



# Left-Turn Calming Saves Lives

Addressing a Chronic Hot Spot for  
Pedestrian Death and Injury

WHITE PAPER  
UPDATED DECEMBER 2024



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## Executive Summary

The numbers are alarming: early estimates from National Highway Traffic Safety Administration report an approximate 10.5% increase in traffic fatalities between 2020-2021. A pedestrian was killed every 71 minutes in traffic crashes in 2021.

Across the board in nearly every state, the number of traffic fatalities per vehicle miles traveled is at its highest point since 2007.


How are fatalities going up when cars are getting safer? There is no simple answer, but there is a solution that's helping municipalities reduce their numbers of deaths and serious injuries.

## VISION ZERO NETWORK

This white paper discusses the Safe System Approach outlined by Vision Zero Network, a nonprofit that supports communities in advancing the goal of Vision Zero: zero roadway deaths or severe injuries among all road users. It focuses on redesigning roadways and managing speeds for safer mobility for everyone, whether walking, biking or driving and the specific problem of intersection fatalities caused by left turns.

It also explores the lessons learned from Vision Zero's pilot program in the U.S., the New York City Department of Transportation. The paper touches on efforts being undertaken by other cities, and the specific remedy that checks all the boxes for improving pedestrian safety.

## BY THE NUMBERS



**†**  
**43,000**  
Motor Vehicle  
Crash Deaths

The highest number of fatalities since 2005 and the largest annual percentage increase in the reporting system's history



**45% ↑**  
2010-2019

People struck and killed by drivers nationwide while walking

An icon showing a blue silhouette of a person walking on a crosswalk.

**10.5% ↑**  
2010-2019

Increase in traffic fatalities

### PEDESTRIAN DEATHS ARE INCREASING

Nearly 43,000 people died in motor vehicle traffic crashes in 2021—the highest number of fatalities since 2005 and the largest annual percentage increase in the reporting system's history.

Vehicle-pedestrian crashes are also increasing: The number of people struck and killed by drivers nationwide while walking increased by 45% between 2010-2019 and another 13% between 2020 and 2021.

### LEFT HAND TURNS

Of the total traffic crashes each year, 36% occur in intersections according to the National Highway Traffic Administration. Of those crashes, left-hand turns account for more than twice as many pedestrian and bicycle fatalities as right-hand turns and over three times as many serious injuries.

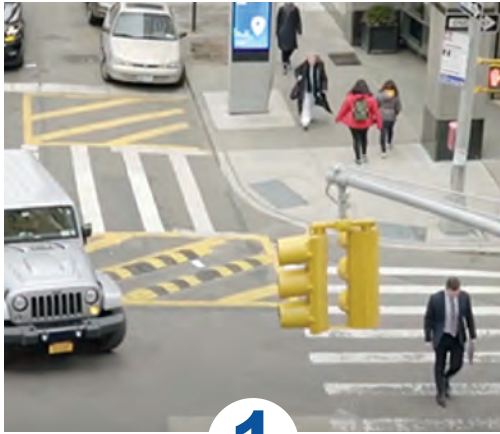
Nationwide, one-quarter of pedestrian deaths are caused by left-turners.



**36%**  
Left Hand Turn  
Crashes

Occur at intersections each year

## 3 LEFT HAND TURN TRUTHS



1

Left turns are taken at a wider radius, leading to higher speeds, cutting corners too closely and greater pedestrian and cyclist exposure.



2

The driver's visibility is partially obscured by the vehicle's A-pillar and/or parked cars.



3

Left turns are more complicated than right turns and require more mental and physical effort. Drivers may have a short time to move as the light changes from yellow to red, cars behind them may be honking, etc.

## A NEW APPROACH

### BARCO PRODUCTS & VISION ZERO

Barco Products (formerly TreeTop Products) is honored to be an official sponsor of Vision Zero Network. As the manufacturer of the speed bump solution chosen by the NYC DOT, Barco Products is actively contributing to Vision Zero's goal of zero traffic fatalities. (See pages 14 & 15 for details about our products' success.)

