



# Project Development and Design Guide Update – Target Speed

*Neil Boudreau – Assistant Administrator  
for Traffic and Safety*

ACEC – TALC Meeting | October 30, 2024



## Outline

- 01 Background
- 02 Target Speed
- 03 PDDG Update
- 04 Speed Management
- 05 Q&A





**Background**

# 2013 MassDOT issues Healthy Transportation Policy (P-13-0001)



Policy: P-13-0001

Date: September 9, 2013

## HEALTHY TRANSPORTATION POLICY DIRECTIVE

Secretary of Transportation and Chief Executive Officer

Highway Division Administrator

MBTA General Manager and Rail and Transit Administrator

Aeronautics Division Administrator

Executive Director, Office of Transportation Planning

### I. Healthy Transportation Policy Directive:

This directive formalizes MassDOT's commitment to the implementation and maintenance of transportation networks that serve all mode choices for our customers and that was memorialized in our Mode Shift Goal announced October 2012.

### II. Goal:

To further MassDOT's GreenDOT Implementation Plan, the Commonwealth's Healthy Transportation Compact and statewide Mode Shift Goal, this *Healthy Transportation Policy Directive* is issued to ensure all MassDOT projects are designed and implemented in a way that all our customers have access to safe and comfortable healthy transportation options at all MassDOT facilities and in all the services we provide. This directive builds on other existing directives and guidance that addresses such issues. Healthy Transportation modes as defined by GreenDOT are walking, bicycling and taking transit.



# 2020 Engineering Directive Controlling Criteria and Design Justification Process for MassDOT Highway Division Projects (E-20-001)



Number: E-20-001  
 Date: 01/02/20

## ENGINEERING DIRECTIVE

Patricia Leavenworth (signature on original)

CHIEF ENGINEER

### Controlling Criteria and Design Justification Process for MassDOT Highway Division Projects

The purpose of this Engineering Directive is to indicate the controlling criteria and appropriate design guidance that shall be applied to MassDOT Highway Division projects, shown in **Exhibit 1**. This Directive updates MassDOT design criteria for pedestrian, bicycle, transit, and vehicle facilities and provides direction regarding the FHWA controlling criteria as presented in their Memorandum dated May 5, 2016. This Directive supersedes Engineering Directive E-14-006, dated December 19, 2014; updates Section 2.11 of the Project Development and Design Guide; and supports the MassDOT Healthy Transportation Policy Directive P-13-0001, dated September 9, 2013.

This Directive applies to all projects not yet advertised for construction. Projects that have received 25% Project Approval as of December 31, 2019 are exempt from meeting the requirements of this Directive, unless directed otherwise by MassDOT on a case-by-case basis.

The controlling criteria and processes contained herein apply to the projects listed in **Exhibit 1**.

#### **Exhibit 1**

#### **Applicable MassDOT Highway Division projects**

MassDOT Highway Division is the project proponent.
MassDOT Highway Division is responsible for project funding (state or federal aid).
MassDOT Highway Division controls the affected infrastructure (State Highway), including projects seeking Category II and III Highway Access Permits.

Roadway and bridge projects advanced under programs, such as Chapter 90 and Massworks are not required to follow the process in this Directive; however, these projects should follow applicable design standards. (Refer to the requirements of the applicable program.)

The design guidance contained herein is intended to provide project proponents with sufficient flexibility to address the unique and diverse conditions encountered on the Commonwealth's streets and highways.

The specific criteria used for roadway and bridge design in Massachusetts vary based on the facility type and area type; these criteria are based on years of research and empirical data for safe and efficient movement of people. Departure from these criteria requires documentation to support the decision-making process.



# 2023 Project Development and Design Guide (PDDG) Update


🏠 > [Massachusetts Department of Transportation](#) > [Highway Division](#) > [MassDOT Highway Project Management and Design](#)

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[Highway Division](#) | [Massachusetts Department of Transportation](#)

**MANUAL**

## MassDOT Project Development and Design Guide

This guide serves as a national model for developing context-sensitive, community-friendly road and bridge projects.



