



2014 Northeast Transportation Safety Conference

Providence, Rhode Island

September 3rd – 4th

Rumble Strips





Highway Safety Improvement Program (HSIP)

- \$9.0 Million per year to NH
 - \$500,000 set aside for rumble strip installation statewide
 - Mostly to replace existing locations that have been impacted by paving projects
 - Common public misconception - funds can ONLY be used for Safety Improvements

Highway Safety Improvement Program (HSIP)

- **Rumble Strips** are one of the nine FHWA Proven Safety Countermeasures to address crashes that occur in the focus areas of intersections, pedestrians, and roadway departure



Roundabouts



Corridor Access Management



Backplates with Retroreflective Borders



Longitudinal Rumble Strips and Stripes on Two-Lane Roads



Enhanced Delineation and Friction for Horizontal Curves



Safety Edges



Medians and Pedestrian Crossing Islands in Urban and Suburban Areas



Pedestrian Hybrid Beacon



Road Diet

Why install rumble strips/stripes?

Run off the road (ROR) crashes and head-on collisions due to fatigued, inattentive, or otherwise impaired drivers are a major contributor to New Hampshire's fatal and injury crashes. Rumble strips are placed as a countermeasure for driver error, rather than roadway deficiencies. Milled shoulder rumble strips/stripes (SRS) and milled centerline rumble stripes (CRS) are a low-cost safety measure that alerts drivers when they drift from their travel lane, providing an opportunity for the driver to maneuver their vehicle out of harms way.

Another recognized benefit of shoulder rumble strips/stripes is that they alert pedestrians and bicyclists of possible danger from errant vehicles approaching from behind that leave the travel way and enter the shoulder area.

Why install rumble strips/stripes?

Nationally,

Center line rumble strips on rural two-lane roads:

- 44% reduction of head on / fatal and injury crashes;

Center line rumble strips on urban two-lane roads:

- 64% reduction of head-on / fatal and injury crashes;

Shoulder rumble strips on rural two-lane roads:

- 36% reduction of run-off -road fatal and injury crashes.

Why install rumble strips/stripes?



Every unsafe act, distracted driving, impaired driving, speeding...
carries the risk of a fatality.



