Designing Stream Crossings in the 21st Century

Governor and Council Breakfast
March 25, 2015
THE CULVERT SITUATION

- Infrastructure is aging
- More people = more houses and pavement = more runoff
- Weather patterns have changed
- Culvert Failures
THE CULVERT SITUATION

Results:

• Public safety
• Repair/Replacement
• $$$

Communities/DOT are asking for help
INVESTMENT

It’s not a question of IF we’ll pay

It’s a question of WHEN we’ll pay

We can plan ahead & get where we want to go

**Anticipatory**

We can incur damages, clean up, loss of new infrastructure

**Reactionary**

$1.00

$4.00

TODAY’S AGENDA

• NH Storm Event Data
• Examples of the Problem
• DES Regulations
• DOT Perspective
• New ways the state is assisting communities/DOT
RECENT FLOODING IN NEW HAMPSHIRE

- NH has seen dramatic increase in precipitation & flooding over the last decade.

- Since 2005, flooding and its effect on rivers has caused at least $91.1 million in damages, and 4 fatalities.
Dover – April, 2007
Federal Expenditures on Presidentially Declared Disasters & Emergency Declarations in NH

1998: Ice Storm
2005: Alstead/Keene Floods (Oct)
2006: Mother’s Day Flood (May)
2007: Patriots Day Flood (April)
2008: Tornado; Floods; Ice Storm
2010: Windstorm; Floods
2011: Irene
2012: Flooding; Sandy

Data from: www.fema.gov/disasters/grid/state-tribal-government
EXAMPLES OF THE PROBLEM, ALSTEAD, 2006
Any Municipal or State employee can become certified provided they:

- Attend the approved T2 course and pass the exam
- Or, hold a PE license

273 individuals certified to date (over two years of program)

Certified Individuals may maintain, repair, or replace culverts up to and including 48" in dia. (or hydraulic equivalent)

- May increase size by up to 50% (48" max.)
- May extend up to 10 feet each end
- May adjust angle to improve flow
- Does NOT have a history of being overtopped (must consult a PE for redesign)

Certified Culvert Maintainer must:

- Utilize Best Management Practices
- File Quarterly Work Summary to NHDES
- Be certified or recertified every two years

NHDES Wetlands Permit Applications Received to Replace or Upgrade Culverts and Bridges Per Year:
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From NHDOT: 30
From Municipalities: 53

45 Emergency Authorizations issued to repair/ replace damaged crossings.
New Hampshire House Bill 648

Chapter 179 Laws of 2007

Comprehensive Flood Management Study Commission

Final Report

September 2008
HB 648 COMPREHENSIVE FLOOD MANAGEMENT
STUDY COMMISSION: KEY FINDING

NEED: ENSURE THAT BRIDGES AND CULVERTS ARE ADEQUATELY SIZED.

“DOT, DES and Fish & Game with input by the Nature Conservancy, should be tasked to develop the procedure and database for a standard culvert assessment data collection.”

HTTP://GENCOURT.STATE.NH.US/STATSTUDCOMM/REPORTS/1853.PDF
HB 648 COMPREHENSIVE FLOOD MANAGEMENT STUDY COMMISSION: KEY FINDING

**NEED:** ENSURE THAT BRIDGES AND CULVERTS ARE ADEQUATELY SIZED.

**Guidance for Wetlands Bureau Stream Crossing Rules:**

- 100-year frequency storm
- No increase in flood stages on abutting properties
- No adverse effect on channel stability
- Provide in-lieu fee mitigation option
PERMITTING BACKGROUND

• State permitting authority for impacts to state wetlands (and surface waters), since 1967

• Federal authority:
  • Federal Clean Water Act: Section 404-wetlands, 1972; Section 10 of the Rivers and Harbors Act of 1899
  • 1992 through 2012 - US Army Corps of Engineers’ NH Programmatic General Permit (PGP), updated and renewed every 5 years
21. Waterway/Wetland Work and Crossings

(a) All temporary and permanent crossings of waterbodies and wetlands shall be suitably culverted, bridged, or otherwise designed to withstand and to prevent the restriction of high flows, to maintain existing low flows, and to not obstruct the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction.

