

# Temporary Portable Rumble Strips

Western Association of State Highway and Transportation Officials

**2016** | **Construction and Materials  
Subcommittee Meeting**

April 4, 2016  
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## Our Path Today

- ▣ Need
- ▣ Evaluation
- ▣ Finding of Public Interest
- ▣ Current Process
- ▣ Lessons Learned
- ▣ Summary

## Need

- Short duration Work Zones are different from long term applications
  - WZs are set up and taken down every day
  - Location of WZ may move with the work
- Motorists are part of our Work Zones
  - Always present unless a green pastures road

## Need

- Often, motorists are distracted.....
  - Adjusting the radio
  - Reading a billboard
  - Talking on the phone
- ....or are exhibiting unacceptable behavior
  - Speeding
  - Tailgating
  - Improper lane changes
- We want to create an awareness by the motorist in Work Zones

## Temporary Portable Rumble Strips

- ▣ Can alert motorists to changing road conditions
- ▣ Can 'shake' drivers from distractions
- ▣ Provide significant sounds and vibrations
- ▣ Provide similar feel as milled-in rumble strips

## Temporary Portable Rumble Strips

- ▣ Advantages
  - No installation equipment needed
  - Are reusable
  - Multiple year life
  - Can be used on both low speed and high speed roads
  - Easily transportable

## Temporary Portable Rumble Strip Selection

- ▣ Evaluation of different types of TPRS
  - Involved UDOT Traffic and Safety, Construction, Maintenance, Risk Management, FHWA, and contractors
  - Tested in the field on a high speed (Rural Interstate) road under reconstruction
    - ▣ Cars, large trucks, and motorcycles

## Temporary Portable Rumble Strip Selection



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## Extended Testing

- ▣ Continued testing with the preferred Temporary Portable Rumble Strip



Six locations were set up and tested on I-70 near Yellow Cat

## Temporary Portable Rumble Test Video I-70 Yellow Cat

# Finding of Public Interest

October 18, 2013

Finding of Public Interest File  
Utah Department of Transportation

To Whom it May Concern,

A request for a Finding in the Public Interest was submitted to the Utah Department of Transportation (UDOT) to allow the use of Plastic Safety Systems, Inc., RoadQuake 2 Temporary Portable Rumble Strips.

After a review of the information that was submitted by John Leonard, Operations Engineer, Division of Traffic and Safety for UDOT, the following conclusions for the RoadQuake 2 Temporary Portable Rumble Strips manufactured by Plastic Safety Systems, Inc. have been reached. Mr. Leonard indicated that only two manufacturers of TPRS exist.

- 1) Lessens travelling public chance of injury. Demonstrations (documented with videos and photographs) witnessed by UDOT, FHWA and a project contractor indicate that only the RoadQuake 2 Temporary Portable Rumble Strips (TPRS) system is capable of essentially remaining in place. In the demonstration, the RoadQuake 2 TPRS showed sufficient stability for use. The other system was not stable, became airborne and was a risk for adjacent vehicles.
- 2) Reduction in anticipated life cycle costs. Although the capital cost of the RoadQuake 2 is slightly more than the other product, there is a very high risk that the other TPRS system would have projectile properties that could result in significant property damage as well as injury or death. These costs are assumed, but the videos and photos document a dangerous situation that resulted from the other TPRS system use. The other TPRS system was not able to maintain position during service and became airborne. Consequently, considering the results of the demonstration, a very high risk of substantial property damage, injury or death exists. It is not known if the other product is suitable at lower speeds or in different vehicle distribution scenarios.
- 3) Reduced risks during repositioning. During the demonstration, the RoadQuake 2 proved to only move slightly which limits the field crew's need to reposition the strips. Conversely, during the demonstration, the other product showed a need to be repositioned almost immediately after the first truck passed.

The request for a FIFI to specify the use of Plastic Safety systems, Inc., RoadQuake 2 Temporary Portable Rumble Strips in the conditions defined earlier is approved. This approval is good for a five period ending November 1, 2018. Further, the Traffic and Safety Division is requested to review this Finding no later than November 1, 2016. After the five year period, the UDOT will need to renew this FIFI.

# Current Use

- RoadQuake 2 Series is the only approved Temporary Portable Rumble Strip allowed on the State system
  - Includes both the original 3 piece RoadQuake 2 and the folding RoadQuake 2F

# One Lane Road

**TAPER LENGTH FORMULAS**

SPEED	FORMULA
FOR SPEEDS OF 45 MPH AND LESS	$L = \frac{S^2}{10}$
FOR SPEEDS OF 45 MPH AND GREATER	$L = WS$

L = TAPER LENGTH IN FEET  
 S = WIDTH OF STRIP IN FEET  
 W = SPEED IN MPH

1. FOR SINGLE-LEAF COLORED TAPER  
 2. FOR SINGLE-LEAF TAPER

**3. CHANNEL LEDS DEVICES**

APPROVED AND TESTED TAPERS USE A MINIMUM OF 10 FEET OF LEDS AND CLOSING WITH FULLY OPERATIONAL DEVICES TO 15 FEET.

4. FOR ONE-LANE TAPER AND CHANNEL LED TAPERS USE A MINIMUM OF 10 FEET AND 15 FEET OF DEVICES ON PORTAL, FORWARD FLAT, AND BACK TO BE SET, CLEAR TAPER IS 15 FEET SPACING UP TO 100 FT MAXIMUM.

5. LENGTH OF BUFFER ZONE SHALL BE 50 FEET FROM END OF LANE TO CLOSE TAPER TO WORK SPACE, OR ANY OBSTRUCTION PRIOR TO WORK SPACE.

