

Chapter 11

ISCO Aquatic Life Passage



ISCO A.L.P. (Aquatic Life Passage)

For many years fish and other aquatic organisms have migrated through culverts made with corrugated metal pipe (CMP). Installed as many as 50 years ago, numerous CMP culverts are so significantly rusted and near failure that water and fish have trouble effectively getting from one end to the other. A “fish-friendly” solution to these failing culverts that is economically feasible, quickly installed and non-disruptive to the motoring public is imperative. Relining these culverts has always been a possible and popular solution. However, most high density polyethylene (HDPE) pipes have a smooth interior wall. The smooth wall has an extremely low resistance to flow, consequently increasing water velocity and making it difficult for fish and other aquatic organisms to pass through.

Snap-Tite® now offers an interior open profiled HDPE pipe designed to enhance aquatic life passage. ISCO A.L.P.’s internal structure is comparable to that of CMP, but manufactured with a more durable material. Fish and other aquatic organisms can now migrate more easily through their physical environment but with a pipe constructed of HDPE, offering a much longer service life. The interior profiles act as “roughness elements” that decrease the flow velocity and allow for some silt and stream bed material to collect inside.

Additionally, Snap-Tite® can install available baffles to solve depth and velocity problems within a culvert during flow extremes. In low-flow situations, most baffles act as weirs to create small pools of standing water. As the flow increases, the water rises up over the baffles. The baffles help decrease flow velocity while creating resting areas for fish to use during high velocity water flow occurrences.

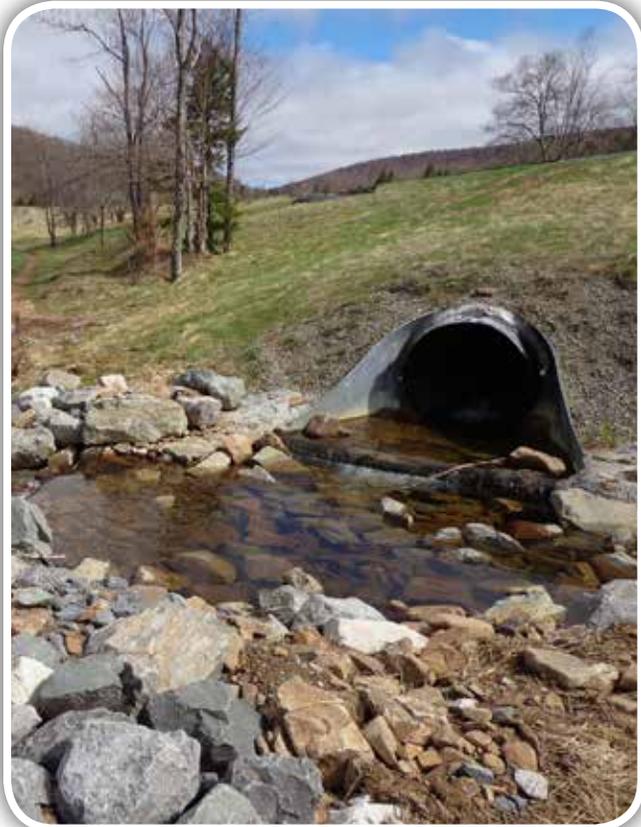


Table 11-1
ISCO A.L.P. Size Range

Nominal Pipe Diameter (Internal) Inches	Ring Stiffness Classifications RSC	Profile Type	Pipe OD Inches	Estimated Lbs./pipe
24	100	A.L.P.	28.72	366
	160	A.L.P.	28.72	366
30	100	A.L.P.	34.72	446
	160	A.L.P.	34.72	446
36	100	A.L.P.	40.72	526
	160	A.L.P.	40.72	526
42	100	A.L.P.	46.72	606
	160	A.L.P.	46.96	771
48	100	A.L.P.	52.96	738
	160	A.L.P.	53.12	995
54	100	A.L.P.	58.96	975
	160	A.L.P.	59.20	1309
60	100	A.L.P.	65.12	1227
	160	A.L.P.	65.35	1616
66	100	A.L.P.	71.75	1415
	160	A.L.P.	71.75	1996
72	100	A.L.P.	77.75	1719
	160	A.L.P.	77.75	2412
84	100	A.L.P.	89.75	2419
	160	A.L.P.	90.22	3530
96	100	A.L.P.	101.91	3383

** Typical values. Actual values may differ. Additional sizes available.*



More and more culverts are being accessed as a crossing by fish and other aquatic organisms; 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. Experts tend to agree that the most effective solution for creating unobstructed fish passages is to replace problem culverts with new crossing structures such as bridges or oversized and/or embedded culverts that are able to simulate a natural streambed bottom.

However, many agencies have concluded that due to the number existing culverts and the limited amount of public funds available, it is unlikely and/or impractical that every culvert that impairs fish passage will be removed and replaced with an adequate design. In situations where replacements are not practical or sensible, retrofitting a culvert

with baffles may be a reasonable measure to provide some passage improvements. Culvert retrofits are modifications to an existing culvert and/or stream channel in an attempt to reduce barriers and improve fish passage. Baffle retrofits are not considered by many to be long-term solutions, but rather are viewed as a temporary solution until replacement can be logistically and financially viable.

