Southern Oregon Wildlife Crossing Project
Conceptual Design Report

Prepared for

Southern Oregon Wildlife Crossing Coalition

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November 14, 2022

Acknowledgements

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Charlie Schelz (U.S. Bureau of Land Management)

Karen Mager (Southern Oregon University)

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Executive Summary

Implementation of wildlife passage improvements in the Interstate 5 (I-5) corridor between Ashland and the state border will improve the ease with which wildlife move throughout the region. This overarching goal will be achieved by reducing wildlife mortality from collisions, providing safe passageways for sensitive species who are likely to exhibit avoidance behavior towards roads, and connecting fragmented habitats separated by human constructed barriers.

The Cascade-Siskiyou region is ecologically significant to abundant wildlife species. There are species of concern which are at a greater risk of direct and indirect impacts from I-5 and vehicle collisions. These species of concern include black bear, fisher, and elk which are also hazards to drivers during wildlife-vehicle collisions.

Wildlife connectivity is essential for species success as movement is directly related to improved fitness, population growth and generational resilience. There is a greater chance of preserving biodiversity and promoting healthy wildlife populations through conserving passages between habitat types. These less developed lands provide essential habitat and valuable connectivity through the region.

Eight projects are proposed to improve wildlife passage and habitat connectivity in the corridor: overcrossings at Barron Creek (milepoint 8.7), Wall Creek (milepoint 7.0), Bear Gulch (milepoint 2.7), Mariposa Preserve (milepoint 1.6) and milepoint 0.3; and undercrossing retrofits at Neil Creek Road (milepoint 10.3), Mt. Ashland Exit (milepoint 5.3) Siskiyou Summit (milepoint 4.8), and Bear Gulch (milepoint 2.5).

The Southern Oregon Wildlife Crossing Coalition has identified the proposed overcrossing at Barron Creek as the highest priority north of the Siskiyou Summit and the proposed overcrossing at Mariposa Preserve as the highest priority south of the Summit. The geography and climate at these locations support high levels of biodiversity. The combination of these two overcrossings will reduce wildlife vehicle collisions between Ashland and the California border, creating a safer passage for drivers as well as protecting wildlife populations from the direct and indirect impacts associated with I-5.

These wildlife passage improvement projects support the key values of Practical Design (ODOT, 2017):

1. Reducing wildlife-vehicle collisions improves **safety** for traveling public and ODOT staff
2. Overcrossings will be designed to complement the surrounding environment in the **corridor context**
3. SOWCC has built **public support** for improving wildlife passage and habitat connectivity in the region. The overcrossings will be highly visible to the traveling public as a demonstration of the State of Oregon's commitment to wildlife conservation.

The anticipated range of costs for these improvements is from $80K - $3M for the retrofits (including fencing where applicable) and from $7.4M - $12M for the overcrossings. Anticipated design, permitting, and construction schedules (once funding is secured) range from within a year for the retrofits to three to five years for the overcrossings. These schedules assume that permitting can be completed concurrently with design development and within two years for the overcrossings.

1 Introduction

1.1 Scope of Study

The Southern Oregon Wildlife Crossing Coalition (SOWCC) retained Samara Group, LLC and River Design Group, Inc. to perform an alternatives analysis and conceptual design for potential wildlife crossings along Interstate 5 (I-5) between Ashland, Oregon and the California border (**Figure 1-1**). The project area includes portions of the Cascade-Siskiyou National Monument which provides an ecological connection from the coast to the inlands. The goal of this work is to increase the overall permeability for animals to move between wildlands east and west of the highway as well as reduce wildlife-vehicle collisions (WVCs) which are dangerous to drivers and wildlife populations alike.

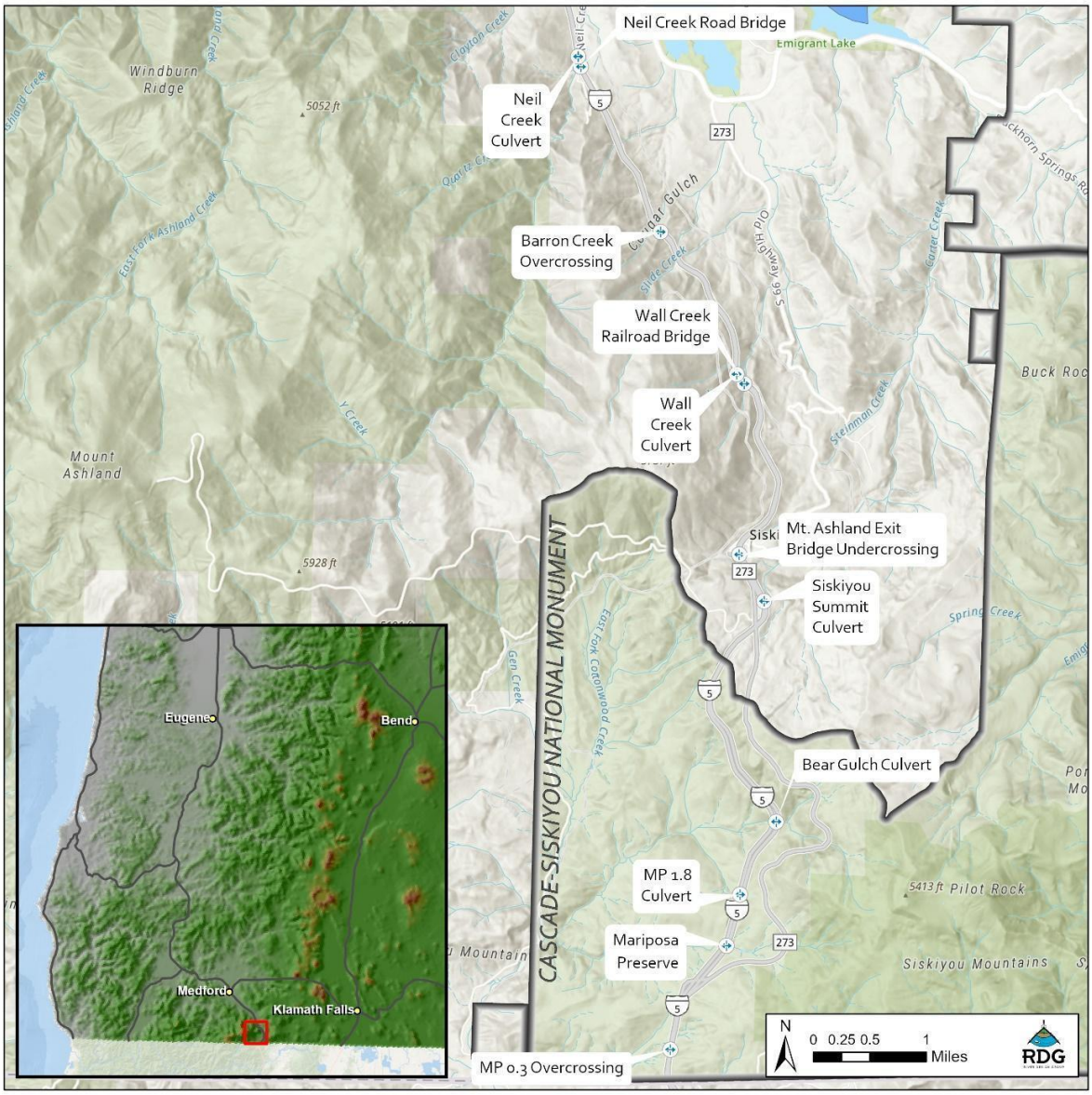
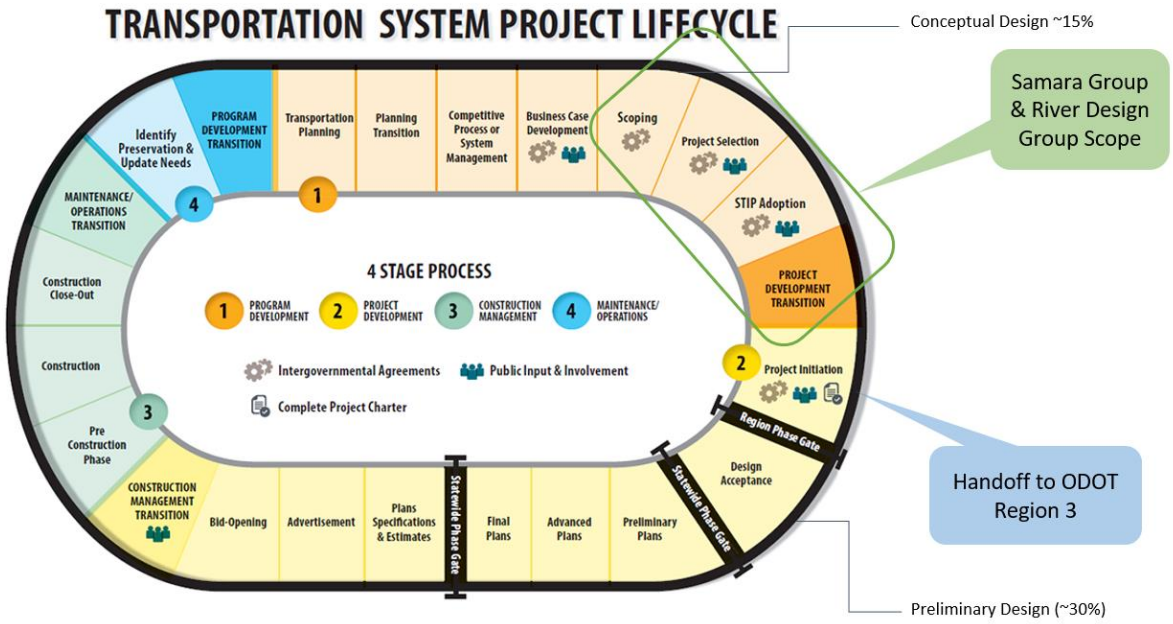


Figure 1-1. Vicinity Map showing the crossing locations and the Cascade-Siskiyou National Monument.

This report presents the preferred alternative selected for each site during the design workshops (Task 3) and alternatives analysis (Task 4) informed by engineering design criteria and permitting context (Task 1) and site condition assessment and project launch (Task 2).

The purpose of this report is to refine the level of detail for the preferred alternative at each site to fulfill the requirements of the "Scoping" phase of the Oregon Department of Transportation (ODOT) project delivery and prepare for the "Project Initiation" phase (**Figure 1-2**) (ODOT 2017). The level of design is approximately 15%. This report also includes relative priority ranking among the feasibility sites to inform a corridor-wide implementation strategy.



Source: https://www.oregon.gov/odot/ProjectDel/Pages/Project-Delivery-Guide.aspx

Figure 1-2. ODOT Project Delivery lifecycle diagram and scope for conceptual design (ODOT, 2017).

Conceptual designs are attached in **Appendix A** including a plan view, profile (if applicable) and typical section (if applicable) for each site. Preliminary fencing layouts are attached in **Appendix B**. Planning-level cost estimates in **Appendix C** include anticipated project design, permitting, and construction costs.

This report follows three design workshops as well as interviews and background research (**Figure 1-3**). The draft report was reviewed by the SOWCC and discussed during a conceptual design review meeting before being revised to develop this final conceptual design report for the corridor.

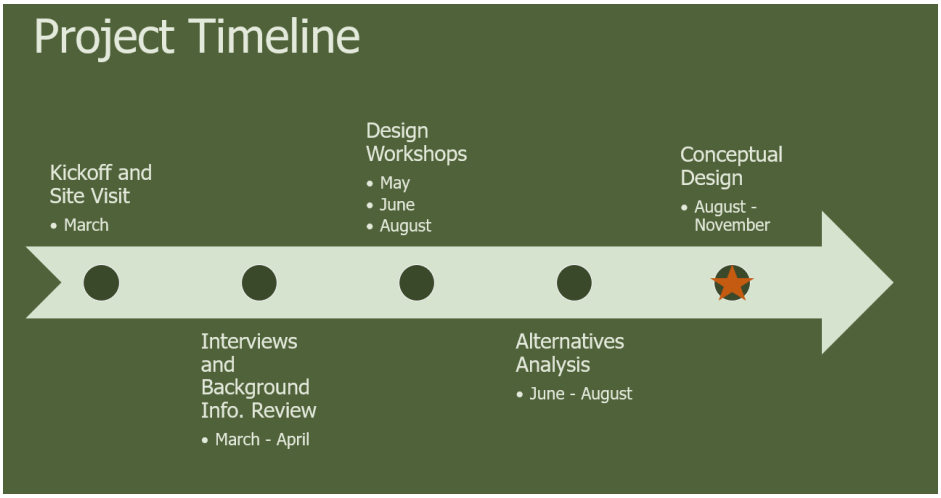


Figure 1-3. Progress in the Project Timeline.

1.2 Stakeholder Engagement

Improving wildlife movement across I-5 is an important mission that affects many different species, including humans. Multiple organizations and agencies have a vested interest in creating or restoring crossing structures in the Siskiyou Summit region between Ashland and the California border. It was therefore essential to include stakeholders throughout the decision-making process. It is important to consider different perspectives, experiences and approaches for this kind of project. An initial site visit and kick off meeting gave members of the SOWCC an outline of how each site would be evaluated, where new potential crossings may be considered, and the process for evaluating alternatives for each site to advance the design to a conceptual level with sufficient detail for the Oregon Department of Transportation (ODOT) to begin project development and preliminary design. Members of the coalition were invited to participate in this decision-making process (**Figure 1-4**) through a series of interviews and workshops to maximize input into the structured decision-making process.

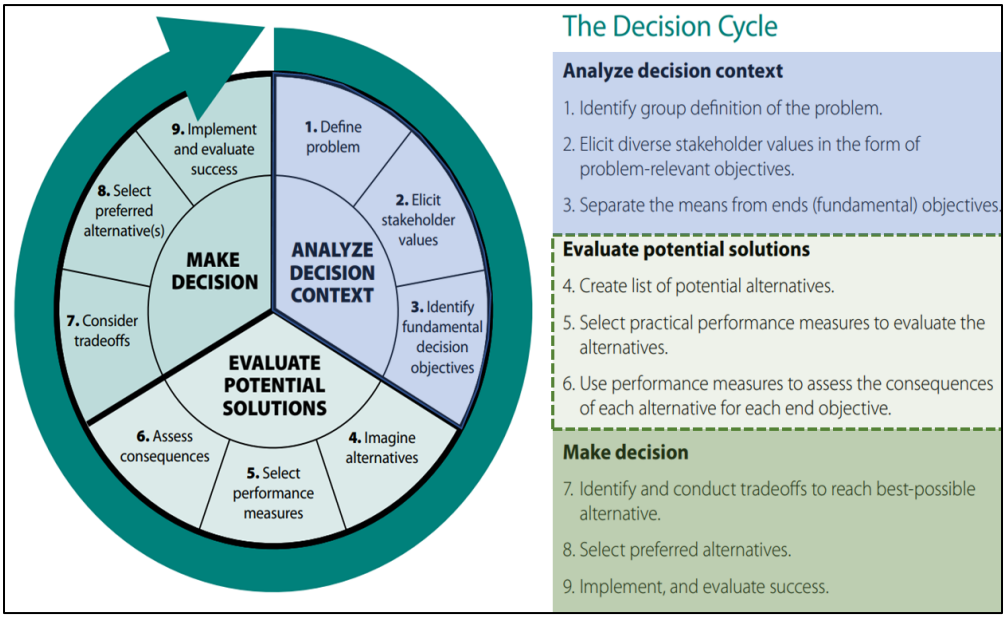


Figure 1-4. Overview of the structured decision-making process (Wilson & Arvai, 2011).

1.3 Interviews

Individual or small group interviews were conducted with members of the coalition to gauge priorities and perspectives across agencies. A total of 23 interviews were conducted with 29 individuals across 17 different organizations/agencies. All interviews were between March and April 2022.

Interviewees were asked the following questions:

- When/how did you get involved or otherwise connected with the SOWCC?
- What are your expectations for this phase of the work? What are your goals/outcomes for you or your organization/agency? What are your top priorities for a final crossing structure design?
- What do you see as potential roadblocks to reaching the goals/outcomes stated above?
- Are there any other considerations or things we should know?

Responses from the interviews were analyzed to understand common themes and identify all opportunities and constraints of potential crossing structures which coalition members brought attention to. A draft decision matrix was put together that highlighted species of concern and potential constructions or retrofits to crossing structures that could benefit wildlife movement (Section 4). This information was used to guide the full partner workshops.

1.4 Workshops

A series of design workshops helped to inform the engineering basis of design. The outcome of these workshops was to collaboratively develop design alternatives and conceptual designs. This process involves building the project knowledge base and providing opportunity for feedback from the project partners as designs advance.

April 28th, 2022 | Virtual Full Partner Zoom Meeting: This meeting covered the main takeaways and outcomes from the coalition member interviews. The different perspectives from the interviews gave essential insights into the logistics of potential crossing structures and highlighted wildlife species of concern. Overall, the consensus was to prioritize permeability and movement for this entire stretch of road from Ashland to the California border. There were four recurring priority categories discussed, each of which had their own opportunities and challenges. The following priorities were used to outline the draft decision matrix: land ownership and scale; ecological value of locations; co-benefits and/or concerns; and future considerations and opportunities. Coalition members had the opportunity to comment on or ask questions about the draft decision matrix.

May 17th, 2022 | Virtual Baseline Conditions, Opportunities and Constraints Workshop: This first design workshop was an opportunity for the coalition to evaluate the engineering considerations of potential crossing structures. The goal was for everyone to gain an appreciation for the engineering perspective and understand the intentional design choices that go into various crossing structures. The discussion focused on the existing crossings and assessed possible repairs or retrofits to improve wildlife movement. Important terms and acronyms as well as engineering design standards and guidance were covered so as to understand the different design decisions in both culverts and bridges. A site-by-site review was presented, details of which are in Section 3, Baseline Conditions.

June 14th, 2022 | Hybrid Alternatives Analysis Workshop: The purpose of this second workshop was to collaboratively develop a wide range of alternatives for each site. The end goal was to narrow down each site to a selection of up to three alternatives. In order to accomplish this goal in a hybrid environment both in-person and virtual worksheets and corresponding aerial maps were provided. Workshop participants were asked to fill out a worksheet and mark up a map with an alternative for a specific crossing location. Each participant was encouraged to repeat this process for three different sites. The in-person participants joined groups at different tables while the online participants were sorted into breakout groups for each site. All alternatives presented by coalition members were categorized and analyzed and were used to guide the alternatives evaluation.

August 17th, 2022 | Virtual Preferred Alternative Selection and Conceptual Design Kickoff Workshop: The design team presented a summary of the results of the draft alternatives analysis report and preliminary recommended alternatives to the coalition. The outcome of this workshop was the selection of one preferred alternative design concept for each site including recommended modifications to the alternatives presented. Participants also began discussion of a corridor-wide strategy for implementation of the preferred alternative at each site. Following this discussion, all coalition members were sent a site ranking survey in order to compare the benefits and downsides of each preferred alternative against the others. The results of this survey are included in Section 5 of this conceptual design report.

October 20th, 2022 | Corridor Strategy Review Meeting: The design team presented a summary of the results of the draft conceptual design report and discussed comments received from SOWCC. The workshop discussion focused on the corridor strategy: a north end overcrossing, a south end overcrossing, and a retrofit. The discussion focused particularly on the relative merits and drawbacks of Barron Creek and Wall Creek for the north overcrossing sites. The group ultimately selected Barron Creek as the first choice for the north overcrossing and Mariposa Preserve was unanimously selected for the south overcrossing. Following this, the group discussed fencing as a way to funnel animals to the overcrossings and reduce wildlife-vehicle collisions. Fencing this area and providing regular maintenance will be complex, however, it will benefit wildlife in the long run. There will be specific efforts to not block animals from using existing crossing structures and jumpouts will be utilized to prevent wildlife from getting stuck on the roadway.

1.5 Standard of Practice

This conceptual design was performed or directed by a Professional Engineer (PE) licensed to practice civil engineering in the State of Oregon with over 10 years of experience with fish passage, river restoration, and transportation improvement projects. The standard of care used to develop this study meets those of a planning level, conceptual design study based on available budget constraints and existing data provided to RDG and SG from SOWCC, Bureau of Land Management (BLM), Southern Oregon University (SOU), ODOT, Pacific Forest Trust (PFT), Southern Oregon Land Conservancy (SOLC), and publicly available datasets.

1.6 Anticipated Project Delivery

We understand that ODOT Region 3 engineers will develop the design for these crossing sites for implementation (**Figure 1-2**). All of the crossing sites are considered part of one project for the purposes

of this report. The crossings may be constructed in phases across the landscape. Site-specific design details are included in Section 6 and project-level scoping considerations are included in Sections 7 through 12.

2 Landscape Context

The landscape context was evaluated through a combination of literature review, desktop analyses, site visits, and review of information shared by SOWCC members. Physical and ecological setting informs the site constraints and opportunities for development of the conceptual designs.

2.1 Physical Setting

The I-5 corridor traverses a complex set of geologic terranes (**Figure 2-1**) including pre-Jurassic metasedimentary rocks (Applegate Group), late Cretaceous sedimentary rocks (Mitchell Group), and intrusive volcanics (Little Butte volcanics, early Western Cascades, Nevadan intrusives) with abundant landslides and colluvial units (Quaternary surficial deposits) (Wiley et al., 2011). The steep, rugged mountains were formed by a complex sequence of regional compression, thrust faulting, and metamorphism with periods of extensional tectonics with emplacement of plutonic bodies (Snoke and Barnes, 2006). Steep terrain, significant mass wasting, and high sediment yields characterize the Klamath terrane due to the intense deformation history (O'Connor et al., 2014). Multiple faults and landslides are mapped by the Oregon Department of Geology and Mineral Industries along the corridor (see detail maps by site in Section 3). Active rockfall was observed in the rock cuts near the Siskiyou Summit (approximately milepoint (MP) 3).

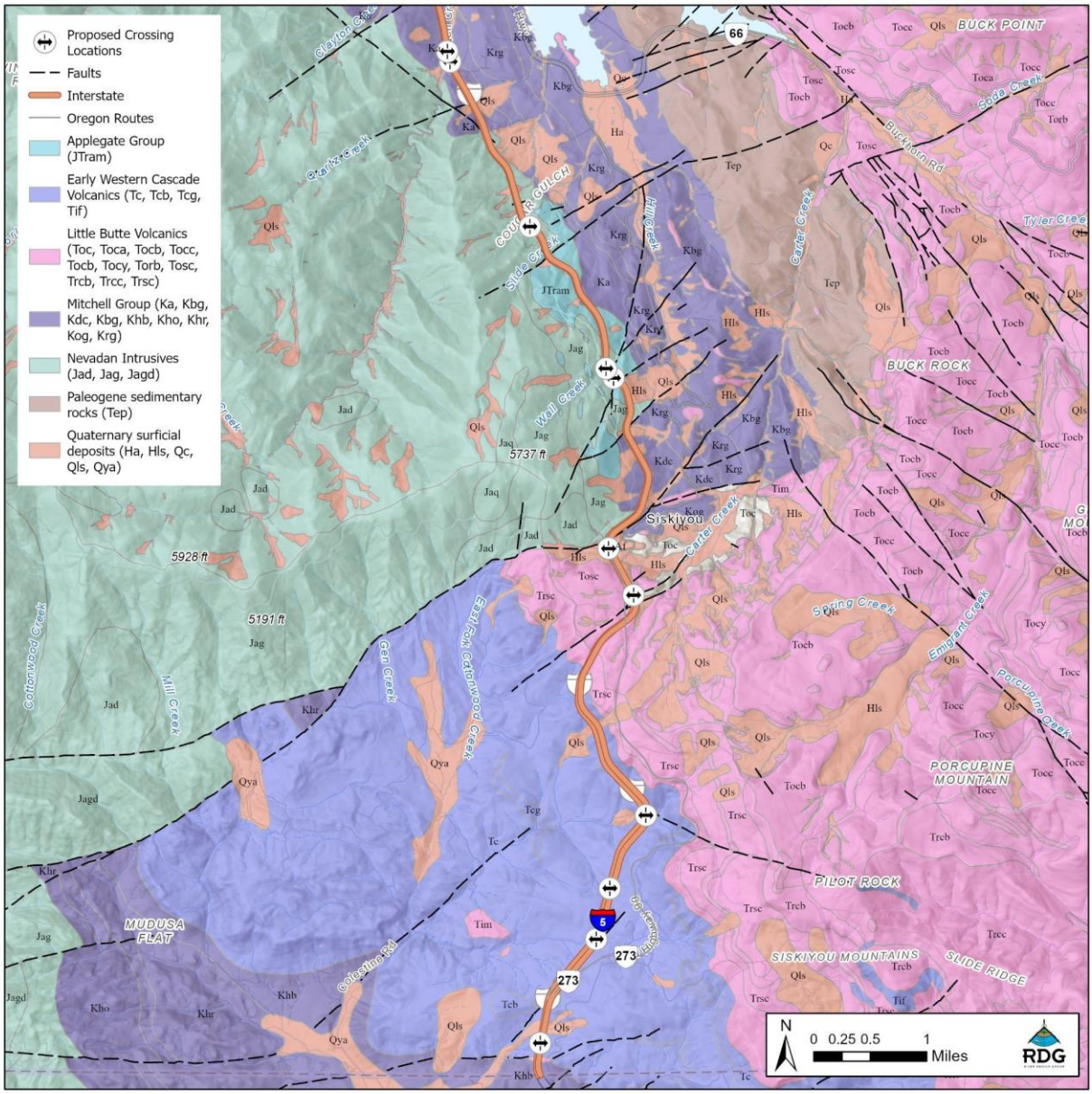


Figure 2-1. Geologic terrane groups and faults in the project corridor.

This portion of I-5 was constructed between 1965 and 1966 to replace the Siskiyou Highway (Highway 273 and Old Highway 99). The interstate highway construction included cuts through the mountains and deep fills in the valleys, especially south of the summit. The valley fills included corrugated metal pipe and structural plate culverts which are beginning to reach the end of their functional design lives. The condition of each existing structure is discussed in Section 3, Baseline Conditions, of this report.

The roadway alignment is winding with multiple vertical curves which may limit sight lines. The road steepness can be a safety issue for drivers especially during winter weather conditions. An ODOT publication regarding the hazards of the Siskiyou Pass warns truck drivers traveling northbound that, "The summit is at an elevation of 4,310 feet with approximately 2,300 feet of elevation lost in six miles at a 6 percent downgrade with sharp curves and some of the most hazardous visibility (fog) and road surface

conditions in Oregon." The design speed is 55 miles per hour which requires long stopping distances, wide clear zones, and restricted vegetation in the medians. The highway is a designated high-clearance freight route which requires a minimum clearance of 17 feet and 4 inches between the pavement surface and low chord of any overhead structures (ODOT, 2023).

Highway 273 deviates from I-5 at approximately MP 1 and travels east of I-5 until it crosses under at approximately MP 4.6, travels parallel to I-5 on the west, and crosses under again at the Mt. Ashland exit. Highway 273 remains east of I-5 at that point until it ends in Ashland. Local roads and driveways connect to Highway 273 along its length. A line of the Central Oregon & Pacific Railroad is also located east of I-5 from Ashland until the railroad crosses I-5 at the Wall Creek site. The railroad alignment remains west of I-5 from Wall Creek to the Mt. Ashland exit where the railroad deviates from the highway alignment and continues west out of the corridor.

Several non-highway roads (paved and unpaved) are present within the corridor which may affect wildlife movement (**Figure 2-2**). A road impact score was calculated for each proposed crossing site. The road impact score is a function of the distance to the nearest paved road and the density of roads within a 3-kilometer buffer from the crossing site. Road density was determined by the length of road within the buffer multiplied by an impact factor:

- Paved roads with high traffic volume (highways) have an impact factor of four
- Paved roads with low-moderate traffic volume have an impact factor of two
- Trails and unpaved roads have an impact factor of one

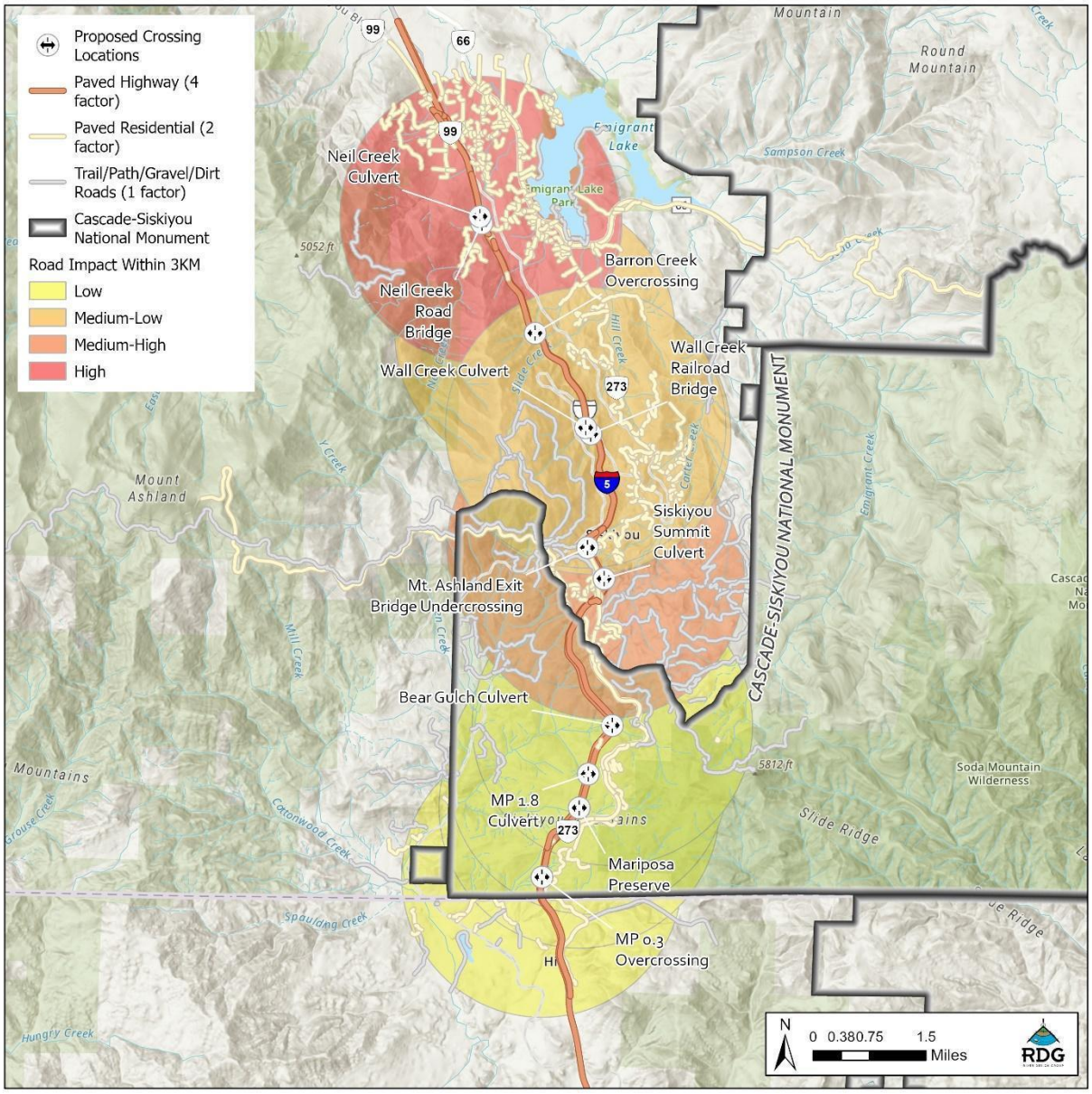


Figure 2-2. Road network and road impact score within 3 kilometers of the crossing sites.

Road type (highway, arterial, residential, etc.) was used as a proxy for traffic volume for this analysis. This analysis used a combination of publicly available datasets from ODOT and Open Street Maps. The roads data was edited to remove decommissioned roads within the Soda Mountain Wilderness per direction from SOWCC. This desktop analysis is for planning purposes. Road presence and type should be ground-truthed during design development. Road impact scores are included in the decision matrix (Section 4).

Adjacent landuse varies from high-density residential and commercial development near Ashland to agricultural and low-density residential near the summit (**Figure 2-3**). Much of the area is managed forest lands and many taxlots have entered into conservation easements with PFT or SOLC. These conservation areas are protected from future development. Federal public land within Cascade-Siskiyou National Monument boundaries is protected from future development.

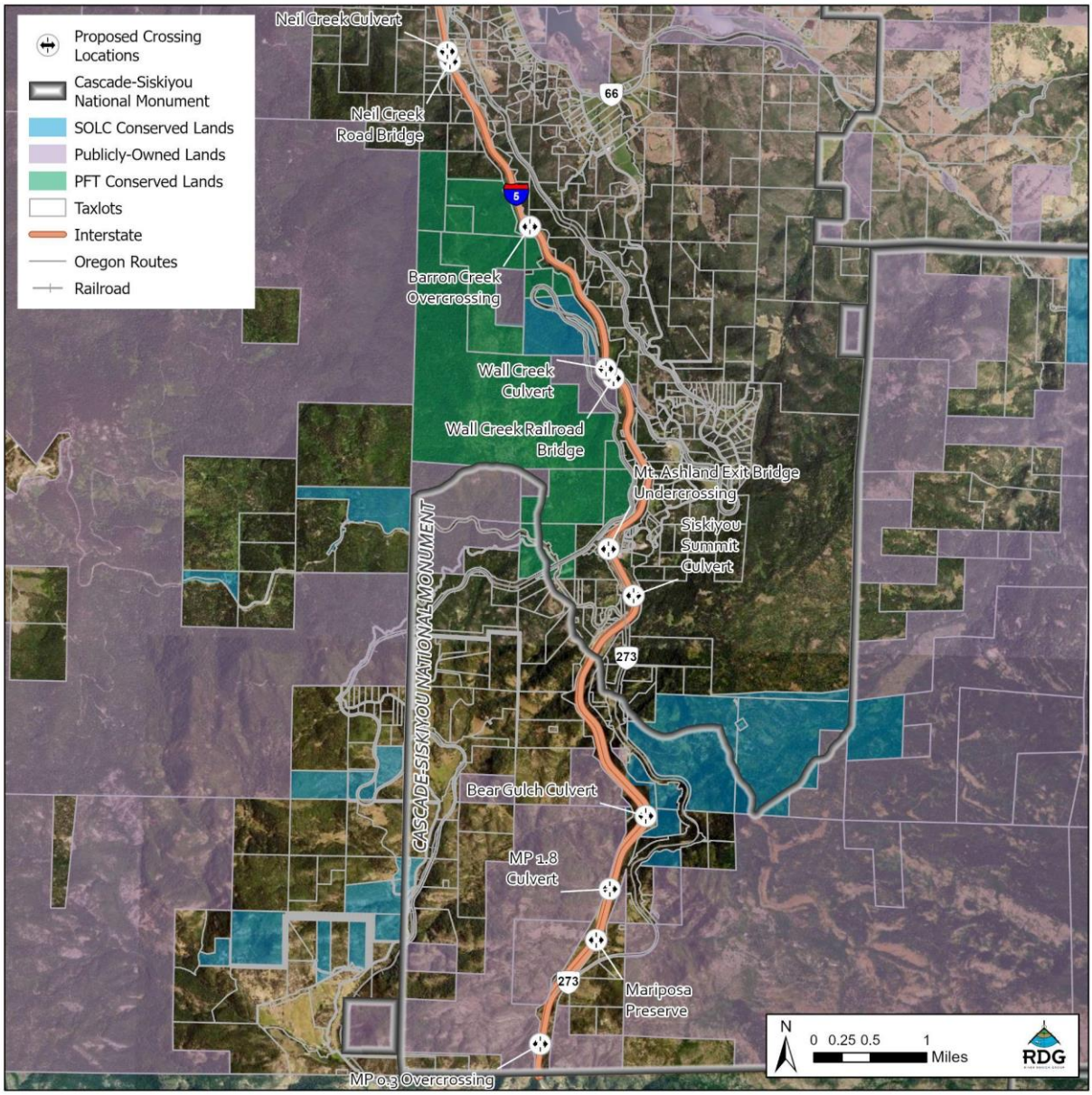


Figure 2-3. Landuse, publicly owned lands, and conserved lands within the project corridor.

2.2 Ecological Setting

The Cascade-Siskiyou region is ecologically significant to a multitude of wildlife species. Within the project area, the habitat transitions from the Inland Siskiyous in the north to the Klamath River Ridges in the south (EPA Ecoregions Level IV). This habitat transition includes variability in vegetation, elevation, and hydrology that in turn supports high biodiversity. Not only do these wildlands provide essential habitat, but they also provide valuable connectivity for wildlife through the region. Landscape connectivity is important in promoting the flow of key ecological processes and allows species movement to suitable conditions amidst an ever-changing climate (Frost, 2018). By conserving passages between habitat types there is a greater chance of preserving biodiversity and promoting healthy wildlife populations. This particular area is significant as it provides valuable low-density development and mostly intact habitat connectivity from coastal habitat to inland mountain systems (Frost, 2018).

The biodiversity in the Cascade-Siskiyou region is driven by climate and geology as well as the transitional habitats through the various ecoregions. Within the Cascade-Siskiyou National Monument there are high desert habitats, old growth forests and rocky bluffs (BLM). As these ecoregions connect there are hotspots of biodiversity. Alpine forests meet dense chaparral habitats while open glades and meadows meet mixed woodlands causing a significant amount of movement across a diverse set of species and making the Monument an essential location to support biodiversity (Office of Press Secretary, 2017). The chaparral habitat, dominated by shrubs, supports many rare, threatened or endemic species (Balti, 2021) as do old growth forests (Frost, 2018) making this area significant for sensitive species.

During the 1990's federal biologists recognized the Cascade-Siskiyou region had high levels of biodiversity present within the varying ecosystems and that there was great value in preserving a connected habitat for the flora and fauna of the area (Frost, 2018). There was specific concern over rare and endemic species living within the monument range including the Northern Spotted Owl (Proclamation 7318 USDI, 2000). A final supplemental Environmental Impact Statement in early 1994 addressed public concerns and evaluated the management of habitat for late successional and old growth forest needed for Northern Spotted Owl populations in order to address potential development and harvesting of resources in sensitive areas (USDA, FS, USDI, BLM, 1994). The 1994 Record of Decision summarized findings from the presidentially appointed Forest Ecosystem Management Assessment Team and decisions were made to reduce harvest and salvage in old-growth areas and "provide for greater connectivity of late-successional forest habitat" within the range of the northern spotted owl (USDA, FS, USDI, BLM, 1994 ROD). In 2000 President Clinton proclaimed the Cascade-Siskiyou a National Monument under the Antiquities Act, it was later expanded by President Obama in 2017 (Schelz & Fallon, 2022).

The ecological diversity of the monument stretches across many different taxa, of particular note is the diversity in invertebrates present (Frest & Johannes, 2004). The Monument, with its unique and varied landscape and wildflower diversity is one of the greatest species rich regions for butterflies within the U.S. (Schelz & Fallon, 2022). This suitable habitat for pollinator species relies on plant connectivity. The diversity of bird species present is notable as well. There are oak and chaparral habitats that support unique bird species at the northern range limit of the Monument while the southern edge with mixed hardwood and conifers supports even more diverse species (Trail, 2002). Bird species that require the lower elevations associated with chaparral climates are most threatened by development (Trail, 2002).

In addition to the rich biodiversity present within the Cascade Siskiyou National Monument there is also a diversity of species utilizing the higher elevations north of the Monument. ODOT roadkill counts reveal that this section of I-5 is an active movement location for black bears as many attempt to cross I-5 (ODOT GIS Unit). Through recent wildlife camera recordings there have been 14 sightings of black bear from 2021-2022 near Barron Creek south of Ashland (Mager & Smith, 2022, Table 2-1). While this location, in comparison to the Monument area, is more fragmented and closer to urban locations, wildlife sightings and tracks reveal there are still many species traveling through the landscape. The value in preserving connectivity north of the monument is prevalent in protecting fisher habitat as well. Fisher populations in Oregon have already been threatened due to a combination of over-trapping, low reproduction rates, loss of habitat and landscape fragmentation (Coe, 2018). However, there are accounts of established populations of fisher both east (introduced) and west (indigenous) of I-5 that are likely to frequent the rugged landscape and higher elevations north of the Monument (Barry, 2018).

Table 2-1. A summary of the species observed at each of the proposed crossing sites from November 2021 through September 2022 using remote camera monitoring. Remote cameras are best suited to capture large mammal movement and therefore small species, especially reptiles and amphibians are not likely to be represented well in the data. Additional species which have not been observed at the existing structures, are also likely to benefit from the crossings. Monitoring data was provided by Dr. Karen H. Mager, Assistant Professor of Environmental Science, Policy, and Sustainability, and Biology at SOU, and was collected in conjunction with the Capstone Project completed by Maya Smith & Alex Zenor in June of 2022 and collaboration with additional monitoring efforts by Charles Schelz, Ecologist for the BLM at the Cascade-Siskiyou National Monument.

