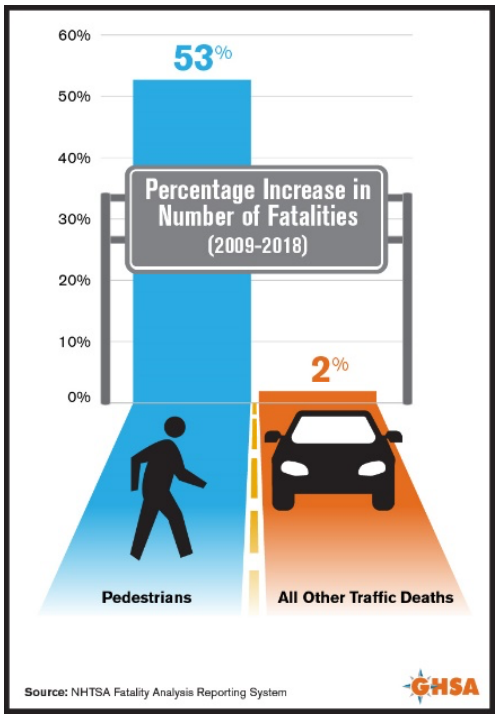
# Toward a Comprehensive Pedestrian Safety Strategy in CT

CTDOT, 2020-11-23

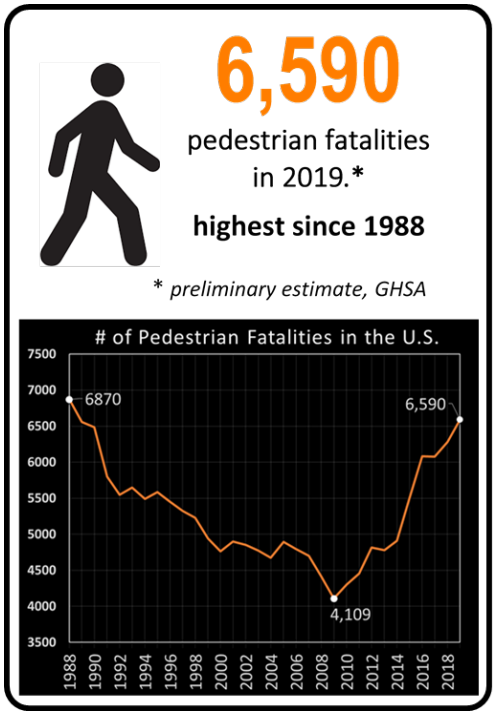
After a decade of steady progress developing strong pedestrian policies and building a more pedestrian-friendly transportation infrastructure, CTDOT is shifting its focus to put ***more emphasis on pedestrian safety***. The shift is a response to the rising risks posed to pedestrians from traffic crashes.

At the national level, pedestrian fatalities are increasing faster than any other type of traffic fatality. Since 2009 the number of pedestrian deaths increased by 53%, while all other traffic fatalities increased only 2%. Total pedestrian deaths nationwide increased from a low of 4,109 in 2009 to 6,590 in 2019.[1] [2]




This 53% increase in pedestrian deaths is a dramatic reversal of the previous historic downward trend in pedestrian deaths. Prior to 2009, the United States recorded over 3 decades of decreasing pedestrian fatalities. While all the factors contributing to this reversal are not fully understood, some of the more significant factors are:

- **More Pedestrians.** Increased numbers of people are choosing to walk for reasons of health, supporting a cleaner environment, or save money.
- **More Traffic.** An increasing volume of traffic on roads increases the potential for pedestrian collisions.
    - Larger Vehicles. An increased % of vehicles on the roads are large SUVs and pick-up trucks that can inflict more serious injuries to pedestrians.
- **More Distraction.** There are more distractions as more people use smart phones.
- **More Drugs & Alcohol.** There is an increased incidence of impaired driving and walking.




[1] Connecticut's trend in pedestrian fatalities is very similar to the national trend. For the CT data and explanation see Appendix A.

[2] Pedestrian Traffic Fatalities by State: 2019 Preliminary Data, https://www.ghsa.org/resources/Pedestrians20, Final 2019 data was not yet available as of Nov. 2020.