**ORGANIZATION:** [Highway Division](#)  
[Massachusetts Department of Transportation](#)

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**DATE PUBLISHED:** October 4, 2023

## Overview


The purpose of the Project Development and Design Guide (PDDG) is to define the Massachusetts Department of Transportation (MassDOT) Highway Division's project development process and guide the planning and design of transportation projects. The PDDG's intended audience includes planners, designers, practitioners, and decision makers.

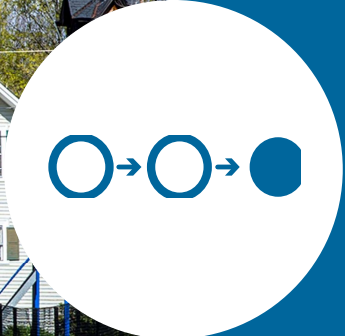
The previous edition of the PDDG, published in 2006, expanded MassDOT's framework for incorporating context-sensitive design and multimodal elements into transportation improvement projects. This edition of the PDDG expands on those elements and formally incorporates process changes and guidance revisions that have occurred since 2006. **MassDOT is actively updating the 2006 edition's content and modernizing the PDDG to a web-based format to aid the ease and regularity of future updates.** Updated chapters are published in this new web-based format. For chapters currently undergoing updates, the 2006 edition is temporarily posted to that chapter's web page.

# 2023 Project Development and Design Guide (PDDG) Update

Chapter	PDDG Phase 1 Update - Status				
	Under Development	Under Review by Chief's Office	Under Review by FHWA	In Publication Process	Published
1	Introduction				
2	Project Development				
3	Basic Design Controls				
4	Horizontal and Vertical Alignment				
5	Cross-Section and Roadside Elements				
6	Intersection Design				
7	Interchanges				
8	Drainage and Erosion Control				
9	Pavement Design				
10	Bridges				
11	Shared Use Paths and Greenways				
12	Intermodal Facilities and Rest Areas				
13	Landscape Design				
14	Wildlife Accommodation				
15	Access Management				
16	Traffic Calming and Traffic Management				
17	Work Zone Management				
18	Plans, Specs, and Estimates				

Published: Oct. 17<sup>th</sup>  
 Effective: Oct. 21<sup>st</sup>





Target Speed



# Design impacts people's ability to move and their safety



## What is Target Speed?

**Target Speed:** A **selected** speed used to identify the highest operating speed at which vehicles should operate in a particular context to provide safer environments for all roadway users

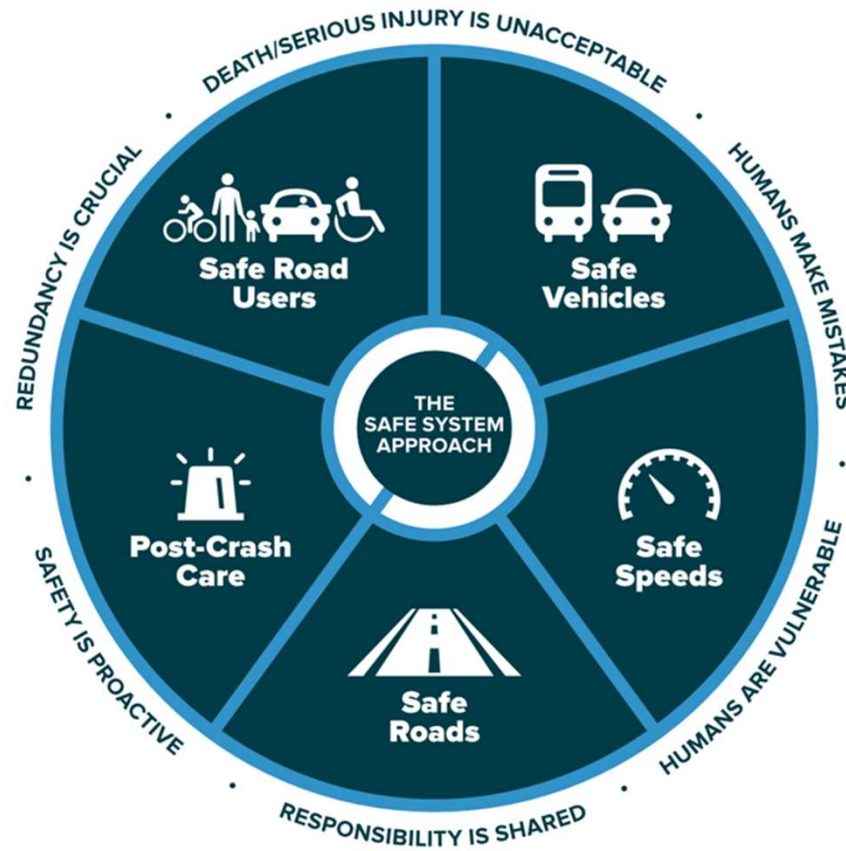
- Use to identify speed management measures
- Use to select design speed
- Not the existing posted limit