Site	Black bear	Black-tailed deer	Bobcat	CA ground squirrel	Cougar	Coyote	Douglas squirrel	Elk	Ermine	Gray fox	Jackrabbit	Mouse	Fisher	Striped skunk	Raccoon	Western grey squirrel	Woodrat
Neil Creek Culvert (MP 10.4)	Monitoring data was not collected or was not available for this site																
Neil Creek Bridge (MP 10.3)	■	■				■				■	■					■	
Barron Creek Potential Overcrossing (MP 8.7)	■	■						■		■							
Wall Creek Culvert (MP 7.1)	Monitoring data was not collected or was not available for this site																
Wall Creek Railroad Bridge (MP 7.1)	■	■	■	■					■	■						■	
Mt. Ashland Exit (MP 5.3)		■		■						■	■			■			■
Siskiyou Summit (MP 4.8)		■		■	■		■			■				■	■	■	
Bear Gulch (MP 2.5)	■	■	■	■	■	■				■	■		■	■		■	
Mariposa Preserve (MP 1.4)	■	■	■	■		■	■	■		■	■	■		■	■		■
South Potential Overcrossing (MP 0.3)	Monitoring data was not collected or was not available for this site																

Wildlife sightings throughout the Cascade-Siskiyou National Monument and the surrounding natural areas are frequent and are reflected in iNaturalist observations (**Figure 2-4** and **Table 2-2**). These observations have been filtered to only include sightings that meet the criteria for research grade, meaning they are confirmed identifications by the iNaturalist community and were recorded between 2012 and 2022. These data include 65 amphibian, 727 bird, 299 mammal, and 192 reptile observations made by iNaturalist accounts in the area surrounding I-5 between Ashland and the California border. It is important to note that these observations mark where humans have come into contact with wildlife and recorded their occurrence. While this is not a complete account of all vertebrate species that may be present within the project area, it clearly indicates that an abundance of species are present both east and west of I-5.

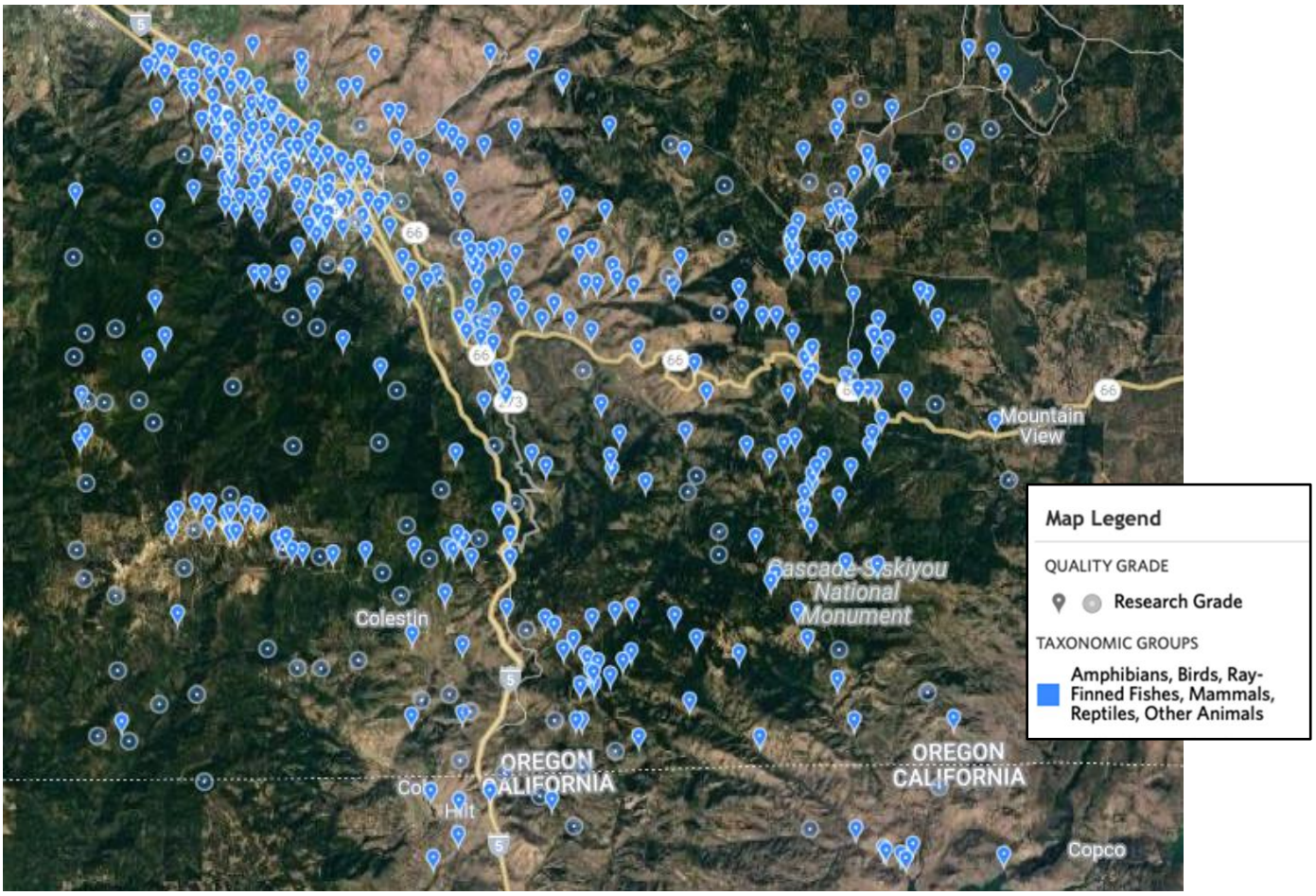


Figure 2-4. iNaturalist research grade observations from 2012- 2022 showing vertebrate species recorded in the surrounding project area. These data include 65 amphibians, 727 birds, 299 mammals, and 192 reptiles.

Table 2-2. iNaturalist observations from 2021 – 2022 of amphibians, reptiles, mammals, and birds within the broader Cascade-Siskiyou region including the primary project area from Ashland, OR down to the California border.

Mammals		**Birds**	
American Beaver	3	Acorn Woodpecker	31
American Black Bear	33	American Coot	1
Black-tailed Jackrabbit	9	American Crow	4
Bobcat	3	American Dipper	10
Brown Rat	5	American Goldfinch	6
Bushy-tailed Woodrat	1	American Robin	22
California Ground Squirrel	9	American White Pelican	2
California Kangaroo Rat	1	American Wigeon	3
Columbian Black-tailed Deer	95	Anna's Hummingbird	9
Common Raccoon	13	Ash-throated Flycatcher	1
Coyote	4	Bald Eagle	3
Domestic Cat	7	Band-tailed Pigeon	2
Domestic Dog	2	Barn Swallow	1
Domestic Rabbit	1	Barred Owl	4
Douglas' Ground Squirrel	1	Belted Kingfisher	3
Douglas' Squirrel	6	Bewick's Wren	2
Fisher	1	Black Phoebe	4
Golden-mantled Ground Squirrel	5	Black-capped Chickadee	8
Gray Fox	5	Black-headed Grosbeak	11
Gray Wolf	1	Blue-gray Gnatcatcher	1
Hoary Bat	1	Brewer's Blackbird	12
Humboldt's Flying Squirrel	1	Brown Creeper	1
Mule Deer	5	Brown-headed Cowbird	3
Muskrat	3	Bufflehead	1
North American Mountain Lion	1	Bullock's Oriole	4
North American River Otter	11	Bushtit	1
Ringtail	3	California Quail	1
Roosevelt Elk	1	California Red-shouldered Hawk	2
Siskiyou Chipmunk	3	California Scrub-Jay	33
Snowshoe Hare	1	California Towhee	5
Striped Skunk	3	Canada Goose	2
Virginia Opossum	3	Canada Jay	3
Wapiti	3	Caspian Tern	1
Western Gray Squirrel	52	Cassin's Vireo	2
Western Spotted Skunk	1	Cedar Waxwing	8
Yellow-bellied Marmot	1	Chipping Sparrow	2
Yellow-pine Chipmunk	1	Common Merganser	2
		Common Poorwill	1
		Common Raven	5
		Cooper's Hawk	7
		Dark-eyed Junco	20
		Domestic Greylag Goose	1
		Domestic Mallard	13
		Domestic Muscovy Duck	9

Table 2-2. iNaturalist observations from 2021 – 2022 of amphibians, reptiles, mammals, and birds within the broader Cascade-Siskiyou region including the primary project area from Ashland, OR down to the California border.

Reptiles	
California Alligator Lizard	1
California King Snake	1
California Mountain Kingsnake	5
Common Garter Snake	2
Common Sagebrush Lizard	9
Gopher Snake	22
Mountain Garter Snake	4
North American Racer	3
Northern Alligator Lizard	6
Northern Pacific Rattlesnake	8
Northern Rubber Boa	5
Northwestern Fence Lizard	7
Northwestern Garter Snake	2
Pacific Gopher Snake	5
Pond Slider	1
Red-eared Slider	2
ring-necked snake	1
Sharp-tailed Snake	4
Skilton's Skink	3
Southern Alligator Lizard	18
Valley Garter Snake	5
Western Fence Lizard	51
Western Pond Turtle	7
Western Rattlesnake	1
Western Skink	10
Western Terrestrial Garter Snake	1
Western Yellow-bellied Racer	8

Amphibians	
American Bullfrog	6
Boreal Toad	1
Coastal Giant Salamander	5
Ensatina	3
Klamath Black Salamander	5
Long-toed Salamander	4
Northern Pacific Tree Frog	25
Oregon Ensatina	1
Oregon Spotted Frog	1
Rough-skinned Newt	5
Sierran Tree Frog	2
Southern Long-toed Salamander	1
Western Toad	6

Domestic Turkey	1
Double-crested Cormorant	2
Downy Woodpecker	8
Dusky Flycatcher	2
Eurasian Collared-Dove	2
European Starling	4
Fox Sparrow	6
Golden Eagle	3
Golden-crowned Kinglet	1
Golden-crowned Sparrow	14
Great Blue Heron	13
Great Egret	3
Great Gray Owl	3
Great Horned Owl	3
Green Heron	5
Green-tailed Towhee	3
Green-winged Teal	1
Hairy Woodpecker	3
Hermit Thrush	6
Hermit Warbler	1
Hooded Merganser	1
House Finch	7
House Sparrow	2
House Wren	1
Indian Peafowl	2
Killdeer	3
Lazuli Bunting	4
Least Sandpiper	1
Lesser Goldfinch	15
Lesser Scaup	1
Lewis's Woodpecker	2
Lincoln's Sparrow	5
Long-billed Dowitcher	1
MacGillivray's Warbler	1
Mallard	23
Merlin	1
Mountain Bluebird	4
Mountain Chickadee	2
Mountain Quail	2
Mourning Dove	5
Nashville Warbler	1
Northern Flicker	19
Northern Goshawk	1
Northern Mockingbird	1

Table 2-2. iNaturalist observations from 2021 – 2022 of amphibians, reptiles, mammals, and birds within the broader Cascade-Siskiyou region including the primary project area from Ashland, OR down to the California border.

	Northern Pygmy-Owl	3
	Northern Red-shafted Flicker	1
	Northern Saw-whet Owl	1
	Northern Shoveler	1
	Oak Titmouse	4
	Olive-sided Flycatcher	1
	Osprey	6
	Peregrine Falcon	2
	Pileated Woodpecker	5
	Pine Siskin	8
	Prairie Falcon	1
	Purple Finch	1
	Purple Martin	1
	Red Crossbill	1
	Red-breasted Nuthatch	2
	Red-breasted Sapsucker	10
	Red-shouldered Hawk	6
	Red-tailed Hawk	14
	Red-winged Blackbird	8
	Ring-billed Gull	1
	Ring-necked Duck	2
	Rock Wren	1
	Ruby-crowned Kinglet	1
	Rufous Hummingbird	5
	Sandhill Crane	2
	Sapsuckers	1
	Savannah Sparrow	1
	Say's Phoebe	1
	Semipalmated Plover	1
	Sharp-shinned Hawk	2
	Siskins and New World Goldfinches	1
	Song Sparrow	2
	Sooty Grouse	4
	Spotted Owl	1
	Spotted Sandpiper	2
	Spotted Towhee	19
	Steller's Jay	25
	Townsend's Solitaire	1
	Townsend's Warbler	1
	Tree Swallow	5
	Trumpeter Swan	1
	Turkey Vulture	10
	Vesper Sparrow	1
	Western Bluebird	9
	Western Kingbird	4

Table 2-2. iNaturalist observations from 2021 – 2022 of amphibians, reptiles, mammals, and birds within the broader Cascade-Siskiyou region including the primary project area from Ashland, OR down to the California border.

	Western Meadowlark	2
	Western Sandpiper	1
	Western Screech-Owl	6
	Western Tanager	10
	Western Wood-Pewee	4
	White-breasted Nuthatch	7
	White-crowned Sparrow	5
	White-headed Woodpecker	2
	White-throated Sparrow	2
	Wild Turkey	26
	Williamson's Sapsucker	1
	Wilson's Snipe	1
	Wilson's Warbler	3
	Wood Duck	18
	Yellow-rumped Warbler	3

The Oregon Conservation Strategy is a document developed by the Oregon Department of Fish and Wildlife as a blueprint for conservation in Oregon with the goal of maintaining healthy wildlife populations (Oregon Conservation Strategy, 2016). Associated with the Oregon Conservation Strategy is the compass online mapping tool (Internet at: https://compass.dfw.state.or.us/) Within the Compass tool, users can view habitat maps for strategy species critical to the long term conservation of Oregon's biodiversity. Twenty-one strategy species of Amphibians, Reptiles, and Mammals are shown to intersect with the Cascade-Siskiyou region from Ashland to the California border and have mapped habitats on either side of the Interstate 5 Highway corridor (Table 2-3). Additionally, the area has been identified as a Crucial Terrestrial Habitat for landscape connectivity.

Table 2-3. Oregon Conservation Strategy Species with overlapping habitat in the Cascade-Siskiyou region including the primary project area from Ashland, OR down to the California border.

Amphibians: Cascades Frog Clouded Salamander Coastal Tailed Frog Foothills Yellow-Legged Frog Northern Red-Legged Frog Western Toad	**Mammals:** American Marten California Myotis Fisher Fringed Myotis Hoary Bat Long Legged Myotis Pallid Bat Silver Haired Bat Spotted Bat Townsends Long-Eared Bat Ringtail Western Gray Squirrel
Reptiles: California Mountain Kingsnake Northwestern Pond Turtle Western Rattlesnake	

The Interstate 5 Highway system presents a major barrier to wildlife and creates a multitude of issues for the local and migratory wildlife species that occur nearby. Roads impact wildlife in several ways, including direct impacts such as mortality from roadkill, disrupted daily and migratory movements, habitat loss, and pollution impacts as well as indirect impacts such as overexploitation of resources and habitat degradation (Barrientos et al., 2021). Roads, depending on the density of traffic volumes, are barriers to species movement that can have long term impacts on the evolution and trajectory of populations (Jacobson et al., 2016). However, there is so much that is still unknown about specific species reactions to roads, the majority of studies have focused on carnivores or ungulates while very few dive into smaller animals or invertebrates (Barrientos et al., 2021). The combination of impacts from roads can result in large scale and long term implications for local and regional biodiversity.

Highways and interstates can be especially dangerous to wildlife due to their larger footprint, denser traffic volumes and faster speed limits. I-5 presents a serious threat to wildlife connectivity in Southern Oregon. It is a barrier that changes through the landscape, with varying levels of permeability and new obstacles for species that cross at different terrains (Stewart, 2019). This highway results in mortality of wildlife species, behavioral changes, and disruption to habitat and movement. As I-5 moves through the Cascade-Siskiyou region it is of particular concern due to potential “bottleneck” effect coming from high biodiversity and animal movement converging in a single region, leading to an increased risk to connectivity (Frost, 2018). **Figure 2-5** indicates the wildlife vehicle collisions recorded by ODOT on I-5 between Ashland and the California border (ODOT GIS Unit). This figure illustrates the high number of deer collisions on this particular stretch of highway, with the highest fatalities in the north around Neil Creek and in the south near Bear Gulch and Mariposa Preserve. There have been several bear collisions throughout this stretch and one recorded elk collision. There were no accounts of medium to small species vehicle collisions in the ODOT database, however this does not mean that they are not frequent in this stretch. Smaller species are less likely to be reported to ODOT dispatch and are often not noticed because of their small size and negligible impact on motorists and/or are removed relatively quickly by scavengers (ODOT GIS Unit).

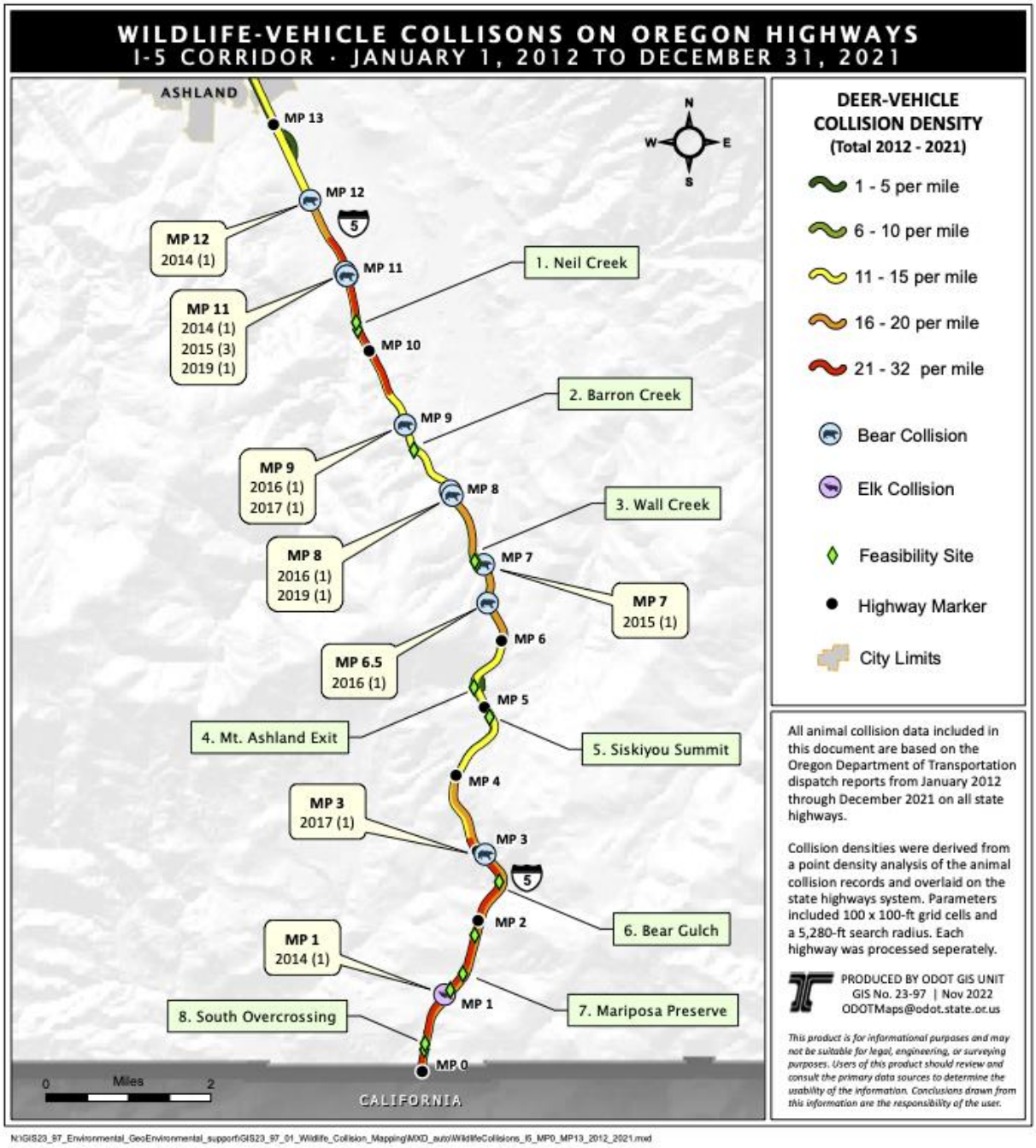


Figure 2-5. ODOT record of wildlife-vehicle collisions along I-5 from Ashland to the California border.

The biodiversity present in and around the Cascade-Siskiyou National Monument is already being directly threatened by the presence of I-5. This major barrier, in addition to causing wildlife mortality, is likely inhibiting gene flow in populations and causing genetic isolation. Studies have shown that some mammal species will present genetic discontinuities between subpopulations due to landscape barriers such as roads (Lecis et al., 2022). Furthermore, some bird species have developed different genetic makeups on one side of a barrier compared to the other. In California, wrentits, a small shrub dwelling songbird, have had difficulty adapting to the construction and traffic volume of highways as they are not strong flyers

(Golden, 2022). Evidence has shown that the genetics of the birds on the northside of the highway is isolated from the populations on the southside. Increased fracturing of a population's genetics is dangerous long term and leaves the birds more susceptible to threats (Thomassen et al., 2018). While this is of concern for individual sensitive species, areas with high levels of biodiversity, as is seen in the Cascade-Siskiyou National Monument, are at an even higher risk of disrupting ecosystem dynamics. Overall, the barrier effect caused by roads often lowers dispersal rates and therefore reduces demographic rescue and gene flow, increasing the risk of local extinction (Jacobson et al., 2016).

A multispecies approach will help to improve overall ecological connectivity in the Cascade-Siskiyou region. Species with sensitivity to human presence are especially vulnerable to barriers that cause a loss in habitat connectivity. There are many species of concern within and around the Monument that are at a greater risk of direct and indirect impacts from I-5 and vehicle collisions. Just a few of these species of concern include black bear, fisher and elk. Recent surveys have been conducted to determine how fisher populations in particular are faring in the increasingly fractured landscape. The results showed that populations are not expanding into new or historical habitats and they are becoming increasingly isolated (Barry, 2018). Conclusions from these surveys and other research on fisher state that "researchers suggest the most effective conservation strategy to reduce the risk of fisher extinction involves protecting existing populations and encouraging them to expand beyond their current boundaries." (Coe, 2018). Not only are mammal species at risk for habitat loss and fragmentation they are often involved in wildlife vehicle collisions. These are harmful to wildlife populations and can also cause serious harm to drivers who may either hit these animals or swerve to dodge them (Donaldson & Elliott, 2021).

Within the Cascade-Siskiyou region there are sensitive species that are highly susceptible to the negative impacts of roads. There are many populations of amphibians and reptiles in the Monument including the torrent salamander, tailed frog, Pacific giant salamander, northwestern pond turtle and California king snake that are at a high risk from increased habitat fragmentation. In addition, terrestrial birds such as the mountain quail or birds that are maladapted to vehicles like barn owls and raptors that are disproportionately impacted by roads (Jacobson et al., 2016). By incorporating a multispecies approach to wildlife crossings, which improves both plant and animal connectivity in the Cascade-Siskiyou region, there is a stronger change for preserving biodiversity.

It is critical to preserve habitat corridors that allow species to move across and between landscapes as climate change continues to impair and shift the locations of suitable habitat. Habitat connectivity helps to preserve populations of species rather than isolated geographic areas. When human activity interrupts a range shift for traveling wildlife there will be both direct and indirect impacts to the entire population (Hannah, 2011). Improving connectivity for multiple species in a changing climate can be challenging. These challenges tend to be context specific as well as dependent on land-ownership patterns, socioeconomic factors, and policy drivers (Keeley et al., 2018). Connectivity actions that have proven successful in the face of climate change are associated with a shared vision among diverse sets of stakeholders, including entities and organizations outside of conservation groups (Keeley et al., 2018).

The land within the Cascade-Siskiyou National monument and the wildlands surrounding it has incredibly high value for preserving connectivity in the face of climate change. With high biodiversity present, animal movement is not only important for species health and fitness, but also essential as the effects of climate change continue to worsen. **Figure 2-6** shows the critical lands for wildlife connectivity surrounding I-5 in southern Oregon (Wildlands Network, 2022). The best locations for current wildlife movement as well as

projected movement needs under future climate scenarios are shown in purple. This map highlights the many opportunities between Ashland and the California border for improving connectivity, and the potential positive impact from mitigating the barrier effect of I-5.

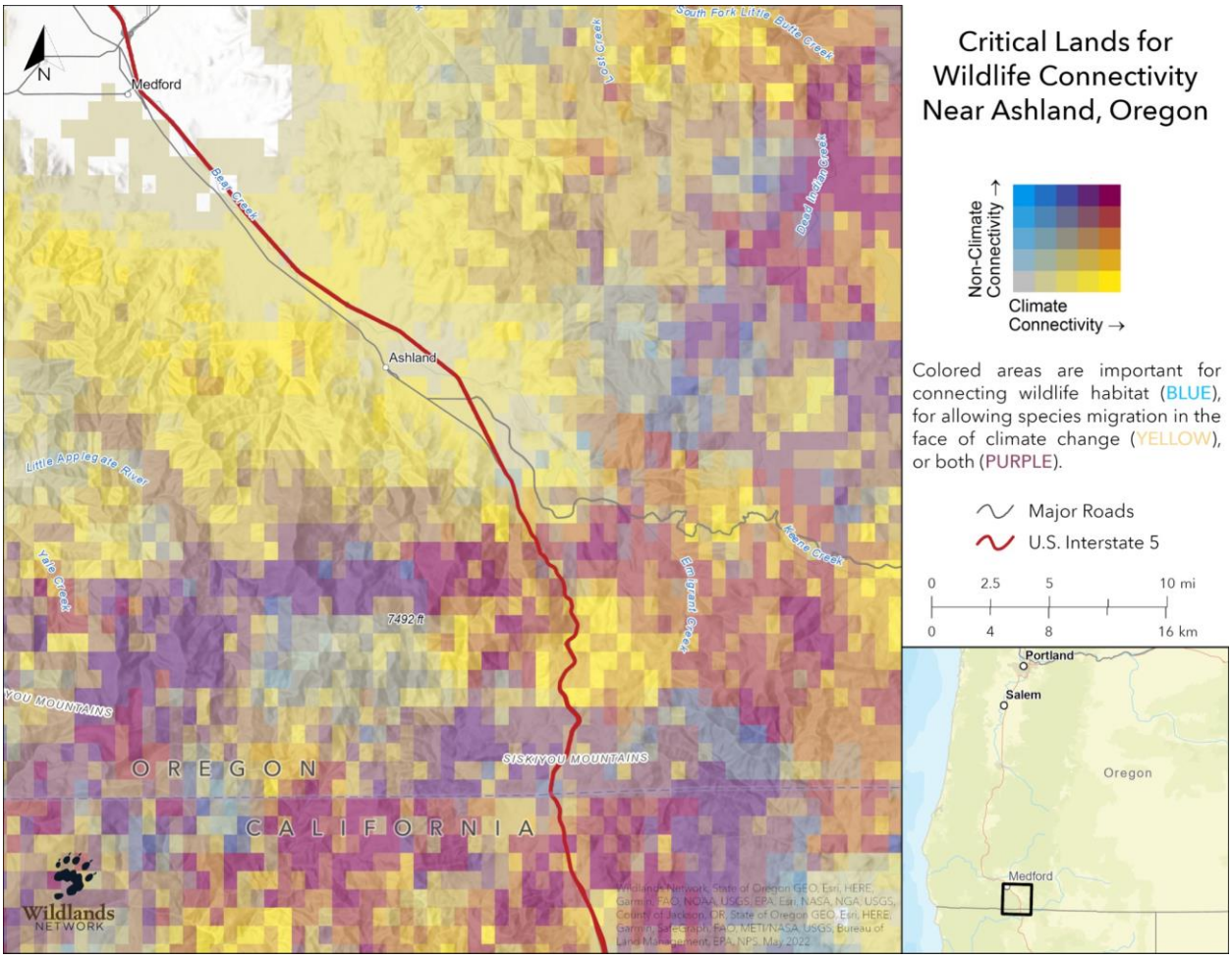


Figure 2-6. Connectivity value under current conditions (blue) and projected climate change scenarios (yellow) and those areas that provide both current and projected connectivity value (purple) in the project area (Wildlands Network, 2022).

Overall, the diverse landscapes and ecosystems present within and around the Cascade-Siskiyou National Monument support a great diversity of wildlife species. However, this is being impeded by a major barrier and causing disruption to what would otherwise be a mostly intact landscape. The elevation shifts between the mountainous range south of Ashland and the chaparral close to the California border provide a diversity of habitats and potential movement of species to access shifting seasonal resources. Climate change impacts are likely to increase the need for movement between these habitats as species search for the resources they need.

3 Baseline Conditions

3.1 Neil Creek

The existing culvert over Neil Creek under I-5 (ODOT bridge ID 02196 at MP 10.43) is an 8-foot span by 8-foot rise by 435-foot-long concrete box culvert. It has 44 feet of cover at the inlet and 42 feet of cover at the outlet (**Figure 3-1**). It was constructed in 1936 and was most recently inspected in June 2018 with a fair bridge condition, meaning it warrants preservation measures, a culvert rating of 5 (moderate damage) and a sufficiency rating of 24 (FHWA, 2022). It is considered scour-critical which is defined as a bridge with a foundation element that has been determined to be unstable for the observed or evaluated scour condition. Wetted marks and erosion on the culvert sides indicate that the culvert regularly flows more than half-full. The structure continues under Neil Creek Road with an open-air section at the outlet of I-5. Access to the outlet is via Neil Creek Road and a vegetated access road. Access to the inlet was not observed. ODOT installed concrete baffles to improve fish passage in 2018 (ODFW and ODOT, 2021). The culvert bottom is mostly bare concrete in the observed area though some sand and gravel are depositing upstream of the baffles.

The Neil Creek culvert crossing is only available for fully aquatic species. Aquatic species that are not strong swimmers or are unable to withstand swift currents, amphibians in particular or possibly juvenile fish, are unable to use this crossing. Additionally, Neil Creek is not available to semi-aquatic species or terrestrial species. Current species activity is unclear, and it is unknown if fish surveys have been conducted since the 2018 retrofit.

Figure 3-1. Outlet of Neil Creek Culvert (left) with I-5 at the top of the image; detail of fish passage retrofit baffles (right).

The existing bridge over Neil Creek Road (ODOT bridge ID 20673 at MP 10.34) is a 75-foot long (along I-5) by 101-foot wide (along Neil Creek Road) prestressed concrete bridge with approximately 16 feet of clearance between Neil Creek Road and the low chord (**Figure 3-2**). It was constructed in 2008 and most recently inspected in June 2020 with a fair condition and sufficiency rating of 87.9. The bridge is not over water and thus scour was not assessed; however, a roadside ditch runs along the south side of Neil Creek

Road and is armored with quarry spalls. Some erosion is evident along the flow line of the ditch. Access to the bridge is very good via Neil Creek Road.

Figure 3-2. Neil Creek Road bridge (left) with I-5 at the top of the image; detail of existing road shoulder materials (right).

The Neil Creek bridge crossing is only accessible for terrestrial species. It is highly suitable for deer and likely also used by mesocarnivores such as raccoons. There is possible infrequent use by small animals like mice, and/or the occasional lizard or snake. This crossing is unavailable to aquatic and semi-aquatic species. Additionally, smaller terrestrial species that prefer cover are less likely to use the Neil Creek bridge crossing. Larger species that exhibit behavioral avoidance to frequent human activity will also likely avoid this area. There is clear evidence of deer activity in and around the bridge and the frequency of use was corroborated by a conversation with a local resident.

Both crossings are surrounded by private property (**Figure 3-3**). Land to the west is primarily forested with large lots and few buildings. Neil Creek flows out of U.S. Forest Service land adjacent to conserved lands (Pacific Forest Trust) approximately one mile upstream (west) of the existing culvert crossing. Land to the east is primarily open fields/pastures with smaller lots and more buildings. A railroad line is approximately 900 feet to the east.

No mapped landslides or faults are present at the existing crossings.

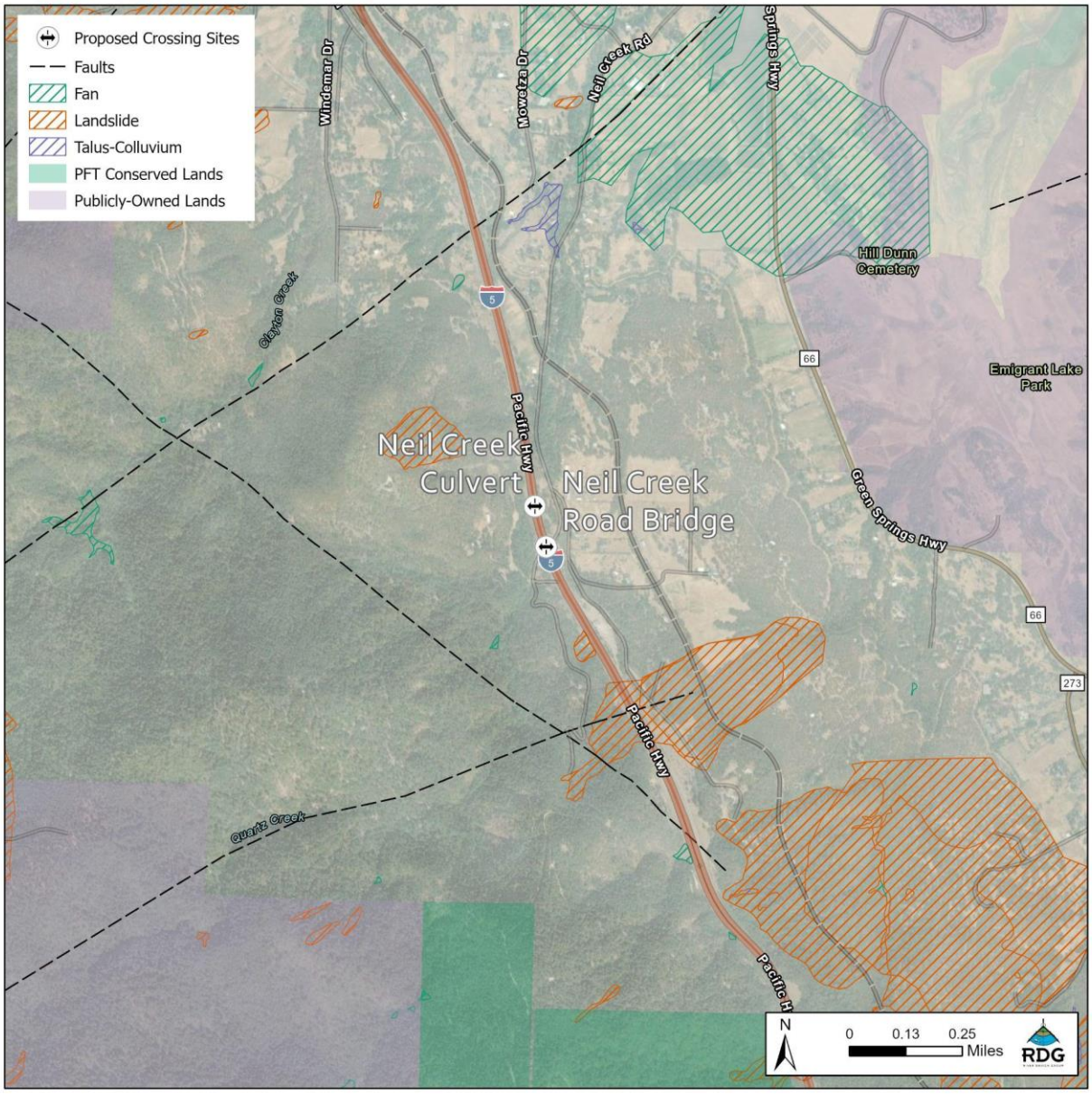


Figure 3-3. Neil Creek vicinity showing adjacent development and mapped faults and landslides.

3.2 Barron Creek

An existing 134-foot long, 4-foot diameter corrugated metal pipe culvert conveys Barron Creek under the highway (west to east) at MP 8.75. There is currently no overcrossing structure at this location. The highway cuts through the adjacent hills to the south which lend themselves to a potential overcrossing (aka a land bridge restoring the ridge lines). The proximity to the creek is likely to attract many species to this location. Fencing is proposed to direct wildlife to the crossing structure along the benches cut in the slopes. It is not anticipated that wildlife will need to navigate the steep rock faces.

This potential overcrossing location is at the intersection of the Siskiyou Crest range and the Cascade Mountains where wildlife naturally look to cross from the east-west corridor to access the higher, cooler

habitat areas of the Cascade Range. This location was identified as a critical land for wildlife connectivity and allowing species migration in the face of climate change by the Wildlands Network. Wildlife camera monitoring has revealed that this location is frequented by black bears. Cameras observed 14 sightings of black bear at Barron Creek between November 2021 and September 2022 which is more than all of the other crossing sites combined (Table 2-1; Mager & Smith, 2022; pers. com.). Barron Creek is the only site north of the Siskiyou Summit where elk have been captured on wildlife cameras (Table 2-1; Mager & Smith, 2022; pers. com.).

PFT has conservation easements in place on the properties to the west (Mountcrest Forest LLC). Lands to the east are privately-owned large lots, forested, with very few buildings present. The railroad is approximately one quarter mile to the east (**Figure 3-4**). No mapped landslides or faults are present at the proposed crossing location; however, a mapped landslide and fault is present on the North Fork Barron Creek crossing at MP 8.9 to the north.

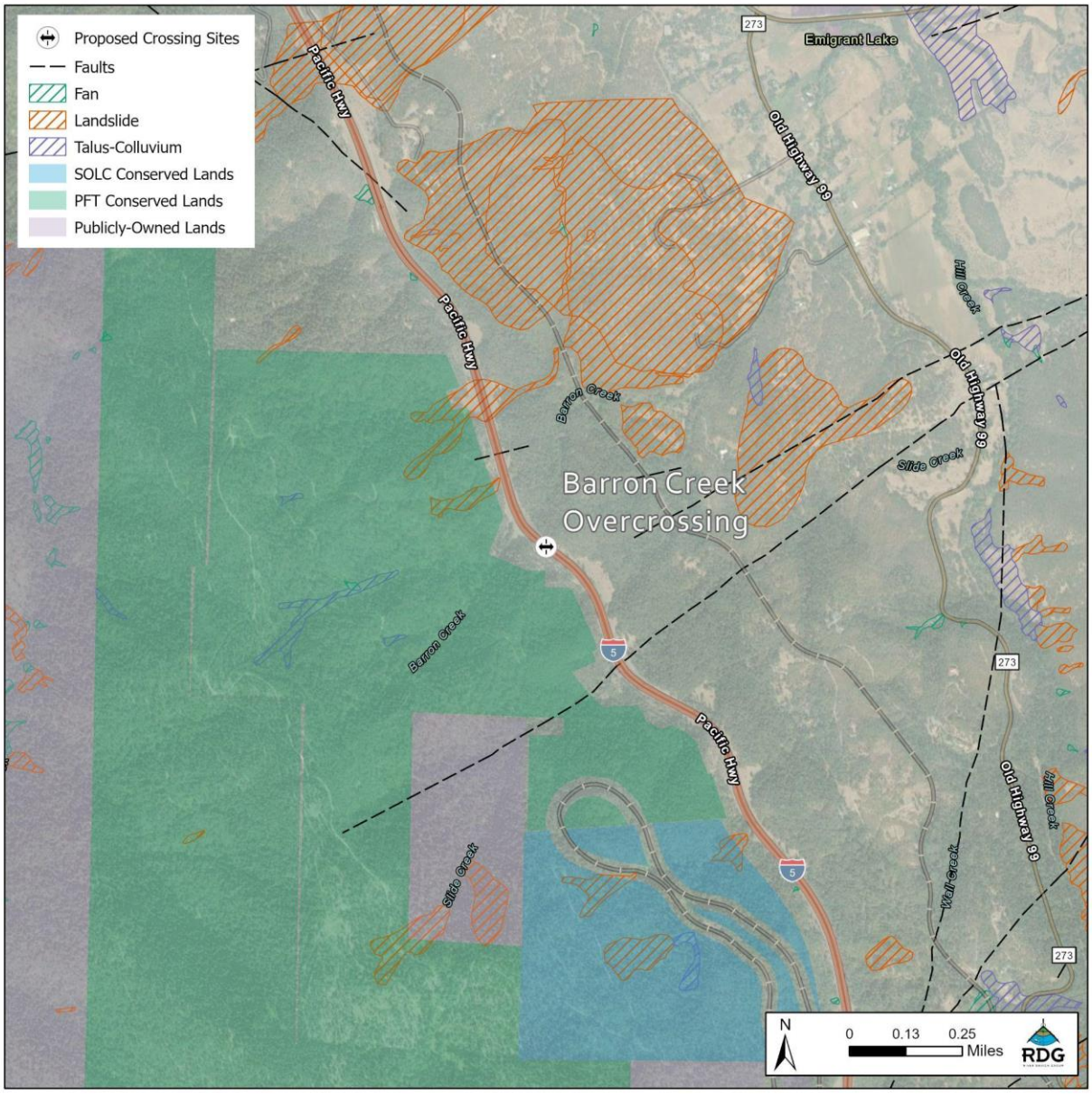


Figure 3-4. Barron Creek vicinity showing adjacent development and mapped faults and landslides.

3.3 Wall Creek

The existing culvert over the south fork of Wall Creek at I-5 (ODOT drainage facility ID D039606 at MP 7.07) is a 3-foot diameter by 308-foot-long circular concrete pipe culvert (**Figure 3-5**). It has 14 feet of cover at the inlet and 32 feet of cover at the outlet. It was constructed in 1966 and most recently inspected in July 2013 with a condition rating of fair.

Figure 3-5. Wall Creek culvert inlet with I-5 at the top of the image.

The Wall Creek railroad bridge crossing over I-5 (ODOT Bridge ID 02011A at MP 7.08) is a 48-foot long (along railroad) steel girder bridge (**Figure 3-6**). It was constructed in 1937, replaced in 1966, and most recently inspected in June 2020 with a fair condition and sufficiency rating of -2. Access to the railroad bridge is limited due to the steep embankments. Drainage from the bridge is reported by ODOT maintenance staff to cause icy, unsafe conditions on the roadway under the bridge. The railroad is situated on a bench cut into the hillside on the west and a trough cut through the hillside to the west with retaining walls supporting the existing bridge abutments. A small berm of remnant hillside separates the railroad from the highway on the east side from approximately MP 7.0 to MP 6.9.

Figure 3-6. Wall Creek Railroad Bridge (looking south).

Potential for species use at the Wall Creek culvert is limited to semi-aquatic species of medium to small animals. This culvert is currently not safely passing any species as it does not have a straight path under the highway, rather it connects to a complex underground culvert system. If a pathway was constructed for wildlife, there would be additional challenges as cold conditions in small culverts can prohibit use by some ectothermic species.