## Major Elements of the Pedestrian Safety Strategy

CTDOT routinely includes safety features in all its pedestrian construction projects and programs. Additionally, it includes pedestrian safety features in other roadway projects when a need is identified. The new safety focus will continue building pedestrian safety into the design of all projects, but it will also examine how CTDOT should integrate pedestrian safety into the way it operates and manages its roadways. These operational issues include managing traffic speeds for pedestrian safety by setting appropriate speed limits and building more traffic calming[3] features into roadways with high concentrations of pedestrians.

The enhanced safety strategy CTDOT is developing is built around the four major elements below. Each is discussed in more detail in the following pages.

1. Managing Speed for Pedestrian Safety
2. Managing Crosswalks, Intersections, and Streets for Pedestrian Safety
3. Public Awareness, Education, and Training for Pedestrian Safety
4. Integrating Pedestrian Safety into the Broader Roadway Safety Program

### 1. MANAGING SPEED FOR PEDESTRIAN SAFETY

Managing speed is essential to any program for reducing the number of pedestrian fatalities and serious injuries. The reason is that pedestrians are especially vulnerable to injury in any collision with a motor vehicle.

#### *Why Pedestrians Are So Vulnerable to Speed*

Speed contributes to vulnerability in two ways: (1) As vehicle speed increases, the risk or likelihood that a vehicle-pedestrian collision will occur also increases, and (2) As speed increases, the risk of a pedestrian receiving a serious (incapacitating) or fatal injury increases significantly.

In contrast, the risk of serious injury or death to the driver or vehicle occupant is much less since motor vehicles are designed with multiple safety features like seat belts and air bags that offer protection to drivers and passengers. Pedestrians are afforded no such protection. They are directly subjected to the impact of a force from a much heavier object traveling at a much higher rate of speed. Simple physics dictate that an unprotected

[3] Traffic calming consists of physical design and other measures put in place on existing roads to reduce vehicle speeds and improve safety for pedestrians and cyclists. See USDOT website discussion on Traffic Calming to Slow Vehicle Speeds (https://www.transportation.gov/mission/health/Traffic-Calming-to-Slow-Vehicle-Speeds).

pedestrian is very likely to be injured, potentially seriously. The severity of the injury is largely determined by the speed of the vehicle at the time of impact.[4]

Studies have shown that the risk of serious and/or fatal injuries increases dramatically as speed increases. As illustrated below, the risk of a fatal injury to the pedestrian is 1-in-10 (10%) at 20 mph, but increases to 5-in-10 (50%) at 30 mph, and to 9-in-10 (90%) at 40 mph.[5]

