091 in July 2007 as a planning guide for improving highway safety in the State. A goal was established in the SHSP to reduce the State’s fatality rate to 1.80 fatalities per 100 million vehicles miles (MVM) by the year 2010. The State’s 2008 fatality rate was 1.85 fatalities per 100 MVM which is the lowest rate ever recorded in the State. Some of the strategies listed in the SHSP to reduce roadway departure crashes included the installation of shoulder rumble strips.

Since there is a need to address roadway departure crashes that many times result in fatal and/or serious injuries, the Arkansas State Highway and Transportation Department (AHTD) has developed a policy on the design and application of shoulder rumble strips (SRS) for various types of highways. The use of centerline rumble strips (CLRS) and rumble stripes are also included. The intent of this policy is to enhance safety through the use of rumble strips on the State Highway System in order to reduce roadway departure crashes while addressing and mitigating the major concerns with the use of rumble strips.

## Considerations for Use of Rumble Strips

Several factors need to be considered in the use of rumble strips. These factors include:

- Urban vs. rural areas
- Noise
- Type and condition of shoulders
- Bicyclists

### Urban vs. Rural Areas

As a normal practice, rumble strips should not be installed in urban areas because of higher population concentrations and lower speed limits. However, rumble strips may be installed on shoulders or on centerlines in less developed urban areas where an engineering study determines their need to reduce roadway departure crashes.

The use of rumble strips should primarily focus on rural areas or less developed areas where there is a lower concentration of driveways and limited residential and commercial development near the roadway.

## Noise

Rumble strips add sound and vibration to the visual benefits of painted markings when traversed by a vehicle. Rumble strips consist of either raised or grooved patterns that are installed perpendicular to the direction of travel. Rumble strips can provide a drowsy, inattentive or distracted driver with a clear warning that the vehicle has left the travel lane and can provide additional reaction time to recover before the vehicle leaves the roadway. A rumble strip can be installed along a shoulder or along the centerline of a roadway. Alternative rumble strip designs have been used across the country. However, evaluation studies have demonstrated that regardless of their design, rumble strips have been effective in reducing roadway departure crashes.

The Colorado Department of Transportation conducted research in 2001 on the sound level generated by various depths of the grooves of rumble strips. Based on the results, a 1/2-inch depth was determined to be needed to generate a minimum 6 db increase in sound level for the critical vehicle type (dump truck) at 65 mph, while a 3/8-inch depth was sufficient at 55 mph to provide a similar sound level. Therefore, 1/2-inch deep rumble strips should be used on rural, divided highways, while 3/8-inch deep rumble strips should be used on other rural highways with speeds greater than 45 mph. This will provide a reduction in the noise level on routes that typically have some residential and commercial development near the roadway.

## Type and Condition of Shoulders

One of the concerns expressed over the use of SRS is the deterioration and failure caused to the shoulders. For this reason, any location that is proposed for SRS will be evaluated by the AHTD's District Engineer to determine whether the shoulder condition will accommodate SRS. When shoulder rumble strips are installed, the shoulder should be in good condition structurally as determined by the District Engineer. Also, the posted speed limit shall be greater than 45 mph, and the paved shoulder width shall be 5 feet, 4 inches or greater. On divided highways, this minimum shoulder width only applies to the outside shoulder.

Shoulder rumble strips shall not be installed on curb sections, bridge decks, approach slabs, intersecting streets or roadways, residential or commercial driveways or across transverse joints of concrete shoulders.

## Bicyclists

A common complaint of bicyclists is that the design of a continuous SRS and a narrow shoulder sometimes require bicyclists to move into the travel lane. To address this concern, SRS with a gap pattern should be installed on highways that are not fully access controlled and the remaining shoulder width beyond the outside edge of the rumble strip is 4 feet or greater (5 feet where guardrail is

present). The typical longitudinal pattern will consist of 48 feet of SRS and 12 feet without SRS. When driveways or intersections are present, the use of a gap pattern will be adjusted at the discretion of the Engineer so that the driveway or intersection may be utilized as a gap. In addition, the 3/8-inch depth of grooves of rumble strips on rural, undivided highways is considered to be less disruptive to bicyclists traveling on these routes.

