MassDOT's New Stormwater Design Guide and DOT Highway Division Environmental Process Updates

MassDOT, Highway Division, Environmental Section
MassDOT Environmental Review Checklist
Environmental Review Checklist (ERC)

• Effective May 29, 2023
• Replaces the EECC
• Found on the MassDOT Environmental Webpage
Learning Objectives

- Understand how the ERC fits into project development and timing
- Understand how commonly encountered regulations are reviewed with the ERC
ERC Purpose and Goals

• Primarily a scoping tool

• Covers commonly encountered reviews & permits

• Identifies potential environmental risks and requirements early in the design process
How Did We Get Here?

- 25% EECC in effect from 2015 to 2023 needed improvement
## ERC Structure

Consists of three columns: Permits/approvals, MassDOT Response, and Consultant Response

<table>
<thead>
<tr>
<th>ERC Number</th>
<th>ERC Description</th>
<th>MassDOT ER Response - Scoping/Pre-25% OTS</th>
<th>Consultant Response/Action – 25%</th>
</tr>
</thead>
</table>
| 10.        | Coastal Zone Management (CZM) Federal Consistency Review (Y/N)  
If yes, scope consultant to prepare and submit a federal consistency review determination letter to CZM at 25%. | No | Consultant concurs. |
| 11.        | Essential Fish Habitat (EFH) (Y/N)  
If yes, confirm if consultant has fisheries biologist/environmental scientist experienced in EFH Assessment (EFHA). If yes, scope consultant for EFHA; if no, MassDOT Environmental will hire open services consultant. If Federal Aid (FA), use the FHWA Programmatic Agreement. If no FA, use the EFH and Fish and EFH and Fish and Wildlife Coordination Act Worksheet. | Yes, Essential Fish Habitat assessment will be necessary. | The Essential Fish Habitat assessment is underway and will be provided by the Consultant in a future submittal. |
| 12.        | Section 7 Endangered Species Act (Y/N; U.S. Fish & Wildlife Service [USFWS] and/or National Marine Fisheries [NMFS Service])  
If yes, write USFWS and/or NMFS to designate which consultation is required. Refer to “Notes” in Question 51 for guidance on scoping the consultant. | Yes, NMFS consultation required. | The NMFS Consultation is underway and will be provided by the Consultant in a future submittal. |
Who Fills Out The ERC?

- **MassDOT Environmental Representative**
  - Fills out column 2 and submits to consultant at Scoping

- **Consultant Environmental Preparer**
  - Fills out column 3 and submits to MassDOT at 25%
Step 1: MassDOT Reviews Project

- MassDOT Environmental Representative conducts desktop review
Step 2: MassDOT Presents Findings at Scoping

- MassDOT Environmental confirms findings with Project Team at scoping session
- MassDOT Environmental distributes ERC to PM and consultant
- MassDOT Environmental populates Pinfo
Step 3: Consultant Completes ERC and Submits at 25%

- Consultant responds to MassDOT findings and provides supplemental attachments
ERC Section 1: Project Details

- Highlights key project info such as project name & number, Environmental Representative, and scoping session date.

<table>
<thead>
<tr>
<th>Project Details (MassDOT ER to populate)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Name:</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Project Number:</strong></td>
<td><strong>MassDOT Project Manager:</strong></td>
</tr>
<tr>
<td><strong>Consultant:</strong></td>
<td><strong>Consultant Project Manager:</strong></td>
</tr>
<tr>
<td><strong>Environmental Representative:</strong></td>
<td><strong>Scoping Session Date:</strong></td>
</tr>
<tr>
<td><strong>ProjectInfo Populated/Documentation Saved Date:</strong></td>
<td><strong>ProjectInfo Updated/Documentation Saved Date:</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Certification (Consultant to populate)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consultant Project Manager Certification (sign and date):</strong></td>
<td><strong>Consultant Environmental Preparer Certification (sign and date):</strong></td>
</tr>
</tbody>
</table>
ERC Section 2: Summary of Permits

- Briefly addresses all possible reviews and permits at a high level
- Can be used to quickly reference a project’s environmental needs
ERC Section 3: Detailed Questions