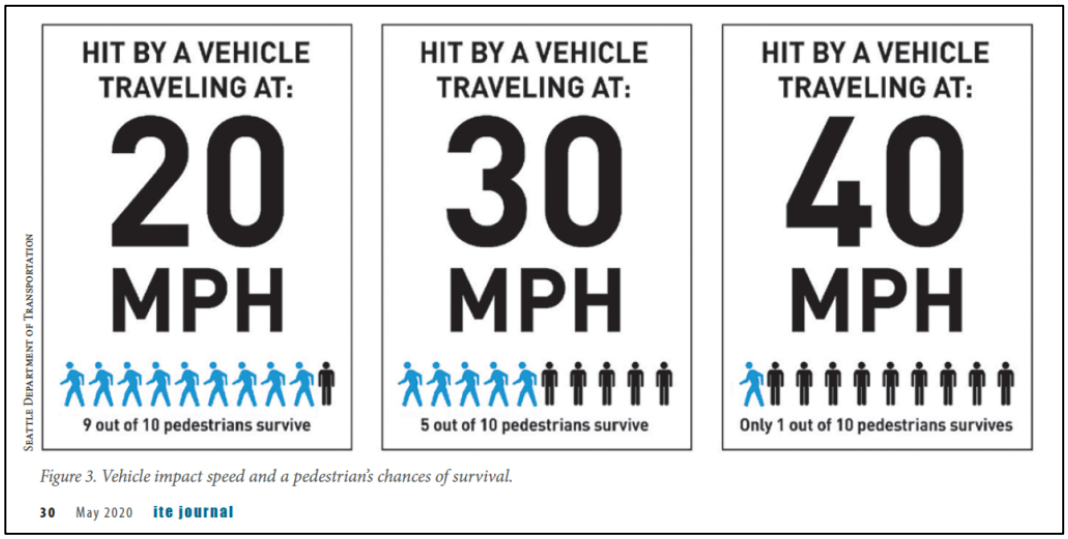



*Figure 3. Vehicle impact speed and a pedestrian's chances of survival.*

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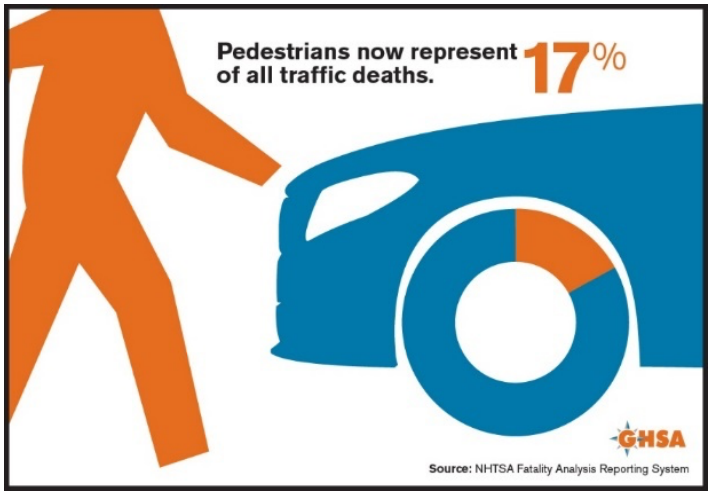
Pedestrian vulnerability is reflected in national traffic crash data in which pedestrians account for **17%** of traffic deaths, despite the fact they are involved in only **1.2%** of crashes.




[4] Vehicle speed is the primary determinant of severity, but it is also affected by vehicle size and type (car or truck), weight of the vehicle, and height of the vehicle's bumper. Other factors include angle of collision, pedestrian's age, height, and weight. (AAA, *'Impact Speed' and a Pedestrian's Risk of Serious Injury or Death*, 2011)

[5] *The Road to Zero: Taking the Safe Systems Approach*, ITE Journal, May 2020, https://www.ite.org/pub/?id=8B6264A1-D5A7-1560-D583-D90F54D8DDB9

## *Managing Speed for Pedestrian Safety*

In response to the disproportionate impact of speed on pedestrians, CTDOT is proposing a program to reduce and better manage traffic speeds in areas with significant pedestrian activity. The program includes:

(a) legislation to allow municipalities to set speed limits on municipally-owned roads
(b) legislation to allow creation of pedestrian safety zones in community centers
(c) before and after studies to test the effectiveness of pedestrian safety zones
(d) a speed management training program
(e) a study to identify opportunities to lower traffic speeds on state routes in community centers

**(a)** Local control of speed limits on municipally-owned roads. CTDOT supports legislation to enable municipalities to set speed limits on municipally-owned roads with speeds as low as 25 mph. Most municipalities have an intimate knowledge of conditions on their own roadways, including the type and volume of traffic, the speed of traffic, the adjacent land uses, the level of pedestrian traffic, and the potential for conflicts between motor vehicles and pedestrians. Enabling municipalities to set their own speed limits will give them the ability to carefully adjust local speed limits to levels suitable for local conditions. A municipality can set a speed limit lower than 25 mph if an engineering study indicates the lower limit is justified.

**(b)** Pedestrian Safety Zones. CTDOT supports legislation to enable municipalities and CTDOT to establish Pedestrian Safety Zones on their respective roadways where speed limits can be set as low as 20 mph. The purpose of a Pedestrian Safety Zone is to help improve the safety of pedestrians and other vulnerable users in downtown districts and community centers where pedestrians must share the road with motor vehicles. In these specially designated zones[6], pedestrian safety can be enhanced through the combination of a low speed limits and other speed management treatments such as traffic calming.


Municipalities will be authorized to establish these zones on municipally-owned roads in community centers provided they:

- Conduct an engineering study in accordance with the MUTCD and other generally accepted engineering guidance. The study must address all relevant factors such as vehicles speeds and volumes, pedestrian volumes, and the risks of collisions between vehicles and pedestrians.

[6]All Pedestrian Safety Zones will be posted with appropriate signs, but the one shown here is only an example of the type of sign that might be used.

- Prepare and implement a speed management plan for the zone that includes incorporating or installing traffic calming measures in addition to the lower speed limit. selected designated defined established

CTDOT can establish Pedestrian Safety Zones in community centers on state-owned roads provided they follow the same procedures as cited above for municipalities.

