Context Sensitive Design

U.S. 93

Evaro to Polson, Montana

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Goals

Provide a case-study on the innovations used on U.S. 93 in Montana:

• means to reach a shared vision
• design elements that incorporate this vision
• relation to NEPA process
• Project Length: 56.3 miles
• Volume: 7975 vehicles
• Trucks: 2% - 9%
• RV’s 2% - 5%
• Configuration: mostly 2-lane
• Accidents: 4.8 % fatal
  (versus 1.7 % statewide)
  and 44.2 % injury
  (versus 37.1 % statewide)
Project History
U.S. 93 in Montana

• 187 miles long – Idaho to B.C.
  – Serves fastest growing counties in Montana
  – Entire corridor high priority

• South section …Hamilton to Lolo
  – Reconstruct 33.4 miles to 4 lanes
  – Context Sensitive design features
  – First project: 1998 let
  – Last project: 2004 let
  – Hamilton – Lolo EIS

• North section …Somers to Kalispell
  – Reconstruct 20.6 miles to divided 4 and five lanes
  – Context Sensitive design features
  – First project: 1996 let
  – Last project: 2002 let
Project History (cont.)

Central Section of U.S. 93 – Evaro to Polson

• Entirely within the Flathead Reservation of the Confederated Salish Kootenai Tribes (CSKT)

• Tribal context
  – Unique sovereignty and government to government issues
  – Cultural Aspects

• Early 1980’s
  – Environmental reviews on separate projects
  – Tribe requested a comprehensive EIS

• Early 1990’s
  – Comprehensive corridor-long EIS
  – State supported a 4-lane design
  – CSKT preferred 2-lane with some passing
Project History (con’t)

• August 1996 FHWA ROD

  “FHWA chooses to defer making a decision on lane configuration or the preservation of a corridor of land for future construction.”

  “Before any improvements to U.S. 93 between Evaro and Polson can move forward…a resolution of the differences between (the CSKT and the State) is necessary.”

• August 1996 – Early 1998: 18 months of contemplation:
  – Millions of dollars had been spent
  – 15 years had elapsed
  – The north and south corridors were moving forward, and
  – People were still dying on the corridor
Project History (con’t)

• February 1998
  – The ROD was amended to support access management on non-tribal lands
• November 1998
  – Access management plan was completed
  – These discussions built trust and led to a decision by CSKT and the State to reach a decision
• March 2000
  – Tri-government team established
  – Skillings-Connolly hired to lead negotiation process
• December 2000
  – Design agreement for majority of corridor
  ★ – MOA signed by CSKT, FHWA, and MDT

So, once the approach changed it took 10 months to reach a conceptual agreement.
Reaching a Shared Vision

• MDT team had to understand the CSKT goals:
  – Linkage between Salish and Kootenai people and the land
  – Sensitivity to Cultural issues
  – Desire to preserve and restore land for wildlife
  – Desire to share beauty of place

• CSKT team learned of the linkage between design, safety and capacity

• FHWA team learned how to flex as much as possible into NEPA
Facilitating the Visual Language

• “Landscapes”
  – 14 big “rooms” were identified within the reservation
  – Each landscape had unique visual and physical characteristics

• The Highway design will respond to and respect the visual and ecological qualities of these landscapes

• The concept of natural and cultural landscapes spatially organized the design approach
MOA

• Important Aspects of the MOA
• Set up a method of working together, A Technical Design Committee (TDC) and Project Oversight Group (POG)
• Defined Design Concepts and treatments for the environment.
• New way for MDT Engineers to look at roads.
• No longer just a MDT project, now a “We Thing”
HEADLINES
“US Highway 93 Expansion”
“Kinder, gentler project”

Missoulian, January 14, 2001
A Shared Vision

“Landscapes”
Along U.S. 93
within the
Flathead Reservation
Landscapes – Linkage to Design

By looking at the individual landscapes ideas began to form of how the highway should be influenced and respond to the land.