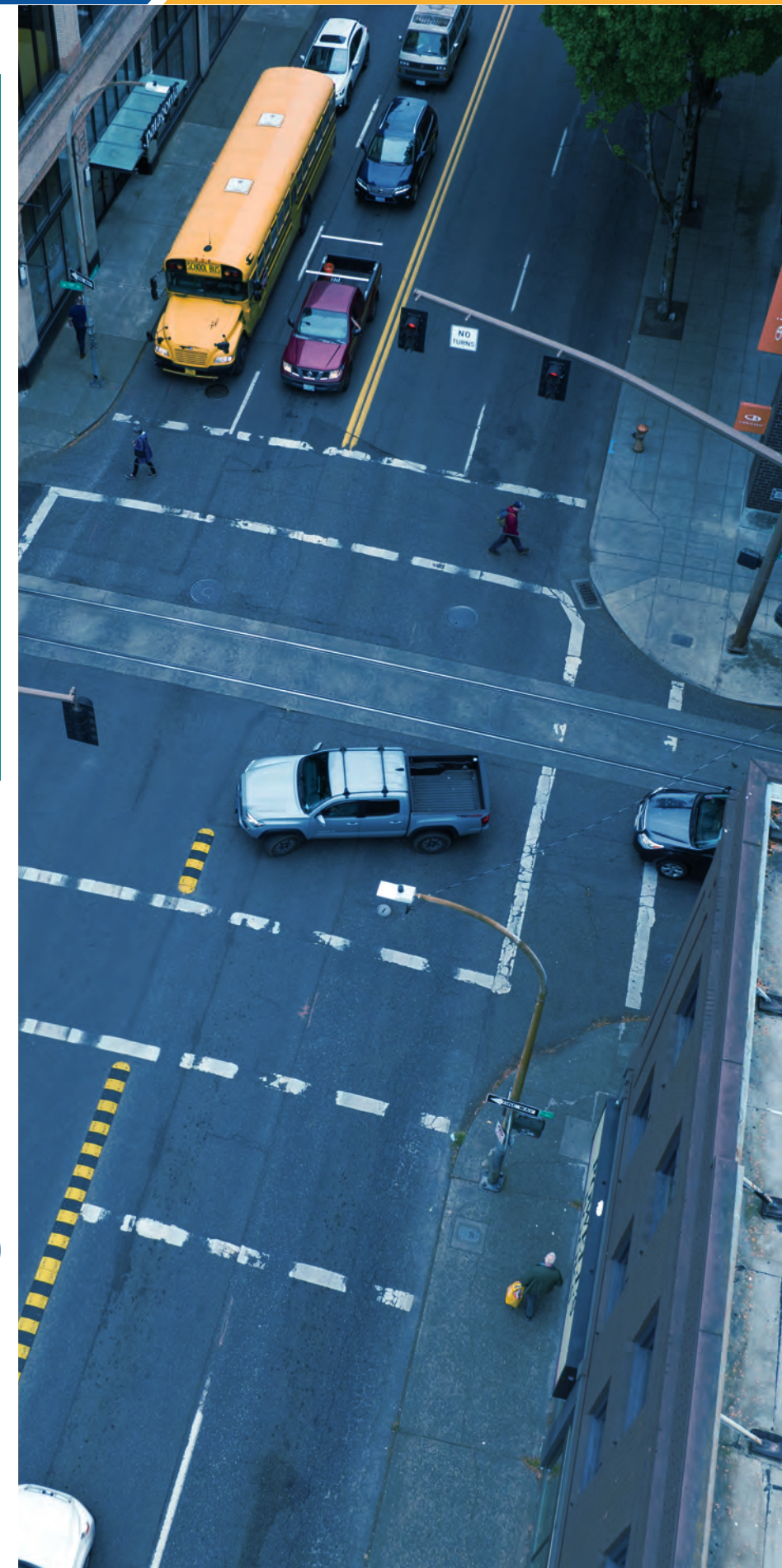
*This sponsorship agreement does not entail or imply an endorsement from the Vision Zero Network of any Barco products.*

To obtain more information about Vision Zero Network visit <http://visionzeronetwork.org>

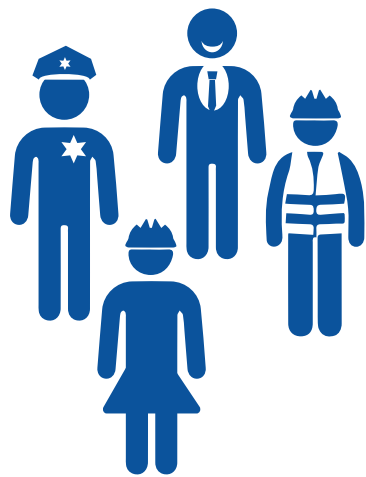


On behalf of communities across the country who are investing in safe mobility, we thank you for supporting the ambitious—and achievable—goal of Vision Zero. Your support of our nonprofit work at a critical time boosts safety for communities across the nation. I look forward to collaborating with Barco Products toward a safer future.

