



NATIONWIDE

19,514

Average yearly fatalities due to roadway departure crashes between 2015 and 2022.¹



CONNECTICUT

161

Average yearly fatalities due to roadway departure crashes between 2015 and 2022.²



CLRS has been shown to reduce fatal and all injury head-on and opposite direction sideswipe crashes by:⁴



CONTACT US:

CTDOT DIVISION OF TRAFFIC ENGINEERING SAFETY ENGINEERING UNIT PHONE (860) 594-2711 DOT.TRAFFICENGINEERING@CT.GOV

STRATEGY AT-A-GLANCE

Centerline Rumble Strips



U.S. Route 66, Marlborough, CT - Traditional

Each year, roadway departure crashes account for over half of all traffic fatalities.¹ In Connecticut, roadway departure crashes accounted for 1,282/2,384 (54%) of total fatalities from 2015 through 2022.² From 2015 through 2022 the following Connecticut annual averages are noted:

- » 161 fatalities and 544 serious injuries due to roadway departure crashes.
- » 42 fatalities and 174 serious injuries occurred due to head-on and sideswipe multi-vehicle crashes involving vehicles traveling in opposite directions.
- » 7 fatalities and 21 serious injuries occurred when the driver crossed the centerline and struck a fixed object.

Centerline rumble strips (CLRS) are an effective, low-cost strategy for preventing drivers from crossing the centerline into oncoming traffic. CLRS are grooves within the double yellow centerline that produce noise and vibration when a vehicle drives over them. The noise and vibration alert the driver that they have departed from their lane and gives the driver an opportunity to recover. In addition to alerting drivers of lane departures, CLRS helps drivers to navigate during poor weather conditions such as fog, snow, and rain. States across the country are implementing CLRS and 55% of states report using them often.³



Route 187, Bloomfield, CT - Sinusoidal

Benefits

As outlined in the SHSP, Connecticut is working to prevent roadway departures with a goal of reducing the five-year rolling average of fatalities and serious injuries by 15% or more with a goal from roadway departures to less than 665 by 2026. CLRS are an FHWA proven safety countermeasure and one of the strategies that Connecticut is implementing to help meet this goal.

The installation of CLRS has been shown to reduce fatal and all injury head-on and opposite direction sideswipe crashes by 45% in rural areas and 64% in urban areas.⁴ With an increase in CLRS sites in Connecticut and additional years of data available, a more comprehensive CT specific CMF analysis of CLRS effectiveness is under development.

Cost Considerations

CLRS are a relatively low-cost countermeasure with a benefit-cost ratio that can exceed 100 to 1 (i.e., 100 dollars saved for every 1 dollar spent).⁵ The installation of rumble strips ranges from approximately \$0.10 and \$1.20 per linear foot (about \$500 to \$6,000 per mile).⁶

Where should Connecticut municipalities consider applying centerline rumble strips?

1 SPEED LIMIT

The posted speed limit is 35 mph or greater.

2 TRAFFIC VOLUME

The average daily traffic on the road is at least 2,000 vehicles per day.

3 PAVEMENT

The pavement should be in good condition and overlaid within the last three years.

4 ROADWAY WIDTH

The location is to have a minimum of 14 feet of width from the centerline to the edge of pavement for both directions of travel.

5 LENGTH

The length of the proposed centerline rumble strips segment should be at least 1/4 of a mile as per CTDOT's latest recommendation.

6 DENSITY

Low residential density with residences preferably 100 feet or more from edge of road.

7 LOCATION

No installation on railroad crossings, bridges, or intersections, but they should be installed in passing zones.



Route 534, Manchester, CT - Traditional

REDUCING NOISE

Unlike traditional rumble strips, sinusoidal rumble strips feature a low-noise design characterized by a wave-patterned sinusoidal strip profile.

Traditional rumble strips Sinusoidal rumble strips





Montauk Avenue, Stonington, CT - Sinusoidal

Additional Considerations

Since it is difficult to determine where a driver will become distracted or drowsy, it is recommended that CLRS be installed system-wide along corridors. Agencies can use crash history or crash predictors such as traffic volume or trip types to help identify high-priority corridors. Spot installations are not expected to be as effective. While rumble strips have been extensively used in rural areas where head-on crashes are prevalent, they are also effective in urban areas.⁷

CTDOT has adopted the sinusoidal rumble strip specification for all rumble strip installations starting in 2023. Sinusoidal rumble strips, also referred to as mumble strips, are designed to reduce the amount of noise generated by passing traffic.³ Unlike traditional rumble strips, which have cylindrical grooves carved into the pavement with flat sections between the grooves, sinusoidal rumble strips feature a low-noise design characterized by a wave-patterned sinusoidal strip profile.⁸ While traditional rumble strips create noise that may impact nearby residents, the wave pattern ground into the pavement for sinusoidal rumble strips aims to reduce external noise produced when vehicles travel over them. Research indicates that sinusoidal rumble strips are as effective as traditional rumble strips on rural two lane undivided roadways.⁸

Application in Connecticut

CLRS have been actively installed on undivided Connecticut state routes since 2016. As of June 2024, approximately 695 miles of CLRS have been installed on state roads. For municipal roads, approximately 92 miles of CLRS have been installed as part of statewide projects, although the exact amount is unknown because municipalities can install them on their own.

Since 2018, CLRS have been installed in conjunction with the Vendor-In-Place (VIP) paving program and Pavement Preservation (PP) projects. CTDOT's Traffic Safety Engineering unit is responsible for reviewing state road segments for CLRS eligibility when they are being resurfaced and providing CLRS installation locations to the Office of Maintenance (VIP) and Traffic Project Design unit (PP). All proposed CLRS limits are discussed with the municipalities prior to installation. As of May 2024, CLRS can be found in almost 150 out of 169 Connecticut municipalities.

REFERENCES

- 1. Fderal Highway Administration. *Roadway Departure Safety*. <u>https://</u> highways.dot.gov/safety/RwD
- 2. Connecticut Crash Data Repository. https://www.ctcrash.uconn.edu/
- NCHRP. Synthesis 515: Practices for Preventing Roadway Departures. https://nap.nationalacademies.org/read/25165/chapter/1
- NCHRP. Report 641: Guidance for the Design and Application of Shoulder and Centerline Rumble Strips. <u>https://nap.</u> nationalacademies.org/read/14323/chapter/1
- Federal Highway Administration. Decision Support Guide for the Installation of Shoulder and Center Line Rumble Strips on Non-Freeways. <u>https://safety.fhwa.dot.gov/roadway_dept/pavement/</u> rumble_strips/fhwasa16115/fhwasa16115.pdf
- 6. Federal Highway Administration. *Rumble Strips and Rumble Stripes: Frequently Asked Questions*. <u>https://safety.fhwa.dot.gov/roadway_</u> dept/pavement/rumble_strips/faqs.cfm
- Federal Highway Administration. Technical Advisory: Center Line Rumble Strips. <u>https://safety.fhwa.dot.gov/roadway_dept/pavement/</u> rumble_strips/t504040/t504040.pdf
- 8. Minnesota Department of Transportation. *Traffic Engineering, Rumble Strips and Stripes*. <u>https://www.dot.state.mn.us/trafficeng/</u> <u>safety/rumble/index.html</u>