- Addresses specific review considerations
- Often requires quantitative impact estimates from Consultant and input from Subject Matter Experts (SME)
ERC Section 4: Attachments

- Provides list of figures and attachments for consultant to provide at 25%
- Includes EJ outreach and NLEB analysis instructions

**MEPA EJ ANALYSIS AND OUTREACH INSTRUCTIONS**

If MEPA documentation is required and the project is subject to MEPA’s EJ Protocols and amended regulations, effective January 2022, include an EJ analysis and outreach plan in Attachment C in compliance with MEPA’s Public Involvement Protocol or Project Impacts on EJ Populations. This information must

**NORTHERN LONG-EARED BAT INSTRUCTIONS**

If the Northern Long-eared Bat is determined through IPaC to potentially occur with the project limits, please complete a) through j):
Where Do I Find the ERC?

• ERC Template available on MassDOT Environmental Webpage

• Questions can be submitted to MassDOTEnvironmental@dot.state.ma.us
The Massachusetts Rivers & Roads Training Program
MassDOT Rivers & Roads Collaboration
MA Rivers & Roads Program

1. Classroom and field trainings about river shape and processes, and resilient infrastructure design
   1. 2024 trainings: AUGUST 20-21, SEPTEMBER 4-5, SEPTEMBER 25-26

2. Field guide (in progress)
   1. Bankfull channel measurement field form and application

3. Video mini-series (MassDOT YouTube Channel)

4. Project implementation assistance using the principals of fluvial geomorphology

5. Pre-scoping field trips to guide design in a more cost-effective way where river-road conflict areas exist
MA Rivers & Roads Program

Total: 44

- MassDER, 16
- MassDEP, 14
- MassDCR, 6
- MassWildlife, 5
- MassDFG, 1
- MEPA, 1
- MEMA, 1
MA Rivers & Roads Program
Culvert with Stream Simulation

Provide for bed material comparable to natural channel and that results in similar depths and velocities at a variety of flows.

1.2 x Bankfull Width

(310 CMR 10.00: Wetlands Protection Act Regulations, 2017; As referenced in the draft MassDOT Stream Crossing Guidelines)
Undersized Culverts are Everywhere

Size of Assessed Massachusetts Culverts (839 culverts)

<table>
<thead>
<tr>
<th>Culvert Size (% of Bankfull Channel Width)</th>
<th>Number of Culverts</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50</td>
<td>80.5%</td>
</tr>
<tr>
<td>50-75</td>
<td>14.5%</td>
</tr>
<tr>
<td>75-100</td>
<td>3.8%</td>
</tr>
<tr>
<td>100-125</td>
<td>0.2%</td>
</tr>
<tr>
<td>&gt; 125</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

Size of Assessed Vermont Culverts (2017) (11,433 culverts)

Size of Assessed Piscataquog River Culverts (2013) (361 culverts)

(MMI, 2016)
Smaller Culverts Get Damaged More

Percentage of Structures Damaged by Structure Width

(MassDOT, UMass, MMI, 2017)
Why Bankfull?

• GREATER FLOOD RESILIENCY
  – Allow design flood plus sediment and large wood to pass through bridge or culvert.
  – Greater channel stability if bed forms can pass through bridge or culvert.
  – Bankfull width bridges and culverts tend to fail less in floods.

• IMPROVED FISH AND WILIFE PASSAGE
  – Larger bridges and culverts tend to be more invisible in terms of fish passage and wildlife passage.
  – Larger structures allow space for bank lines or shelves for wildlife passage.