## Other Key “Speed Related” Terms

- **Operating Speed:** The **measured** speed at which drivers are observed operating their vehicles in fair weather conditions during off-peak hours
  - Often reported as 50th and 85th percentile speeds
- **Design Speed:** A **selected** speed used to determine the various geometric design features of the roadway for vehicles such as horizontal alignment, vertical alignment, cross slope, and separation of user types.
- **Speed Limit:** The maximum lawful vehicle speed for a particular location as displayed on a regulatory sign as approved by MassDOT per Massachusetts General Laws (MGL) or a statutory limit as established per MGL.

# Why Target Speed?



# Context Should Direct Vehicle Speeds

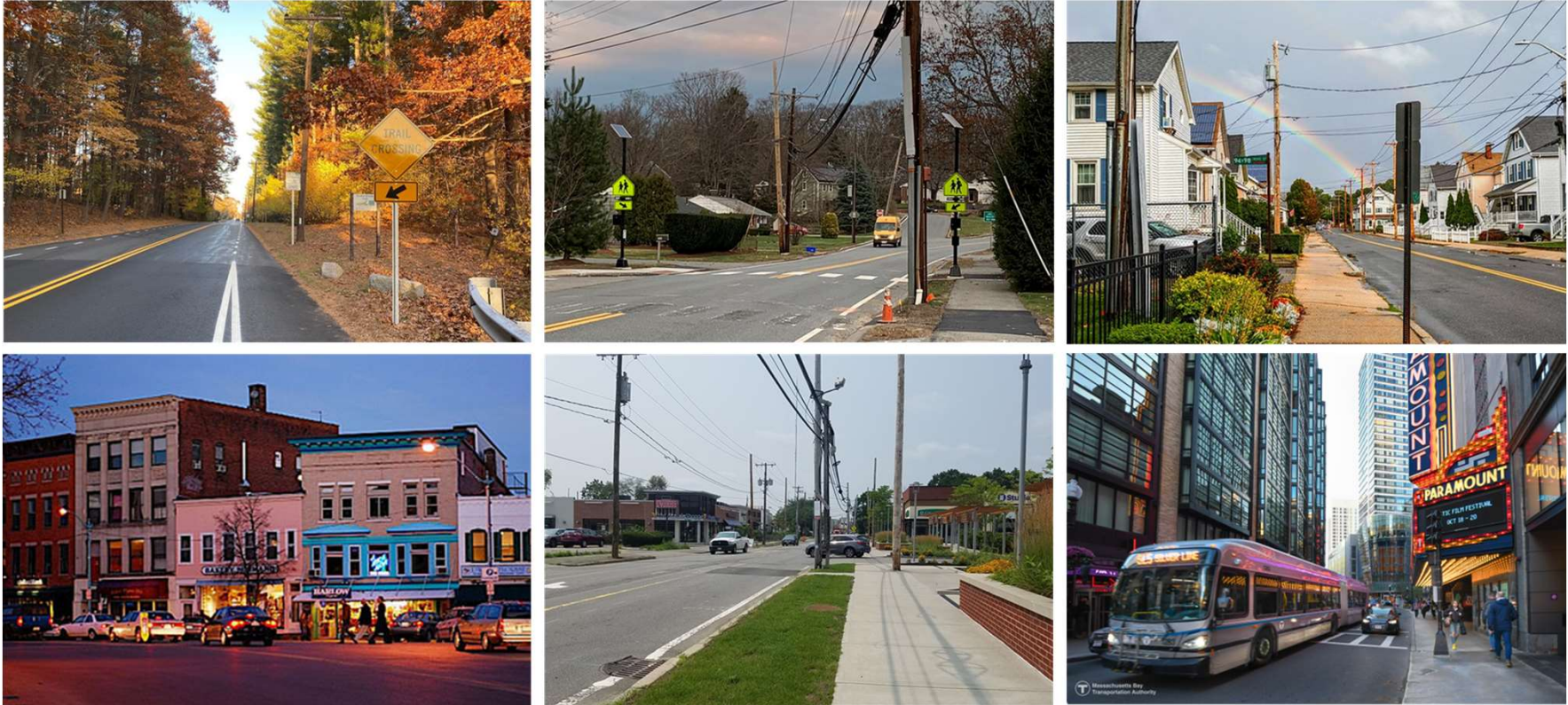


Image credits: Top (left to right): Amber Vaillancourt, Kristen Mei, Solomon Foundation /  
Bottom (left to right): Kerstin Martin, Margaret Kent, MBTA

# 2024 PDDG Chapter 3

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THIS IS A PART OF:

[MassDOT Project Development and Design Guide](#) →



## PDDG Chapter 3 - Basic Design Controls

Chapter 3 of the MassDOT Project Development and Design Guide

### TABLE OF CONTENTS

- 3.1 Introduction
- 3.2 Roadway Context
- 3.3 Roadway Users
- 3.4 Transportation Demand
- 3.5 Measures of Effectiveness
- 3.6 Speed
- 3.7 Sight Distance
- 3.8 Controlling Criteria
- 3.9 For Further Information

### 3.1 Introduction

**Basic design controls** serve as the foundation for establishing the physical form, safety, and functionality of the transportation facility. Some design controls are inherent characteristics of the facility (e.g., its physical context and the existing transportation demands placed upon it). Other basic design controls are selected or determined by the designer, working with communities and users to address a project's need, goals, and objectives. Selecting appropriate values or characteristics for these basic design controls is essential to achieve a safe, effective, and context sensitive design. This chapter discusses these basic design controls and their influence on the physical characteristics of a roadway or other transportation facility.

