

# TOP FIVE CONCERNS WHEN REHABILITATING A CULVERT UTILIZED FOR FISH PASSAGE

Due to the complex infrastructure of roads, highways and interstates, more and more culverts are being accessed as a crossing by fish and other aquatic life. However, most culverts are not fully passable.

For a fish on an upstream migration to successfully negotiate a culvert, it must enter the culvert barrel, traverse the barrel length, exit at the upstream end and proceed to the first resting area. As such, many states are implementing recommendations and guidelines for improving the effectiveness and ecological impact for waterway crossings. Snap-Tite® provides solutions to address these concerns.

## TOP FIVE CONCERNS

- 1) THE JUMP (EROSION)
- 2) NATURAL BOTTOM STREAMBED
- 3) INCREASED WATER VELOCITY
- 4) DEBRIS BEING TRAPPED IN THE CULVERT
- 5) THE COST & DELAYS REQUIRED TO BUILD A BRIDGE



## Problem #1 – The Jump (Erosion)

*The 2003 Washington State Design of Road Culverts for Fish Passage report states "turbulence or downstream channel scour are the most prevalent blockages at culverts."*

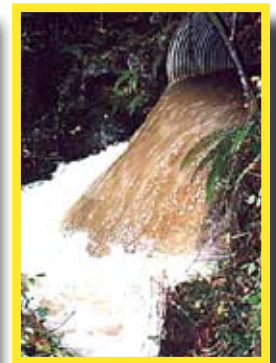
The jump fish must take from the stream into the culvert cannot be too extreme (as demonstrated in Photos 1.1, 1.2 & 1.3). Often when water from wider streams enters a narrower culvert, increased water velocity occurs, resulting in scouring of the streambed on the outlet side of the culvert. Culverts that are easily passable at the time of installation may not be passable a few years later. This occurs due to erosion, which is caused by years of rushing water exiting the culvert into the streambed base, and results in an impossible jump for fish migrating up stream.



*Photo 1.1*



*Photo 1.2*



*Photo 1.3*

**The Solution:** Snap-Tite provides a solution to this problem by incorporating a scour-resistant apron to its lining system, thus preventing the erosion from occurring. The apron absorbs the impact of the rushing water and spreads the forces. The apron allows the water to return to a more natural flow without impacting the surrounding environment. The apron is corrosion- and impact-resistant and easily restrained to assure it will remain intact at its installed location for years to come.

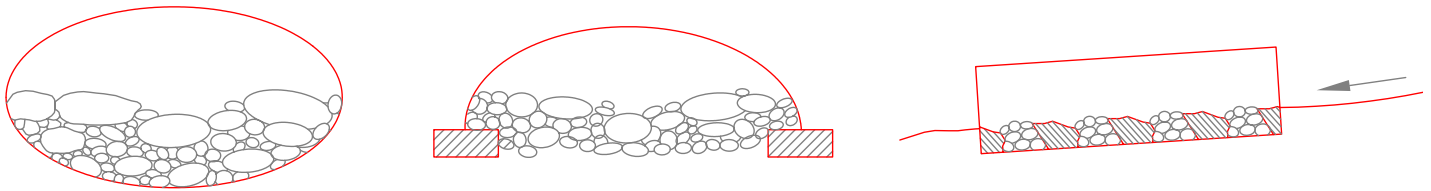


## Problem #2 – Natural bottom streambed

When possible some professionals suggest a natural bottom through the culvert to accommodate stress-free fish passage. In most cases it is best to use a stone native to the area in which the culvert resides.

**The Solution:** Snap-Tite offers the Natural Lining System as a solution to this concern. The Natural Lining System incorporates multiple lining options to line an existing culvert and retain a natural flow line of native stone. These designs allow great flexibility so they may be tailored to an individual location. Additionally, the Natural Lining System typically significantly reduces costs when compared to dig and replacement solutions, while providing a stream bed throughout the culvert bottom similar to the surrounding stream bed.

Also – see picture 2.4 and 2.5 below for an example of an arched pipe designed to rehab a culvert in New England.