Leah Shahum  
Founder and Executive Director  
Vision Zero



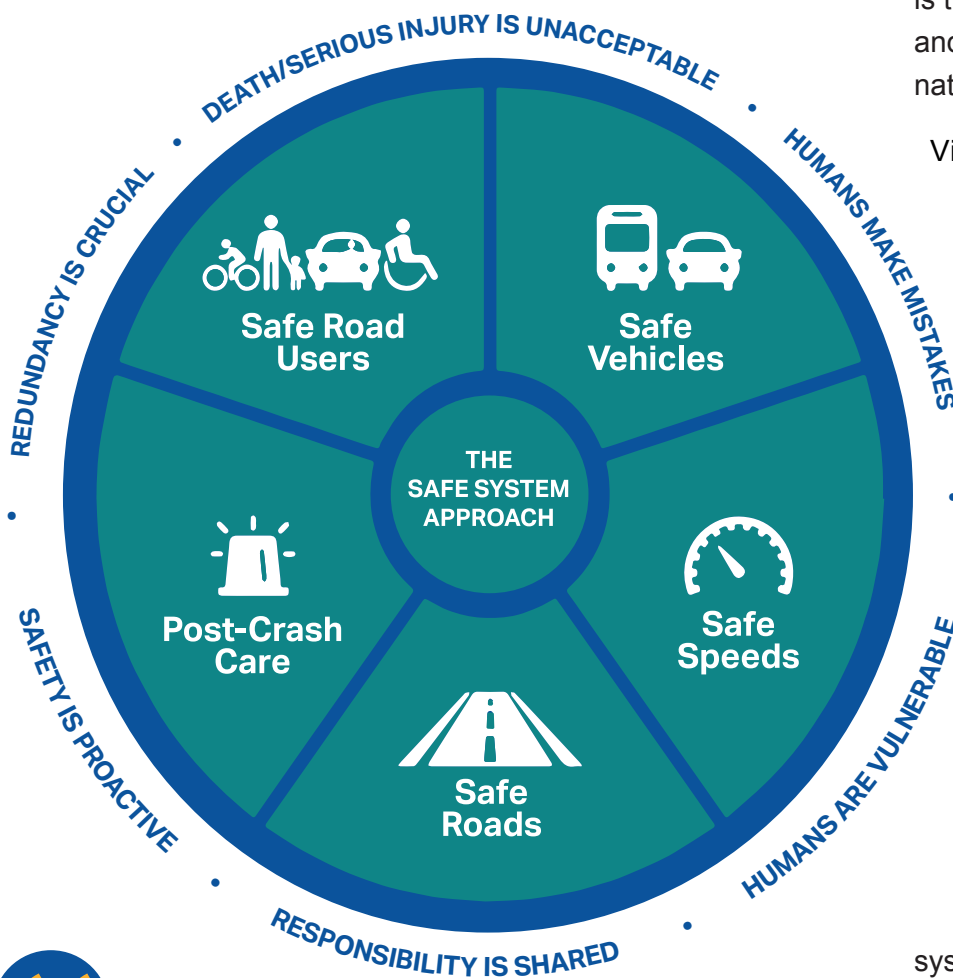
## WHO'S RESPONSIBLE?



Traffic safety traditionally falls under the purview of local Departments of Transportation (DOT). These officials have traditionally responded reactively—instituting calming remedies only after tragedies occur; and even then, acting without full knowledge of the best remedy to install. Most notably, they have acted alone, without enlisting the assistance of other public officials, engineers, or lawmakers.

One thing is clear—not taking action will result in continued loss of life, public pressure to take action, and the possibility of lawsuits.

# VISION ZERO NETWORK



Started in Sweden in the 1990s and used successfully across Europe, Vision Zero is the goal of eliminating all traffic fatalities and severe injuries - reaching zero fatalities nationally.

Vision Zero is built upon what's known as the Safe System approach.

## SAFE SYSTEM APPROACH

The Safe System approach recognizes that humans will make errors, but that crashes causing severe injuries or deaths are not inevitable. If the errors can be anticipated and mitigated, then fatalities and serious injuries can be avoided.

The Safe System approach is above all, holistic, shifting responsibility from the people using the roads to the people designing them. Everyone involved in the transport system – from engineers and planners to lawmakers and police officers – shares responsibility with road users for designing a road system that does not allow human error to have a serious or fatal outcome.

For more information on Vision Zero Network and the Safe System Approach, visit <https://visionzeronetwork.org/vision-zero-201/>

