

## Development and Implementation of Culvert Outlet Diffuser to Improve Stream Flow

### PROJECT TITLE

Development and Implementation of Culvert Diffuser to Improve Stream Flow

### STUDY TIMELINE

June 2016 – June 2018

### INVESTIGATORS

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### FURTHER RESOURCES

<https://www.maine.gov/mdot/research/publications/>

### Introduction or Problem Statement

Existing pipe culverts are often hydraulically undersized due to increased rain intensities and drainage area changes. Culvert outlet diffusers can provide improved hydraulic capacity without having to totally replace the insitu culvert pipe.



### Methodology or Action Taken

Modelling and laboratory testing were completed to examine the potential of the culvert diffuser technology. Afterwards a field evaluation was conducted on an old 15" diameter culvert pipe in Thorndike, Maine. A fiberglass diffuser was manufactured, installed and tested. To our knowledge this was the first ever diffuser installed in a roadway application.

### Conclusions or Next Steps

Results of the study have shown a 40% increase in hydraulic capacity can be achieved with a properly designed diffuser. As a result, a second culvert pipe was fitted with a diffuser with similar positive results. A patent has been issued to MaineDOT and the researcher to ensure the diffuser technology will remain open to use and further development. We are investigating more cost-effective diffuser manufacturing using 3D printing technology at the University of Maine. Preliminary cost estimates are less than ½ the cost of fiberglass materials.

### Potential Impacts and Benefits

The culvert diffuser technology can increase hydraulic capacity by up to 40%. This means that existing under-sized pipes do not require expensive replacement, especially in deep fill situations. Also culverts that are being rehabilitated using sliplining can retain their hydraulic capacity if a diffuser is used. This potentially opens the use of sliplining to more conditions, again saving money by avoiding expensive replacements.