**(c)** Before and after studies to evaluate effectiveness of Pedestrian Safety Zones. CTDOT will conduct before and after studies to evaluate and document the effectiveness of individual pedestrian safety zones. The studies will be used to assess the effectiveness of the overall program and will identify the comparative effectiveness of different traffic calming measures. The data collected as part of the municipality's engineering study will serve as the data needed to document the 'before' conditions. CTDOT will work with the UConn Transportation Safety Research Center to perform the 'after' study.

**(d)** Speed management plans and training. CTDOT will fund the UConn T2 Center to provide training to municipalities in local speed management and the preparation of speed management plans. (For more information on speed management training see *T2 Center's Speed Display/Driver Feedback Sign Program*)

**(e)** Evaluate opportunities to lower traffic speeds on state roadways in community centers**.** CTDOT will study how it can reduce the speed of traffic on state routes that pass through community centers. The study will include a sample of 5-10 community centers served by state roadways. They will be in locations where there is a significant amount of pedestrian activity. In each location, CTDOT will evaluate the option to lower the speed limit to reduce the risk of serious and fatal injuries to pedestrians. CTDOT will also evaluate traffic calming and other speed countermeasures appropriate to state routes and community centers.

The lessons learned from these studies will help identify how the CTDOT can better manage traffic speeds on its roadways to reduce the risk of fatal and serious injuries to pedestrians. These lessons can be applied to the community centers studied, but also more broadly to other communities throughout the state. They may also guide future changes to CTDOT policies and practices relative to pedestrian safety.

## 2. MANAGING CROSSWALKS, INTERSECTIONS, AND STREETS FOR PEDESTRIAN SAFETY

While speed management is essential for pedestrian safety, there are also a variety of roadway design and safety engineering tools that can be effective at making the roadway safer for pedestrians. Of significance in urban areas are the way we design and regulate our streets, intersections, and crosswalks.

In recent years, CTDOT implemented many projects and introduced new safety engineering initiatives that enhance pedestrian safety. These include everything from road diets, to

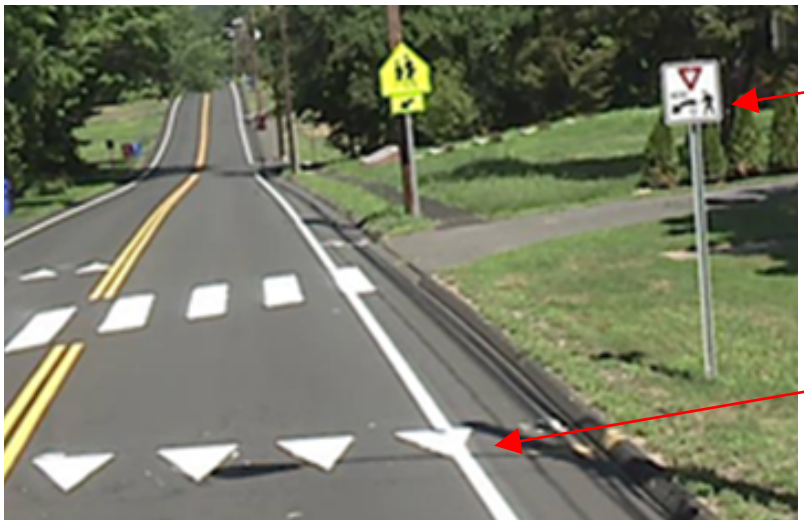
intersection reconstructions, to statewide programs to make crosswalks more visible and safer. The proposed pedestrian safety strategy builds on this foundation with a commitment to expand critical safety programs such as upgrading signalized intersections and changing state laws to enhance the visibility at pedestrian crosswalks. The proposed safety engineering component includes the three elements below.

(a) Improve crosswalks for pedestrian safety
(b) Upgrade signalized intersections
(c) Implement road diets

**(a) Improve crosswalks for pedestrian safety.** Crosswalk safety can be improved by changing state laws to redefine when drivers must yield to pedestrians, and by not allowing cars to be parked where they obstruct a driver's view of pedestrians entering a crosswalk.


- Yield to pedestrians. CT supports proposed legislation that redefines when drivers must yield to pedestrians in marked or unmarked crosswalks. The proposal requires drivers to yield to pedestrians who have stepped into a crosswalk or who are at the curb and wave to signal their intent to step into the crosswalk.
- Increase visibility of pedestrians at crosswalks. CTDOT supports a redrafting of parking restrictions in the vicinity of mid-block crosswalks. The proposal clarifies how far back from a crosswalk that a parked vehicle must be to ensure that a parked car will not block a driver's view of a pedestrian entering a crosswalk.
- Upgrading crosswalks at unsignalized locations and intersections. CTDOT has been modifying and upgrading unsignalized intersections for several years to reduce the risks to pedestrians. This is a statewide effort that will continue to focus on making pedestrian crossings more visible and provide advance warning to drivers.