Examples:
- Polson Hill – weave and traverse glacial terrain
- Minesinger – curvilinear design
- Pablo Pines – restore pines and pull in meander edges
- Ronan Spring Creek – respond to the rolling terrain

Important Design Elements
- Curvilinear design to compliment or display terrain
Cultural and Historic Resources

• To avoid having to identify individual and sacred sites, cultural information was associated with wildlife issues.

• The close linkage between sacred sites and wildlife concerns is consistent with the Salish-Kootenai culture
Wildlife

- **Goals**
  - Reduce mortality
  - Reduce habitat loss
  - Increase habitat connectivity
- **Information and data**
  - Migratory patterns
  - Road-kill data
  - Ecological habitats
  - Construction techniques for wildlife crossings
- **Design result**
  - 42 wildlife crossings are planned throughout the corridor
  - Range from $28,000 for a pipe or box culvert to $2.3 million for a wildlife over crossing
  - Five locations totaling about 14 miles of fencing to channel wildlife to crossing locations
Types of Wildlife Crossings from Locations in the U.S. and Canada

Examples

Concrete Culverts

Concrete Box Culvert
Location: Roemersn Creek, Cowlam County, Washington - State Route 112.
Why built: Culverts had been built on a steep slope - the water velocity was too high for most fish swimming upstream.
Suitable for: Fish and amphibians.
Effectiveness: The project added nearly 700 ft of a mile of stream habitat, - post-project surveys reported salmon, trout and other fish in upstream areas where they had not been before.

Red Earth Underpass
Location: Banff National Park, Canada - Trans-Canada Highway
Size: 3.5 M X 2.5 M.
Why built: To facilitate safe wildlife passage across highway.
Suitable for: Carnivores, ungulates, small mammals, fish, amphibians and reptiles.
Effectiveness: Black bear, coyote, and ungulates have used the underpass.

Bear Underpass
Location: Fisher's - State Road 66
Size: 47' (14.3 M) long, 24' (7.3 M) wide and 8' (2.4 M) high.
Why built: Bears were using similarly designed panther crossings on Interstate 70. Placement of underpass locations were based on bear kill data along the road.
Suitable for: Carnivores, ungulates, small mammals, fish, amphibians and reptiles.

Prefabricated Concrete Arch Culverts
Size: Up to 10' high and 24' wide.
Suitable for: Carnivores, ungulates, small mammals, fish, amphibians and reptiles.

Bridges

Open Span Bridge - US HWY 2
Location: Montana
Why built: To accommodate motorists. A passage underneath was built with FHWA funds to facilitate mountain goat passage (Constructed in 1990).
Suitable for: Carnivores, ungulates, small mammals, fish, amphibians, and reptiles.
Effectiveness: 4 years after completion, all "crossing goats" in the area are now using the underpasses.

Open Span Bridges - Trans-Canada Highway
Location: Built National Park, Canada
Why built: 5-Mile Bridge was built to accommodate motorists. All other bridges shown were built to reduce mortalit and facilitate wildlife movement.
Suitable for: Carnivores, ungulates, small mammals, fish, amphibians, and reptiles.
Effectiveness: The 5 underpasses over a 30 mile stretch of road have reduced ungulate roadkill by 98 percent (FHWA web page). Bridges that span both water and land are considered by experts to be optimal for carnivores (see individual pages for more details).

Wetland Effectiveness: Used by black bears, wolves, cougar, coyote, and ungulates.

Duthi
Effectiveness: Two grizzly crossings. Frequent use by black bears, wolves, cougar, coyote, and ungulates.

Carroll Creek Bridge
Effectiveness: Two grizzly crossings. Frequent use by black bears, wolves, cougar, coyote, and ungulates.

