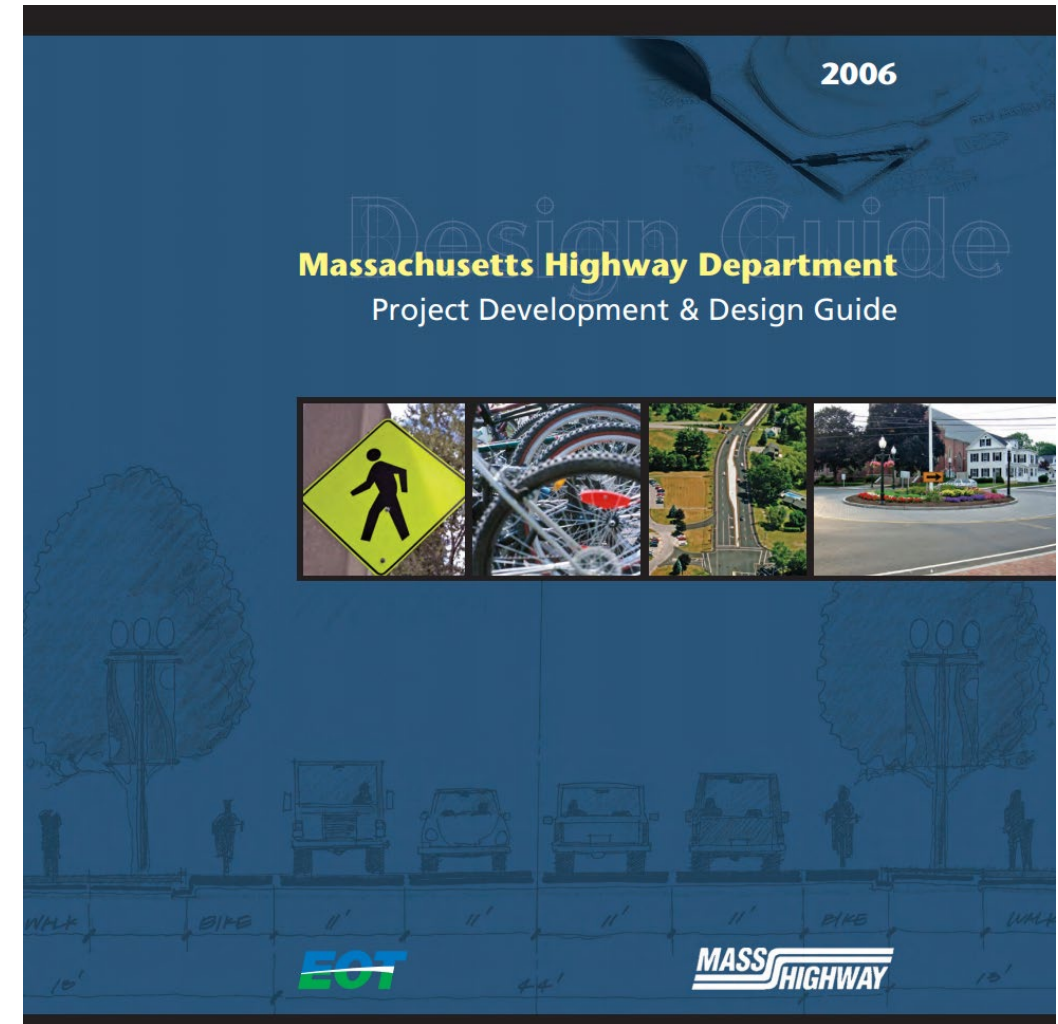


Project Development and Design Guide Update

Andrew K. Paul, P.E.
MassDOT Highway Design Engineer

Overview

- What is the Project Development and Design Guide?
- Problems with the Guide
- Proposed Updates
 - Climate Resiliency Standards
 - Content Management System
 - Updated Content, beginning with design for Pedestrians, Cyclist, and Transit Users
- Updated Controlling Criteria



