

Designing America's Wildlife Highway: Montana's U.S. Highway 93

Grant Jones, FASLA, Cory Parker, ASLA, Charlie Scott, ASLA

Spend some time in western Montana and you'll see the bumper sticker: "Pray for me, I drive U.S. 93." This highway runs from Arizona to Canada. It is a two-laner through much of Montana, entering big-sky country from Idaho at Lost Trail Pass and passing through Missoula, Kalispell, the Flathead Indian Reservation, and along the western shore of Flathead Lake before entering Canada.

The road is heavily used, filled with recreational travelers as well as commercial and local traffic. It is also Montana's most dangerous two-lane highway—not only for people, but animals. To address escalating safety concerns, the Montana Department of Transportation (MDT) initiated a plan to expand U.S. 93 to a four-lane highway in 1989. Based on data gathered over 20 years, MDT knew that most fatalities occurred during passing and during weekly and seasonal peaks.

However, the Confederated Salish and Kootenai tribes (CSKT) opposed the plans, expressing concerns about their natural, cultural, recreational, and scenic resources on the 55-mile stretch of highway that traversed the Flathead Indian Reservation. The tribes believed the road expansion would harm their land and its diverse animal population—from grizzly bears and elk to painted turtles and bullhead trout. Wildlife and the places they feed, mate, give birth, and travel hold considerable meaning for the Salish, Kootenai, and Pend d'Orielle people. For the CSKT, protecting and safeguarding animals is part of perpetuating Indian culture.

Marcia Pablo, who works with the CSKT Tribal Preservation Department, put it this way: "We have been trying to take care of these wildlife corridors for centuries. . . We can't interrupt their continuum. They can't speak for themselves. We have to speak for them."

Expanding the highway wouldn't just add lanes, tribal members pointed out, it would also encourage higher speeds, which would increase the number of animals killed by speeding traffic—a safety issue for wildlife and motorists alike. Despite several efforts to come together, the project stalled.

The Road as Respectful Visitor

In 1999, at the request of the tribes, Jones & Jones Architects, Landscape Architects, and Planners of Seattle, Washington, was brought in to help resolve the decade-long impasse between the MDT, CSKT, and the Federal Highway Administration (FHWA) by establishing a new design concept for the alignment of the highway.

We at Jones & Jones proposed an unorthodox idea: step beyond the traditional "level of service" road-building approach, which focuses on simply adding lanes. Instead, reconstruct the highway as a respectful visitor to the land. In other words, look at the land first and then find ways to fit the road to the land. This approach would confer several benefits. By focusing on ways the land can shape the road, which cut a virtually straight swath through the countryside, we could respect the way of life in rural towns along its route and restore fragmented habitat corridors through a "permeable highway." At the same time the approach would give travelers a more pleasant, safer trip and a better understanding of the tribal people and homelands.

As part of this approach, the design team undertook an intensive analysis to determine whether a different lane configuration could meet safety and level of service goals. The analysis showed that level of service could be improved by replacing the old straight-aways with soft and continuous transition curves, which naturally increase spacing between vehicles, eliminating line-ups. Improved level of service could also be achieved with intermittently spaced passing lanes.

Using "the land comes first" approach, it was eventually concluded that only the northern quarter of the project needed to have four lanes. This narrower road prism would not only reduce construction and environmental costs but would make most of the road realignments possible without altering the existing right-of-way.

Putting it on Paper

Through a yearlong negotiation process, Jones & Jones' concept was articulated in terms of the tribes' values, and a series of design guidelines and parameters were established to address them.

These guidelines were made binding through a formal Memorandum of Agreement (MOA) signed in late 2000 by the CSKT, MDT, and FHWA. Awarded the *President's*



The new U.S. 93 multi-span Jocko River Bridge as it now crosses the Jocko River. The old highway consisted of a single span bridge, and long fill berms that constricted water and wildlife movement.