Rendering 2.1



Photo 2.1



Photo 2.2



Photo 2.3



Photo 2.4

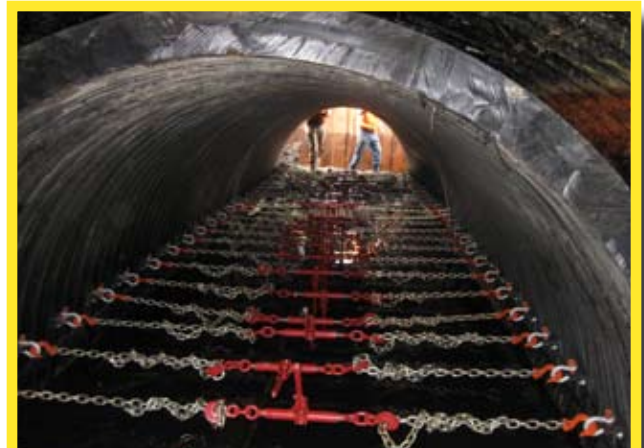


Photo 2.5

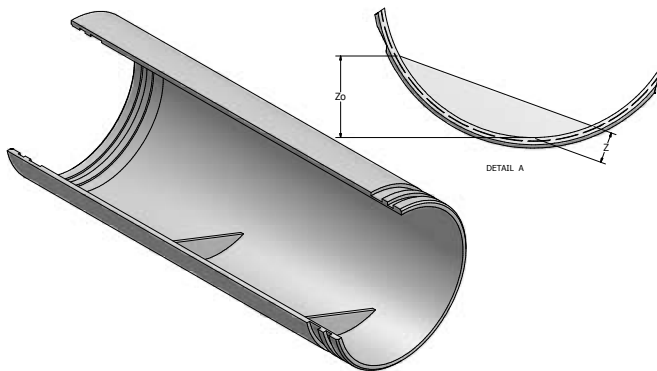
## Problem #3 – Increased water velocity

When a culvert is rehabilitated with a smaller liner the velocity of water traveling through the newly lined culvert is typically faster than the velocity in the old culvert. Increased velocity in the rehabilitated culvert may make it difficult for fish to pass through the culvert.

**The Solution:** Snap-Tite offers multiple solutions to assist fish in traversing a culvert. Snap-Tite pipe has been installed in numerous projects across the US with a wide variety of elements to ease the task for fish to pass. **If you can draw it, we can incorporate it** into your new culvert with a fully restrained and non-corrosive solution. Corrugated bottoms, weir designs and fish ladders have all been incorporated into a Snap-Tite lining system to reduce the flow velocity and/or provide resting areas for fish. Snap-Tite offer flexibility to match requirements to the needs required by both the fish and designing engineer.

### Baffle Designs

#### Corner Baffle Design



#### Notched Weir Baffle

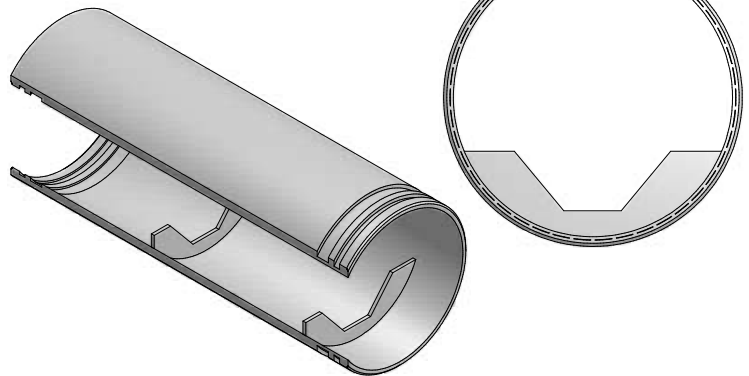


Photo 3.1

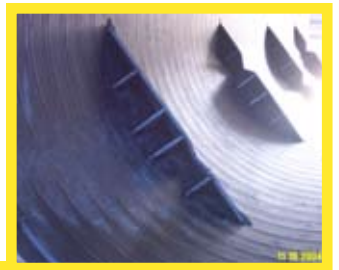


Photo 3.3



Photo 3.2



Photo 3.4

## Problem #4 – Debris being trapped in the culvert

Debris, and the blockages associated with its accumulation, are a problem common to many culverts. A two-tiered approach was found to provide the most effective solution to this issue. The first and most common approach is a regularly scheduled program of inspection, debris removal and culvert maintenance. The second approach is to construct and/or rehabilitate damaged or deteriorated culverts with a uniformly smooth pipe material with high flow characteristics and minimal potential for off-set joints. Long lengths of Snap-Tite are produced from extruded HDPE pipe with a extremely smooth interior surface that does not deteriorate over time.

Snap-Tite also uses a patented joining system which minimizes the number of joints required in a culvert. Each joint is “flush” thus minimizing potential points for debris accumulation.



*Photo 4.1*



*Photo 4.2*



*Photo 4.3*



*Photo 4.4*

## Problem #5 – Wanting to build a bridge instead.

Some DOT professionals have suggested that the only solution to poorly designed culverts is to replace them with open bottom bridges. This solution assures a nearly natural bypass of the roadways while protecting both the environment and the public. However, the cost to retrofit all existing problem culverts to open bottom culverts is impractical due to the high costs associated with this method. Beyond the costs, lengthy traffic delays caused by implementing a wholesale replacement of problem culverts would trigger even greater road safety concerns.

**The Solution:** Compared to a traditional culvert, the economically feasible Snap-Tite system offers the best solution for maintaining the advantages bridges provide for fish passage. The cost to build a bridge, faced with an existing problem culvert, is more than 20 times greater than rehabilitating it with the Snap-Tite solution. While agencies struggle to find the money for a bridge solution, generations of fish go unborn. Snap-Tite provides an opportunity to tackle at least 20 problem culverts for every one bridge retrofit. Even if this is considered as only a temporary solution for an open bottom bridge until the most critical culverts are addressed, generations of fish and aquatic organisms will benefit from the more cost-effective “temporary” solution. Additionally, the Snap-Tite system provides critical bypass or overflow capacity, which are needed if funds and permits ever become available for a complete bridge replacement. As a result, the Snap-Tite solution provides immediate relief to the ecosystem and long-term benefits to any future construction plans.



Photo 5.1



Photo 5.2