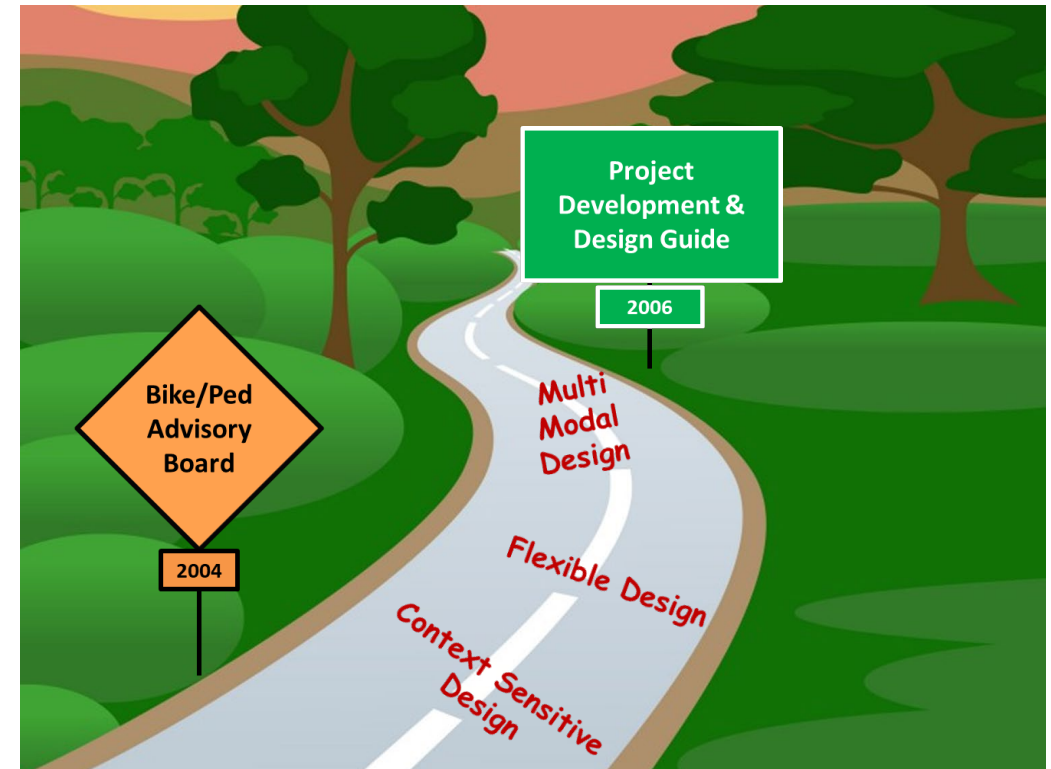
Background

- The Project Development and Design Guide is used as a reference during the planning and design of roadway infrastructure projects funded by MassDOT
- This is a design guide for Everyone
 - Staff, consultants, municipalities, advocates, the general public...
 - Guide has a very wide audience and covers all aspects of the MassDOT project development process



The 2006 PDDG was Revolutionary

- Award-winning progressive design guide
- Multi-Modal Considerations
 - “[...] non-motorized transportation modes are fundamental considerations in the design process.”
 - Facilities for people walking and people biking were integrated into the Guidebook as a whole, rather than being relegated to a “bike chapter” or “pedestrian chapter”
- Context Sensitive Design
 - Now sometimes known as “design flexibility”
 - Recognition that there is no “one-size fits all” solution for designing a roadway



