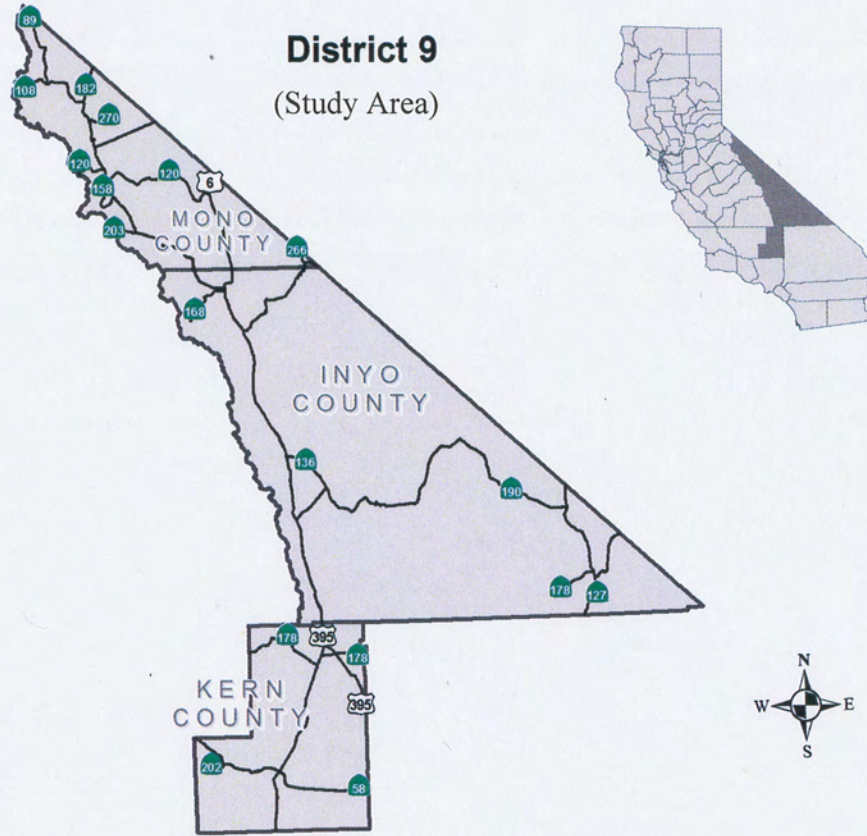


FEASIBILITY STUDY REPORT
for
Wildlife Vehicle Collision Reduction in Caltrans District 9.



W11-3
Deer

THIS DOCUMENT CANNOT BE USED FOR PROGRAMMING PURPOSES. A PROJECT STUDY REPORT OR EQUIVALENT SCOPING DOCUMENT WILL NEED TO BE WRITTEN TO SERVE AS THE PROGRAMMING AND SCOPING DOCUMENT.



APPROVAL RECOMMENDED:

DENNEE ALCALA, PROJECT MANAGER

APPROVED:

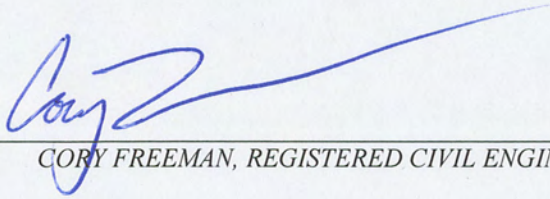
FOR

BRENT L. GREEN, DISTRICT 9 DIRECTOR

10/21/2016

DATE

This Feasibility Study Report has been prepared under the direction of the following Registered Engineer. The registered civil engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.



CORY FREEMAN, REGISTERED CIVIL ENGINEER

10-21-16

DATE

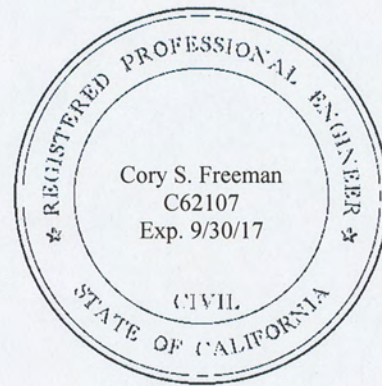


Table of Contents

Contents

1. Executive Summary.....	1
2. Purpose and Need Statement.....	2
3. Introduction.....	3
3A. Discussion of Data Sets.....	3
3B. Study Area.....	4
3C. Focus area.....	9
4. Background.....	9
5. Deficiencies.....	17
6. Corridor and System Coordination.....	20
7. Concepts.....	21
7A. Concept 1.....	23
7B. Concept 2.....	30
7C. Concept 3.....	32
7D. Concept 4.....	34
7E. Concept 5.....	36
7F. Concept 6.....	38
7G. Concepts Considered But Not Recommended.....	40
8. Public and Agency Involvement.....	41
9. Environmental Determination / Document.....	42
10. Funding.....	42
11. District Contacts.....	43
12. List of Attachments.....	43
13. References.....	43

1. EXECUTIVE SUMMARY

Caltrans Mission is to provide a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability. Transportation allows for the movement of people and goods through various modes of travel, however many of these modes impact the natural environment. True to its mission and as stewards of the California State Highway System, Caltrans has a responsibility to seek a balance for the needs of travelers, safety, and the environment.

During the spring and fall deer migration season, travelers note an increase in wildlife vehicle collisions (WVCs) along California's Highways. Though the increase in WVCs may be evident from an empirical perspective, Caltrans District 9 has never undertaken an engineering and science based approach using modern technology and analysis on this issue. Therefore, it was determined that such a report would help identify if there is a higher than statewide average of WVCs in Caltrans District 9, location hotspots, and what type of mitigation treatments could potentially mitigate WVCs. By identifying these locations, Caltrans, in partnership with other agencies and organizations can investigate best practices for potential mitigation efforts to reduce WVCs.

It is hoped that this study will form the basis for future discussion, collaboration among many organizations, and possible funding opportunities to help reduce WVCs.

2. PURPOSE AND NEED STATEMENT

Need:

Even if a motorist is successful at avoiding wildlife in the roadway, a collision may result from their efforts at avoiding it. Numerous collisions have been documented where a vehicle successfully avoided wildlife in the roadway but in their efforts to avoid it lost control of their vehicle and left the highway resulting in a collision or damage to their vehicle. Collisions have also been documented where a vehicle has been in a WVC, pulled to the side of the road and was struck by a passing vehicle.

According to State Farm Insurance the national cost per claim of a DVC averages \$4,100. Most of the cost is covered by insurance if the motorist has coverage for both comprehensive and collision for the vehicle. If the motorist does not have comprehensive coverage, the motorist will be responsible for paying all costs to repair the damaged vehicle. Most people carry both comprehensive and collision on newer vehicles, but not necessarily on older ones. Some research suggest a societal cost of \$8,000 per DVC including vehicle damage, insurance claims, medical bills, removal of deceased deer, and recreational value of deer.

Many times WVCs result in deceased deer on or adjacent to the roadway visible to passing motorists detracting from the Scenic Highway designation for this portion of US 395. Public complaints to Caltrans have resulted from visible deceased deer.

Purpose:

The purpose of this Feasibility Study Report (FSR) is to evaluate the frequency of wildlife vehicle collisions (WVCs) in Caltrans District 9, to identify localized areas with the highest concentration of collisions, and to evaluate concepts that would reduce WVCs where concentrations are found.

3. INTRODUCTION



Figure 1: 1980s CDFG/Mono Co. flyer/handout. Locations shown are still relevant today.

Conflicts Between Wildlife and the Highway

The reasons for WVCs are complex and many. Individual species migratory patterns, areas of use relative to highways, time of day/night, highway geometry and side slope steepness, sight distance, habitat, traffic density, vehicle speeds, population size, the number of use days, and driver awareness with respect to local wildlife patterns are just a few variables, which contribute to WVCs. Deer are most active at dusk and dawn which compounds the issue for the traveling public. Deer blend in well with the surrounding environment which makes them difficult to see in the day time. Early morning/evening ambient lighting conditions make it even more difficult to see them, increasing the potential for deer vehicle conflicts. Most recorded DVCs occur at this time. It's common for deer to travel together in groups of up to 12, increasing the chances of hitting more than one. Often times a single deer will cross the road and then is followed several seconds later by several more.

Deceased wildlife alongside the road often attract scavengers resulting in additional WVCs and wildlife mortality.

Topography contributes to WVCs. Canyons and mountainous terrain with steep side slopes adjacent to the roadway are areas with increased odds of conflicts with wildlife. Deer and wildlife in general tend to follow the path of least resistance to conserve energy. They will often follow drainages or ridgelines down from higher terrain to areas of lower terrain for foraging or cover. Where these intersect the highway, DVCs are common. Wildlife, deer in particular, can suddenly appear alongside the road giving both the motorist and deer limited or no time to react.

3A. Discussion of Data Sets

Two data sets are used in this report. One is based on eleven years of California Highway Patrol (CHP) collision data from 2003-2013, the other represents 14 years of deceased wildlife/deer removed from along the State highway from 2002-2015 as reported by Caltrans Maintenance forces. More records were generated by Caltrans Maintenance than by the CHP, therefore, the graphs and statistics included in this report are based on the deceased wildlife mortality data collected by Caltrans Maintenance unless stated otherwise.

There can be as many as 30% or more unreported collisions with wildlife, deer in particular, that go unreported; some documentation suggest as high as double. There are several reasons for unreported WVCs. CHP collision data is based on officially reported traffic collision reports taken by CHP officers. Generally a report is only filed when there is significant damage to the vehicle, fatalities, or injuries sustained due to the collision. In some collisions wildlife are thrown to the side of the roadside and hidden by vegetation and go unnoticed. Other times the animal is injured and wanders off beyond the roadside environment unseen, where it succumbs to its injuries. In other cases deceased wildlife may be removed but are unreported to dispatch. Fortunately there have not been any documented fatalities attributed to collisions with wildlife within the study area. Deceased wildlife are generally removed from the roadway by Caltrans Maintenance crews or by others when noticed. The data in this report represents reported collisions and is not adjusted up to account for unreported collisions.

A summary of the two data sets are presented below.

Summary And Comparison of Reported Wildlife CHP Collision Data and Wildlife Mortality On Caltrans District 9 Facilities				
	Total Deer Mortality (2002-2015)	Total Wildlife Mortality (2002-2015)	Total Deer Collisions Reported to CHP (2003-2013)	Total Wildlife Collisions Reported to CHP (2003-2013)
In Mono, Inyo, And Eastern Kern County	2023	2188	465	542
Mono County	1845	1891	341	409

Table 1: Comparison of Mono County collision and mortality data sets to all of District 9.

3B. Study Area

The study area is defined as Caltrans District 9 which is comprised of Mono, Inyo, and eastern Kern Counties. Northern San Bernardino County is not included.

Deer represent the majority (92.6%) of the wildlife mortality collected by Caltrans District 9 Maintenance forces on District 9 highways. 91% of deer vehicle collisions (DVCs) within Caltrans District 9 occurred in Mono County where highways pass through and/or adjacent to several important deer migration corridors. For this reason this report addresses reducing WVCs but focuses on deer as the primary species of concern and within Mono County since the majority of the WVCs occur there.

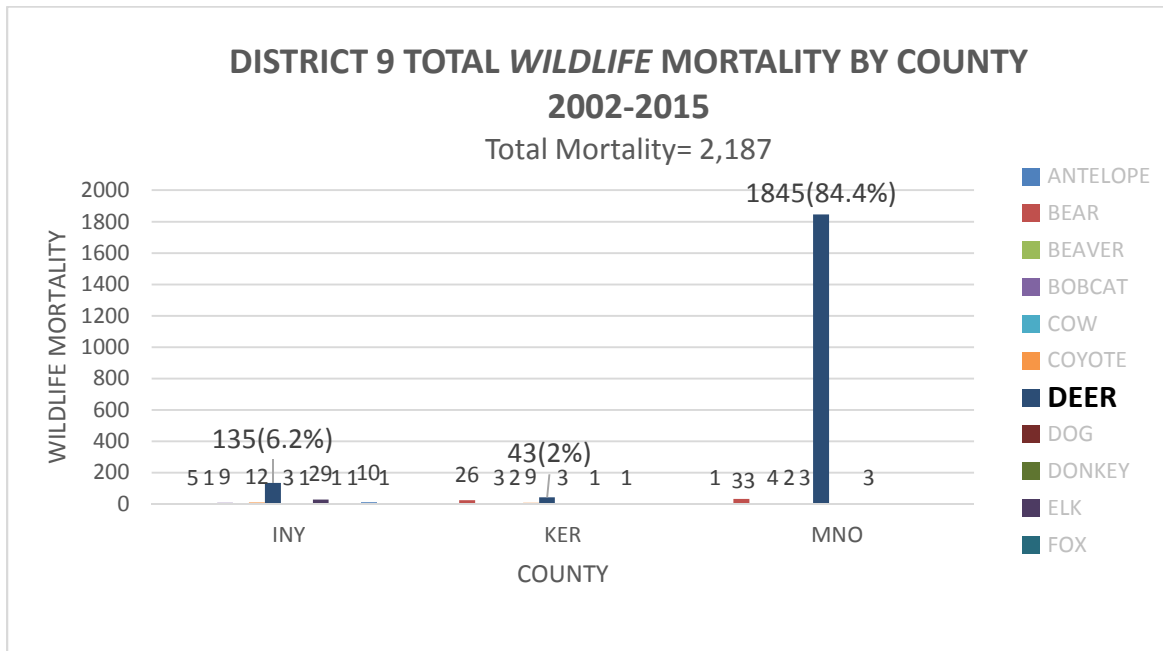


Figure 2: Wildlife mortality on State highways by County in Caltrans District 9.

90.4% of all deer mortality in Mono County occurred on US 395.

