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

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Overview

• Overview of History
• Goals
• Proposed Changes
  – Design Justification Workbook
• Case Studies
• Other Updates
**September 2013 – Healthy Transportation Policy Directive**

“This [policy] 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.” Policy requires all state transportation projects to increase biking, transit, and walking options.


“This Directive introduces new controlling criteria for pedestrian and bicycle accommodation that will be used together with FHWA’s 13 controlling criteria for roadways and bridges.”

- Requires sidewalks on both sides of the street
- Requires 5 foot shoulders
MassDOT Separated Bike Lane Planning & Design Guide

2015

FHWA's Revisions to Controlling Criteria

2016
Policies impacts transportation infrastructure & choices...
• How has the Healthy Transportation Policy done what it intended to do – increase walking, biking, and transit?

• Does the Highway Division Healthy Transportation Engineering Directive for pedestrian and bicycle accommodations have a positive effect, negative effect, or no effect on our ability to meet the goals of the Healthy Transportation Policy?

• How can we further advance transit goals outlined in the policy?

• What types of projects should be exempt from design criteria? What additional projects should not be? How do we maintain assets while also being opportunistic during paving, preservation and rehab projects?
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)

5 foot minimum

Context sensitive solutions
Proposed Outcomes

• 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
Proposed Outcomes

- 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

In Massachusetts:
- 24% of all trips are 1 mile or less
- 52% of all trips are 3 miles or less
- 67% of all trips are 5 miles or less
Context sensitive solutions
Proposed Changes

• Refine MassDOT-specific Controlling Criteria
  – Pedestrian Facilities
  – Bicycle Facilities
• Add Transit Provisions
• Add Ramp Length
• Adopt FHWA’s CC changes
• Clarify what triggers specific Design Exceptions and what doesn’t
FHWA CC Revisions (2016)

<table>
<thead>
<tr>
<th>Controlling Criteria</th>
<th>&lt;50 mph Facilities</th>
<th>&gt;50 mph Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Speed</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Design Loading Structural Capacity</td>
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<td>✔</td>
</tr>
<tr>
<td>Lane Width</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Shoulder Width</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Horizontal Curve Radius</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Superelevation Rate</td>
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<td>✔</td>
</tr>
<tr>
<td>Stopping Sight Distance</td>
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<td>✔</td>
</tr>
<tr>
<td>Maximum Grade</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Cross Slope</td>
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<td>✔</td>
</tr>
<tr>
<td>Vertical Clearance</td>
<td></td>
<td>✔</td>
</tr>
</tbody>
</table>
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 ≥ 40 MPH
  – Vehicular volumes ≥ 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
Draft *Ramp Length* Criteria

• Ramps is defined as any type, arrangement, or size of turning roadways that connect two or more legs of an interchange

• Required if:
  – Construction of a new ramp
  – Major reconstruction/reconfiguration of an existing ramp

• Minimum length of an off- or on-ramp is 1000 feet

No ramp length requirement today
Draft *Ramp Length* Criteria
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
Design Justification Workbook
Certain projects are categorically exempt from the need to fill out this workbook. To determine if that is the case, check the boxes for which, if any, of the following cases apply to this project:

- 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
- None of these apply
This project involves work only on the following work types:

- Pavement preservation only: crack sealing, fog sealing, chip sealing, or rubber chip sealing
- Pavement preservation only: microsurfacing, cape seal, ultra thin bonded wearing, cold-in-place recycling, hot-in-place recycling, level and overlay, mill and overlay, full-depth reclamation
- Project designed under the Bridge R&R Program for Non-NHS Bridges (P-92-010)
- Bridge preservation/maintenance treatments only: joint repair, deck repair, super/substructure repair, etc.
- Isolated single intersection safety improvement project with minimal work on approach roadways
- Non-roadway maintenance only: mowing, catch basin cleaning, street sweeping
- Drainage only
- Noise barrier only
- Guardrail only
- Lighting only
- Traffic signal equipment only
- Signing only
- Landscape only
- Vertical construction only
- Non-vehicular access permits
- Minor vehicle access permits (Category I)
- None of these apply
Design Justification Workbook

**Criterion applicable:**

<table>
<thead>
<tr>
<th>PEDESTRIAN FACILITIES</th>
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<tbody>
<tr>
<td>Facility: Street Road (Route X)</td>
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</table>

☐ If pedestrians are not legally allowed on the facility, check this box and do not fill out this sheet.