# Engineering Directive E-24-004

## Supersedes:

- **E-06-001** – Massachusetts Highway Department Project Development and Design Guidebook, 2006 Edition
- **E-14-002** – Minimum Length of Horizontal Curves
- **E-21-002** – Pre-25% Design Scoping Procedure



Number: E-24-004  
Date: 10/17/24

## ENGINEERING DIRECTIVE

Carrie Lavaltee, P.E. (signature on original)

CHIEF ENGINEER

### MassDOT Highway Division Project Development and Design Guide Active Update Edition

This Engineering Directive formally announces changes to the *MassDOT Highway Division Project Development and Design Guide (PDDG)* and provides direction on the appropriate use of the PDDG for new and existing projects.

Starting in October 2023, MassDOT began to update elements of the 2006 Edition of the PDDG by posting revised chapters on mass.gov. Eventually, all chapters of the 2006 Edition of the PDDG will be updated and converted to a web-based format. The web-based version of the PDDG will be actively updated and will be used on all transportation projects where one or more of the following conditions exist:

- MassDOT is the proponent
- MassDOT is responsible for project funding (state or federal-aid projects)
- MassDOT controls the infrastructure (projects on state highways)

Effective October 21, 2024, the Active Update Edition of the PDDG shall be used for all new and existing projects, as applicable, except as follows:

- Projects that received Project Review Committee approval prior to July 1, 2024 need not conform to all new planning process guidelines (in Chapter 2).
- Projects that received 25% design approval prior to October 21, 2024 need not conform to all new design guidelines and may continue to be designed in accordance with any previously-issued design standards.