There is great potential for terrestrial species' use of the Wall Creek bridge as a crossing over the highway. It is highly suitable for deer and other large animals. Additionally, it is suitable for use by mesocarnivores and other medium sized mammals such as raccoons. There is possibly infrequent use by small animals like mice, and/or the occasional lizards or snakes. It is unavailable to aquatic and semi-aquatic species. Smaller terrestrial species that prefer cover are less likely to use this open-air crossing. Some species may exhibit behavioral avoidance to the crossing due to high noise levels and smells from motor vehicle traffic below. Camera data and tracks have revealed use by bear, bobcat, cougar, fox, raccoon and deer.

Land adjacent to the ODOT right-of-way to the west is publicly owned and bisected by another railroad line approximately 900 feet to the west of the existing railroad bridge (**Figure 3-7**). The railroad easement runs along the east side of the site and is surrounded by private land except for a small sliver parcel of publicly owned lands near MP 6.85. The privately-owned parcels are large with few structures present.

A large landslide complex is mapped along the entirety of the east side and a multi-fault complex crosses the existing railroad bridge location and continues to both sides. The creek channel alignments appear to follow mapped faults.

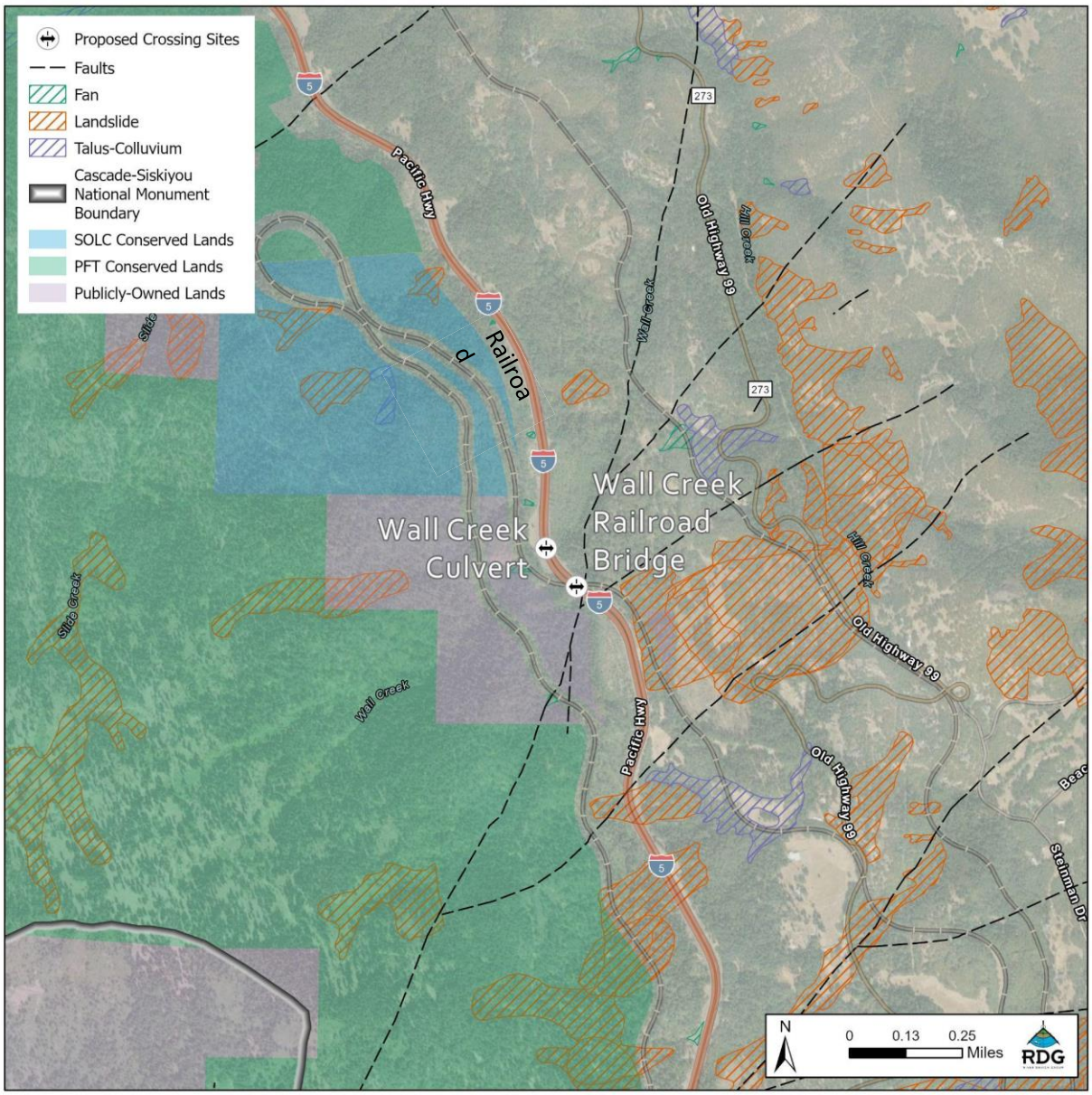


Figure 3-7. Wall Creek vicinity showing adjacent development and mapped faults and landslides.

3.4 Mt. Ashland Exit

The existing bridge over Highway 273 (ODOT bridge ID 09259 at MP 5.32) is a 234-foot long (along I-5) by 58-foot wide (along Highway 273) prestressed concrete girder bridge (**Figure 3-8**). It was constructed in 1965 and most recently inspected in June 2020 with a fair condition and sufficiency rating of 92 (southbound) and 88.2 (northbound). The bridge is not over water and thus scour was not assessed; however, a roadside ditch runs both sides of Highway 273. The ditches are partially routed through culverts which are mostly embedded with sediment from the road shoulder and ditch. Some erosion is evident along the flow line of the ditch. Access to the bridge is very good via Highway 273.

Figure 3-8. Mt. Ashland Exit bridge (southbound) (looking west).

Potential for species use at the Mt. Ashland Exit is limited to terrestrial species. The crossing is highly suitable for deer and the crossing is also likely used by mesocarnivores such as raccoons. There is possibly infrequent use by small animals like mice, and/or the occasional lizards or snakes. This crossing is unavailable to aquatic and semi-aquatic species. Smaller terrestrial species that prefer cover are less likely to use Mt. Ashland Exit as a crossing. Additionally, larger species that exhibit behavioral avoidance to frequent human activity will be less likely to utilize this crossing. There are currently species using the area, frequent signs of deer activity are evident through and around the bridges.

Land immediately adjacent to the ODOT right-of-way is privately owned in many relatively small lots (**Figure 3-9**). The Mountcrest LLC lands conserved by PFT are approximately one-quarter mile to the west.

A mapped fault travels across the interchange from southwest to northeast. A landslide is mapped along the railroad at the west end of the interchange. No faults or landslides are mapped at the existing bridges.

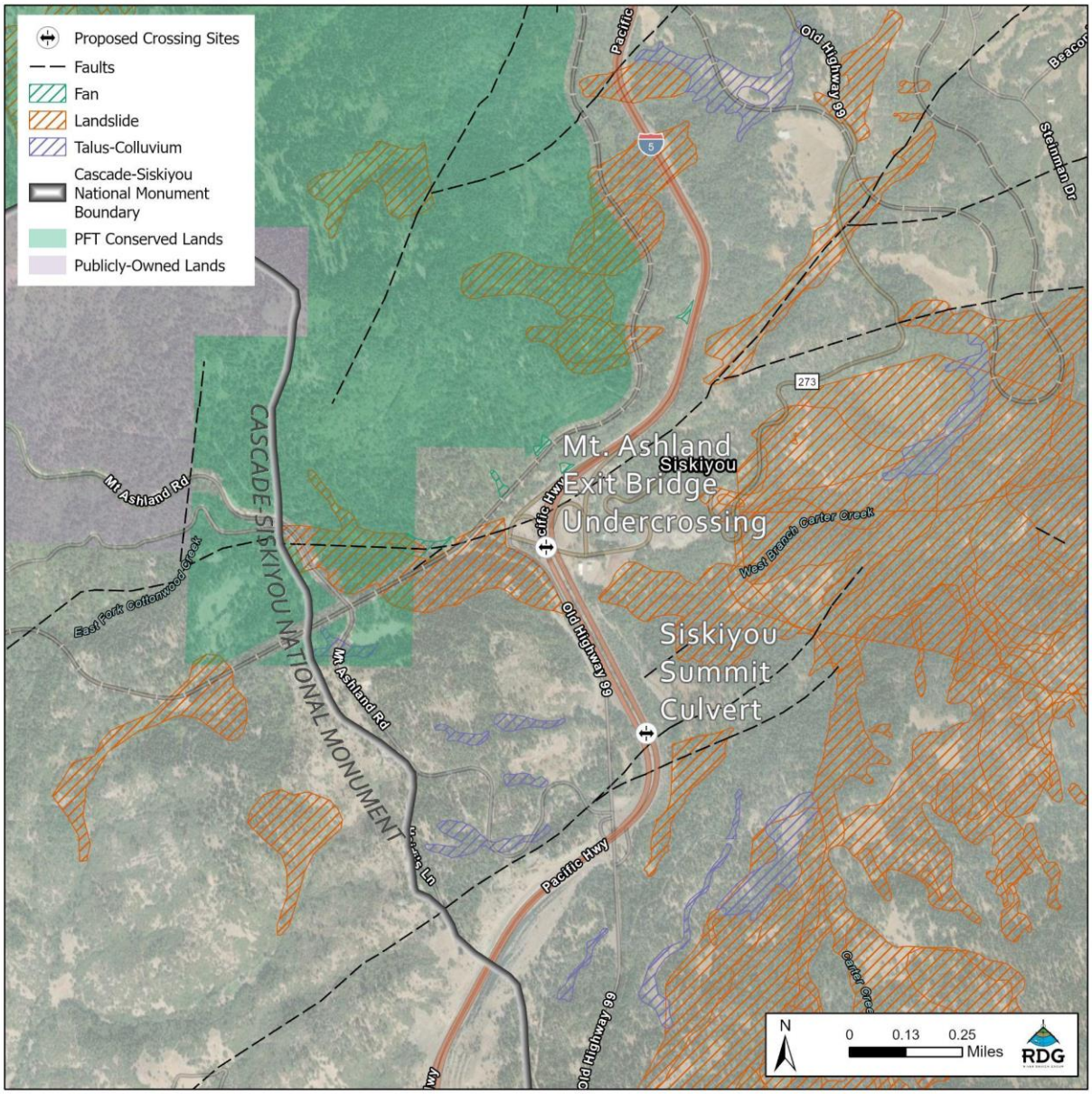


Figure 3-9. Mt. Ashland and Siskiyou Summit vicinity showing adjacent development and mapped faults and landslides.

3.5 Siskiyou Summit

The existing crossing structure observed is a 4-foot diameter corrugated metal pipe culvert with approximately 40 feet of cover at the inlet (**Figure 3-10**). It was constructed in 1966 and most recently inspected in July 2013 with a condition rating of fair. The channel upstream of the culvert had an approximate 8-foot bottom width, fine organic material in the bed with low benches (<6 inches above the channel bottom) and tall, nearly vertical banks approximately 3 feet tall. The culvert showed evidence of invert degradation and some small roots appeared to be entering through culvert walls. The inlet is accessible via a maintenance road to the south.

Figure 3-10. Siskiyou Summit culvert inlet with I-5 at the top of the image.

There is potential for species use by both terrestrial and semi-aquatic species. There is likely infrequent use by small animals like ground squirrels and/or occasional amphibians. This culvert is unavailable to fully aquatic species. Additionally, smaller terrestrial species that prefer cover are less likely to use this crossing. Larger species, particularly ungulates are unable to use this crossing as is. Camera monitoring documented gray fox and a fawn entering the culvert, however adult deer are not likely to use this culvert. A person was observed entering the culvert (presumably a hiker from the nearby Pacific Crest Trail). They did not re-emerge from the culvert and are assumed to have traveled through.

Land immediately adjacent to the ODOT right-of-way is privately owned in many relatively small lots (**Figure 3-9**). No conserved lands are present.

Two faults are mapped parallel to the creek and existing culvert alignment. A landslide is mapped along the faults southeast of the highway.

3.6 Bear Gulch

The existing culvert at Bear Gulch under I-5 (ODOT bridge ID 0P215 at MP 2.55) is a 7-foot diameter by 699-foot-long circular corrugated metal pipe (**Figure 3-11**). The culvert is listed in the national bridge inventory. It has 131 feet of cover at the inlet and 94 feet of cover at the outlet. The construction date is 1965 and it was most recently inspected in November 2020 with a fair bridge condition, a culvert rating of 6 (deterioration) and sufficiency rating of 24. The culvert is considered scour critical. Wetted marks in the culvert indicate that it does not regularly flow more than half-full. The channel downstream of the culvert is paved with concrete and some of the reinforcing bars are exposed. The channel upstream of the culvert is composed of gravels, cobbles, and some angular rock. Sediment has been transported and deposited approximately halfway through the culvert.

Figure 3-11. Bear Gulch culvert outlet with access road bench at top of the image. I-5 is not visible from the culvert outlet.

There is potential for species use by terrestrial and semi aquatic species. There is likely infrequent use by small mammals like ground squirrels. The crossing is not on a fish bearing stream, and it is unlikely to pass amphibians or reptiles due to a combination of the length of the culvert and cold internal conditions.

Additionally, the culvert is unavailable to small and medium mammals that avoid wading through water. Smaller terrestrial species that prefer cover are also less likely to use this culvert. Larger species that prefer long sight distance may avoid using this culvert. Camera monitoring has documented deer, bear tracks have been observed at the culvert outlet (west), and fox tracks have been observed at the culvert inlet (east).

Lands adjacent to the ODOT right-of-way are publicly owned on the west and privately-owned with an SOLC conservation easement (Sky King Cole) to the east (**Figure 3-12**).

A fault is mapped from the northwest to southeast at the crossing. A landslide is mapped to the west (downstream) of the existing crossing.

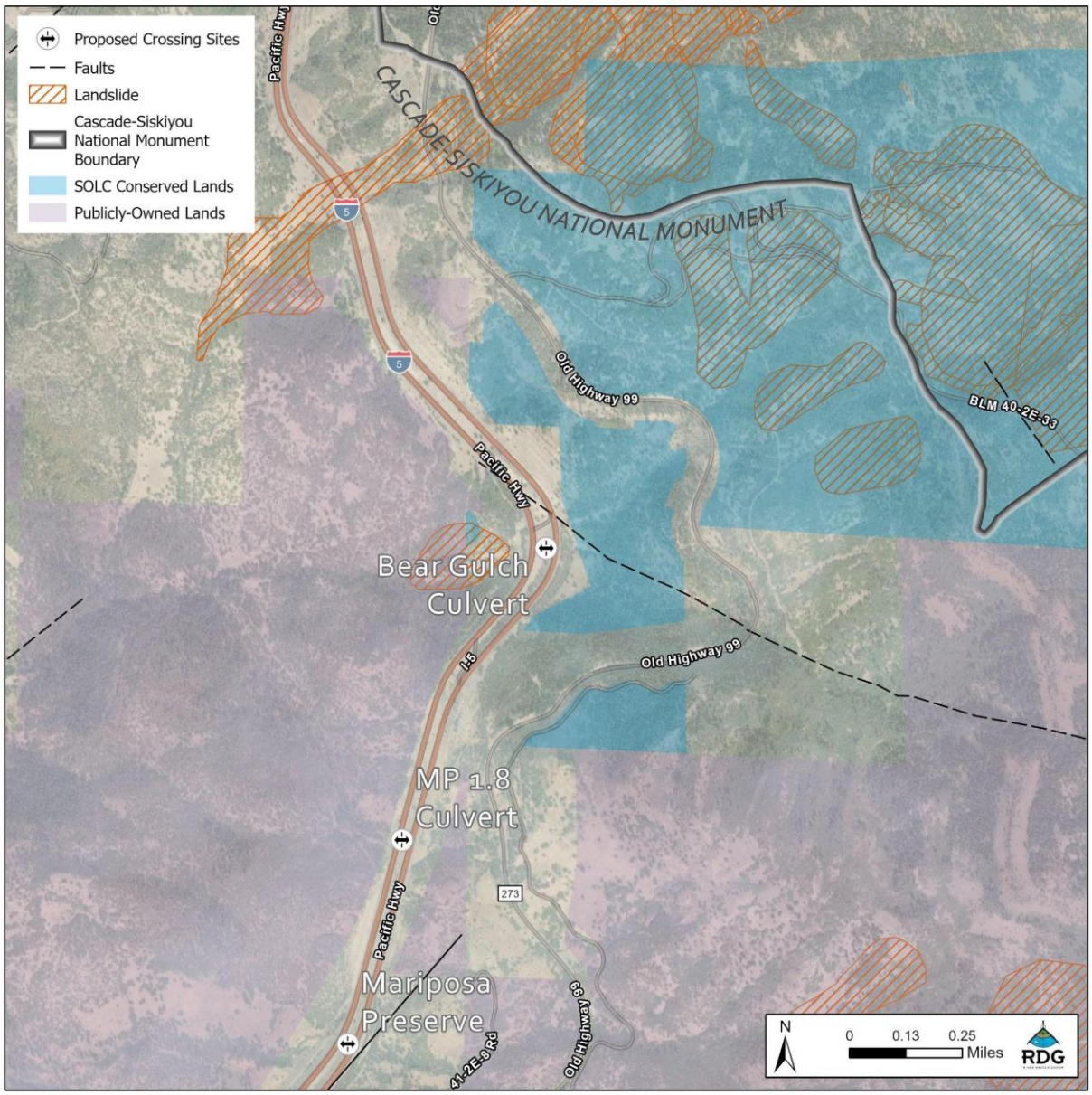


Figure 3-12. Bear Gulch vicinity showing adjacent development and mapped faults and landslides.

3.7 Mariposa Preserve

The existing culvert over Indian Creek at Mariposa Preserve (ODOT drainage facility ID D039512 at MP 1.35) is a 5-foot diameter by 614-foot-long circular corrugated metal pipe metal pipe culvert (**Figure 3-13**). The culvert has 81 feet of cover at the inlet and 67 feet of cover at the outlet. It was constructed in 1965 and most recently inspected in June 2013 with a condition rating of fair. The culvert is not listed in the national bridge inventory. The culvert outlet is perched approximately 5 feet above the creek bed. Access to the outlet is via the highway shoulder and an access road with occasional rutting. The ditch running along the access road was deeply incised (over 10 feet) at the confluence with the creek at the outlet (**Figure 3-13**).

Figure 3-13. Mariposa Preserve culvert outlet with access road bench near the top of the image and I-5 at the top of the image.

There is potential for species use by medium sized terrestrial and semi-aquatic species. There is likely infrequent use by small mammals like ground squirrels. It is unavailable to aquatic species and Indian Creek at the crossing location is not considered a fish bearing stream. The culvert is unlikely to pass amphibians or reptiles due to a combination of the length of the culvert, cold internal conditions, and the fact that it is a perched culvert. Additionally, the culvert is not available to small and medium mammals that avoid wading through water. Smaller terrestrial species that prefer cover are less likely to use this culvert. Large species do not have enough room to use this crossing. Camera monitoring has documented wildlife activity adjacent to the culvert including bobcat and several bird species. It is unclear what level of use and what species actually use the culvert.

The 222-acre Mariposa Botanical Area is a designated conservation area (botanical preserve) which provides protection for two rare endemic plants, Greene's Mariposa Lily (the Botanical Area's namesake) and Detling's microseris (BLM, 2022).

Lands immediately adjacent to the ODOT right-of-way are publicly owned to the west and privately-owned without a conservation easement to the east (**Figure 3-14**). Publicly owned lands are present approximately one-quarter mile to the east.

A fault is mapped approximately parallel to the northbound lane of I-5 on the east side of the existing crossing.

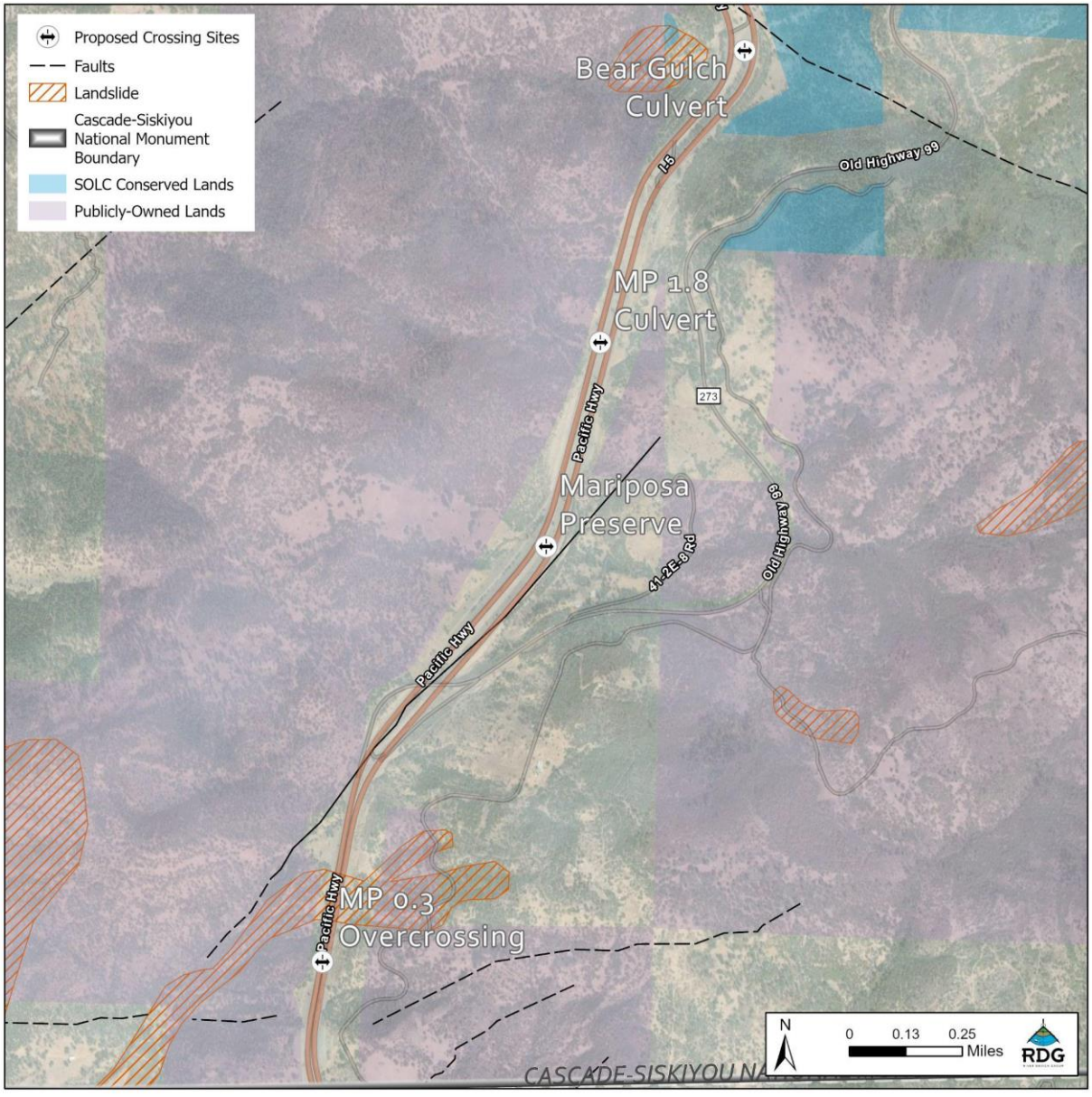


Figure 3-14. Mariposa Preserve vicinity showing adjacent development and mapped faults and landslides.

3.8 South Overcrossing

The highway cuts through ridges in the landscape near milepost 0.3. There is currently no overcrossing structure at this location. This location may be suitable for an overcrossing because of the existing cuts

with sufficient width and elevation to span over the traffic lanes, being surrounded by publicly owned lands, and the distance from Highway 273 to the east. The species assemblage is similar to that observed and expected at the Mariposa Preserve site.

Lands immediately adjacent to the ODOT right-of-way at MP 0.3 are publicly owned on both sides (**Figure 3-15**).

No mapped faults or landslides are present at this location.

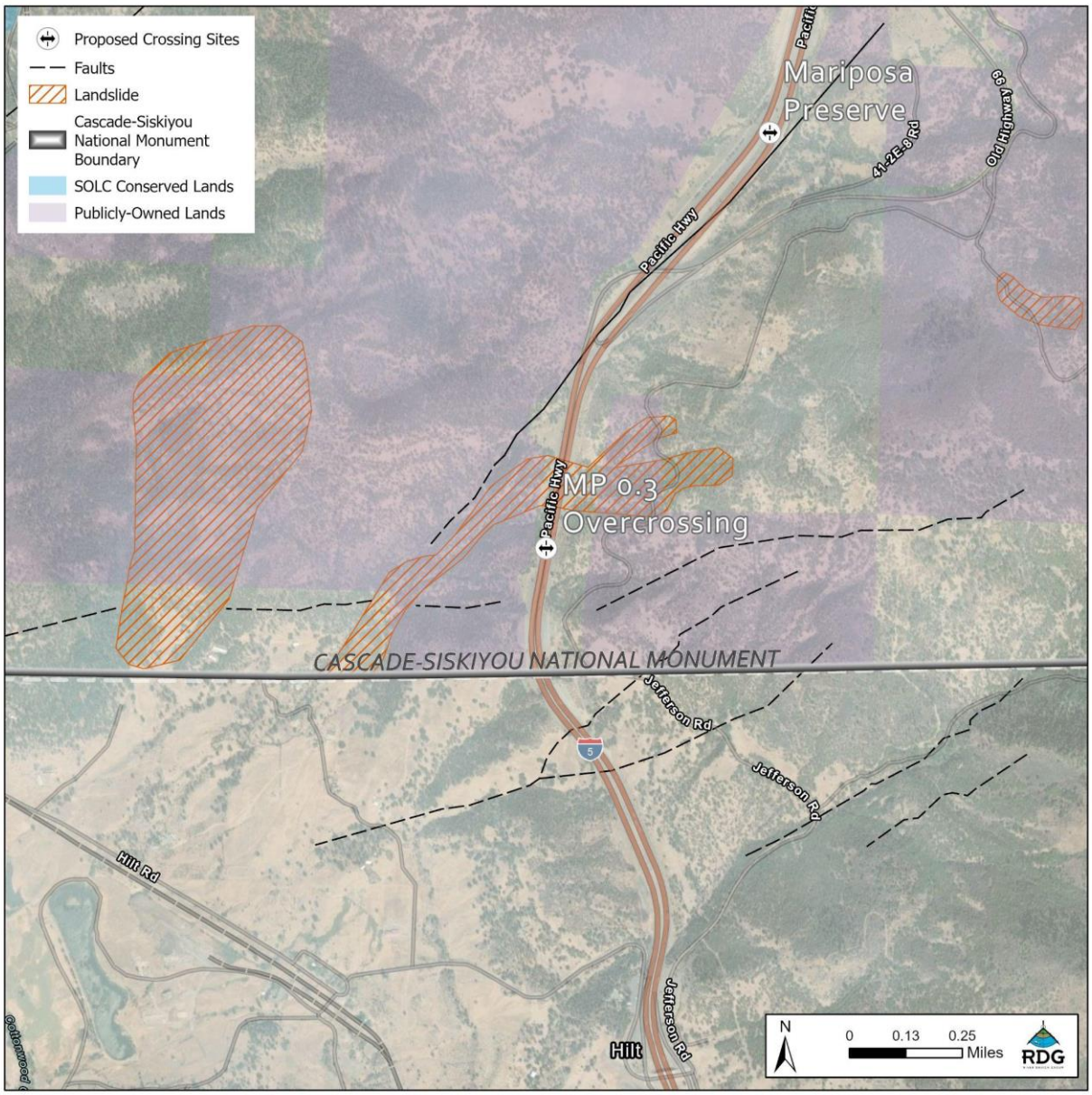


Figure 3-15. South Overcrossing vicinity showing adjacent development and mapped faults and landslides

4 Decision Matrix

The purpose of the decision matrix is to compare the recommended alternatives across the sites within a corridor context. It was developed collaboratively by Samara Group, relying on their expertise, as well as the contributions from stakeholder interviews, existing data provided by SOWCC members, spatial analysis, and the full partner meeting and design workshops.

4.1 Stakeholder Interviews

Samara Group developed a set of interview questions for stakeholders in order to gain a better understanding of the corridor context (Section 1.3). These questions were designed to identify the priorities of each individual or agency in order to support development of the decision matrix parameters. The interviews focused on understanding stakeholders' history with SOWCC, expectations for this phase of work, identification of potential roadblocks to meeting those expectations, and clearly communicating how Samara Group and River Design Group would address those expectations with the current scope of work. Species of concern, land ownership information and accounts of road density, logistics and potential for wildlife collisions were noted. Information was compiled and organized to track recurring important themes and any potential conflicts between stakeholder priorities throughout the interview process.

Interview responses were summarized and presented back to SOWCC at a virtual meeting. The responses were summarized into four major categories:

- **Land Ownership & Scale**: considerations and impacts beyond the specific project site in the surrounding areas of each crossing location that may facilitate or inhibit wildlife movement (such as vegetation communities, road density, private vs. public land ownership, etc.).
- **Ecological Value of Crossings/Crossing Locations**: consideration for the ability to provide multispecies and, when possible, ecological connectivity value of each crossing location. Species were included here that were mentioned as being of particular interest to partners, as well as how effective a given location may be at reducing large and small animal collisions. Additional consideration was given to the presence of and/or ability to mitigate for non-mortality related road impacts, such as road avoidance behavior resulting from artificial light and traffic noise.
- **Co-Benefits and/or Concerns**: opportunities where additional benefit could be provided while simultaneously supporting wildlife habitat connectivity. For example, locations where an existing structure was reaching the end of its lifespan and needed repair or replacement, or locations where maintenance needs and safety could be improved simultaneously to wildlife needs.
- **Future Considerations/Opportunities**: elements that were important to stakeholders but would not be immediately addressed by the current scope of the project. Examples include the development of design standards and study design that would be useful for future engineering projects and supportive of wildlife crossing monitoring efforts and outreach activities. An important element of this category included the incorporation of indigenous and place-based local art styles in the design of any potential overcrossings.

Emphasis was given to interview responses that were heard multiple times. For example, many stakeholders felt that public land should be prioritized for the crossing location. There was additional opportunity for members to ask questions and provide feedback when the responses were summarized and presented back to SOWCC. This reflection was to check that the emphasis was being placed

appropriately and that stakeholders did not feel the information presented was in conflict with their personal or organizational goals and objectives.

4.2 Existing Monitoring Data provided by SOWCC Members

A list of species currently utilizing crossing structures in the area were compiled from monitoring data provided by Dr. Karen H. Mager, Assistant Professor of Environmental Science, Policy, and Sustainability, and Biology at SOU, collected in conjunction with the Capstone Project completed by Maya Smith & Alex Zenor in June of 2022 and in collaboration with monitoring efforts by Charles Schelz, Ecologist for the BLM at the Cascade-Siskiyou National Monument. Remote camera data included species documented using crossing structures and those moving through the roadside habitat areas but not confirmed to be utilizing the structures. Monitoring locations included all initial project sites except for the Neil Creek culvert, Wall Creek culvert, and the proposed location of a southern overcrossing at MP 0.3 (Table 2-1).

4.3 Spatial Analysis

Samara Group incorporated spatial data analysis and species' behavioral considerations into the draft decision matrix. The spatial data analysis included road density and proximity (Section 2.1).

4.4 Behavioral Considerations

Behavioral considerations for species movement included the likelihood and severity of traffic noise, the presence of artificial light, and the potential for human presence and domestic animal activity. These factors were estimated by reviewing conditions in the surrounding landscape and feedback from SOWCC members. Examples include the presence or absence of homes or outdoor recreation destinations and features which may shield wildlife from traffic noise and headlights or other sources of artificial light.

4.5 Partner Meetings and Design Workshops

The full partner meeting and stakeholder workshops (Section 1.3) provided additional opportunities for coalition members to review existing information, provide feedback, and contribute to the decision-making process which would ultimately form the final Decision Matrix Table (**Table 4-1**). Detailed notes from each meeting were compiled and reviewed and modifications to the matrix were made as needed, including any additional criteria for consideration.

4.6 Decision Matrix Table

The decision matrix (**Table 4-1**) evaluates site conditions that are independent of the selected alternative (land ownership and scale, road density and proximity) and conditions that are dependent on the selected alternative (biodiversity value, behavioral considerations). Scores were assigned to each metric with subtotals by site for each condition and a total score summing the subtotals.

- **Land ownership and scale:** scores based on the adjacent land being majority public (scored 2), private with an existing conservation easement (scored 1) or private without an existing easement (scored 0).
- **Biodiversity:** scores for each species with a range of values from 3 to 0 based on the likelihood of wildlife movement through the structure with consideration for the likelihood of a given wildlife species or group being present in the area. For example, passages without water are automatically scored a 0 for fish passage of any type and alternatives that are undersized for a given animal based

on physical size and not behavior will also get scored a zero (see elk and the Siskiyou Summit alternative). In contrast, an alternative that is behaviorally not likely to be used by a given species would be scored a 1 to account for the possibility of a crossing event, however infrequent. A score of 2 indicates that a given species would be likely to use the structure but perhaps that use is restricted to resident animals that have become habituated to less-than-ideal conditions (i.e., lack of cover, high exposure to road noise, etc.) or that the give species is not expected to be found in high numbers in this particular area. A score of 3 indicates that the species is found nearby with high frequency and/or has already been documented using the structure and would readily utilize the given structure.

- **Road density and proximity:** Road density values were assigned to one of four categories based on the range of values across all sites, high scored -3, medium-high scored -2, medium-low scored -1, or low scored 0. Road proximity scores based on distance: if the nearest road distance was >1000 meters it was given a score of 0, <1000 to 500 was scored -1, <500 to 200 was scored -2, and <200 was scored -3.
- **Wildlife behavioral consideration:** Behavioral considerations (Section 4.4) scores range from 0 indicating very little or no impact, up to -2 indicating the most impact.

Table 4-1. Decision Matrix

Evaluation Category	**Evaluation Metric**	**Neil Creek Undercrossing Retrofit (MP 10.3)**	**Barron Creek Overcrossing (MP 8.7)**	**Wall Creek Overcrossing (MP 7.1)**	**Wall Creek RR Bridge as is with fencing (MP 7.0)**	**Mt Ashland Exit Undercrossing Retrofit (MP 5.3)**	**Siskiyou Summit as is with vegetation (MP 4.8)**	**Bear Gulch Overcrossing (MP 2.5)**	**Mariposa Preserve & MP 1.8 Overcrossing (MP 1.6)**	**South Overcrossing (MP 0.3)**
Land ownership and scale	Public land							2	2	2
	Private with existing easement		1	1	1			1		
	Private without existing easement	0	0	0	0	0	0			
	Land Ownership and Scale Subtotal	***0***	***1***	***1***	***1***	***0***	***0***	***3***	***2***	***2***
Biodiversity Value *(ranges from 0-3 based on likelihood of wildlife movement through the structure with*	Fisher	1	3	3	2	1	1	3	2	2
	Black bear	1	3	3	3	1	2	3	2	2
	Deer	3	3	3	3	3	0	3	3	3
	Elk	1	2	2	1	1	0	3	3	3
	Fish passage (salmonids)	0	0	0	0	0	0	0	0	0
	Fish passage (lamprey)	0	0	0	0	0	0	0	0	0

Table 4-1. Decision Matrix										
Evaluation Category	**Evaluation Metric**	**Neil Creek Undercrossing Retrofit (MP 10.3)**	**Barron Creek Overcrossing (MP 8.7)**	**Wall Creek Overcrossing (MP 7.1)**	**Wall Creek RR Bridge as is with fencing (MP 7.0)**	**Mt Ashland Exit Undercrossing Retrofit (MP 5.3)**	**Siskiyou Summit as is with vegetation (MP 4.8)**	**Bear Gulch Overcrossing (MP 2.5)**	**Mariposa Preserve & MP 1.8 Overcrossing (MP 1.6)**	**South Overcrossing (MP 0.3)**
consideration for the likelihood of a given wildlife species or groups presence in the area)	Small/medium mammals	3	3	3	3	3	3	2	3	3
	Amphibians	1	1	2	0	1	2	2	2	2
	Reptiles	2	3	2	1	2	1	3	3	3
	Pollinators	1	3	3	1	1	0	3	3	3
	Road sensitive birds	1	3	3	1	2	1	3	3	3
	Plant community connectivity	1	3	3	0	2	0	3	3	3
	Biodiversity Subtotal	***15***	***27***	***27***	***15***	***17***	***10***	***28***	***27***	***27***
Road density and proximity	Distance to next paved road (sum of the type of road and the distance from site)	-4	-1	-1	-1	-4	-3	0	-2	-2
	Road density value (product of road type and length within a 3km buffer from the site)	-3	-1	-1	-1	-2	-2	0	0	0

Table 4-1. Decision Matrix

Evaluation Category	**Evaluation Metric**	**Neil Creek Undercrossing Retrofit (MP 10.3)**	**Barron Creek Overcrossing (MP 8.7)**	**Wall Creek Overcrossing (MP 7.1)**	**Wall Creek RR Bridge as is with fencing (MP 7.0)**	**Mt Ashland Exit Undercrossing Retrofit (MP 5.3)**	**Siskiyou Summit as is with vegetation (MP 4.8)**	**Bear Gulch Overcrossing (MP 2.5)**	**Mariposa Preserve & MP 1.8 Overcrossing (MP 1.6)**	**South Overcrossing (MP 0.3)**
	Road Density and Proximity Subtotal	***-7***	***-2***	***-2***	***-2***	***-6***	***-5***	***0***	***-2***	***-2***
Wildlife behavioral consideration	Human and domestic animal activity	-2	0	0	0	-2	-1	-1	0	0
	Road noise	-2	-1	-1	-1	-2	-1	0	-1	0
	Light pollution (headlights/streetlights)	-2	0	0	-1	-2	0	0	0	-1
	Visibility of the road/traffic	-2	0	0	-1	-2	0	0	0	0
	Behavioral Considerations Subtotal	***-8***	***-1***	***-1***	***-3***	***-8***	***-2***	***-1***	***-1***	***-1***
	Total Score	***0***	***25***	***25***	***11***	***3***	***3***	***30***	***26***	***26***

5 Corridor Strategy

SOWCC members were asked to rank the preferred alternative selected for each site relative to each other in a poll to inform the prioritization of proposed projects after the preferred alternative selection workshop. SOWCC members had the decision matrix and final alternatives analysis report available for reference. The survey form included the selected alternatives and asked respondents to enter a "1" for their highest priority site in the corridor, then proceeding in ascending order to their lowest priority site out of 8 possible options (**Table 5-1**). Seventeen coalition members, out of thirty-nine requests, participated in the poll. The highest-ranked site was the Mariposa Preserve overcrossing at MP 1.4 ranked "1" by eight respondents. The lowest-ranked site was the Siskiyou Summit culvert retrofit at MP 4.8 ranked "8" by twelve respondents.

Table 5-1. Summary results of SOWCC responses to ranking requests of selected crossing designs in the project area. A value of 1 indicates the alternative ranked as a top choice for the majority of respondents, descending values indicate lower cumulative ranking with the lowest-ranked site given a value of 8.

Rank	Site
1	Mariposa Preserve Overcrossing (MP 1.6)
2	Bear Gulch Overcrossing (MP 2.7) & Culvert Retrofit (MP 2.5)
3	Wall Creek Overcrossing (MP 7.1)
4	Barron Creek Overcrossing (MP 8.7)
5	South Overcrossing (MP 0.3)
6	Mt. Ashland Exit Bridge Retrofit (MP 5.3)
7	Neil Creek Bridge Retrofit (MP 10.3)
8	Siskiyou Summit Culvert Retrofit (MP 4.8)

Interpretation of these rankings and how to apply them to SOWCC decision making was discussed among the project team. It was determined that the eight potential projects can be categorized into three types:

1. **Retrofits**: The existing infrastructure is supporting some level of wildlife movement in several locations based on the monitoring data. In these locations, retrofit modifications can enhance that movement and/or increase the diversity of species utilizing the structure. Alternatives that fit the "retrofit" designation include Mt. Ashland Exit, Neil Creek Bridge, and Siskiyou Summit. While these locations ranked among the lowest priority for the group, it is also worth noting that they are also the least expensive to implement (Section 11) and may have shorter design, permitting and construction timelines (Section 12).
2. **Northern habitat:** Alternatives that fit the "northern habitat" type include the Wall Creek Overcrossing and the Barron Creek Overcrossing which are ranked 3 and 4 respectively.

3. **Southern habitat:** Alternatives that fit the "southern habitat" type include the Mariposa Preserve Overcrossing, Bear Gulch Overcrossing, and South Overcrossing which are ranked 1, 2, and 5 respectively.

The consensus from the SOWCC during a final corridor strategy review meeting was to prioritize an overcrossing at Barron Creek to promote wildlife movement through the northern habitat and an overcrossing at Mariposa Preserve as an equally high priority for the southern habitat. Prioritizing both a northern habitat (high elevation conifer forest dominated) and a southern habitat (woodlands and chaparral dominated) crossing structure promotes landscape connectivity across transition habitats. The implementation of overcrossings at both the northern and the southern habitats is considered the best way to encourage the greatest diversity in species movement across the entire stretch of I-5 from Ashland to the California border.

There is an opportunity to greatly reduce large animal-vehicle collisions by prioritizing the Barron Creek Overcrossing when taking a regional view of the potential projects and including fencing placement. This could be accomplished by including fencing from the Neil Creek Bridge to the Barron Creek Overcrossing and on to the existing railroad bridge at Wall Creek. The existing railroad bridge has been shown to regularly pass a diversity of wildlife including deer and black bear (Table 2-1). Each of these locations are, or would be, large enough to pass deer and would provide both valuable connectivity at regular intervals and limitations to large animals accessing the freeway.