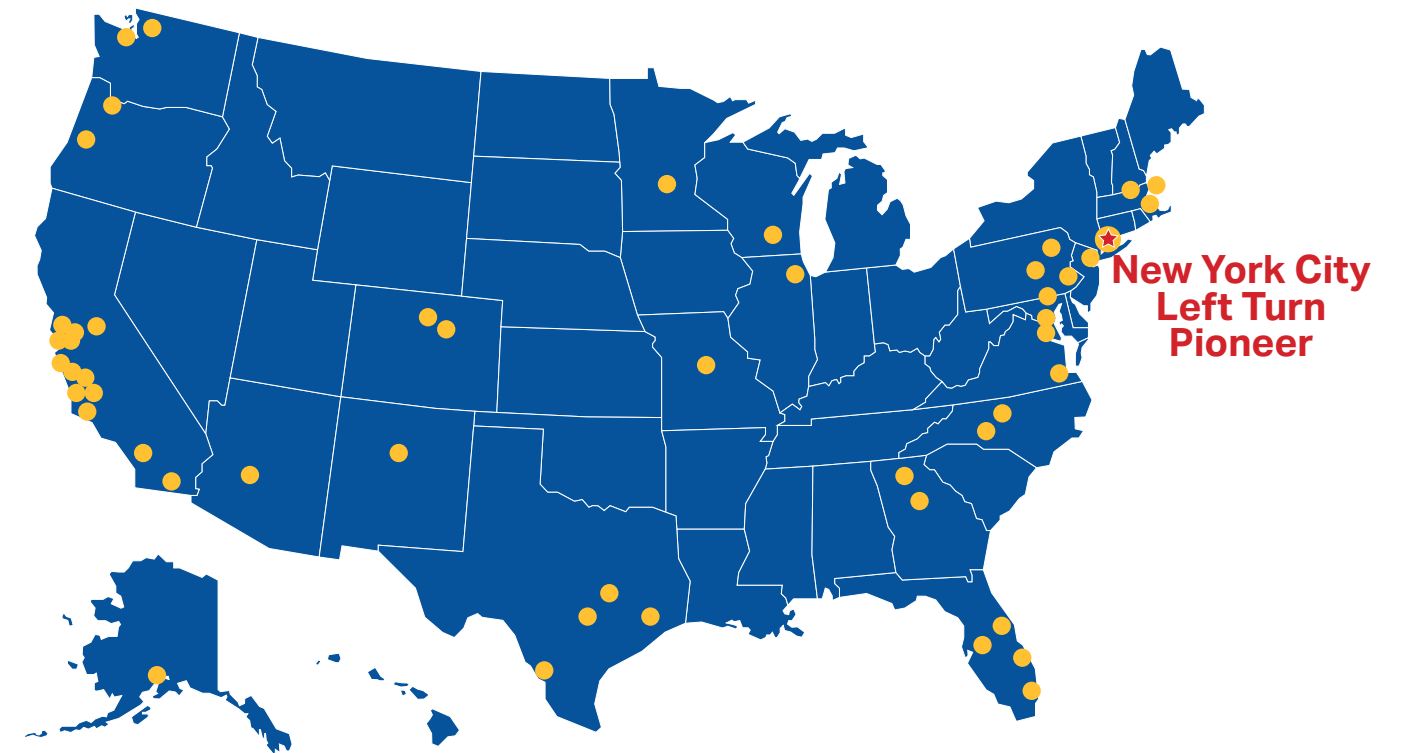
The Safe System approach has been adopted by the U.S. Department of Transportation and serves as the foundation for the new National Roadway Safety Strategy (NRSS), part of the Bipartisan Infrastructure Law. The NRSS is the first step in working toward an ambitious long-term goal of reaching zero roadway fatalities.

There are other organizations that are working at the national level to affect change and have also adopted the Vision Zero Safe System approach. Look for these organizations for policy, grant information and upcoming meetings: NACTO (National Association of City Transportation Officials), AASHTO (American Association of State Highway and Transportation Officials), ATSSA (American Traffic Safety Services Association).

DOT's and government agencies across the country have recognized left turn safety as a critical piece in their Safe System Approach and are addressing it within their Vision Zero strategy.

## AT THE LOCAL LEVEL

Today, more than 45 U.S. communities have committed to Vision Zero. While each city has its own unique problems, there is much to be gained from studying the lessons learned from cities that have already gone through the process; in particular, the first Vision Zero location—New York City.



● A Vision Zero Network Community



Vision Zero rejects the idea that deaths and severe injuries are an unavoidable consequence of modern life, and instead has proven that traffic deaths and severe injuries are preventable.



Leah Shahum  
Founder and Executive Director  
Vision Zero Network







**NEW YORK CITY: THE LEFT TURN CALMING PIONEER**

*In New York City, before the city committed to Vision Zero, left turns accounted for more than three times as many serious injuries and fatalities as right turns.*

In 2014, Mayor Bill DeBlasio was looking for answers to the urgent crises of preventable roadway deaths and injuries, especially amongst people walking and biking, and including a high number of serious left-turn crashes in particular. That year, NYC became the first U.S. city to commit to the goal of Vision Zero, with strong political and community support. Since then, the movement has grown nationwide, with more than 45 Vision Zero cities in the U.S. and more committing each week.