Crashes 2003-2010

Fatal Crash Reporting - DOS

New Hampshire Fatal Crashes 2013

January thru April

Impact Location / Roadway Departure

Case	Date	Vehicles Involved	Fatalities Resulted	Town	Route	FHE (First Harmful Event)
13-001	1/5/2013	1	1	Jaffrey	Fitzwilliam Road (100 ft North of Scott Pond Road)	Right Side Road Departure
13-002	1/12/2013	1	1	Seabrook	Ledge Road (2000 ft. West of London Lane)	Left Side Road Departure
13-003	1/21/2013	2	1	Plainfield	Route 12A (Near intersection of Freeman Road)	Centerline Encroachment (Snow Covered Roadway)
13-004	1/23/2013	2	1	Bristol	Route 104 1000 ft West of Homestead Restaurant	Centerline Encroachment (Solar Glare)
13-005	1/27/2013	2	4	Hillsborough	Route 9 1360 ft East of Route 202	Centerline Encroachment (Cause Unknown)
13-006	1/26/2013	2	1	N. Haverhill	Route 10 125 ft North of Petticoat Lane	Failure to Yield(Left turn from driveway across path)
13-007	2/5/2013	2	2	Alton	Route 28 3000 ft North of Quarry Road	Centerline Encroachment(Alcohol / Drug Related)
13-008	2/8/2013	1	1	Auburn	Route 28 Bypass 1732 ft North of Rattlesnake Hill Rd	Left Side Road Departure
13-009	2/10/2013	1	1	New Ipswich	Route 124 600 ft East of Spindleback Lane	Left Side Road Departure
13-010	2/15/2013	1	1	Portsmouth	Interstate 95 Mile Marker 14.2	Right Side Road Departure
13-011	2/8/2013	1	1	East Kingston	East Road 1 Mile South of Main Street	Left Side Road Departure
13-012	2/23/2013	2	1	Durham	Route 4 4000 Feet East of Main Street	Centerline Encroachment (Unsafe Lane Use)
13-013	2/27/2013	2	1	Milton	Route 125 (1362 White Mtn Highway)	Centerline Encroachment (Cause Unknown)
13-014	2/27/2013	2	1	Gorham	Route 16 1100 Ft North of Southern Cascade Flats	Centerline Encroachment (Possible Medical Event)
13-015	3/11/2013	1	1	Candia	Route 101 300 Feet West of MM 109.2	Left Side Road Departure
13-016	3/16/2013	1	1	Newmarket	North Main Street near intersection of Bay Road	Right Side Road Departure
13-017	3/16/2013	1	1	Raymond	Chester Road Node 0020 250 ft to Node 0021	Left Side Road Departure
13-018	3/24/2013	1	1	Meredith	Route 25 (in front of #182)	Left Side Road Departure
13-019	3/30/2013	1	1	Manchester	Interstate 293 Exit 4 NB	Right Side Road Departure
13-020	4/3/2013	2	1	Milan	Route 110 2500 ft. West of York Pond Road	Centerline Encroachment (Cause Unknown)
13-021	4/5/2013	1	1	Belmont	Route 106 600 ft South of Stone Road	Left Side Road Departure
13-022	4/7/2013	2	1	Claremont	Main Street 800 ft North of North Street	Centerline Encroachment (Alcohol Related)
13-023	4/14/2013	1	1	Jaffrey	Route 202 750 ft North of Childrens Woods	Left Side Road Departure
13-024	4/14/2013	1	1	Farmington	Hometown Road in front of #289	Left Side Road Departure
13-025	4/19/2013	1	1	Laconia	Messer Street & Opeechee Street	Left Side Road Departure
13-026	4/20/2013	2	2	Amherst	Route 101 & Schoolhouse Road	Left Side Road Departure
13-027	4/24/2013	1	1	Winchester	Fullum Pond Road 1000 ft South Old Chesterfield Rd	Centerline Encroachment (turning left) Left Side Road Departure

Centerline Encroachment = 10/27 = 37%

Left Side Road Departure = 12/27 = 44%

81% of Fatal Crashes Involved Drivers Crossing the Centerline

96% of Fatal Crashes are considered Run-Off-The-Road by FHWA criteria.

What does it sound like when rumble strips are driven on?

Passenger car driving over rumble strips

(First from outside the vehicle then inside then outside again)

[Car.m4a](#)

Commercial truck driving over rumble strips

(First from outside the vehicle then inside then outside again)

[Commercial Truck.m4a](#)

Courtesy FHWA Safety website

Established NHDOT Guidelines

- Developed in 2008
 - In response to public comments about installation practices
 - Combined effort:
Highway Design,
Construction, Traffic,
Highway Maintenance,
Rail & Transit, FHWA,
and Environment
 - Guidelines being
reevaluated in 2013 to
allow a systemic
approach to roadway
selection and installation



These Conditions Must Apply...

- Highway segment has a speed limit of ~~40~~ 50 MPH or greater with limited or controlled access.
 - Highway segment should have a minimum 28 feet of pavement 4' wide shoulders
 - ~~• Highway segment has a crash history (crossing the centerline), greater than the State average.~~
 - ~~• ADT should be greater than 5000 vpd~~
 - Existing Pavement must be in good condition so that the installation of CRS will not cause future pavement delamination.
 - Minimum depth of the existing wearing course should be 1-1/4 inches
 - Any highways that do not meet all of the above conditions will require an engineering analysis and Chief Engineer Approval.
 - A public informational meeting will be held and concurrence from the local officials should be obtained.
- ❖ Guidelines were revised by the NHDOT and the Federal Highway Administration in 2013 to broaden the number of roads eligible for rumble strip installation.