MassDOT Highway engineering directives

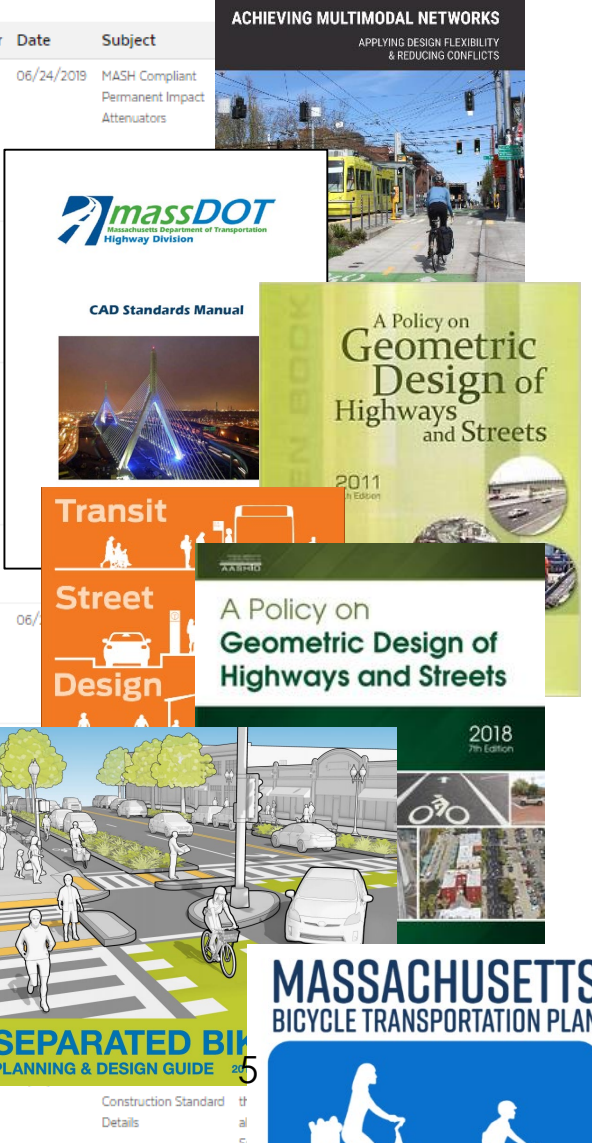
These directives introduce new engineering standards or procedures, or supplement, clarify, or amend existing engineering standards or procedures.

Active engineering directives

Superseded engineering directives

Active engineering directives

Number	Date	Subject
E-19-003	06/24/2019	MASH Compliant Permanent Impact Attenuators
E-19-002		
E-19-001		
E-18-002		
P-18-003	06/	
P-18-		
P-18-		
E-18-		
E-17-		



Problems with the 2006 Guide

- The Guide is a static PDF
 - Content has been supplemented or superseded by...
 - MassDOT Engineering Directives
 - New MassDOT Publications and Guides (Separated Bike Lane Guide)
 - New AASHTO Green Book updates (twice!)
 - CAD Standards
 - Other guides (e.g., NACTO guides)
- ...but, if you're looking at the Guide as a one-stop shop for design information, you might not ever know that this newer information exists

MassDOT Highway engineering directives

These directives introduce new engineering standards or procedures, or supplement, clarify, or amend existing engineering standards or procedures.

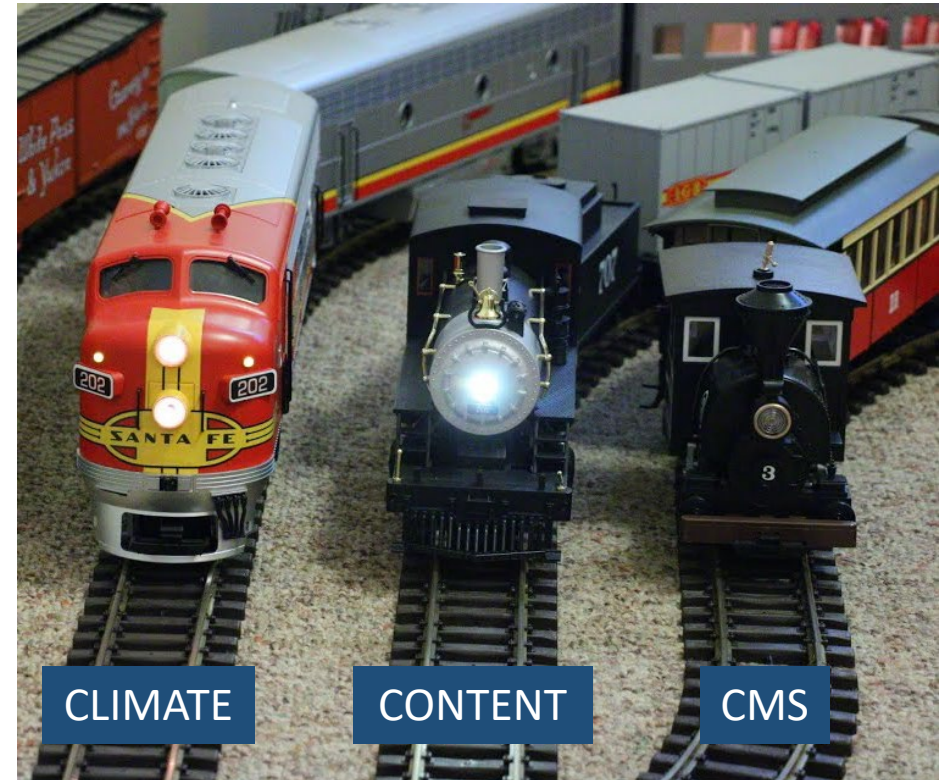
- [Active engineering directives](#)
- [Superseded engineering directives](#)