(b) Aquatic Life Movements. No activity may substantially disrupt the necessary life-cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity’s primary purpose is to impound water.

(c) All temporary and permanent crossings of rivers, streams, brooks, etc. (here on referred to as “streams”) shall conform to the “New Hampshire Stream Crossing Guidelines” when the State has adopted these guidelines as regulations. The Corps shall review projects under the Minor/Major or IP review procedures if conforming to the Guidelines is impractical. The Guidelines typically require bridge spans, open bottom arches or embedded culverts. Bridge spans are generally preferred.
PURPOSE OF STREAM RULES:

• Enhance public safety
  • Recent flood damages
  • Adapting to climate change

• Preserve functions and values of stream systems

• Wildlife and Fishery habitats

• Support restoration of degraded streams and improve aquatic life passage and sediment transport.
Stream crossings shall NOT:

• Be a barrier to sediment transport
• Restrict high flows
• Obstruct Aquatic Organism passage
• Cause Flooding
• Cause Erosion
• Degrade water quality degradation
• The applicant shall propose an alternative design if installing the structure specified in the applicable rule is not practicable.

  • Applies to existing AND new crossings
  • Submit a written request
  • Submit a technical report prepared by an environmental scientist or PE
  • Report explains how the proposed alternative meets the criteria for approval.
NHDOT Culvert Assessments

• Collect a pool of data on substandard State Highway stream crossings
• Provide NHDES compliant data to assess Aquatic Passage and Flood Damage
• Utilize information for mitigation option to replace deficient crossings for infrastructure condition and aquatic passage
NHDOT DATA COLLECTION

• Query maintenance personnel on trouble spots, Filter 1 Condition Report

• Collect NHDES compliant field data with Ipads

• Post collection data review and geo-referencing
“SADES”

STATEWIDE ASSET DATA EXCHANGE SYSTEM

• Cloud Based / ArcGIS Online
• Ipad, Web and Desktop applications
• WiFi / Cell Data / Ethernet Connection to the Cloud
• Multiple users using the same data, crowd-sourcing
WEB BASED
CLASSIC ARCGIS DESKTOP
NHDOT DATA ROUND UP

- NHDOT – 164 crossings
- DES – 269 crossings
- Regional Planning Commissions – 304 crossings
- Municipal crossings - 1,254

**Total:** 1,991 crossings on State Highways which include 508 named rivers
WHAT IS NHDES DOING?

• Partnered with UNHT2 to create Routine Roadway Culvert Certification program
• Developed ILF Stream Mitigation Option
• Continuing to assess stream crossings & problem areas.
NOTIFICATION FOR ROUTINE ROADWAY MAINTENANCE
ALLOWABLE PROJECTS

• DES has processed 1,000 Notifications to date
• Culvert Extension at the Same Location
  • Up to 10 feet at each end
  • Max single 48” culvert
• Culvert Replacement and Relocation
  • Max single culvert 48”
  • Can increase a smaller culvert up to 50% to a max of 48”
• Embankment Stabilization
• Headwall Repair, Replacement and Construction
• Roadside Ditch Maintenance and Culvert Cleaning
CULVERT MAINTAINER CERTIFICATION
PROGRAM OVERVIEW

- Any Municipal or State employee can become certified provided they:
  - Attend the approved UNHT^2 course and pass the exam
  - Or, hold a PE license
  - 273 individuals certified to date (over two years of program)
- Certified Culvert Maintainer must:
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ARM Funds have been awarded to assist communities to mitigate for flood and culvert failures:

- Town of Alton received $23,000 ($118,675 match)
- City of Dover received $440,000
- Francestown Land Trust received $237,000
- Manchester: NH Rivers Council received $65,400 ($134,800 match)
SOME SPECIFIC SOURCES OF FUNDS:

• DES - Aquatic Resource Mitigation (ARM) Fund & 319 funds (Federal)
• NH Fish & Game Moose Plate Program
• FEMA - Hazard Mitigation
• Federal Highway Administration, NOAA, NRCS
FOR MORE INFORMATION:

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