Currently in place in NH...

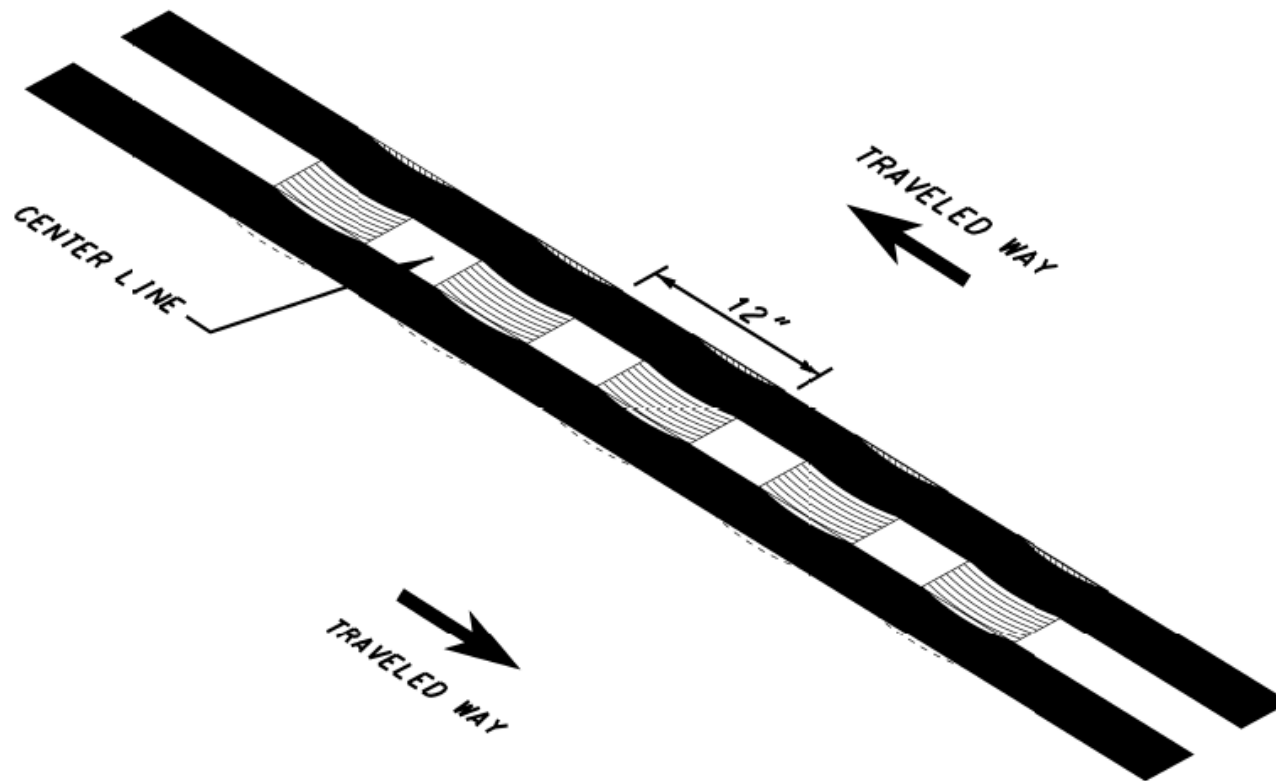
- Shoulders
 - Interstates and Turnpikes
 - US202/NH9 – Henniker & Hopkinton
 - NH 101 – Auburn to Exit 10 in Exeter
 - NH 125 – Plaistow to Rochester
- Centerline
 - US202/NH9 – Henniker & Hopkinton – 12 miles
 - NH 16 – Rochester to Ossipee – 30 miles
 - NH 101 – Milford & Amherst – 10 miles
 - NH 111 – Hudson to Hampstead - 20 miles
 - NH 125 – Plaistow to Rochester – 35 miles

Currently in place in NH...