**Criterion not applicable:**

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Design Justification Workbook

MassDOT Design Justification Workbook
Project: 60XXXX Description: MUNICIPALITY: PROJECT DESCRIPTION

PEDESTRIAN FACILITIES

Facility: Street Road (Route X)

☐ If pedestrians are not legally allowed on the facility, check this box and do not fill out this sheet.

(Fill in information about the proposed Pedestrian Accommodations on this facility.)
(For the purposes of this Workbook, the entries for this criterion have been split into several subcriteria.)

Type of Pedestrian Accommodation:

Subcriterion: Width

Minimum: 5.0 FT Existing: FT Proposed: 5.0 FT

Source used for minimum: MassDOT Controlling Criteria

Justify the proposed width:

(Attach additional sheets as necessary.)

Subcriterion: Width

Minimum: 5.0 FT Existing: FT Proposed: 4.5 FT

Source used for minimum: MassDOT Controlling Criteria

Justify the proposed width:

(Attach additional sheets as necessary.)

Subcriterion: Presence

Pedestrian facilities exist on

Pedestrian facilities are proposed on

(Check the boxes if any of the following apply.)
☐ The roadway is in an urbanized area, an urban cluster, or a rural
☐ The project involves work on or underneath a bridge.
☐ The roadway is identified as having a High Potential of Walkable Trips in the Pedestrian Plan.

Justify the proposed number of sidewalks:

(Attach additional sheets as necessary.)

Standard not met.
Design Justification Workbook

### Subcriterion: Width

<table>
<thead>
<tr>
<th>Minimum:</th>
<th>5.0 FT</th>
<th>Existing:</th>
<th>Proposed:</th>
<th>4.5 FT</th>
</tr>
</thead>
</table>

*(If the depth varies, provide a minimum.)

**Source used for minimum:** MassDOT Controlling Criteria

**Justify the proposed width:**

*(Attach additional sheets as necessary.)*

**Add justification**

Standard not met.
Bicycle Facilities

MassDOT Design Justification Workbook

Project: 60XXX
Description: MUNICIPALITY-PROJECT DESCRIPTION

BICYCLE FACILITIES

Facility: Street Road (Route 3)

☐ If bicyclists are not legally allowed on the facility, check this box and do not fill out this sheet.

(If in information about the proposed bicycle accommodations on this facility.)
(For the purposes of this Workbook, the sections for this criterion have been split into several "subcriteria.")

Subcriterion: Type

Type of Bicycle Accommodation: SHOULDER

Posted or statutory speed of facility: MPH

Facility volume (vehicles per day):

Number of travel lanes (in each direction): (If this varies, use the higher number.)

☐ The roadway is classified as a corridor with a High Potential for Everyday Biking in the Bike Plan.

Justify the proposed value.

(Attach additional sheets as necessary.)

Subcriterion: Width

Minimum: 5.0 FT

Existing: FT

Proposed: 5.0 FT

Source used for minimum: MassDOT Controlling criteria

Justify the proposed value.

(Attach additional sheets as necessary.)

Subcriteria: Presence

Bicycle facilities exist on of the facility.

Bicycle facilities are proposed on of the facility.

(if this is a one way road, a one-way facility in the direction of vehicular travel satisfies the requirement for "each").

Justify the proposed value.

(Attach additional sheets as necessary.)