• MEET STATE AND FEDERAL STANDARDS
  – Structure width $\geq 1.2 \times$ bankfull channel width.
  – Naturalize channel bottom sediment and hydraulics.
### MASSDOT BANKFULL FIELD MEASUREMENT FORM (REVISED 2/19/2024)

**BACKGROUND**
- PROJECT ID: 513592
- TOWN/CITY: Topsfield
- ROAD NAME: Salem Road
- STREAM NAME: Ipswich River
- OBSERVATION DATE/TIME: 2/16/24 11:00 AM
- BRIDGE/CULVERT ID: ?
- STRUCTURE LOCATION: Near River Road
- OBSERVER/COMPANY: Roy/SLR Consulting

**DESKTOP BANKFULL ESTIMATE FROM STREAMSTATS**
- WIDTH (FEET): 25.9
- DEPTH (FEET): 3.4
- CROSS SECTIONAL AREA (SQUARE FEET): 202
- DRAINAGE AREA (SQUARE MILES): 88.7
- FLOW (CFR): 897

**EXISTING STRUCTURE MEASUREMENTS (HYDRAULIC OPENING AT BANKFULL)**
- WIDTH (FEET): 63
- EFFECTIVE WIDTH (FEET): same
- HEIGHT (FEET): ?

**BANKFULL MEASUREMENTS (FEET)**

<table>
<thead>
<tr>
<th>ID</th>
<th>WIDTH</th>
<th>DEPTH</th>
<th>UPSTREAM</th>
<th>DOWNSTREAM</th>
<th>NOTES (LOCATION, MEASUREMENT QUALITY, BANKFULL INDICATORS, PHOTO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>82</td>
<td></td>
<td></td>
<td></td>
<td>136' DS of bridge, perennial trees and sediment shelf</td>
</tr>
<tr>
<td>2</td>
<td>104</td>
<td></td>
<td></td>
<td></td>
<td>215' DS of bridge</td>
</tr>
<tr>
<td>3</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
<td>170' US of Route 1 embankment. Seems confined by fill.</td>
</tr>
<tr>
<td>4</td>
<td>82</td>
<td></td>
<td></td>
<td></td>
<td>Across from #15 River Road. Trees on banks.</td>
</tr>
<tr>
<td>5</td>
<td>81</td>
<td></td>
<td></td>
<td></td>
<td>Hydrant upstream of #15 River Road. Trees on bank.</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Broad floodplain. Salem Road blocks floodplain.</td>
</tr>
</tbody>
</table>

**RECOMMENDED DESIGN BANKFULL WIDTH (FEET):** 82

**% BANKFULL WIDTH (RELATIVE TO EXISTING STRUCTURE WIDTH):** 0.6

**1.2 x DESIGN BANKFULL WIDTH (FEET):** 98

**MEASUREMENT METHOD:**
- ✔ Laser range finder
- ✔ Tape measure
- ✔ Survey

**NOTES:**
- LOCATION: Mark on map, distance from structure, GPS coordinates, closest wetland flag.
- MEASUREMENT QUALITY: Good, constrained, over-wide, other.
- BANKFULL INDICATORS: Sediment deposits, shelf next to channel, large trees, small trees and shrubs, point bar, other.
- PHOTO: Photo at measurement location?
Bankfull
Bankfull
Bankfull - Maximum Extent Practicable Analysis

MA WPA 310 CMR 10.53(8)

- The potential for downstream flooding;
- Upstream and downstream habitat (in-stream habitat, wetlands);
- Potential for erosion and head-cutting;
- Stream stability;
- Habitat fragmentation caused by the crossing;
- The amount of stream mileage made accessible by the improvements;
- Storm flow conveyance;
- Engineering design constraints specific to the crossing;
- Hydrologic constraints specific to the crossing;
- Impacts to wetlands that would occur by improving the crossing;
- Potential to affect property and infrastructure; and
- Cost of replacement.
Streambed Restoration Specification

Number of MassDOT Projects w/Streambed Spec

Number of Projects

Year


Number of MassDOT Projects w/Streambed Spec

massDOT
Massachusetts Department of Transportation

U.S. Department of Transportation
Federal Highway Administration
Streambed Restoration Specification

Route 20
Charlton
(SLR, 2023)

Route 20
Charlton
(Pavo, 2023)
Streambed Restoration Specification
Streambed Restoration Specifications

