

FAUNA UNDERPASSES

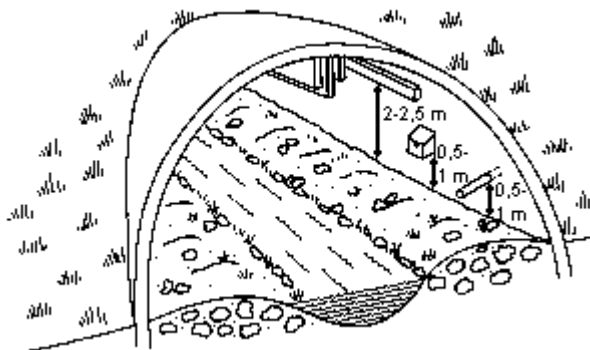
I. Over-sized culverts

.....Where bridges are impossible at road crossings of watercourses fauna passage may be constructed as over-sized culverts incorporating artificial banks. The natural bank outside the culvert should continue uninterrupted onto the artificial banks on both sides of the watercourse. The course of the stream should be altered as little as possible. The dimensions of underpasses should be as large as possible to increase its attractiveness to e.g. deer.



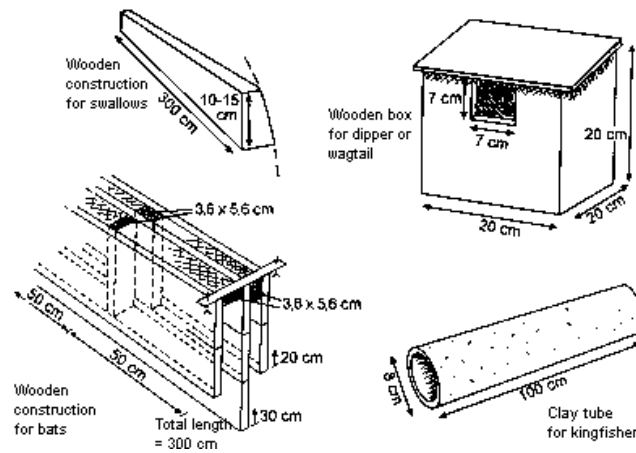
Oversized culvert as fauna underpass through a dam. (fot. Piotr Galicki)

.....The artificial banks should be constructed of stable material as stones and gravel. They should be higher than water level at high flows sloping down towards the stream. Also the river bed inside the culvert should be stabilised with stones to create a sufficiently strong water current in a deep central part of the stream, ensuring oxidisation of the water.



Oversized culvert with artificial riverbanks, nesting boxes for birds and bat-hides.

Large boulders may preferably be placed in the stream to create a more varied and dynamic water flow. The boulders may also serve as resting sites for birds such as dipper. Birds such as kingfisher and dipper may be attracted to the fauna passage by installing nesting boxes on the sides at the entrance of the culvert. Planks suspended under the ceiling may serve as bat-hides.



Nesting boxes for birds and bat-hides - details of construction

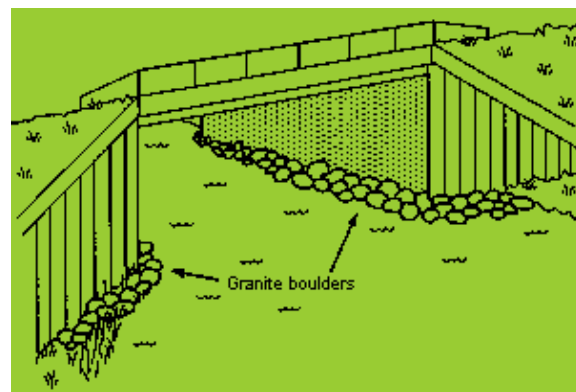
2. Underpasses at existing smaller bridges

.....At existing smaller bridges a reduction in traffic mortality can be achieved at relatively small financial costs by construction of fauna passages made of boulders or as floating pontoons.

.....An underpass made of boulders sloping down towards the water is favoured at sites where difference between high and low water levels are small and the riverbed is solid. This type of passage may give the best visual impression and if connected to the bank outside of the bridge the underpasses will be attractive not just for aquatic/semi-aquatic species such as otter, mink and polecats, but also for terrestrial species as weasel, stoat and martens.



