Evolution to Context Sensitive Design – MassDOT’s Updated 2020 Design Criteria

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Overview

• How we got here
• Goals
• Changes
  – Design Criteria
  – Design Justification Workbook
• Case Studies
**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.”
Policies impacts transportation infrastructure & choices...
2016-2017 Review

• 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
Better Bus Project

Pedestrian Transportation Plan 2019

Bicycle Transportation Plan 2019
Goals of Updates

- Make the Design Exception process more efficient and decrease confusion
- Align with new FHWA Controlling Criteria
- Increase awareness of Separated Bike Lane Guide
- No “one-size fits all” solution when designing for people biking
- Meet Statewide bicycle, pedestrian and transit goals
MassDOT Roundabout Guide
2020
2020 Updated Design Criteria and new Design Justification Process
E-20-001
Vision
Biking in Massachusetts will be a safe, comfortable, and convenient option for everyday travel.

Goal 1
Eliminate bicyclist fatalities and serious injuries.

Goal 2
Increase the percentage of everyday trips made by bicycling.
Vision
All people in Massachusetts will have a safe, comfortable, and convenient option to walk for short trips.

Goal 1
Eliminate pedestrian fatalities and serious injuries.

Goal 2
Increase the percentage of short trips made by walking.
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

Source: National Household Travel Survey (NHTS), 2009
Controlling Criteria and Design Justification Process for MassDOT Highway Division Projects
Changes > Anticipated Outcomes

• Increase access and safe access to transit.
• Build high-comfort bicycle network of facilities to increase potential for everyday biking trips
• Increase short trips made by walking and biking
• Decrease conflict between people using different travel means
• Increase safety for everyone on roadways
2020 Changes

• Refine MassDOT-specific Controlling Criteria
  – Pedestrian Facilities
  – Bicycle Facilities
• Add Transit Provisions
• Add Ramp Length
• Adopt FHWA’s Controlling Criteria changes
• Clarify what triggers specific Design Exceptions and what doesn’t
<table>
<thead>
<tr>
<th>Controlling Criteria</th>
<th>&lt;50 mph Facilities</th>
<th>≥50 mph Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Speed</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Design Loading Structural Capacity</td>
<td>✔</td>
<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>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Stopping Sight Distance</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Maximum Grade</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Cross Slope</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Vertical Clearance</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>
Pedestrian Facilities Criteria

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

Add “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 new requirement

• Marked crosswalks shall be provided at existing crosswalks new requirement
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

New bi-directional width requirement
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

New requirement
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

New transit requirement
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
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>
</tr>
</thead>
<tbody>
<tr>
<td>Facility:</td>
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- 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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Massachusetts Department of Transportation
### Design Justification Workbook

#### PEDESTRIAN FACILITIES

<table>
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<tr>
<th>Facility:</th>
<th>Street Road (Route X)</th>
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- **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 form.)

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

**Type of Pedestrian Accommodation:**

<table>
<thead>
<tr>
<th>Subcriterion: Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum: 5.0 FT</td>
</tr>
<tr>
<td>Existing:</td>
</tr>
<tr>
<td>Proposed: 5.0 FT</td>
</tr>
</tbody>
</table>

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

Justify the proposed width.

(Attach additional sheets as necessary.)

<table>
<thead>
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<th>Subcriterion: Width</th>
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<tbody>
<tr>
<td>Minimum: 5.0 FT</td>
</tr>
<tr>
<td>Existing:</td>
</tr>
<tr>
<td>Proposed: 4.5 FT</td>
</tr>
</tbody>
</table>

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

(If the width varies, provide a minimum.)

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.)

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## Design Justification Workbook

### 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 form.)
(For the purposes of this Workbook, the entries for this criterion have been split into several "subcriteria".)

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<tr>
<td>Source used for minimum: MassDOT Controlling Criteria</td>
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<tr>
<td>Justify the proposed width.</td>
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</tbody>
</table>

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<tbody>
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<td>Pedestrian facilities exist on</td>
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<tr>
<td>(Check the boxes if any of the following apply):</td>
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<td>The roadway is in an urbanized area, an urban cluster, or a rural;</td>
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<table>
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<tr>
<th>Subcriterion: Number of Sidewalks</th>
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</thead>
<tbody>
<tr>
<td>Justify the proposed number of sidewalks.</td>
</tr>
</tbody>
</table>

**Subcriterion: Width**

| Minimum: 5.0 FT | Existing: | Proposed: 4.5 FT |
| Source used for minimum: MassDOT Controlling Criteria |
| Justify the proposed width. | Attach additional sheets as necessary. |

**Standard not met.**

Add justification
Bicycle Facilities

Subcriterion: Presence
Bicycle facilities exist on
Bicycle facilities are proposed on
(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.)

Subcriterion: Type
Type of Bicycle Accommodation:
Shoulder
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: 5.0 FT  Proposed: 5.0 FT
(Width excludes any buffer areas.)

Source used for minimum: MassDOT Controlling Criteria

Justify the proposed value.
(Attach additional sheets as necessary.)

Additional comments may be provided in the box below.
(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 alternatives evaluated to ensure the project meets the intended purpose/need, while minimizing or mitigating associated impacts to the maximum extent feasible. 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 an adequate justification.)

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Bicycle Facilities

MassDOT Design Justification Workbook

Project: 60XXX Description: MUNICIPALITY-PROJECT DESCRIPTION

**BICYCLE FACILITIES**

Facility: Street Road (Route X)

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

*(Fill in information about the proposed Bicycle Accommodations on this facility.)*

*(For the purposes of this Workbook, the entries for this criterion have been split into several "subcriteria.")*

**Subcriterion: Type**

Type of Bicycle Accommodation: **SHOULDER**

- 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 *(If the width varies, provide a minimum.)*

Source used for minimum: MassDOT Controlling Criteria

Justify the proposed value.

*(Attach additional sheets as necessary.)*

**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

**MassDOT Design Justification Workbook**

<table>
<thead>
<tr>
<th>Project: 60XXXX</th>
<th>Description: MUNICIPALITY- PROJECT DESCRIPTION</th>
<th>SHOULDER WIDTH</th>
</tr>
</thead>
</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 PDDG, 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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**Subcriterion: Inside Shoulder**

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

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

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

**Justify use of this source for the inside shoulder width.** *(Attach additional sheets as necessary.)*

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Based on the preceding responses, the Lane Width criterion has been satisfied.

Additional comments may be provided in the box below.

*Reference Project Development and Design Guide, Exhibit 5.1:

Summarize the decision-making process that led to the selection of the proposed shoulder width. This should include a discussion of the intended function of the shoulder and the safety and operational advantages of the selected width. Attach additional pages as necessary.*

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Workbook updated August 3, 2013
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

• Issue Engineering Directive Training Videos
• Continue to modernize Design Justification Workbook
We want to hear from you

• What questions do you have about the changes?
• What is working well/better?
• What can still be improved?