## Criteria for the Use of Rumble Strips

### Rural, Divided Highways with Full Access Control

Shoulder rumble strips shall be installed on both the inside and outside shoulders of rural, divided highways with full access control. Shown as Rumble Strips (Type 1) on Figure 1, these rumble strips should be 16 inches wide and 1/2 inch deep and offset 4 inches from the edge line. This offset may be increased to avoid longitudinal joints. Longitudinally, the grooves should be 12 inches on center, with a 7-inch groove and 5 inches between grooves.

### Rural, Divided Highways with Partial Access Control

Shoulder rumble strips shall be installed on both the inside and outside shoulders of rural, divided, partial access control highways. Shown as Rumble Strips (Type 2) on Figure 1, these rumble strips should be 12 inches wide, 3/8 inch deep and offset 4 inches from the edge line. This offset may be increased to avoid longitudinal joints. Longitudinally, the grooves should be 12 inches on center, with a 5-inch groove and 7 inches between grooves with a 48-foot rumble strip and 12-foot gap pattern.

### Rural, Undivided Highways

Shoulder rumble strips shall be installed on rural, undivided, highways where the remaining paved shoulder width beyond the outside edge of a rumble strip would be 4 feet or greater (5 feet where guardrail is present) and the posted speeds are greater than 45 mph. Shown as Type 2 Rumble Strips on Figure 1, these rumble strips should be 12 inches wide, 3/8 inch deep and offset 4 inches from the edge line. This offset may be increased to avoid longitudinal joints. Longitudinally, the grooves should be 12 inches on center, with a 5-inch groove and 7 inches between grooves with a 48-foot rumble strip and 12-foot gap pattern.

### Special Consideration for Narrow Shoulders

On roadways with narrow shoulders (less than 5 feet, 4 inches) where a crash analysis shows a high incidence of roadway departure crashes, a type of shoulder rumble strip called shoulder rumble stripes should be considered.

If installed, shoulder rumble stripes should be installed on rural highways where the shoulder width is less than 5 feet, 4 inches and the posted speeds are greater than 45 mph. Shown as Rumble Stripes on Figure 1, these rumble stripes should be placed at the edge of the travel lane and should be

6 inches wide and 3/8 inch deep. Longitudinally, the grooves should be 12 inches on center, with a 5-inch groove and 7 inches between grooves, and the 4-inch wide edge line installed on top of the grooves. The minimum lane width shall be 10 feet in tangent sections, 11 feet for curves with a minimum radius equal to or greater than 800 feet, and 12 feet for curves with a minimum radius equal to or greater than 500 feet.

The out-to-out track width of a WB-67 (semi with a 53 foot trailer) design vehicle was used to determine the minimum radii criteria. At a radius of 800 feet, the out-to-out track width is 10 feet. At a radius of 500 feet, the out-to-out track width is 11 feet.

### Centerline Rumble Strips

Centerline rumble strips (CLRS) should be considered on selected rural highways where a crash analysis and engineering study reveals a high incidence of roadway departure crashes. As shown on Figure 1, CLRS should be 16 inches wide and 3/8 inch deep. Longitudinally, the grooves should be 12 inches on center, with a 5-inch groove and 7 inches between grooves, and the “double yellow” centerline installed on top of the grooves.

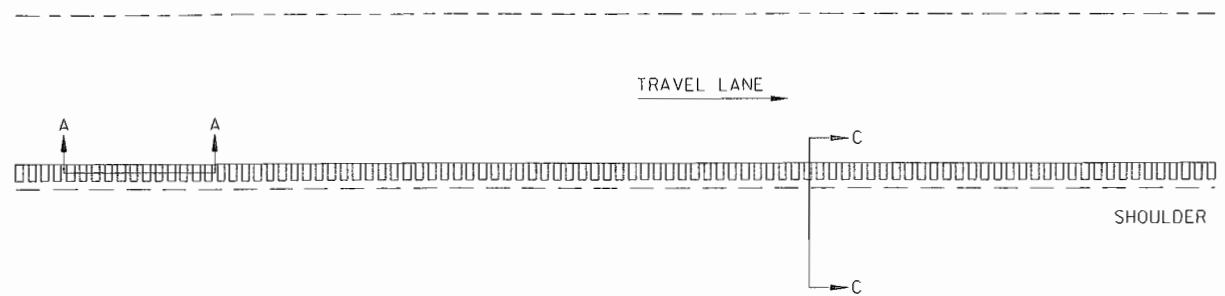
Centerline rumble strips shall only be considered in bidirectional, no passing zones where the posted speed limit is greater than 45 mph. The minimum lane width shall be 10 feet in tangent sections, 11 feet for curves with a minimum radius  $\geq$  800 feet, and 12 feet for curves with a minimum radius  $\geq$  500 feet.