Fauna underpass constructed of boulders
(fot. Aksel Bo Madsen)

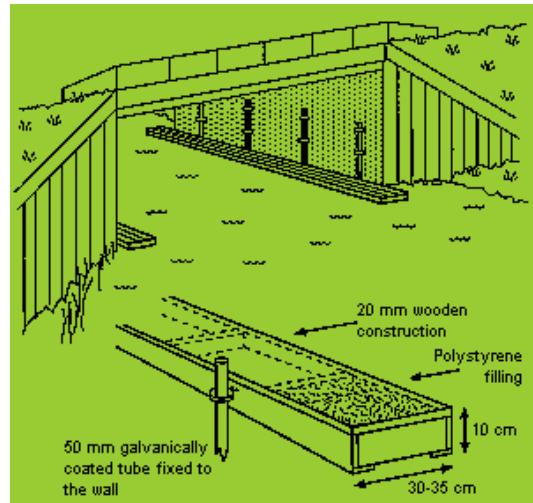


Boulders in fauna underpass

.....Floating pontoons are made of wood with a core of a buoyant material. The pontoons should have a minimum length equal to that of the bridge, be 30 cm wide and 10 cm high. Floating pontoons may be favoured at rivers with large difference between high and low flow, great depth, and soft riverbed. Preferably, the pontoon should also be connected to the riverbank to allow terrestrial species to use the underpass.



Pontoon underpass in Denmark pontoons (fot. Olimpia Pabian)



Fauna underpass constructed as floating

.....The use of fencing along the road may be required to reduce mortality where roads pass close to watercourses and to guide wildlife towards the fauna underpass.

3. Small and medium sized mammal tunnels

.....Tunnels with a minimum diameter of 60 cm should be constructed under roads to enable badgers and foxes to maintain their usual behavioural patterns under roads in forests, wood lots, at hedgerows and ditches.



Entrance of tunnel targeted towards small and medium sized mammals (fot. Piotr Galicki)

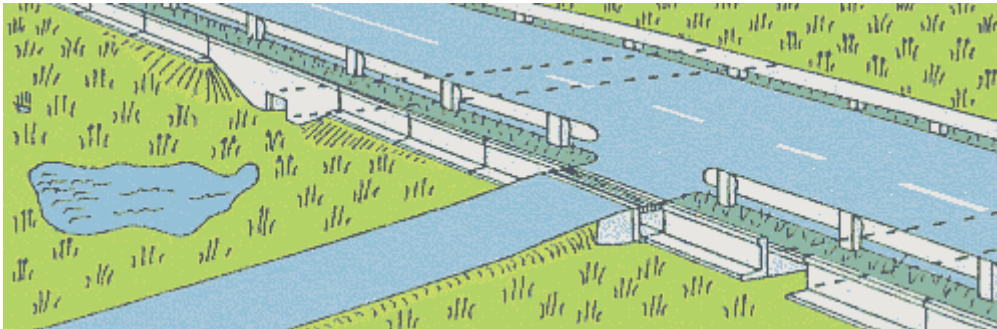
.....The efficiency of tunnels for badgers is highly dependent on the quality and length of the adjacent fencing. The fence should continue 40 cm under the ground level and include a 30 cm horizontal underground "overhang" facing away from the road to prevent badgers and foxes from digging tunnels under the fences. If a wildlife fence is targeted only towards badgers, foxes and other smaller mammals the height may be reduced to just 1.0 m.

4. Amphibian tunnels and fences

.....In river valleys and wetland areas, amphibians may have special needs for underpasses. In culverts with streams a minimum width of 50 cm of ledges meets the amphibian requirements.

Special emphasis must be directed towards construction of underpasses for amphibians where their migration routes are intersected by roads.

.....The tunnel must be levelled with the surrounding ground. The size / diameter of the tunnel depends on its length. Underpasses under motorways should generally be at least 1.5 m in diameter and distances between tunnels less than 50 m. A guiding fence along the road is necessary. The fence must be manufactured of an opaque material. It should have a height of minimum 40 cm and an overhang of 10 cm and extent more than 200 m from the amphibian natural migration route.



Road with amphibian tunnels and fencing

Preferably the floor of the amphibian tunnel should have the same humidity as the surrounding grounds. The tunnels must be cleaned for leaves, sand and litter regularly.



Amphibian fences and entrance of amphibian tunnel (fot. Lars Christian Adrados)