In one such project, all school crossing signs throughout the state were replaced with new high visibility signs with retro-reflectivity and fluorescent yellow-green color. Additionally, advance warning signs were installed, and pavements were marked for crosswalks and special sawtooth yield lines. The program will continue to address safety at unsignalized crossings through upgrades and innovative solutions such as pairing signs with Rectangular Rapid-Flashing Beacons.




**(b) Upgrading signalized intersections.** Recently, CTDOT started planning and programming upgrades to many of the signalized intersections on state routes. The new designs greatly enhance pedestrian safety. This reflects a major shift in CTDOT policy that now ensures that pedestrian safety is fully addressed in the design process. The projects include the full complement of pedestrian safety and convenience features in the traffic signal design and hardware. They also include all necessary adjustments to the physical layout of the intersection to safely accommodate pedestrians. It represents a major advancement in how pedestrian safety is built into the design of signalized intersections.

CTDOT GREEN LIGHT
CONNECTICUT TRAFFIC SIGNAL PROGRAM INITIATIVE

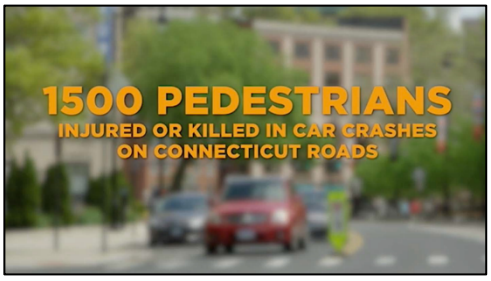
- Traffic signal hardware and timing. CTDOT is systematically upgrading its traffic signals to be fully compliant with current national standards. The upgrades will integrate the latest technology and incorporate a full complement of features designed to serve and protect pedestrians. These include features like countdown signal heads, both audible and vibrotactile walk indications, and signal retiming to provide enough time for pedestrians to cross before traffic starts.


- Intersection layout for pedestrian safety. The upgraded traffic signal hardware and timing plans will be complemented by modifying the intersection design or layout to include all the necessary pedestrian features such as crosswalks and sidewalk ramps. Crosswalks will be located to minimize crossing distance and increase the visibility of pedestrians to drivers.
- Fully accessible and ADA compliant. Signals and intersections will be designed to current ADA standards.

**(c) Road diets.** Road diets are an effective traffic calming and pedestrian safety technique that CTDOT began using several years ago. Since being proved effective at early test sites, CTDOT will continue to implement road diets at appropriate locations where the number of traffic lanes can be reduced.

A road diet typically involves converting an existing four-lane, undivided roadway segment to a three-lane segment consisting of two through lanes and a center, two-way left-turn lane. Road diets enhance safety, mobility, and access for all road users. Road diets are a FHWA proven safety countermeasure. Some of the benefits for pedestrians include fewer lanes for pedestrians to cross; opportunity to install pedestrian refuge islands; traffic calming measures for more consistent and potentially lower vehicle speeds; and a more community-focused "complete streets" environment. A feasibility assessment for road diets on state roadways is currently ongoing. Over the next year, a feasibility assessment will be initiated to identify potential road diets on municipally-owned roadways.

## 3. PUBLIC AWARENESS, EDUCATION, AND TRAINING FOR PEDESTRIAN SAFETY



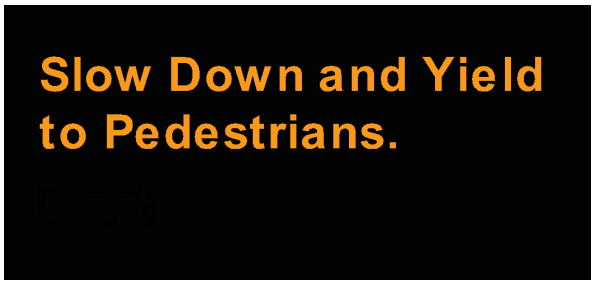

A key component of CTDOT's strategy is to increase public awareness of the growing number of pedestrian deaths and serious injuries caused by traffic crashes. It is an important state and national problem that has been increasing rapidly since 2009.[7] Unfortunately, much of the public is unaware of this dangerous trend. Many pedestrians are unaware of the rising risk they face, and many drivers do not realize the increased risk they pose to pedestrians. The goal of this safety initiative is to raise awareness of the problem among drivers and pedestrians, and in doing so encourage safer and less risky driver and pedestrian behaviors.