As part of its Vision Zero program, the NYC DOT undertook a study to focus its safety improvements on key problem areas. This study, completed in 2016, queried five years of citywide crash data, manually reviewing 1,105 crash reports drawn from the 478 most problematic intersections citywide. City and state DOT crash reports and police reports were compared and compiled to provide the most comprehensive picture to date about the circumstances of each crash (such as vehicle location pre-crash, street width, and directionality).

In addition to uncovering the three truths about left-turns (pg. 6) the study collected this baseline data:

 <p><b>9 vs. 5 Miles Per Hour</b></p> <p>Left-hand turners are going faster (9 mph vs. 5 mph for right turns)</p>	 <p><b>80% Deaths By Car</b></p> <p>Nearly 80% of deaths and serious injuries are caused by a passenger car</p>	 <p><b>67 yrs Seniors at Risk</b></p> <p>Seniors are more at risk: the median age for the victim of a left-turn fatality is 67, whereas all other fatal crash types have a median age of 50</p>	 <p><b>18% NYC Intersections</b></p> <p>All left turn fatalities/serious injuries occurred at 18% of NYC intersections</p>
 <p><b>70% One Way Streets</b></p> <p>70% of crashes involved a one-way street; 80% were at signalized intersections</p>	 <p><b>69% Wider Streets</b></p> <p>Wider streets = more danger. 69% of fatalities and serious injuries were on streets 60 ft. and wider</p>	 <p><b>51% Minor to Major</b></p> <p>51% of left turn accidents occurred when turning from a minor street into a major street</p>	

Based on the results of this study, a 6-month trial period ensued, where the City experimented with various solutions at the identified intersections.



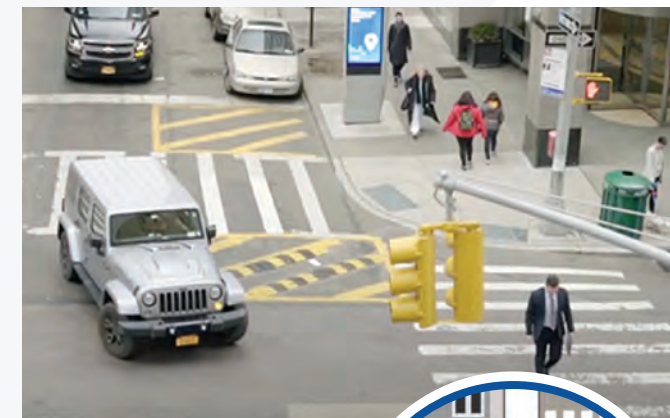
**Basic Hardened Centerline Kit**

*Installed where one-way or two-way road meets a two-way road.*



**Complete Hardened Centerline Kit**

*Installed where a one-way road meets a two-way road.*



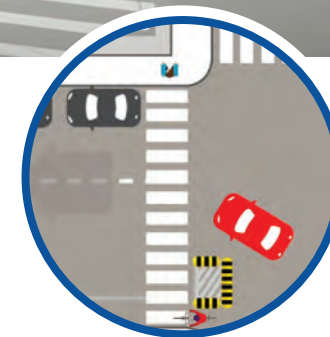
**Left Turn Wedge Kit**

*Installed where a one-way road meets a one-way road. The slow turn wedge, or daylighting treatment may be used for left or right turns.*