In all cases, MassDOT reserves the right to require the use of the most-current project development and design guidelines and standards for any project at any stage of design. Proponents and designers should frequently monitor the Active Update Edition of the PDDG for changes to ensure that all projects are advanced using the most-current guidelines and standards.



# Target Speed Process

Table 3-6: Process, Documentation, and Reviews for Identifying Target and Design Speed

Project Development Step	Target Speed Process	Documentation	Review
Scoping	Identify <b>target speed and design speed range</b>	<ul style="list-style-type: none"> <li>Scoping Checklist</li> <li>Project Scoping Meeting</li> </ul>	<ul style="list-style-type: none"> <li>District Project Development Engineer</li> <li>HQ Highway Design</li> </ul>
Pre-25%	<p>Verify <b>existing operating speed</b>.</p> <p>Assess a <b>target speed</b> appropriate for the project context.</p> <p>Determine if <b>speed management</b> is needed to achieve target speed. If so, select <b>speed management measures</b>.</p> <p>Assess the need for <b>separation</b> between motor vehicles and people walking and biking.</p>	<ul style="list-style-type: none"> <li>Draft Design Justification Workbook (DJW)</li> <li>Pre-25% Over-the-Shoulder (OTS) Review Meeting</li> </ul>	<ul style="list-style-type: none"> <li>District Project Development Engineer and/or District Traffic Engineer (based on District discretion)</li> <li>HQ Highway Design</li> </ul>
25%	Design project based on <b>design speed</b> . <i>If needed, refine limits of design speed(s) for segments with different needs along project corridor. Finalize target and design speed documentation.</i>	<ul style="list-style-type: none"> <li>DJW</li> <li>Functional Design Report (FDR)</li> </ul>	<ul style="list-style-type: none"> <li>District Project Development Engineer (DJW)</li> <li>HQ Highway Design (DJW)</li> <li>District Traffic Engineer (FDR and DJW)</li> <li>HQ Traffic &amp; Safety (FDR)</li> </ul>
Through 100% / PS&E	Confirm design elements meet target speed, design speed(s), and user separation needs.	<ul style="list-style-type: none"> <li>Design Plans</li> </ul>	<ul style="list-style-type: none"> <li>District Project Development Engineer</li> <li>HQ Highway Design</li> </ul>

Source: MassDOT



## Area Type (Rural)

Figure 3-1: Illustration of Rural Area Types



Source: MassDOT

### Rural Natural

This is the traditional concept of rural space, where the roadway travels through forest land, farmland, and other open space. There are few access points along the roadway and little or no development. Design constraints tend to involve topographic, environmental, scenic, or historic resources.

### Rural Village

This is an isolated built-up area with storefronts, civic uses, and interspersed housing. Varied building setbacks, and frequent driveways and intersections are common. Individual property frontage is generally less than 200 feet. Right-of-way is usually constrained by the built environment. An important safety consideration for design is the often rapid transition between rural natural or rural developed areas to a rural village.

### Rural Developed

This is an area of low-density residential development or occasional commercial uses. Buildings generally have large setbacks from the roadway and are frequently obscured due to tree cover. Occasional driveways require a driver to be more alert for entering and exiting vehicles than in rural natural areas. The consideration of future developments are important factors in project development.

## Area Type (Suburban)

Figure 3-2: Illustration of Suburban Area Types



### Suburban High Density

This category covers a wide range of suburban development where the majority of the roadside is intensively developed with a mix of property-types and building setbacks. Residential property frontage is often less than 200 feet and intensive commercial development, including strip development, is frequently encountered. Right-of-way is usually restricted to a moderate extent by the built environment.