6 Wildlife Passage Conceptual Designs

The balance of project benefits, risks, cost, and schedule considerations were decided collaboratively with the design team and SOWCC during the preferred alternative selection workshop. This section of the report summarizes the conceptual design of the preferred alternative for wildlife passage improvements at each site.

Design concepts to improve wildlife passage were developed collaboratively with SOWCC members, SG and RDG. Design options included retrofits within the existing structure, replacement of the existing structure with a new crossing structure, and enhancement of conditions outside of the existing structure and/or new structure. Preliminary layouts of each conceptual design are included in **Appendix A**. All overcrossings are assumed to consist of two prefabricated concrete arches forming tunnels over the highway. The arch should fully span the road and shoulder without disturbance of the existing pavement.

Fencing presents many complications as the paths to the crossing structures encounter barriers such as side roads, private property, creek crossings, and existing culverts. Each site includes a brief discussion of potential fencing layout and additional details are discussed in Section 7. Sections 8 through 12 contain additional details including design data needs, anticipated permit requirements, and costs for the project (across all sites).

6.1 Neil Creek (MP 10.3) – Existing Bridge Retrofit

Retrofit of the existing bridge is recommended at Neil Creek (**Figure 6-1**). Wildlife sign and tracks, as well as reports from local landowners, indicate that many large species such as deer are already using the undercrossing as well as occasional medium and small species. Enhancing conditions to meet species'

needs more directly is preferable to a disruptive and costly construction project to replace the existing culvert.

Retrofit of the existing Neil Creek Road bridge would include the removal of the angular rock on the shoulder outside of the ditch line and replacement with softer material (select general backfill) with the angular rock being reused for rock piles. Large boulders and woody material are not recommended at this location because they may be a hazard to drivers unless a separation barrier were installed. The softer material would be more amenable to hooved species and the rock piles would provide cover to smaller species.

Fencing would be installed from the edge of the bridges and along the roadside (outside of the clear zone) to the next suitable area for large animals to cross (approximately MP 11.4 to the north, and MP 9.1 to the south). The total length of the proposed fencing is approximately 4.7 miles. The northern fence ends in a relatively straight section of highway without recorded WVCs and crosses one mapped fault. The southern fence ends in a relatively straight section of highway without recorded WVCs and crosses two mapped landslides and two mapped faults. Both sections of fencing cross several culverts which may provide passage to smaller species; the fence design should consider maintaining access to these crossings for smaller species while excluding ungulates and bears. Maintenance access to the crossing inlets must be maintained. The southern fencing of the Neil Creek crossing ends where the northern fencing of the Barron Creek crossing begins.

Replacement of the road shoulder would likely require single-lane closures of Neil Creek Road. Installation of the fencing may require single-lane closures on I-5 for equipment access and staging on the shoulder. No disturbance of the road subgrade or pavement is anticipated for this design.

Table 6-1 summarizes design recommendations for the Neil Creek retrofit.

Table 6-1. Design recommendations for Neil Creek Road retrofit.

Design Element	Recommended Dimensions
Soft shoulder	8 feet min. wide and separated from the road traffic with rock piles. Composed of select general backfill without angular rock fragments.
Rock piles	6 - 8 inches diameter, piles up to 4 foot diameter by 2.5 feet high. Rocks shall be subangular to subrounded. Place rock piles to maximize solar exposure. Do not compact rock piles (leave voids open). Include at least three boulders in each rock pile.

Figure 6-1. Perspective view of Neil Creek Road undercrossing (looking west to east along Neil Creek Road).

6.2 Barron Creek Overcrossing (MP 8.7)

This overcrossing location is recommended due to the favorable topography and highway geometry (straight highway through a rock cut without large grade separation between lanes), proximity to drainages likely to attract wildlife, and conserved lands adjacent on the west side. This overcrossing would provide a multispecies benefit and would contribute to plant and habitat connectivity in addition to promoting animal movement. A concern is that lands to the east are privately owned in many relatively small lots. There may be opportunities for conservation easements or purchase of the timberlands east of the crossing.

An overcrossing structure at an existing rock cut south of the existing culvert is being considered for the Barron Creek Overcrossing (**Figure 6-2**). The overcrossing would be a minimum of 150 feet wide (perpendicular to animal movement) with a corresponding bridge span (along I-5) of 150 feet. The length of the crossing is approximately 200 feet (in the direction of wildlife movement). The southwestern rock cut face (along I-5 southbound) is terraced, and the crossing structure could tie into the first terrace. The northeastern cut face (along I-5 northbound) is sloped approximately 1h:1v. The northeastern end of the crossing structure will likely need excavation of a landing bench on the rock cut for construction and maintenance access.

Fencing would be installed along the perimeter and along the roadside (outside of the clear zone) to the next suitable area for large animals to cross (approximately MP 9.2 to the north and MP 7.8 to the south). The total length of proposed fencing is approximately 3.9 miles. The northern fence ends in a relatively straight section of highway without recorded WVCs and crosses one mapped fault and two mapped

landslides. The southern fence ends in a relatively straight section of highway without recorded WVCs and crosses one mapped landslide and one mapped fault. Both sections of fencing cross several culverts which may provide passage for smaller species; the fence design should consider maintaining access to these crossings for smaller species while excluding ungulates and bears. Maintenance access to the crossing inlets must be maintained. The northern fencing of the Barron Creek crossing ends where the southern fencing of the Neil Creek crossing begins. The southern fencing of the Barron Creek crossing ends where the northern fencing of the Wall Creek crossing begins. Fencing should be continuous from the existing Neil Creek undercrossing (MP 10.3) and the existing Wall Creek railroad bridge (MP 7.0).

Vegetation on the crossing structure will provide browse and cover to attract wildlife to the crossing and buffer wildlife from noise, light and vehicle exhaust. Vegetation would include a mix of deciduous and evergreen understory trees or large shrubs along the perimeter with increasingly shorter vegetation towards the center (native understory and floral species). Woody material, rock piles with good solar exposure, and scattered boulders will provide cover for smaller species using the crossing. Small depressions in the soil could create temporary areas of ponded water during snowmelt which could be attractive to amphibians. Solid walls at the edge of the crossing (a minimum of eight feet tall) would buffer wildlife from road noise, lights and smells and maintain safety to avoid items falling onto the roadway.

Construction of the overcrossing may require partial closures of the northbound and/or southbound lanes with traffic routed into single lanes for structure placement, similar to the temporary traffic management in place the summer of 2022 for the surfacing improvements. Installation of the fencing may require single-lane closures for equipment access and staging on the shoulder. No disturbance of the road subgrade or pavement is anticipated for this design.

Table 6-2 summarizes design recommendations for the overcrossing at Barron Creek.

Table 6-2. Design recommendations for Barron Creek overcrossing.

Design Element	Design Recommendation
Horizontal clearance between crossing structure walls (perpendicular to vehicle traffic)	42 feet including 2 foot shy distance (ODOT 2023)
Vertical clearance between pavement and crossing low chord	17 feet 4 inches min. (ODOT 2023)
Crossing width (perpendicular to direction of animal movement/parallel to vehicle traffic)	150 feet min.
Crossing sidewall height (above soil medium)	8 feet min.

Table 6-2. Design recommendations for Barron Creek overcrossing.

Design Element	Design Recommendation
Growing medium	48 inches min. of topsoil with 3 inches of compost around plants to support shrub root establishment
Downed woody material and brush piles	8 - 18 inches diameter by 10 - 30 feet long, including branches and bark. Place logs in brush piles. Logs with rootwads are preferred but not required. Add slash/small woody material. Leave open pathway minimum 15 feet (min.) wide through woody material for larger animal movement.
Rock piles	6 - 8 inches diameter, piles up to 4 foot diameter by 2.5 feet high. Rocks shall be subangular to subrounded. Place rock piles to maximize solar exposure. Do not compact rock piles (leave voids open). Include at least three boulders in each rock pile.
Boulders	10 - 16 inches diameter, resting on growing medium surface (not embedded). Boulders shall be subrounded to rounded.
Seasonal pools	12 - 18 inches deep with shallow side slopes (5h:1v max.) sizes varying from 5 sq. ft. (min.) to 30 sq. ft. (max.). Place woody material on edge of pools and plant with native species tolerant of seasonally saturated soil conditions.

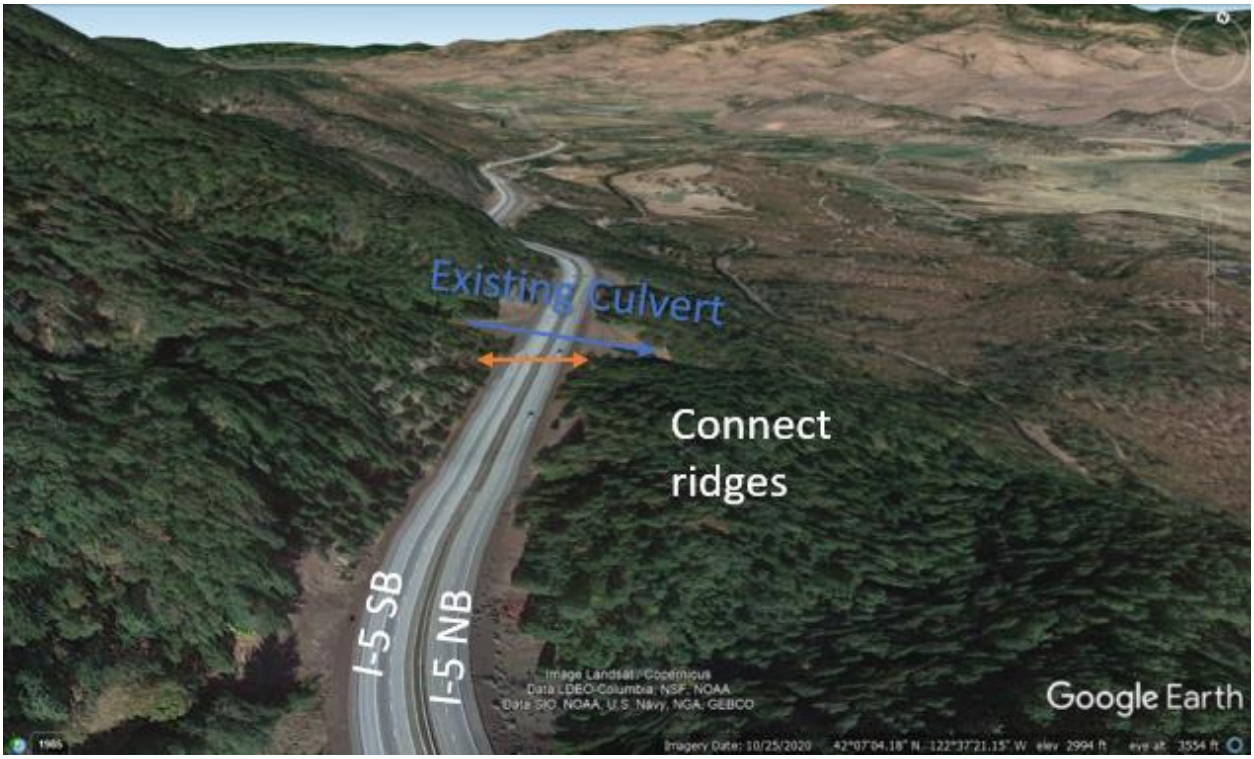


Figure 6-2. Perspective view of Barron Creek (looking north along I-5).

6.3 Wall Creek (MP 7.0) - Overcrossing

A new overcrossing at MP 7.0 is recommended at Wall Creek. A new overcrossing could attract more diverse species with the inclusion of vegetation and habitat structure and buffer the noise from the roadway compared to the existing railroad bridge. Fencing to guide wildlife to the existing railroad bridge could be considered in a phased implementation approach in addition to construction of the new overcrossing.

A new overcrossing without the railroad adjacent to the existing railroad bridge would have a structure width (150 feet) and low chord (20 feet minimum above the pavement surface). The bridge span (along I-5) would be approximately 155 feet. The west side of the crossing could tie into a bench excavated in the cut face and the east side would tie into the small berm separating the highway from the railroad (**Figure 6-3**). A landing bench may be required on the east side for construction of the crossing.

The structure would not cross any mapped faults or landslides. The land adjacent to the railroad easement is publicly owned to the west and privately-owned to the east.

Vegetation on the crossing structure will provide browse and cover to attract wildlife to the crossing and buffer wildlife from noise, light and vehicle exhaust. Vegetation would include a mix of deciduous and evergreen understory trees or large shrubs along the perimeter with increasingly shorter vegetation towards the center (native understory and floral species). Woody material, rock piles with good solar exposure, and scattered boulders will provide cover for smaller species using the crossing. Small depressions in the soil could create temporary areas of ponded water during snowmelt which could be

attractive to amphibians. Solid walls at the edge of the crossing (a minimum of eight feet tall) would buffer wildlife from road noise, lights and smells and maintain safety to avoid items falling onto the roadway.

Fencing would be installed along the perimeter and along the roadside (outside of the clear zone) to the next suitable area for large animals to cross (approximately MP 7.8 to the north and MP 6.2 to the south). The total length of proposed fencing is approximately 3.2 miles. The northern fence would have a gap at the existing railroad bridge. The northern fence ends in a relatively straight section of highway without recorded WVCs and does not cross mapped faults or landslides. The southern fence ends in a relatively straight section of highway without recorded WVCs and crosses three mapped landslides and three mapped faults. Both sections of fencing cross several culverts which may provide passage to smaller species; the fence design should consider maintaining access to these crossings for smaller species while excluding ungulates and bears. Maintenance access to the crossing inlets must be maintained. The northern fencing of the Wall Creek crossing ends where the southern fencing of the Barron Creek crossing begins.

Construction of the overcrossing may require partial closures of the northbound and/or southbound lanes with traffic routed into single lanes for structure placement, similar to the temporary traffic management in place the summer of 2022 for the surfacing improvements. Installation of the fencing may require single-lane closures for equipment access and staging on the shoulder. No disturbance of the road subgrade or pavement is anticipated for this design. The rail traffic may be temporarily interrupted during construction of the east side tie-in.

Table 6-3 summarizes design recommendations for the overcrossing at Wall Creek.

Table 6-3. Design recommendations for Wall Creek overcrossing.

Design Element	Design Recommendation
Horizontal clearance between crossing structure walls (perpendicular to vehicle traffic)	60 feet (southbound) and 66 feet (northbound) including 2 foot shy distance (ODOT 2023)
Vertical clearance between pavement and crossing low chord	17 feet 4 inches min. (ODOT 2023)
Crossing width (perpendicular to direction of animal movement/parallel to vehicle traffic)	150 feet min.
Crossing sidewall height (above soil medium)	8 feet min.
Growing medium	48 inches min. of topsoil with 3 inches of compost around plants to support shrub root establishment

Table 6-3. Design recommendations for Wall Creek overcrossing.

Design Element	Design Recommendation
Downed woody material and brush piles	8 - 18 inches diameter by 10 - 30 feet long, including branches and bark. Place logs in brush piles. Logs with rootwads are preferred but not required. Add slash/small woody material. Leave open pathway minimum 15 feet (min.) wide through woody material for larger animal movement.
Rock piles	6 - 8 inches diameter, piles up to 4 foot diameter by 2.5 feet high. Rocks shall be subangular to subrounded. Place rock piles to maximize solar exposure. Do not compact rock piles (leave voids open). Include at least three boulders in each rock pile.
Boulders	10 - 16 inches diameter, resting on growing medium surface (not embedded). Boulders shall be subrounded to rounded.
Seasonal pools	12 - 18 inches deep with shallow side slopes (5h:1v max.) sizes varying from 5 sq. ft. (min.) to 30 sq. ft. (max.). Place woody material on edge of pools and plant with native species tolerant of seasonally saturated soil conditions.

Figure 6-3. Perspective view of Wall Creek (looking north along I-5).

6.4 Mt. Ashland Exit (MP 5.3) – Existing Bridge Retrofit

Adding a bench under the existing bridges and vegetation enhancement is recommended at the Mt. Ashland Exit (**Figure 6-4**). This structure is already frequently used by large animals, mostly deer who tend to stay on the road shoulder. Adding a bench with increased habitat structure features such as woody material, boulders or large rock would increase opportunity for a diversity of species to use this crossing structure.

The addition of a bench/shelf/flat area under the bridges would provide a pathway for wildlife away from the road and the road shoulder. The proposed bench is mostly cut into the existing grade with a small rock embankment on the north side. The alignment and grading were selected to avoid impacts to the existing bridge supports and maintaining approximately 10 feet of clearance between the bench and the existing bridge low chord. Geotechnical analysis of slope stability with the bench will be required and structural assessment of the bridge foundations may be required depending on the results of the geotechnical analyses.

The bench would be located between one-half and three-quarters up the side slope, a minimum of eight feet wide, and include boulders and woody material on the side closer to the road. The placement of woody material and boulders is important to provide cover for smaller species and a visual buffer from the road. The bench, woody materials and boulders continue through the median between the bridges for a total length of approximately 265 feet. Vegetation would be added in the median and approaching the bridges. Vegetation would include a mix of deciduous and evergreen shrubs and understory species planted up the slope to maintain clear sight lines.

Fencing is not proposed at this site. Fencing would be problematic due to the multiple gaps at roads and ramps that could lead to wildlife being trapped within the highway corridor rather than excluded from it. This would decrease safety for both people and wildlife which cannot be an outcome of this project.

Table 6-4 summarizes design recommendations for the retrofit at the Mt. Ashland Exit.

Table 6-4. Design recommendations for Mt. Ashland Exit retrofit.

Design Element	Design Recommendation
Bench width (perpendicular to direction of animal movement/parallel to vehicle traffic)	8 feet min.
Downed woody material and brush piles	8 - 18 inches diameter by 10 - 30 feet long, including branches and bark. Place logs on side of bench towards the road. Logs with rootwads are preferred but not required. Add slash/small woody material.
Rock piles	6 - 8 inches diameter, piles up to 4 foot diameter by 2.5 feet high. Rocks shall be subangular to subrounded. Place rock piles to

Table 6-4. Design recommendations for Mt. Ashland Exit retrofit.	
Design Element	**Design Recommendation**
	maximize solar exposure. Do not compact rock piles (leave voids open). Include at least three boulders in each rock pile.
Boulders	10 - 16 inches diameter, resting on growing medium surface (not embedded). Boulders shall be subrounded to rounded.

Figure 6-4. Perspective view of Mt. Ashland Exit (looking west to east along Highway 273).

6.5 Siskiyou Summit (MP 4.8) - Culvert Retrofit and Vegetation Enhancement

Culvert retrofit and vegetation enhancement without fencing is recommended for Siskiyou Summit (**Figure 6-5**). Paving the invert could extend the lifespan of the existing culvert structure and incorporate wildlife-friendly design elements. The recommended alternative includes vegetation enhancement in the areas leading up to the existing crossing and addition of habitat structure within the crossing to provide cover for smaller species.

Repair of the existing culvert structure to extend its functional life could include paving the invert to create a strong surface to resist erosion and scour. The design of this paving could include wildlife-friendly surfacing (textured concrete rather than a completely smooth surface) and potentially some boulders along the margins to provide cover for small species. This retrofit would not change the alignment, gradient, length or depth of the existing structure. This retrofit may be eligible for Fix-It Program funds.

The contributing drainage area to the existing culvert is approximately 0.24 square miles as determined using the U.S. Geological Survey (USGS) StreamStats application version 4.10.1 (USGS, 2022). The predicted peak flow for the 50-year recurrence interval is approximately 3.6 cubic feet per second using regional streamflow regression equations for western Oregon (USGS, 2022). The corresponding flow depth during this flow is approximately nine inches assuming normal depth and gradually varied flow. Inclusion of habitat structure (modeled as obstructing up to 25% of the culvert flow area) did not result in headwater depths exceeding the culvert diameter. Inclusion of habitat structure (embedded boulders) should be hydraulically feasible for this culvert.

Vegetation leading to and from the crossing would include native shrubs to provide cover for smaller species. The vegetation should not include browse which could attract larger ungulates to the roadside.

Table 6-5 summarizes design recommendations for the culvert retrofit at Siskiyou Summit.

Table 6-5. Design recommendations for Siskiyou Summit retrofit.

Design Element	Design Recommendation
Invert paving	2 inches (min.) of cured-in-place concrete with a textured finish to provide grip during wet conditions.
Rocks and boulders in crossing	Embed 8 inch - 12 inch diameter rounded rocks in concrete, spaced 2' - 3' on center. Vary placement to provide cover for smaller species and dry passage for medium species.
Downed woody material and brush piles (outside culvert)	8 - 18 inches diameter by 10 - 30 feet long, including branches and bark. Place logs in brush piles. Logs with rootwads are preferred but not required. Add slash/small woody material.
Rock piles (outside culvert)	6 - 8 inches diameter, piles up to 4 foot diameter by 2.5 feet high. Rocks shall be subangular to subrounded. Place rock piles to maximize solar exposure. Do not compact rock piles (leave voids open). Include at least three boulders in each rock pile.
Boulders (outside culvert)	10 - 16 inches diameter, resting on growing medium surface (not embedded). Boulders shall be subrounded to rounded.

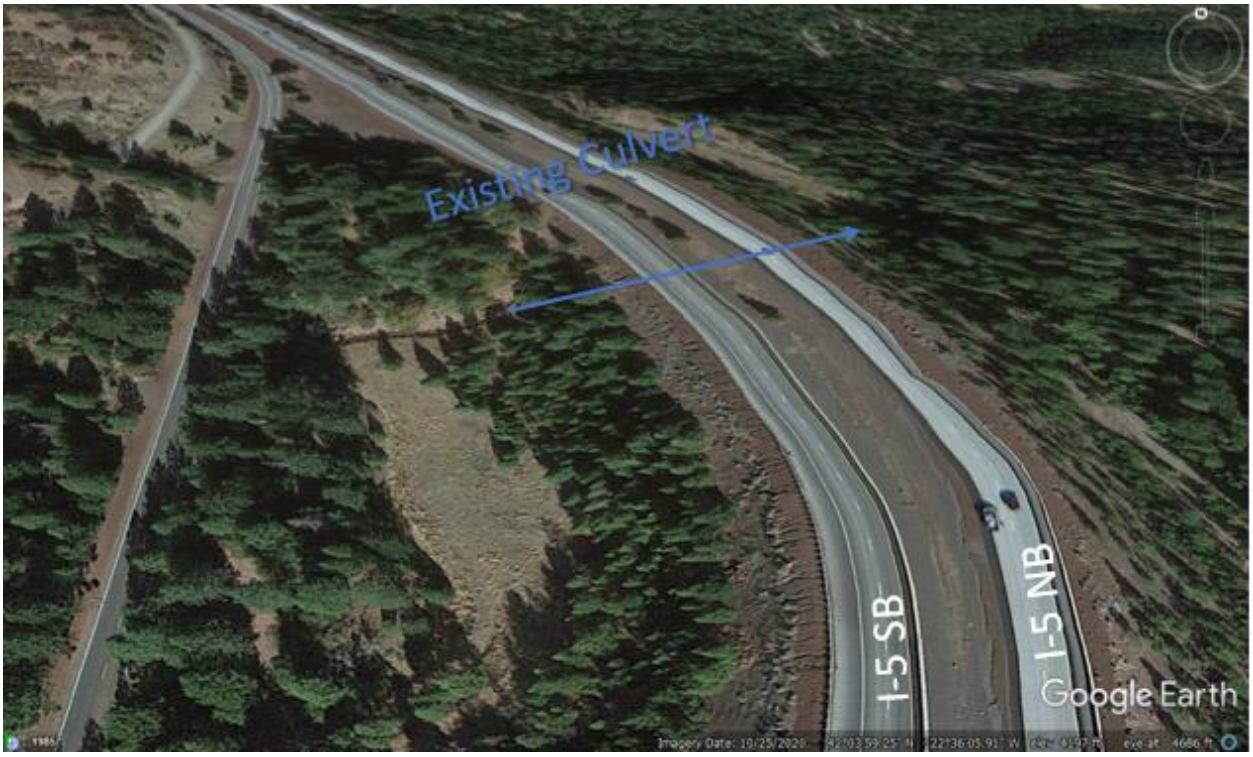


Figure 6-5. Perspective view of Siskiyou Summit (looking north along I-5).

6.6 Bear Gulch (MP 2.7 & MP 2.5) – Overcrossing and Culvert Repair

An overcrossing and repair of the existing culvert are recommended at Bear Gulch (**Figure 6-6**). Camera monitoring at the inlet of the existing culvert shows wildlife using the roads adjacent to the culvert which bodes well for utilizing an overcrossing at this location. The addition of an overcrossing will not address the scour-critical nature of the existing culvert. Paving the invert could extend the lifespan of the existing culvert structure and incorporate wildlife-friendly design elements. This location with adjacent public land and privately-owned lands with conservation easements and high-quality diverse habitat presents an ideal opportunity to improve wildlife movement.

An overcrossing at Bear Gulch would be located in a rock cut north of the existing culvert. The culvert would need to remain in place to convey the perennial creek flows. The overcrossing would be approximately 150 feet wide (perpendicular to animal movement) with a corresponding bridge span of 152 feet (along I–5). The length of the crossing (in the direction of wildlife movement) would be approximately 500 feet. The crossing structures could 'land' on the rock exposed in the median. The northeastern rock cut face (along I-5 northbound) is terraced, and the crossing structure could tie into the first terrace. The southwestern end of the crossing structure could land on the top of the knoll along the southbound lanes.

Construction of the overcrossing would occur entirely within ODOT's right-of-way, and the adjacent lands are publicly owned within the Cascade-Siskiyou National Monument or privately-owned with conservation easements.

Vegetation on the crossing structure will provide browse and cover to attract wildlife to the crossing and buffer wildlife from noise, light and vehicle exhaust. Vegetation would include a mix of deciduous and

evergreen understory trees or large shrubs along the perimeter with increasingly shorter vegetation towards the center (native understory and floral species). Woody material, rock piles with good solar exposure, and scattered boulders will provide cover for smaller species utilizing the crossing. Small depressions in the soil could create temporary areas of ponded water during snowmelt which could be attractive to amphibians. Solid walls at the edge of the crossing (a minimum of eight feet tall) would buffer wildlife from road noise, lights and smells and maintain safety to avoid items falling onto the roadway.

Fencing would be installed along the roadside (outside of the clear zone) to the next suitable area for large animals to cross (approximately MP 3.8 to the north and MP 1.8 to the south). The total length of proposed fencing is approximately 3.8 miles. The northern fence ends in a relatively straight section of highway without recorded WVCs and crosses one mapped landslide and one mapped fault. The southern fence ends in a relatively straight section of highway without recorded WVCs and does not cross mapped landslides or faults. Both sections of fencing cross several culverts which may provide passage to smaller species; the fence design should consider maintaining access to these crossings for smaller species while excluding ungulates and bears. Maintenance access to the crossing inlets must be maintained. The southern fencing of the Bear Gulch crossing ends where the northern fencing of the Mariposa Preserve crossings begins.

Construction of the overcrossing may require partial closures of the northbound and/or southbound lanes with traffic routed into single lanes for structure placement, similar to the temporary traffic management in place the summer of 2022 for the surfacing improvements. Installation of the fencing may require single-lane closures for equipment access and staging on the shoulder. No disturbance of the road subgrade or pavement is anticipated for this design.

Repair of the existing culvert structure to extend its functional life could include paving the invert to create a strong surface to resist erosion and scour. The design of this paving could include wildlife-friendly surfacing (textured concrete rather than a completely smooth surface) and potentially some boulders along the margins to provide cover for small species. This retrofit would not change the alignment, gradient, length, or depth of the existing structure. This retrofit may be eligible for Fix-It Program funds.

Table 6-6 summarizes design recommendations for the overcrossing at Bear Gulch.

Table 6-6. Design recommendations for Bear Gulch overcrossing.

Design Element	Design Recommendation
Horizontal clearance between crossing structure walls (perpendicular to vehicle traffic)	60 feet including 2 foot shy distance (ODOT 2023)
Vertical clearance between pavement and crossing low chord	17 feet 4 inches min. (ODOT 2023)

Table 6-6. Design recommendations for Bear Gulch overcrossing.

Design Element	Design Recommendation
Crossing width (perpendicular to direction of animal movement/parallel to vehicle traffic)	150 feet min.
Crossing sidewall height (above soil medium)	8 feet min.
Growing medium	48 inches min. of topsoil with 3 inches of compost around plants to support shrub root establishment
Downed woody material and brush piles	8 - 18 inches diameter by 10 - 30 feet long, including branches and bark. Place logs in brush piles. Logs with rootwads are preferred but not required. Add slash/small woody material. Leave open pathway minimum 15 feet (min.) wide through woody material for larger animal movement.
Rock piles	6 - 8 inches diameter, piles up to 4 foot diameter by 2.5 feet high. Rocks shall be subangular to subrounded. Place rock piles to maximize solar exposure. Do not compact rock piles (leave voids open). Include at least three boulders in each rock pile.
Boulders	10 - 16 inches diameter, resting on growing medium surface (not embedded). Boulders shall be subrounded to rounded.
Seasonal pools	12 - 18 inches deep with shallow side slopes (5h:1v max.) sizes varying from 5 sq. ft. (min.) to 30 sq. ft. (max.). Place woody material on edge of pools and plant with native species tolerant of seasonally saturated soil conditions.

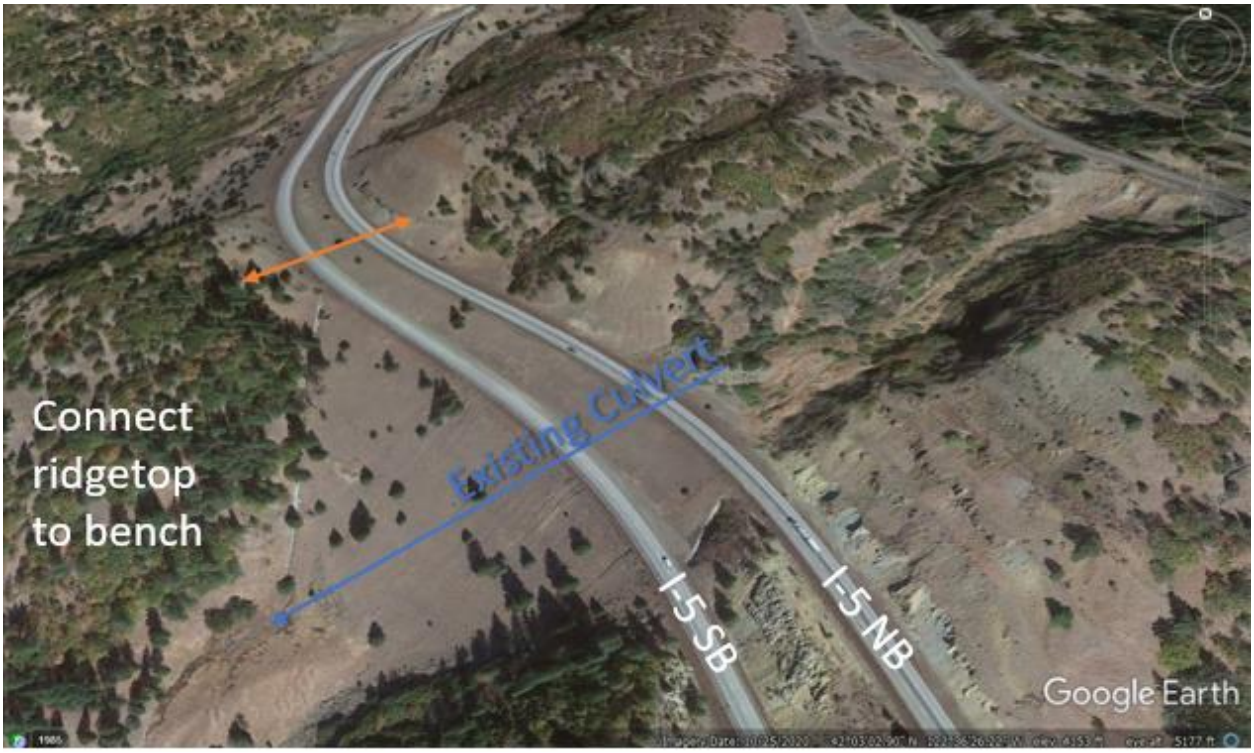


Figure 6-6. Perspective view of Bear Gulch (looking north along I-5).

6.7 Mariposa Preserve – Overcrossing at MP 1.6

An overcrossing is recommended at the Mariposa Preserve (**Figure 6-7**). An overcrossing within the Mariposa Preserve would be located in a rock cut at MP 1.6. The culvert would need to remain in place to convey the perennial creek flows. The overcrossing would be approximately 150 feet wide (perpendicular to wildlife movement) with a corresponding bridge span (along I-5) of 153 feet. The crossing length (in the direction of wildlife movement) would be approximately 380 feet. Both rock cuts are terraced, and the overcrossing could tie into the first bench on each side.

Construction of the overcrossing would occur entirely within ODOT's right-of-way, and the adjacent lands are publicly owned within the Cascade-Siskiyou National Monument.

Vegetation on the crossing structure will provide browse and cover to attract wildlife to the crossing and buffer wildlife from noise, light and vehicle exhaust. Vegetation would include a mix of deciduous and evergreen understory trees or large shrubs along the perimeter with increasingly shorter vegetation towards the center (native understory and floral species). Woody material, rock piles with good solar exposure, and scattered boulders will provide cover for smaller species utilizing the crossing. Small depressions in the soil could create temporary areas of ponded water during snowmelt which could be attractive to amphibians. Solid walls at the edge of the crossing (a minimum of eight feet tall) would buffer wildlife from road noise, lights and smells and maintain safety to avoid items falling onto the roadway.

Fencing would be installed along the roadside (outside of the clear zone) to the next suitable area for large animals to cross (approximately MP 1.8 to the north and MP 0.6 to the south). The total length of proposed fencing is approximately 2.4 miles. The northern fence ends at the MP 1.8 crossing and crosses no mapped landslide or faults. The southern fence ends in a relatively straight section of highway without recorded

WVCs and crosses one mapped fault. The eastern segment of the southern fencing crosses Highway 273 where a gate is not feasible, and care must be taken to provide jumpouts and guide wildlife to the appropriate crossing rather than traveling along the roadways.

Construction of the overcrossing may require partial closures of the northbound and/or southbound lanes with traffic routed into single lanes for structure placement, similar to the temporary traffic management in place the summer of 2022 for the surfacing improvements. Installation of the fencing may require single-lane closures for equipment access and staging on the shoulder. No disturbance of the road subgrade or pavement is anticipated for this design.

Table 6-7 summarizes design recommendations for the overcrossing at Mariposa Preserve.

Table 6-7. Design recommendations for Bear Gulch overcrossing.

Design Element	Design Recommendation
Horizontal clearance between crossing structure walls (perpendicular to vehicle traffic)	54 feet including 2 foot shy distance (ODOT 2023)
Vertical clearance between pavement and crossing low chord	17 feet 4 inches min. (ODOT 2023)
Crossing width (perpendicular to direction of animal movement/parallel to vehicle traffic)	150 feet min.
Crossing sidewall height (above soil medium)	8 feet min.
Growing medium	48 inches min. of topsoil with 3 inches of compost around plants to support shrub root establishment
Downed woody material and brush piles	8 - 18 inches diameter by 10 - 30 feet long, including branches and bark. Place logs in brush piles. Logs with rootwads are preferred but not required. Add slash/small woody material. Leave open pathway minimum 15 feet (min.) wide through woody material for larger animal movement.
Rock piles	6 - 8 inches diameter, piles up to 4 foot diameter by 2.5 feet high. Rocks shall be subangular to subrounded. Place rock piles to maximize solar exposure. Do not compact rock piles (leave voids open). Include at least three boulders in each rock pile.

Table 6-7. Design recommendations for Bear Gulch overcrossing.

Design Element	Design Recommendation
Boulders	10 - 16 inches diameter, resting on growing medium surface (not embedded). Boulders shall be subrounded to rounded.
Seasonal pools	12 - 18 inches deep with shallow side slopes (5h:1v max.) sizes varying from 5 sq. ft. (min.) to 30 sq. ft. (max.). Place woody material on edge of pools and plant with native species tolerant of seasonally saturated soil conditions.

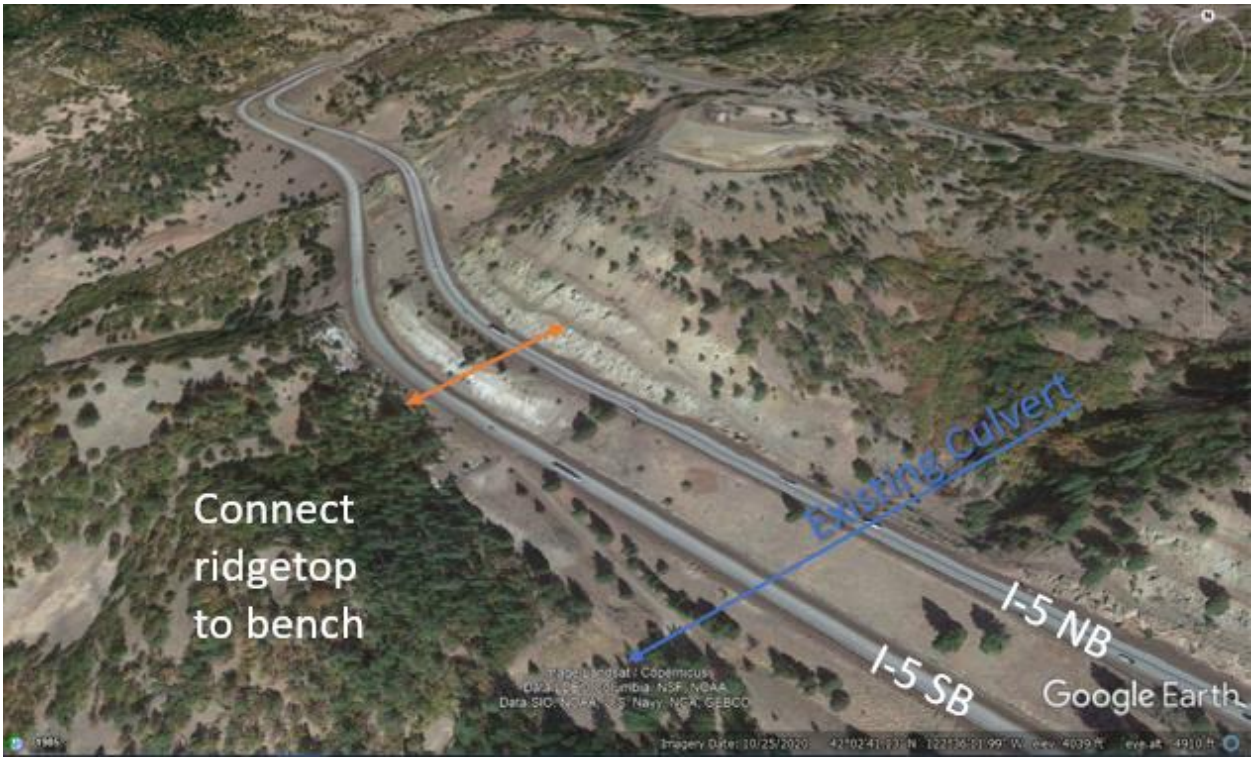


Figure 6-7. Perspective view of Mariposa Preserve (looking north along I-5).

6.8 South Overcrossing (MP 0.3)

The South Overcrossing location was selected for its favorable topography (**Figure 6-8**) and highway geometry, surrounding public land ownership, and distance from busy roads adjacent to I-5. Fencing crossing into California was embraced as a beneficial opportunity for collaborative cross-state efforts.

The overcrossing would be a minimum of 150 feet wide (perpendicular to animal movement) with a corresponding bridge span (along I-5) of 150 feet. The length of the crossing (in the direction of wildlife movement) would be approximately 300 feet. The northeastern rock cut face (along I-5 northbound) is terraced, and the crossing structure could tie into the first terrace. The southwestern cut face (along I-5

southbound) is sloped approximately 2h:1v. The southwestern end of the crossing structure could tie to the top of the knoll and will likely need excavation of a landing bench and maintenance access.

Fencing would be installed along the perimeter and along the roadside (outside of the clear zone) to the next suitable area for large animals to cross (approximately MP 0.6 to the north and past MP 0.0 to the south). The total length of proposed fencing is approximately 1.9 miles. The northern fence ends in a relatively straight section of highway without recorded WVCs and crosses one mapped landslide and no mapped faults. The southern fence ends in a relatively straight section of highway and crosses two mapped faults and no mapped landslides. Additional faults and landslides may be present in California which may not be mapped in the Oregon geodatabase. Both sections of fencing cross several culverts which may provide passage to smaller species; the fence design should consider maintaining access to these crossings for smaller species while excluding ungulates and bears. Maintenance access to the crossing inlets must be maintained. The northern fencing of the South overcrossing ends where the southern fencing of the Mariposa Preserve crossing begins. The southern fencing of the South overcrossing would extend approximately three quarters of a mile into California. This would require a cooperative construction and maintenance agreement with CalTrans.

Vegetation on the crossing structure will provide browse and cover to attract wildlife to the crossing and buff wildlife from noise, light and vehicle exhaust. Vegetation would include a mix of deciduous and evergreen understory trees or large shrubs along the perimeter with increasingly shorter vegetation towards the center (native understory and floral species). Woody material, rock piles with good solar exposure, and scattered boulders will provide cover for smaller species utilizing the crossing. Small depressions in the soil could create temporary areas of ponded water during snowmelt which could be attractive to amphibians. Solid walls at the edge of the crossing (a minimum of eight feet tall) would buffer wildlife from road noise, lights and smells and maintain safety to avoid items falling onto the roadway.

Construction of the overcrossing may require partial closures of the northbound and/or southbound lanes with traffic routed into single lanes for structure placement, similar to the temporary traffic management in place the summer of 2022 for the surfacing improvements. Installation of the fencing may require single-lane closures for equipment access and staging on the shoulder. No disturbance of the road subgrade or pavement is required.

