

MASSACHUSETTS

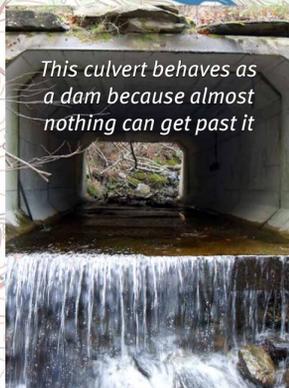
# stream crossings

*designs to restore stream continuity*

Stream continuity is critical to all creatures that depend on rivers and streams, including invertebrates, fish, amphibians, reptiles, and mammals. The design and condition of stream crossings determine whether a river behaves naturally and whether wildlife can migrate freely. Through the combined effects of dams and poorly designed stream crossings (certain culverts and bridges), we have fragmented rivers and streams and hindered wildlife dispersal throughout our watersheds. In many cases, even crossings that were once effective are now barriers because of river erosion or mechanical breakdown. Safe and stable stream crossings can accommodate wildlife and protect stream health while reducing expensive erosion and structural damage. By adhering to the crossing standards in the *Massachusetts Stream Crossings Handbook*, town conservation commissioners, highway departments, and town engineers can play a vital role in protecting and restoring stream continuity in Massachusetts.



*Crossings should be essentially "invisible" to fish and wildlife—they should maintain appropriate flow and substrate through the crossing and not constrict a stream.*



*This culvert behaves as a dam because almost nothing can get past it*



*Installing well-designed stream crossings will benefit fish and wildlife*



BRIDGE



OPEN-ARCH

## WELL-DESIGNED CROSSINGS

*(fish friendly)*



### KEY FEATURES

- Large sizes suitable for handling high flows
- Bridges and open-arch designs preferred under most conditions
- Crossings are wide and high relative to their length
- Greater than 1.2x bankfull width helps maintain dry passage for wildlife
- Water depth and velocity are comparable to conditions upstream and downstream
- Natural substrates create good conditions for stream wildlife

### EFFECTIVE CROSSINGS INCLUDE...

- Bridges
- Open bottom arches
- Culverts that span, and are sunk into, the streambed

## STREAM CROSSING PROBLEMS...

### UNDERSIZED CROSSINGS



Undersized crossings restrict natural stream flow, particularly during high flows, causing several problems, including scouring and erosion, high flow velocity, clogging, ponding and, in some cases, washouts. Crossings should be large enough to pass fish, wildlife, and high flows.

### SHALLOW CROSSINGS



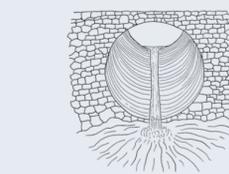
Shallow crossings have water depths too low for many organisms to move through them and may lack appropriate bed material. Crossings should have an open bottom or should be buried into the streambed to allow for substrate and water depths that are similar to the surrounding stream.

### PERCHED CROSSINGS

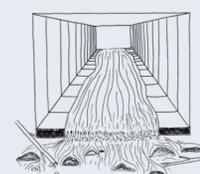


Perched crossings are above the level of the stream bottom at the downstream end. Perching can result from either improper installation or from years of downstream bed erosion. Crossings should be open-bottomed or sunk in the bed to prevent perching.

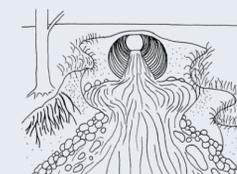
## ...AND COMMON CONSEQUENCES



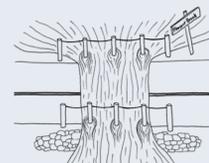
**LOW FLOW**  
Causes: Shallow or perched crossings



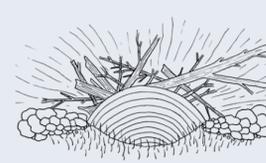
**UNNATURAL BED MATERIAL**  
Causes: Shallow or perched crossings



**SCOURING AND EROSION**  
Causes: Undersized or perched crossings



**HIGH FLOW VELOCITY**  
Causes: Undersized crossings



**CLOGGING**  
Causes: Undersized crossings



**PONDING**  
Causes: Undersized or perched crossings

### TO LEARN MORE

This poster is a companion to the *Massachusetts Stream Crossings Handbook*, produced by the Division of Ecological Restoration, Riverways Program. Please consult that publication for further information on stream crossings and design standards. The Stream Continuity website, maintained by UMass Extension, has up-to-date guidelines and crossing standards and information on crossing problems, the ecological importance of river continuity, and further resources. Staff at the Division of Ecological Restoration are also available to provide suggestions and guidance to improve fish and wildlife movement through stream crossings. Visit these web sites for more information on stream continuity:

Stream Continuity - UMass Extension [www.streamcontinuity.org](http://www.streamcontinuity.org)  
Division of Ecological Restoration [www.mass.gov/dfele/der/](http://www.mass.gov/dfele/der/)

### ACKNOWLEDGMENTS

The Division of Ecological Restoration, in the Department of Fish and Game, restores and protects the Commonwealth's rivers, wetlands, and watersheds for the benefit of people and the environment. The River Continuity Partnership is a collaborative effort with the Division of Ecological Restoration, the University of Massachusetts Extension, The Nature Conservancy, and other nonprofit and agency partners.



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