MA Endangered Species Act: MassDOT Case Studies in Early Coordination

MACC Webinar
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MassDOT Highway Division
Presentation Overview

*Early coordination design approaches and strategies for:*

- Aquatic habitat restoration and connectivity
  - Stream crossing projects
  - Roadway embankment projects
  - Turtle protection & passage
Early Coordination & Holistic Approaches

Early Coordination
• Planning Phase
• Pre-25% Design

Fluvial Geomorphology – The science of understanding river and stream-channel responses to both human-induced and natural disturbances.

• Predict stream channel responses to alterations in a watershed, and in turn how these changes will impact human infrastructure and aquatic habitat.

Soil Bioengineering (“Bioengineering”) – The use of plant material, living or dead, to alleviate environmental problems such as shallow, rapid landslides and eroding slopes and stream banks.
Stream Crossing Projects
MassDOT Stream Crossing Handbook

- Guidance on meeting MA River & Stream Crossing Standards; constraints analysis; conceptual design guidance; municipality guidance; climate change resiliency
MassDOT Stream Crossing Handbook

Adapted from Gubernick, 2003
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<th>Likely to exceed standards</th>
<th>Valley Span</th>
<th>Replacement, New</th>
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**Likely to exceed standards**
- Valley Span Replacement, New

**Likely to partially meet standards**
- Stream Span Replacement, New
- Stream Simulation

**Likely to meet standards**
- Bridge Replacement with Retained Abutments
MassDOT Stream Crossing Handbook & Standard Plan Drawings

ELEVATION
SCALE: 1" = 4'
I-90 over Peebles Brook, Blandford
North Fitzwilliam Road over Lawrence Brook, Royalston
INSTALL WILDLIFE PASSAGE BENCH AT TOP OF BANK ADJACENT TO BRIDGE ABUTMENT (SEE NOTE 4)

1' LAYER OF NATURAL STREAM BANK MATERIAL

FILL VOIDS IN RIPRAP WITH FINER AGGREGATE

ELEVATION PROFILE: ADJACENT TO ABUTMENT WILDLIFE PASSAGE BENCH
Wildlife Passage Bench Design
MassDOT Rivers & Roads Training Program
MassDOT Rivers & Roads Training Program

November 13, 2019 - Middleborough Town Hall

November 14, 2019 - Westford Highway Department

November 19, 2019 - MA Wildlife Field Headquarters, Westborough

November 20, 2019 - Westfield State University

November 21, 2019 - Skyline Country Club, Lanesborough

Click Here for Rivers & Roads Training Workshop Registration
Roadway Embankment Projects:

Early Coordination & Fluvial Geomorphology
Stream Bank Stabilization, Little River, Westfield Maintenance Depot

- Eroding stream bank
- Salt facility ~35’ from bank
- Pavement undercut
- Asphalt from parking area falling into river
Stream Bank Stabilization, Little River, Westfield Maintenance Depot
Stream Bank Stabilization, Little River, Westfield Maintenance Depot

- Increased floodplain
- Bioengineered bank
Stream Bank Stabilization, Little River, Westfield Maintenance Depot

J-Hooks to redirect flow away from bank
Pre-existing top of embankment
New embankment with increased floodplain
Habitat Restoration: SR 116 Retaining Wall, South River, Conway
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- Brook Trout, Atlantic Salmon, Longnose Sucker, Wood Turtle
- Other fish species & invertebrates (food sources)
Habitat Restoration: SR 116 Retaining Wall, South River, Conway

Historic Floodplain

Design approach:
- Restore BFW - reduce peak flows
- Deflect thalweg away from wall
- Install resilient habitat features
Habitat Restoration: SR 116 Retaining Wall, South River, Conway

Conceptual design schematic—marginal log jam

Cross section view

Longitudinal view

Plan view structure dimensions

Active channel

Keyed into bank

8 ft. 12 ft.

7 ft. logjam above grade 3 ft. logjam below grade 4 ft. footer boulders

20 ft. 20 ft.
Habitat Restoration: SR 116 Retaining Wall, South River, Conway

Longitudinal view

- Excavated trench
- Vertical log pile
- Stream bed surface

Notes:
- Vertical log pile driven to refusal depth

Legend:
- Loam
- Mix of angular rip rap and rounded stone approximating local bed material

Note: view looking upstream
Habitat Restoration: SR 116 Retaining Wall, South River Conway
Habitat Restoration: SR 116 Retaining Wall, South River Conway
Alternatives to Rockfill Slopes
Vegetated Rockfill Slopes
Turtle Protection & Passage
The Turtle Road Mortality Problem
Short Term Protection: Fencing
Long Term Planning & Roadway Design: Turtle Tunnels w/Fencing
Questions?

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