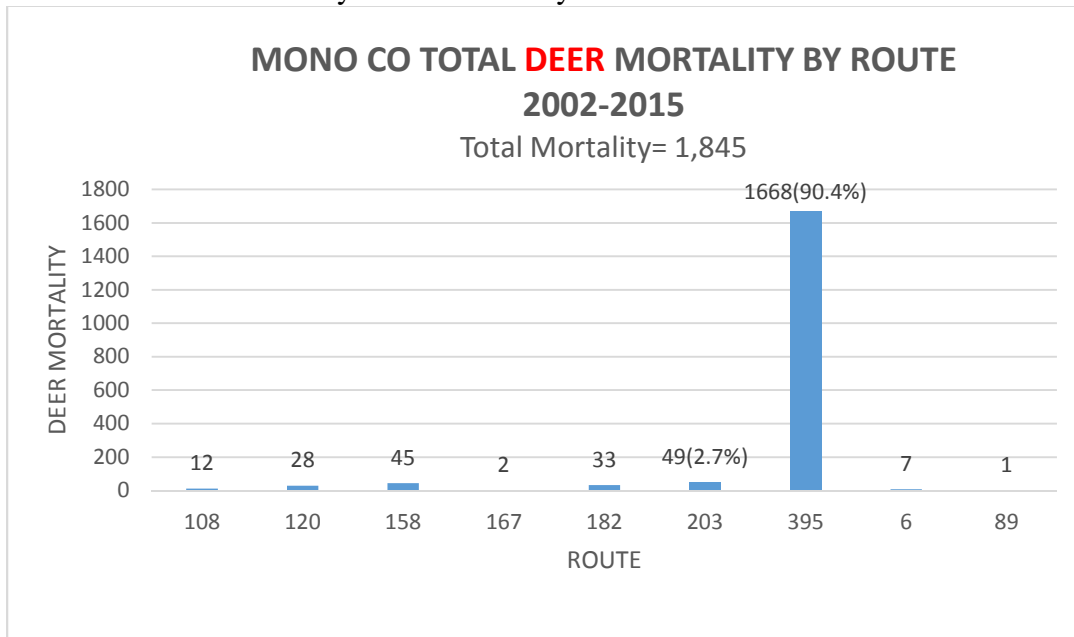


Figure 3: Total deer mortality by State Route in Mono County.

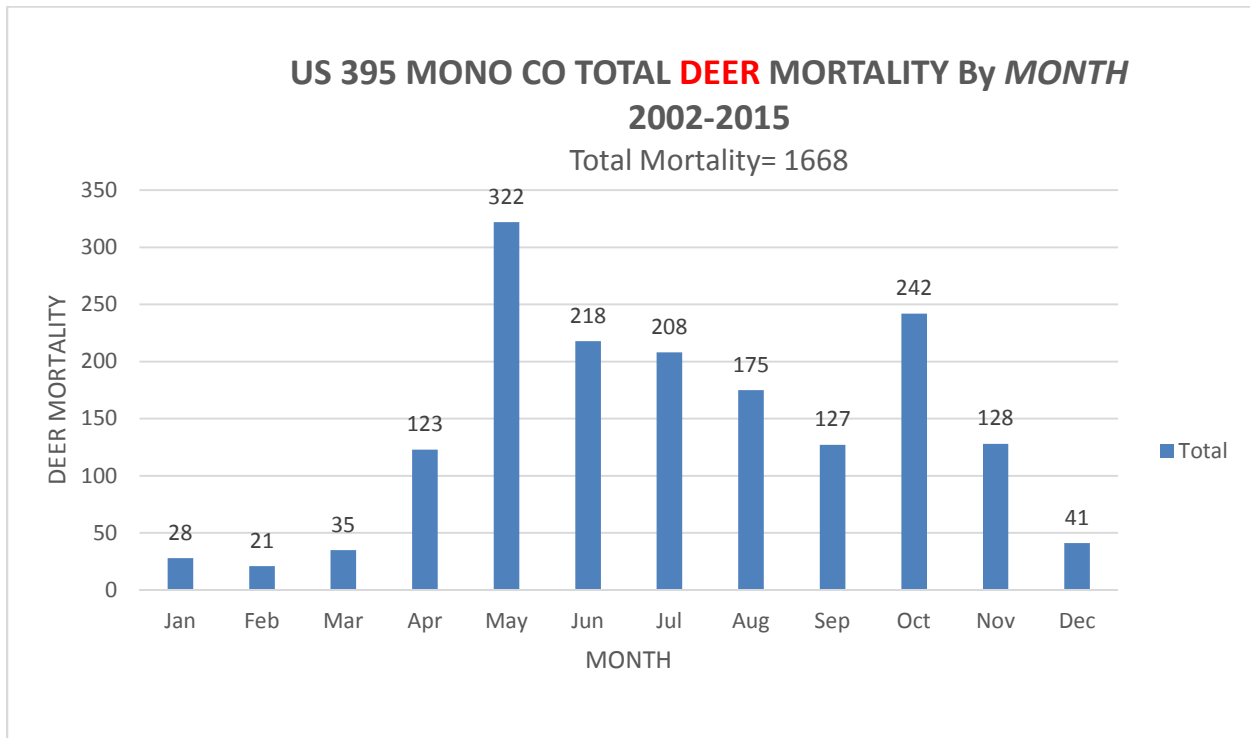


Figure 4: Monthly distribution of deer mortality in Mono County on US 395.

Analysis Method for Data Sets

CHP collision data and wildlife/deer mortality data collected by Caltrans Maintenance forces were used to make a spatial analysis and create a hot spot map of WVCs on state highways throughout District 9. The hot spot map provides a quick visual assessment of WVC concentrations and contains information on which species if any were most often struck. Deer are by far the most frequently hit wildlife in the District and represent the greatest wildlife collision threat to motorists. Both data sets were integrated into a spatial data base for use in ArcGIS.

Hot Spot Analysis

A spatial analysis utilizing the Kernel density analysis for point features was utilized in ArcGIS to produce a hot spot map for each data set. The hot spots represent a density or concentration of collisions per area. The locations of the collisions are represented by points. The Kernel density analysis calculates the density of collisions in a neighborhood around each point. Points that are close are weighted more than points that are further away. A hot spot map, Figure 5 below, depicts a gradation of colors from green to red. Green represents few collisions and red represents many collisions.

The hot spot map confirm that the majority of deceased deer removed from District 9 are along US 395. Of the hot spots generated there were six notable ones that stood out; four of those are located within the focus area; see the hot spot map below. The largest hot spot occurs between Benton Crossing Rd. and Mt. Morrison Rd. The six hot spots are tabulated and ranked according to density, deer mortality per year per mile, in the table below.

US 395 DEER MORTALITY HOT SPOTS IN MONO COUNTY (2002-2015)							
Ranking From Largest to Smallest Sized Hot Spot	Hot Spot Name	Location by PM	Length (miles)	Total Mortality	Mortality Per Year	Mortality Per Year Per Mile	Comments
1	Mt Morrison Rd to Benton Crossing Rd	19.7-20.3	0.47	79	6.1	12.93	located within the focus area
2	McGee	18.6-19.6	0.43	55	4.2	9.84	located just north of the McGee Maintenance Sta and within the focus area
3	Hot Creek Hatchery Rd.	22.83-23.24	0.41	34	2.6	6.38	Just North of Hot Creek Hatchery Rd.; south end of snow fence
4	Buckeye Rd	80.75-81.49	0.74	58	4.5	6.03	located 0.40 miles north of Buckeye Rd.
5	JCT 395/203	25.6-26.0	0.4	26	2	5	between the intersection of SR203/US 395 & Mammoth Creek
6	Bodie Rd. (SR 270)	69.41-69.85	0.44	26	2	4.5	Jct Bodie Rd & US 395 & .35 miles south of Bodie Rd

Table 2: Hot spot summary of US 395 in Mono County.

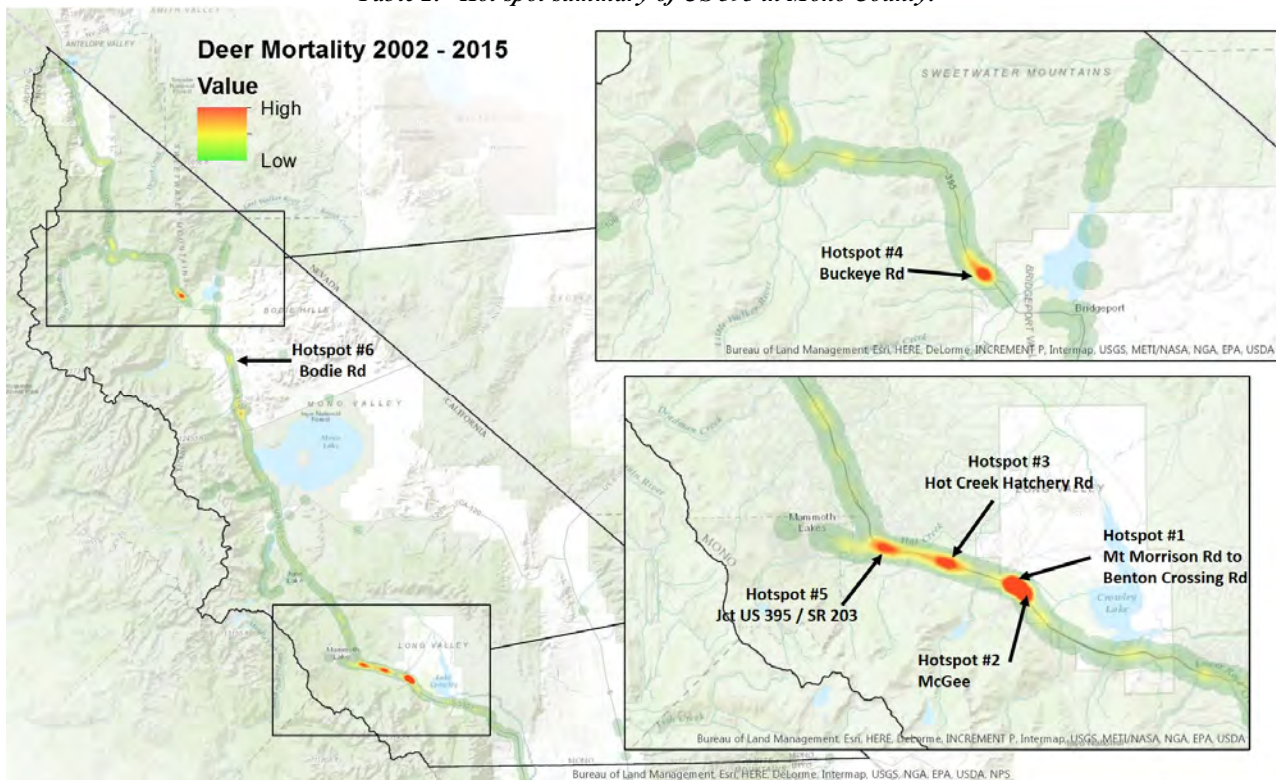


Figure 5: District 9 hot spot map.

As can be seen from Figure 5, the District 9 hot spot map, there are numerous DVCs along US 395 in Mono County. The highest concentration of DVCs occurs within the focus area. 387 deceased deer were collected by Caltrans Maintenance forces within the focus area over a 14 year period, an average of 28 per year. This represents 23% of the deceased deer collected in Mono County by Caltrans Maintenance forces for the same 14 year time frame. This does not include the unreported deceased deer, which is estimated to account for an additional 19%-30% or more. The CHP reports indicate that 42.8% of the collisions within the focus area are with deer. Collisions with deer usually result in death to the animal, property damage, and in some cases injuries or fatalities to the motorist; no fatalities associated with collisions with wildlife have been reported within the focus area for the period from 2002-2013. However there were 9 reported injuries as a result of DVCs.

The seven mile stretch of US Highway 395, from Crowley Lake Dr. to the junction with SR 203, accounts for more than double the number of deceased deer removed by Caltrans Maintenance forces compared to any other seven mile stretch of US 395 within District 9 and accounts for 43% of reported collisions for this area of US 395. This seven mile stretch of highway also contains the largest hotspot, or a specific location of concentrated DVCs, within the district, located just south of Mt. Morrison Rd. A histogram depicting the number of DVCs per mile for US 395 in Mono County is shown below and is included as a larger image as Attachment E.

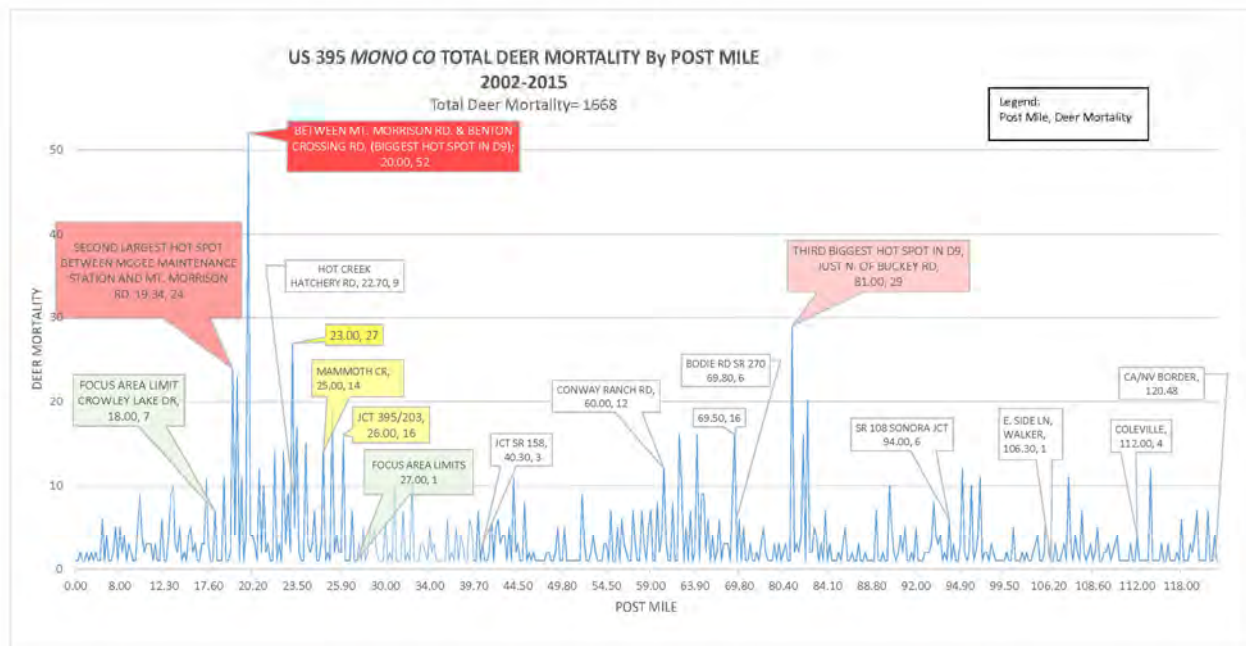


Figure 6: Deer mortality by post mile on Mono US 395.

3C. Focus area

After an overall analysis of WVCs in District 9, a focus area was derived that represents the location with the highest concentration of WVC; on US 395 from the Crowley Lake Drive Overhead (PM 13.9) to just beyond the intersection with SR 203 (PM 26.0) and on SR 203 from Meridian Blvd (PM 6.9) to just beyond the intersection with US 395 (PM 8.6).