- Transverse
 - NH 101 – Peterborough
 - Long high speed (55MPH) downgrade to roundabout
 - NH 153 – Effingham
 - Problem approach to mainline NH 25
 - I-95 Exit 2 – North Hampton
 - Long high speed (65MPH) exit ramp to Toll Plaza
 - I-89 Exit 5 – Hopkinton
 - High speed (65MPH) left exit to rural 2 lane facility

Design Details

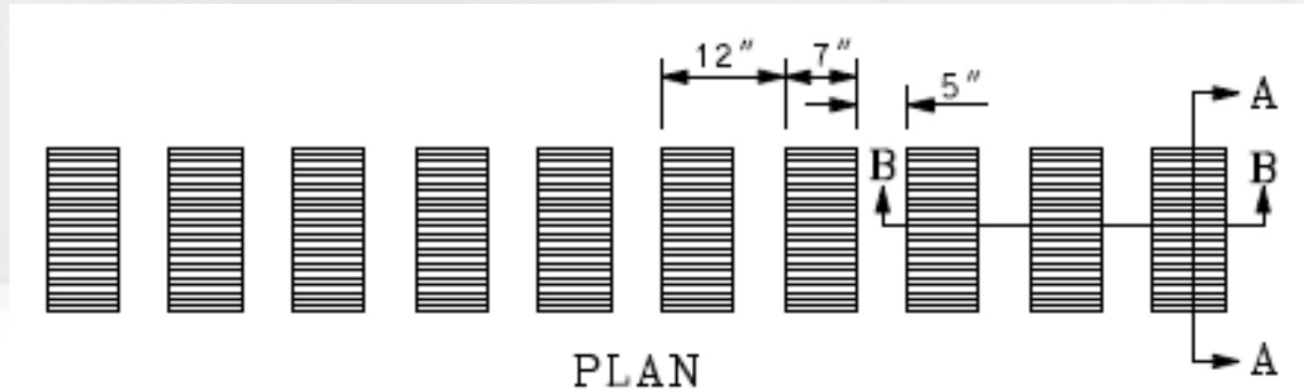
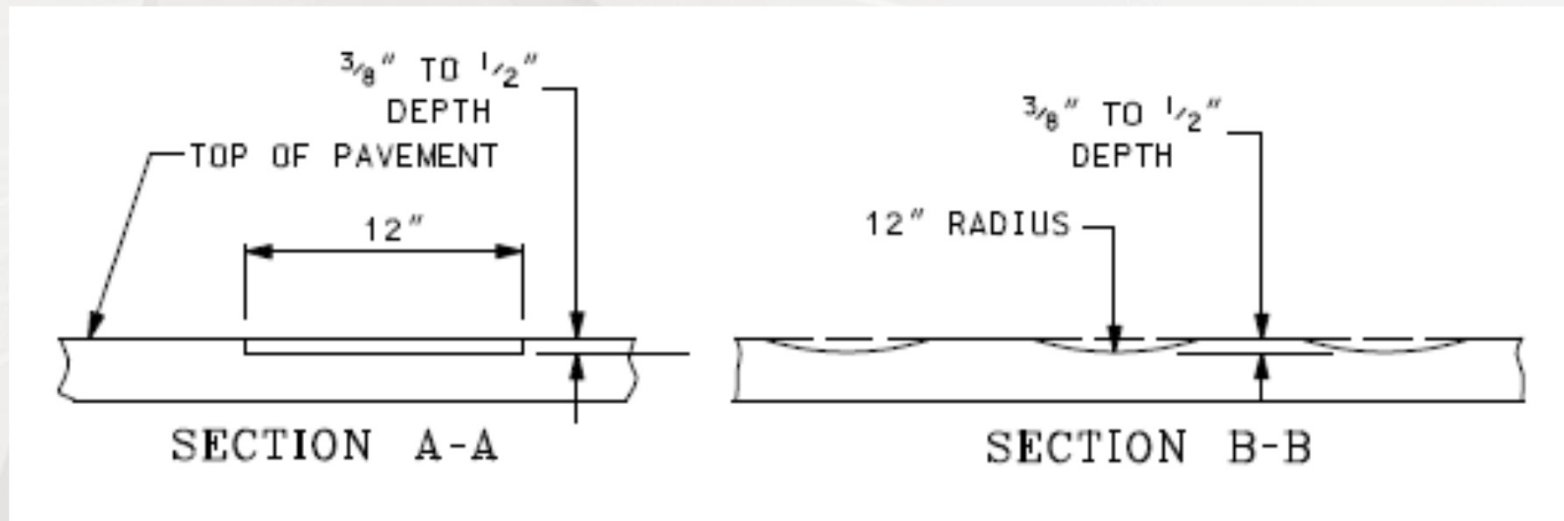
- Centerline 12 inches wide