Table 6-8 summarizes design recommendations for the South Overcrossing.

Table 6-8. Design recommendations for South overcrossing.

Design Element	Design Recommendation
Horizontal clearance between crossing structure walls (perpendicular to vehicle traffic)	54 feet including 2 foot shy distance (ODOT 2023)
Vertical clearance between pavement and crossing low chord	17 feet 4 inches min. (ODOT 2023)

Table 6-8. Design recommendations for South overcrossing.

Design Element	Design Recommendation
Crossing width (perpendicular to direction of animal movement/parallel to vehicle traffic)	150 feet min.
Crossing sidewall height (above soil medium)	8 feet min.
Growing medium	48 inches min. of topsoil with 3 inches of compost around plants to support shrub root establishment
Downed woody material and brush piles	8 - 18 inches diameter by 10 - 30 feet long, including branches and bark. Place logs in brush piles. Logs with rootwads are preferred but not required. Add slash/small woody material. Leave open pathway minimum 15 feet (min.) wide through woody material for larger animal movement.
Rock piles	6 - 8 inches diameter, piles up to 4 foot diameter by 2.5 feet high. Rocks shall be subangular to subrounded. Place rock piles to maximize solar exposure. Do not compact rock piles (leave voids open). Include at least three boulders in each rock pile.
Boulders	10 - 16 inches diameter, resting on growing medium surface (not embedded). Boulders shall be subrounded to rounded.
Seasonal pools	12 - 18 inches deep with shallow side slopes (5h:1v max.) sizes varying from 5 sq. ft. (min.) to 30 sq. ft. (max.). Place woody material on edge of pools and plant with native species tolerant of seasonally saturated soil conditions.

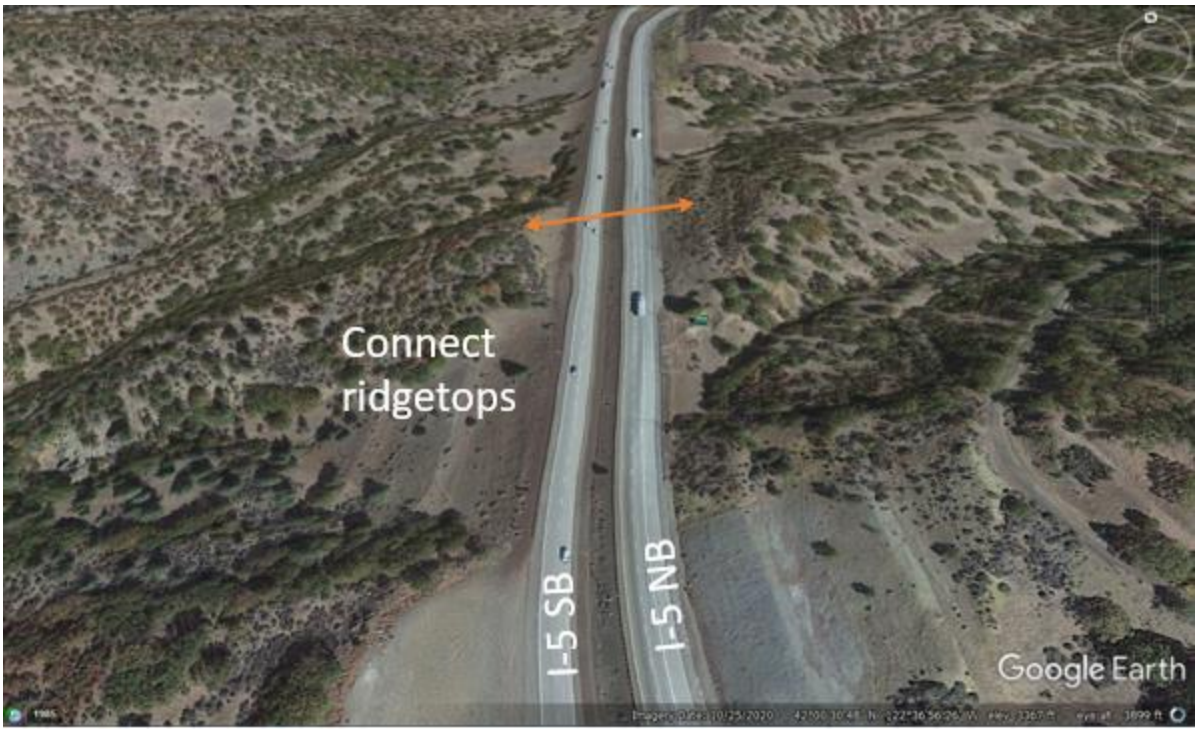


Figure 6-8. Perspective view of MP 0.3 (looking north along I-5).

7 Fencing Design

The purpose of wildlife fencing is to prevent animals from entering the roadway and guiding them to suitable crossing locations. Jumpout structures between crossings allow animals who are on the road side of the fence to escape over the fence without allowing easy access from the non-roadway side of the fence. Fencing coupled with crossing structures reduced collision rates on US97 at Lava Butte by 86% compared to the same area without fencing before the project.

Fencing sections are recommended in association with each crossing structure to maximize the success of guiding wildlife to the crossing structure and reducing potential WVCs. The fencing may be implemented in a phased approach with each crossing structure or as a standalone project. A total of approximately 18.7 miles of wildlife fencing is proposed along the corridor from approximate MP 11.5 (north of Neil Creek) to MP 6.2 (south of Wall Creek) and from MP 3.7 (north of Bear Gulch) extending at least three quarters of a mile past the state border into California. Fencing from MP 6.2 to 3.7 is not recommended due to the on- and off-ramps, driveways, and other access points that would require gaps in the fence and could not be gated.

The preliminary fencing layouts (see **Appendix B**) were developed using the following design guidelines:

- Minimum distance from crossing structure: ½ mile
- Preferred distance from crossing structure: 2 miles
- Maximum distance from crossing structure: 4 miles
- Staying outside the clear zone (estimated) - needs to be ground-verified during design
- Staying within the right-of-way

- Staying on an approximately constant elevation to the greatest extent possible
- Crossing over tops of culverts conveying streams where possible to maintain drainage and small animal access; roadside drainage culverts may be within roadway side of the fence
- End fences in areas without known WVCs and good sight lines to avoid collisions

Discussion with ODOT maintenance staff regarding the fence layout generated additional design guidelines:

- Minimum distance from edge of pavement: 30 feet to avoid damage from snow removal activities
- Corrosion-resistant coating on all metal components
- Locks are not recommended, self-closing gates would be better
- Remove fall-hazard trees during fence installation
- North of the summit
    - Access gates for machinery (12-ft minimum width) at existing culvert crossing inlets (typically access from southbound lanes)
    - Person access gates (4-ft minimum width) at existing culvert outlets (typically access from northbound lanes) for annual jet cleaning maintenance
- South of the summit
    - Access gates for machinery (12-ft minimum width) at existing breaks in guardrail
    - Maintain existing access roads

Table 7-1 summarizes the culverts conveying streams through the corridor and would ideally remain accessible to smaller species of wildlife (the inlets and outlets would be on the outside of the fence) (ODOT 2022).

Table 7-1. Culverts which convey streams and may provide passage for small wildlife species through the fenced segments.

Southbound MP	Northbound MP	Culvert Diameter and Material	Stream Name
11.02	11.06	24-inch concrete circular pipe	Tributary to Neil Creek
10.36	10.42	96-inch concrete box	Neil Creek
9.90	9.95	18-inch corrugated metal circular pipe	Unnamed
9.58	9.66	36-inch corrugated metal circular pipe	Unnamed
9.53	9.52	24-inch corrugated metal circular pipe	Unnamed
9.05	9.13	24-inch corrugated metal circular pipe	North Fork Barron Creek
8.75	8.86	48-inch corrugated metal circular pipe	Barron Creek
8.53	8.60	36-inch corrugated metal circular pipe	South Fork Barron Creek

Table 7-1. Culverts which convey streams and may provide passage for small wildlife species through the fenced segments.

Southbound MP	Northbound MP	Culvert Diameter and Material	Stream Name
8.37	8.47	48-inch corrugated metal circular pipe	Slide Creek
7.90	7.94	30-inch corrugated metal circular pipe	Cougar Creek
6.28	6.26	36-inch concrete box culvert	Hill Creek
2.54	2.55	84-inch corrugated metal plate pipe	Bear Gulch
1.83	1.83	60-inch corrugated metal plate pipe	Unnamed
1.38	1.35	60-inch corrugated metal plate pipe	Indian Creek
1.08	1.04	36-inch corrugated metal pipe	Unnamed
0.71	0.70	36-inch corrugated metal pipe	Unnamed
0.37	0.36	36-inch concrete circular pipe	Unnamed
0.20	0.20	36-inch concrete box culvert	Unnamed

Each of these stream crossings would need a gate for access and may need protection from traffic if the inlet or outlet is within the clear zone (more likely north of the summit).

The proposed fencing is located within the ODOT right-of-way and is supplementary to the existing access control fencing. A small portion of fencing is within the railroad right-of-way connecting to the existing railroad bridge at Wall Creek.

Wildlife fencing is assumed to use the following ODOT standard drawings to the greatest extent practicable:

- RD830 (Wildlife Fence)
- RD832 (Wildlife Fence Access Gate)
- RD835 (Wildlife Fence with Anti-Burrow Apron)
- RD840 (Wildlife Fence Miscellaneous Details)
- RD845 (Wildlife Escape Ramps (Jumpouts))

The general design is for an 8-foot tall fence with woven wire fence fabric varying from 3-inch to 7-inch spacing (vertically) supported by fence posts 16 feet (max.) apart. Fence posts are embedded in concrete footings extending 3 feet (min.) below the ground surface for terminal posts and brace posts. Line posts are studded tee posts with anchor plates. Access gates are 8-feet tall using the same woven wire fabric as the fence. The anti-burrow apron is a 16-inch section of the fencing fabric extending along the ground line on the non-roadway side of the fence. The wildlife jumpouts are gently sloped earthen embankment

ramps, supported by modular concrete blocks at the fence interface, extending approximately six feet above the surround grade with a 15-foot wide cutout in the fencing fabric.

The topographic and geologic setting of this corridor (Section 2) creates some challenges in fencing design and layout:

- Steep terrain with limited access points
- Multiple drainages and creeks
- Mapped landslides and faults with potential for debris flows
- Snow accumulation and removal areas
- Exposed bedrock with variable resistance to erosion

The steep terrain and limited access points may make staging, construction, and maintenance challenging without the addition of access roads. Access roads would be on the highway side of the fence and would not present an additional barrier to wildlife movement. Crossing drainages and creeks may potentially intercept watershed materials (sediment and wood) and block smaller wildlife species from utilizing existing culverts. The fence may need to be located within the clear zone in some instances to cross over the existing culverts - in these instances the location of the brace sections with brace (top) rails should be outside of the clear zone per the highway design manual (ODOT 2023) or may require guardrails or other barriers to separate traffic from the fence. Debris accumulation (from landslides, drainages, or snow removal activities) may push down the fence and require more frequent maintenance to remove the debris. Alternative fence post foundations may be required in areas of exposed bedrock.

The wildlife fencing is separate from, and in addition to, the existing fence installed along the right-of-way (access control line) when the highway was originally constructed. The as-constructed drawings for the highway show “Type 2” fencing installed along the right-of-way. Type 2 fencing is a relatively short fence with woven wire mesh (**Figure 7-1**). The presence of wildlife within the highway corridor indicates that this fence is permeable to wildlife movement. Wildlife fencing may need to be installed along the right-of-way if adjacent private property owners express a strong disinterest in wildlife movement across their property. The movement pathways and fencing details will be developed further during the design process in conjunction with landowner engagement activities and on-the-ground verification of landscape features.

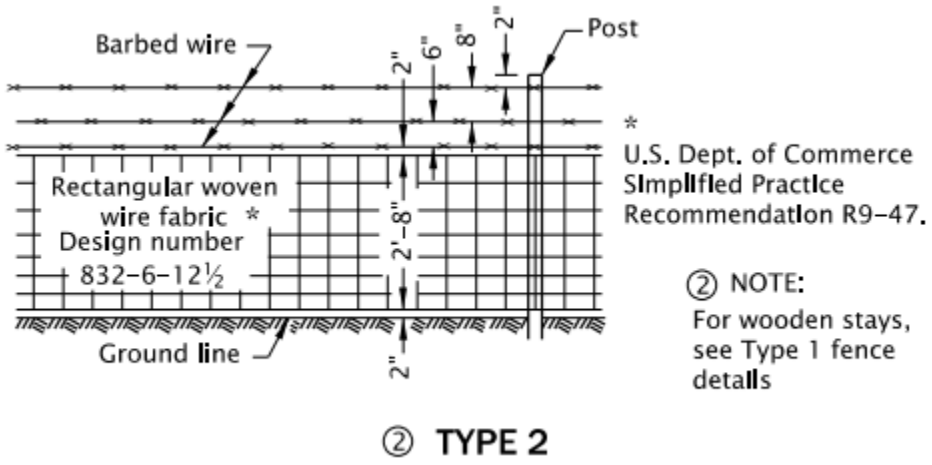


Figure 7-1. Type 2 fence detail excerpt from ODOT Standard Drawing 810 (Barbed and Woven Wire Fences).

8 Design and Permitting Scoping Notes

The following subsections outline the project scoping notes form 734-5128 (ODOT 2017).

High Level Requirements: The overcrossings are considered new construction projects likely to be governed by single function 4R design standards. The retrofits are likely to be considered single function 4R projects since they do not modify the existing roadway geometry.

Planning: This project supports the following plans:

- Oregon Transportation Plan > Strategy 4.1.1
    - Strategy 4.1.1: Practice stewardship of air, water, land, wildlife and botanical resources. Take into account the natural environments in the planning, design, construction, operation and maintenance of the transportation system. Create transportation systems compatible with native habitats and species and help restore ecological processes, considering such plans as the Oregon Conservation Strategy and the Oregon Plan for Salmon and Watersheds. Where adverse impacts cannot reasonably be avoided, minimize or mitigate their effects on the environment. Work with state and federal agencies and other stakeholders to integrate environmental solutions and goals into planning for infrastructure development and provide for an ecosystem-based mitigation process.
- Oregon Highway Plan > Policy 5A
    - Policy 5A: Environmental Resources: It is the policy of the State of Oregon that the design, construction, operation, and maintenance of the state highway system should maintain or improve the natural and built environment including air quality, fish passage and habitat, wildlife habitat and migration routes, sensitive habitats (i.e., wetlands, designated critical habitat, etc.), vegetation, and water resources where affected by ODOT facilities.
- Oregon Highway Plan > Strategies 5A.4, 5A.6, and 5A.11

- Strategy 5A.4: Design, construct and maintain all stream crossings with anadromous fish in accordance with applicable Oregon Department of Fish and Wildlife standards and criteria for stream-road crossings.
- Strategy 5A.6: Establish a credit/debit banking system for wetland mitigation and wildlife habitat enhancement. Provide advanced mitigation in high-priority areas where construction projects are known to be necessary in the future.
- Strategy 5A.11: Participate in watershed and coordinating councils for planning and on-the-ground actions to enhance fish and wildlife habitat and improve migration.

Traffic Data Analysis: The average annual daily traffic (AADT) for I-5 is greater than 15,000 and truck AADT of greater than 4,000 (ODOT, 2022). The AADT for Highway 273 is approximately 160. Many WVCs have been recorded throughout the corridor including deer, bears, cougars, elk, and several smaller species.

Recommended Solution: Undercrossing retrofits at Neil Creek Road (MP 10.3), Mt. Ashland Exit (MP 5.3) Siskiyou Summit (MP 4.8), and Bear Gulch (MP 2.5); overcrossings at Barron Creek (MP 8.7), Wall Creek (MP 7.0), Bear Gulch (MP 2.7), Mariposa Preserve (MP 1.6) and MP 0.3.

Construction Scoping Notes and **Project Risks** are discussed in sections 9 and 10 respectively.

8.1 Environmental

- No mapped wetlands are present at the crossing sites. Fencing may cross wetlands.
- Fish passage is not needed at the crossing sites. The fencing will need to maintain fish passage
- Need visual inventory of the project areas especially within the national monument
- Vegetation removal for fence installation may need nesting bird surveys
- ODOT staff performed an archaeological review database search during conceptual design development with the following findings
    - None of the sites are within recorded cultural sites or within one half-mile of recorded cultural sites
    - Neil Creek was previously surveyed in 2005
    - Several of the sites are in close proximity to historic rail lines and historic trails

8.2 Hydrology & Stormwater Management

- 50-year recurrence interval design storm (ODOT 2014)
- Assume no stormwater management (no new impervious surfaces)
- The growing medium on the overcrossings is intended to retain moisture with native vegetation intercepting precipitation. Underdrains may be required to prevent excess soil moisture from entering the crossing structure (tunnel) and falling on the roadway
- Bear Gulch: Invert paving to address scour and habitat structure to enhance existing crossing
- Siskiyou Summit: Invert paving and habitat structure to enhance existing crossing

8.3 Utilities

- Potential coordination around fencing and access
- No impacts likely from overcrossing structures

8.4 Survey

- Conceptual designs based on LiDAR data
- Need detailed topographic survey incl. utilities and ROW at proposed crossing locations
- May need survey for fence alignments depending on final design
- Need center of railway track at Wall Creek bridge for railroad ROW encroachment with fencing

8.5 Roadway

- No permanent changes are proposed to the existing roadway alignment, grade, or section
- The roadway will be restored to pre-project conditions if disturbed during construction

8.6 Bridge

- Overcrossings not intended for regular vehicular traffic
- Support fire equipment in emergencies
- Accelerated bridge construction methods using prefabricated concrete arch tunnel structures
- Bridge and wall design should accommodate artwork and/or signs on superstructure

8.7 Geotechnical

- Landslides, faults, rockfall – especially regarding fencing
- Overcrossing structure foundations will require drilling (estimated 20 borings per structure)
- Mt. Ashland Exit: Evaluate slope stability with bench

8.8 Traffic

- Signage by overcrossings may benefit public awareness of wildlife habitat connectivity
- Signage by dual use undercrossings (Neil Creek Road and Mt. Ashland Exit)
- Illumination may be beneficial within crossings tunnels depending on length
- Anticipated single-lane closures during crossing structure installation and backfill
- No detours or full closures anticipated
- I-5 is a freight route and a seismic lifeline route; emergency vehicle access must be maintained

8.9 Hazardous Materials

- Hazardous materials are not likely to be mobilized by these projects as they are primarily embankment without significant excavation

8.10 Right of Way

- Wall Creek - Railroad maps (permanent easement for fencing; potential temporary easement for overcrossing)
- May need inter-governmental agreement (IGA) with CalTrans for fencing south of MP 0.3 crossing
- Neil Creek Road retrofit may need IGA with Jackson County for maintenance

8.11 Maintenance

- Potential vegetation maintenance after establishment

- Need to access to existing culverts and cross-drains through proposed fencing
- Need snow removal / accumulation areas and maintenance road gates through proposed fence
- Evaluate debris/sediment accumulation potential in undercrossing retrofits

8.12 Community Affairs

- Continue to partner with SOWCC and land trusts for outreach and engagement with neighbors
- Highlight importance of wildlife connectivity in the region
- Build connections with Oregon Department of Fish and Wildlife for implementation of Oregon Conservation Strategy

9 Construction Scoping Notes

Construction of the overcrossings is assumed to follow accelerated bridge construction methods with limited highway closures. The embankment for the overcrossings may be taken from prior excavation disposal sites within the corridor (assuming these materials are free from contaminants or other deleterious materials).

9.1 Staging

Staging is assumed to occur within the existing ODOT right-of-way either in the shoulders or medians near the proposed overcrossings. Staging for the fencing may require partial lane closures if the shoulders are not wide enough for safe staging.

9.2 Temporary access

Temporary access roads may be required for construction of the overcrossings and for maintenance access post-construction. Vegetation removal may be required for fence installation.

10 Project Risks

The following risks were identified during the development of the conceptual design. This list of risks is suitable for planning purposes, and it is anticipated that additional risks may be identified during design development and on-site investigations including survey, permitting evaluations, and subsurface explorations.

10.1 General

- Wall Creek - Railroad maps (permanent easement for fencing; potential temporary easement for overcrossing)
- May need IGA with CalTrans for fencing south of MP 0.3 crossing
- Neil Creek Road retrofit may need IGA with Jackson County for maintenance

10.2 Environmental

- May need design exception to plant browse and cover vegetation in the vicinity of and on the crossings (ODOT 2020)

- Avoid high-maintenance trees (Western Hemlock, Black Cottonwood, Red Alder, Big-leaf Maple, Willow species) (ODOT 2020)
- Consider the cost and benefit of temporary irrigation during the establishment period – where is the nearest water source, and are water rights required? (ODOT 2020)
- None of the sites have been fully surveyed for cultural resources within one half-mile of the project area. The extent of the proposed fencing has not been reviewed for cultural resources.

10.3 Roadway

- No known risks

10.4 Bridge

- Design deviation will likely be required
- May be considered 'unusual' structure and require FHWA approval

10.5 Traffic

- No known risks

10.6 Geotechnical

- Mt. Ashland Exit: Evaluate foundation stability with bench
- Multiple mapped faults and landslides
- Highly modified geology throughout corridor

10.7 Hydro

- No known risks

10.8 Hazmat

- The Oregon Department of Environmental Quality lists a fuel spill from an overturned truck at MP 6 in 2004. A letter of no further action was issued in 2006.

10.9 Utilities

- No utility mapping or locates done during conceptual design

10.10 Construction/Staging

- Availability of safe staging areas on shoulders or in medians
- Temporary access roads' construction and vegetation removal
- Dry weather construction
- Fire season restrictions

11 Opinions of Probable Costs

Opinions of probable cost are included for each site (**Appendix C**). Class 4 opinions are typically used for concept evaluation and preliminary budgeting (AACE 2005). They are appropriate for conceptual (1%-

15%) design phases and include high and low contingencies of +50% and -15% respectively (AACE 2005). The opinions include estimated costs for design, permitting, and construction. The construction costs utilize bid items from the ODOT Standard Specifications (2021) to the greatest extent possible. Unit costs were based on the weighted averages from 2021 and the first half of 2022. Design and permitting costs assume that ODOT is completing these tasks.

Wildlife fencing costs are assumed to include jumpouts and gates (locations to be determined during future design phases). The estimated costs for the wildlife fencing can approach or exceed the crossing structure costs and may be implemented in a separate contract. The fencing contract may include provisions for ongoing inspection and maintenance of the fencing.

Table 11-1 summarizes the opinions of probable cost for each site. Detailed opinions are included in **Appendix C**. The higher costs at Wall Creek are due to coordination with the railroad for fencing design and construction. Higher costs at Bear Gulch and Mariposa Preserve are due to the large volumes of embankment needed to meet the proposed overcrossing finish grade. These details will be refined during future design phases.

Table 11-1. Summary of Probable Costs

Site	Design & Permitting Subtotal Cost	Fencing Subtotal Cost	Construction Subtotal Cost (incl. Fencing)	Total Probable Cost	Total Probable Cost, Low (-15%)	Total Probable Cost, High (+50%)
Neil Creek	$ 54,000	$ 3,102,000	$ 3,530,500	$ 3,584,500	$ 3,050,000	$ 5,380,000
Barron Creek	$ 750,000	$ 1,782,000	$ 6,842,900	$ 7,592,900	$ 6,460,000	$ 11,390,000
Wall Creek	$ 800,000	$ 2,112,000	$ 7,254,650	$ 8,054,650	$ 6,850,000	$ 12,090,000
Mt. Ashland Exit	$ 45,000	$ -	$ 43,250	$ 88,250	$ 80,000	$ 140,000
Siskiyou Summit	$ 27,000	$ -	$ 212,200	$ 239,200	$ 210,000	$ 360,000
Bear Gulch	$ 750,000	$ 2,574,000	$ 13,543,050	$ 14,293,050	$ 12,150,000	$ 21,440,000
Mariposa Preserve	$ 750,000	$ 1,584,000	$ 10,489,000	$ 11,239,000	$ 9,560,000	$ 16,860,000
South Overcrossing	$ 810,000	$ 1,254,000	$ 7,822,150	$ 8,632,150	$ 7,340,000	$ 12,950,000

All of the projects may qualify for Safety Program funds by reducing potential WVC's. Retrofits of the existing structures at Neil Creek Road, Mt. Ashland Exit, Siskiyou Summit and Bear Gulch may be eligible for Fix-It Program funds, especially repair of the culvert invert at Bear Gulch.

12 Anticipated Design and Construction Durations

The overcrossings are anticipated to be in design development for one to three years and constructed in one season each (total project duration of approximately four years assuming funding is secured). The permitting for the overcrossings will likely require a visual resource inventory and cultural resources surveys. The permitting for the overcrossings is anticipated to take 18 - 24 months concurrent with design development. The overcrossings are not limited to in-water work windows and should be constructed in dry months especially for the placement and compaction of the backfill materials. The opinions of probable cost assume 14 weeks of active construction and temporary traffic control for the overcrossings. Topsoil placement and vegetation installation should occur during the fall planting window to maximize establishment success. All overcrossings assume up to three years of plant establishment with supplemental irrigation while the soils develop and retain moisture.

The retrofits at Neil Creek Road and Mt. Ashland Exit could be designed within one year and construction is anticipated to occur within one month. Geotechnical evaluation at Mt. Ashland Exit may require dry weather conditions for subsurface investigation prior to starting design. Permitting for the undercrossing retrofits is anticipated to take 6 - 12 months concurrent with the design development. The opinions of probable cost assume two weeks of active construction for the undercrossing retrofits.

Design for the culvert rehabilitation and planting at Siskiyou Summit and Bear Gulch could occur within one year. The culvert rehabilitation should occur during the lowest flow part of the year (late summer) to minimize temporary drainage needs. Vegetation installation should occur during the fall planting window to maximize establishment success. Temporary irrigation is not included for the planting at these sites as the native soils should retain sufficient moisture for native plant establishment.

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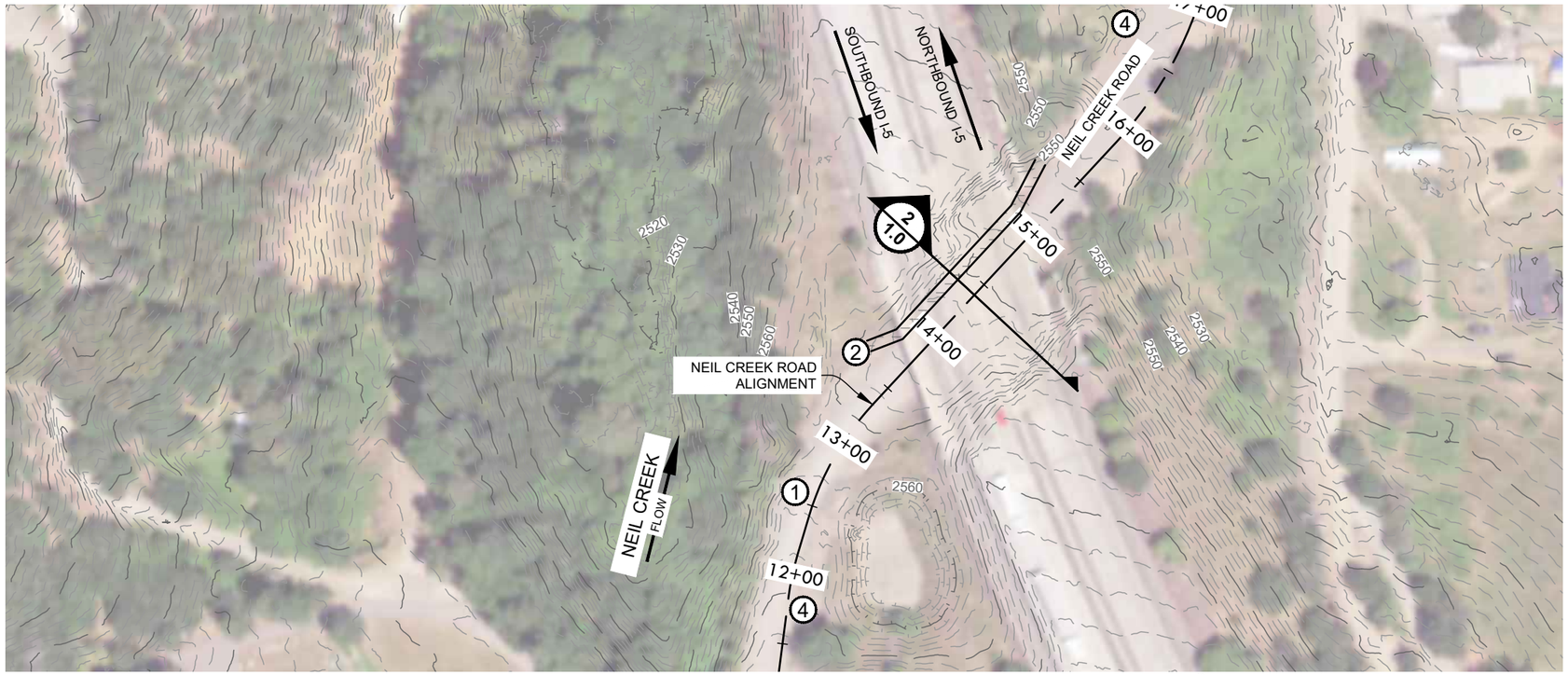
14 Appendices

A) Conceptual Site Designs
B) Preliminary Fencing Layouts
C) Opinions of Probable Costs

Appendix A
Conceptual Site Designs



1 RETROFIT PLAN VIEW

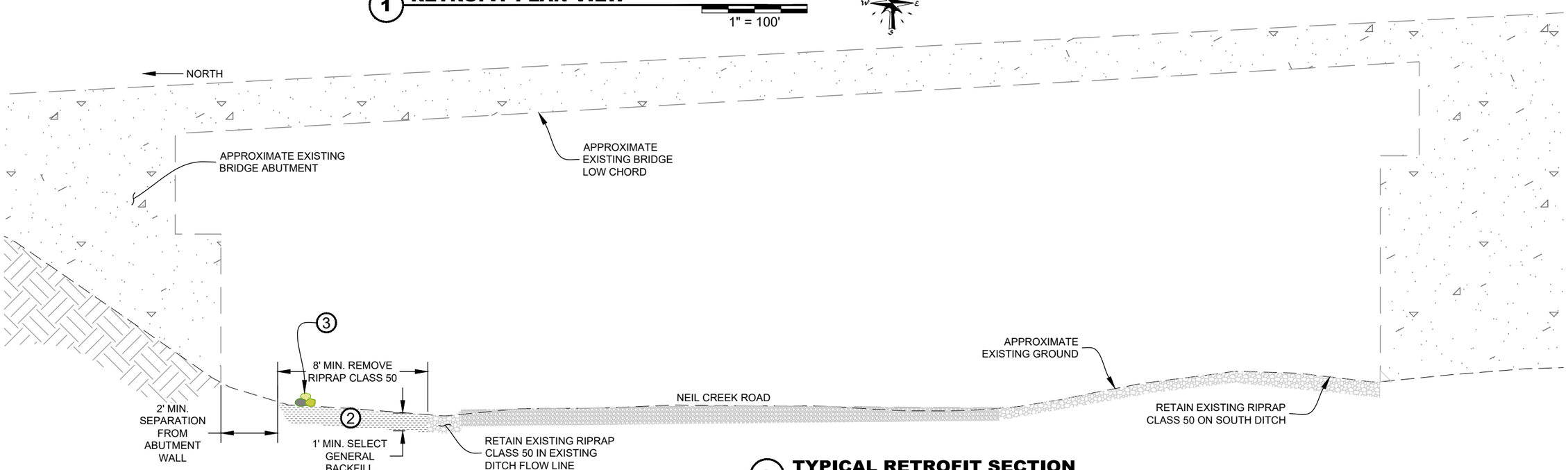
1" = 100'

GENERAL NOTES

1. CONCEPTUAL DESIGNS WERE DEVELOPED IN COLLABORATION WITH SAMARA GROUP AND THE SOUTHERN OREGON WILDLIFE CROSSING COALITION. THE STANDARD OF CARE USED TO DEVELOP THIS DESIGN MEETS THAT OF A PLANNING LEVEL, CONCEPTUAL DESIGN STUDY.
2. ALL WORK IS TO BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE ODOT 4R DESIGN STANDARDS INCLUDING STANDARD SPECIFICATIONS, STANDARD DRAWINGS, STANDARD DETAILS AND DESIGN MANUALS.
3. CONCEPTS SHOWN ARE BASED ON REMOTELY-SENSED TERRAIN DATA (LIDAR) FROM THE OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES. NO SITE SURVEY OR SUBSURFACE INVESTIGATIONS WERE PERFORMED FOR THIS CONCEPTUAL DESIGN DEVELOPMENT.
4. ALL CONSTRUCTION WORK SHOWN IS ASSUMED TO BE WITHIN THE ODOT RIGHT-OF-WAY (TO BE VERIFIED DURING DESIGN).
5. WILDLIFE FENCING NOT SHOWN; SEE FENCING LAYOUT DRAWINGS IN APPENDIX B OF CONCEPTUAL DESIGN REPORT.

CONSTRUCTION NOTES

1. ACCESS WORK AREA FROM NEIL CREEK ROAD. STAGE MATERIALS IN ODOT RIGHT-OF-WAY.
2. REMOVE RIPRAP CLASS 50 OUTSIDE OF DITCH FLOW LINE ON NORTH SIDE OF NEIL CREEK ROAD. REPLACE WITH SELECT GENERAL BACKFILL.
3. PLACE ROCK CLUSTERS 3' - 5' ON CENTER USING LARGEST CLASTS OF REMOVED RIPRAP CLASS 50. DO NOT EMBED ROCK CLUSTERS.
4. INSTALL 'WILDLIFE CROSSING' SIGNS.



2 TYPICAL RETROFIT SECTION

HORIZ 1" = 6'
VERT 1" = 6'

DRAFT

RDG RIVER DESIGN GROUP
236 Wisconsin Avenue Whitefish, MT 59937 406.862.4927
311 SW Jefferson Avenue Corvallis, OR 97333 541.738.2920

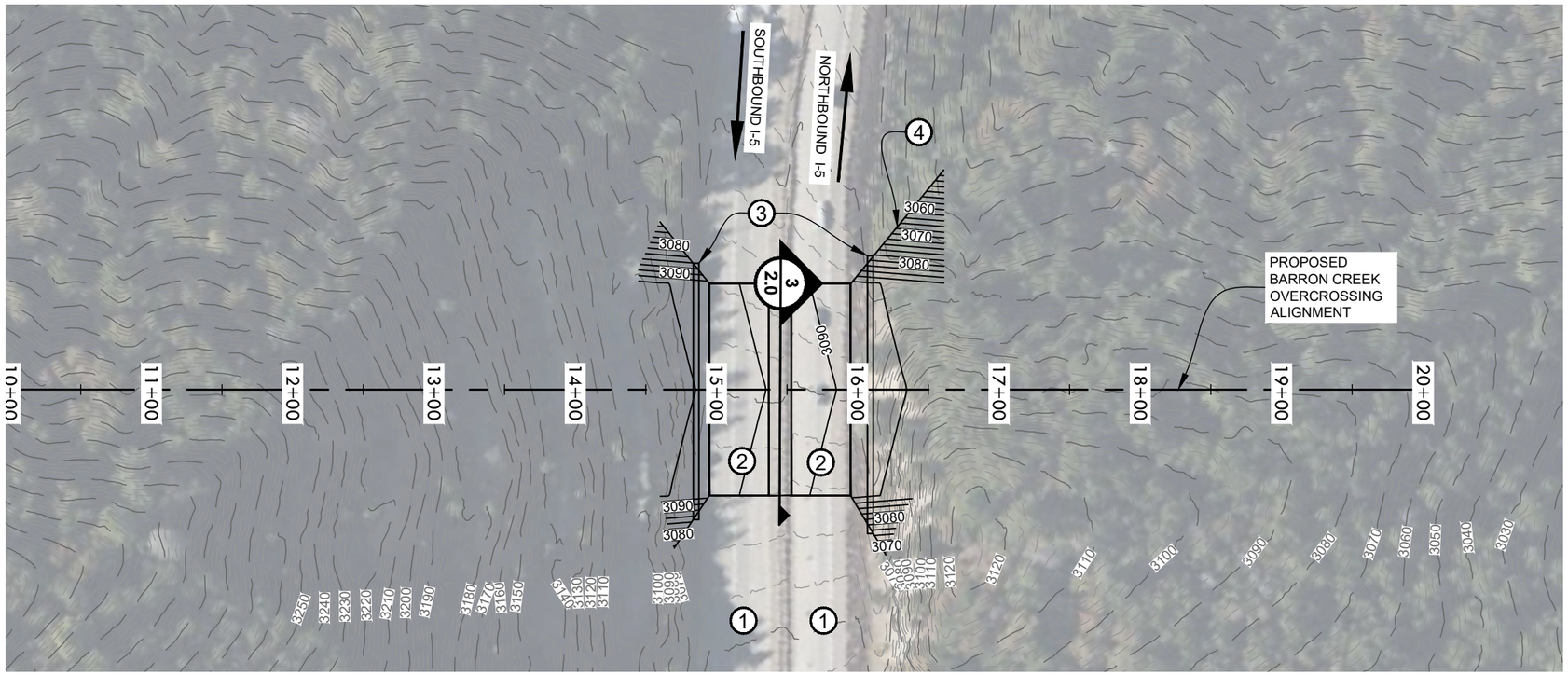
NEIL CREEK UNDERCROSSING

SOUTHERN OREGON WILDLIFE CROSSINGS (MP 10.3)
JACKSON COUNTY, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	11/07/22	MK	CONCEPTUAL	SW

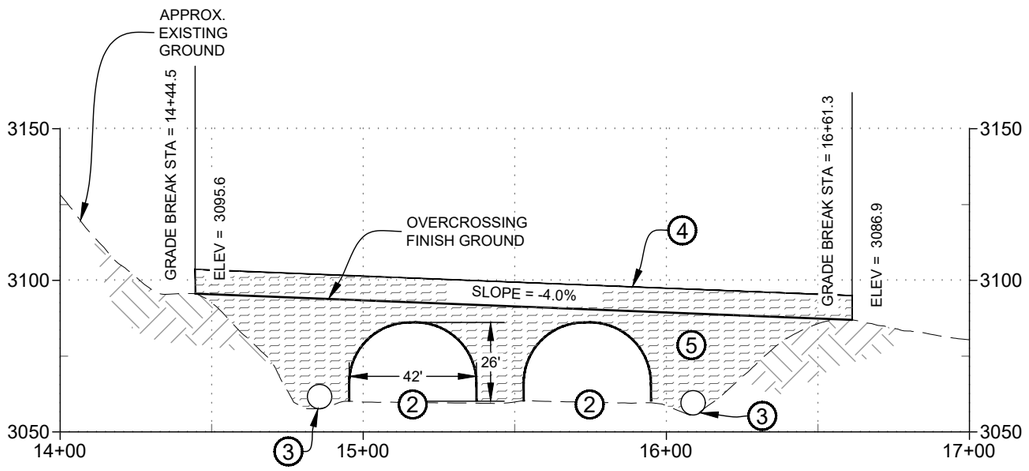
PROJECT NUMBER
RDG-22-051

DRAWING NUMBER
1.0



1 OVERCROSSING PLAN VIEW

1" = 100'



2 OVERCROSSING PROFILE

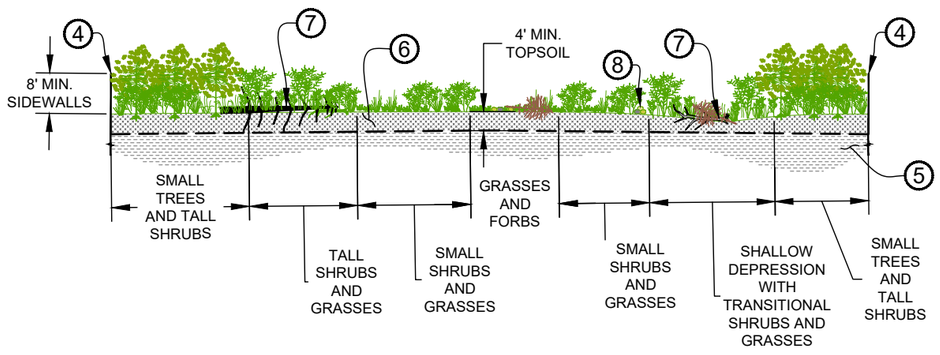
HORIZ 1" = 50'
VERT 1" = 50'

GENERAL NOTES

1. CONCEPTUAL DESIGNS WERE DEVELOPED IN COLLABORATION WITH SAMARA GROUP AND THE SOUTHERN OREGON WILDLIFE CROSSING COALITION. THE STANDARD OF CARE USED TO DEVELOP THIS DESIGN MEETS THAT OF A PLANNING LEVEL, CONCEPTUAL DESIGN STUDY.
2. ALL WORK IS TO BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE ODOT 4R DESIGN STANDARDS INCLUDING STANDARD SPECIFICATIONS, STANDARD DRAWINGS, STANDARD DETAILS AND DESIGN MANUALS.
3. CONCEPTS SHOWN ARE BASED ON REMOTELY-SENSED TERRAIN DATA (LIDAR) FROM THE OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES. NO SITE SURVEY OR SUBSURFACE INVESTIGATIONS WERE PERFORMED FOR THIS CONCEPTUAL DESIGN DEVELOPMENT.
4. ALL CONSTRUCTION WORK SHOWN IS ASSUMED TO BE WITHIN THE ODOT RIGHT-OF-WAY (TO BE VERIFIED DURING DESIGN).
5. WILDLIFE FENCING NOT SHOWN; SEE FENCING LAYOUT DRAWINGS IN APPENDIX B OF CONCEPTUAL DESIGN REPORT.