5-Mile Bridge
Effectiveness: This is an unconventional wildlife underpass, characterized by great breadth and openness. One of the five places, large carnivores choose to cross the TCH (Clawson, 1996).
Types of Wildlife Crossings from Locations in the U.S. and Canada

Culverts

- **Medium Culvert**
  - Location: Laxdal, Florida, U.S.
  - Size: 12 ft. wide and 6 ft. deep
  - Why built: To allow sub-adults to safely cross the road
  - Suitable for: Small mammals, reptiles, and amphibians

- **Large Elliptical Metal Culvert - Castle**
  - Location: Banff National Park, Canada
  - Size: 14 ft. wide
  - Why built: To facilitate safe wildlife passage

- **Large Round Metal Culvert**
  - Location: Banff National Park, Canada
  - Size: 14 ft. wide
  - Why built: To facilitate safe wildlife passage

Wildlife Overpass

- **Wildlife Overpass - Red Earth**
  - Location: Road 700, Saskatoon, Canada
  - Size: 730 ft. wide
  - Why built: To facilitate safe wildlife passage

- **Wildlife Overpass - Wolverine**
  - Location: Road 700, Saskatoon, Canada
  - Size: 730 ft. wide
  - Why built: To facilitate safe wildlife passage

Other Examples of Wildlife Overpasses

- **Wildlife Overpass**
  - Location: U.S. Hwy 395 and W100, Washington
  - Size: 1000 ft. wide
  - Why built: To facilitate safe wildlife passage

Roads on Piers

- **Linn Cove Viaduct - Blue Ridge Parkway**
  - Location: Linn Cove Viaduct, U.S.
  - Size: 500 ft. long
  - Why built: To facilitate safe wildlife passage

- **Interstate 70**
  - Location: Grand Teton National Park, U.S.
  - Size: 1000 ft. long
  - Why built: To facilitate safe wildlife passage

- **Interstate 75**
  - Location: Boise, Idaho, U.S.
  - Size: 2000 ft. long
  - Why built: To facilitate safe wildlife passage

BARRIERS

- **Fence with apron**
  - Location: Trans Canada
  - Size: 10 ft. high
  - Why built: To prevent sub-adults from crossing

- **Perforated Jersey Barrier**
  - Location: Trans Canada
  - Why built: To allow small mammals to cross the road

- **Barrier**
  - Location: Trans Canada
  - Why built: To allow small mammals to cross the road

- **Road on Piers**
  - Location: Trans Canada
  - Why built: To allow small mammals to cross the road

- **Road on Piers**
  - Location: Trans Canada
  - Why built: To allow small mammals to cross the road
Wildlife Crossing Locations within U.S. 93 Landscapes

3. Rail Link Fish & Wildlife Crossing
   Evraro Segment
   This crossing currently serves as a wildlife travel corridor for many species including deer, elk, coyotes and bears. The crossing could be enhanced with fencing on either side of the highway and increased plant cover.

   Design Recommendations
   Recommended crossing type: Multi-lane bridge
   Approximate dimensions: Existing structure

   Notes:
   Continue 8' page wire fencing along both sides of road.
   Begin fencing north of Evraro to continue to East Fork Finley Creek. Provide cattle guards for connecting roads and driveways.

   Jump outs are desirable on either side of the rail link bridge because studies have shown that animals trapped inside the R.O.W. will turn around rather than cross structures.

   Criteria for locations of crossings:
   1. Winter kill areas from south of Evraro to the Sheep Ranch Tract were completed by the tribal wildlife program during the period 11/51 - 4/52. The segment of road from the railroad ROW extending east of Joe's Smoke Ring exhibited the most wildlife activity during each of the transects.
   2. Camera units were placed along nearby existing summer game trails from 4/21-6/30. Results indicated substantial and regular use of the trails by white-tailed deer, elk, moose, mule deer, black bears, snowshoe hares, & bobcats.
   3. Aerial surveys of big game were conducted in the area in March 1992. Deer, elk, and big horn sheep were observed.
   5. Habitat - Excellent continuous habitat. The Evraro area may represent the last opportunity to maintain an effective link between the Mission/Bob Marshall complex and the Bitterroot Range. Gray wolf activity in the Nisimabi Drainage indicates use of the Evraro corridor. Scientists have identified this area as the best potential linkage area for gray bears. This is also the most likely spot in the corridor for lynx to cross.
   6. Engineering Practicality - Existing structure could easily be enhanced with fencing. Additional vegetative cover would increase cover for animals.