### Suburban Town Center

This is a built-up area of commercial and residential uses. The commercial uses are usually concentrated together and are notable for a uniform building setback. Residential areas consisting of properties with frontage of less than 200 feet often define the edges of a suburban town center. Right-of-way is usually restricted by the built environment.

### Suburban Low Density

These are transitional areas where roadways have a mix of natural and developed characteristics. Residential development is low to moderate in density, and there are isolated commercial properties. There are generally large setbacks to buildings and individual property frontage usually exceeds 200 feet.

Source: MassDOT

## Area Type (Urban)

Figure 3-3: Illustration of Urban Area Types



### Urban Park

Open space in the urban area is usually found in parks or preserves. Driveways are usually infrequent in open spaces, although path and trail crossings of the roadway may be common.

### Urban Residential

Urban residential districts usually consist of multifamily developments at a common scale and setback along roadway corridors. Driveways are usually consolidated for entire buildings or blocks.

### Central Business District (CBD)

The majority of development is usually commercial or mixed-use. Access to property is the primary function of the roadway network.

Source: MassDOT

# Factors for Establishing Target Speed



Safety Risk



Crash History



Activity Level



Conflict Density



Community Input



Motor Vehicle Operating Speeds



Existing or Planned Bicycle Facilities

# Target and Design Speed Ranges

Table 3-7: Target and Design Speed Ranges by Area Type and Roadway Type

Area Type <sup>1</sup>	Arterial Roadway Target and Design Speed Range (mph) <sup>2</sup>	Collector Roadway Target and Design Speed Range (mph)	Local Roadway Target and Design Speed Range (mph)
Rural Natural	25-55	25-45	15-35
Rural Developed	25-45	20-40	15-35
Rural Village	20-35	20-35	15-30
Suburban Low Density Development	20-45	20-40	15-35
Suburban High Density Development	20-35	20-35	15-30
Suburban Town Center	20-30	20-30	15-30
Urban (Park, Residential, Central Business District)	20-30	15-30	15-30

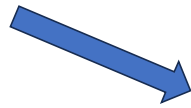
Notes:

<sup>1</sup>Table 3-7 does not apply to limited access roadways and freeways. The design speed range for a limited access facility such as a freeway is 50 to 75 mph regardless of area type.

<sup>2</sup>A design speed higher than these values, up to 55 mph, may be appropriate for multi-lane, divided arterials.

# Updated Design Justification Workbook

New process to integrate the Target Speed and Design Speed Range from Chapter 3.6 of the PDDG



File Home Insert Page Layout Formulas Data Review View Automate Help BLUEBEAM Acrobat

Default Normal Page Break Preview Custom Views Navigation Ruler Gridlines Formula Bar Show Zoom 100% Zoom to Selection Freeze Pan

BW23

MasDOT Design Justification Workbook

Project: 60XXXX Description: MUNICIPALITY- PROJECT DESCRIPTION

DESIGN AND TARGET SPEED (This Workbook she

PLEASE FILL OUT ALL FIELDS MARKED WITH \*

Facility & Segment: Test Road 1 # of Facility Set: 1 of 2 FALSE (Other types of,

Check this box if target speed is not applicable for this project as identified on the Pre-25% Scoping Checklist. FALSE

Step 1. Enter Target and Design Speed Range from PDDG

Roadway Type: (Refer to PDDG Figure 3-4 and its accompanying text) FALSE

Area Type: (Refer to PDDG Table 3-1) (The area type and

Check this box if segment is a multilane divided arterial. FALSE (Based on Table 3-7

(Document distinguishing characteristics consistent with area type (see PDDG Table 3-1) (Document disting

Target and Design Speed Range: (Based on PDDG Table 3-7)

Lower Target Speed Range: MPH Higher Target Speed Range: MPH

Step 2. Verify Existing Speed Information

Design Speed that current roadway elements meet: MPH (N/A if unable to determine.)

