



NATIONWIDE

7,832 Fatalities in 2022 occurring at unsignalized intersections.³



CONNECTICUT

373 Fatalities in 2022 occurring at unsignalized intersections.⁴



Doubled-up signs implemented in rural areas have shown a reduction:



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STRATEGY AT-A-GLANCE

Doubled-up Signs



Cabin Road Approach to Route 16, Colchester, CT

Doubled-up signs are part of a Federal Highway Administration (FHWA) proven safety countermeasure for Systemic Application of Multiple Low-Cost Countermeasures at Unsignalized Stop-Controlled Intersections.¹ Regulatory and warning traffic control signs, such as stop signs and oversized advance intersection warning signs, are recommended to be placed on both sides of the road at uncontrolled and stop controlled approaches. The Manual on Uniform Traffic Control Devices (MUTCD) also allows enhancing sign conspicuity by doubling up signing (adding a second identical sign on the left side of the roadway at the same locations), including for stop signs and pedestrian crossing signs.

Examples of applications are shown in Figures 1 and 2 on the next page. Figure 1 indicates an example of signs at an unsignalized T-intersection. In many cases, retroreflective sheeting on sign posts, properly placed stop bars, and removing sightline obstructions like vegetation are implemented. At T-intersections, double-arrow warning signs are recommended. Figure 2 illustrates an example of doubled-up signs at a pedestrian crossing at an intersection, where fluorescent yellow-green signs and delineator posts are used to enhance visibility and to help improve safety for vulnerable road users.

In 2022, there were 42,514 traffic fatalities in the U.S., with 7,832 fatalities (18%) occurring at unsignalized intersections.³ In Connecticut, there were a total of 373 fatalities in 2022 with approximately 37 fatalities (10%) occurring at unsignalized intersections.⁴ Unsignalized intersections are at-grade crossings of two or more public roads where the right-of-way is controlled by a yield or stop sign, or in some cases, no signs at all, making them uncontrolled.⁵





Figure 2: Doubled-up Signs at a Pedestrian Crossing at an Intersection.

Benefits

As outlined in the Strategic Highway Safety Plan (SHSP), Connecticut is working to mitigate all intersection-related and pedestrian-related fatal and serious injury crashes. Doubled-up stop signs at unsignalized intersections and crossing warning signs at uncontrolled intersection and midblock crosswalks is one of the strategies being implemented and can offer several benefits, including:

- Enhanced Safety: Doubled-up signs at stopcontrolled intersections have shown a 10% reduction in fatal and injury crashes across various locations and types.⁴
- Increased Visibility: Placing signs on both sides of the road, along with increased retroreflectivity and larger signs, makes them more noticeable to drivers during both daytime and nighttime periods, reducing the likelihood of them being overlooked.⁶
- Improved Driver Response: With signs on both sides of the road, drivers have more opportunities to notice and respond, which can be particularly beneficial in high-speed or hightraffic areas.⁴
- Redundancy: In a situation where one sign is damaged or obscured, the other sign can still convey the necessary information to drivers, maintaining the effectiveness of the signage.

Cost Considerations

Doubled-up signs are a relatively low-cost safety measure compared to other infrastructure changes and safety enhancements.⁵ Installation and maintenance of the signs are the main cost considerations, with installation in a recent CTDOT project costing approximately \$11,500 per intersection. Should municipalities choose to install the signs themselves, the installation cost would be based on the cost of sign sheeting. Using the 2024 CTDOT Cost Estimating Guidelines⁷, the unit price range for Type IX retroreflective sign face sheet aluminum is \$50-\$100/ square foot.

The average benefit-cost (b/c) ratio for these improvements at stop-controlled intersections is **12:1 (\$12 saved for every \$1 spent)**, assuming a conservative 3-year service life.¹⁰ Using Type XI sheeting, which typically has a longer service life, the benefit-cost ratio would be anticipated to be even higher.

Higher level sheeting types, such as Type XI used for warning signs and many regulatory signs in Connecticut, have slightly higher installation costs (22% higher based on CTDOT's August 2024 Master Bid Item Lists weighted unit prices⁸) but will provide a brighter sign and in general have a longer service life, allowing for an overall cost savings.⁹ Service life is based on a number of factors including type of sheeting, geographic location, color, and direction the sign faces¹¹, and agencies must use an assessment or management method to maintain sign retroreflectivity at or above minimum levels as noted in the MUTCD 11th Edition Section 2A.22.¹² Some states have leveraged connections between their SHSP, Intersection Safety Implementation Plans (ISIP), and Highway Safety Improvement Program (HSIP) to make projects eligible for HSIP funds. While available, HSIP resources may not be sufficient to fund all improvements; states and municipalities can supplement funds with other federal, state, or local resources.¹³



Cabin Road Approach to Route 16, Colchester, CT

Where should Connecticut municipalities consider implementing doubled-up signs?

- High-crash locations, especially intersections with a history of frequent intersection-related crashes. The Connecticut Crash Data Repository¹⁰ can be used to access Connecticut crash data and more advanced network analyses can be performed using the Connecticut Roadway Safety Management System.¹⁴
- Intersections with geometric constraints, including limited sightlines to stop approaches or side streets, especially where additional attention is needed for unexpected conditions. Locations where a single sign might be obstructed by vehicles, vegetation, or other obstacles should also be considered.
- **3 Complex intersections with multiple approaches,** which can include slightly offset minor approaches.
- **4** Pedestrian and school crossing warning signs at uncontrolled intersection and midblock marked crosswalks.

Several states, including Missouri, Louisiana, South Carolina, and Ohio, have successfully implemented countermeasures related to signage, pavement markings, and visibility improvements. Louisiana DOT evaluated the effectiveness of these treatments at 89 intersections and saw a reduction of fatal and injury crashes by **56% and 64%**, respectively, at rural three-legged and four-legged intersections.⁶ Engaging the community and considering equity impacts are important for gaining public trust and ensuring that the benefits of doubled-up signs are distributed fairly across different areas and populations. Public education and outreach would also assist in reducing confusion around travel direction for lanes or roadways with signs on opposite sides of the road due to doubled-up signage implementation.

Application in Connecticut

CTDOT is implementing a systemic approach to enhance safety at high-risk, single lane, unsignalized intersections by doubling up regulatory and warning signs with the goal of reducing the potential for future crashes at these intersections. The projects include doubled-up stop ahead symbol signs, stop signs, as well as advance intersection warning signs on both sides of the roadway at each approach of the uncontrolled roadway.¹⁵ Project designs at state road intersections were completed in the spring of 2023 and construction was completed in early 2024. For municipally owned intersections, design is ongoing, and installation is anticipated to be completed by the end of 2025. These projects include public outreach during the design phase. CTDOT is also replacing existing pedestrian and school crossing signs at uncontrolled intersection approaches and midblock crosswalks and includes doubling up of the crossing signs. There are a total of 223 crosswalk locations in District 1, where design has been completed and construction will begin in the Spring of 2025. There are approximately 244, 194, and 229 crosswalk locations proposed in projects in Districts 2, 3, and 4 respectively, which are expected to be installed over the next couple of years.



Before/After: East Road approach at Route 69 (Wolcott Road) in Bristol, CT (Source: Google Maps)





Before/After: South Eagleville Rd at Westwood Rd, Mansfield (*Source: Google Maps*)

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