Transportation Award for the Environment (American Association of State Highway and Transportation Officials) and the *Strive for Excellence Team Award* (Federal Highway Administration), the MOA established the terms under which the project could proceed and gave direction to many aspects of the road design.

The MOA outlined a comprehensive design where all highway elements would blend with the cultural and natural landscape. Integrated features include place-specific roadway designs for the historic rural towns along the road, protection and restoration of native plant communities of cultural and ecological value, and a visitor information system of roadside pull-offs and interpretation.



Wildlife specialists monitor many of the underpass structures that have been built thus far for the new highway.

Making Way for Animals—45 Wildlife Crossings

The project's innovative centerpiece, and one of its biggest successes, is the integration of 45 wildlife-crossing structures along the highway—an unprecedented move that will double the number of such structures on highways nationwide once construction is complete next year. The structures, based on four prototypes ranging from small-box culverts to major over-crossings, allow bear, elk, moose, mountain lion, and other mammals, as well as amphibians, waterfowl, and fish to pass under and over the highway.

How Many Wildlife Crossings?

Local experts from the Salish and Kootenai tribes provided the detailed information to justify the number of crossings to highway planners. Tribal staff experienced in wildlife biology, wetlands, and native plants all shaped the network of wildlife crossings and their eventual design.

An open and scenic landscape allowed highway planners and engineers to easily visualize the wildlife-corridor concept. Along U.S. 93, green riparian stream corridors are visible from the highway, descending the western slopes of the Mission Mountains and crossing the dry plains of the Flathead River valley. These stream corridors give cover to the wildlife making their way across the valley and between farm fields. Wildlife crossings could certainly be implemented in many ecological contexts; however in the Mission Valley the stream corridors' visibility plays a role in legitimizing and building support for the crossing network.

Choosing Crossing Locations

The planning and design of U.S. 93 was carried out in a larger spatial and historic frame of reference than is typical for highway projects. In placing and designing the crossings, we drew on landscape ecology and wildlife biology to root the crossings in the greater ecological context. We looked at the highway as a series of watersheds, some extending for miles from either side of the road. Each watershed contains unique wildlife populations, plant communities, geologic features, historic settlement patterns, and land uses established over thousands of years. This larger space-time continuum came to be called the "spirit of place," representing the intrinsic patterns and complex dynamics of a landscape the tribes hold sacred.

In evaluating locations, we chose areas already frequented by wildlife. Riparian corridors crossing the highway were obvious locations, given the documented evidence of animal movement up and down stream corridors. A few places on the highway already had a culvert or bridge with a stream flowing beneath. These structures could be renovated or replaced to accommodate wildlife. Areas without development on either side of the road are prime locations for the larger wildlife crossings as large mammals avoid areas with even a few houses.

By some estimates, one million vertebrates are killed on U.S. roads every day. Highway road-kill data, where it exists (usually from maintenance crews), can indicate where the greatest numbers of animals are crossing the road.

Residents and environmental organizations were also a great resource. CSKT staff wildlife biologists, led by Dale Becker, responded to animal complaints and sightings near towns in addition to studying reservation wildlife. Dale told stories from Flathead Reservation residents about grizzlies rooting through their garbage or eating the apples on their fruit trees. He and his staff knew the patterns of the larger mammals based on direct experience.

Four Prototype Crossings

Once we had a tentative placement plan, we started on design. As part of a large wildlife crossings' network, the design of the crossings needed to be flexible enough to adapt to the changing road and landscape conditions, as well as to different animals that need to cross the highway. We ultimately developed four prototypes and presented them to the seven engineering teams responsible for implementation of individual highway segments.

Small box culvert crossing for rodents, amphibians, and some deer: These box culverts are four-feet high, six-feet

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A scenic pullout near the U.S. 93 project's northern terminus in Polson allows visitors spectacular views of Flathead Lake and the Mission Mountains.

wide and usually made of concrete. They may be associated with small, intermittent drainages. Along U.S. 93, this type of box culvert often replaced the standard corrugated steel culvert for drainage purposes to allow for more room for animal movement. A small pipe was laid along the floor of the culvert to provide cover for rodents.