Focus area		
Route	Begin PM	End PM
SR 203	6.9	8.6
US 395	13.9	26.0

Table 3: Focus area – Summary by Route and Post Mile

Road/Creek Intersections Within The Focus area		
	Road or Creek	Post Mile
US 395	Crowley Lake Dr. Bridge	13.93
	McGee Creek Road	16.62
	Crowley Lake Drive/McGee Maint Station	18.04
	Mt. Morrison Road	19.86
	Convict Creek	20.23
	Benton Crossing Road	20.36
	Convict Lake Road	21.31
	Hot Creek Hatchery Road	22.74
	Sherwin Creek Road	24.40
	Mammoth Creek	25.07
	Intersection with SR 203	25.80
SR 203	Meridian Blvd	6.87
	Intersection with SR 203	8.56

Table 4: Summary of Roads and Creeks within the Focus area

4. BACKGROUND

Mono County Deer Herds and US 395

US 395 in Mono County traverses a large area with diverse geology and habitats that support and contain numerous wildlife species. The topography of the natural landscape has greatly influenced and in some places dictated the highway alignment as it passes through higher elevation basins, mountain passes, canyons, and valley floors. This same topography has influenced various migration and holding patterns for wildlife. This confluence of habitat and the highway results in conflicts between vehicles and wildlife.

In Mono County, there are five deer herds, which inhabit various summer and winter ranges as well as temporary holding areas that the deer migrate seasonally between. As the highway

passes through Mono County, it bisects some of these holding areas and migration routes. In other locations, the holding areas and migration routes are adjacent to the highway. It is at these areas where conflicts with deer are most common, especially near holding areas where deer may linger for up to 6-10 weeks according to California Department of Fish and Wildlife (CDFW).

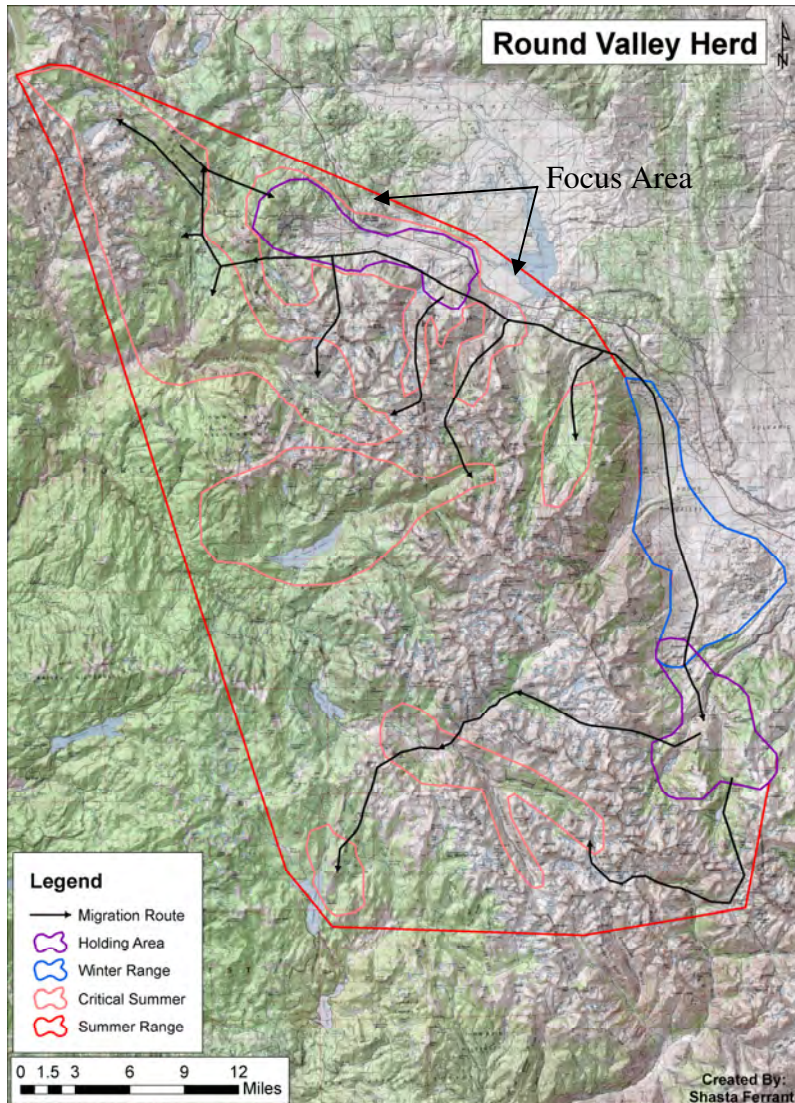


Figure 7: Round Valley Herd migration routes, summer/winter ranges, and holding areas from CDFW.

The focus area is located within a deer holding area and summer range habitat used by animals from both the Round Valley and Casa Diablo herds. The Round Valley herd is estimated to be around 2400 in number and the Casa Diablo herd approximately 2000. In a landscape context, the holding area is an expanded portion of the migration corridor and includes both the east and west sides of US 395, from north of SR 203 to south of McGee Creek. Deer arrive at the holding area during early to mid-April and remain there for 6-10 weeks while they feed on nutrient rich spring forage and regain body condition lost over the winter. While at the holding area, many deer move back and forth across the highway to access forage and water resources available on both sides of US 395. As a result, the frequency of deer crossing the highway increases during April-June, which increases the risk of DVCs. After the holding period, deer migrate from the holding area to summer ranges located on both

the east and west sides of the Sierra Crest. However, many deer remain in the holding area as summer residents and these animals also cross the highway multiple times during the summer to access food and water resources.

General Description of the Focus area Terrain and Habitat

Within the focus area, US 395 passes through several terrain features which may contribute to the DVCs. US 395 climbs out of the McGee area with a series of short tangents and horizontal and vertical curves, to align with a relatively flat area in Long Valley between Mt. Morrison Rd. and SR 203. From Mt. Morrison Rd., US 395 continues north on a four mile tangent taking it past the Mammoth Airport, immediately to the east, and just south of Mammoth Creek where the

alignment shifts to the northwest deviating from the old highway alignment near Sherwin Creek Rd. From here it follows a mile long tangent crossing Mammoth Creek with two bridges and continues on to the junction of SR 203. As US 395 passes north of the junction with SR 203 the highway begins to gradually gain in elevation as it heads towards Deadman Summit 10.5 miles to the north; leaving the treeless environment typical of the Great Basin Desert for the forested area between SR 203 and the June Lake Junction.

Most of the focus area consists of flora typical of high elevations within the Great Basin Desert. The dominant flora being Big Sagebrush, Bitterbrush, and smaller shrubs. Forest cover consisting of Jeffrey and Pinion trees begin to sparsely appear near the junction of SR 203 and US 395 and increases in cover to the west on SR 203, toward the Town of Mammoth Lakes, and to the north of the junction along US 395. Most of the focus area between Benton Crossing Rd. and SR 203 is fairly flat with little topographic relief. Cut slopes are generally 20 ft. tall or less and fill slopes are generally less than 15 ft. tall. US 395 crosses two creeks within this section, Convict Creek and Mammoth Creek, which flow year round. Laurel Creek, just north of Hot Creek Hatchery Rd. may flow under the highway intermittently depending on snow pack levels.

The area with greatest topographical relief within the focus area occurs between the Caltrans McGee Maintenance Station and Mt. Morrison Rd. This section of highway skirts the steep eastern slopes of McGee Mountain immediately to the west, crosses the Tobacco Flat area, and moraines from the Convict Lake Drainage. When this portion of US3 95 was converted to a



four-lane divided highway in 1963 it was moved away from the eastern flank of McGee Mountain and pushed east towards the flatter areas that surround Crowley Lake. The highway gains approximately 200 ft. in elevation from the McGee Maintenance Station to Benton Crossing Rd. This necessitated fill slopes approximately 60 ft. tall with 2:1 side slopes mostly on the north bound lanes in this portion of the focus area. The south bound lanes to

Image 1: Tobacco Flat and US 395 – Hot spot No. 2.

the west were constructed mostly in cut with 2:1 slopes along the relatively steep slopes of McGee Mountain, Tobacco Flat, and the moraine to the north of Tobacco Flat.

Tobacco Flat is a relatively shallow depression between the north slopes of McGee Mountain and the moraine to the north. Its topography slopes from west to east fairly steeply towards the valley floor and the highway. Within this depression is a deep drainage feature which intersects steeply with the highway. A seep is evident here immediately adjacent to the southbound lanes and is densely covered in willows. This is a fairly significant hot spot, second largest, for DVCs. The largest hot spot in the District is located nearby between Benton Crossing Road and Mt. Morrison Rd. Terrain features, constriction of the migration route by the highway and

topography, food and water sources near the highway, and the duration the deer hold up in this region during spring all seem to contribute to the concentration of DVCs here.



Image 2: US 395 looking to the north at hot spot no. 1 - the largest in the district.

Existing Facilities

US 395

US 395 through the focus area is a Scenic Highway designated four lane divided expressway with a variable width median from 46 ft.-100 ft. and standard shoulder widths. Side slopes vary through the focus area from relatively flat slopes to cut and embankment slopes of 2:1. Metal beam guardrail is installed at various locations through the focus area. This portion of US 395 is built to the Concepts envisioned in the Interregional Transportation Strategic Plan and no further capacity increasing projects are scheduled. Right of way varies 200 ft.-842 ft. and is delineated with a standard barb wire fence. The highway is designated as a State Scenic Highway and is part of the National Highway System (NHS) but is not currently considered a Strategic Highway Network (STRAHNET) connector.

US 395 is classified as a Principle Arterial and is one of the major through routes in Eastern California; providing access to Nevada from Southern California. The average annual daily traffic (AADT) is estimated to be 7020 (2013) to the junction with SR 203 and consists of a mix of commercial, recreational, and interregional traffic. North of the junction with SR 203 the AADT drops to approximately 4260 (2013). The *2011 US 395 Origination and Destination Study* found that 60% of surveyed travelers were recreational in nature. The Town of Mammoth Lakes is a major year round recreational destination, especially for Southern Californians. Summer visitation usually starts at the end of April with the opening of fishing season and peaks in August. This section of US 395 has a speed limit of 65 mph.

Adjacent land to Caltrans right of way through the focus area is a mix of public and private ownership including the USDA Forest Service (USFS), Bureau of Land Management (BLM), City of Los Angeles, and Mono County. Adjacent land use includes ranching and cattle grazing.

SR 203

Within the focus area, SR 203 is a four-lane conventional highway with a variable width median, from 4 ft. to 150 ft., from the junction with US 395 to Meridian Blvd. Within the focus area the facility is both a divided highway and an all paved undivided highway. SR 203 is classified as a Minor Arterial and provides access to the Town of Mammoth Lakes.

Since SR 203 is a conventional highway there is no right of way fence to delineate access control, except for a short length near the junction of US 395 on the north side of the west bound lanes. The right of way varies in width from 240 ft. to 380 ft. SR 203 is fully developed with no future improvements planned. SR 203 has a speed limit of 55 mph within the focus area.

Adjacent land to Caltrans right of way through the focus area belongs to the USFS. Current placement of standard non-vehicular warning signs for Deer (W11-3) are summarized for US 395 and SR 203 in the table below.


Locations of Standard Warning Sign for Deer (W11-3) Within and Adjacent to Focus Area							
Route	Location	NB	SB	WB	EB	Within Focus Area?	Remarks 
395	PM 12.77		X			no	
	PM 18.0	X				no	240 ft south of Crowley Lake Dr. (Begin Focus Area)
	PM 20.98		X			yes	
	PM 25.28		X			yes	
	PM 26.68	X				yes	
	PM 27.13		X			no	0.35 miles outside of Focus Area
203	PM 6.34				X	no	.53 miles outside of Focus Area; supplemental plaque attached: "Next 2 Miles"
	PM 7.11				X	yes	attached to overhead light pole
	PM 8.33			X		yes	supplemental plaque attached: "Next 2 Miles"

Table 5: Standard warning sign W11-3 placement.

Previous District 9 DVC Studies, Methods and Projects

The following are a few examples of WVCs/DVC projects the District has been involved with.

Mammoth Deer Fence

Current methods of reducing DVCs and WVCs in general aren't new and in fact were being studied and implemented as far back as the early 1960s by CDFW, Caltrans and District 9. There has been a lot learned since then and with the additional knowledge most of these methods have been refined to yield much better and more predictable results for both the users of the highway and wildlife.

The as-built plans dated 11-30-1969 of the US 395 four lane project from Mt. Morrison Rd. to just north of the junction with SR 203 called for 16,060 ft. of “*a-deer-proof fence*”. It was installed on both sides of the highway from Sherwin Creek Rd. to the junction with SR 203 and was intended to funnel deer to Mammoth Creek and cross under the bridges. It was a 7 ft. tall seven strand barb wire fence with 6 inch x 6 inch wood posts spaced at 12 ft. on center. Reflectors were placed on the top most strand of barb wire in hopes of reflecting headlight and possibly scaring deer enough to stay away. It was ineffective at keeping deer off the highway. It was not tall enough to prevent deer from attempting to jump over it yet tall enough to capture many deer by tangling their rear legs in the top strands of barb wire. It was also ineffective at funneling the deer to the crossing at Mammoth Creek. As early as 1972 there were concerns that the fence wasn’t effective at keeping deer off the highway and on occasion trapped some within the right of way or ensnared them in the fence. Discussions and field visits ensued over the years



Image 3: Mammoth Creek crossing and the 1969 deer fence.

between Caltrans and the then California Department of Fish and Game (DFG) on how to improve the fence to keep deer off of the highway.

In 1984 a joint field review by DFG and Caltrans Environmental unit determined that the fence was not serving its purpose and was more of a detriment to the deer. Deer that got past the fence and entered the roadway were often hit by a vehicle as they could not quickly get out of the roadway. The following recommendations were made to alter the fence in an attempt to reduce the negative impact on the deer: 1) removal of the lower strand, making it easier and faster for deer to cross, 2) removal of the reflectors as there was no evidence they were effective at keeping deer away and there was concern they may actually spook the deer more.

Public concern over the fence causing more harm than good and its ineffectiveness at keeping deer out of the roadway was cause for its removal in 2006. Only a small portion of it remains under the bridges at Mammoth Creek.