CONSTRUCTION NOTES

1. UTILIZE HALF-LANE CLOSURES FOR PRECAST ARCH INSTALLATION. MAINTAIN EMERGENCY VEHICLE ACCESS.
2. INSTALL PRECAST ARCH STRUCTURES: NOMINAL 42' SPAN X 26' RISE X 150' LENGTH BOTH DIRECTIONS.
3. INSTALL CULVERT IN EXISTING DITCH LINE TO MAINTAIN ROADSIDE DRAINAGE.
4. CONSTRUCT WALLS AROUND STRUCTURES AND CULVERTS. EXTEND SIDEWALLS 8-FT MIN. ABOVE TOPSOIL OVER CROSSING STRUCTURE TO BUFFER WILDLIFE FROM ROAD NOISE, SMELLS, AND LIGHTS. INCORPORATE INDIGENOUS AND PLACE-BASED LOCAL ART STYLES ON WALL FACINGS.
5. BACKFILL STRUCTURES WITH GRANULAR STRUCTURE BACKFILL AND SELECT GENERAL BACKFILL.
6. INSTALL 4-FT MIN. TOPSOIL AND NATIVE VEGETATION.
7. PLACE DOWNED WOODY MATERIAL IN CONTACT WITH TOPSOIL.
8. PLACE ROCK CLUSTERS ON SURFACE OF TOPSOIL, DO NOT EMBED.



3 OVERCROSSING TYPICAL SECTION

HORIZ 1" = 30'
VERT 1" = 30'

DRAFT

RDG RIVER DESIGN GROUP
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920
236 Wisconsin Avenue
Whitefish, MT 59937
406.862.4927

BARRON CREEK OVERCROSSING

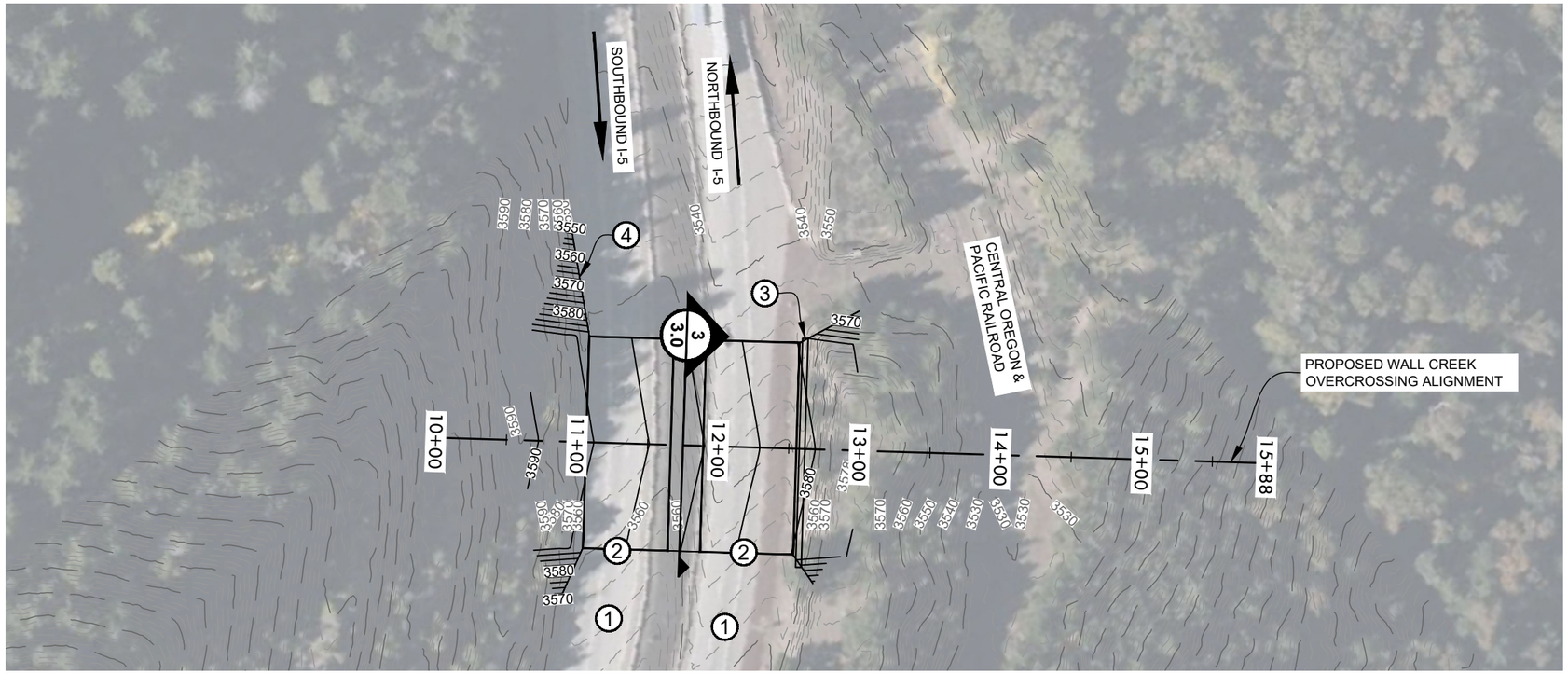
SOUTHERN OREGON WILDLIFE CROSSINGS (MP 8.7)
JACKSON COUNTY, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	11/07/22	MK	CONCEPTUAL	SW

PROJECT NUMBER
RDG-22-051

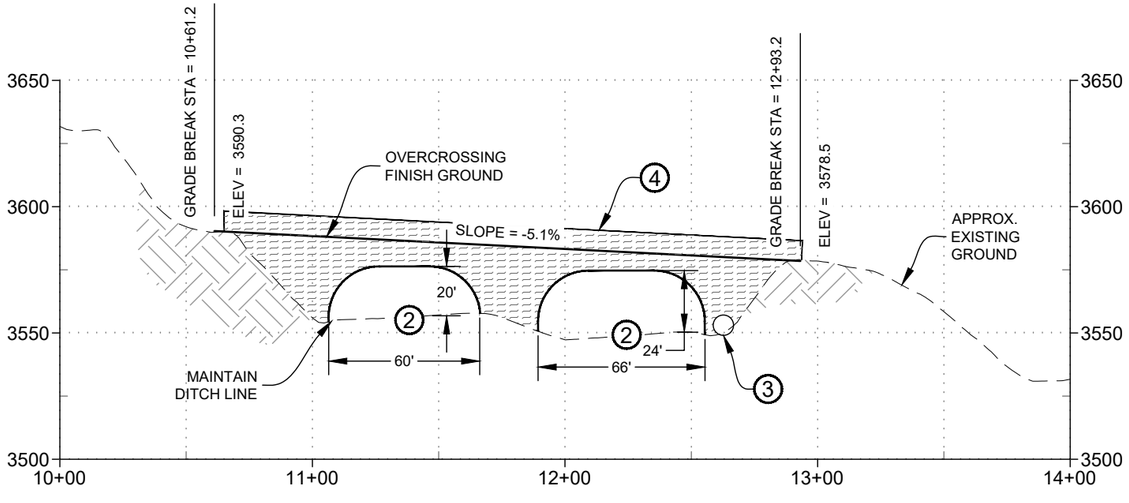
DRAWING NUMBER
2.0

Drawing 2 of 8



1 OVERCROSSING PLAN VIEW

1" = 100'



2 OVERCROSSING PROFILE

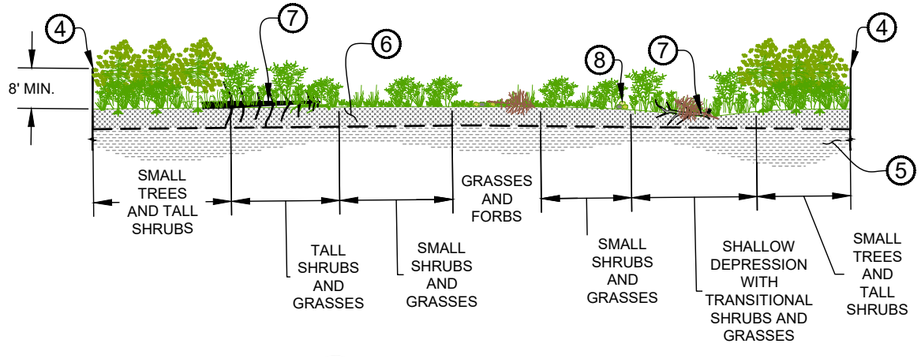
HORIZ 1" = 60'
VERT 1" = 60'

GENERAL NOTES

1. CONCEPTUAL DESIGNS WERE DEVELOPED IN COLLABORATION WITH SAMARA GROUP AND THE SOUTHERN OREGON WILDLIFE CROSSING COALITION. THE STANDARD OF CARE USED TO DEVELOP THIS DESIGN MEETS THAT OF A PLANNING LEVEL, CONCEPTUAL DESIGN STUDY.
2. ALL WORK IS TO BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE ODOT 4R DESIGN STANDARDS INCLUDING STANDARD SPECIFICATIONS, STANDARD DRAWINGS, STANDARD DETAILS AND DESIGN MANUALS.
3. CONCEPTS SHOWN ARE BASED ON REMOTELY-SENSED TERRAIN DATA (LIDAR) FROM THE OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES. NO SITE SURVEY OR SUBSURFACE INVESTIGATIONS WERE PERFORMED FOR THIS CONCEPTUAL DESIGN DEVELOPMENT.
4. ALL CONSTRUCTION WORK SHOWN IS ASSUMED TO BE WITHIN THE ODOT RIGHT-OF-WAY (TO BE VERIFIED DURING DESIGN).
5. WILDLIFE FENCING NOT SHOWN; SEE FENCING LAYOUT DRAWINGS IN APPENDIX B OF CONCEPTUAL DESIGN REPORT.

CONSTRUCTION NOTES

1. UTILIZE HALF-LANE CLOSURES FOR PRECAST ARCH INSTALLATION. MAINTAIN EMERGENCY VEHICLE ACCESS.
2. INSTALL PRECAST ARCH STRUCTURES: NOMINAL 60' SPAN X 20' RISE X 150' LENGTH SOUTHBOUND AND 66' SPAN X 24' RISE X 150' LENGTH NORTHBOUND.
3. INSTALL CULVERT IN EXISTING DITCH LINE TO MAINTAIN ROADSIDE DRAINAGE.
4. CONSTRUCT WALLS AROUND STRUCTURES AND CULVERTS. EXTEND SIDEWALLS 8-FT MIN. ABOVE TOPSOIL OVER CROSSING STRUCTURE TO BUFFER WILDLIFE FROM ROAD NOISE, SMELLS, AND LIGHTS. INCORPORATE INDIGENOUS AND PLACE-BASED LOCAL ART STYLES ON WALL FACINGS.
5. BACKFILL STRUCTURES WITH GRANULAR STRUCTURE BACKFILL AND SELECT GENERAL BACKFILL.
6. INSTALL 4-FT MIN. TOPSOIL AND NATIVE VEGETATION.
7. PLACE DOWNED WOODY MATERIAL IN CONTACT WITH TOPSOIL.
8. PLACE ROCK CLUSTERS ON SURFACE OF TOPSOIL, DO NOT EMBED.



3 OVERCROSSING TYPICAL SECTION

HORIZ 1" = 30'
VERT 1" = 30'

DRAFT

RDG RIVER DESIGN GROUP
311 SW Jefferson Avenue
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541.738.2920
236 Wisconsin Avenue
Whitefish, MT 59937
406.862.4927

WALL CREEK OVERCROSSING

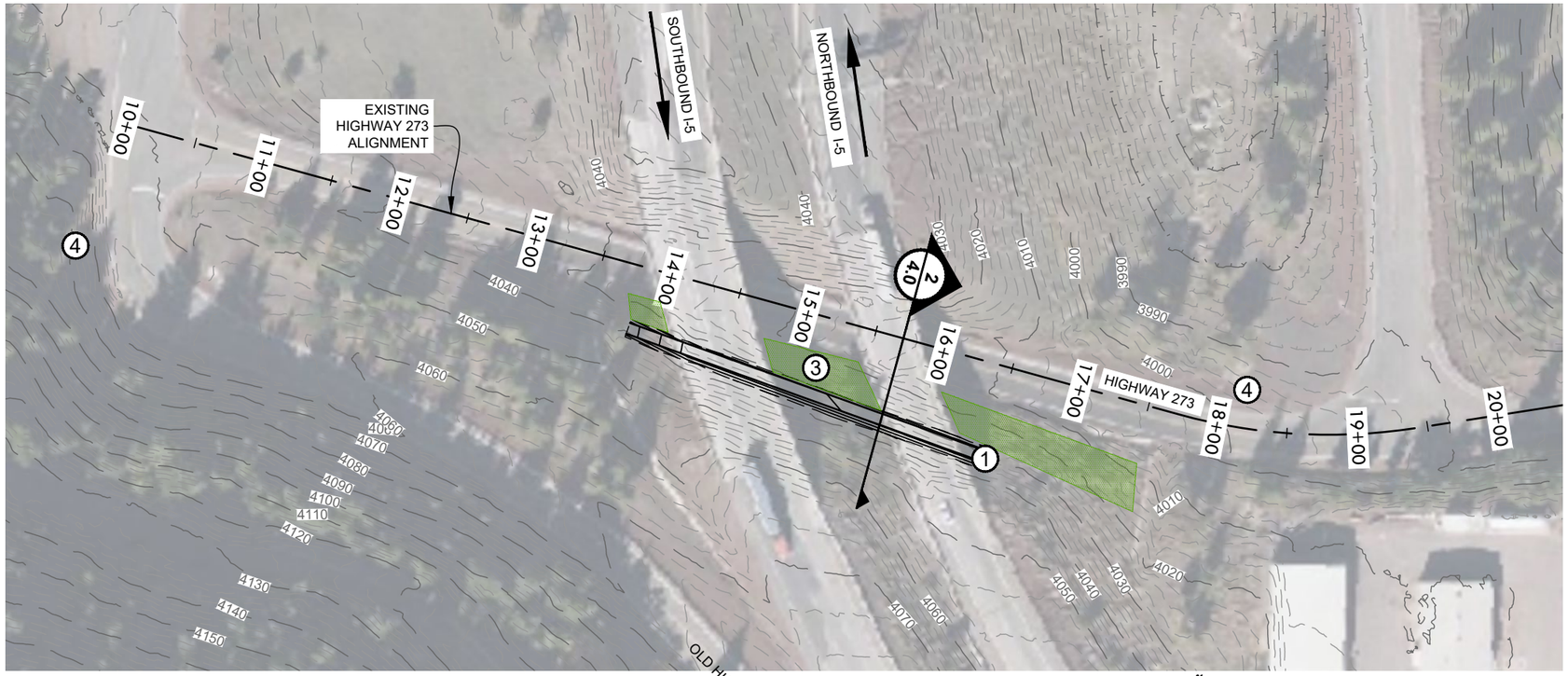
SOUTHERN OREGON WILDLIFE CROSSINGS (MP 7.1)
JACKSON COUNTY, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	11/07/22	MK	CONCEPTUAL	SW

PROJECT NUMBER
RDG-22-051

DRAWING NUMBER
3.0

Drawing 3 of 8



1 RETROFIT PLAN VIEW

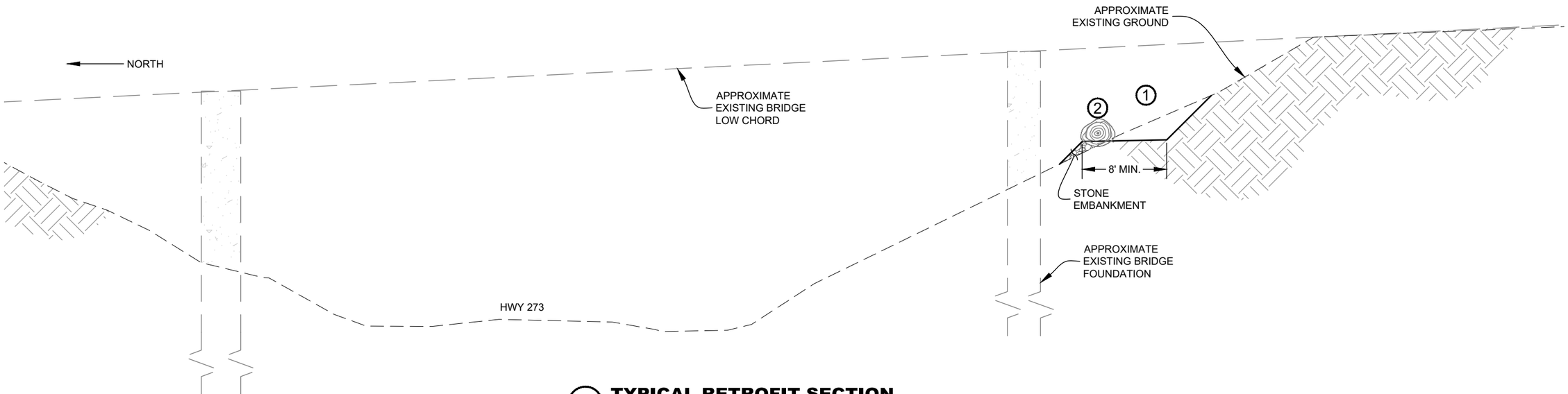
1" = 100'

GENERAL NOTES

1. CONCEPTUAL DESIGNS WERE DEVELOPED IN COLLABORATION WITH SAMARA GROUP AND THE SOUTHERN OREGON WILDLIFE CROSSING COALITION. THE STANDARD OF CARE USED TO DEVELOP THIS DESIGN MEETS THAT OF A PLANNING LEVEL, CONCEPTUAL DESIGN STUDY.
2. ALL WORK IS TO BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE ODOT 4R DESIGN STANDARDS INCLUDING STANDARD SPECIFICATIONS, STANDARD DRAWINGS, STANDARD DETAILS AND DESIGN MANUALS.
3. CONCEPTS SHOWN ARE BASED ON REMOTELY-SENSED TERRAIN DATA (LIDAR) FROM THE OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES. NO SITE SURVEY OR SUBSURFACE INVESTIGATIONS WERE PERFORMED FOR THIS CONCEPTUAL DESIGN DEVELOPMENT.
4. ALL CONSTRUCTION WORK SHOWN IS ASSUMED TO BE WITHIN THE ODOT RIGHT-OF-WAY (TO BE VERIFIED DURING DESIGN).

CONSTRUCTION NOTES

1. CONSTRUCT WILDLIFE PASSAGE BENCH ON SOUTH EMBANKMENT. PROTECT EXISTING BRIDGE FOUNDATIONS.
2. PLACE DOWNED WOODY MATERIAL IN CONTACT WITH BENCH ON TRAFFIC (NORTH) SIDE OF BENCH.
3. PLANT NATIVE SHRUBS AND SMALL TREES TO SCREEN WILDLIFE FROM VEHICLES. AVOID BROWSE SPECIES.
4. INSTALL "WILDLIFE CROSSING" SIGNS.



2 TYPICAL RETROFIT SECTION

HORIZ 1" = 10'
VERT 1" = 10'

DRAFT

RDG RIVER DESIGN GROUP
236 Wisconsin Avenue Whitefish, MT 59937 406.862.4927
311 SW Jefferson Avenue Corvallis, OR 97333 541.738.2920

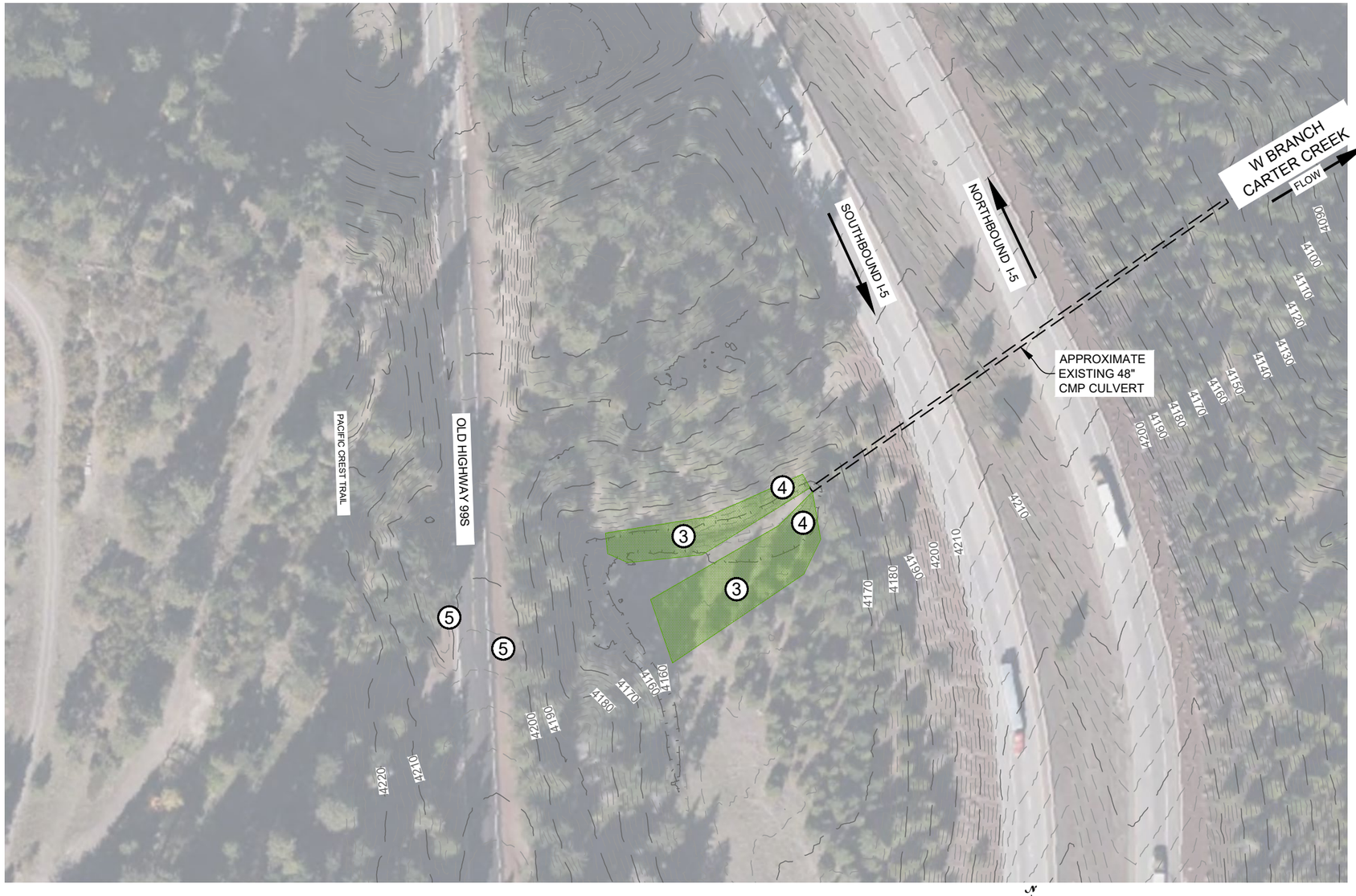
MT. ASHLAND EXIT UNDERCROSSING

SOUTHERN OREGON WILDLIFE CROSSINGS (MP 5.3)
JACKSON COUNTY, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	11/07/22	MK	CONCEPTUAL	SW

PROJECT NUMBER
RDG-22-051

DRAWING NUMBER
4.0



1 RETROFIT PLAN VIEW

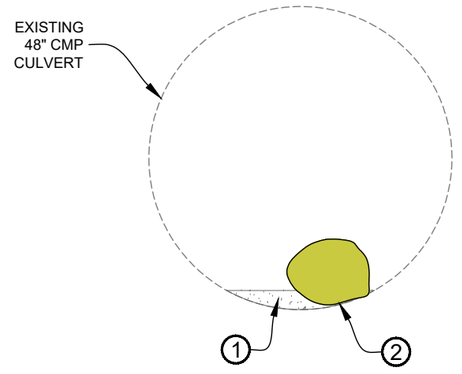
1" = 100'

GENERAL NOTES

1. CONCEPTUAL DESIGNS WERE DEVELOPED IN COLLABORATION WITH SAMARA GROUP AND THE SOUTHERN OREGON WILDLIFE CROSSING COALITION. THE STANDARD OF CARE USED TO DEVELOP THIS DESIGN MEETS THAT OF A PLANNING LEVEL, CONCEPTUAL DESIGN STUDY.
2. ALL WORK IS TO BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE ODOT 4R DESIGN STANDARDS INCLUDING STANDARD SPECIFICATIONS, STANDARD DRAWINGS, STANDARD DETAILS AND DESIGN MANUALS.
3. CONCEPTS SHOWN ARE BASED ON REMOTELY-SENSED TERRAIN DATA (LIDAR) FROM THE OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES. NO SITE SURVEY OR SUBSURFACE INVESTIGATIONS WERE PERFORMED FOR THIS CONCEPTUAL DESIGN DEVELOPMENT.
4. ALL CONSTRUCTION WORK SHOWN IS ASSUMED TO BE WITHIN THE ODOT RIGHT-OF-WAY (TO BE VERIFIED DURING DESIGN).

CONSTRUCTION NOTES

1. PAVE INVERT OF EXISTING CULVERT WITH TEXTURED CONCRETE.
2. EMBED 8" - 12" DIA. ROUNDED ROCKS IN CONCRETE, SPACED 2' - 3' ON CENTER. VARY PLACEMENT TO PROVIDE COVER FOR SMALLER SPECIES AND DRY PASSAGE FOR MEDIUM SPECIES.
3. PLANT NATIVE SHRUBS AND SMALL TREES TO SCREEN WILDLIFE FROM VEHICLES. AVOID BROWSE SPECIES.
4. PLACE DOWNED WOODY MATERIAL AND ROCK PILES IN AREA NEAR CULVERT INLET. KEEP 12' MIN. MAINTENANCE ACCESS ROUTE CLEAR.
5. INSTALL "WILDLIFE CROSSING" SIGNS.



2 TYPICAL RETROFIT SECTION

HORIZ 1" = 2'
VERT 1" = 2'

DRAFT

RDG RIVER DESIGN GROUP
236 Wisconsin Avenue Whitefish, MT 59937 406.862.4927
311 SW Jefferson Avenue Corvallis, OR 97333 541.738.2920

SISKIYOU SUMMIT CULVERT RETROFIT

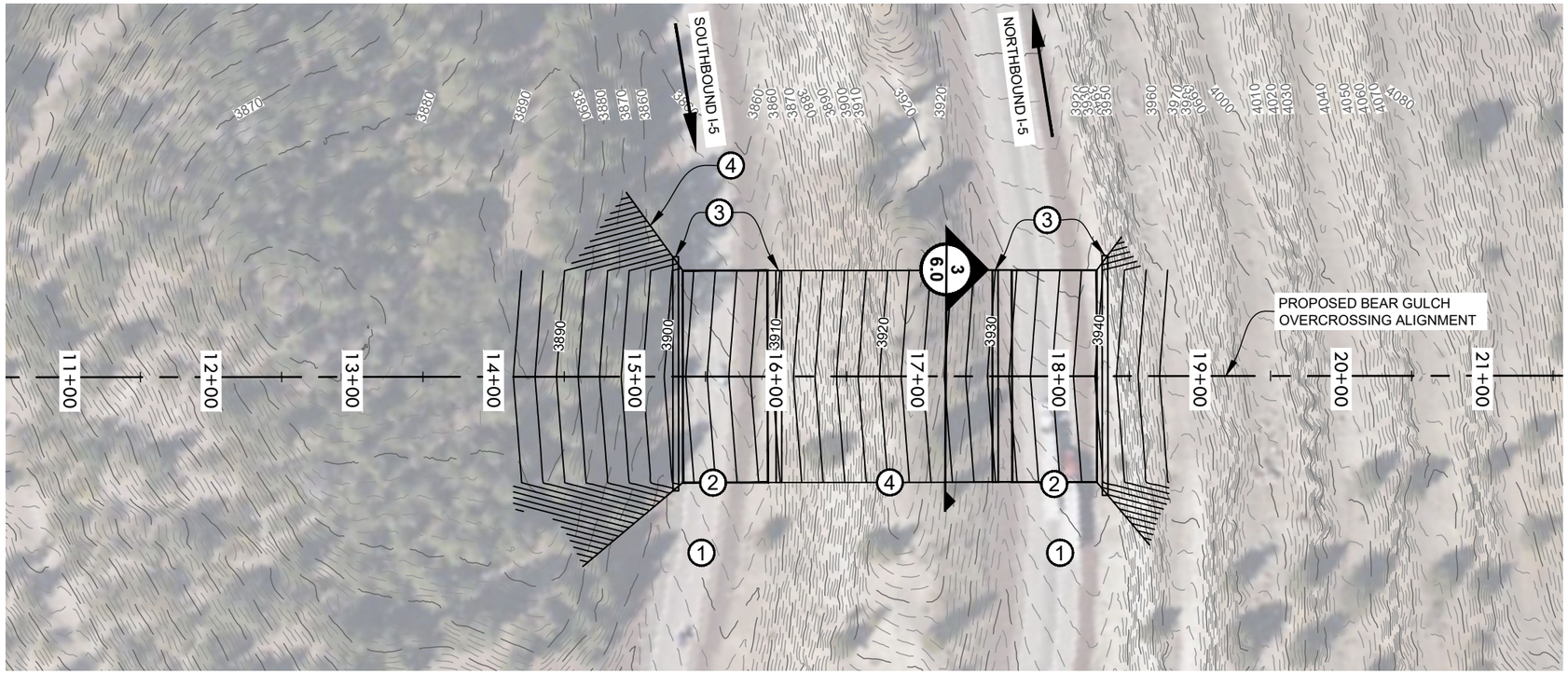
SOUTHERN OREGON WILDLIFE CROSSINGS (MP 4.8)
JACKSON COUNTY, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	11/07/22	MK	CONCEPTUAL	SW

PROJECT NUMBER
RDG-22-051

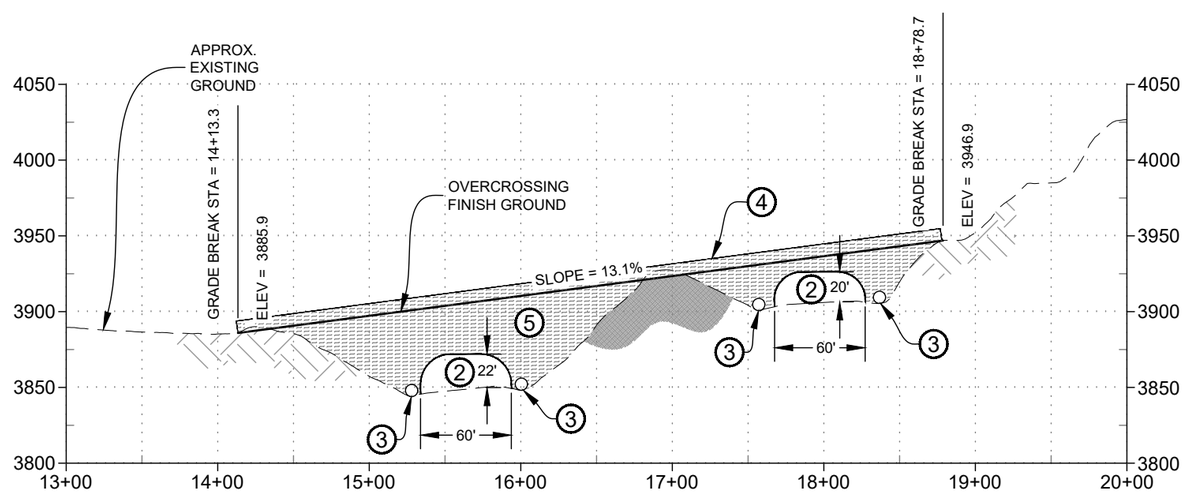
DRAWING NUMBER
5.0

Drawing 5 of 8



1 OVERCROSSING PLAN VIEW

1" = 100'



2 OVERCROSSING PROFILE

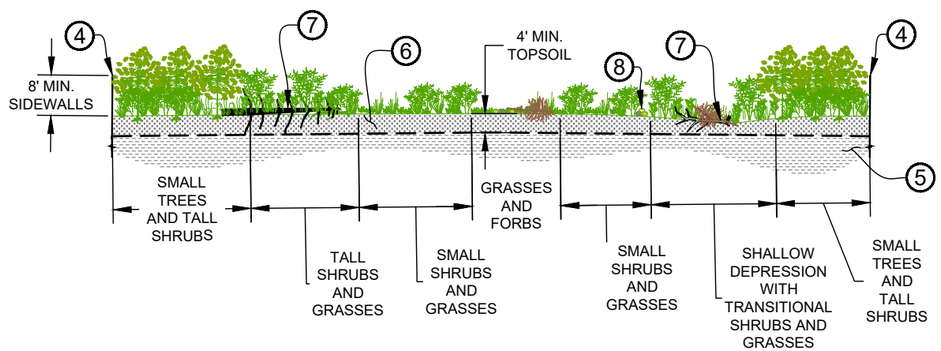
HORIZ 1" = 100'
VERT 1" = 100'

GENERAL NOTES

1. CONCEPTUAL DESIGNS WERE DEVELOPED IN COLLABORATION WITH SAMARA GROUP AND THE SOUTHERN OREGON WILDLIFE CROSSING COALITION. THE STANDARD OF CARE USED TO DEVELOP THIS DESIGN MEETS THAT OF A PLANNING LEVEL, CONCEPTUAL DESIGN STUDY.
2. ALL WORK IS TO BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE ODOT 4R DESIGN STANDARDS INCLUDING STANDARD SPECIFICATIONS, STANDARD DRAWINGS, STANDARD DETAILS AND DESIGN MANUALS.
3. CONCEPTS SHOWN ARE BASED ON REMOTELY-SENSED TERRAIN DATA (LIDAR) FROM THE OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES. NO SITE SURVEY OR SUBSURFACE INVESTIGATIONS WERE PERFORMED FOR THIS CONCEPTUAL DESIGN DEVELOPMENT.
4. ALL CONSTRUCTION WORK SHOWN IS ASSUMED TO BE WITHIN THE ODOT RIGHT-OF-WAY (TO BE VERIFIED DURING DESIGN).
5. WILDLIFE FENCING NOT SHOWN; SEE FENCING LAYOUT DRAWINGS IN APPENDIX B OF CONCEPTUAL DESIGN REPORT.

CONSTRUCTION NOTES

1. UTILIZE HALF-LANE CLOSURES FOR PRECAST ARCH INSTALLATION. MAINTAIN EMERGENCY VEHICLE ACCESS.
2. INSTALL PRECAST ARCH STRUCTURES: NOMINAL 60' SPAN X 22' RISE X 150' LENGTH SOUTHBOUND, 60' SPAN X 20' RISE X 150' LENGTH NORTHBOUND.
3. INSTALL CULVERT IN EXISTING DITCH LINE TO MAINTAIN ROADSIDE DRAINAGE.
4. CONSTRUCT WALLS AROUND STRUCTURES AND CULVERTS. EXTEND SIDEWALLS 8-FT MIN. ABOVE TOPSOIL OVER CROSSING STRUCTURE TO BUFFER WILDLIFE FROM ROAD NOISE, SMELLS, AND LIGHTS. INCORPORATE INDIGENOUS AND PLACE-BASED LOCAL ART STYLES ON WALL FACINGS.
5. BACKFILL STRUCTURES WITH GRANULAR STRUCTURE BACKFILL AND SELECT GENERAL BACKFILL.
6. INSTALL 4-FT MIN. TOPSOIL AND NATIVE VEGETATION.
7. PLACE DOWNED WOODY MATERIAL IN CONTACT WITH TOPSOIL.
8. PLACE ROCK CLUSTERS ON SURFACE OF TOPSOIL, DO NOT EMBED.
9. PAVE INVERT OF EXISTING CULVERT (NOT SHOWN) WITH TEXTURED CONCRETE.
10. EMBED 8" - 12" DIA. ROUNDED ROCKS IN CONCRETE, SPACED 2' - 3' ON CENTER ON SOUTH SIDE OF CULVERT. VARY PLACEMENT TO PROVIDE COVER FOR SMALLER SPECIES AND DRY PASSAGE FOR MEDIUM SPECIES.



3 OVERCROSSING TYPICAL SECTION

HORIZ 1" = 30'
VERT 1" = 30'

DRAFT

RDG RIVER DESIGN GROUP
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920
236 Wisconsin Avenue
Whitefish, MT 59937
406.862.4927

BEAR GULCH OVERCROSSING

SOUTHERN OREGON WILDLIFE CROSSINGS (MP 2.7)
JACKSON COUNTY, OREGON

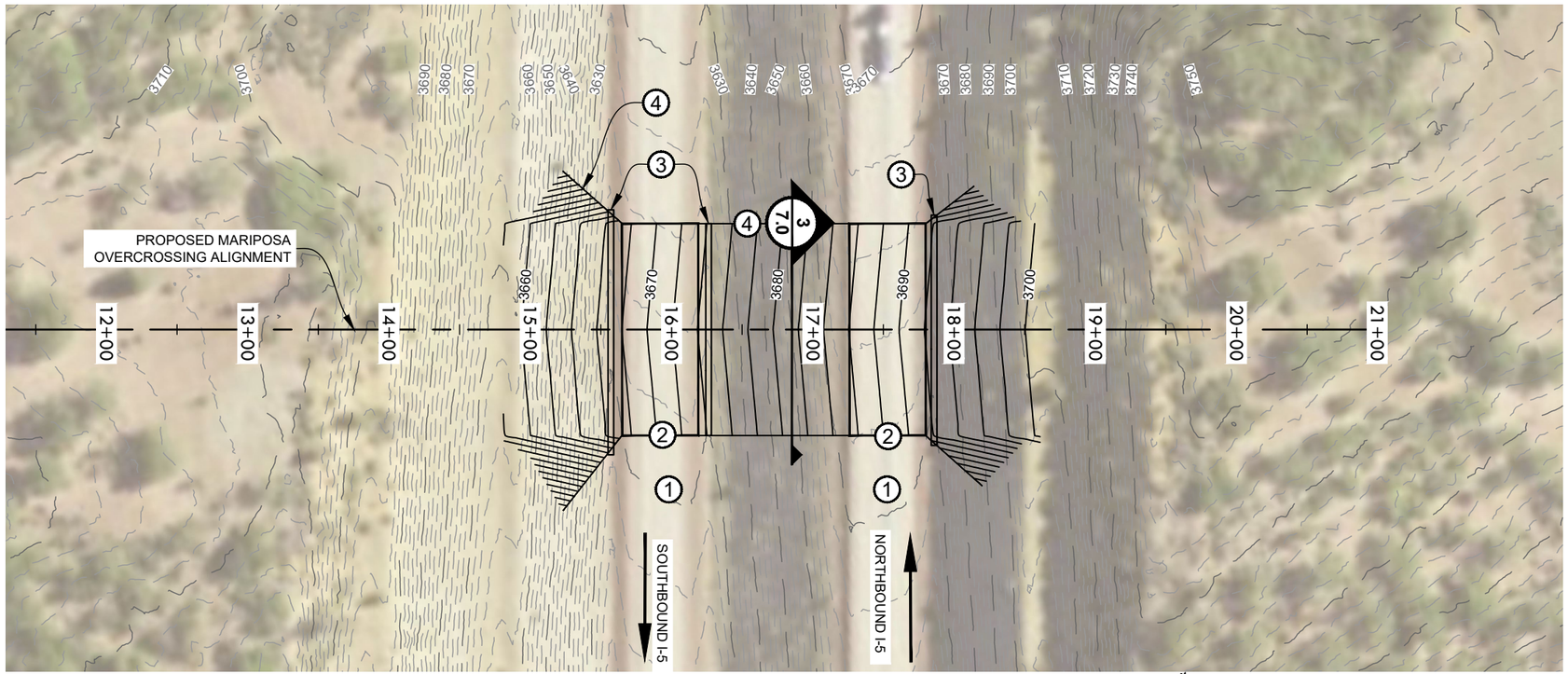
NO.	DATE	BY	DESCRIPTION	CHK
*	11/07/22	MK	CONCEPTUAL	SW

PROJECT NUMBER
RDG-22-051

DRAWING NUMBER
6.0

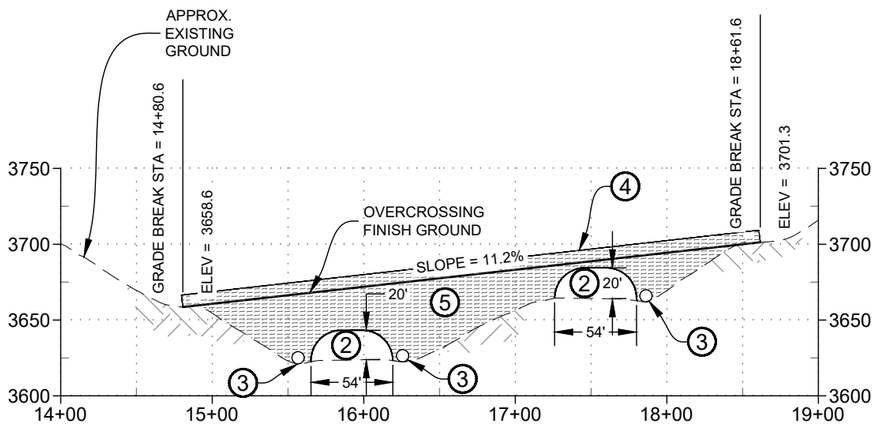
Drawing 6 of 8

Nov 06, 2022 - 10:29am M:\Projects\2022\22-051 SOWCC Wildlife Crossings\CAD\22-051 SOWCP Production.dwg



1 OVERCROSSING PLAN VIEW

1" = 100'



2 OVERCROSSING PROFILE

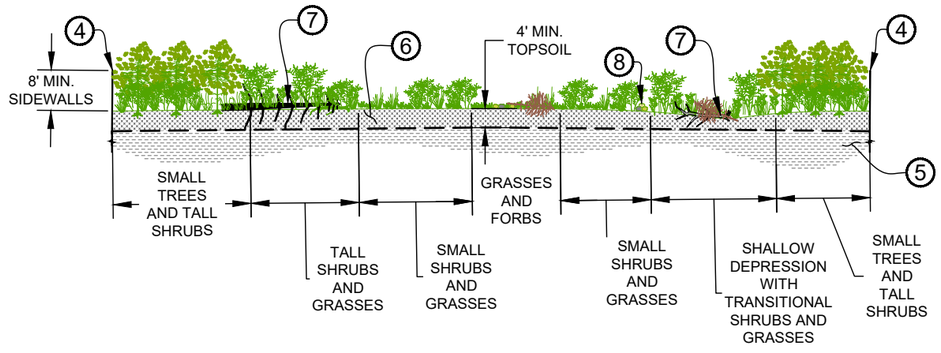
HORIZ 1" = 100'
VERT 1" = 100'

GENERAL NOTES

1. CONCEPTUAL DESIGNS WERE DEVELOPED IN COLLABORATION WITH SAMARA GROUP AND THE SOUTHERN OREGON WILDLIFE CROSSING COALITION. THE STANDARD OF CARE USED TO DEVELOP THIS DESIGN MEETS THAT OF A PLANNING LEVEL, CONCEPTUAL DESIGN STUDY.
2. ALL WORK IS TO BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE ODOT 4R DESIGN STANDARDS INCLUDING STANDARD SPECIFICATIONS, STANDARD DRAWINGS, STANDARD DETAILS AND DESIGN MANUALS.
3. CONCEPTS SHOWN ARE BASED ON REMOTELY-SENSED TERRAIN DATA (LIDAR) FROM THE OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES. NO SITE SURVEY OR SUBSURFACE INVESTIGATIONS WERE PERFORMED FOR THIS CONCEPTUAL DESIGN DEVELOPMENT.
4. ALL CONSTRUCTION WORK SHOWN IS ASSUMED TO BE WITHIN THE ODOT RIGHT-OF-WAY (TO BE VERIFIED DURING DESIGN).
5. WILDLIFE FENCING NOT SHOWN; SEE FENCING LAYOUT DRAWINGS IN APPENDIX B OF CONCEPTUAL DESIGN REPORT.