To increase awareness of the pedestrian safety problem, CTDOT will initiate a variety of statewide education and media campaigns. Many of these efforts will be aimed at drivers and will build on the successful Watch for Me program sponsored by CTDOT and the CT Children's Medical Center. Safety messages will be crafted around the risk drivers pose to pedestrians, and will use a variety of media including TV, radio, social media, and billboards.

[7] Nationally, total pedestrian deaths were steadily trending down until 2009 when the total fatalities bottomed out at 4,109. Since then, fatalities have trended upward reaching 6,590 in 2019. The 2019 total is the highest since 1988.

The campaign will also deliver messages to discourage unsafe pedestrian behavior such as distracted walking and encourage safe pedestrian behavior such as crossing the street at marked crosswalks.

Campaigns will be timed to coincide with important events such as implementation of the proposed crosswalk laws, National Pedestrian Safety Month in October, and special press events. Some will also be targeted to more local projects such as implementation of a road diet project or a new Pedestrian Safety Zone in a community.


## 4. INTEGRATING PEDESTRIAN SAFETY INTO THE BROADER ROAD SAFETY PROGRAM

CTDOT's proposal to develop a comprehensive program for pedestrian safety is being done within the context of its overall roadway safety program. CTDOT's roadway safety program includes a broad array of safety initiatives aimed at reducing serious and fatal injuries to motorists and non-motorists (pedestrians, bicyclists, wheelchair users). CTDOT is proposing some policy changes to the broader safety program as part of this pedestrian safety initiative. These policy changes reflect CTDOT's strong commitment to safety, and they will benefit pedestrians as well motorists. They include:

**(a) Safe Systems.** CTDOT will evaluate how to integrate safe systems[8] principles into CTDOT's planning and design practices.

**(b) Toward Zero Deaths.** CTDOT will adopt USDOT's Toward Zero Deaths policy that sets a long-term goal of reducing traffic fatalities to zero.[9]

### (a) Safe Systems: Evaluate safe systems principles

Safe Systems is an alternative approach to roadway design and traffic management that places more emphasis on reducing roadway fatalities and serious injuries than do many current engineering guidelines and practices. It is sometimes referred to as the "injury minimization" approach. It is particularly relevant to the design and operation of urban streets where drivers must share the road with pedestrians and where pedestrian safety

[8] Sometimes referred to as the "injury minimization" approach.
[9] For more info go to: https://www.towardzerodeaths.org/

is a concern. More information on Safe Systems can be access at the ITE website: https://www.ite.org/technical-resources/topics/safe-systems/.

CTDOT evaluation of Safe Systems. CTDOT will initiate a process to evaluate how Safe Systems principles can be integrated into its planning and design practices. CTDOT's objectives in undertaking this initiative are to make our entire roadway system safer, to support our proposed Toward Zero Deaths goal, and to support our pedestrian safety program.

Focus on urban streets. While the Safe Systems Approach applies to freeways as well as local streets, the initial effort will be focused on urban streets. On urban streets, pedestrians and other "vulnerable" users face a unique safety risk from motor vehicles. Their risk of serious or fatal injury is high and increases as vehicle speed increases.

### (b) Toward Zero Deaths: Adopt as CTDOT goal

Toward Zero Deaths or **TZD** is one of several programs sponsored by different organizations that share a common vision of reducing traffic fatalities to zero. All these programs recognize it will likely take decades to reach the goal, but they believe the effort must be made and adoption of the vision and goal is a critical first step.

Toward Zero Deaths is a program sponsored by USDOT and is endorsed by most state DOTs in the country. USDOT requires that the endorsement of TZD be officially included in the state DOT's Strategic Highway Safety Plan. The Strategic Highway Safety Plan is updated on a 5-year cycle, and CT's Plan will not be updated for another year. As an interim measure, CTDOT will adopt TZD as a standalone CTDOT policy until such time as the Strategic Plan is updated.