### Implementation

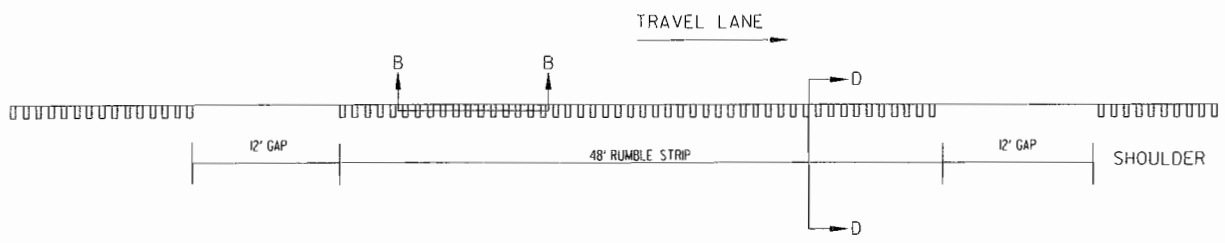
Shoulder rumble strips shall be included as individual construction projects are let to contract on highways meeting the criteria listed previously. In addition, statewide or regionwide rumble strip or rumble stripe projects on highways meeting the criteria listed previously may be developed and let to contract as funds become available.

### Summary

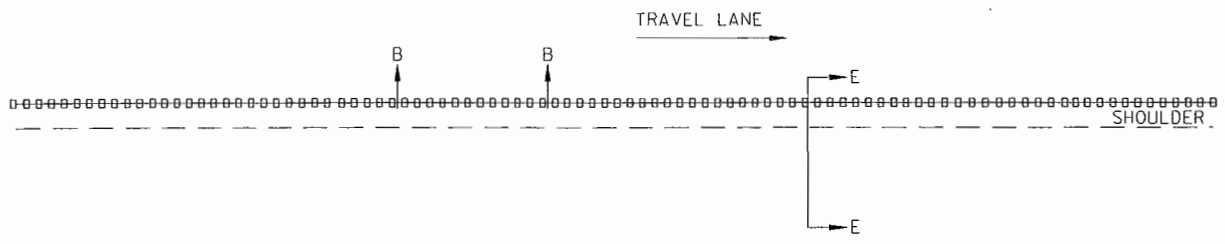
Preventing a vehicle from leaving its travel lane or the roadway is a priority for highway safety. Reducing the likelihood that a vehicle will leave the travel lane or the roadway by installing rumble strips can prevent deaths and serious injuries. While this may not eliminate crashes with other vehicles, fixed objects, pedestrians or bicyclists, it can eliminate many fatalities that result when a vehicle departs the lane or roadway. The objective of this rumble strip policy is to enhance safety through the use of rumble strips while addressing and mitigating the major concerns with their use.



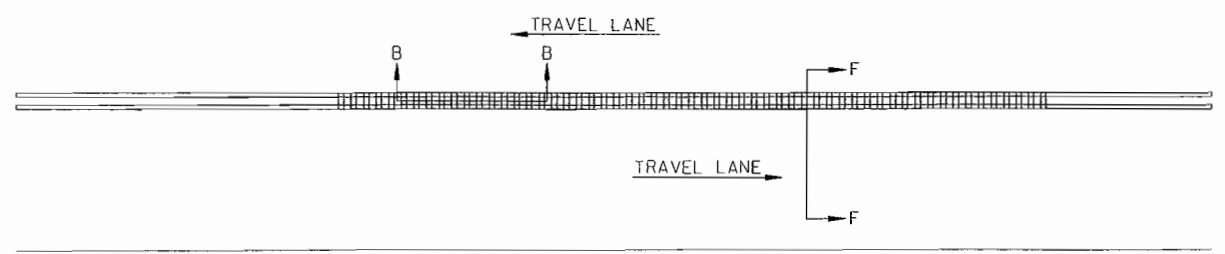
RUMBLE STRIP (TYPE 1)