(If the criteria was violated, summarize the decision-making process that led to the selection of the proposed cross-section. This should include a discussion of the remaining alternatives evaluated to ensure the project meets the intended purpose/need, while minimizing associated impacts to the environment. The evaluation may include an incremental comparison of costs for ROW acquisition, square footage of wetland and/or parkland impacts, building encroachment, construction costs, individual tree impacts, impacts to historically significant properties, etc. Justification should also include a discussion of the safety benefits for the evaluated alternatives. Attach additional pages as necessary.

Note that preservation of on- or off-street parking areas is not considered adequate justification.)

Workbook updated August 9, 2013
Question 3: Select proposed bicycle accommodation:
- Shoulder
- Bicycle Lane
- Shared Use Path
- Side Path
- Separated Bicycle Lane (1-way)
- Separated Bicycle Lane (2-way)
- None
# Shoulder Width

<table>
<thead>
<tr>
<th>Project</th>
<th>Description</th>
<th>MassDOT Design Justification Workbook</th>
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</thead>
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<tr>
<td>600000</td>
<td>MUNICIPALITY-PROJECT DESCRIPTION</td>
<td>SHOULDER WIDTH</td>
</tr>
</tbody>
</table>

**Facility:** Street Road (Route X)

(Fill in information about the proposed Shoulder Width on this facility.)

(For the purposes of this Workbook, the entries for this criterion have been split into several “subcriteria”)

### Subcriterion: Outside Shoulder

- **Min. RT (Outside) Shoulder Width:** [FT]
- **Proposed RT (Outside) Shoulder Width:** [FT]

**Source used for minimum:** MassDOT PODG, Section XX

**Function of shoulder:**

Justify the intended function and the use of this source for the outside shoulder width.

(Attach additional sheets as necessary.)

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1. Along the right side of freeways, 30-foot shoulders should be provided. The right shoulder should be increased to 12 feet when truck and bus volumes are greater than 250 per hour. An additional 9 feet offset from the edge of the shoulder is required to vertical elements over 6 inches in height (such as guardrail).

### Subcriterion: Inside Shoulder

- **Min. LT (Inside) Shoulder Width:** [FT]
- **Proposed LT (Inside) Shoulder Width:** [FT]

**Source used for minimum:** MassDOT PODG, Section XX

**Justify use of this source for the inside shoulder width.**

(Attach additional sheets as necessary.)
Case Study Examples

- Hadley – Route 9
  - Shoulder exemption
- Buckland – Route 2
  - Length of horizontal curve
- I-495/I-90
- I-495/I-290
- Worcester – Kelley Square
  - Followed the new directive
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

• Pending FHWA approval
• Issue Engineering Directive
  – As of date currently unknown
  – FAQ document underdevelopment
  – Training slides underdevelopment
• Continue to modernize Design Justification Workbook
  – Also revise as we get feedback
Agenda

• Why?
  – 2016 FHWA changes 13 to 2
  – PDDG flexibility/context sensitivity
  – Design exceptions lead to exceptional designs – need to think creatively
  – Current engineering directive is confusing – needs to be simpler, getting closer

• How we got here:
  – Policy
  – Engineering Directive
  – Separated Bike Lane Guide
  – Process has been working with District and Chief’s office
    • Outcomes = Engineering Directive, Design Justification, Internal SOP for process FHWA vs MassDOT review

• What - Need for Revisions to Criteria
  – Table on controlling criteria – check FHWA presentation
  – Ped, Bike, Transit, Ramp Length
  – Better documentation - Design Justification Workbook
  – Less paperwork
  – Better projects/outcomes

• Why/How - Case Examples
  – Kelley Square pilot comparison
  – Hadley shoulders
  – Buckland bridge example – length of horizontal curve
  – Georgetown SUP example – bike and ped
  – Needham/Newton Highland Avenue/Needham Street – shoulders, lane widths, TWLTL
  – ADA variances

• When?
  – Now
  – This Fall – pending FHWA approval

• Other guidance coming – SUP, Roundabout, Stormwater