Large arch culvert for deer, elk, and bears: These arch culverts are 10-feet high, 22-feet wide and are made of corrugated steel or concrete. We originally proposed a 12-foot-high design, but the engineering teams found a lower arch culvert to cost significantly less. Usually constructed over a larger drainage, the culvert is partially filled in at the bottom to provide natural earth for animals to walk on. Culvert ends are faced with stone or concrete stamped and colored with a stone pattern.

Open span bridge for deer, elk, moose, and bear: Bridges were either existing or replaced a large existing culvert with a large stream below. Here, clearance for animals was not a problem, as long as the bridge span provided enough gravel area on either side of the creek for animals to pass.

Wildlife over-crossing for deer, elk and bear: One over-crossing was placed at the Evaro Hill area, a densely-forested crossing point for bears and elk moving between mountain ranges. Patterned after one at Banff National Park, British Columbia, it forms a lid over the highway with native vegetation on top. Deer and elk cross over on higher ridges down the center and along the sides of the lid. This crossing has yet to be built, as the Evaro road section has not been constructed.

Fencing is Essential

An eight-foot-stock fence runs along the road between wildlife crossings to funnel animals into the crossings and

prevent them from crossing the road surface. This fencing is a key component of the wildlife network, as even the most rigorous selection of crossing points won't "work" for all animals. If animals get trapped between the fences in the highway right-of-way, there are jump-outs located near the crossings, so animals can get out of the road corridor and back into the adjacent landscape.

Reshaping the Road

Part of the "land comes first" and "road as visitor" concept meant reshaping the new highway based on cues from the land. This approach not only enhances aesthetics of the new road, but in tandem with the wildlife crossings, improves safety for all.

Rather than following the "straight shot" route of the old road, the new highway gently curves, visually conforming to the hilly terrain and undulating landforms in the larger landscape. Horizontal and vertical alignments were fine-tuned to reduce cuts and fills. Where cuts occur, slopes are rounded and shaped to look like natural hillsides. Creeks and rivers are crossed in low-impact locations with channel banks and bottoms restored to a natural condition. Surfaces of major culvert and bridge structures are textured to look like stone or tinted to blend with the soil. Simple box-beam guardrails are unobtrusive and diminish visual clutter. The cumulative effect is visual harmony throughout the corridor.

Native plants have been reintroduced in the right-of-way at each crossing and will eventually screen the culvert walls and provide more natural cover for the smaller creatures. In fact, the entire project involved a thorough inventory of native plants in the highway corridor. Road design and construction has been orchestrated to protect native plant communities to the greatest extent possible and to salvage and replant native plants disturbed by construction.

From Scissors to a Zipper

The U.S. 93 project represents a radical realignment of priorities in the planning and design of a major highway. Birds, turtles and grizzlies, tufted wheatgrass, camas and willow, and ancient stories about mountains and river canyons were given as much consideration in the road design as the safe and efficient movement of vehicles.

Essentially, a native people's values and identity have been woven into the design of a U.S. highway carrying thousands of daily travelers, prompting this description by Jones & Jones Principal Grant Jones: "The road is no longer like a pair of scissors. It's a zipper." Or, as a new bumper sticker might say, "I drive U.S. 93.—America's Wildlife Highway."

***Grant Jones**, FASLA, is a co-founder of Jones & Jones. He has received international recognition for his planning and design work with roadways, rivers, scenic corridors, forest management, and bio-aesthetics. He has developed the firm's expertise in integrating visual and natural resource assessments into corridor and transportation planning and design projects.*

Nine Lessons from America's Wildlife Highway

While the U.S. 93 project is unique, the process for its planning and design—looking to the people and the place for direction—is highly applicable to other contentious projects in sensitive landscapes.