CONSTRUCTION NOTES

1. UTILIZE HALF-LANE CLOSURES FOR PRECAST ARCH INSTALLATION. MAINTAIN EMERGENCY VEHICLE ACCESS.
2. INSTALL PRECAST ARCH STRUCTURES: NOMINAL 54' SPAN X 20' RISE X 150' LENGTH BOTH DIRECTIONS.
3. INSTALL CULVERT IN EXISTING DITCH LINE TO MAINTAIN ROADSIDE DRAINAGE.
4. CONSTRUCT WALLS AROUND STRUCTURES AND CULVERTS. EXTEND SIDEWALLS 8-FT MIN. ABOVE TOPSOIL OVER CROSSING STRUCTURE TO BUFFER WILDLIFE FROM ROAD NOISE, SMELLS, AND LIGHTS. INCORPORATE INDIGENOUS AND PLACE-BASED LOCAL ART STYLES ON WALL FACINGS.
5. BACKFILL STRUCTURES WITH GRANULAR STRUCTURE BACKFILL AND SELECT GENERAL BACKFILL.
6. INSTALL 4-FT MIN. TOPSOIL AND NATIVE VEGETATION.
7. PLACE DOWNED WOODY MATERIAL IN CONTACT WITH TOPSOIL.
8. PLACE ROCK CLUSTERS ON SURFACE OF TOPSOIL, DO NOT EMBED.



3 OVERCROSSING TYPICAL SECTION

HORIZ 1" = 30'
VERT 1" = 30'

DRAFT

RDG RIVER DESIGN GROUP
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920
236 Wisconsin Avenue
Whitefish, MT 59937
406.862.4927

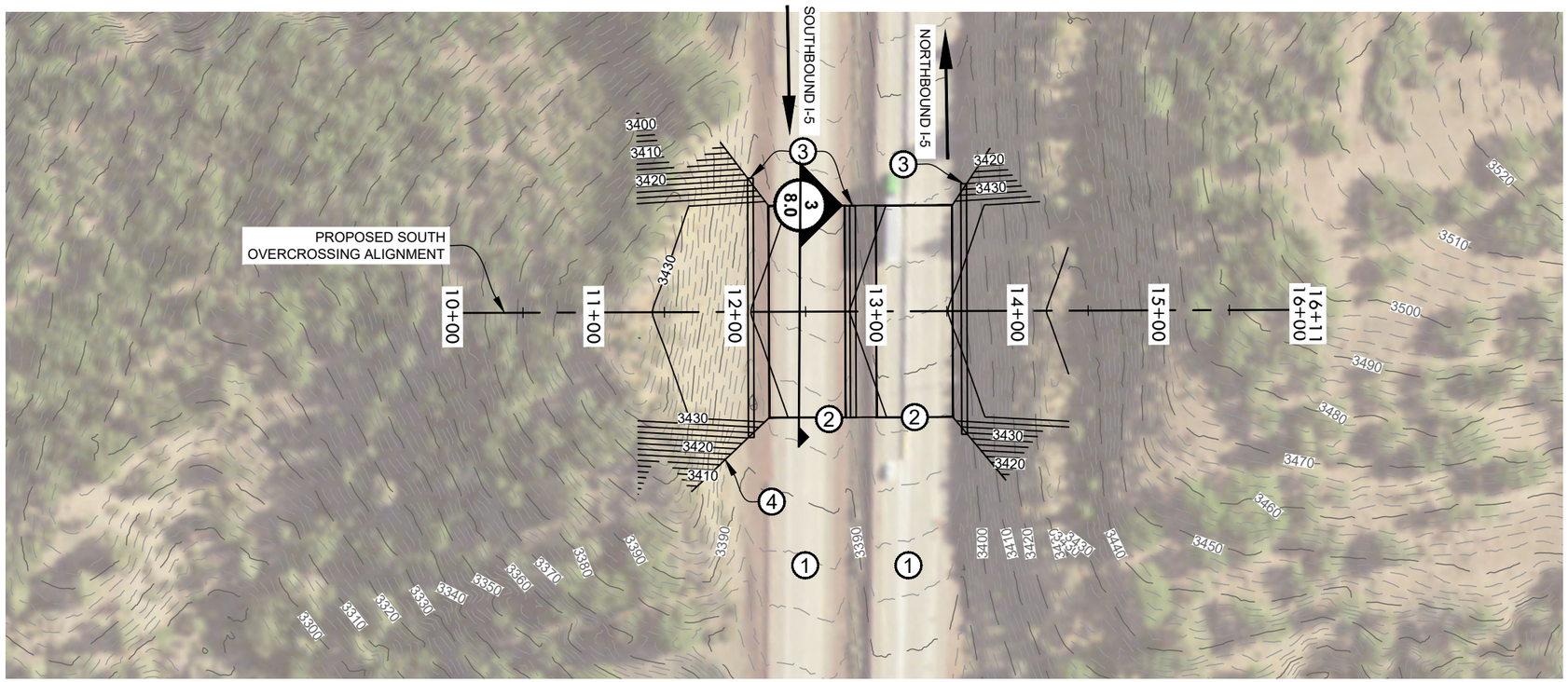
MARIPOSA OVERCROSSING

SOUTHERN OREGON WILDLIFE CROSSINGS (MP 1.6)
JACKSON COUNTY, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	11/07/22	MK	CONCEPTUAL	SW

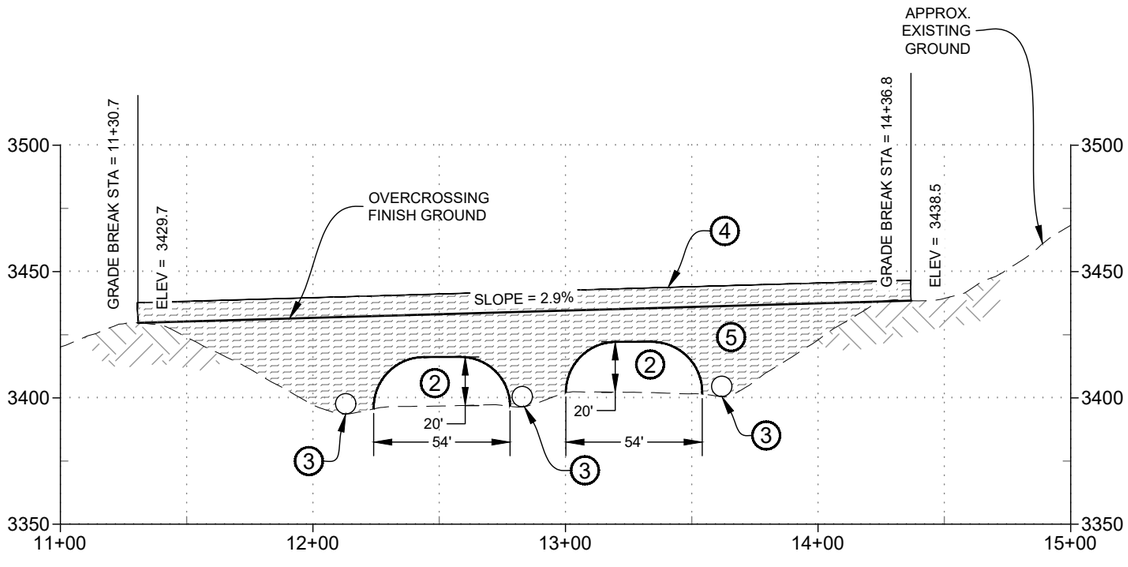
PROJECT NUMBER
RDG-22-051

DRAWING NUMBER
7.0



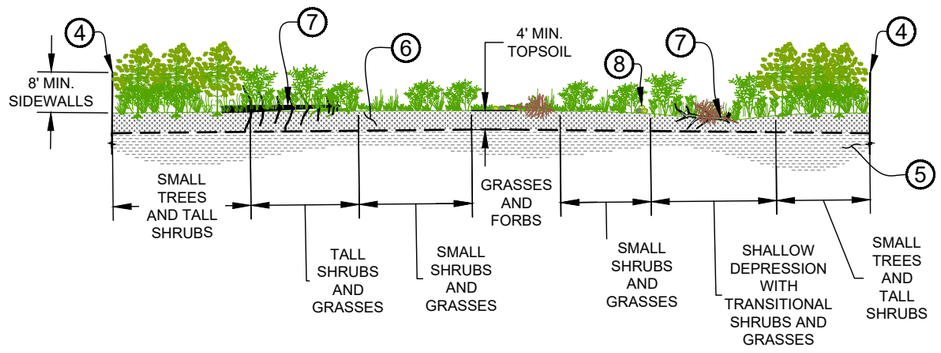
1 OVERCROSSING PLAN VIEW

1" = 100'



2 OVERCROSSING PROFILE

HORIZ 1" = 60'
VERT 1" = 60'



3 OVERCROSSING TYPICAL SECTION

HORIZ 1" = 30'
VERT 1" = 30'

GENERAL NOTES

1. CONCEPTUAL DESIGNS WERE DEVELOPED IN COLLABORATION WITH SAMARA GROUP AND THE SOUTHERN OREGON WILDLIFE CROSSING COALITION. THE STANDARD OF CARE USED TO DEVELOP THIS DESIGN MEETS THAT OF A PLANNING LEVEL, CONCEPTUAL DESIGN STUDY.
2. ALL WORK IS TO BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE ODOT 4R DESIGN STANDARDS INCLUDING STANDARD SPECIFICATIONS, STANDARD DRAWINGS, STANDARD DETAILS AND DESIGN MANUALS.
3. CONCEPTS SHOWN ARE BASED ON REMOTELY-SENSED TERRAIN DATA (LIDAR) FROM THE OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES. NO SITE SURVEY OR SUBSURFACE INVESTIGATIONS WERE PERFORMED FOR THIS CONCEPTUAL DESIGN DEVELOPMENT.
4. ALL CONSTRUCTION WORK SHOWN IS ASSUMED TO BE WITHIN THE ODOT RIGHT-OF-WAY (TO BE VERIFIED DURING DESIGN).
5. WILDLIFE FENCING NOT SHOWN; SEE FENCING LAYOUT DRAWINGS IN APPENDIX B OF CONCEPTUAL DESIGN REPORT.

CONSTRUCTION NOTES

1. UTILIZE HALF-LANE CLOSURES FOR PRECAST ARCH INSTALLATION. MAINTAIN EMERGENCY VEHICLE ACCESS.
2. INSTALL PRECAST ARCH STRUCTURES: NOMINAL 54' SPAN X 20' RISE X 150' LENGTH BOTH DIRECTIONS.
3. INSTALL CULVERT IN EXISTING DITCH LINE TO MAINTAIN ROADSIDE DRAINAGE.
4. CONSTRUCT WALLS AROUND STRUCTURES AND CULVERTS. EXTEND SIDEWALLS 8-FT MIN. ABOVE TOPSOIL OVER CROSSING STRUCTURE TO BUFFER WILDLIFE FROM ROAD NOISE, SMELLS, AND LIGHTS. INCORPORATE INDIGENOUS AND PLACE-BASED LOCAL ART STYLES ON WALL FACINGS.
5. BACKFILL STRUCTURES WITH GRANULAR STRUCTURE BACKFILL AND SELECT GENERAL BACKFILL.
6. INSTALL 4-FT MIN. TOPSOIL AND NATIVE VEGETATION.
7. PLACE DOWNED WOODY MATERIAL IN CONTACT WITH TOPSOIL.
8. PLACE ROCK CLUSTERS ON SURFACE OF TOPSOIL, DO NOT EMBED.

DRAFT

RDG RIVER DESIGN GROUP
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920
236 Wisconsin Avenue
Whitefish, MT 59937
406.862.4927

SOUTH OVERCROSSING

SOUTHERN OREGON WILDLIFE CROSSINGS (MP 0.3)
JACKSON COUNTY, OREGON

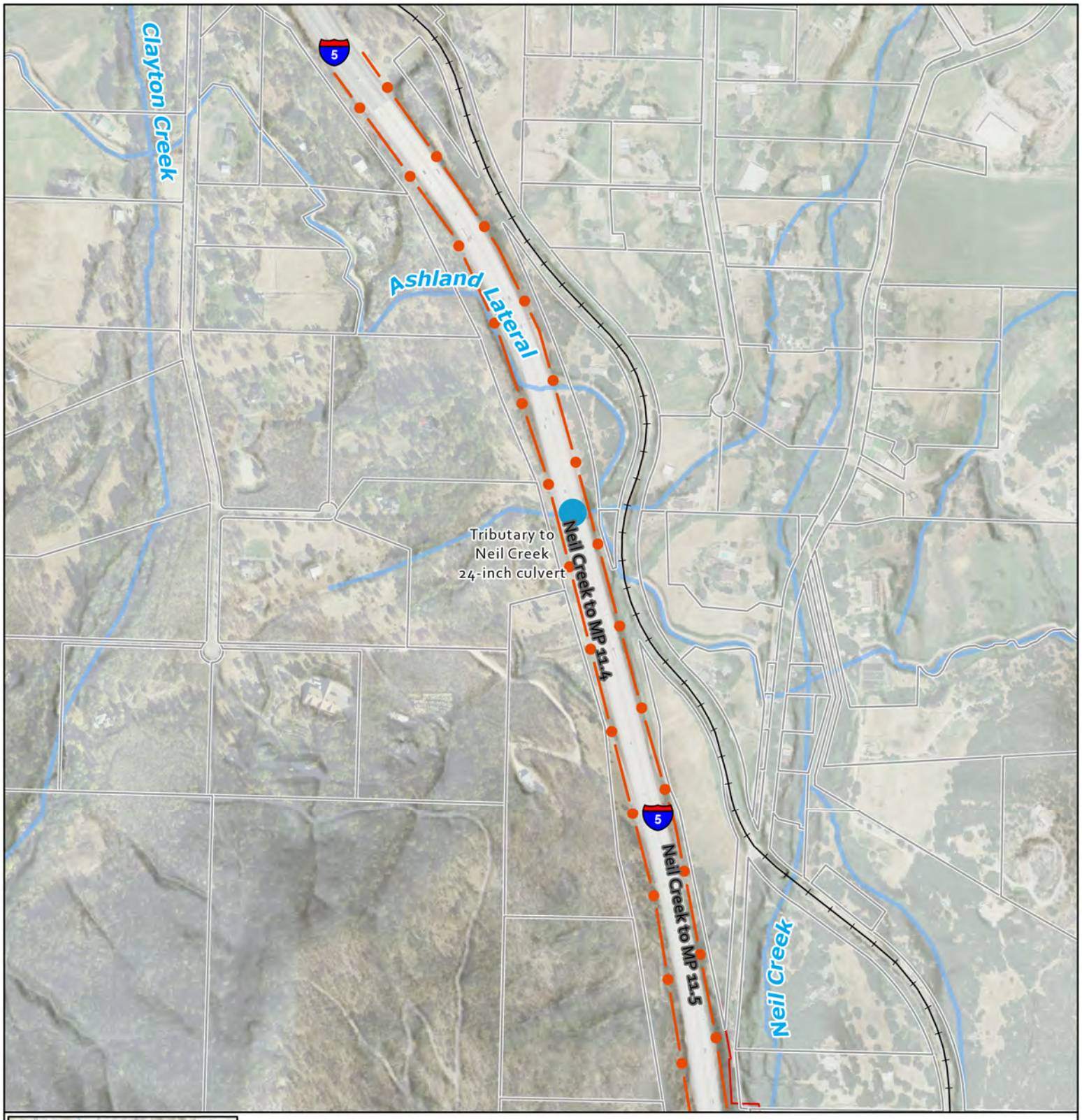
NO.	DATE	BY	DESCRIPTION	CHK
*	11/07/22	MK	CONCEPTUAL	SW

PROJECT NUMBER
RDG-22-051

DRAWING NUMBER
8.0

Drawing 8 of 8

Appendix B
Preliminary Fencing Layouts



Preliminary Wildlife Fencing Layout

- Potential Wildlife Fencing
- ODOT Right of Way
- Taxlots
- Maintain Wildlife Access to Creek Culvert Crossing

Credits: ODOT, DOGAMI, ESRI, Jackson County, RDG, SG

N

0 300 600 Feet

RDG

Preliminary Wildlife Fencing Layout

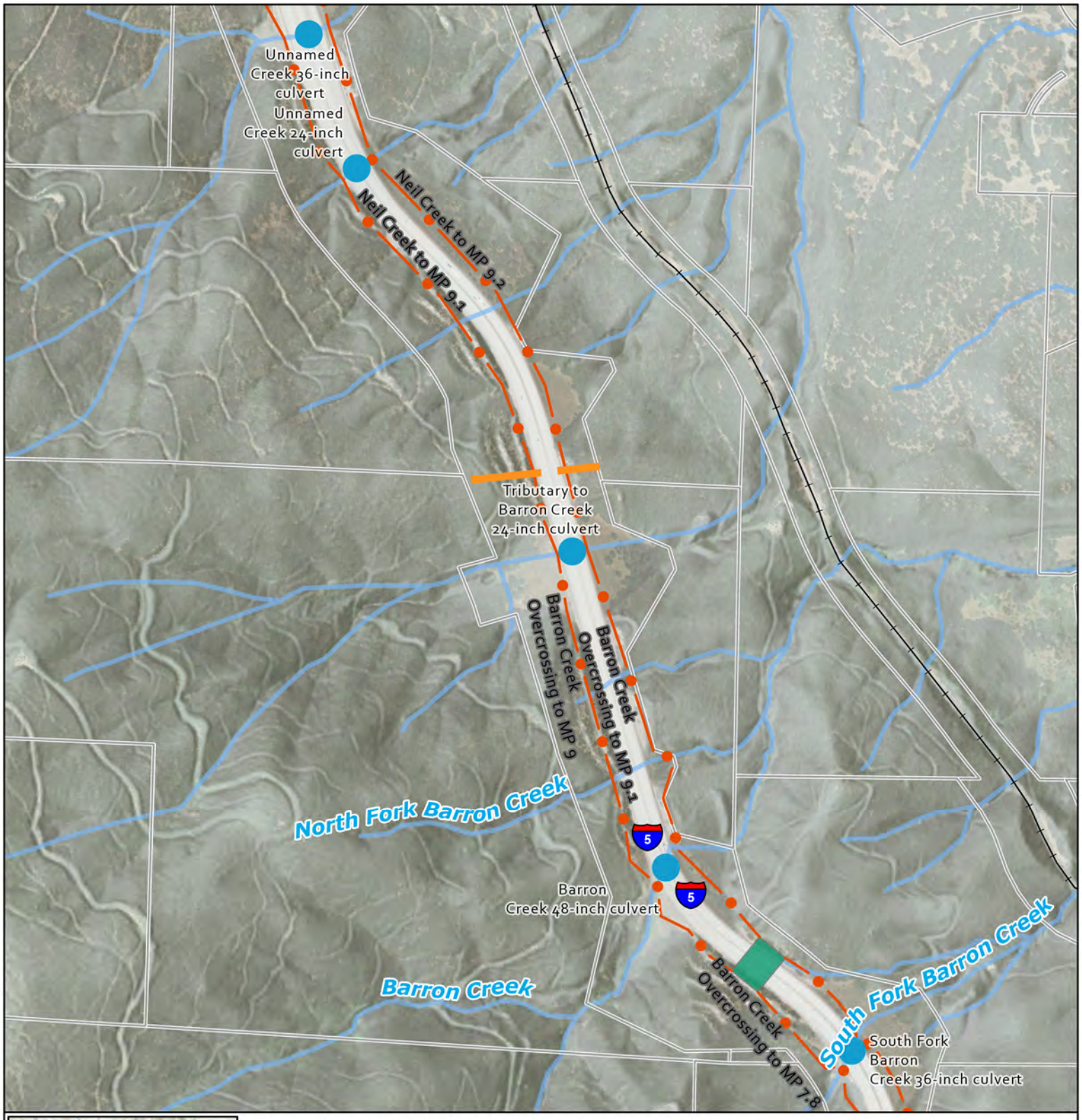
- Potential Wildlife Fencing
- Crossing Structure
- ODOT Right of Way
- Taxlots
- Maintain Wildlife Access to Creek Culvert Crossing

Credits: ODOT, DOGAMI, ESRI, Jackson County, RDG, SG

N

0 300 600 Feet

RDG



Preliminary Wildlife Fencing Layout

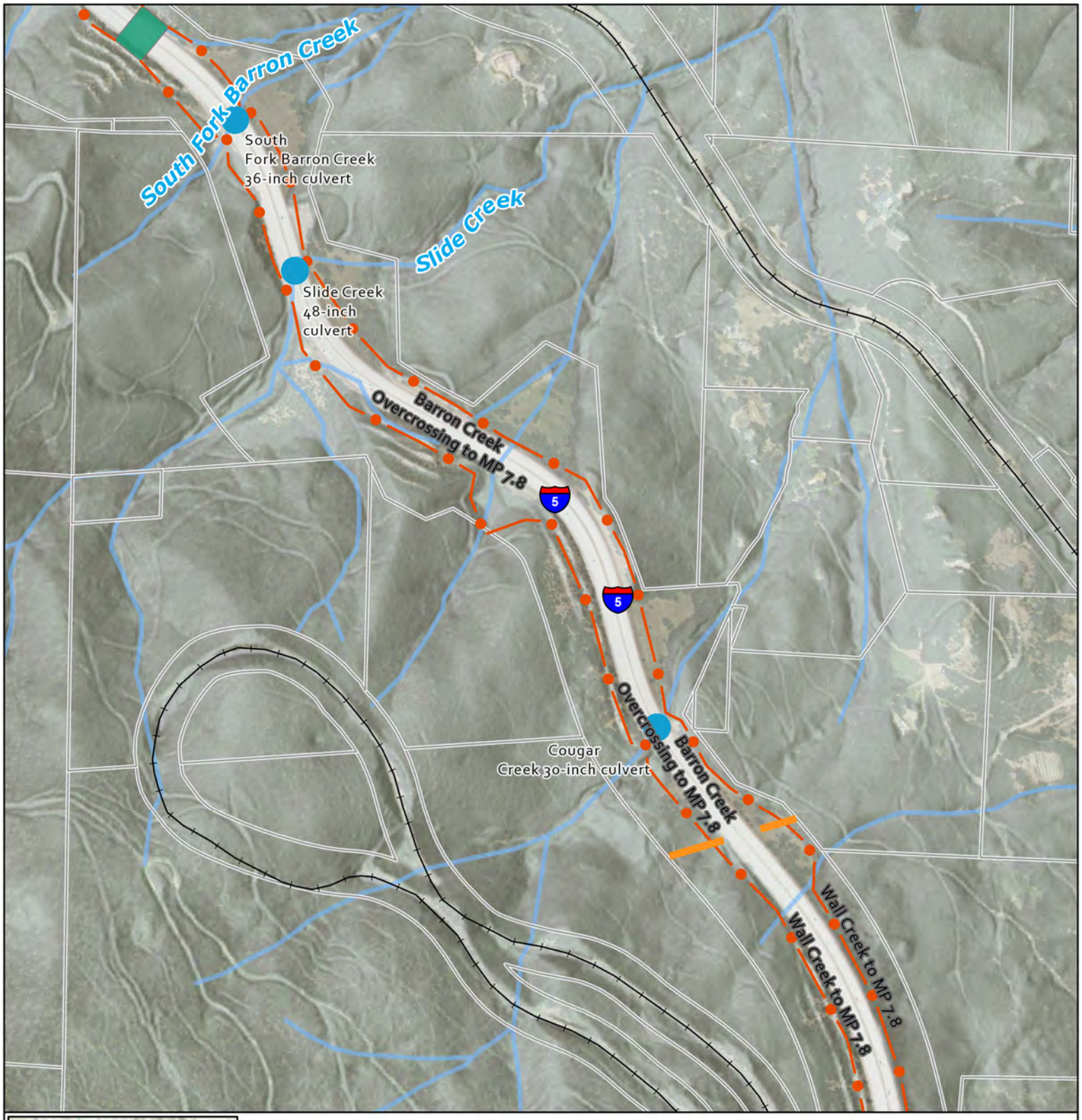
- Potential Wildlife Fencing
- Crossing Structure
- Taxlots
- Maintain Wildlife Access to Creek Culvert Crossing
- Potential Fence Segment Start/ End Locations

Credits: ODOT, DOGAMI, ESRI, Jackson County, RDG, SG

N

0 300 600 Feet

RDG



Preliminary Wildlife Fencing Layout

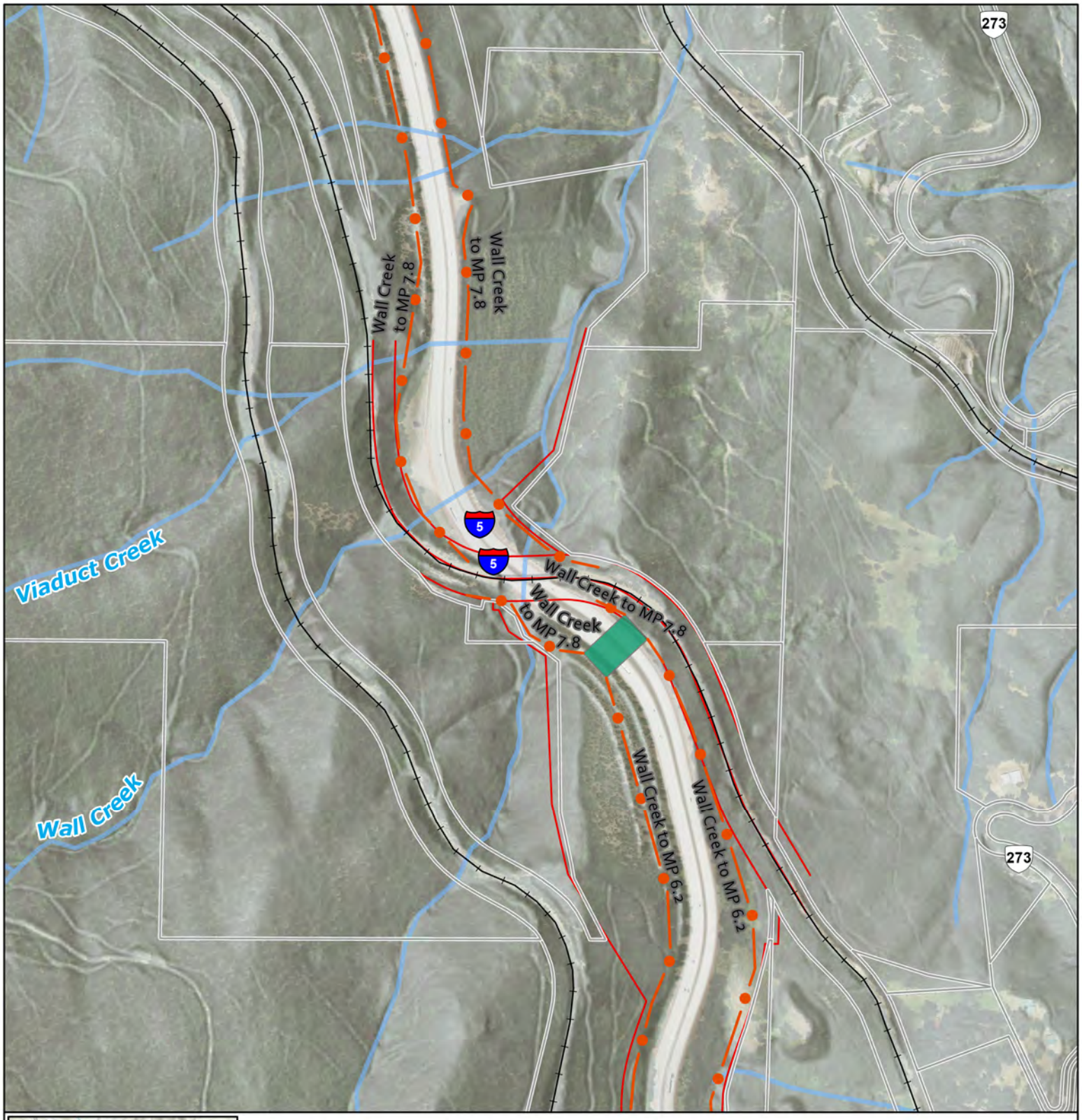
- Potential Wildlife Fencing
- Crossing Structure
- Taxlots
- Maintain Wildlife Access to Creek Culvert Crossing
- Potential Fence Segment Start/ End Locations

Credits: ODOT, DOGAMI, ESRI, Jackson County, RDG, SG

N

0 300 600 Feet

RDG



Preliminary Wildlife Fencing Layout

- Potential Wildlife Fencing
- Crossing Structure
- ODOT Right of Way
- Taxlots

Credits: ODOT, DOGAMI, ESRI, Jackson County, RDG, SG

N

0 300 600 Feet

RDG

Preliminary Wildlife Fencing Layout

- Potential Wildlife Fencing
- ODOT Right of Way
- Taxlots
- Maintain Wildlife Access to Creek Culvert Crossing

Credits: ODOT, DOGAMI, ESRI, Jackson County, RDG, SG

N

0 300 600 Feet

RDG

Preliminary Wildlife Fencing Layout

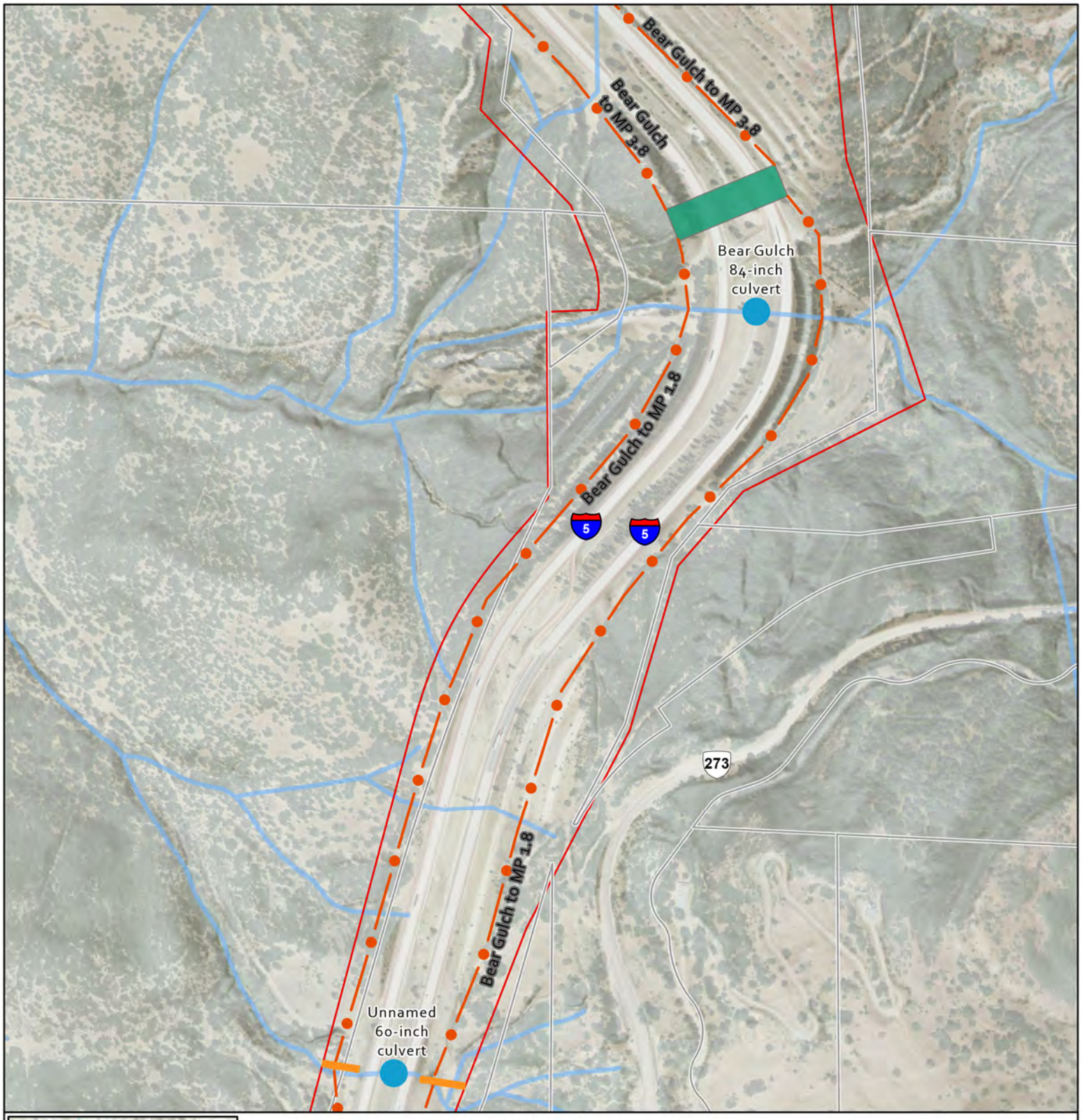
- Potential Wildlife Fencing
- ODOT Right of Way
- Taxlots

Credits: ODOT, DOGAMI, ESRI, Jackson County, RDG, SG

N

0 300 600 Feet

RDG



Preliminary Wildlife Fencing Layout

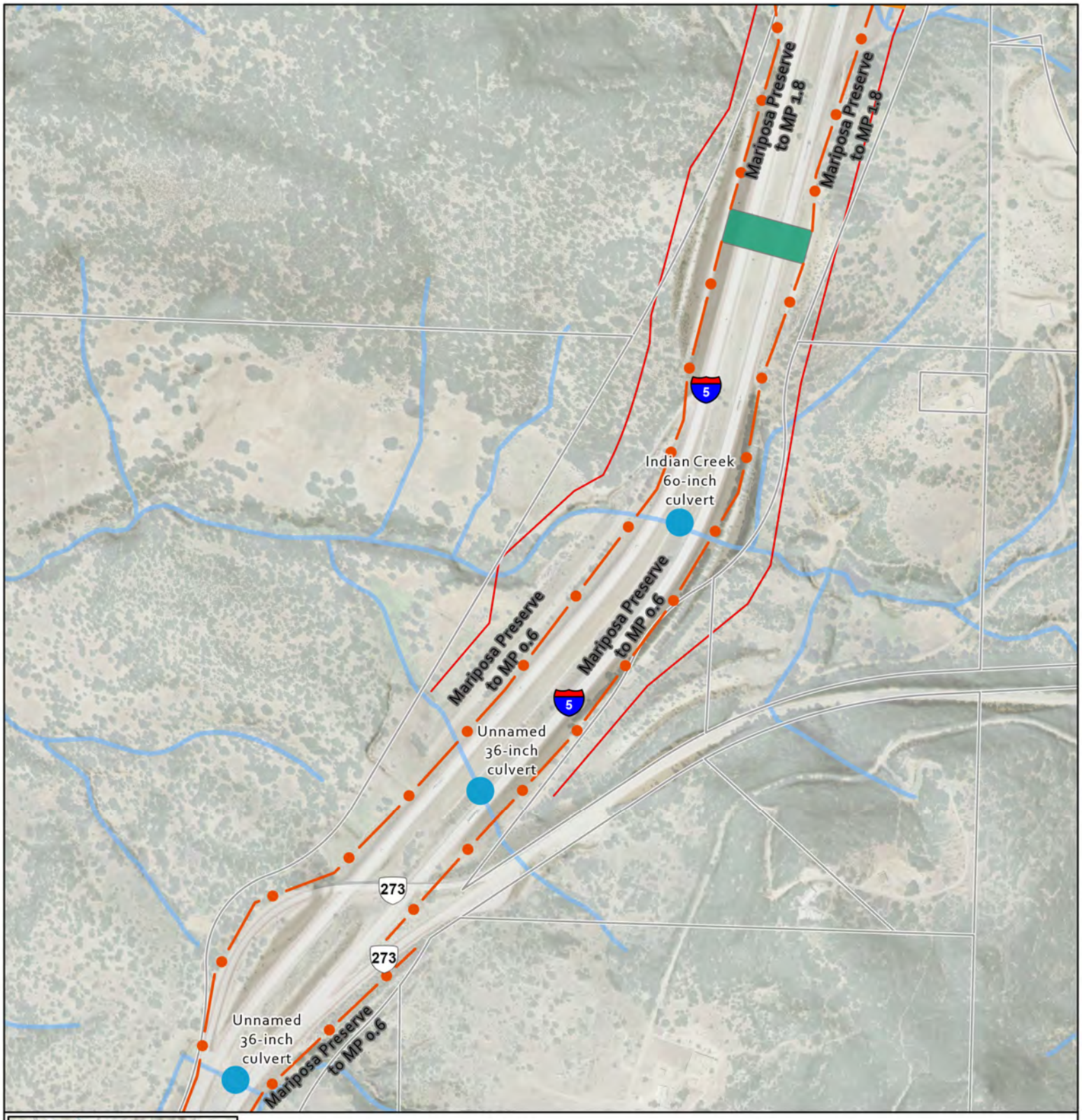
- Potential Wildlife Fencing
- Crossing Structure
- ODOT Right of Way
- Taxlots
- Maintain Wildlife Access to Creek Culvert Crossing
- Potential Fence Segment Start/ End Locations

Credits: ODOT, DOGAMI, ESRI, Jackson County, RDG, SG

N

0 300 600 Feet

RDG



Preliminary Wildlife Fencing Layout

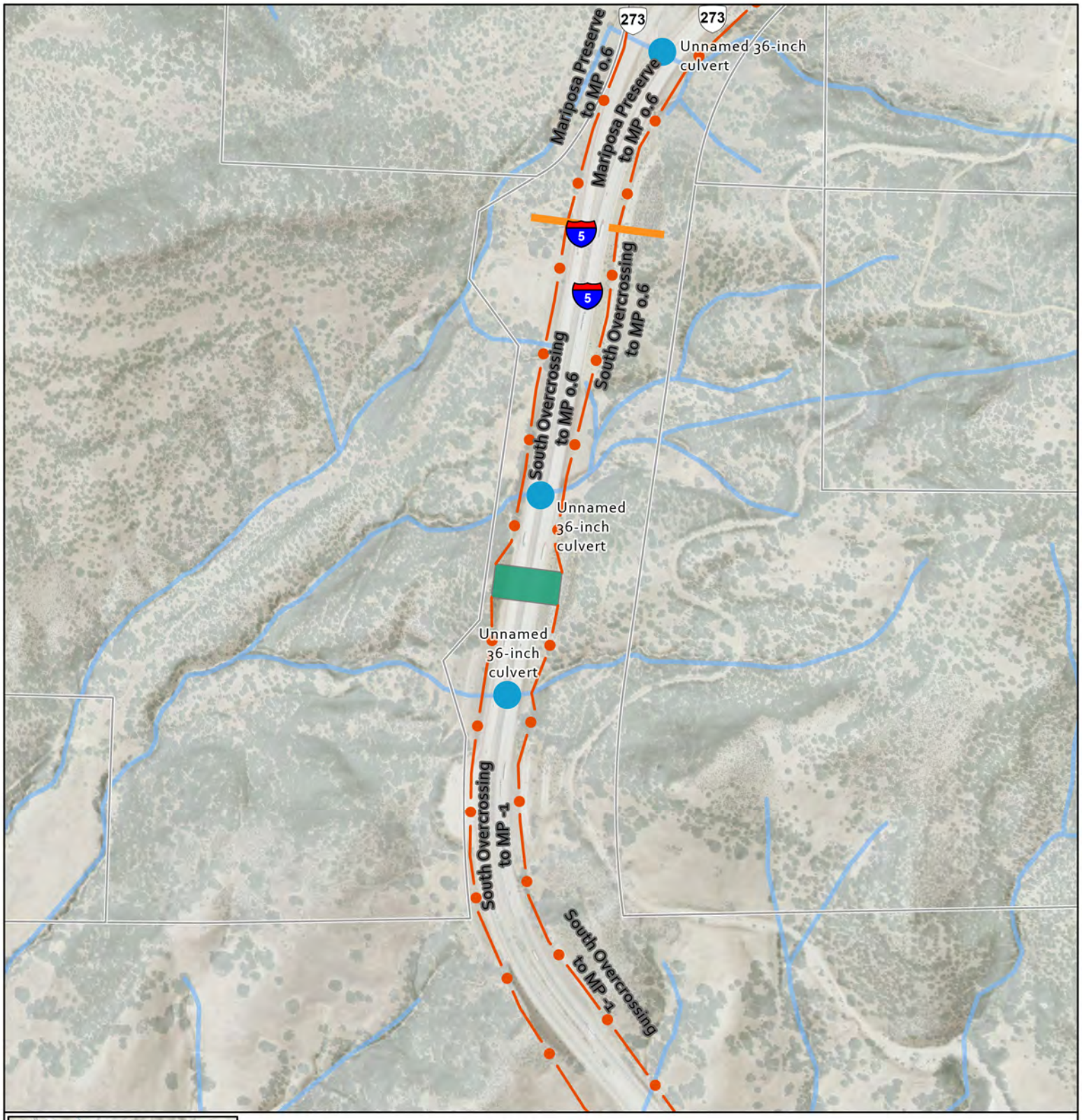
- Potential Wildlife Fencing
- Crossing Structure
- ODOT Right of Way
- Taxlots
- Maintain Wildlife Access to Creek Culvert Crossing
- Potential Fence Segment Start/ End Locations