Active engineering directives

Number	Date	Subject	Description
E-19-003	06/24/2019	MASH Compliant Permanent Impact Attenuators	Requires that new installations of Permanent Impact Attenuators on MassDOT projects or MassDOT-owned facilities be MASH compliant. Projects advertised prior to January 1, 2019 may continue to install Permanent Impact Attenuators in accordance with the relevant contract documents for each contract.
E-19-002	06/20/2019	Protection of Bridge Piers and Abutments	Establishes new guidelines for the protection of bridge piers and abutments, based on NCHRP Report 892, Guidelines for Shielding Bridge Piers. These guidelines and associated drawings will be incorporated into the MassDOT Bridge Manual.
E-19-001	06/20/2019	Inspection of Structural Members for Design of Bridge Preservation Project	Establishes a new procedure that requires designers of bridge preservation projects to conduct "quantity verification" level inspections of structural elements at the start of design and prior to advertising, and to ensure that the results of the inspections are reflected in the final contract bid documents.
E-18-002	11/07/2018	Bluebeam for Design Submission Reviews	Formalizes the use of Bluebeam software as the primary review platform for MassDOT Highway Division design projects.
P-18-003	06/21/2018	Tunnel Inspection and Testing Protocol for Roadways Covered by Air Rights Developments	Provides a uniform protocol for the inspection and testing of portions of I-90 and the Central Artery covered by air rights developments, consistent with P-18-002. Supersedes P-13-004.
P-18-002	06/21/2018	Tunnel Inspection and Testing Program	Provides a uniform policy for tunnel inspection and life safety system testing for all tunnels under the jurisdiction of MassDOT. Supersedes P-13-003.
P-18-001	06/21/2018	Bridge and Tunnel Inspection Standards and Procedures	Identifies the bridge and tunnel inspection standards and procedures of the MassDOT Highway Division. Supersedes P-13-002.
E-18-001	06/21/2018	F Shape Concrete Barrier for Permanent Use	Formally declares that the MassDOT standard details for F Shape Concrete Barrier now apply to Precast Concrete Barrier only, and no longer apply to Cast-in-Place Concrete Barrier. New installations of Cast-in-Place Concrete Barrier must conform to MASH performance requirements.
E-17-002	10/19/2017	October 2017 Construction Standard Details	Formally issues the October 2017 edition of the Construction Standard Details for use on all projects advertised after 10/21/17. Supersedes the December 2016 edition of the Construction Standard Details issued under E-16-005.