- 1. Draw on a broad context.** Full consideration of ecological, cultural, geographical, and historical influences shaped a design that achieved visual, political, fiscal, and environmental harmony across the watersheds traversed by the road.
- 2. Seek local wisdom.** Tribal elders, citizens, and local environmental groups were an invaluable complement to governmental agencies. Their inclusion fostered public trust and led to better information.
- 3. Consider ecological context,** research data, and existing conditions when determining crossing placements. Identify clear habitat corridors along creek drainages. Check road-kill data. Choose areas already frequented by wildlife for crossings; select undeveloped areas where possible; build on existing crossings.
- 4. Create flexible designs.** Adaptability to various terrain and road conditions, as well as wildlife needs, keeps costs down.
- 5. Use fencing to funnel animals to crossings.** Animals are quite intelligent, but few are “street-smart.”
- 6. Limit adjacent development.** The U.S. 93 project uses access management, conservation easements, and open-space protection to ensure the long-term viability of crossings and the wildlife that uses them.
- 7. Hold stakeholders accountable.** Recognizing that much of the project success hinged on decisions made during the actual design and construction of the road, the MOA called for a technical oversight committee and a project oversight group, each comprised of representatives of the state, tribal, and federal governments, followed by tribal construction oversight.
- 8. Foster non-car alternatives to the highway.** A new walking/biking path incorporated into the highway right-of-way will link three key towns. Two other towns will receive sidewalks designed to improve safety, local identity, and give a “main street” quality to the highway. A new roadside equestrian trail leads to nearby rodeo grounds.
- 9. Consider a different yardstick.** By reframing the question of how “level of service” is improved, the team created a safer, more beautiful highway that respects natural and cultural features. The “land comes first.” By deploying the landscape architect approach, the road can be made to heal the landscape, connecting the landscape continuum on both sides.

Commissioned by the Federal Highway Administration, Grant taught the award-winning “Aesthetics and Visual Resource Management for Highways,” and also helped prepare the subsequent step-by-step illustrated guidebook “Visual Impact Assessment for Highway Projects.” Grant also serves on the board of directors of Scenic America. He was principal-in-charge for the reconstruction of U.S. Highway 93 through the Flathead Indian Reservation.



Charlie Scott, ASLA, is a landscape architect with more than 25 years of experience in complex planning and design projects. He specializes in highways that require the careful integration of the road into sensitive landscapes and community settings. His work on the Paris-Lexington Road in Kentucky has been nationally recognized as the benchmark for context-sensitive highway design—now known as “context-sensitive solutions” by state and federal highway departments throughout the U.S. He was the project manager for the reconstruction of U.S. Highway 93.

Cory Parker, ASLA, LEED TM AP has 15 years of experience as a landscape architect, managing environmental planning, parks and open space, as well as stream and river restoration projects. His work on the reconstruction of U.S. Highway 93 included design guidelines, landscape and stream restoration, borrow pit restoration, and wildlife crossings. Prior to Jones & Jones, Cory worked for L.C. Lee & Associates, collaborating with wetland ecologists, botanists, and soil scientists to re-create complex, riparian ecosystems. 🐾

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And so it goes with planning, that symbiotic relationship of multiple hopes that often conflict, yet also reinforce and inspire. These are the hopes embodied in a community's comprehensive plan; the hopes envisioned by the proponent of each annexation, new subdivision or zone change; the hopes of both shy neighbors and vocal activists concerned about how each proposed change might impact their own homes and the broader community; the hopes of planning commissioners, staff, and elected officials committed to both the appearance of fairness and being fair, as well as to fostering civil discourse and enlightened public debate to achieve community goals.

During these times of polarization and budget limitations, local planning is about hope under siege; planning may also be our last best hope for **keeping the faith in difficult times**.

Ron Faas is an extension economist emeritus of Washington State University, a WPR board emeritus, and WPR editorial board member. He is a member of the Santa Maria Community Coalition and was a City of Pullman planning commissioner and a PAW board member for 22-plus years. 🐾