Hamlin Street 10/17/24 and 11/28/24
Streambed Restoration Specification

<table>
<thead>
<tr>
<th>Stone Size (mm)</th>
<th>Stone Size (Inches)</th>
<th>Particle*</th>
<th>% Finer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.024</td>
<td>40</td>
<td>Medium boulder</td>
<td>100</td>
</tr>
<tr>
<td>256</td>
<td>10</td>
<td>Very large cobble</td>
<td>90</td>
</tr>
<tr>
<td>64</td>
<td>2.5</td>
<td>Very coarse gravel</td>
<td>42</td>
</tr>
<tr>
<td>0.5</td>
<td>0.02</td>
<td>Coarse sand</td>
<td>9</td>
</tr>
</tbody>
</table>

The streambed material shall be approved by the Resident Engineer and Geomorphologist prior to use.
To sign up for the Rivers and Roads Training or for FGM technical assistance on a project contact:

David Paulson
Wildlife and Endangered Species Unit Supervisor
MassDOT Highway Division, Environmental Services
david.j.paulson@state.ma.us
Introducing:
The MassDOT Stormwater Design Guide (SDG)

May 1st, 2024
Who You’ll be Meeting Today

Maria Briones
MassDOT Stormwater Management
Program Supervisor

Lauren Caputo
Senior Water Resources Engineer at VHB
Today’s Presentation

- MassDOT’s Stormwater Program
- Scope and Benefits
- SDG content (Chapters 1 – 4)
- Takeaways
Background, Scope, and Benefits
Notable Events in Shaping MassDOT’s Stormwater Program

1997: MassDEP issues 1997 Stormwater Policy


2003: EPA issues 2003 MS4 Permit

2005: MassHighway and the Mass Turnpike Authority become MassDOT

2007: MassDEP issues 2008 Stormwater Standards as regulations

2009: MassDOT’s Impaired Waters Program begins due to CLF lawsuit

2011: MassDOT implements stormwater retrofits through Impaired Waters Program

2013: MassDOT releases 2013 Stormwater Design Guide

2015: MassDEP issues 2015 Stormwater Standards as regulations


2023: MassDOT releases 2023 Stormwater Design Guide
Scope and Benefits

✔ Incorporates latest regulations and policies, including the water quality treatment credits

✔ Consolidates relevant guidance

✔ Includes approaches for linear projects and addresses constraints (e.g., MassDOT Macro Approach)

✔ Incorporates practitioner experience
What the SDG Does NOT Cover

• Closed drainage design
  ➔ MassDOT PDDG

• Flooding and drainage vulnerability
  ➔ MassDOT vulnerability framework is under development

• Erosion and sediment controls
  ➔ MassDOT PDDG and MassDEP guidance

• Illicit Discharge Detection and Elimination
  ➔ MassDOT Drainage Connection Policy & SOP

• O&M and source controls
  ➔ MassDOT Programmatic O&M Plan is under development

• Anticipated regulatory changes
  ➔ MassDEP Stormwater Standards
  ➔ EPA's TS4 Permit
SDG Content

Chapter 1: Introduction
Chapter 2: Regulatory Requirements
Chapter 3: Integrated Site Design
Chapter 4: Stormwater Control Measures
Chapters 1 and 2 – Introduction and Regulatory Requirements

- Importance of stormwater management
- Pollutants in stormwater runoff

- Regulatory requirements
  - Federal
  - State

- MassDOT policies and approaches
  - Drainage Tie-in Policy
  - Templates, WQDF, SCM Water Quality Curves
  - Macro Approach
  - Application of regulations to MassDOT projects

Relationship between impervious cover and surface runoff © EPA
Chapter 3 – Integrated Site Design

- ISD is an iterative process
- Context, objectives, and design solutions are refined as project moves through design
- Design solutions are a mix of LID and structural SCMs
- LID should be first maximized throughout the site before structural SCMs are implemented
Chapter 3 – Integrated Site Design

Urban Setting

1. Preserve existing street trees.
2. Minimize impervious cover using pervious median.
3. Integrate stormwater treatment into traffic calming and pedestrian safety features, such as bioretention curb bump-outs.
4. Disconnect pavement where possible, such as grading sidewalks to drain to a qualifying pervious area or vegetated filter strip.
5. Include underdrain in porous pavement sidewalks where site conditions preclude infiltration.
7. Select small-footprint SCMs like leaching basins to overcome space constraints.