For many years, Snap-Tite® has made its mark as an excellent option for rehabilitating culverts that are failing structurally, where replacement would be costly, untimely, and very disruptive to the surroundings. Snap-Tite® with factory installed baffles can become a culvert retrofit option that provides the same construction advantages and cost saving benefits, while also providing improvements for aquatic passage.

Most culverts with fish passage problems were designed with a focus on the culvert diameter required to pass a highflow event. As a result they are undersized because they were designed for stream flow only, without regard to velocity impact on fish passage and other aquatic organisms.

Corner Baffle Design



Baffles are placed off center from the invert or flowline of the culvert and remain on one side of the culvert and do not alternate.

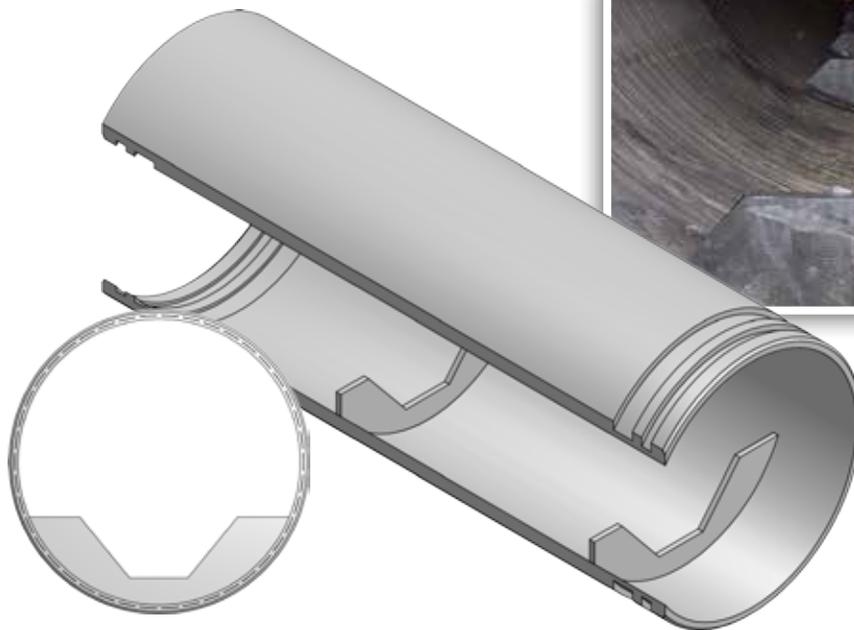
About Baffles

Baffles are used to solve depth and velocity problems within a culvert during flow extremes. In low-flow situations, most baffles act like weirs to create small pools of standing water. As the flow increases, the water rises up on the baffle and the baffles act as roughness elements that decrease the flow velocity, creating resting areas for fish to escape high velocity water streaming through the culvert. Again, it should be noted that baffles are not recommended by leading research organizations for new installations or situations that demand complete replacement of culverts where fish passage is of concern.

When adding baffles to a retrofitted culvert, the culvert now becomes more prone to become blocked or clogged. It is imperative that a regular inspection and maintenance program is developed, otherwise the crossing has exchanged one fish passage problem with another. Inspections and maintenance are typically important during and immediately after high flow events, especially as fish migration occurs in these events. Baffles (and culvert retrofits) are considered part of the

hydraulic design option for design methods used in fish passage analysis. Baffles are typically recommended for culverts with a maximum slope of 2.5%-3.5%. (Corner baffles are typically used for slopes less than 2.5% while notched weir baffles are used between 2.5 % and 3.5%.) It is acknowledged that while the goal is to optimize culvert capacity, limit sediment deposition and debris accumulation, limit maximum velocity and maximum turbulence; each criterion will have to be balanced against each of the others for a compromise in the overall design. Culvert retrofits are not expected to be able to satisfy all the requirements of the hydraulic design option. The retrofit design should also be analyzed in conjunction with inlet and outlet control features such as tailwater control measures. The design engineer should consider and evaluate these conditions when specifying the baffle criterium to Snap-Tite® for fabrication.

Notched Weir Baffle



The notched weir baffle design and corner baffle designs are recognized by the Federal Highway Administration along with many state transportation and environmental agencies.

Is Erosion Control a Problem?

Erosion control is a major concern when rehabbing an existing culvert. Snap-Tite® is your no-dig solution to lining failing culverts, and your answer to erosion control challenges. Not only does Snap-Tite® rehab the culvert, it provides erosion control for the

areas surrounding the culvert and maintains a constant elevation, thus making it easier for fish to enter the culvert. Snap-Tite® pipe is made from HDPE pipe, which can be made to fit all of your culvert needs.



Pools adjacent to culvert can play important design elements in ISCO A.L.P.



Ponding effect created by baffle/weir design during low-flow.