District 9 Deer Kill Study

In 1973, the District produced a highway deer kill study which attempted to evaluate if and where concentrations of deer vehicle conflicts were occurring in Mono County on US 395. They had a limited data set but determined the Walker Canyon area and the area between Walker to Topaz were significant locations of concern. The study gathered data from 1971-1972 submitted by maintenance personnel. 140 deer were collected by maintenance forces in that time for the entire district, with 129 (92%) of them in Mono County. Correlations were made to time of day, topography, habitat, and highway geometry as discussed above in the previous section. The study acknowledged the limitations of the data set and made the following conclusions and recommendations: 1) continue reporting of road kill data, 2) continue efforts to research study methods to reduce DVCs, 3) consider special signing with flashing beacons during times of migration, and 4) continue monitoring of the situation.

The District has been recording deer mortality on and off through the years. In 2002 a concerted effort was launched to record wildlife and deer mortality by Maintenance personnel. An updated reporting sheet was created so all larger mammals could be tabulated along with deer. Maintenance personnel were asked to report twice a day, once in the morning and in the evening any deceased wildlife removed from the roadway. For the most part this has been done consistently. Deceased wildlife removed by Maintenance are called into Caltrans Dispatch and then recorded in the District 9 Wildlife Mortality Log Book.

Variable Width Median Sandhouse Four-Lane Project

The Sandhouse Four-Lane Project on US 395, from just south of the June Lake Junction to just north of West Portal Rd. was constructed from 1994-1996. Elements to reduce DVCs with the Casa Diablo Herd were required environmental commitments for the project. Deer fencing and under-crossings were considered in some alternatives but ultimately were rejected due to the scenic highway designation. A variable width median to reduce DVCs was ultimately chosen for the following reasons: 1) a wider and grade separated median would prevent potential head on collisions as a result of drivers losing control of their vehicles when trying to avoid deer, 2) the median would act as a refuge for deer, 3) the median would minimize headlights coming from two directions as deer crossed the highway. Post construction studies were conducted of the effectiveness of the variable width median on reducing DVCs and the results were compared to preconstruction studies. It was found that the variable width median did not increase the number of deer fatalities upon initial completion; which is typically the case when a new facility is constructed. Our current analysis shows that 75 deer were removed within the Sandhouse Four-Lane Project from 2002-2015.

Current District Efforts to Reduce DVCs

Currently the District engages in public awareness campaigns, installs and maintains standard deer warning signage, trims roadside vegetation to increase sight distance and deer visibility in areas known for DVCs, and avoids planting vegetation along the roadside which attract deer.

During the spring and fall, typical migration periods for deer, the District publishes in the newspaper and via social media strategies for motorists to reduce the chance of having a collision with deer. The changeable message signs throughout the District also warn travelers to be alert for deer.

The District has committed to installing seasonal signage within the focus area in the fall of 2016, as described in Concept 6.

Mammoth Yosemite Airport's Proposed Deer Fence

The Mammoth Yosemite Airport, operated by the Town of Mammoth Lakes (TOML), lies adjacent to US 395 between Benton Crossing Rd. and Hot Creek Hatchery Rd. The airport and Caltrans right of way abut each other here. The TOML approached Caltrans in February 2016 with their plans to install a deer fence around the airport in the summer of 2017. The idea of installing a deer fence around the airport dates back to 2001 when it was included along with other plans of expanding the airport facilities. A Wildlife Hazard Assessment (WHA) study was completed in December 2015 for the airport by a consultant for the TOML. The report recommended a deer fence be installed around the airport based on deer movement studies

conducted in conjunction with the WHA. The author did not consult Caltrans prior to finalizing the WHA. The airport's deer fence will be approximately 1.7 miles long.

Caltrans met with the TOML at the airport on March 8, 2016 to discuss their plan and how it might affect the highway. Airport personnel described the general pattern of the deer, as generally avoiding the areas of the airport with buildings and hangers creating a pattern of use where the deer track around the airport to the north and south. At the south end of the air field the deer cross through Caltrans' standard barb wire fence and continue on to the opposite side of airport property and on to foraging areas to the east of the airport.



Image 4: Mammoth Yosemite Airport and Caltrans R/W fence line along US 395.

The TOML acknowledged that there may be increased DVCs resulting from construction of the airport fence. As it is now, deer are unimpeded by the Caltrans right of way fence (standard 42" tall barb wire fence) separating the airport from Caltrans right of way; deer cross the highway from the west to gain access to foraging areas east of the airport.

The TOML would like to replace the existing Caltrans right of way fence with an eight foot tall chain link fence. The color of the fencing would be approved by Caltrans and the USFS, likely similar to the color of the Caltrans McGee Maintenance Station. The Town of Mammoth Lakes would maintain the fence line through a maintenance agreement with Caltrans.

The new airport fence would pose as an impenetrable barrier. Deer would not be able to pass through or over it and instead would be required to walk around it or turn around and re-cross the highway. Deer impeded by the fence may feel trapped between it and the roadway and hastily and unpredictably try and re-cross US 395 increasing the odds of DVCs.

A Special Use Permit (SUP) from the USFS grants the TOML rights to use a portion of the land the airport operates on. The TOML submitted a Categorical Exclusion (CE) to the USFS to review in accordance with the NEPA document for their SUP. Caltrans has been in contact with the USFS with regards to the airport plans and this FSR. Caltrans requested the USFS recommend mitigation be required by the Town of Mammoth Lakes if the USFS approves of the CE.

If and when the airport deer fence is installed it will be a new barrier for wildlife to go around; it may cause an increase in WVCs through this area, especially collisions with deer. It will be important for CDFW and Caltrans to monitor and record WVCs once the fence is installed. The Concepts developed were heavily influenced by the assumption of a fence along the airport. See the discussion in Section 6 regarding those influences.

5. DEFICIENCIES

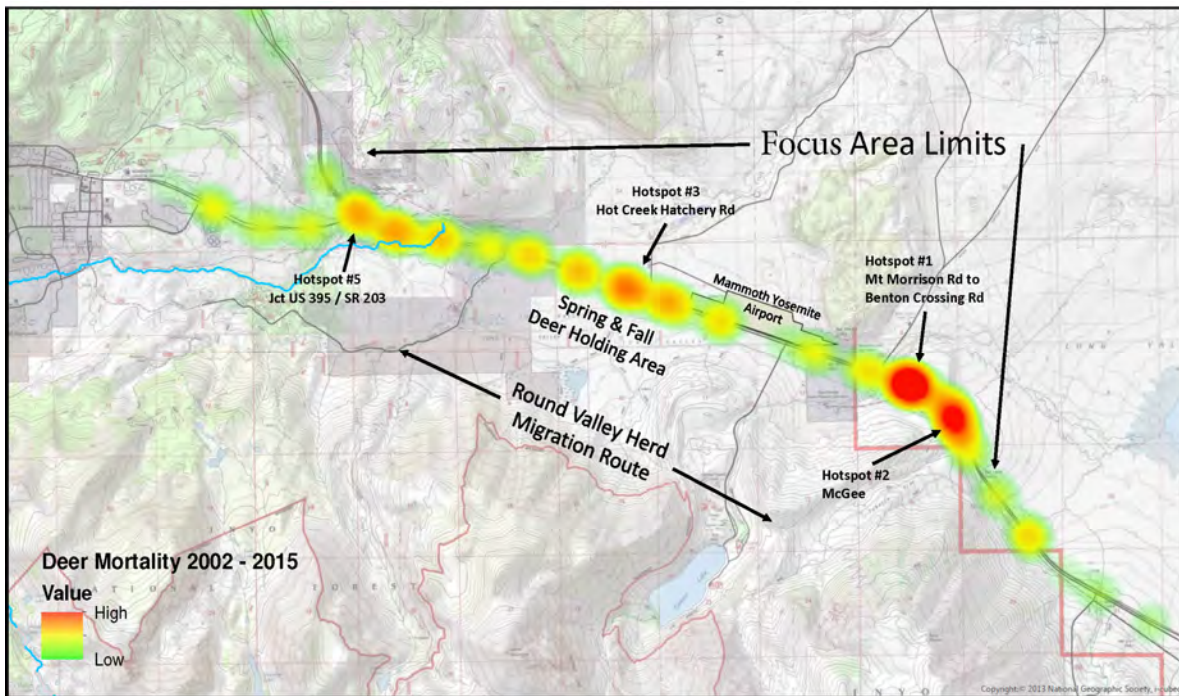


Figure 8: Deer mortality hot spots within the focus area.

Of the many variables associated with DVCs, the most influential is likely the length of time deer spend in the holding area during the spring and fall within the focus area; up to 10 weeks in the spring and a bit less in the fall. In spring deer utilize this area waiting for high elevation passes to clear of snow so they can migrate to their summer range, west of the Sierra crest. The following graph shows the monthly distribution of deer removed from the focus area.

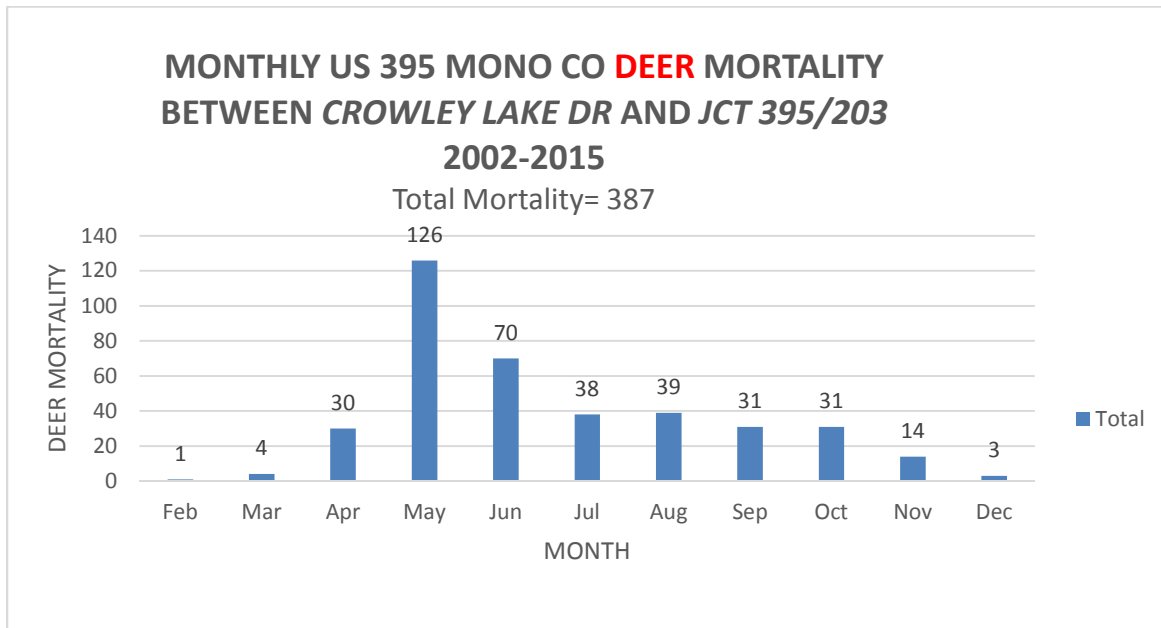


Figure 9: US 395 Number of deceased deer removed within the focus area by month.

As can be seen by the graph above DVCs are most frequent in the spring. In the fall deer spend less time in the holding area while on their way back down to their winter range in Round Valley.

Other stretches of US 395, approximately equivalent in length to the focus area, (7.1 miles long), were analyzed to compare quantity and density of DVCs relative to the focus area. The following table summarizes that analysis:

US 395 MNO 7 Mile length Analysis (For Comparison to Focus Area)						
Location	DEER Mortality 2002-2015	Centerline Miles	Mortality Per Year	Mortality Per YR Per Mile	Mortality Per Mile	comments
US 395 (South Landing-pm 13.94 to Crowley Lake Dr. pm 18.03)	54	4	4	1.0	13.5	
US 395 (Crowley Lake Dr pm 18.03 to just North JCT 203/395 pm 26.1)	387	7.14	28	3.9	54.2	FSR focus area
US 395 (Mt. Morrison Rd pm 19.83 to just North JCT 203/395 pm 26.1)	298	6.1	21	3.5	48.9	FSR focus area
US 395 (JCT 395/203 pm 25.95 to Crestview Rest Area pm 32.41)	106	6.98	8	1.1	15.2	
US 395 (Crestview Rest Area pm 32.41 to JCT 158/395 pm 40.33)	73	7.6	5	0.7	9.6	
US 395 (JCT 158/395 pm 40.33 to 395 & Walker Creek pm 47.53)	80	7.15	6	0.8	11.2	
US 395 (Walker Creek pm 47.53 to The Tioga Lodge pm 54.06)	53	6.6	4	0.6	8.0	
US 395 (The Tioga Lodge pm 54.06 to the Conway Ranch Rd. pm 59.92)	83	5.87	6	1.0	14.1	
US 395 (Conway Ranch Rd. pm 59.92 to pm 67.04, 2.8 miles south of the bodie rd)	127	7.1	9	1.3	17.9	
US 395 (pm 67.04, 2.8 miles south of the bodie rd, to Pt. Ranch Rd pm 73.39)	70	6.25	5	0.8	11.2	
US 395 (Pt. Ranch Rd pm 73.39 to Buckeye Rd. pm 80.61)	15	7.22	1	0.1	2.1	
US 395 (Buckeye Rd. pm 80.61 to Swagger Creek Rd pm 86.98)	128	6.98	9	1.3	18.3	
US 395 (Swagger Creek Rd pm 86.98 to the Sonora Maintenance Station pm 93.94)	100	6.85	7	1.0	14.6	
US 395 (Sonora Maintenance Station pm 93.94 to Shingle Mill Flat Picnic Area pm 100.96)	80	7.02	6	0.8	11.4	
US 395 (Shingle Mill Flat Picnic Area pm 100.96 to Mill Creek crossing in Walker pm 100.10)	69	6.1	5	0.8	11.3	
US 395 (Mill Creek crossing in Walker pm 107.10 to Topaz Ln pm 114.69)	162	7.55	12	1.5	21.5	
US 395 (Topaz Ln pm 114.69 to CA/NV border pm 120.48)	48	5.78	3	0.6	8.3	

Table 6: Comparison DVCs to focus area along Mono US 395.

There are WVCs on SR 203, though not nearly as many as occur on US 395. The following table shows a comparison between SR 203 and US 395.