(If applicable, document how existing design speed was determined (e.g., as-built drawing, field measurements, recreating existing alignments in CAD against field survey.) (If applicable, docu existing alignments

Existing Posted or Statutory Speed Limit: MPH

Existing Operating Speeds: 50th Percentile: MPH 85th Percentile: MPH

(Document operating speed data source, including dates and time periods.) (Document operat

Step 3. Compare Existing Operating Speeds to Target and Design Speed Range (Identify whether th

Operating Speed	Within or Outside of Range	MPH Above Range
50th Percentile:	Outside of Range	mph above maximum
85th Percentile:	Outside of Range	mph above maximum

FACILITY PHOTOS ALTERNATIVES FACILITY INFO CONTROLLING CRITERIA DESIGN & TARGET SPEED



# Speed Management

# Safe Speeds Website

Launched to help explain that traditional “Speed Zoning” was not well understood and that making design changes are necessary to reduce operating speeds – Design for “Self-Enforcing” Roadways

**Mass.gov** Search Mass.gov

Home > Massachusetts Department of Transportation > Highway Division > Safe speeds

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## Learn about speed management

MassDOT is committed to helping realize safer speeds across the Commonwealth to prevent serious crashes. Learn more about speed management and resources to implement speed management in your community.

### TABLE OF CONTENTS

- What is speed management?
- Collect information and analyze data
- Establish a target speed
- Designing for speed control and separation through roadway treatments
- Raising awareness
- Set speed limits
- Take action and learn more
- Contact

## Safe speeds

Speed management to prevent serious injuries and fatalities

Keeping people safe on Massachusetts roadways is Massachusetts Department of Transportation's priority. One life lost or altered by a serious injury on any roadway is unacceptable. In Massachusetts and across the US, the speed that people drive can make a big difference on the safety of our roadways. Higher speed increases the risk of a fatal or serious crash and reduces the likelihood of survival. Every mph matters: each 1 mph increase that a person drives can be attributed to a 3% increase in potential loss of life. Safe vehicle speeds make streets better for everyone, whether you are traveling by car, wheelchair, bicycle, stroller, foot, or bus.

MassDOT is committed to helping realize safer speeds across the Commonwealth to prevent serious crashes. Our goal is zero fatalities and serious injuries. Learn more about speed management and resources to implement speed management in your community.

### What would you like to do?

**Top tasks**

- Learn about speed management →
- Explore roadway treatment technical toolkit →

**All other tasks**

- Apply for funding to implement speed management in your community →
- Notify MassDOT of MGL Chapter 90, Section 17C adoption →
- Request speed zoning →
- Request speed regulation information →



# Roadway Treatment Toolbox

- **Focus of Toolbox** – Assist communities on how to design for speed control and separation of vulnerable road users through roadway treatments
- **Safe System** – A safe system encourages safe speeds through roadway treatments to help reduce potential crashes and associated injuries
- **Safe Roads** – With physical and engineering-related roadway treatments effectively implemented, streets become **self-enforcing**, reducing speed related conflicts and serious crashes

<u>Type of Roadway Treatment</u>	<u>Description</u>
<b>Vertical deflection countermeasures</b>	Speed humps, raised pedestrian crossings, or raised intersections that raise roadways for various lengths to slow drivers.
<b>Horizontal countermeasures</b>	Median islands, chicanes or curves, or curb extensions that change the roadway. Chicanes are a series of curb extensions that alternate from one side of the street to the other, forming S-shaped curves that essentially narrow the roadway width and create an environment that slows down drivers.
<b>Mini roundabouts and neighborhood traffic circles</b>	Small-scale circular islands that act as a kind of intersection, offering yield-controlled entries and counterclockwise circulation in order to improve safety and reduce delays.
<b>Road diets</b>	Roadway configurations that involve narrowing or eliminating travel lanes to calm traffic speeds and increase safety of all roadway users. Road diets do not automatically impact throughput or cause congestion, and when it does safety is the preferred tradeoff.
<b>Marking measures</b>	Strategies such as optical measures and lane markings that can be used as visual cues to separate opposing traffic, signal a change in the roadway use, and help focus drivers' attention on their speed.
<b>Speed transition zones, advisory, and feedback signage</b>	Strategies to slow drivers traveling from a rural to an urban environment and signs that communicate recommended speed information and feedback to drivers.