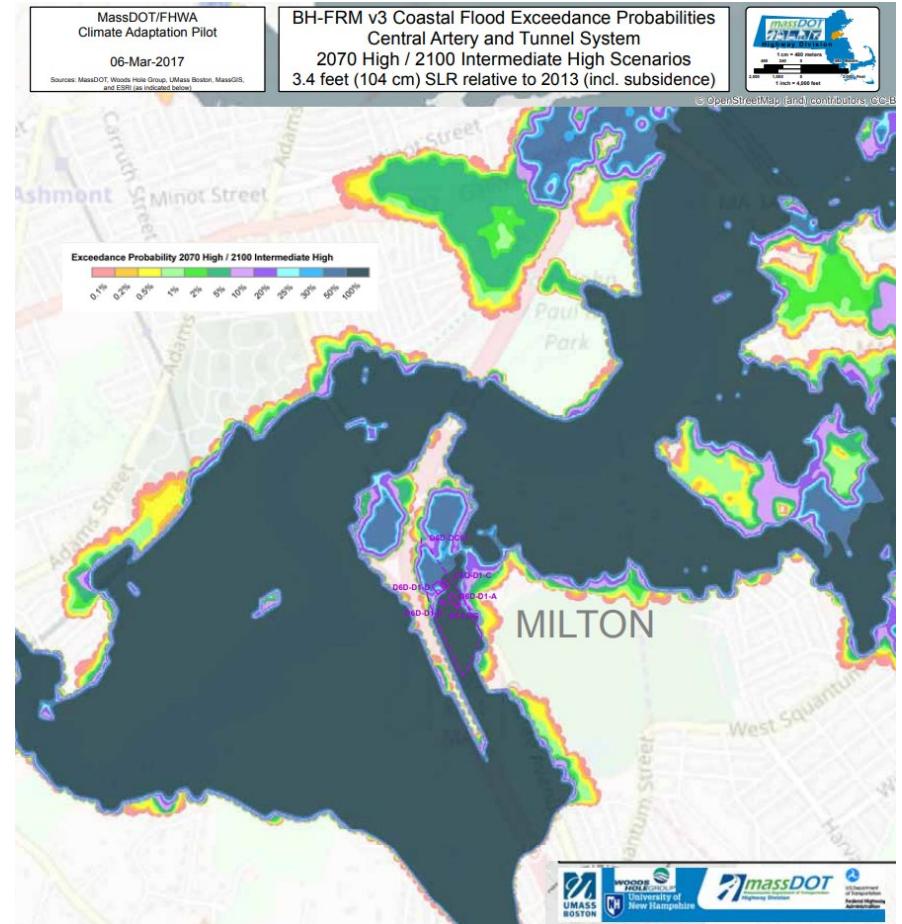
Proposed Updates

- We're working on three "tracks":
 - Create standards for climate resiliency
 - Content Management System
 - Updated Content, beginning with design for Pedestrians, Cyclist, and Transit Users



Climate Resiliency Standards

- Massachusetts Integrated State Hazard Mitigation and Climate Adaptation Plan of 2018
 - MassDOT has involvement with several proposed hazard mitigation actions:
 - Developing of resiliency-oriented design guidelines
 - Creating sea level rise and storm surge scenarios (Boston Harbor + Massachusetts coastline)
 - Ranking vulnerability of culverts and wildlife
 - Incorporating climate resiliency into capital planning activities
 - Assessing statewide transportation asset vulnerability
- How can we address these actions in our Guide?



Content Management System


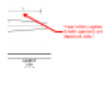





- It has taken us thirteen years to begin work on an update
 - Due, in part, to the size of the document
- What if we could update bits and pieces on a regular basis?
 - Smaller-scale updates for sections that need more urgent updates
- Online, web-based platform
 - Still able to print for those who prefer printed copies
- More accessible document
- Ability to provide graphics, videos, and case examples
- Discoverability
 - “I don’t think that’s in the Guide”
 - Easier to search and navigate by end-users



Update Content

- MassDOT is starting with an internal scan of the Guide to develop a list of known issues, outdated information, and needed changes
- Sample of issues to update:
 - Chapter 18 (Plans, Specs, and Estimates) Plan Production section largely obsolete with new CAD standards
 - New project intake tool (MaPIT) has replaced the paper process outlined in Chapter 2
 - New project scoping processes and pre-25% design deliveries are not reflected in the Guide
 - Incorporate guidance from Separated Bike Lane Guide and future planned design guidance (Roundabouts, Shared Use Paths)

SAMPLE OF INTERNAL REVIEW COMMENTS

	Subject: Callout Page Label: 52 Status: Author: D3 Traffic Joe Frawley Date: 10/16/2019 3:42:23 PM Color: ■	Consideration should be given to revising this exhibit. Given the safety benefit of adding turn lanes, the use of "minimum" should be evaluated. Some consultants treat it as a warrant, rather than guidance on when a turn lane should be strongly considered.
53 (2)		
	Subject: Callout Page Label: 53 Status: Author: HQ Traffic/Safety Lisa Schletzbaum Date: 10/7/2019 1:58:24 PM Color: ■	Taper criteria applies to both approach and departure sides?
	Subject: Callout Page Label: 53 Status: Author: D3 Traffic Joe Frawley Date: 10/16/2019 3:43:01 PM Color: ■	The graphic needs some clarification
54 (1)		
	Subject: Group Page Label: 54 Status: Author: D2 Highway Design - Doug White Date: 9/11/2019 1:33:58 PM Color: ■	update section to include examples of turning roadways that meet main road at 30 degree maximum angle for better lookback angles
57 (1)		
	Subject: Text Box Page Label: 57 Status: Author: CSE - Michelle Danila Date: 10/3/2019 11:59:41 AM Color: ■	replace with upcoming Roundabout Guide
58 (1)		
	Subject: Callout Page Label: 58 Status: Author: D2 Traffic Bao Lang Date: 9/23/2019 4:23:07 PM Color: ■	NCHRP Report 672
63 (1)		
	Subject: Text Box Page Label: 63 Status: Author: CSE - Michelle Danila Date: 10/3/2019 12:02:16 PM Color: ■	need to add PHBs and RRFBs