Summary And Comparison of Wildlife Mortality Within The Focus Area On SR 203 & US 395				
Facility	Total Deer Mortality (2002-2015)	Total Wildlife Mortality (2002-2015)	Total Deer Collisions Reported to CHP (2003-2013)	Total Wildlife Collisions Reported to CHP (2003-2013)
SR 203 (Jct with 395 to Meridian Blvd)	43	44	8	10
US 395 (Crowley Lake Dr. to just north of Jct with 203)	387	390	38	38

Table 7: Comparisons DVCs to focus area along Mono US 395.

Comparison of the Focus Area to Other Locations in and Outside of California

How do we compare to other areas?					
Caltrans Districts	Total Deer Mortality	Years of Collection	Deer Mortality per year		
District 9	2023	14	144.5		
District 10	3010	11	273.6		
Other Study Areas	Description	Length (miles)	Deer Mortality per year	Deer Mortality per year per mile	Notes
Study Area	Crowley Lake Dr. to SR 203	7.14	27.6	3.86	14 years of data
District 3 Undercrossing Project	SR 89 -Kyburz Flat	1.1	4	2.59	7 years of data
District 4	1280 between San Jose and San Francisco	22	45	2.06	8 years of data
Reno to CA/NV border	I80	8	10.5	1.31	2 years of data
Southern Utah, east of Kanab	Highway 89	12	115	Unknown	Unknown

Table 8: Comparisons of DVCs in focus area to other locations.

Traffic:

Crowley Lake Dr. to SR 203

The ten-year (01/01/2004 to 12/31/2013) accident rate within the focus area is 0.70 Accidents per Million Vehicle Miles which is above the statewide average total accident rate of 0.43. The following table shows a breakdown of accidents during this period:

Mono 395 P.M. R18.0/R25.95 (Crowley Lake Dr. to SR 203)				
Type and Number of Accidents		Accident Rate/MVM		
			Actual	Statewide Average
Fatal	2	Fatal	0.01	0.007
Injury	50	Fatal + Injury	0.25	0.17
Property Damage Only	93	Total	0.70	0.43
Total	145			

Table 9: Accident summary in the Focus area.

There were 145 collisions total with two fatalities; these two fatalities were not caused by a collision with wildlife. 62, or 42.8%, of the 145 collisions were with deer. Nine injuries, or 18%, were a result of those DVCs.

Crowley Lake Dr. to Benton Crossing Rd. (Hot Spot Location)

The ten-year (01/01/2004 to 12/31/2013) accident rate within the focus area is 0.96 Accidents per Million Vehicle Miles which is the above the statewide average total accident rate of 0.43. The following table shows a breakdown of accidents during this period:

Mono 395 P.M. R18.0/R20.36 (Crowley Lake Dr. to Benton Crossing Rd.)				
Type and Number of Accidents		Accident Rate/MVM		
			Actual	Statewide Average
Fatal	0	Fatal	.00	0.007
Injury	6	Fatal + Injury	0.34	0.17
Property Damage Only	39	Total	0.96	0.43
Total	45			

Table 10: Accident summary hot spot #1.

There were 45 collisions total with no fatalities. 25, or 55.6%, of the 45 collisions were with deer. Two injuries were a result of those 25 DVCs. 17 of the 25 collisions with deer occurred at night and all 25 collisions with deer occurred in the north bound lane.

6. CORRIDOR AND SYSTEM COORDINATION

US 395 forms the major access corridor to and through Inyo and Mono County. These corridors connect the Eastern Sierra region with Southern California and the Reno/Lake Tahoe region in northern Nevada. US 395 is identified as a regionally significant part of the Interregional Road System (IRRS).

This portion of US 395 is designated by the US Department of Transportation Federal Highway Administration (FHWA) as “Other National Highway System Route”, or other principal arterial, at the time this report was produced. It is not part of the Interstate System and not subject to the vertical clearances of the Interstate System. It also is not part of the Strategic Highway Network (STRAHNET) and does not need to meet STRAHNET requirements for highway design.

This report is consistent with other regional planning documents such as the Mono County Regional Transportation Plan (RTP) and Mono County General Plan. The most current Mono County RTP (2015 Update) discusses collisions with wildlife, especially with deer, in its policies

and goals. The RTP includes a wildlife collision map for Mono County. This FSR is consistent with Caltrans planning documents such as the Caltrans Transportation Concept Reports for US 395/SR 203, and the District System Management Plan (DSMP) for District 9. The DSMP recognizes deer as being a “...major safety issue for motorists.”

7. CONCEPTS

All of the Concepts were created and evaluated with the help and guidance from CDFW and the USFS. After reviewing numerous methods and working with CDFW it was determined that a system of wildlife exclusionary fencing and dedicated crossings would have the most effect at reducing WVCs. Numerous research and case studies indicate that exclusionary fencing in combination with appropriately sized and located crossing structures can reduce WVCs by 90% or more. All but one Concept propose using a combination of exclusionary fencing with crossing structures to reduce WVCs, especially with deer. This system of fencing and over/undercrossings would prevent wildlife from entering the roadway and remove the conflict between wildlife and vehicles. The total current cost estimated for the six Concepts range from \$4,000 to \$48,013,000. The six Concepts would not impinge upon or close off existing land use/access and would allow safe passage for all wildlife small or large.

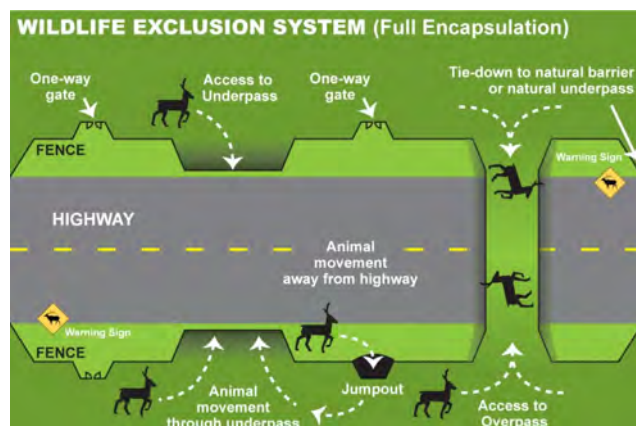


Figure 10: Wildlife Exclusion System.

All Concepts would reduce collisions with Wildlife to some degree, the Full Build (Concept 1) would be the most effective but has the highest cost. Distance between crossing locations are placed roughly one mile apart or as close to this recommended guidance as possible given the constraints within the focus area.

A number of factors influenced the development of the Concepts. The width of the facility requires a larger opening for undercrossing structures and longer spans for

overcrossing structures. The vertical height required of this larger opening size is more than the vertical relief available between Benton Crossing Rd. and Mammoth Creek, at least without modifying the highway profile grade or digging below the existing ground surface adjacent to the roadway. The proposed Mammoth Yosemite Airport fence and the airfield itself prevent crossing opportunities within its length, and ideally requires additional crossing opportunities within a given Concept. All of this combined adds significantly to the costs and complexity.

From a cost and constructability point of view, undercrossings are preferable as a wildlife crossing structure if localized site conditions allow. Unfortunately, the terrain within the focus area isn't ideally suited throughout the focus area to allow for the tall undercrossings needed to insure usage by deer and other large mammals. Overcrossings are shown where there is not enough vertical relief between the roadway and adjacent grade. On US 395 these locations are north of Hot Creek Hatchery Rd. An undercrossing might be an alternate option to an overcrossing as shown in the Concepts, however, the grade adjacent to the roadway would likely

need to be lowered substantially such that a high ground water table or spring snow melt could cause flooding of the undercrossing; at a time when it is needed the most; during the spring migration period. Engineering and hydraulic studies would need to be performed to evaluate the suitability of an undercrossing at these locations.

All the Concepts presented assume The TOML will install a wildlife exclusionary fence around the Mammoth Yosemite Airport in 2017. With a fence around the airport, wildlife will have to walk further distances requiring the need for more crossing opportunities. This increases costs. The presented Concepts below are preliminary and subject to revision by additional studies or additional information that becomes available.

The Concepts considered include:

- **Concept 1:** This Concept is the “Full Build” option which would install fencing and crossing structures on US 395 and a portion of SR 203; starting at Crowley Lake Dr. on US 395 and ending 0.83 miles north of the junction of US 395/SR 203.
- **Concept 2:** This Concept is the same as Concept 1, but excludes WVC reducing measures on SR 203.
- **Concept 3:** Same as Concept 2, except would install a medium size mammal undercrossing between Mammoth Creek and the crossing structure just north of Hot Creek Hatchery Rd.
- **Concept 4, “North Only Concept”:** This Concept would install fencing and crossing structures on US 395 only between Benton Crossing Rd. and the junction with SR 203. No fencing or crossing structures would be installed south of Benton Crossing Rd.
- **Concept 5, “South Only Concept”:** Fencing and crossing structures would be installed between Hot Creek Hatchery Rd. and Crowley Lake Dr. This section of the focus area has the most vertical relief to allow placement of undercrossings.
- **Concept 6, “Seasonal Signage”:** Portable changeable message signs (PCMS) or standard deer warning signs (W11-3) with flashing LED/beacons could be installed in the focus area during the spring and fall when the presence of deer is higher. To maximize effectiveness of the sign a message warning drivers of increased activity or the flashing LEDs/beacon would only be displayed from dusk to dawn; the times deer and wildlife are most active.
- *No build Concept:* This would not install fencing or crossing structures. Current WVC strategies would continue as the only effort to reduce WVCs.

Concepts 1-3 share similar features and differ only in limits of fencing and placement of over/undercrossings. Concept 1 is fully described below and subsequent Concepts describe the differences. Conceptual renderings are included as Attachment D.

7A. **Concept 1**

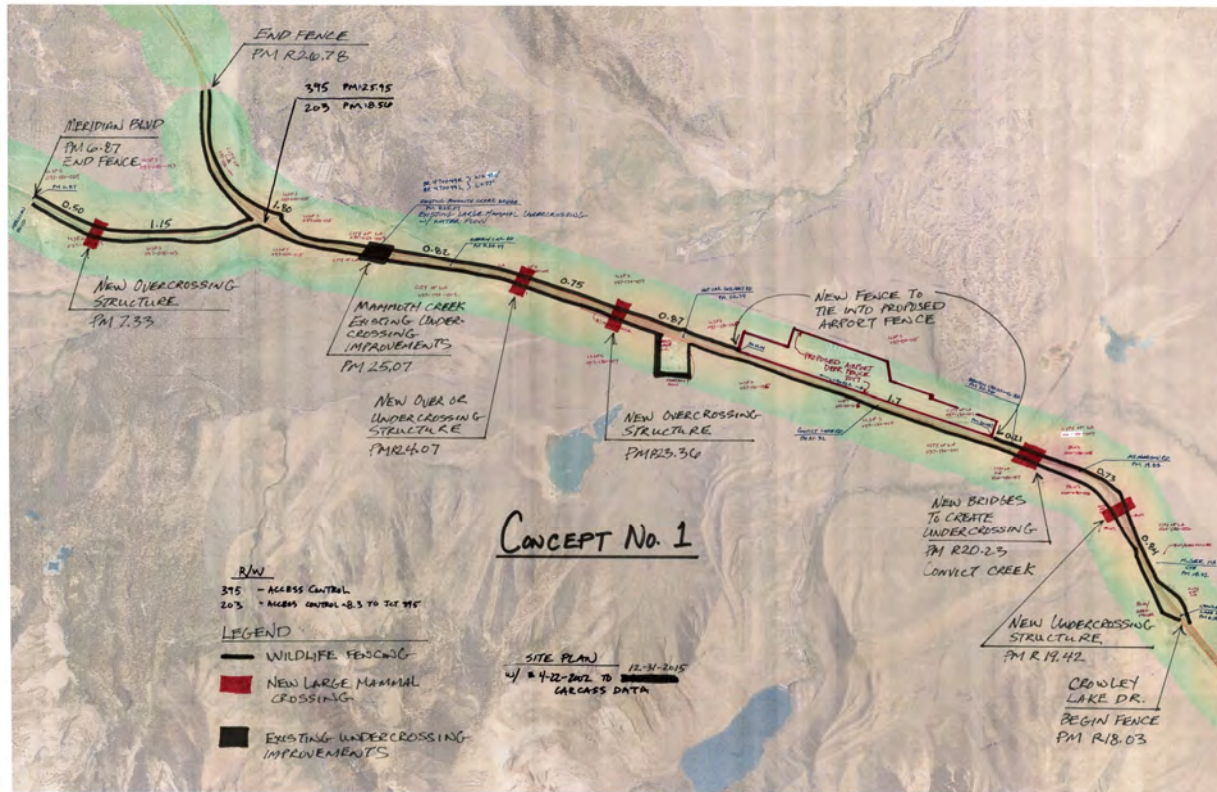


Figure 11: Overview of Concept 1.

Description:

This Concept would implement a combination of wildlife exclusionary fencing and crossing structures on US 395 and SR 203 as a system wide approach to reduce WVCs through the focus area. With a fully integrated system in place such as outlined below, a reduction of WVCs of 90% or more could be realized for this area.

US 395	McGee Creek UnderCrossing	PM 19.42
	Convict Creek Bridges & Under-Crossing	PM 20.23
	Over Crossing north of Hot Creek Hatchery Rd.	PM 23.36
	Over or Undercrossing midway between Mammoth Creek and crossing at PM 23.36	PM ~24.07
	Mammoth Creek Bridges Under-Crossing (improvements to existing)	PM 25.07
SR 203	Over Crossing Structure	PM 7.33 (0.5 miles from Meridian Blvd)

Table 11: Summary of Crossing Structures on US 395 & SR 203 for Concept 1.

US 395

Starting at Crowley Lake Dr. (PM 18.03) 78,317 linear feet of eight foot tall wildlife exclusionary fencing would be installed on both sides of the highway to 0.83 miles north of the junction of SR 203. The fencing would tie into the wildlife fencing already placed along the Mammoth Yosemite Airport. Fencing should be installed at least two feet below grade where practicable to prevent burrowing below the fence by some wildlife thus compromising the ability to prevent wildlife on the roadway. It is assumed the new wildlife exclusionary fencing would replace the existing right of way fencing and be installed where the current right of way fence is, however it could be placed at various locations that differ from the current right of way fence to avoid sensitive environmental locations or to reduce its visibility. On the east side of the highway the exclusionary fencing would tie into the Mammoth Yosemite Airport fence at both ends. The color of the fence would be appropriate for this Scenic Highway designation and be designed to withstand wind and snow loads during the winter. Fencing is not only utilized to prevent wildlife access to the highway, but would funnel wildlife to the crossing structures. Recent research and studies recommend using a fence which utilizes a variation of mesh size, with a square mesh opening size no larger than 6". Smaller sized mesh openings should be placed near the top of the fence especially in areas of sage grouse habitat. The smaller openings at the top create a denser mesh that makes it more visible to running deer and sage grouse. This should reduce the likely hood of deer or birds from running or flying into it.