*TYPICAL CENTERLINE
INSTALLATION DETAIL*

Design Details

- Centerline



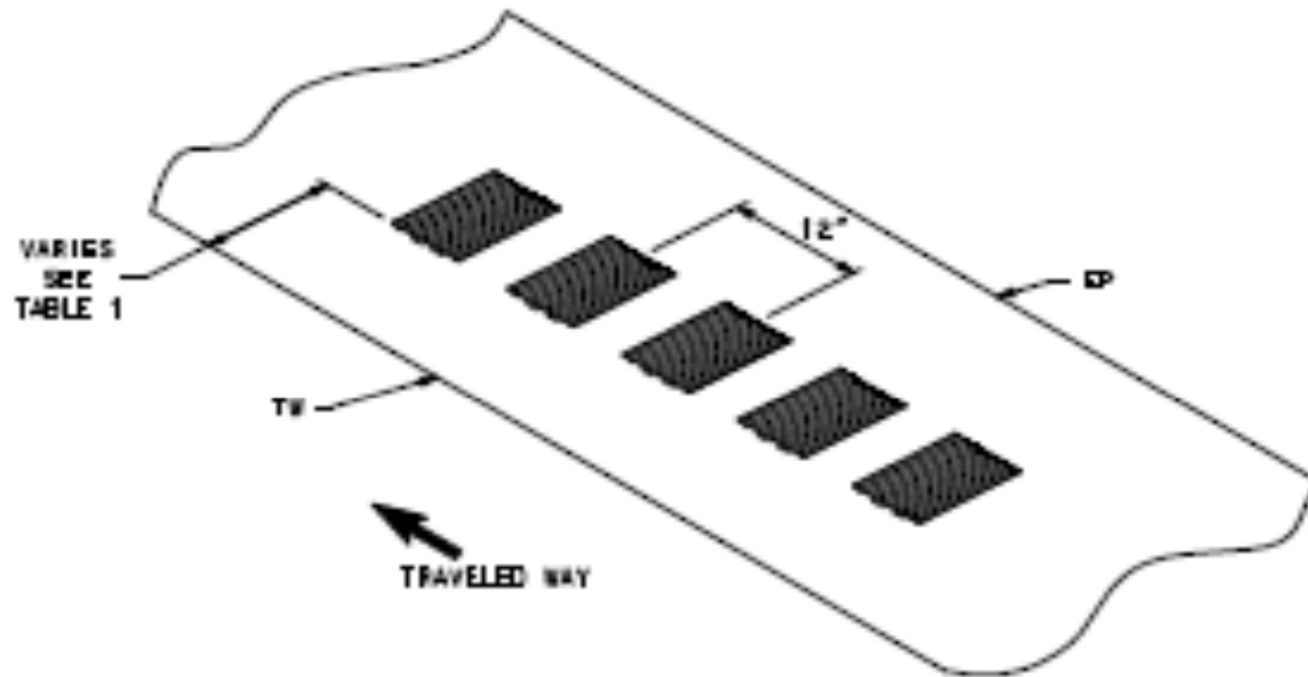
Design Details

- Centerline