6. Evraro Hill Overcrossing
   Evraro Segment
   This area has a high need for wildlife crossing structures and is currently used by a variety of wildlife including deer, black bear, elk, moose, mountain lions, bobcats, snowshoe hares, gray wolves, coyotes, red squirrels, grouse, etc. This is the best possible location for linking grizzly bear populations to the east with the Bitterroot grizzly bear recovery zone to the west.

   Design Recommendations
   Recommended crossing type: Wildlife overcrossing
   Approximate dimensions: 150' to 200' wide

   Notes:
   Continue 8' page wire fencing along both sides of road.
   Begin fencing north of Evraro to continue to East Fork Finley Creek. Provide cattle guards for connecting roads and driveways.

   Criteria for locations of crossings:
   1. Winter Tracking - See Crossing #3.
   2. Summer Game Trails - See Crossing #3.
   3. Road Kill Data - See Crossing #3.
   4. Habitat - See Crossing #3.
   5. Engineering Practicability - Based on the topography (and higher than the road on one side), an overcrossing structure would be desirable and logical at this location. Existing vegetation will provide valuable cover for animals.
Wildlife Crossing Locations within U.S. 93 Landscapes (con’t)

19. Jocko Side Channel Fish & Wildlife Crossing
Arlee - Ravalli Segment

This area has great significance for fish and wildlife crossing. The Jocko River is bell trout hosting. Two tributaries in this area, Copper Creek and Spring Creek have been altered by highway fills and embankments. Restoring these water channels will greatly improve fish and wildlife habitat. Raising the road in concert with constructing undercrossings, would improve motorist safety and allow wildlife to move through the canyon. Anticipated use by: black bears, grizzly bears, mountain lions, bobcats, coyotes, elk, deer, etc.

Design Recommendations
Recommended crossing type: Open span bridge
Approximate dimensions: 100’ to 120’ span, 12’ min. at.

Notes:
Continue 8’ page wire fencing along both sides of road.
Begin 8’ page wire fencing south of Schot Platz #4 crossing; continue to a point south of Ravalli. Provide cattle guards for connecting roads and driveways. Fencing on west side of road to be placed below eight line.

Jump outs are desirable on either side of structure as studies have shown that animals trapped inside ROHS will turn back rather than cross structure.

Mitigation in this area will require coordination between CSKT, MOT, and MRL to ensure appropriately sized companion crossing (across railroad) for fish, wildlife and hydropower.

Criteria for locations of crossings:
1. Winter Tracking - NA
2. Summer Game Trails - NA
3. Road Kill Data - Road kill data from 1/98-4/98 combined with MDT data from 12/97-1/00 indicated at this location
4. Habitat - the road bisects two areas of good mountain habitat, and runs adjacent to excellent riparian habitat (the Jocko River) fed by two tributaries (Spring Creek and Copper Creek). Three tributaries increase the fish and wildlife habitat values.
5. Engineering Practicality - The physical constraints of this canyon pose a challenge.

26. Pistol Creek #2 Wildlife Crossing
St. Ignatius Segment

The creek is currently enclosed in a small culvert underneath 20’-30’ of fill. Livestock graze upstream. The creek is in close proximity to the National Bison Range which increases the area’s appeal for wildlife crossings. Wildlife crossings could be enhanced with restoration of vegetative cover.

Design Recommendations
Recommended crossing type: Corrugated metal pipe or concrete box culvert
Approximate dimensions: 12’ x 22’

Notes:
End 8’ page wire fencing northeast of Pistol Creek #2 in a wing pattern off degrees to road and approx. 109’ in lengths. Begin fencing at the curve coming out of Ravalli.