A double cattle guard crossing structure would be placed where wildlife fencing crosses an adjacent roadway or dirt road. Double cattle guards are considered too wide of an obstacle for deer and other wildlife to attempt to jump over or cross.

The current Concepts propose wildlife fencing installed around the industrial park across from Hot Creek Hatchery Rd. Doing so would require an easement for maintenance and installation of several cattle guard crossings at dirt roads. Further study and consultation with CDFW and the Forest Service may reveal a simpler solution here. One such solution might be to allow the wildlife fencing to tie into the north and south perimeter walls/berms instead of going around the facility.

At PM 19.42 an undercrossing structure would be installed measuring 19 ft. tall by 36 ft. wide and 225 ft. long. This size would provide an open and inviting crossing encouraging use. Other sizes could be utilized upon careful review. At this location the road is built on top of approximately 40-60 ft. of fill. The undercrossing structure could be either prefabricated concrete arches or a steel plate pipe arch. A prefabricated concrete structure would likely be quicker to install and minimize traffic disruption during construction. The soil created from the excavation for the undercrossing structure could be used to construct entrance and exit ramps to the crossing structure eliminating the need to haul off excess earthen material requiring disposal.

This Concept would also proposes constructing bridges at Convict Creek, similar to the ones at Mammoth Creek, creating a crossing under the highway. The bridges would likely be a single span concrete structure without interior columns; maximizing the openness of the undercrossing. The bridge aesthetics and railing would match that of the Mammoth Creek bridges, see image below. The existing 60 inch diameter culvert, 8 ft. x 8 ft. x223 ft. concrete box culvert cattle crossing, and the earthen embankment would be removed creating a wildlife passage under the

highway; the earthen embankment replaced with two simple span concrete bridges, one for the north and south bound lanes.

The median area between the north and south bound lanes would be open like the one at Mammoth Creek; wildlife fencing would be installed keep wildlife within the crossing and to prevent access to the roadway. New Midwest Guardrail and transition railing would be installed at the bridges. Bridge railing and decorative features are proposed to those at Mammoth Creek. Wildlife passage would be constructed on each side of the creek and would allow for passage during high and low flows of the creek. A clear height of 10 feet would be maintained from normal creek flow elevations to the underside of the bridge structure. Installation of bridges here would also reestablish the riparian corridor.



Image 5: Bridge railing and decorative features at Mammoth Creek bridges.

Two over or undercrossing structures could be placed between Hot Creek Hatchery Rd and Mammoth Creek. One at PM 23.36 and the other approximately midway between it and Mammoth Creek. Over crossing structures would likely be prefabricated concrete arches with either prefabricated concrete walls or masonry walls. The walls and arches would support earthen backfill to create a passage

over the highway and median. Wildlife fencing would be installed along the crossing structure to keep wildlife on the crossing structure. The crossings would be vegetated with native landscaping to encourage use and to shield headlights from below at night. Per the Highway Design Manual (HDM) a vertical clearance of 16.5 ft. over the highway would be maintained. Median barrier and transition railing would be required around the structure as it would represent a fixed object within the clear recovery zone. Based on recommended design guidance, the overcrossing structures should be no less than 130 ft.-165 ft. in width; the FSR assumes 150 ft.

Undercrossings would be challenging to construct as there is not much vertical relief between Mammoth Creek and Hot Creek Hatchery Rd. However, it might be possible and would require hydraulic studies. Of particular concern would be potential flooding due to a naturally high water table and/or potential flooding of the undercrossing in late spring/early summer from seasonal snow melt; hydraulic studies would be needed to confirm if flooding would be a concern or not at these locations. The size, length, and construction would be similar to that proposed at PM 19.42.

The existing undercrossing at Mammoth Creek would be improved to increase its openness and visibility to wildlife as a crossing point. The following could be done to achieve that: 1) willows and existing vegetation near the east entrance/exit would be trimmed and/or removed to increase visibility, 2) to increase the size of the east and west side entrances, the existing fill slopes could be cut back and retained with a tall retaining wall. These improvements would

encourage use by wildlife. Further improvements could be made by removing the existing deer fence and regarding the fill slopes at the south abutments, creating a high water crossing.

SR 203

A combination of fencing and one over crossing structure could be placed to reduce WVCs through this section of SR 203. Fencing would start at PM 8.67 at the current cattle guard east of the north bound on and off ramps for US 395. An additional cattle guard would need to be installed. Fencing would be placed on both sides of the highway and would end at Meridian Blvd (PM 6.87). An estimated 17,100 lineal feet of fencing would be required. Since this is not an access controlled facility, there is no existing right of way fencing to remove. The new wildlife fencing could be set back enough to reduce its visibility to motorists. The wildlife fencing would be eight feet tall and have a color suitable for the surrounding environment. Fencing should be installed at least two feet below grade where practicable to prevent burrowing below the fence by some wildlife and compromising the ability to prevent wildlife on the roadway. The fencing would be appropriately designed for the wind and snow loading that occurs here.



Image 6: Existing Mammoth Creek crossing.

An over crossing structure would be placed at approximately PM 7.33 where SR 203 is separated by a 170 ft. median. This location was chosen to take advantage of the existing vertical relief here. A prefabricated concrete arch and walls could be utilized to span from one side of the roadway to the median allowing wildlife to cross over both lanes. Earthen backfill would be placed and vegetated with native vegetation. Color and decorative treatments would be chosen suitable for the context of the environment. Midwest Guardrail and transition railing would be needed as this would be a fixed object within the clear recovery zone. For this type of facility a minimum vertical height of 15 ft. would be maintained above the roadway. The width of the over crossing should not be less than 150 ft. wide to encourage use and not appear too restrictive. Wildlife fencing would be installed along the edges of the structure.

US 395 & SR 203

Should wildlife find a way past the fencing and in the roadway jump-outs or ramps would be provided to allow them to get back over the fencing and exit the roadway. A suitable number of would be allocated on each facility.

Anticipated Effectiveness:

Literature and case studies suggest that this Concept could provide a 90% or greater reduction of WVCs. Based on the 14 years of data collected by Caltrans Maintenance, 28 or more DVCs per year could be reduced on US 395 and 3 or more DVCs on SR 203 could be reduced with this Concept. This assumes adequately placed and sized crossing structures, a properly maintained fence, and properly maintained structures. The Fencing will need to be inspected regularly for compromises in fence line integrity and any breaches repaired promptly. Smaller animals such as coyotes and foxes may compromise the fence line by burrowing below it. If an animal were successful at burrowing under the fence it would allow deer to pass beneath it and onto the

roadway. To prevent this the fencing should be extended below grade as described above. Proper maintenance of the fence includes visual inspection for sections that need repair due to vandalism, errant vehicles colliding with the fence, environmental factors such as downed trees or utility poles that may have fallen on it.

Crossing structures will need to be inspected regularly to insure successful use. To encourage repeated use the entrance and exits of the crossing structure should be regularly maintained to prevent vegetation from hiding or reducing the openness. Heavy vegetation at these points could discourage their use and limit their effectiveness.

Additional Studies Needed:

Additional studies will be needed to validate the viability of the Concepts in this report. Data from animal tracking should be obtained to verify where wildlife are crossing the highway and to confirm the data obtained by Caltrans Maintenance and CHP collision reports. To know the total number of wildlife attempting to cross the highway would help fine tune the conceptual design. GPS data from collared deer could be used to determine where the fence line could be terminated. CDFW has stated they would like to take the lead role in these biology studies.

Hydrology studies would be needed to determine seasonal ground water table elevations, flows, etc. near proposed crossing structures. Geotechnical investigations would be needed to determine soil engineering properties and foundation design for the proposed crossing structures.

Environmental Issues:

An Initial Environmental Scoping Memorandum from the Caltrans District 9 Environmental Unit was prepared in lieu of a Preliminary Environmental Assessment Report (PEAR). The Scoping Memorandum and anticipated environmental documents were established for the Concept which would create the largest impacts, Concept 1.

Anticipated Level of Environmental Document for Concept 1:

CEQA: Environmental Impact Report (EIR)

NEPA: Environmental Assessment (EA)

If it is determined there are fewer environmental impacts, then a lesser level of environmental document may be required.

For Concept 1 the estimated time to final environmental approval would be 4-6 years from the milestone "Begin Environmental". It would take two to three years to obtain the milestone Project Approval (PA) and Environmental Document (ED) and two to three years to acquire the necessary permits and mitigation.

This Concept would require the following permits:

- CDFW 1602 Streambed Alteration Agreement
- 2080.1 Incidental Take Permit
- 401 and 404 permits from the U.S. Army Corps of Engineers

A Biological Opinion (BO) from the United States Fish and Wildlife Service (USFWS) and a wetland delineation report may be needed as well. The following studies would also be required: Visual Impact Report, Cultural Resource Study covering Phase 1 to as high as Phase 3, Section 4(f) Evaluation, and Hazard Waste Study.

Concepts 2-5 would require the same level of documentation and study but may require less time to develop than for Concept 1 due to reduced scope of work.

Due to cost and complexity of Concept 1 it could be constructed over time in stages. Concepts 4 and 5, described below, could be constructed individually to achieve the overall build of Concept 1. The WVC reduction measures described in this Concept for SR 203 could also be built as a separate project.

Construction and Traffic Issues:

Construction impacts to the traveling public would occur due to construction of the crossing structures. Construction of Concept 1 would span multiple seasons. Half width construction could be accomplished at the undercrossings with a lane closure; reducing two lanes to one in the direction of travel. At the proposed Convict Creek bridges, a median detour could be utilized to allow one bridge to be constructed at a time. A creek diversion would be needed or it may be possible to leave the existing 60 inch diameter culvert in-place and work around it to avoid having to construct a creek diversion.

Traffic control at the over crossing structures would be similar to that used at Convict Creek. A median detour would likely be utilized to allow one side of the structure to be constructed at a time.

Traffic control would remain in place over night for the duration of work. Pilot cars may be required at various times.

Right of Way Issues:

Temporary easements such as Permits to Enter (PTE)/Temporary Construction Easements (TCE) would be needed to build fence and crossing structures. Permanent easements would also be necessary at the crossing structures for maintenance purposes. Right of way would be needed from the following land owners that are adjacent to the study area.

Land Owner	Required Easements (Acres)
USFS	35
BLM	3.2
City of Los Angeles (City of LA)	13.6
Mono County	2
Total	53.8

Table 12: Summary of right of way needed for Concept 1.

Utilities:

Underground fiber optic cable runs through the focus area at various locations. In some places the fiber optic line is just outside the existing right of way fence or just inside of it. The depth



Image 7: Fiber optic marker near right of way fence.

and location of the fiber line would need to be determined and if it is determined to be in conflict with the proposed structures or fence line, the utility would need to be relocated or protected in-place. Other known utilities are overhead utility poles just outside the right of way fence near Sherwin Creek Road on the east side of the highway. There are also over-head utility lines to the airport which then go to an underground vault just outside the right of way. If funding is established a thorough investigation of the above and underground utilities will be needed.

Cost Estimate:

The cost estimate below includes 20% contingencies.

Capital Cost Estimate Concept 1 – Full Build

Roadway Capital	\$ 25,448,884
Right of Way Capital	\$ 904,125
<u>Structure Capital</u>	<u>\$21,659,595</u>
Total Capital Cost	\$48,012,604

Risk:

Because of the preliminary nature of this scoping document the cost and scope of this Concept are subject to risk triggers. Any of the following could trigger increases in cost or scope:

1. Presence of archaeological artifacts/sites.
2. Design exceptions not approved or additional exceptions required.
3. Presence of wetlands under Army Corp of Engineers and/or CDFW jurisdiction.
4. Unanticipated impacts to state or federally protected species or habitat
5. Mitigation parcels not identified or not able to be purchased.
 - a. Retaining walls required to prevent embankments from encroaching upon sensitive environmental resources.
6. Lack of agency support.

7B. **Concept 2**

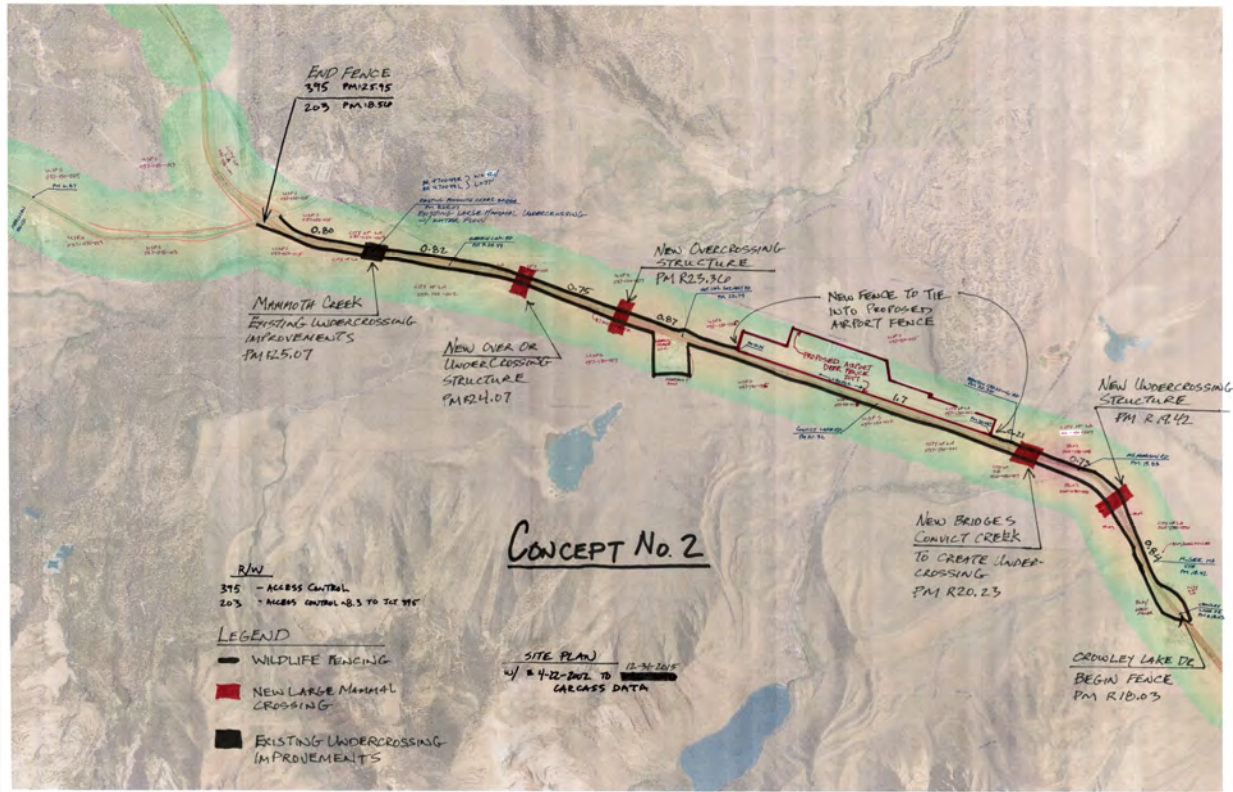


Figure 12 Overview of Concept 2.