Design Details

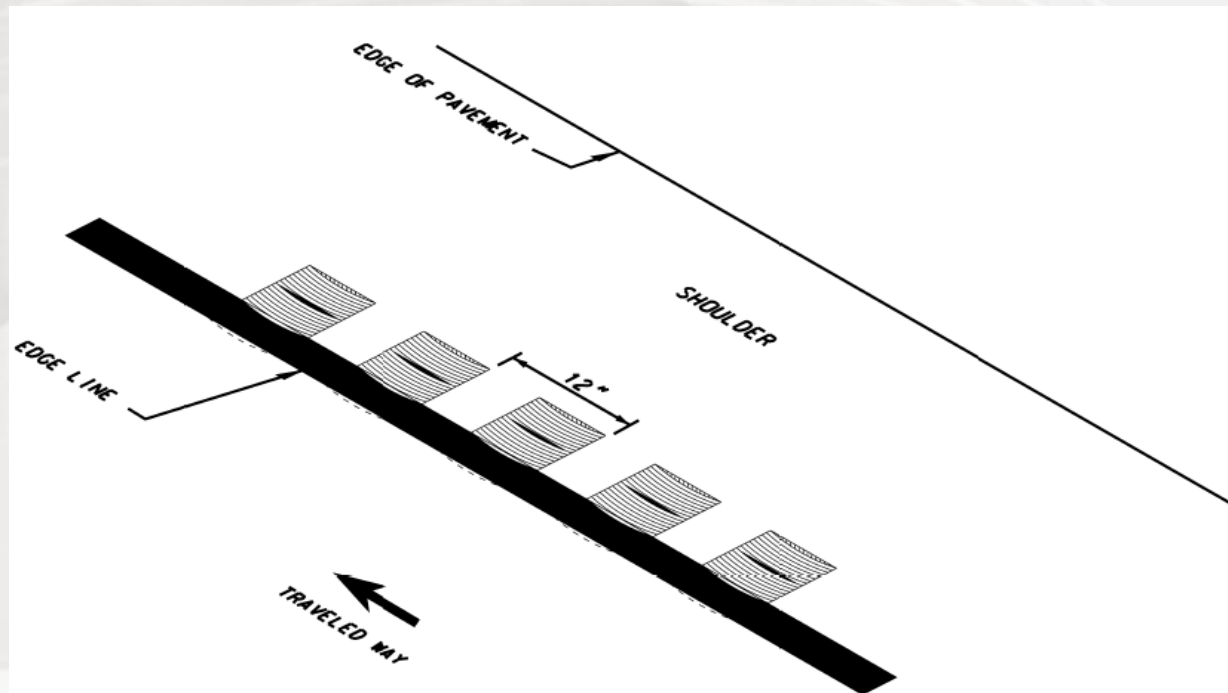
- Shoulder 12 inches wide
- *16 inches wide on Interstates and Divided Highways