Credits: ODOT, DOGAMI, ESRI, Jackson County, RDG, SG

N

0 300 600 Feet

RDG



Preliminary Wildlife Fencing Layout

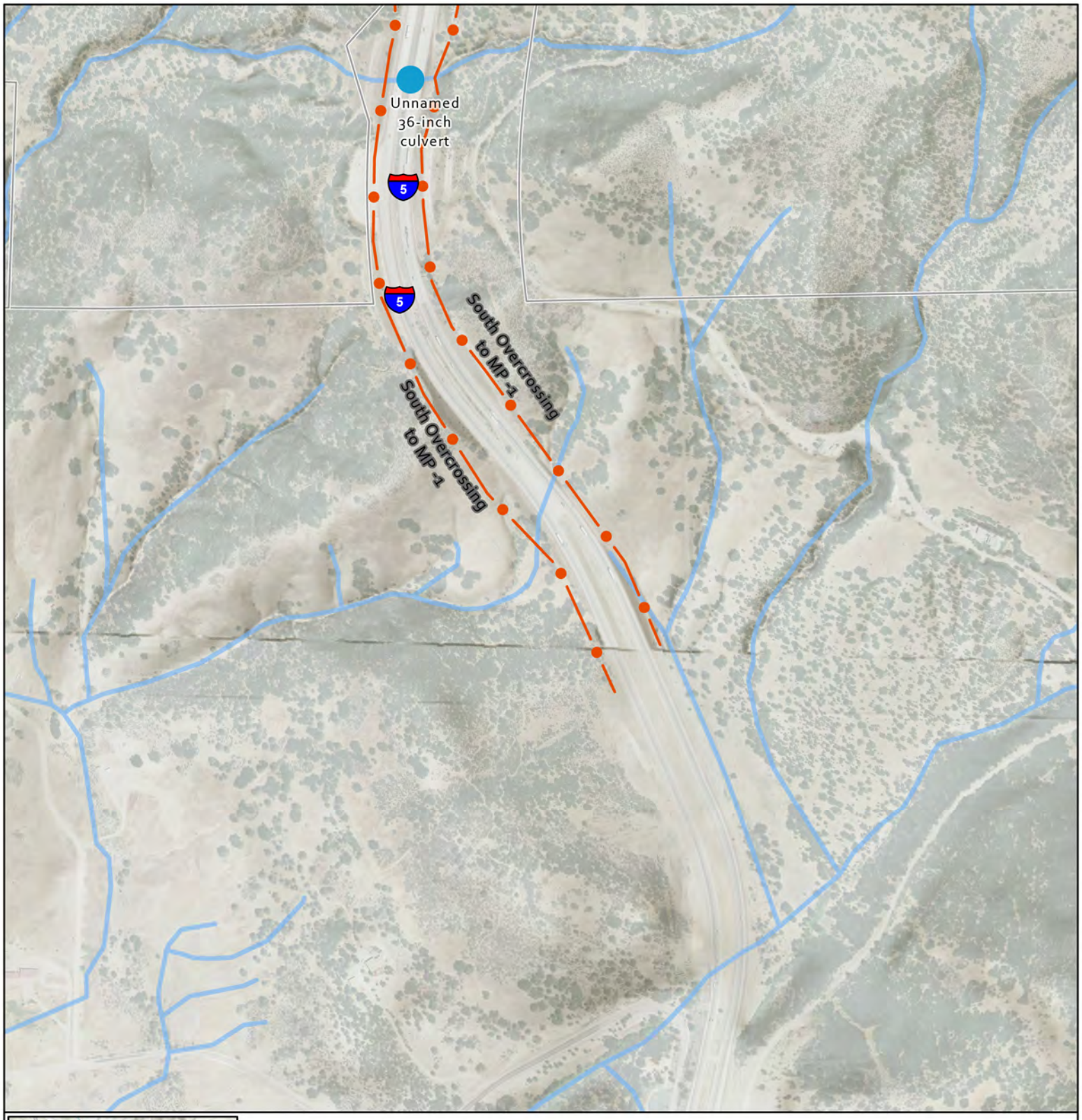
- Potential Wildlife Fencing
- Crossing Structure
- Taxlots
- Maintain Wildlife Access to Creek Culvert Crossing
- Potential Fence Segment Start/ End Locations

Credits: ODOT, DOGAMI, ESRI, Jackson County, RDG, SG

N

0 300 600 Feet

RDG



Preliminary Wildlife Fencing Layout

- Potential Wildlife Fencing
- Taxlots
- Maintain Wildlife Access to Creek Culvert Crossing

Credits: ODOT, DOGAMI, ESRI, Jackson County, RDG, SG

N

0 300 600 Feet

RDG

Appendix C
Opinions of Probable Costs

Opinion of Probable Costs

PROJECT: *Southern Oregon Wildlife Crossings Project*
SITE: *Neil Creek*
TITLE: *Probable Cost Opinion for Conceptual Design*
DATE: *11/06/22*
CLIENT: *Southern Oregon Wildlife Crossings Coalition*
DESCRIPTION: *Class 4 Cost Estimate (American Association of Cost Engineers)*
Based on Conceptual Designs dated 11/07/22

Division	Item	Description	Unit	Quantity	Unit Cost	Cost
1	**Design and Permitting**					**$ 54,000**
		RIGHT-OF-WAY COORDINATION AND MAPPING	LS	1	$ 1,500	$ 1,500
		DESIGN: CIVIL	LS	1	$ 10,000	$ 10,000
		DESIGN: ROADSIDE DEVELOPMENT	LS	1	$ 15,000	$ 15,000
		DESIGN: TRAFFIC	LS	1	$ 2,500	$ 2,500
		PERMITTING: CULTURAL RESOURCES	LS	1	$ 10,000	$ 10,000
		PERMITTING: NEPA	LS	1	$ 6,000	$ 6,000
		PERMITTING: WATER QUALITY PROTECTION	LS	1	$ 2,000	$ 2,000
		PERMITTING: LOCAL	LS	1	$ 2,000	$ 2,000
		PUBLIC OUTREACH	LS	1	$ 5,000	$ 5,000
2	**Temporary Features and Appurtenances**					**$ 423,000**
	0210-0100000A	MOBILIZATION	LS	1	$ 350,000	$ 350,000
	0221-0101000A	TEMPORARY WORK ZONE TRAFFIC CONTROL, COMPLETE	LS	1	$ 3,000	$ 3,000
	0280-0100000A	EROSION CONTROL	LS	1	$ 70,000	$ 70,000
3	**Roadwork**					**$ 3,900**
	0330-0105000K	GENERAL EXCAVATION	CUYD	60	$ 30	$ 1,800
	0330-0123000K	EMBANKMENT IN PLACE	CUYD	60	$ 35	$ 2,100
9	**Permanent Traffic Control and Illumination Systems**					**$ 800**
	0940-0202000J	SIGNS, STANDARD SHEETING, SHEET ALUMINUM	SQFT	16	$ 50	$ 800
10	**Right-of-Way Development and Control**					**$ 3,102,800**
	1050-SP	WILDLIFE FENCE (INCL. JUMPOUTS AND GATES)	MILE	4.7	$ 660,000	$ 3,102,000
					Construction Subtotal =	**$ 3,530,500**
					Design and Permitting Subtotal =	**$ 54,000**
					Total Opinion of Probable Project Cost =	**$ 3,584,500**
					Low Estimate -15% (rounded up to the nearest $10,000) =	$ 3,050,000
					High Estimate +50% (rounded up to the nearest $10,000) =	$ 5,380,000

Opinion of Probable Costs

PROJECT: *Southern Oregon Wildlife Crossings Project*
SITE: *Barron Creek*
TITLE: *Probable Cost Opinion for Conceptual Design*
DATE: *11/06/22*
CLIENT: *Southern Oregon Wildlife Crossings Coalition*
DESCRIPTION: *Class 4 Cost Estimate (American Association of Cost Engineers)*
Based on Conceptual Designs dated 11/07/22

Division	Item	Description	Unit	Quantity	Unit Cost	Cost
1	**Design and Permitting**					**$ 750,000**
		RIGHT-OF-WAY COORDINATION AND MAPPING	LS	1	$ 15,000	$ 15,000
		SURVEY	LS	1	$ 25,000	$ 25,000
		GEOTECHNICAL EVALUATION AND DESIGN	LS	1	$ 80,000	$ 80,000
		DESIGN: CIVIL	LS	1	$ 120,000	$ 120,000
		DESIGN: BRIDGE	LS	1	$ 175,000	$ 175,000
		DESIGN: ROADSIDE DEVELOPMENT	LS	1	$ 150,000	$ 150,000
		DESIGN: TRAFFIC	LS	1	$ 80,000	$ 80,000
		PERMITTING: CULTURAL RESOURCES	LS	1	$ 30,000	$ 30,000
		PERMITTING: NEPA	LS	1	$ 30,000	$ 30,000
		PERMITTING: WATER QUALITY PROTECTION	LS	1	$ 15,000	$ 15,000
		PERMITTING: LOCAL	LS	1	$ 5,000	$ 5,000
		PUBLIC OUTREACH	LS	1	$ 25,000	$ 25,000
2	**Temporary Features and Appurtenances**					**$ 974,000**
	0210-0100000A	MOBILIZATION	LS	1	$ 680,000	$ 680,000
	0221-0101000A	TEMPORARY WORK ZONE TRAFFIC CONTROL, COMPLETE	LS	1	$ 124,000	$ 124,000
	0280-0100000A	EROSION CONTROL	LS	1	$ 135,000	$ 135,000
	0231-0100000A	CONSTRUCT AND REMOVE TEMPORARY ACCESS ROAD	LS	1	$ 5,000	$ 5,000
	0240-0100000A	TEMPORARY DRAINAGE FACILITIES	LS	1	$ 30,000	$ 30,000
3	**Roadwork**					**$ 404,600**
	0305-0100000A	CONSTRUCTION SURVEY WORK	LS	1	$ 25,000	$ 25,000
	0320-0100000R	CLEARING AND GRUBBING	ACRE	0.5	$ 62,500	$ 31,250
	0330-0102000K	FOUNDATION EXCAVATION	CUYD	180	$ 20	$ 3,600
	0330-0123000K	EMBANKMENT IN PLACE	CUYD	9,850	$ 35	$ 344,750
	0330-0126000K	STONE EMBANKMENT	CUYD	0	$ 65	$ -
4	**Drainage and Sewers**					**$ 108,000**
	0445-010048AF	48 INCH CULVERT PIPE, 5 FT DEPTH	FOOT	360	$ 300	$ 108,000
5	**Bridges**					**$ 2,794,800**
	0510-0108000K	GRANULAR STRUCTURE BACKFILL	CUYD	5,640	$ 120	$ 676,800
	0543-0100000J	ARCHITECTURAL TREATMENT	SQYD	1,140	$ 120	$ 136,800
	0595-0100410F	PRECAST REINFORCED CONCRETE THREE SIDED STRUCTURES	FOOT	300	$ 2,500	$ 750,000
	0596-A002000A	RETAINING WALL, MSE	SQFT	10,260	$ 120	$ 1,231,200
8	**Permanent Traffic Safety and Guidance Devices**					**$ 1,000**
	0842-0401000E	BRIDGE IDENTIFICATION MARKERS	EACH	4	$ 250	$ 1,000
10	**Right-of-Way Development and Control**					**$ 2,480,500**
	1030-0101000R	WEED CONTROL	ACRE	0.9	$ 2,000	$ 1,800
	1030-0102000E	SEEDING MOBILIZATION	EACH	1	$ 800	$ 800
	1030-0128000R	NATIVE PLANT SEEDING	ACRE	0.9	$ 5,000	$ 4,500
	1030-0140000R	MULCHING	ACRE	0.9	$ 2,500	$ 2,250
	1040-0101000K	TOPSOIL	CUYD	4,470	$ 120	$ 536,400
	1999-9Z90000R	NATIVE PLANT (#2 CONTAINER) INSTALLATION	ACRE	0.9	$ 160,000	$ 144,000
	1040-0202000E	WOODY COARSE DEBRIS	EACH	20	$ 400	$ 8,000
	1040-SP	BOULDERS/ROCK PILES	EACH	5	$ 150	$ 750
	1050-SP	WILDLIFE FENCE (INCL. JUMPOUTS AND GATES)	MILE	2.7	$ 660,000	$ 1,782,000
11	**Water Supply Systems**					**$ 80,000**
	1120-0100000A	IRRIGATION SYSTEM	LS	1	$ 80,000	$ 80,000
					Construction Subtotal =	**$ 6,842,900**
					Design and Permitting Subtotal =	**$ 750,000**
					Total Opinion of Probable Project Cost =	**$ 7,592,900**
					Low Estimate -15% (rounded up to the nearest $10,000) =	$ 6,460,000
					High Estimate +50% (rounded up to the nearest $10,000) =	$ 11,390,000

Opinion of Probable Costs

PROJECT: *Southern Oregon Wildlife Crossings Project*
SITE: *Wall Creek*
TITLE: *Probable Cost Opinion for Conceptual Design*
DATE: *11/06/22*
CLIENT: *Southern Oregon Wildlife Crossings Coalition*
DESCRIPTION: *Class 4 Cost Estimate (American Association of Cost Engineers)*
Based on Conceptual Designs dated 11/07/22

Division	Item	Description	Unit	Quantity	Unit Cost	Cost
1	**Design and Permitting**					**$ 800,000**
		RIGHT-OF-WAY COORDINATION AND MAPPING (INCL. RR MAP)	LS	1	$ 50,000	$ 50,000
		SURVEY (INCL. RAILROAD)	LS	1	$ 25,000	$ 25,000
		GEOTECHNICAL EVALUATION AND DESIGN	LS	1	$ 80,000	$ 80,000
		DESIGN: CIVIL	LS	1	$ 120,000	$ 120,000
		DESIGN: BRIDGE	LS	1	$ 175,000	$ 175,000
		DESIGN: ROADSIDE DEVELOPMENT	LS	1	$ 150,000	$ 150,000
		DESIGN: TRAFFIC	LS	1	$ 80,000	$ 80,000
		PERMITTING: CULTURAL RESOURCES	LS	1	$ 30,000	$ 30,000
		PERMITTING: NEPA	LS	1	$ 30,000	$ 30,000
		PERMITTING: WATER QUALITY PROTECTION	LS	1	$ 15,000	$ 15,000
		PERMITTING: LOCAL (INCL. RAILROAD)	LS	1	$ 20,000	$ 20,000
		PUBLIC OUTREACH	LS	1	$ 25,000	$ 25,000
2	**Temporary Features and Appurtenances**					**$ 1,024,000**
	0210-0100000A	MOBILIZATION	LS	1	$ 720,000	$ 720,000
	0221-0101000A	TEMPORARY WORK ZONE TRAFFIC CONTROL, COMPLETE	LS	1	$ 124,000	$ 124,000
	0280-0100000A	EROSION CONTROL	LS	1	$ 145,000	$ 145,000
	0231-0100000A	CONSTRUCT AND REMOVE TEMPORARY ACCESS ROAD	LS	1	$ 5,000	$ 5,000
	0240-0100000A	TEMPORARY DRAINAGE FACILITIES	LS	1	$ 30,000	$ 30,000
3	**Roadwork**					**$ 345,150**
	0305-0100000A	CONSTRUCTION SURVEY WORK	LS	1	$ 25,000	$ 25,000
	0320-0100000R	CLEARING AND GRUBBING	ACRE	0.4	$ 62,500	$ 25,000
	0330-0102000K	FOUNDATION EXCAVATION	CUYD	180	$ 20	$ 3,600
	0330-0123000K	EMBANKMENT IN PLACE	CUYD	8,330	$ 35	$ 291,550
4	**Drainage and Sewers**					**$ 48,000**
	0445-010048AF	48 INCH CULVERT PIPE, 5 FT DEPTH	FOOT	160	$ 300	$ 48,000
5	**Bridges**					**$ 2,906,400**
	0510-0108000K	GRANULAR STRUCTURE BACKFILL	CUYD	7,150	$ 120	$ 858,000
	0543-0100000J	ARCHITECTURAL TREATMENT	SQYD	1,080	$ 120	$ 129,600
	0595-0100410F	PRECAST REINFORCED CONCRETE THREE SIDED STRUCTURES	FOOT	300	$ 2,500	$ 750,000
	0596-A002000A	RETAINING WALL, MSE	SQFT	9,740	$ 120	$ 1,168,800
8	**Permanent Traffic Safety and Guidance Devices**					**$ 1,000**
	0842-0401000E	BRIDGE IDENTIFICATION MARKERS	EACH	4	$ 250	$ 1,000
10	**Right-of-Way Development and Control**					**$ 2,850,100**
	1030-0101000R	WEED CONTROL	ACRE	0.9	$ 2,000	$ 1,800
	1030-0102000E	SEEDING MOBILIZATION	EACH	1	$ 800	$ 800
	1030-0128000R	NATIVE PLANT SEEDING	ACRE	0.9	$ 5,000	$ 4,500
	1030-0140000R	MULCHING	ACRE	0.9	$ 2,500	$ 2,250
	1040-0101000K	TOPSOIL	CUYD	4,800	$ 120	$ 576,000
	1999-9Z90000R	NATIVE PLANT (#2 CONTAINER) INSTALLATION	ACRE	0.9	$ 160,000	$ 144,000
	1040-0202000E	WOODY COARSE DEBRIS	EACH	20	$ 400	$ 8,000
	1040-SP	BOULDERS/ROCK PILES	EACH	5	$ 150	$ 750
	1050-SP	WILDLIFE FENCE (INCL. JUMPOUTS AND GATES)	MILE	3.2	$ 660,000	$ 2,112,000
11	**Water Supply Systems**					**$ 80,000**
	1120-0100000A	IRRIGATION SYSTEM	LS	1	$ 80,000	$ 80,000
					Construction Subtotal =	**$ 7,254,650**
					Design and Permitting Subtotal =	**$ 800,000**
					Total Opinion of Probable Project Cost =	**$ 8,054,650**
					Low Estimate -15% (rounded up to the nearest $10,000) =	$ 6,850,000
					High Estimate +50% (rounded up to the nearest $10,000) =	$ 12,090,000

Opinion of Probable Costs

PROJECT: *Southern Oregon Wildlife Crossings Project*
SITE: *Mt Ashland Exit*
TITLE: *Probable Cost Opinion for Conceptual Design*
DATE: *11/06/22*
CLIENT: *Southern Oregon Wildlife Crossings Coalition*
DESCRIPTION: *Class 4 Cost Estimate (American Association of Cost Engineers)*
Based on Conceptual Designs dated 11/07/22

Division	Item	Description	Unit	Quantity	Unit Cost	Cost
1	**Design and Permitting**					**$ 45,000**
		RIGHT-OF-WAY COORDINATION AND MAPPING	LS	1	$ 500	$ 500
		SURVEY	LS	1	$ 1,500	$ 1,500
		GEOTECHNICAL EVALUATION AND DESIGN	LS	1	$ 25,000	$ 25,000
		DESIGN: CIVIL	LS	1	$ 5,000	$ 5,000
		DESIGN: BRIDGE	LS	1	$ 2,500	$ 2,500
		DESIGN: ROADSIDE DEVELOPMENT	LS	1	$ 5,000	$ 5,000
		DESIGN: TRAFFIC	LS	1	$ 1,000	$ 1,000
		PERMITTING: CULTURAL RESOURCES	LS	1	$ 1,500	$ 1,500
		PERMITTING: NEPA	LS	1	$ 1,500	$ 1,500
		PERMITTING: WATER QUALITY PROTECTION	LS	1	$ 500	$ 500
		PERMITTING: LOCAL	LS	1	$ 500	$ 500
		PUBLIC OUTREACH	LS	1	$ 500	$ 500
2	**Temporary Features and Appurtenances**					**$ 9,000**
	0210-0100000A	MOBILIZATION	LS	1	$ 5,000	$ 5,000
	0221-0101000A	TEMPORARY WORK ZONE TRAFFIC CONTROL, COMPLETE	LS	1	$ 3,000	$ 3,000
	0280-0100000A	EROSION CONTROL	LS	1	$ 1,000	$ 1,000
3	**Roadwork**					**$ 5,900**
	0305-0100000A	CONSTRUCTION SURVEY WORK	LS	1	$ 1,000	$ 1,000
	0330-0105000K	GENERAL EXCAVATION	CUYD	120	$ 30	$ 3,600
	0330-0126000K	STONE EMBANKMENT	CUYD	20	$ 65	$ 1,300
9	**Permanent Traffic Control and Illumination Systems**					**$ 800**
	0940-0202000J	SIGNS, STANDARD SHEETING, SHEET ALUMINUM	SQFT	16	$ 50	$ 800
10	**Right-of-Way Development and Control**					**$ 27,550**
	1030-0101000R	WEED CONTROL	ACRE	0.1	$ 2,000	$ 200
	1030-0102000E	SEEDING MOBILIZATION	EACH	1	$ 800	$ 800
	1030-0128000R	NATIVE PLANT SEEDING	ACRE	0.1	$ 5,000	$ 500
	1030-0140000R	MULCHING	ACRE	0.1	$ 2,500	$ 250
	1999-9Z90000R	NATIVE PLANT (#2 CONTAINER) INSTALLATION	ACRE	0.1	$ 160,000	$ 16,000
	1040-0202000E	WOODY COARSE DEBRIS	EACH	20	$ 400	$ 8,000
	1040-SP	BOULDERS/ROCK PILES	EACH	12	$ 150	$ 1,800
					Construction Subtotal =	**$ 43,250**
					Design and Permitting Subtotal =	**$ 45,000**
					Total Opinion of Probable Project Cost =	**$ 88,250**
					Low Estimate -15% (rounded up to the nearest $10,000) =	$ 80,000
					High Estimate +50% (rounded up to the nearest $10,000) =	$ 140,000

Opinion of Probable Costs

PROJECT: *Southern Oregon Wildlife Crossings Project*
SITE: *Siskiyou Summit*
TITLE: *Probable Cost Opinion for Conceptual Design*
DATE: *11/06/22*
CLIENT: *Southern Oregon Wildlife Crossings Coalition*
DESCRIPTION: *Class 4 Cost Estimate (American Association of Cost Engineers)*
Based on Conceptual Designs dated 11/07/22

Division	Item	Description	Unit	Quantity	Unit Cost	Cost
1	**Design and Permitting**					**$ 27,000**
		RIGHT-OF-WAY COORDINATION AND MAPPING	LS	1	$ 1,500	$ 1,500
		DESIGN: CIVIL	LS	1	$ 10,000	$ 10,000
		DESIGN: ROADSIDE DEVELOPMENT	LS	1	$ 10,000	$ 10,000
		DESIGN: TRAFFIC	LS	1	$ 1,000	$ 1,000
		PERMITTING: CULTURAL RESOURCES	LS	1	$ 1,500	$ 1,500
		PERMITTING: NEPA	LS	1	$ 500	$ 500
		PERMITTING: WATER QUALITY PROTECTION	LS	1	$ 500	$ 500
		PERMITTING: LOCAL	LS	1	$ 500	$ 500
		PUBLIC OUTREACH	LS	1	$ 1,500	$ 1,500
2	**Temporary Features and Appurtenances**					**$ 27,000**
	0210-0100000A	MOBILIZATION	LS	1	$ 22,000	$ 22,000
	0280-0100000A	EROSION CONTROL	LS	1	$ 5,000	$ 5,000
4	**Drainage and Sewers**					**$ 126,000**
	0410-0100000F	REHABILITATE, 48 INCH X 48 INCH PIPE	FOOT	420	$ 300	$ 126,000
9	**Permanent Traffic Control and Illumination Systems**					**$ 800**
	0940-0202000J	SIGNS, STANDARD SHEETING, SHEET ALUMINUM	SQFT	16	$ 50	$ 800
10	**Right-of-Way Development and Control**					**$ 58,400**
	1030-0101000R	WEED CONTROL	ACRE	0.3	$ 2,000	$ 600
	1030-0102000E	SEEDING MOBILIZATION	EACH	1.0	$ 800	$ 800
	1030-0128000R	NATIVE PLANT SEEDING	ACRE	0.3	$ 5,000	$ 1,500
	1030-0140000R	MULCHING	ACRE	0.3	$ 2,500	$ 750
	1999-9Z90000R	NATIVE PLANT (#2 CONTAINER) INSTALLATION	ACRE	0.3	$ 160,000	$ 48,000
	1040-0202000E	WOODY COARSE DEBRIS	EACH	15	$ 400	$ 6,000
	1040-SP	BOULDERS/ROCK PILES	EACH	5	$ 150	$ 750
					Construction Subtotal =	**$ 212,200**
					Design and Permitting Subtotal =	**$ 27,000**
					Total Opinion of Probable Project Cost =	**$ 239,200**
					Low Estimate -15% (rounded up to the nearest $10,000) =	$ 210,000
					High Estimate +50% (rounded up to the nearest $10,000) =	$ 360,000

Opinion of Probable Costs

PROJECT: *Southern Oregon Wildlife Crossings Project*
SITE: *Bear Gulch*
TITLE: *Probable Cost Opinion for Conceptual Design*
DATE: *11/06/22*
CLIENT: *Southern Oregon Wildlife Crossings Coalition*
DESCRIPTION: *Class 4 Cost Estimate (American Association of Cost Engineers)*
Based on Conceptual Designs dated 11/07/22

Division	Item	Description	Unit	Quantity		Unit Cost		Cost
1	**Design and Permitting**						**$**	**750,000**
		RIGHT-OF-WAY COORDINATION AND MAPPING	LS	1	$	15,000	$	15,000
		SURVEY	LS	1	$	25,000	$	25,000
		GEOTECHNICAL EVALUATION AND DESIGN	LS	1	$	80,000	$	80,000
		DESIGN: CIVIL	LS	1	$	120,000	$	120,000
		DESIGN: BRIDGE	LS	1	$	175,000	$	175,000
		DESIGN: ROADSIDE DEVELOPMENT	LS	1	$	150,000	$	150,000
		DESIGN: TRAFFIC	LS	1	$	80,000	$	80,000
		PERMITTING: CULTURAL RESOURCES	LS	1	$	30,000	$	30,000
		PERMITTING: NEPA	LS	1	$	30,000	$	30,000
		PERMITTING: WATER QUALITY PROTECTION	LS	1	$	15,000	$	15,000
		PERMITTING: LOCAL	LS	1	$	5,000	$	5,000
		PUBLIC OUTREACH	LS	1	$	25,000	$	25,000
2	**Temporary Features and Appurtenances**						**$**	**1,779,000**
	0210-0100000A	MOBILIZATION	LS	1	$	1,350,000	$	1,350,000
	0221-0101000A	TEMPORARY WORK ZONE TRAFFIC CONTROL, COMPLETE	LS	1	$	124,000	$	124,000
	0280-0100000A	EROSION CONTROL	LS	1	$	270,000	$	270,000
	0231-0100000A	CONSTRUCT AND REMOVE TEMPORARY ACCESS ROAD	LS	1	$	5,000	$	5,000
	0240-0100000A	TEMPORARY DRAINAGE FACILITIES	LS	1	$	30,000	$	30,000
3	**Roadwork**						**$**	**1,678,850**
	0305-0100000A	CONSTRUCTION SURVEY WORK	LS	1	$	25,000	$	25,000
	0320-0100000R	CLEARING AND GRUBBING	ACRE	1.4	$	62,500	$	87,500
	0330-0102000K	FOUNDATION EXCAVATION	CUYD	180	$	20	$	3,600
	0330-0123000K	EMBANKMENT IN PLACE	CUYD	44,650	$	35	$	1,562,750
4	**Drainage and Sewers**						**$**	**402,000**
	0410-0100000F	REHABILITATE, 84 INCH X 84 INCH PIPE	FOOT	700	$	300	$	210,000
	0445-010048AF	48 INCH CULVERT PIPE, 5 FT DEPTH	FOOT	640	$	300	$	192,000
5	**Bridges**						**$**	**5,515,200**
	0510-0108000K	GRANULAR STRUCTURE BACKFILL	CUYD	7,550	$	120	$	906,000
	0543-0100000J	ARCHITECTURAL TREATMENT	SQYD	3,220	$	120	$	386,400
	0595-0100410F	PRECAST REINFORCED CONCRETE THREE SIDED STRUCTURES	FOOT	300	$	2,500	$	750,000
	0596-A002000A	RETAINING WALL, MSE	SQFT	28,940	$	120	$	3,472,800
8	**Permanent Traffic Safety and Guidance Devices**						**$**	**1,000**
	0842-0401000E	BRIDGE IDENTIFICATION MARKERS	EACH	4	$	250	$	1,000
10	**Right-of-Way Development and Control**						**$**	**4,047,000**
	1030-0101000R	WEED CONTROL	ACRE	1.8	$	2,000	$	3,600
	1030-0102000E	SEEDING MOBILIZATION	EACH	1	$	800	$	800
	1030-0128000R	NATIVE PLANT SEEDING	ACRE	1.8	$	5,000	$	9,000
	1030-0140000R	MULCHING	ACRE	1.8	$	2,500	$	4,500
	1040-0101000K	TOPSOIL	CUYD	9,580	$	120	$	1,149,600
	1999-9Z90000R	NATIVE PLANT (#2 CONTAINER) INSTALLATION	ACRE	1.8	$	160,000	$	288,000
	1040-0202000E	WOODY COARSE DEBRIS	EACH	40	$	400	$	16,000
	1040-SP	BOULDERS/ROCK PILES	EACH	10	$	150	$	1,500
	1050-SP	WILDLIFE FENCE (INCL. JUMPOUTS AND GATES)	MILE	3.9	$	660,000	$	2,574,000
11	**Water Supply Systems**						**$**	**120,000**
	1120-0100000A	IRRIGATION SYSTEM	LS	1	$	120,000	$	120,000
						Construction Subtotal =	**$**	**13,543,050**
						Design and Permitting Subtotal =	**$**	**750,000**
						Total Opinion of Probable Project Cost =	**$**	**14,293,050**
						Low Estimate -15% (rounded up to the nearest $10,000) =	$	12,150,000
						High Estimate +50% (rounded up to the nearest $10,000) =	$	21,440,000

Opinion of Probable Costs

PROJECT: *Southern Oregon Wildlife Crossings Project*
SITE: *Mariposa Preserve*
TITLE: *Probable Cost Opinion for Conceptual Design*
DATE: *11/06/22*
CLIENT: *Southern Oregon Wildlife Crossings Coalition*
DESCRIPTION: *Class 4 Cost Estimate (American Association of Cost Engineers)*
Based on Conceptual Designs dated 11/07/22

Division	Item	Description	Unit	Quantity	Unit Cost	Cost
1	**Design and Permitting**					**$ 750,000**
		RIGHT-OF-WAY COORDINATION AND MAPPING	LS	1	$ 15,000	$ 15,000
		SURVEY	LS	1	$ 25,000	$ 25,000
		GEOTECHNICAL EVALUATION AND DESIGN	LS	1	$ 80,000	$ 80,000
		DESIGN: CIVIL	LS	1	$ 120,000	$ 120,000
		DESIGN: BRIDGE	LS	1	$ 175,000	$ 175,000
		DESIGN: ROADSIDE DEVELOPMENT	LS	1	$ 150,000	$ 150,000
		DESIGN: TRAFFIC	LS	1	$ 80,000	$ 80,000
		PERMITTING: CULTURAL RESOURCES	LS	1	$ 30,000	$ 30,000
		PERMITTING: NEPA	LS	1	$ 30,000	$ 30,000
		PERMITTING: WATER QUALITY PROTECTION	LS	1	$ 15,000	$ 15,000
		PERMITTING: LOCAL	LS	1	$ 5,000	$ 5,000
		PUBLIC OUTREACH	LS	1	$ 25,000	$ 25,000
2	**Temporary Features and Appurtenances**					**$ 1,369,000**
	0210-0100000A	MOBILIZATION	LS	1	$ 1,000,000	$ 1,000,000
	0221-0101000A	TEMPORARY WORK ZONE TRAFFIC CONTROL, COMPLETE	LS	1	$ 124,000	$ 124,000
	0280-0100000A	EROSION CONTROL	LS	1	$ 210,000	$ 210,000
	0231-0100000A	CONSTRUCT AND REMOVE TEMPORARY ACCESS ROAD	LS	1	$ 5,000	$ 5,000
	0240-0100000A	TEMPORARY DRAINAGE FACILITIES	LS	1	$ 30,000	$ 30,000
3	**Roadwork**					**$ 1,417,550**
	0305-0100000A	CONSTRUCTION SURVEY WORK	LS	1	$ 25,000	$ 25,000
	0320-0100000R	CLEARING AND GRUBBING	ACRE	1	$ 62,500	$ 68,750
	0330-0102000K	FOUNDATION EXCAVATION	CUYD	180	$ 20	$ 3,600
	0330-0123000K	EMBANKMENT IN PLACE	CUYD	37,720	$ 35	$ 1,320,200
4	**Drainage and Sewers**					**$ 150,000**
	0445-010048AF	48 INCH CULVERT PIPE, 5 FT DEPTH	FOOT	500	$ 300	$ 150,000
5	**Bridges**					**$ 4,668,000**
	0510-0108000K	GRANULAR STRUCTURE BACKFILL	CUYD	5,810	$ 120	$ 697,200
	0543-0100000J	ARCHITECTURAL TREATMENT	SQYD	2,680	$ 120	$ 321,600
	0595-0100410F	PRECAST REINFORCED CONCRETE THREE SIDED STRUCTURES	FOOT	300	$ 2,500	$ 750,000
	0596-A002000A	RETAINING WALL, MSE	SQFT	24,160	$ 120	$ 2,899,200
8	**Permanent Traffic Safety and Guidance Devices**					**$ 1,000**
	0842-0401000E	BRIDGE IDENTIFICATION MARKERS	EACH	4	$ 250	$ 1,000
10	**Right-of-Way Development and Control**					**$ 2,783,450**
	1030-0101000R	WEED CONTROL	ACRE	1.5	$ 2,000	$ 3,000
	1030-0102000E	SEEDING MOBILIZATION	EACH	1	$ 800	$ 800
	1030-0128000R	NATIVE PLANT SEEDING	ACRE	1.5	$ 5,000	$ 7,500
	1030-0140000R	MULCHING	ACRE	1.5	$ 2,500	$ 3,750
	1040-0101000K	TOPSOIL	CUYD	7,760	$ 120	$ 931,200
	1999-9Z90000R	NATIVE PLANT (#2 CONTAINER) INSTALLATION	ACRE	1.5	$ 160,000	$ 240,000
	1040-0202000E	WOODY COARSE DEBRIS	EACH	30	$ 400	$ 12,000
	1040-SP	BOULDERS/ROCK PILES	EACH	8	$ 150	$ 1,200
	1050-SP	WILDLIFE FENCE (INCL. JUMPOUTS AND GATES)	MILE	2.4	$ 660,000	$ 1,584,000
11	**Water Supply Systems**					**$ 100,000**
	1120-0100000A	IRRIGATION SYSTEM	LS	1	$ 100,000	$ 100,000
					Construction Subtotal =	**$ 10,489,000**
					Design and Permitting Subtotal =	**$ 750,000**
					Total Opinion of Probable Project Cost =	**$ 11,239,000**
					Low Estimate -15% (rounded up to the nearest $10,000) =	$ 9,560,000
					High Estimate +50% (rounded up to the nearest $10,000) =	$ 16,860,000

Opinion of Probable Costs

PROJECT: *Southern Oregon Wildlife Crossings Project*
SITE: *South Overcrossing*
TITLE: *Probable Cost Opinion for Conceptual Design*
DATE: *11/06/22*
CLIENT: *Southern Oregon Wildlife Crossings Coalition*
DESCRIPTION: *Class 4 Cost Estimate (American Association of Cost Engineers)*
Based on Conceptual Designs dated 11/07/22

Division	Item	Description	Unit	Quantity	Unit Cost	Cost
1	**Design and Permitting**					**$ 810,000**
		RIGHT-OF-WAY COORDINATION AND MAPPING (INCL. CALTRANS COORDINATION)	LS	1	$ 75,000	$ 75,000
		SURVEY	LS	1	$ 25,000	$ 25,000
		GEOTECHNICAL EVALUATION AND DESIGN	LS	1	$ 80,000	$ 80,000
		DESIGN: CIVIL	LS	1	$ 120,000	$ 120,000
		DESIGN: BRIDGE	LS	1	$ 175,000	$ 175,000
		DESIGN: ROADSIDE DEVELOPMENT	LS	1	$ 150,000	$ 150,000
		DESIGN: TRAFFIC	LS	1	$ 80,000	$ 80,000
		PERMITTING: CULTURAL RESOURCES	LS	1	$ 30,000	$ 30,000
		PERMITTING: NEPA	LS	1	$ 30,000	$ 30,000
		PERMITTING: WATER QUALITY PROTECTION	LS	1	$ 15,000	$ 15,000
		PERMITTING: LOCAL	LS	1	$ 5,000	$ 5,000
		PUBLIC OUTREACH	LS	1	$ 25,000	$ 25,000
2	**Temporary Features and Appurtenances**					**$ 1,094,000**
	0210-0100000A	MOBILIZATION	LS	1	$ 780,000	$ 780,000
	0221-0101000A	TEMPORARY WORK ZONE TRAFFIC CONTROL, COMPLETE	LS	1	$ 124,000	$ 124,000
	0280-0100000A	EROSION CONTROL	LS	1	$ 155,000	$ 155,000
	0231-0100000A	CONSTRUCT AND REMOVE TEMPORARY ACCESS ROAD	LS	1	$ 5,000	$ 5,000
	0240-0100000A	TEMPORARY DRAINAGE FACILITIES	LS	1	$ 30,000	$ 30,000
3	**Roadwork**					**$ 838,700**
	0305-0100000A	CONSTRUCTION SURVEY WORK	LS	1	$ 25,000	$ 25,000
	0320-0100000R	CLEARING AND GRUBBING	ACRE	1.0	$ 62,500	$ 62,500
	0330-0102000K	FOUNDATION EXCAVATION	CUYD	180	$ 20	$ 3,600
	0330-0123000K	EMBANKMENT IN PLACE	CUYD	21,360	$ 35	$ 747,600
4	**Drainage and Sewers**					**$ 150,000**
	0445-010048AF	48 INCH CULVERT PIPE, 5 FT DEPTH	FOOT	500	$ 300	$ 150,000
5	**Bridges**					**$ 3,391,200**
	0510-0108000K	GRANULAR STRUCTURE BACKFILL	CUYD	3,290	$ 120	$ 394,800
	0543-0100000J	ARCHITECTURAL TREATMENT	SQYD	1,880	$ 120	$ 225,600
	0595-0100410F	PRECAST REINFORCED CONCRETE THREE SIDED STRUCTURES	FOOT	300	$ 2,500	$ 750,000
	0596-A002000A	RETAINING WALL, MSE	SQFT	16,840	$ 120	$ 2,020,800
8	**Permanent Traffic Safety and Guidance Devices**					**$ 1,000**
	0842-0401000E	BRIDGE IDENTIFICATION MARKERS	EACH	4	$ 250	$ 1,000
10	**Right-of-Way Development and Control**					**$ 2,247,250**
	1030-0101000R	WEED CONTROL	ACRE	1.4	$ 2,000	$ 2,800
	1030-0102000E	SEEDING MOBILIZATION	EACH	1	$ 800	$ 800
	1030-0128000R	NATIVE PLANT SEEDING	ACRE	1.4	$ 5,000	$ 7,000
	1030-0140000R	MULCHING	ACRE	1.4	$ 2,500	$ 3,500
	1040-0101000K	TOPSOIL	CUYD	6,220	$ 120	$ 746,400
	1999-9Z90000R	NATIVE PLANT (#2 CONTAINER) INSTALLATION	ACRE	1.4	$ 160,000	$ 224,000
	1040-0202000E	WOODY COARSE DEBRIS	EACH	20	$ 400	$ 8,000
	1040-SP	BOULDERS/ROCK PILES	EACH	5	$ 150	$ 750
	1050-SP	WILDLIFE FENCE (INCL. JUMPOUTS AND GATES)	MILE	1.9	$ 660,000	$ 1,254,000
11	**Water Supply Systems**					**$ 100,000**
	1120-0100000A	IRRIGATION SYSTEM	LS	1	$ 100,000	$ 100,000
					Construction Subtotal =	**$ 7,822,150**
					Design and Permitting Subtotal =	**$ 810,000**
					Total Opinion of Probable Project Cost =	**$ 8,632,150**
					Low Estimate -15% (rounded up to the nearest $10,000) =	$ 7,340,000
					High Estimate +50% (rounded up to the nearest $10,000) =	$ 12,950,000