Criteria for locations of crossings:
1. Winter Tracking - NA
2. Summer Game Trails - NA
3. Road Kill Data - Tribal data from 1/99-4/98 combined with MDT data from 12/97-1/00 indicated 1 kill in this area
4. Habitat - Good riparian habitat and grasslands north of the highway. Wildlife (including deer, bears and mountain lions) have been observed in areas both north and south of this location
5. Engineering Practicality - Currently the highway sits atop fill. Removal of a portion, or all, of the fill would create a substantial opening that could be used by wildlife.
Fundamental Cultural Design Elements

Goal: To provide a unified vision of the corridor representing the traditional ways of the tribes

• Signage
  – Portal / Boundary Signs
    “Homeland of the Sqelixw “Ag Ismaknik”
  – Natural materials native to the area:
    • quarried stone (not river rounded)
    • treated wood
    • native vegetation
Fundamental Cultural Design Elements

– Place Names
  • Written in Salish, Kootenai and English
  • Unique in color
  • A traditional beadwork border to the sign will be unique to Salish and Kootenai languages

– Interpretive signs
  • Use 3 languages
  • Incorporate coyote logo
Fundamental Cultural Design Elements

- Visitors Center and Interpretive Overlook
  - One at National Bison Range
  - Native materials
  - Horizontal profile fitting existing landscape
  - Parking will not intrude on view
  - Work of tribal artists incorporated
  - Corridor logo incorporated
Fundamental Cultural Design Elements

Roadway Alignment

- Avoid large cut and fills by following landforms
- Vertical curvature
  - Reflects rolling landscape
  - Meets AASHTO standards
- For divided four-lane configurations berms planted with native pines will separate the road
- Stone veneer on structures
- Planted median between roadway and pedestrian features
- Trees 50 years or older will be protected
- All disturbed areas revegetated
- All abandoned historic roadway sections restored
- Bike/Pedestrian within communities
Summary of Design Concepts

• Mostly two lane with passing lanes
• Four lane divided between the two largest cities in the corridor
• The 11.2 miles within Ninepipes Wildlife Preserve will identify an alternative through a supplemental Environmental Impact Statement
• LOS: all sections will operated at “C” or better through 2024
• Safety: Estimated reduction of 1235 accidents in 20 years (fatal, injury, personal property)
Next Steps

- EIS will be re-evaluated to see if there are any environmental impacts coming from the agreement that have to be studied
- MDT will initiate design and ROW acquisition
- GARVEE bonds will be used to accelerate construction
- 8 – 9 individual projects
US-93 EVARO TO POLSON, MONTANA
Project Development Schedule

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- **Access Control – Corridor Preservation**
- **RW Acquisition (Except Ninepipe, Ronan, & Polson)**
- **Design Discussions**
- **MOA**
- **Environmental Re-Evaluation**
- **SBS Ninepipe & Ronan**
- **Design Management & Oversight**
- **Design Contracts 10 thru 12**
- **Legislative Funding Concurrence**
- **Design Management & Oversight**
- **RW Acquisition (Ninepipe & Ronan)**
- **Construction Management – Aggressive Construction Schedule**
  (Open for discussion – Could be 5-8 years in length)
- **3 Construction Contracts**

**DESIGN CONTRACTS**
1) Visitor Center & Interpretive Area
2) Evaro – McClure Road
3) McClure Rd. to N. End Arlee Couplet
4) N. End Arlee Couplet - Vic. White Coyote Rd.
5) Vic. White Coyote Rd. – S. End Ravalli
6) S. End Ravalli – S. St. Ignatius (Medicine Tree)
7) S. St. Ignatius (Medicine Tree) – Vic. Red Horn Rd.
8) Spring Creek Rd. (N. Ronan) – Minesinger Trail
9) Minesinger Trail – MT 35 (Polson)
Design Excellence

- Simultaneously advancing the objectives of safety, mobility, enhancement of the natural environment, and preservation of community values.