**TYPICAL SHOULDER INSTALLATION
RIGHT SHOULDER DETAIL**

Design Details

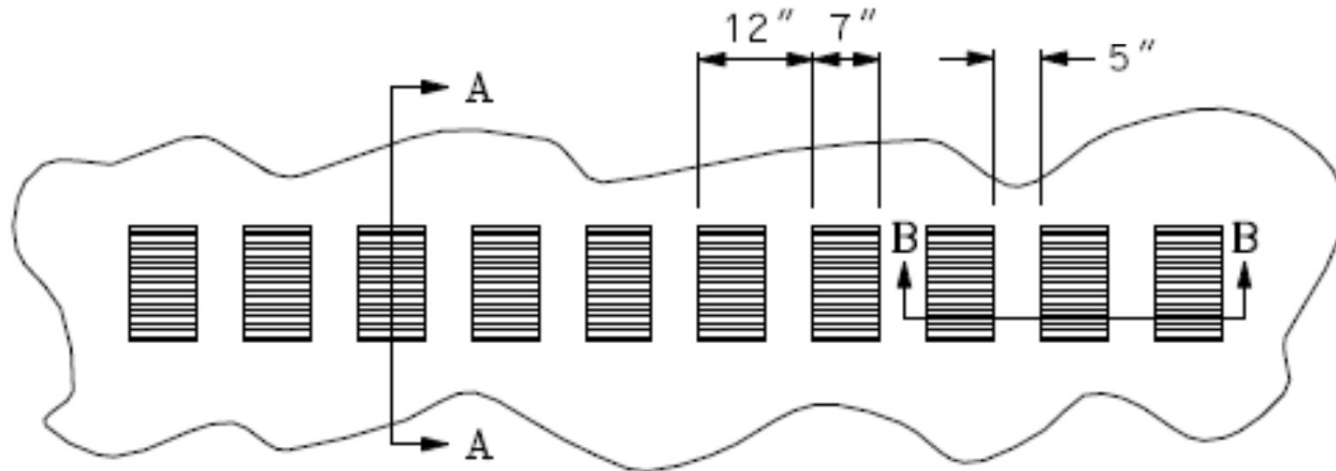
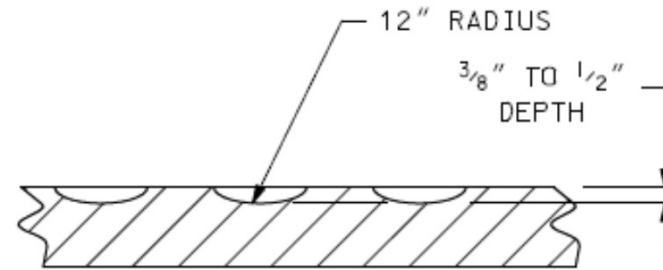
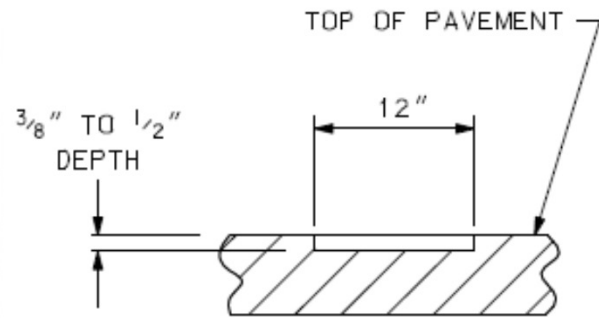
- Edge line Rumble Stripes will begin ON the white lane line and the remainder will be within the shoulder



*TYPICAL SHOULDER
RUMBLE STRIPE
INSTALLATION DETAIL*

Design Details

- Shoulders



PLAN

Design Details

- Shoulders



Benefits to Rumble “Stripes”

- Improved nighttime visibility
- Increased reflectivity under wet road conditions
- Increased longevity of the pavement markings
- Incremental weather navigational aid





Design Details

- Transverse



WHAT IT SAYS

RIGHT LANE
CLOSED
AHEAD

WHAT PEOPLE READ

RIGHT LANE
"MIGHT" BE CLOSED
AHEAD. SO JUST STAY
IN YOUR LANE AND MERGE AT
THE LAST SECOND
IF YOU HAVE
TO.

Reinvented by TrueStory for iFunny :)

ifunny.mobi

Approximate Costs

- Centerline @ \$2,000/mile
- Shoulder @ \$1,300/mile



Personal Note

My nephew was involved in a head-on collision with another vehicle in 2013. He and all other parties survived...



In my professional opinion, I believe rumble strips could have prevented this

Thank You

Rumble Strip Installation Guidelines

www.nh.gov/dot/org/projectdevelopment/highwaydesign/documents/2013_11_01_milled_rumble_strips.pdf

Rumble Strip Standards

www.nh.gov/dot/org/projectdevelopment/highwaydesign/standardplans/index.htm