The Strategic Highway Safety Plan is an important state safety document that establishes the strategic vision and priorities for improving highway safety over a 5-year timeframe. It is a multi-agency effort that is jointly adopted by several state agencies including DMV and the State Police. A copy of the current plan can be found at: https://t2center.uconn.edu/pdfs/shsp/17-014L-CONN_SHSP.pdf.

Emphasis on Pedestrians. Pedestrian fatalities will be identified as a special emphasis area within the broader TZD goal. Pedestrian safety is already identified as safety priority within the SHSP.

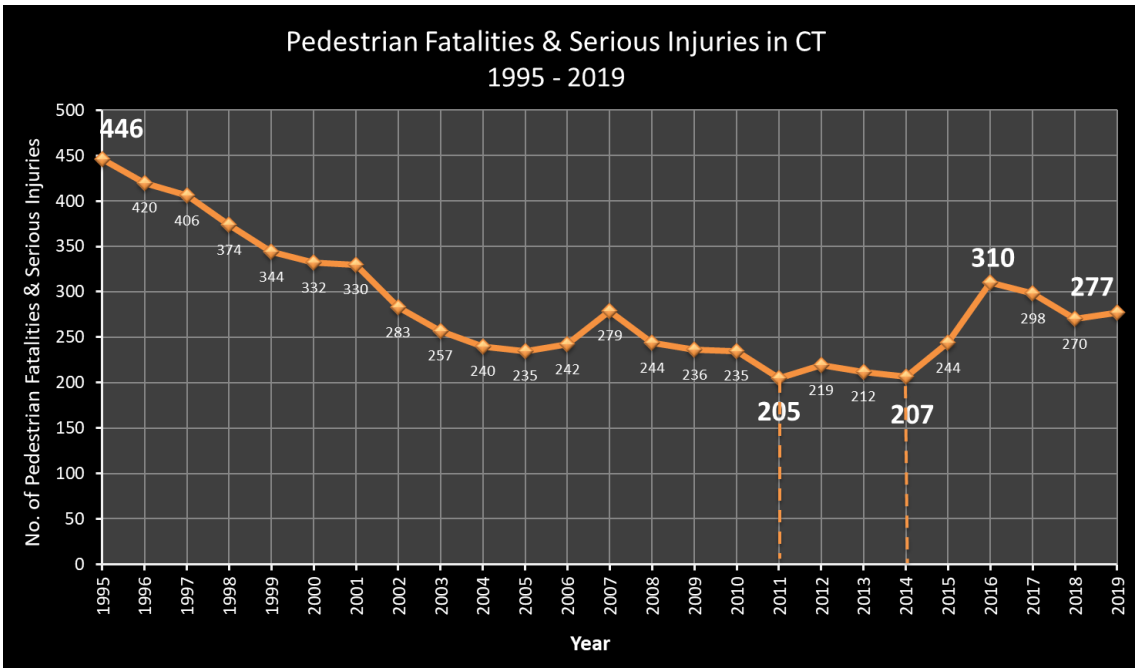
**Appendix A**

## Connecticut Data on Pedestrian Fatalities & Serious Injuries

The pedestrian fatality trend in Connecticut is similar to the national trend. Fatalities have grown sharply since 2011, but the number of fatalities is much smaller than the national number. Whereas there are typically 6,000-6,500 pedestrian deaths in the U.S. each year, the number in Connecticut ranges between 30-60 deaths. Given the small number of fatalities found CT, there is typically a lot fluctuation in deaths from year to year.

To achieve a more stable performance measure with less fluctuation, CTDOT tracks the combined total of pedestrian **deaths** plus **serious injuries**. As seen in the chart below, the trend for the combined measure is similar to the national trend for pedestrian fatalities. In Connecticut the low point of deaths and serious injuries was 205 in 2011 and rose to 277 in 2019.

The combined measure of deaths and fatal injuries also shows a significant degree of stability – particularly before 2011, which ended 16 years of relatively steady declines. Since we have included only serious injuries in the combined measure, it still serves as a good indicator of the high risk of bodily harm that motor vehicles pose to pedestrians.




**Definition of Serious Injury**. A serious injury is generally defined as incapacitating. The detailed definition used in the federal Model Minimum Uniform Crash Criteria guideline is a non-fatal injury that results in one or more of the following:

- severe laceration;
- broken or distorted arm or leg;
- crush injuries;
- skull, chest or abdominal injury;

- significant burns (first or second degree burns over 10% of the body);
- unconsciousness when taken from the crash scene; and
- paralysis.