February 5, 2008

NEW HAMPSHIRE DOT
RUMBLE STRIP INSTALLATION GUIDELINES

The following are guidelines established for the use of milled rumble strips along New Hampshire roadways. 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. Milled shoulder rumble strips (SRS) and milled centerline rumble strips (CRS) provide low-cost safety solutions that alert 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 is that they alert pedestrians and bicyclists of possible danger from errant vehicles that leave the travel way and enter the shoulder area. Because of their proven benefits (NCHRP Synthesis Report #191 & #339), a project specific cost to benefit analysis will not be required.

General Design Guidelines for the Installation of Milled Rumble Strips on New Hampshire Highways

Milled Shoulder Rumble Strips (SRS) will be installed on all Interstate Highways, and similarly Limited Access divided highways to reduce the number of run off the road accidents due to driver inattention. Specific guidelines and details are included in this section.

- Other highways that may be considered for SRS installation:
  - Highway segments with a speed limit of 50 MPH or greater with Limited or Controlled Access
  - Highway segments with a minimum of 8' wide shoulders
  - Highway segments with an accident history of run off the road accidents that would warrant SRS consideration (Based on NH statewide average).
  - Highways with ADT greater than 1500 vpd
  - Any highways not meeting all of the above conditions will require an engineering analysis and Chief Engineer Approval.

Milled Centerline Rumble Strips (CRS) will not be standard practice on any Highway. CRS installation will only be considered on an individual project-by-project basis to reduce the number of crossing the centerline road accidents due to driver inattention. Specific guidelines and details are included in this section.

- As a minimum the following conditions will apply:
  - Highway segment has a speed limit of 50 MPH or greater with Limited or Controlled Access.
  - Highway segment should have a minimum of 4' wide shoulders
  - Highway segment has an accident history (crossing the centerline), greater than the NH statewide 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
  - A public informational meeting will be held and concurrence from the local officials should be obtained.
  - Any highways that do not meet all of the above conditions will require an engineering analysis and Chief Engineer Approval.

Specific Design Guidelines for the Installation of Milled Rumble Strips on New Hampshire Highways

Installation procedures for Milled Shoulder Rumble Strips (SRS) on Interstate and similarly Limited Access divided highways:

Right Side Shoulders

- Depth shall be 1/2 inch
- Width shall be 16"
- Location shall be 30" from the outside of the edge line
- SRS shall not be installed on bridge decks.
- Terminate SRS 30' before at grade bridges and begin them 30' after. (This eliminates conflicts with at grade approach slabs.)
- Install SRS on fill over bridge structures

Ramp starting and stopping locations

Off ramps: Terminate SRS when the shoulder either gets narrower than 6' or at the beginning of the concrete nose

Mainline: Begin at concrete nose for off ramp
Terminate at end of concrete nose for on ramp

On ramps: Begin at end of the concrete nose as long as the shoulder is wider than 6' throughout the length of the acceleration lane

NOTE: At cloverleaf interchanges that have high volume and the acceleration lane is also the deceleration lane, consideration should be given to start the SRS 500' to 1000' beyond the off ramp nose

Note: If the ramp continues as a multi-lane roadway beyond the nose, consideration should be given during the design phase to extend SRS beyond the nose.

Left Side Shoulders (Median side)

- Depth shall be 1/2 inch
- Width shall be 16"
- Location shall be 6" from the outside of the edge line if shoulder width is 6' and less
- Location shall be 30" from the outside of the edge line if the shoulder width is greater than 6'

Median Crossovers (Starting and Stopping locations)

- When SRS are 30" off the edge line (shoulders greater than 6') terminate SRS 50' before and begin SRS 50' after.
- When the SRS are 6" off the edge line (shoulders 6' & less) terminate SRS 130' before and begin SRS 50' after.

Installation procedures for Milled Shoulder and Centerline Rumble Strips on NHS and other undivided 2-lane or 4-lane roadways:

Shoulder Rumble Strips (SRS)

- Depth shall be 3/8 inch
- Width shall be 12"
- Location shall be 12" from the outside of edge line

Intersections, drives and climbing lanes – starting and stopping locations

- If the highway has on and off ramps, terminate SRS at the edge line taper point

- Where right turn lanes exist – terminate at the beginning of the edge line taper of the turn lane
- Where no right turn lane exists - terminate SRS 300' before pavement radius of the side road
- Where no left turn lane exists (but many vehicles make this movement), terminate SRS 300' before the pavement radius of the side road.
- Begin SRS 150' after the radius of the side road
- At major commercial drives, use the guidelines noted above
- SRS will run by single resident & field driveways
- For truck climbing lanes, terminate SRS at the beginning of the edge line taper, unless the shoulder maintains a minimum width of 8'. Begin SRS when the edge line tapers back to normal and the shoulder has a minimum width of 8'.
- SRS will not be placed on segments of roadway that have more than 5 side roads and/or major commercial drives in a one-mile segment.

Note: Design should also take into consideration whether they should be installed in residential areas at all.

Signing

- Signing specifically related to the presence of SRS shall be included in all projects requiring the installation of SRS

Centerline Rumble Strips (CRS)

- Depth shall be 3/8 inch (passing zones included)
- Width shall be 12"
- Location shall be directly under the centerline

Intersections with no turn lanes or painted islands - starting and stopping locations

- Terminate CRS 25' before the end of the double yellow centerline
- Begin CRS 25' after start of the double yellow centerline

Intersections with raised islands - starting and stopping locations

- When approaching an island and at the point where the double yellow lines diverge, the CRS shall continue along the left double yellow line and terminate 25' before the end of the double yellow. If the double yellow becomes a single yellow terminate 25' before that point

Intersections with left turn lanes - starting and stopping locations

- Terminate CRS 25' before the end of the double yellow.
- Begin CRS 25' after the start of the double yellow.

Intersections with Painted Islands - starting and stopping locations

- At the point where the painted island starts (double yellow lines diverge), CRS shall only continue along the left double yellow line and terminate 25' before the end of the double yellow.

Signing

- Signing specifically related to the presence of CRS shall be included in all projects requiring the installation of CRS