Building town capacity for improving road-stream crossings in Massachusetts

Timothy Chorey
Stream Continuity Specialist
Timothy.Chorey@state.ma.us

Kristen Ferry
Restoration Specialist/Continuity Program Manager
Kristen.Ferry@state.ma.us
Stream Continuity Program
Est. 2014

Westfield Brook – Windsor, MA (DER)
Massachusetts Situation

- 351 Municipalities
- 30,000 culverts
- 30,000 miles of roads
- Mostly town owned, maintained & managed.
Stream Continuity Program
Est. 2014

Program Goal
Increase the State-wide capacity for culvert replacement

Westfield Brook – Windsor, MA (DER)
Massachusetts Stream Crossing Standards, 2011

- 0.82 Openness ratio
- Open arch
- Large span, 1.2x bankfull width
- Natural substrate
- 2 feet Embedment
- Banks, dry passage
- Comparable depth and velocity, up & downstream
Massachusetts Situation

MA Stream Crossing Standards promulgated into regulations

- MA Wetland Protection Act – 2014
- MA Army Corp of Engineers – 2005
Few culvert projects have been completed that meet MA Standards.
Identify the Barriers

Conducted a state-wide needs assessment.

Status Quo & Barriers to Implementation

Survey Respondents

- 131 Communities responded
- 37% of Massachusetts

Identifying Municipal Needs for Replacing Culverts

The MA Division of Ecological Restoration (www.mass.gov) is developing a state-wide program to help cities and towns replace failing or undersized culverts with structures that incorporate the new MA Stream Crossing Standards. See link below. Research has shown that culverts meeting the stream crossing standards hold up better during floods, are more cost-effective for municipalities in the long-term, and restore river health. Your response to this survey will help us shape this program and the type of assistance and materials we will offer.

Your time and input are greatly appreciated. The survey should only take 5-10 minutes to complete. We would appreciate your response by June 25th, 2015. Please feel free to forward this survey to fellow road managers and community decision makers to spread awareness. Thank you!

Please feel free to contact me:
Tom Chuney
Stream/Continuity Specialist
1271 Causeway St. Suite 400
Boston, MA 02114
Email: (617) 626-1551
Tom.Chuney@state.ma.us

A link to a summary of the MA Stream Crossing Standards:

Legend
TOWNS
- Did Not Respond
- Survey Respondents
Needs Assessment Summary

Primary Barriers to Implementation
- Cost (Construction and Design)
- State Engineering Review
- Environmental Permitting.
Needs Assessment Summary

Primary Barriers to Implementation
- Cost (Construction and Design)
- State Engineering Review
- Environmental Permitting

PROCESS
Use Training Sites to Build Capacity
Use Training Sites to Build Capacity
Use Training Sites to Build Capacity

3 Phases of The Project Process

1) Site/River Assessment

2) Design & Permitting

3) Construction
Phase 1 Training
Site/River Assessment
Phase 1 Training:
Site/River Assessment

**TEST BORING LOG**

**SOIL EXPLORATION CORP.**
Geotechnical Drilling
Groundwater Monitoring Wells
138 Pioneer Drive
Leominster, MA 01453
978-140-2791

**Ground Elevation:**

<table>
<thead>
<tr>
<th>Date Started</th>
<th>Date Finished</th>
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</thead>
<tbody>
<tr>
<td>May 5, 2016</td>
<td>May 5, 2016</td>
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</table>

**Soil Engineer/Geologist:**
GG

**Comprehensive Environmental Site:**

<table>
<thead>
<tr>
<th>Site</th>
<th>Culvert</th>
</tr>
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<tbody>
<tr>
<td>Clark Road</td>
<td>Spencer, MA</td>
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**PROJECT NO:** 16-00508

**DATE:** May 6, 2016

**GROUNDWATER OBSERVATIONS**

<table>
<thead>
<tr>
<th>DATE</th>
<th>DEPTH</th>
<th>CASING</th>
<th>STABILIZATION</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
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</table>