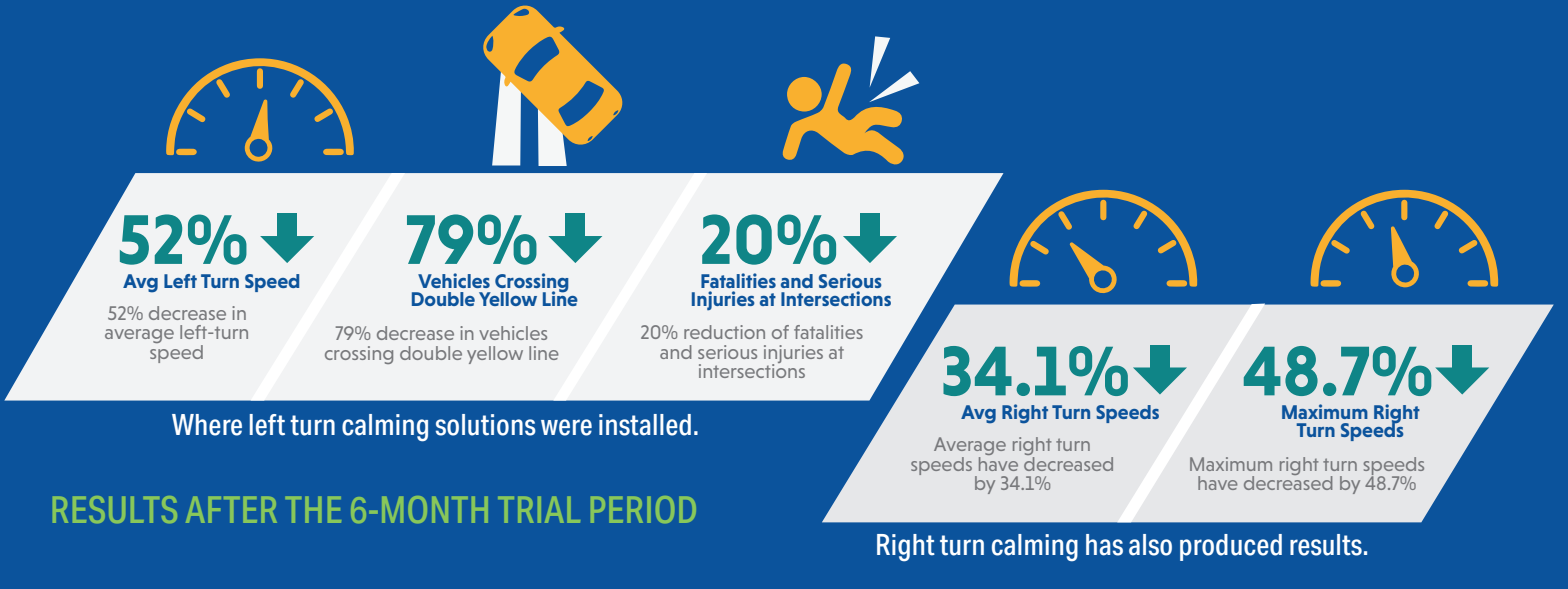
**Bike Channelization Kit**

*Installed where a one-way road meets a one-way with a protected bike lane. This remedy was installed adjacent to existing bike islands.*



## 6 MONTH TRIAL PERIOD RESULTS

In addition to intersection remedies, the city made several large-scale changes such as reducing the speed limit to 25 miles per hour (40 km/h) and changing the timing of traffic lights to give pedestrians a head start over turning cars.



## RATING THE REMEDIES

In May 2018, after the trial period ended, Vision Zero hosted a webinar with Rob Viola, Director of Safety Policy & Research, NYC Department of Transportation, who discussed what worked and what didn't.

The initial plan was to concentrate on the bollard/rubber curb combination (shown right). Viola reported that this remedy did work at slowing vehicles and improving safety, but there were continual problems with the bollards (vertical posts).

After the trial period:

- Only 60% of the bollards remained in good shape
- In 37% of locations, one or more were missing
- Maintenance crews were dispatched numerous times to make repairs

In contrast, the Barco Products' Premium Recycled Rubber speed bump:

- Was much more durable
- Performed as well or better than the bollard posts
- Required little or no maintenance



**Stand-Alone Bollards**

These were bolted to the street and were used in the bike island channelization solution as well as the slow turn wedge.

"We're really excited about the rubber speed bump solution," Viola stated, "It seems to be doing everything that the other materials were doing at a fraction of the maintenance. I would advise people to look in that direction."

Based on the results of the citywide test, New York City chose the Barco Products' Premium Recycled Rubber speed bump as its treatment of choice. To date, they have been installed over 1,000 intersections in all 5 boroughs (and counting), reducing fatalities and serious injuries by more than 50%.

As exciting as this early success was, pedestrian deaths spiked again in 2021, mirroring what happened in the rest of the country. NYC Mayor Eric Adams has promised design improvements to 1,000 more intersections, stating "We clearly need to turbo-charge Vision Zero — and fast."



**Bollards With Rubber Curb**

This combines a semi-flexible post or bollard with rubber curbing. It was part of NYC's original hardened center line solution.



**Rubber Speed Bumps**

A variety of speed bumps types were tested in each of the traffic calming test sites.

"We're really excited about the rubber speed bump solution. It seems to be doing everything that the other materials were doing at a fraction of the maintenance. I would advise people to look in that direction."

Rob Viola  
Director of Safety Policy & Research  
NYC Department of Transportation

# ADVANTAGES OF A RUBBER SPEED BUMP

## The Advantages of the Barco Products Recycled Rubber Speed Bump

Here are the reasons that New York City and a growing list of American cities are mandating the Barco Products' speed bump above all competing products:

### Sturdy Design:

The Barco Products Premium Recycled Rubber speed bump has two rows of hardware, one on each side, where other competitors only have a single row down the middle. Testing performed by New York City and Portland found they stayed in place. The single row products rocked back and forth with traffic and the hardware continually popped out, causing safety concerns.



### 15-year Warranty

Barco Products has an industry-leading warranty against breakage.



### Low Maintenance

They're designed to be run over, so there is nothing to knock down (unlike the bollard posts, which require repairs numerous times a year).



### Durability

During pilot testing there was no observed fraying or chipping unlike competitors' products. And in continued use, they stand up to heavy traffic including emergency vehicles, buses and large trucks.