**STANDARD WORK ZONE SIGNING WITH TEMPORARY PORTABLE RUMBLE STRIPS**

**TRAFFIC CONTROL DEVICE LEGEND**

- RUMBLE STRIP OR PORTABLE
- CHANNEL LED DEVICE
- CHANNEL LED DEVICE
- CHANNEL LED DEVICE
- PLACING SYSTEM
- BARRIER
- TYPE 2 BARRIER
- DIRECTION OF TRAFFIC
- DIRECTION OF MOTOR VEHICLE
- TRAFFIC SIGNAL

1. USE FC 40 RUBBER STRIPS FOR SIGN DESIGN AND LAYOUT.  
 2. RUMBLE STRIPS (SIGNAL AND RUMBLE STRIP) WITH FINE NOTIFICATION (PREG) BRIDGE MAY BE USED INTERCHANGEABLY.  
 3. TEMPORARY PORTABLE RUMBLE STRIP ARRAY CONSISTS OF THREE TRANSVERSELY PLACED RUMBLE STRIPS WITH 4 FT SPACING.  
 4. SPACE AT 10 FT ON CENTER FOR SPEEDS OF 45 MPH OR LESS.  
 5. PLACE RUMBLE STRIPS AHEAD 500 FEET TO RUMBLE STRIPS AHEAD SIGN.  
 6. REMOVE TEMPORARY PORTABLE RUMBLE STRIPS PRIOR TO REMOVING RUMBLE STRIPS AHEAD SIGN.  
 7. REFER TO SPECIAL PROVISIONS FOR MAINTENANCE OF TEMPORARY PORTABLE RUMBLE STRIPS, DURING THE TEMPORARY PORTABLE STRIPS AS NECESSARY TO MAINTAIN PROPER ALIGNMENT, SPACING AND LOCK-IN.  
 8. DO NOT USE TEMPORARY PORTABLE RUMBLE STRIPS ON HORIZONTAL CURVES UNLESS APPROVED BY REGION TRAFFIC ENGINEER.  
 9. DO NOT PLACE TEMPORARY PORTABLE RUMBLE STRIPS DURING SNOW EVENTS.  
 10. SIGN LAYOUT IS TO BE APPLIED TO EACH DIRECTION OF TRAFFIC.

SEE SIGNING TO ACTION PROJECTS FOR SIGNING.

EXAMPLE ONLY - NOT TO SCALE SETUP TO BE USED FORWARD

WORK ZONE  
 RUMBLE STRIPS AHEAD  
 ONE LANE ROAD AHEAD  
 NO PASSING AHEAD  
 ROAD WORK AHEAD

TEMPORARY PORTABLE RUMBLE STRIPS  
 CHANNEL LED DEVICE  
 CHANNEL LED DEVICE  
 CHANNEL LED DEVICE  
 PLACING SYSTEM  
 BARRIER  
 TYPE 2 BARRIER  
 DIRECTION OF TRAFFIC  
 DIRECTION OF MOTOR VEHICLE  
 TRAFFIC SIGNAL

OPTION: SEE NOTES 1 & 2 SEE TOWA



## Typical Installations



## Typical Installations



## Typical Installations



## Typical Installations



# Motorcycles



# Motorcycles



Temporary Portable Rumble Strips and Motorcycles During Rain Events



## Lessons Learned

- ❑ Temporary Portable Rumble Strips are a good tool for alerting motorists when entering a Work Zone
- ❑ UDOT has modified the Detail Sheets and Specifications as we have gained experience with the TPRS

## Lessons Learned

- ▣ TPRSs are now placed across the lane to be closed and the immediately adjacent lane, then a second array is placed in the lane to be closed prior to the taper.
  - Previously, we had shown the one-lane array after the end of the lane closure.
- ▣ UDOT adjusted (doubled) the specified spacing between each strip in the array
  - Spacing:
    - 20 ft on center for 50 mph or greater
    - 10 ft on center for 45 mph or less
    - Reduced impacts on the downstream TPRS

## Lessons Learned

- ▣ Adjustment of TPRSs is required when one end is 3 feet or more out of skew with the other end
  - Experience showed that the rumble strips go out of skew and turn longitudinal to traffic at an increased rate once they get a certain distance out of being perpendicular to traffic.

## Alignment



## Lessons Learned

- ❑ On higher volume roads, require Law Enforcement (UHP) to be onsite when the TPRSs are in place
- ❑ They perform a slowdown, if necessary, to create gaps in traffic for maintaining the alignment of the rumble strips
- ❑ On lower volume roads, the contractor is able to find acceptable gaps in traffic

## Lessons Learned

- ❑ Should not be used where horizontal curves are present (generally not suitable for canyons). Oncoming traffic should be perpendicular to the array where possible.
- ❑ Should not be used where speeds are in excess of 75 MPH. The posted speed limit through our test projects varied from 65 to 80, with many drivers exceeding 85.
- ❑ Should not be used when the roadway temperature is below 0 degrees F (not suitable for use during extremely cold weather).
- ❑ Exceptions allowed at the discretion of the Region Traffic Engineer

## Summary

- ❑ Temporary Portable Rumble Strips are a valuable tool in the Work Zone Toolbox
  - Both construction and maintenance activities
- ❑ Should be used in active WZs that are setup and taken down daily
- ❑ Provide a 'wake up' to distracted or impatient drivers
- ❑ Easy to install, remove, transport, and store
  - Do not need any specialized equipment
- ❑ Have a lifecycle of 3-5 years