Description:

Concept 2 would be the same as Concept 1 described above with the following differences:

1. No WVC reducing measures would be implemented on SR 203.
2. WVC reducing measures on US 395 would not be implemented north of the junction of SR 203 & US 395.

US 395	McGee Creek Undercrossing	PM 19.42
	Convict Creek Bridges Under-Crossing	PM 20.23
	Over Crossing north of Hot Creek Hatchery Rd.	PM 23.36
	Over or Undercrossing midway between Mammoth Creek and crossing at PM 23.36	PM ~24.07
	Mammoth Creek Bridges Under-crossing (improvements to existing)	PM 25.07

Table 13: Summary of Crossing Structures on US 395 for Concept 2.

Anticipated Effectiveness:

28 or more DVCs per year could be reduced on US 395 with this Concept. No reduction in WVCs would be seen on SR 203 or on US 395 north of the junction with SR 203.

Additional Special Studies Needed:

The same special studies would be needed as outlined in Concept 1 above.

Environmental Issues:

This concept would have the same environmental issues and anticipated environmental document as discussed in Concept 1 along US 395.

Construction and Traffic Issues:

This concept would have the same construction and traffic issues as discussed in Concept 1 along US 395.

Right of Way Issues:

Right of way requirements would be the same as Concept 1 described above between the junction of US 395 with SR 203 to Crowley Lake Dr. This concept would reduce the amount of USFS land required and is reflected in the table below.

Potential utility conflicts would be the same for this concept on US 395 south of the junction of US 395 and SR 203 as described in Concept 1 above.

Land Owner	Required Easements (Acres)
USFS	24
BLM	3.2
City of LA	13.6
Mono County	2
Total	42.8

Table 14: Summary of right of way needed for Concept 2.

Cost Estimate:

The cost estimate below includes 20% contingencies.

<i>Capital Cost Estimate Concept 2</i>	
Roadway Capital	\$ 20,360,240
Right of Way Capital	\$ 865,000
Structure Capital	\$16,337,355
Total Capital Cost	\$37,562,595

Risk:

The same risk triggers would be present for this Concept as described for Concept 1.

7C. **Concept 3**

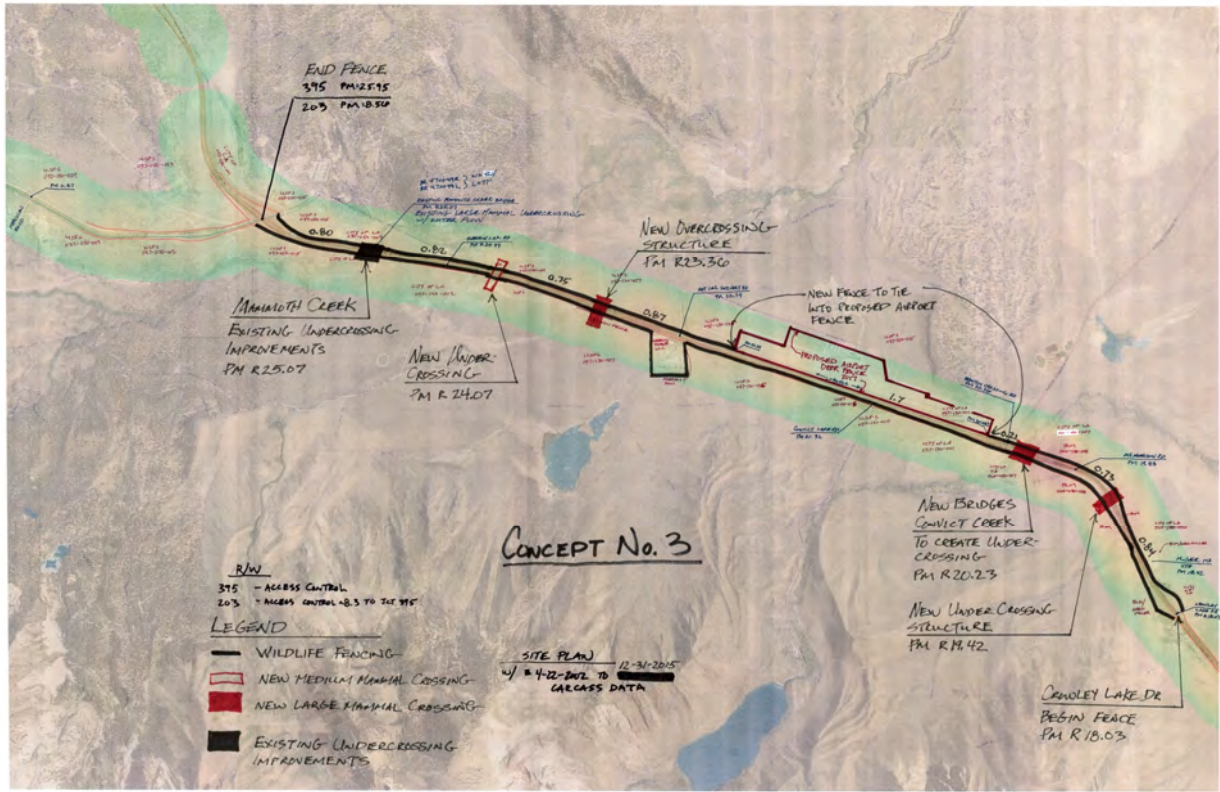


Figure 13: Overview of Concept 3.

Description:

Concept 3 would be the same as Concept 2 described above with the following difference:

1. The large mammal crossing described in Concept 1 and Concept 2 at PM 24.07 would be replaced with a medium mammal crossing.

US 395	McGee Creek Undercrossing	PM 19.42
	Convict Creek Bridges Undercrossing	PM 20.23
	Over Crossing north of Hot Creek Hatchery Rd.	PM 23.36
	Medium mammal undercrossing midway between Mammoth Creek and crossing at PM 23.36	PM ~24.07
	Mammoth Creek Bridges Undercrossing (improvements to existing)	PM 25.07

Table 15: Summary of crossing structures on US 395 for Concept 3.

Anticipated Effectiveness:

28 or more DVCs per year could be reduced on US 395 with this Concept.

Additional Special Studies Needed:

The same special studies would be needed as outlined in Concept 1 above.

Environmental Issues:

This concept would have the same environmental issues and anticipated environmental document as discussed in Concept 1 along US 395.

Construction and Traffic Issues:

This concept would have the same construction and traffic issues as discussed in Concept 1 along US 395.

Right of Way Issues:

The right of way requirements would be the same as described for Concept 2 above. Potential utility conflicts would be the same for this concept south of the junction of US 395 and SR 203.

Cost Estimate:

The cost estimate below includes 20% contingencies.

<i>Capital Cost Estimate Concept 3</i>	
Roadway Capital	\$ 17,538,721
Right of Way Capital	\$ 865,000
<u>Structure Capital</u>	<u>\$11,844,284</u>
Total Capital Cost	\$30,248,005

Risk:

The same risk triggers would be present for this Concept as described for Concept 1 & 2.

7D. **Concept 4**

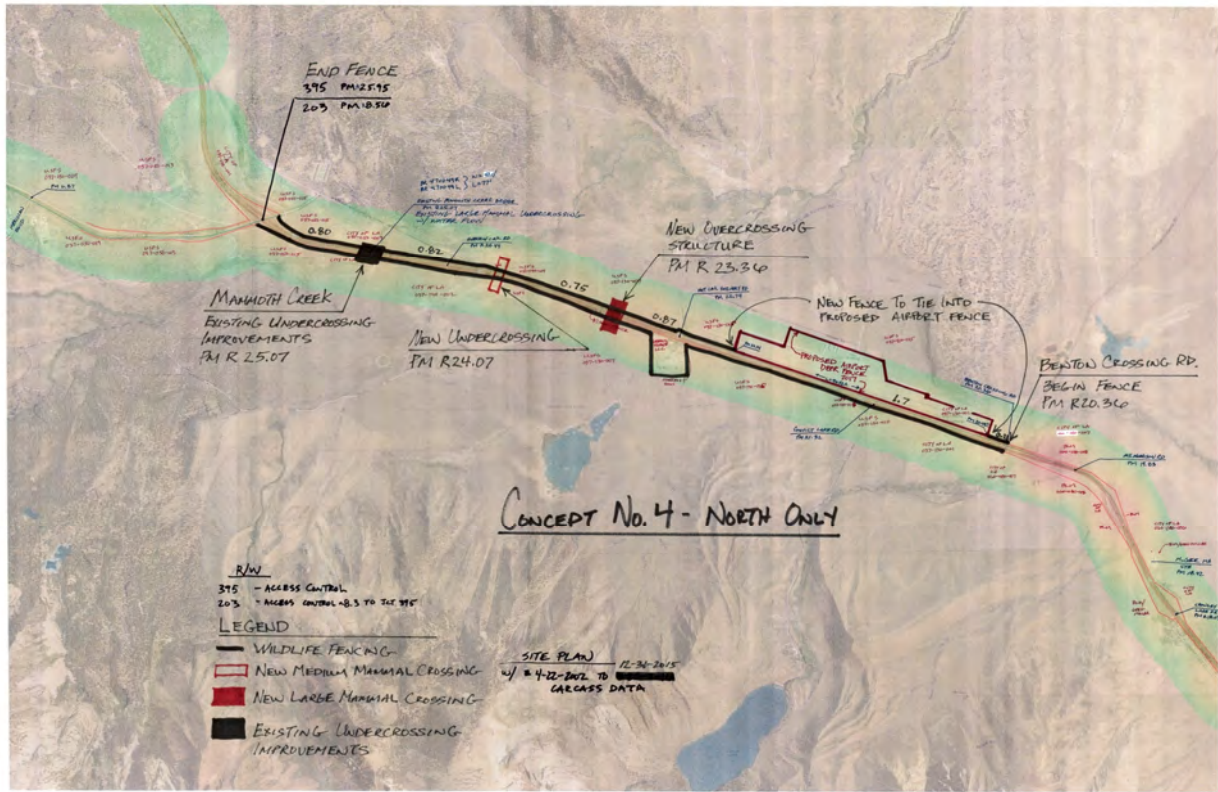


Figure 14: Overview of Concept 4.

Description:

Concept 4 would take advantage of the existing Mammoth Creek crossing, but not install any WVC reducing measures on US 395 south of Benton Crossing Rd. This Concept would also allow a logical construction staging of Concept 1. Concept 4 would install eight miles of wildlife exclusionary fencing on both sides of US 395 from Benton Crossing Rd. to the Junction with SR 203; the fence would tie into the wildlife fencing placed along the Mammoth Yosemite Airport. Wildlife exclusionary fencing would be the same type, color treatment, and installation as described in Concept 1. Two new crossing structures would be installed along with improvements to the existing crossing at Mammoth Creek. The new crossing structures and improvements at the Mammoth Creek crossing would be the same as described in Concept 1. A medium mammal undercrossing would be installed at PM 24.07. The proposed overcrossing structure at PM R23.36 would be the same as described in Concept 1.

US 395	Over Crossing north of Hot Creek Hatchery Rd.	PM 23.36
	Medium mammal undercrossing midway between Mammoth Creek and crossing at PM 23.36	PM ~24.07
	Mammoth Creek Bridges Undercrossing (improvements to existing)	PM 25.07

Table 16: Summary of crossing structures on US 395 for Concept 4.

Anticipated Effectiveness:

Approximately 15 DVCs per year occur between the junction of US 395 and SR 203 and Benton Crossing Rd. These could be reduced significantly in this area if Concept 4 were implemented. No reduction in WVCs would be seen on SR 203 or on US 395 north of the junction with SR 203 or south of Benton Crossing Rd. This Concept may shift or create new hot spots south of Benton Crossing Rd. This Concept would require monitoring south of Benton Crossing Rd. so that measures could be taken if there is an increase in WVCs.

Additional Special Studies Needed:

The same special studies would be needed as outlined in Concept 1 above.

Environmental Issues:

This concept would have the same environmental issues outlined in Concept 1 between the intersection of US 395/SR 203 and Benton Crossing Rd. As there is less work proposed with this Concept there would be less impacts and may allow a lesser level of environmental documentation. However, for planning and scoping purposes it is assumed this Concept would require the same level of environmental documentation described in Concept 1.

Construction and Traffic Issues:

This concept would have similar construction and traffic issues as discussed in Concept 1.

Right of Way Issues:

Less right of way would be required for this concept. Potential utility conflicts would be the same for this concept between the junction of US 395 and SR 203 to Benton Crossing Rd.

Land Owner	Required Easements (Acres)
USFS	14.6
City of LA	6.6
Mono County	1.5
Total	22.7

Table 17: Summary of right of way needed for Concept 4.

Cost Estimate:

The cost estimate below includes 20% contingencies.

Capital Cost Estimate Concept 4

Roadway Capital	\$ 8,742,233
Right of Way Capital	\$ 600,000
Structure Capital	\$ 5,891,838
Total Capital Cost	\$15,234,071

Risk:

The same risk triggers would be present for this Concept as described for Concept 1, 2, and 3.