### Superior Hardware

In addition to using two rows of hardware, Barco Products' hardware is longer and thicker than the competition. We proactively made this quality improvement after receiving feedback from the pilot cities.



### Availability and Versatility

Our ability to manufacture large quantities ensures quick availability nationwide, even for large city-wide orders. We also offer multiple sizes for a variety of locations, as well as black and white bumps for right turn calming applications.



### No Guesswork

Barco Products' bumps include end caps, connecting rods, and all hardware required. Other companies sell individual components, and the buyer needs to confirm everything will match together.



### Price

Not only is the price tag of the Barco speed bumps much lower than combination bump-and-bollard solutions, concrete barriers, traffic signals, or other calming remedies, but being extremely low maintenance and easy to install makes them more cost effective overall. The New York City program reported that maintenance rates for the speed bumps were 80% less than other solutions.

### Slip resistance

Textured nonslip surface is safer for pedestrians and cyclists. In Portland, the Barco bump was tested against a competitor and found to be more slip-resistant to walkers and felt safer overall to cyclists and motorcyclists.



### Non-Fading

Safety yellow color is molded-in on top of black rubber, not painted on, so the color won't fade with wear and UV exposure. Other competitor models faded from yellow to white, or the sheeting peeled off.



### High Visibility

With cat eye reflectors on both sides.



### Flexible Material

Recycled rubber is flexible and conforms naturally to the ground.



## VISION ZERO IN U.S. CITIES



There are currently 45+ cities with an ongoing Vision Zero project. Below are statistics from four states that are currently using the Premium Speed Bump for their left turn calming solutions.

**Portland, OR** - After a trial period at 42 intersections across the city:

- Hardened centerlines using Barco Products' Premium Rubber speed bumps determined to be about equally effective at slowing turning speeds as hardened centerlines with flexible posts
- The Barco Products' Premium Rubber speed bump was found to be considerably safer for foot traffic in wet conditions and safer overall to cyclists



**Washington D.C.** - In intersections with a hardened left turn remedy:

- 70% reduction in near-miss pedestrian crashes (e.g. sudden braking or swerving)
- 67% reduction in the odds of a left-turning vehicle exceeding 15 mph



**San Francisco, CA** - After a one-year pilot study:

- Cars at treated intersections turned 17% slower
- 71% decrease in vehicles turning at speeds over 15 mph



**Chicago, IL** - Reduced crashes by 24% with a trial of 18 intersections

- Drivers yielding to pedestrians up 21%
- Drivers turning within safe zones up 24%
- 24% reduction in traffic crashes on State Street

## HOW TO GET STARTED



If you're a city without many resources, the **Safe Streets and Roads for All** grants (see pg. 9) are a great chance to get started (or to reactivate a previous plan). Historically, left turn calming projects would not have counted towards testing/piloting, but under the rules of this program they do.

When determining your needs, the extensive research conducted by New York City and other cities can help you bypass months or even years of your own testing and evaluation. Cities like Toronto and Washington D.C. went straight to NYC's recommended remedy, the Barco Products' Premium Rubber Speed Bump.

For more details about getting started, read "Where to Start on the Road to Vision Zero." <https://visionzeronetwork.org/where-to-start/>

## FAQS

**Q** *Is this Left Turn Calming treatment temporary or permanent?*

**A** It depends on the need. They can be installed permanently or they can be temporarily installed for a pilot test or short-term initiative.

**Q** *How are the speed bumps installed?*

**A** They use a lag bolt and anchor system. They are very simple to install and do not require a special contractor or heavy equipment. A hammer drill and ratchet set is all that's needed.

**Q** *What if I live in a snowy climate, do I need to remove the bumps in the winter?*

**A** It depends on your preference and budget. If you have a large scale installation it will not be economical to remove the bumps in the winter and reinstall in the spring. However, if you have a small installation and want to remove in the winter you can. If you do remove them, we recommend filling the holes left in the road with silicone to help preserve them through the winter.

**Q** *How do the speed bumps hold up to snowplows and street sweepers?*

**A** Anything that gets installed onto a roadway is bound to be hit and potentially damaged at some point (i.e., signs, posts, concrete curbs, delineators, etc.). Our bumps are extremely durable and resistant to snowplow and street sweeper damage. There may be instances where a bump is dislodged. In these cases, the bump is typically salvageable and can be reinstalled. If not, a new section can be purchased at a very economical price. Additionally, plow blades and sweeper attachments should not be damaged by the bumps, as they are low profile rubber products.

**Q** *Do speed bumps affect water drainage?*

**A** No. The bumps are installed in a pattern that leave gaps and spacing to allow water to flow and drain on the streets as designed. Water can also flow under the bumps as they are not sealed to the road surface.