Highway Setting

1. Disconnect pavement where possible to a qualifying pervious area or vegetated filter strip.
2. Preserve existing trees and vegetation.
3. Grade in vegetated linear practices with check dams to slow flow and promote infiltration.
4. Relocate outfall to vegetated upland area if not able to direct runoff to a stormwater control measure.
5. Protect wetland resource areas.
6. Locate treatment in existing open areas where possible.
7. Maximize treatment capacity with infiltration measures, such as an infiltration basin with sediment forebay.
8. Establish and maintain vegetation to stabilize roadway embankment.
Chapter 4 – Structural Stormwater Control Measures

- **Description**
- **Additional info:**
  - Accessories
  - Pretreatment
  - Siting and design criteria
  - Storage volume
  - Design references
Takeaways
Takeaways on the SDG

- Brings focus to how MassDOT projects can best comply with state and federal stormwater regulations
- Provides guidance on structural SCMs for MassDOT corridors
- Promotes a holistic approach (i.e., site planning)
- One of MassDOT’s several tools to implement statewide stormwater management focused on improving water quality

Find the MassDOT SDG (and other resources) here: [https://www.mass.gov/info-details/stormwater-management-unit](https://www.mass.gov/info-details/stormwater-management-unit)
Contact Info

Email: Maria.b.briones@dot.state.ma.us

Phone: 857-275-7253

Website: https://www.mass.gov/info-details/stormwater-management-unit
Wetlands Checklists

Types and Resources:
• Notice of Intent (Wetlands Protection Act) Checklist
• Joint 401 Water Quality Certification and Pre-Construction Notification Checklist
• MassDEP Chapter 91 Template Plans
• Landscape Design and Roadside Maintenance Guidance

Purpose:
• Efficiency
• Completeness
• Consistency
Where to Find

- MassDOT Highway Project Development Tools Webpage
- MassDOT Wetlands and Water Resources Webpage
MassDOT Notice of Intent Application Checklist

Notice of Intent Application Checklist

Revised January 2024

Purpose: The purpose of this checklist is to ensure that Notice of Intent (NOI) applications are complete and contain the information and data necessary for Conservation Commissions and the Massachusetts Department of Environmental Protection (MassDEP) to process applications in an efficient manner. This checklist also enables Massachusetts Department of Transportation Highway Division (MassDOT) staff to efficiently review the quality and completeness of applications.

Instructions: The party responsible for preparing the NOI for MassDOT review shall complete and sign this checklist. This checklist should be included with draft permit application(s) submitted to MassDOT for review and comment prior to filing. The checklist should not be included in the application submittal to the Conservation Commission and MassDEP.
MassDOT Joint Water Quality Certification and Pre-Construction Notification Application Checklist

401 Water Quality Certification
U.S. Army Corps of Engineers Section 404
Joint Permit Application Checklist

Revised January 2024

Purpose: The purpose of this checklist is to ensure that applications for 401 Water Quality Certification (WQC) and/or Section 10/404 General Permit or Individual Permit authorizations are complete and contain the information and data that is necessary for the U.S. Army Corps of Engineers (USACE) and the Massachusetts Department of Environmental Protection (MassDEP) to process the applications in an efficient manner. This checklist also enables Massachusetts Department of Transportation Highway Division (MassDOT) staff to efficiently review the quality and completeness of applications prepared on its behalf by its consultants before the applications are filed.
Required with Permit Application Submittals to MassDOT

APPROVALS
Design engineer / consultant confirming completeness of checklist & application:

Signature ____________________________
Name ________________________________
Date ________________________________

MassDOT Wetlands Unit Reviewer confirming completeness of checklist & application:

Signature ____________________________
Name ________________________________
Date ________________________________

☐ APPROVED BY MASSDOT FOR FILING
TABLE OF CONTENTS

- MassDOT Guidance
- MassDOT Landscape and Environmental Special Provisions
- Seed Mixes
- Plant Care & Management
- Invasive Plant Management
- Resources
More Information

Comments/questions can be submitted to MassDOTEnvironmental@dot.state.ma.us