

Montana Department of Transportation Small Mammal Ramp Guidelines

Introduction:

In the 1930's people began to document the threat which highways posed to animals. While most work has been done relative to larger mammal species recent research has looked at highways potential impacts relative to small mammals. Smaller mammals are actually impacted in 2 primary ways. First the wide expanses of a 4-lane highway (and shoulders) provide a formidable barrier for species that are primarily prey for mammalian carnivores and raptors, species such as shrews (Order Insectivora) and rodents (Order Rodentia). These species are very vulnerable if they attempt to cross a highway, given the lack of protective cover. Indeed early trapping studies by Oxley et al. found that dispersal of small mammals across a divided highway (a distance of 90+ m) was significantly reduced, consistent to the barrier effect posed by open bodies of water. They concluded that such a highway "...may be as effective a barrier to the dispersal of small forest mammals as a body of fresh water twice as wide". A majority of these species have indeed evolved behavioral patterns that cause them to avoid areas devoid of vegetative cover thereby reducing their susceptibility to predation and, as a result, their populations are readily fragmented by highway construction. Secondly, species that do attempt to cross these openings [e.g. the predators which behaviorally do not perceive openings as threatening such as striped skunks (*Mephitis mephitis*), weasels (*Mustela* sp.), raccoons (*Procyon lotor*), red foxes (*Vulpes vulpes*), coyotes (*Canis latrans*)] are often killed in this attempt because the distance is great and vehicles are moving so quickly. Such effects on these species are greatly magnified when highways bisect habitats such as wetland communities, riparian areas or forested areas which have historically served as wildlife corridors.

When highways bisect wetland habitats small diameter culverts or equalizer pipes are used to prevent the buildup of water in the road subgrade and prevent potential erosion of road fill material. During periods when the culverts carry water most animal use is prohibited. In order to provide a travel corridor for small mammals when these pipes contain water, small mammal ramps can be installed into new or existing pipes.

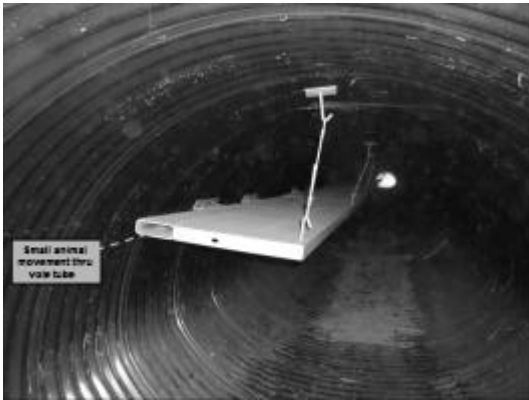
Recommendations for Use of Small Mammal Ramp Technology

Biologists will determine appropriate habitats along roadway corridors where these small mammal ramps will be most suitable or appropriate. Typically this will include the following:

1. relatively expansive wetlands on either side of the roadway where primarily groundwater drives the wetland hydrology.
2. riparian drainages or bottomlands where small mammal use is a known function of the corridor or area.
3. ADT of present traveled way (PTW) at or projected to be over 4,000 ADT.
4. focus small mammal ramp recommendations to projects where pipe replacement is part of the proposed project.

Important considerations for biologists before recommending the use of ramps includes the following:

1. Determine what species are present at the proposed location, highest consideration for Threatened and/or Endangered species and State Sensitive species, and/or culturally important species identified by tribes. However, do not dismiss needs of local small mammal populations although they may not be T&E or state sensitive species. Biologists must use best professional judgement.
2. What are that species cover needs.
3. Provide adequate cover and cover type at the entrance and exit of culvert proposed to provide travel corridor (this is critical).
4. Check with road design, hydraulics and geotechnical sections to determine appropriate culvert size, type (metal vs. concrete), and elevation in order to adequately convey water and withstand potential (soil/water) corrosives. Culverts must be minimum 4' diameter to hold small mammal ramps, thus fill must be high enough to provide adequate cover over pipe. Small mammal ramps when planned for ahead of time, can be installed in concrete pipes or steel pipes. However, guidance as to spacing for mounting bolts and brackets will need to be provided in a detail.
5. **Investigate option of placing dry culvert higher up in fill.** This may work for conveying predatory small mammals such as fox, coyote, skunk, or weasels. However, if other predators such as muskrat or raccoon utilize the area **or** you are trying to provide conveyance for species that require water during certain portions of their life cycle, placement of the culvert lower with the ramps may be more appropriate. Also, if there is an abundance of prey species that by their very nature are reluctant to venture out into the open spaces without cover, strongly consider the use of the ramps and provide thick cover at the entrance and exit of culvert crossing.
6. Evidence suggests that species such as deer will readily use large, steel corrugated culverts if these are tied to protective vegetation at their entrances. If providing dry passage for deer modify the floor corrugations to provide a more natural surface. Once appropriate modifications are made, it is felt that this type of wildlife structure would be as functional as bridge-type structures for a fraction of the cost. (*Further investigations are necessary as to how best modify the bottom of corrugated metal pipe with live flowing water to provide passage for larger mammals.*)
7. **Make sure that suitable habitat is present on both sides of the roadway and inquire with county officials about upcoming or ongoing development pressure in the area. This may affect animal movement patterns or use and availability of suitable habitat. Thus, it can influence your decisions as to best locations for providing small mammal crossings. District biologists should also consult local maintenance crews relative to potential for debris build up prior to final recommendations for small mammal ramps.**



Cross sectional view of ramp installed, note vole tube on left side of ramp.



a



b



c

Figure 16. Photos of new shelf and entrance: (a) frontal view with entrance ramp entering from side, (b) side view, and (c) top view showing width of entrance ramp and shelf.