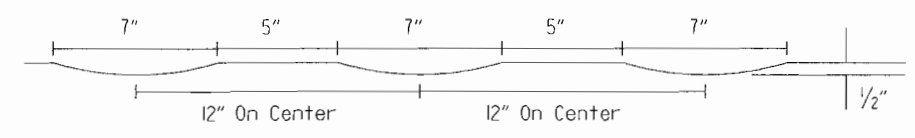
RUMBLE STRIP (TYPE 2)



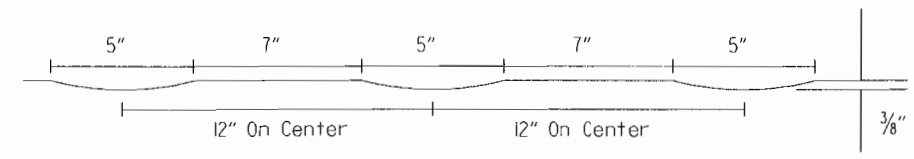
RUMBLE STRIPE



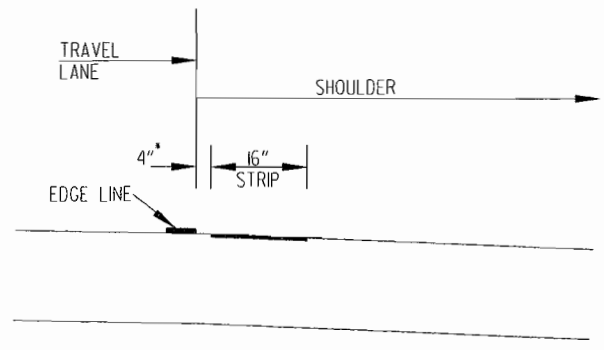
CENTERLINE RUMBLE STRIP



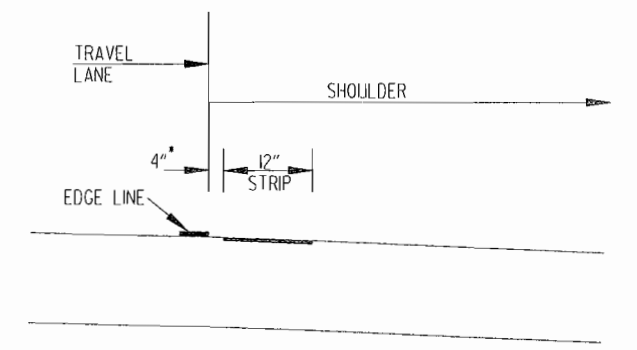
SECTION A - A



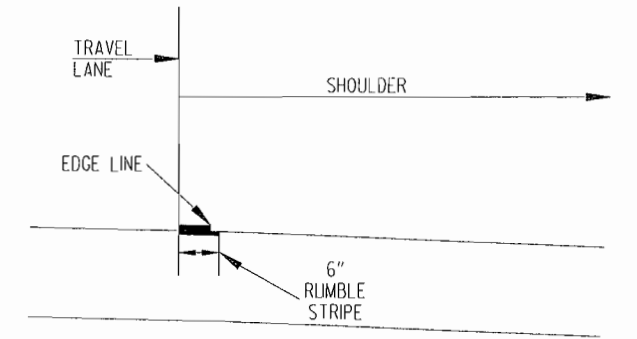
SECTION B - B



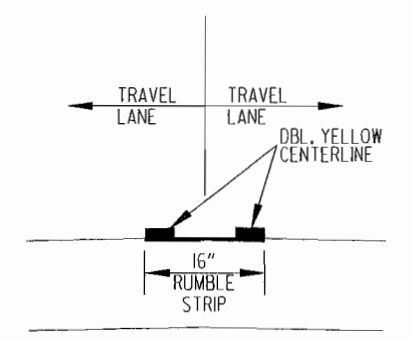
SECTION C - C (Type 1)



SECTION D - D (Type 2)



SECTION E - E



SECTION F - F

FIGURE 1  
GENERAL NOTES

1. Rumble Strips shall not be installed on bridge decks or across transverse joints of concrete shoulders.
2. The 4" offset from the edge line may be increased to avoid longitudinal joints. In all cases, the lateral deviation from the planned offset should be kept to a minimum.
3. Rumble strips shall be omitted at all intersections and driveways, and at other locations if and where directed by the Engineer.