**Test Boring Log Boring B-2**

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Casing</th>
<th>No.</th>
<th>Topo/</th>
<th>Sample</th>
<th>Depth</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 6'</td>
<td>1</td>
<td>13'</td>
<td>6'-6&quot;</td>
<td></td>
<td>6-10-10-14</td>
<td>6&quot;</td>
</tr>
<tr>
<td>5 4'</td>
<td>2</td>
<td>3'</td>
<td>5'-6&quot;</td>
<td>5'-6&quot;</td>
<td>5-6-6</td>
<td>4&quot;</td>
</tr>
<tr>
<td>10 9.5'</td>
<td>3</td>
<td>10'</td>
<td>10&quot;-12'</td>
<td></td>
<td>7-18-18-18</td>
<td>9.5&quot;</td>
</tr>
<tr>
<td>15 9.0'</td>
<td>4</td>
<td>13'</td>
<td>15'-17'</td>
<td></td>
<td>9-24-17-17</td>
<td>9.0&quot;</td>
</tr>
<tr>
<td>20 8.5'</td>
<td>5</td>
<td>13'</td>
<td>20'-21'</td>
<td>40-55-600'4</td>
<td>20'-21'-4&quot;</td>
<td>8.5&quot;</td>
</tr>
<tr>
<td>25 8.0'</td>
<td>6</td>
<td>0</td>
<td>22'-22'</td>
<td>50-11'</td>
<td>50'-11'</td>
<td>8.0&quot;</td>
</tr>
</tbody>
</table>

**Visual Identification of Soil and/or Rock Sample:**

- Asphalt
- Medium dense, dry, fine to coarse sand and gravel, trace silt.
- Somewhat saturated, peat
- Medium dense, wet, fine to medium sand and silt.
- Dense to very dense, wet, fine to coarse sand and gravel, cobbles, some organic silt.
- End of boring at 22'-6"; Refilled with sugars.
- Water encountered at 4" upon completion.

**Notes:** Hollow Stem Auger Size - 4 1/4"
Phase 1 Training: Site/River Assessment

Where to Survey

From Knighton, 1998

(Photo - Dave Nyman)
Phase 1 Training: Site/River Assessment

Long Profile and What its used for.

- Importance
  - Long Profile Stream Shape
  - Vertical Adjustment Potential (VAP)
  - Size and Frequency of Stream Features
Phase 1 Training:
Site/River Assessment

Surface Pebble Count, Trib to Bear Creek- Ashfield, MA

- D<sub>50</sub>:
  - 0.01 mm
- D<sub>84</sub>:
  - 1 mm

(Photos - Dave Nyman)
Phase 1 Training
Site/River Assessment

(USDA Stream Sim)
Phase 1 Training:
Site/River Assessment

Good field notes
Phase 1 Training:
Site/River Assessment

Getting into the River
Phase 1 – Site/River Assessment Tools

Examples and Templates

Structure Selection Evaluation
Phase 1 - Site/River Assessment

1) Examples and Templates

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**Bid Request**

Click here to enter Project Name

Click here to enter your town, MA

TO: Click to enter Bidder’s name

FROM: Click here to enter name.

RE: Culvert Replacement Site Assessment Request for Proposals

DATE: Click here to enter a date.

The Enter Department and Town is requesting bids for technical services as described below under section III, Project Specifications for Enter project name in Enter town name, MA.

This Bid Request presents a general proposed sequence of work with an expectation that responding firms will express their own project approaches. Bidders will be evaluated based upon their demonstrated experience with scientific river assessments and data collection and engineering culvert replacements that meet the MA River and Stream Crossing Standards, project examples, technical and management approach to this project, timeline for completed work, and cost effectiveness.

*Enter town name* anticipates execution of a contract in *Enter Month* of *Enter year* for services through *Enter end of contract date*.

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I. PROJECT LOCATION

<table>
<thead>
<tr>
<th>Site #</th>
<th>Location</th>
<th>Type of site</th>
<th>GPS Coordinate</th>
<th>Desired technical</th>
</tr>
</thead>
</table>
Phase 1 - Site/River Assessment

2) Structure Selection Evaluation

4 Considerations:
1) Cost
2) Site
3) Hydraulic
4) Geotechnical
Next Steps

Fall 2016
- 2 New Training Sites for Site/River Assessment
- Continue Ashfield into Designer
- Improve crossings in coldwater streams with support from NFWF
Lessons Learned

- More Trainings are needed
  - Local Highway Directors
- Work Closely Surveyors
- Expect Stormwater Improvements
Stay Tuned...

Tim Chorey
Timothy.chorey@State.ma.us