**Q** *Do I need to re-route power or sewer lines to install?*

**A** No, all speed bumps are surface-mounted and will not affect anything previously installed underground.

**Q** *Do I need different lengths of speed bumps for different intersection orientations?*

**A** Yes, our speed bumps are sold as a modular system. Choose the number of sections and end caps you need to create the best configuration for your intersection (end caps are required for the warranty). Barco Products can help you decide what's best for your particular needs.

**Q** *How much can I expect to pay?*

**A** This is a very low cost/big impact product. A standard 6' bump will cost approximately \$170\*. Compared to expensive bollard systems that need constant replacement, this system is much more economical.

\* Visit [BarcoProducts.com](https://BarcoProducts.com) for current pricing.

## The Bottom Line

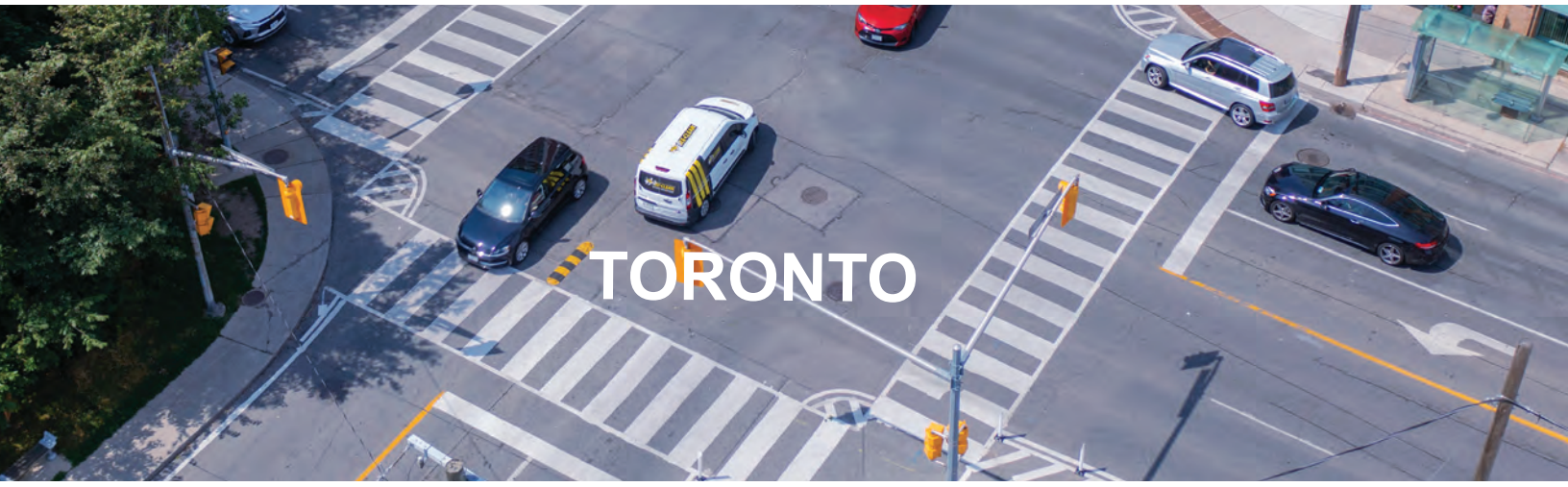
The results are in. In New York and elsewhere, Barco Products' Premium Recycled Rubber Speed Bumps are saving lives. The question of how to improve street safety is complex. But one solution is simple. Barco Products Premium Speed Bumps are proven to save lives. And, at a cost that's a fraction of more elaborate remedies.



PORTLAND



NEW YORK



TORONTO



SAN FRANCISCO

## WORKING WITH BARCO PRODUCTS



Barco Products is a Proud Sponsor of Vision Zero Network: Working Toward a Safer Future!

We have a dedicated Traffic Safety Specialist to discuss your needs, provide personalized recommendations, quotes, shipping logistics and other traffic safety product recommendations.

### COMPLETE KITS

To simplify the selection process, or to quickly test the Left Turn Calming solution on your own, we offer complete kits of speed bumps and accessories tailored to the solution you're looking for:

- Basic Hardened Centerline Kit
- Complete Hardened Centerline Kit
- Left Turn Calming Wedge Kit
- Bike Channelization Left Turn Calming Kit
- Right Turn Calming Wedge Kit

In addition, we offer a full suite of traffic safety products designed for any application including bike lane safety, radar speed detection signs, solar flashing signs, speed humps, wheel stops, barriers, and more.

Visit [BarcoProducts.com](https://BarcoProducts.com) or call our contact:

Amy Jendruczek | Traffic Safety Specialist

phone | 866-251-4523

email | [keyaccounts@barcoproducts.com](mailto:keyaccounts@barcoproducts.com)

#### Sources:

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