Evolution to Context Sensitive Design – MassDOT's Updated Design Criteria

MassDOT Separated
Bike Lane Planning
& Design Guide

2015

5' min
shoulder

FHWA's
Revisions to
Controlling
Criteria

2016

Healthy
Transportation
Compact

2009

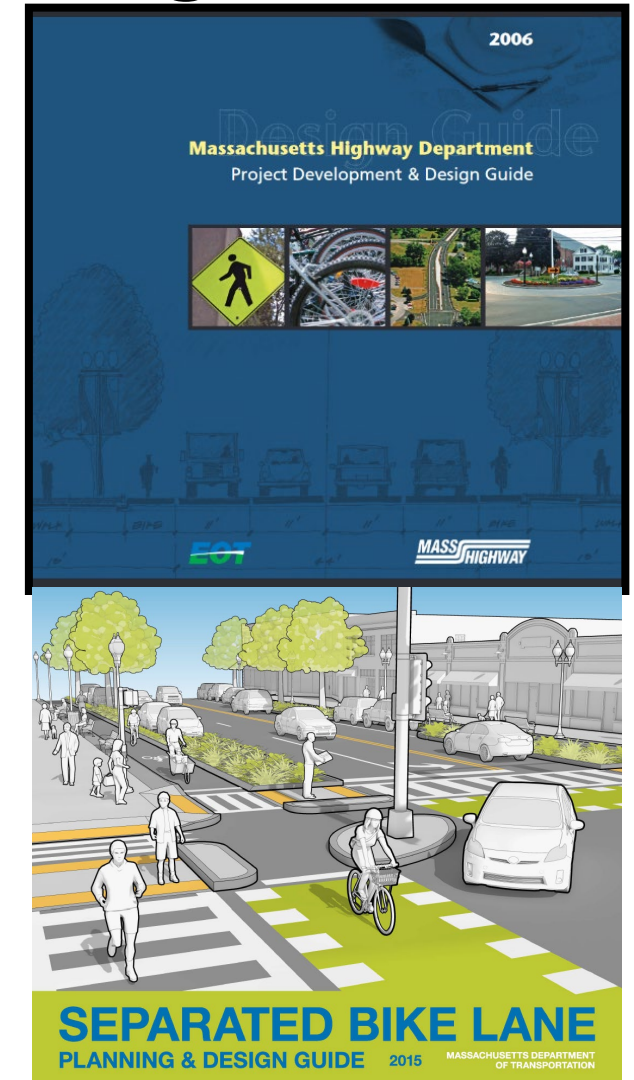
16' desirable
15' minimum

Why Design Criteria Matter

- The Guide has a very wide audience and covers all aspects of the project delivery processes.
- The Design Criteria within the Guide set the groundwork for every MassDOT/MassDOT funded project.
- Being flexible with design criteria allows the project outcomes to align better with a community's context, while helping achieve the project's purpose and need.

Proposed Outcomes of Revised Controlling Criteria

- Make the Design Exception process more efficient
- Clarify a confusing process
- Align with new FHWA Controlling Criteria
- Conform Directive and PDDG
- Increase awareness of Separated Bike Lane Guide
- No “one-size fits all” solution when designing for people biking
- Align with Bicycle Plan and Pedestrian Plan recommendations
- Build high-comfort bicycle network of facilities to increase potential for everyday biking trips
- Increase short trips by walking and biking
- Accommodate people using transit which is not captured in existing Engineering Directive



EXAMPLE FOR ILLUSTRATIVE PURPOSES

The Engineering Directive is too prescriptive and not context sensitive – i.e. bicycle accommodations minimum is a 5 foot shoulder (regardless of area type, how many travel lanes exist, speed of roadway)