## Designing for Self-Enforcing Roads


- Focus on narrowing travel lanes
- Providing offsets and or separator islands
- Increase use of signs, markings and delineators




# Toolbox Treatments: Cut Sheets

- A set of speed management treatment cut-sheets were drafted to better “market” the treatments being installed around Massachusetts
- MassDOT will seek feedback from municipalities on future installation of these treatments and capture safety data
- The cut-sheets will be periodically updated based on new statewide speed management installations
- Note: Not yet published on MassDOT website...soon!

**RAISED INTERSECTIONS**



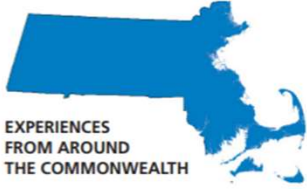


THE ENTIRE INTERSECTION IS RAISED, INCLUDING CROSSWALKS

**+ ADVANTAGES**  
All crosswalks have raised crossings, with improved pedestrian visibility and comfort and reinforced priority.  
Calms speeds on two streets at once.

**TYPICAL LOCATIONS**  
Unsignalized collector-local and local-local intersections. Installed in both dense urban and suburban context at multi-leg intersections.

**- CONSIDERATIONS**  
Requires drains on legs with water flowing toward the intersection.  
With gradual sloped ramps, these can be used on bus routes and emergency response routes.  
Need for sidewalks on all approaches where crosswalks intersect.



**EXPERIENCES FROM AROUND THE COMMONWEALTH**

**Rt 9, Amherst**  
85th percentile speed reduction from 39 to 27 mph was achieved.

**Needham Street, Dedham**  
At Riverdale Elementary School, instead of a raised crossing, the town installed a raised intersection, which is smoother for traffic but also creates a sense of place.

**Concord and Springfield Streets, Somerville**  
Steep ramps at this raised intersection make crossing pedestrians feel safe in spite of the long crosswalks.

MASSDOT SPEED MANAGEMENT STUDIES
2024

**MEDIAN CROSSING ISLAND**





ISLAND THAT SPLITS A CROSSING IN TWO AND FORCES HORIZONTAL DEFLECTION ON TRAFFIC  
 SLOWS TRAFFIC BY CREATING A NARROW CHANNEL AND BY HORIZONTAL DEFLECTION

**+ ADVANTAGES**  
Makes crossing easier and safer, as pedestrians must cross one direction of traffic at a time.  
Promotes motorist yielding by making the crossing, and pedestrians, prominent, especially when vertical elements (yellow flexposts, Yield for Pedestrian signs) are used.  
Not a problem for emergency response or snow clearance, except that the crossing passage must be cleared.

**TYPICAL LOCATIONS**  
Unsignalized crossings of 2-lane and multilane collectors and arterials.

**- CONSIDERATIONS**  
Geometric layout determines the S-curve radius vehicles have to follow; the sharper the S-curve, the greater the speed reduction.  
May need accommodation (e.g. sloped curbs) for large vehicle turns.  
On multilane roads, helpful for crossing safety but ineffective at controlling speed.



**EXPERIENCES FROM AROUND THE COMMONWEALTH**

**South Pleasant Street, Amherst**  
Pedestrian use of the crosswalk (instead of crossing elsewhere) increased from 45% to 94%. 85th percentile speed fell from 39 to 32 mph.

**Amory Street, Boston**  
At a midblock crossing, a crossing island constructed of temporary materials (plastic C-section curbs, flexposts) has survived two years, including winters. Traffic is slower and nearly 100% of motorists yield to pedestrians.

MASSDOT SPEED MANAGEMENT STUDIES
2024



## Questions & Discussion



# *Thank You*

*Target Speed Update*

Neil.Boudreau@dot.state.ma.us

ACEC TALC Meeting | October 30, 2024