Context sensitive solutions

Draft *Pedestrian Facilities* Criteria

- Sidewalks on both sides required if...
 - Roadway in an urbanized area, urban cluster, or rural village are legally allowed
 - Roadway on or under a bridge where legally allowed
 - Roadways with a High Potential for Everyday Walking

Adds “rural village” and “High Potential”
- Minimum width 5'-0" *no change*
- Marked crosswalks across all legs of signalized intersections where sidewalks are present or proposed *no requirement today*
- Marked crosswalks shall be provided at existing crosswalks *no requirement today*

Draft *Bicycle Facilities* Criteria

- Bicycle facilities required (where bicycles are legally allowed) *except* for local roads *no change*
- Bicycle facilities shall have separation (shared use path, side path, separated bike lane, buffered bike lane) if...
 - Posted speed limit \geq 40 MPH
 - Vehicular volumes \geq 10,000 vehicles per day
 - Roadway has more than one travel lane in a single direction
 - Intersection more than one travel lane in a single direction
 - Roadway classified as corridor with a High Potential for Everyday Biking*All new. Current minimum is 5' shoulder, regardless of context*
- Minimum width 5'-0" (single direction), 10'-0" (bi-directional)
 - Does not include curbs, buffers*No bi-directional requirement today*

Draft *Transit Provisions* Criteria

- *transit route* = any fixed-route bus, shuttle, streetcar, or trolley service owned or operated by a RTA or the MBTA
- *transit stop* = any permanent location used for the boarding or alighting of passengers on a *transit route*; or, any permanent facility accepting or discharging passengers on intercity rail, regional rail, commuter rail, subways, streetcars, trolleys, or other fixed-guideway transit systems
- *transit priority treatment* = considered to be any means to improve transit operations, including, but not limited to, queue jumps, transit signal priority, and exclusive transit lanes

No transit requirement today



Draft *Transit Provisions* Criteria

- If roadway is within a service area of an RTA or MBTA has an existing or proposed transit route (rail or bus)...
 - Consultants required to submit 25 Percent Design construction plans to RTA for review
 - Invite RTA/MBTA to planning or scoping meetings
- Crosswalks required within 250 feet of a transit stop
- A shelter or bench required at transit stop with 100 or more boardings a day
- Transit priority treatment required along transit routes with headways of 15 minutes or less

No transit requirement today

Better Outcomes



Worcester – Kelley Square

- Piloted new directive and design justification workbook
- Findings:
 - Reduced the number of exemptions needed
 - Easier format which saved time/hours
 - Revised Design Justification Workbook based on feedback by District 3 and Consultant (VHB)



Next Steps

- FHWA approval received on 11/26/19
- Issue Engineering Directive and update website by the end of 2019
 - FAQ document under development
 - Training materials under development
- Identifying discrete tasks for updates
- Coordinate with updates to other design guidance
 - Roundabouts, Stormwater, Shared Use Path
- Outreach to external stakeholders (consulting community)
- Outreach to other state DOTs
- Develop an IT strategy
- Create timeline
 - Near-term
 - Long-term



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Summary

- Updating our Guide to reflect changes since 2006
- Proposing Updates
 - Climate Resiliency Standards
 - Other Updated Content
 - Content Management System
- MassDOT Controlling Criteria being updated
 - Today, review of proposed changes submitted to FHWA
- Continuing development of Design Guide

Appendix

FHWA CC Revisions (2016)

Controlling Criteria	<50 mph Facilities	≥50 mph Facilities
Design Speed	✓	✓
Design Loading Structural Capacity	✓	✓
Lane Width		✓
Shoulder Width		✓
Horizontal Curve Radius		✓
Superelevation Rate		✓
Stopping Sight Distance		✓
Maximum Grade		✓
Cross Slope		✓
Vertical Clearance		✓

Design Justification Workbook

- Provides a uniform method for evaluating design criteria
- Contains all controlling criteria (FHWA and State)
- Documents design decisions
- Easy to follow format
- Replaces the Design Criteria Workbook
- Prepared by Designer
- Submitted with 25 Percent Design submission
- Submit entire workbook regardless if a formal exception approval is required