7E. Concept 5

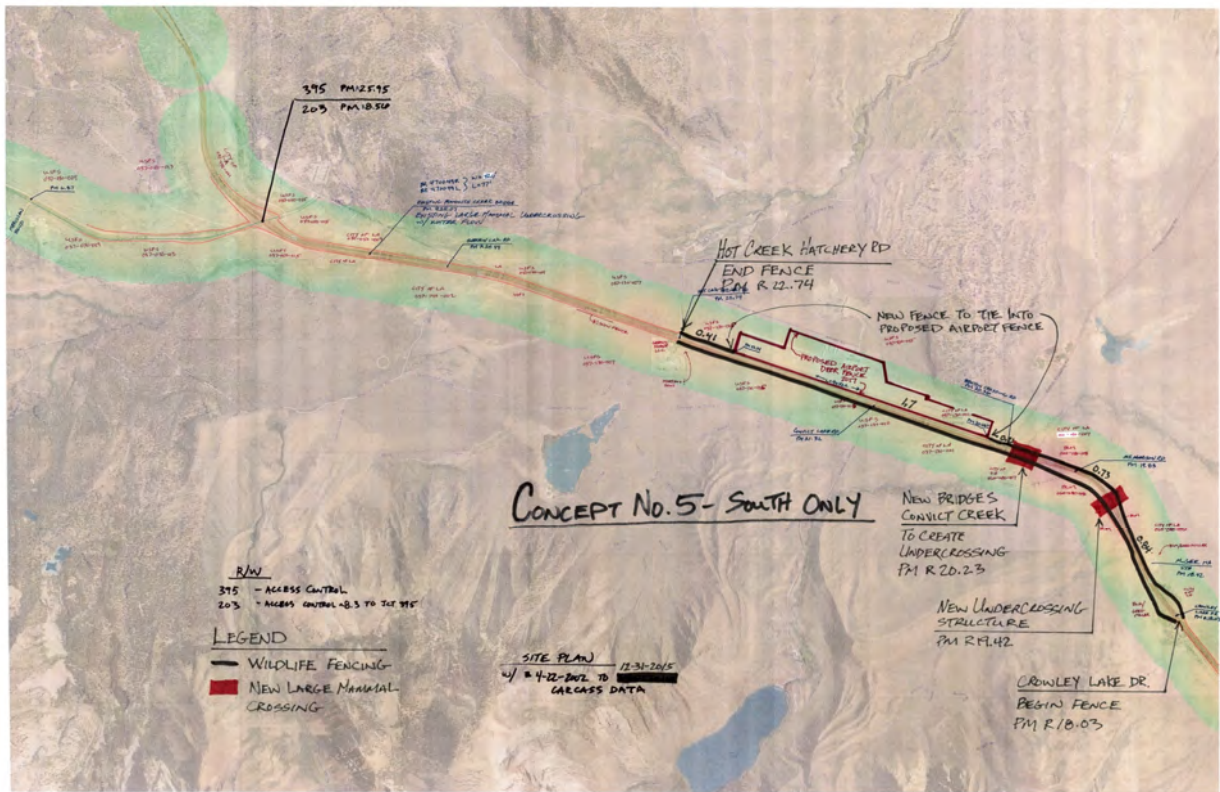


Figure 15: Overview of Concept 5.

Description:

Concept 5 would address the two largest hot spots in the District and allow for a staged construction of Concept 1. Concept 5 would install seven miles of wildlife exclusionary fencing on both sides of US 395 from Hot Creek Hatchery Rd. to Crowley Lake Dr.; the fence would tie into the wildlife fencing placed along the Mammoth Yosemite Airport. Wildlife exclusionary fencing would be the same type, color treatment, and installation as described in Concept 1. Two new crossing structures would be installed along with the wildlife exclusionary fencing. A new bridge at Convict Creek, as described in Concept 1, would be installed to create an undercrossing opportunity like the one at Mammoth Creek. The other undercrossing would be constructed at PM 19.42, 0.80 miles south of Convict Creek. It would be constructed as described in Concept 1.

US 395	McGee Creek Undercrossing	PM 19.42
	Convict Creek Bridges Undercrossing	PM 20.23

Table 18: Summary of Crossing Structures on US 395 for Concept 5.

Anticipated Effectiveness:

Approximately 17 DVCs per year occur between Hot Creek Hatchery Rd. and Crowley Lake Dr. These could be reduced significantly in this area if Concept 5 were implemented. No reduction in WVCs would occur north of Hot Creek Hatchery Rd. This Concept may shift or create new hot spots north of Hot Creek Hatchery Rd. This Concept would require monitoring north of Hot Creek Hatchery Rd. so that measures could be taken if there is an increase in WVCs.

Additional Special Studies Needed:

The same special studies would be needed as outlined in Concept 1.

Environmental Issues:

This concept would have the same environmental issues outlined in Concept 1 between Hot Creek Hatchery Rd. and Crowley Lake Dr. As there is less work proposed with this Concept there would be less impacts and may allow a lower level of environmental documentation. However, for planning and scoping purposes it is assumed this Concept would require the same level of environmental documentation described in Concept 1.

Construction and Traffic Issues:

This concept would have the similar construction and traffic issues as discussed in Concept 1.

Right of Way Issues:

Less right of way would be required for this concept. Potential utility conflicts would be the same for this concept as outlined above between the junction Hot Creek Hatchery Rd. and Crowley Lake Dr.

Land Owner	Required Easements(Acres)
USFS	3.9
City of LA	7.5
BLM	3.4
Total	14.8

Table 19: Summary of right of way needed for Concept 5.

Cost Estimate:

The cost estimate below includes 20% contingencies.

Capital Cost Estimate Concept 5

Roadway Capital	\$ 10,432,689
Right of Way Capital	\$ 600,000
Structure Capital	\$ 5,692,875
Total Capital Cost	\$16,725,564

Risk:

The same risk triggers would be present for this Concept as described for Concept 1, 2, 3 and 4.

7F. Concept 6

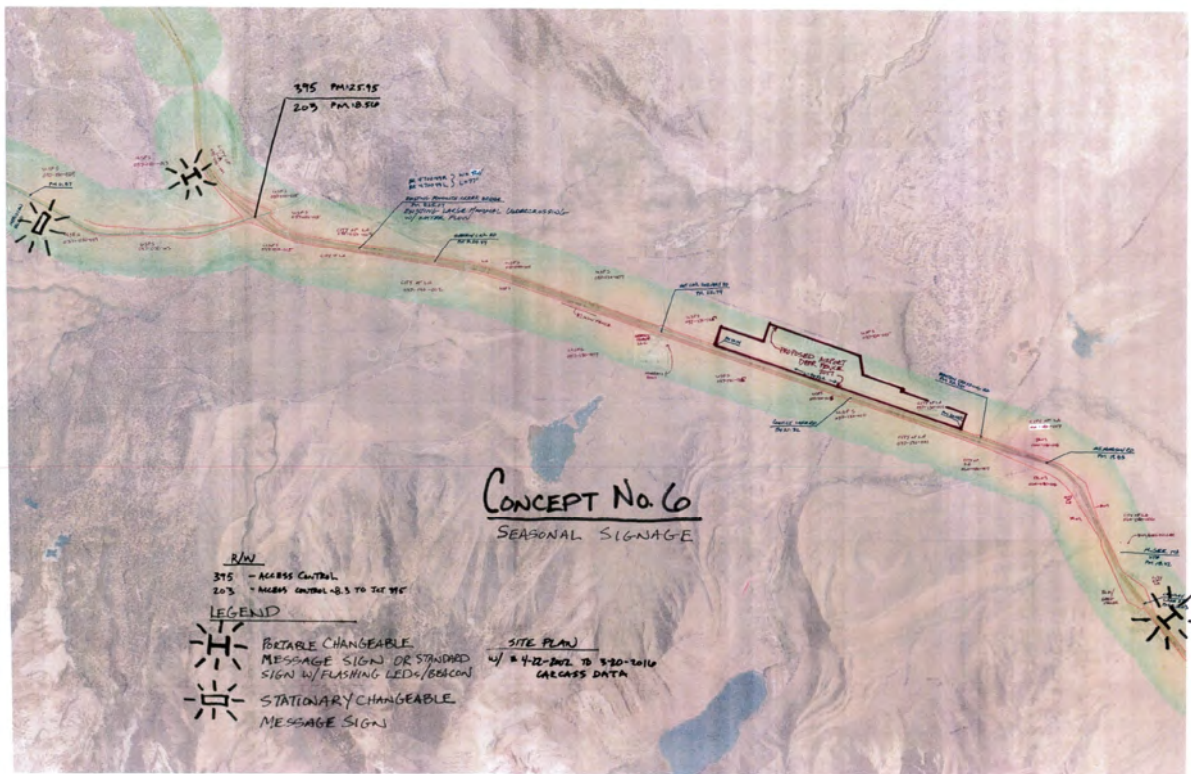


Figure 16: Overview of Concept 6.

Description:



Image 8: Seasonal PCMS w/ deer warning message.

Concepts 1-5 rely on modifying deer/wildlife behavior to reduce WVCs and require intensive and lengthy environmental studies which precludes a quickly implemented solution. Concept 6 is a more quickly implemented and more cost conscious solution. Concept 6 would install seasonal signage to warn drivers of the increase in deer activity within the study area during seasonal migration in the fall and spring; fencing would not be installed allowing wildlife to continue to cross the highway. Temporary warning signs could be temporary portable changeable message signs (PCMS) placed along the highway or standard deer warning signs (W11-3) with either flashing LED

lights or flashing a beacon. If standard deer warning signs are used they would be installed permanently, but the flashing LEDs/beacon would be programmed to only operate during the spring and fall. To maximize the effect of the sign and attract driver attention the message displayed by the PCMS or the flashing LEDs/beacon on a standard deer sign would only occur during dusk to dawn when deer/wildlife are most active. The location of the signs and when they would be installed/removed would be coordinated between Caltrans and CDFW. Caltrans Maintenance forces would install and maintain seasonal signage.

Anticipated Effectiveness:

The effectiveness of Concept 6 is difficult to quantify as it relies on modifying driver behavior to reduce WVCs. This would require motorists to heed the warning and not become habituated to them and wind up ignoring them. Ideally the signs would prompt drivers to be more alert and possibly slow down through thus reducing WVCs. The temporary nature of the signs and the on/off of the message or the flashing LEDs/beacon should make them more effective at keeping drivers attention and not becoming habituated to them; more-so than the standard deer warning sign (W11-3). Some studies have shown a reduction of DVCs between 41%-58% while others have shown no reduction in DVCs when these types of signs are implemented.



Image 9: Standard deer warning sign with flashing beacon.

Additional Special Studies Needed:

No special studies would be needed.

Environmental Issues:

This concept would not require any environmental studies as the signage would be installed directly adjacent to the highway and within existing areas routinely maintained by Caltrans Maintenance forces.

Construction and Traffic Issues:

This concept would have minimal if any impacts to the traveling public during installation of the seasonal signage.

Right of Way Issues:

There would be no right of way required for this Concept.

Cost Estimate:

The cost associated with this Concept assumes that Caltrans Maintenance forces would install and maintain seasonal signage. Rental or purchase costs would also come from Caltrans District 9 Maintenance Budget. The following was assumed in creating an estimate associated with this Concept:

1. Rental of two PCMS boards if these are utilized
2. Installation of two single post standard warning signs with either a flashing beacon or flashing LEDs.

3. Caltrans Maintenance forces would install/setup and maintain the signs.

Capital Cost Estimate Concept 6

Caltrans District 9 Maintenance Capital	\$4,000 ¹ - \$29,000 ²
Total Capital Cost	\$4,000 - 29,000

1. Cost for purchasing and installing two standard deer warning signs with flashing LEDs/flashing beacon by Caltrans Maintenance forces.
2. Annual Cost for renting and maintaining PCMS by Caltrans District 9 Maintenance forces.

Risk:

There would be no risk associated with this Concept.

7G. Concepts Considered But Not Recommended

Of the many possible solutions to reduce WVCs, preventing wildlife from randomly crossing the highway and instead directing them to dedicated over/undercrossings with exclusionary fencing seems to have the greatest effect. Of the many potential methods to reduce WVCs the following methods were considered but not recommend:

1. *Wildlife Detection Systems with Activated Signage*- these system utilize a detection system consisting of either Doppler radar, infra-red cameras, or a break-the-beam technology to detect wildlife near the roadway. When wildlife are detected the signs are activated to warn motorists of wildlife near the roadway. Many of these detection systems are installed without exclusionary fencing and rely on motorists to slow down in response of the activated signage.

These systems have been tested for several years in the United States and abroad. Unfortunately they have an inconsistent track record for reliability which can result in drivers ignoring the signs. Of all the case studies utilizing this technology all were installed on two lane facilities without a median. In some case studies the detection system and activated signage were used in combination with exclusionary fencing to direct wildlife to an at-grade wildlife crossing. The system would detect wildlife when approaching the crossing and warn motorists of the wildlife. Electrified elements placed in the roadway define the “crosswalk” and help guide wildlife from one side to the other. As long as the detection system is setup correctly, this seems to work well for locations with short crossings, i.e. a two lane facility without a center median. A system like this would be inappropriate for the focus area due to the long crossing created by four lanes and variable width median.

The other issue contributing to the inconsistent performance of these detection systems’ are the difficulties of correctly detecting wildlife which pose a collision hazard. Not only do the Doppler /IR detection systems need to correctly identify the correct species, i.e. larger mammals such as bear, deer, coyotes, and others, they need to correctly screen out all other false detections. The detection system needs to be carefully setup to screen out smaller wildlife which do not present a collision hazard and other false activations. Vehicles pulling over road have been known to trigger

the system. Locations prone to wind have been known to prove difficult for some detection systems, especially those utilizing break the beam technology. With break-the-beam sensors vegetation must be constantly trimmed/maintained so as not to interfere with the beam or get blown into the beam. Wind gusts may also misalign the sensors giving a false detection. Given enough false detections motorists lose confidence in the system and may ignore the signs.

Another issue with these detection systems is getting motorists to trust the system, especially when wildlife may not always be visible which cause activation. Motorists who regularly travel through areas with these systems have stated they don't trust the system because they had not seen any wildlife when the signs were indicating the presence of wildlife.

These systems are considered inappropriate due to the size of the facility, windy location of the focus area, installation and maintenance costs of the system, and inconsistent performance. These systems should be reevaluated for use in the future as the technology and applications evolve.

2. *Electric Fencing*- electric fencing is sometimes used instead of exclusionary fence to minimize aesthetic concerns. Electric fencing only needs to be three to four feet tall where standard wildlife exclusionary fencing is typically eight to ten feet tall. The reduced height reduces visibility to motorists and reduces the negative visual impact to the landscape. The potential down side to electric fencing is that if the system becomes de-energized wildlife can easily pass over the fence and get in the roadway. Electric fencing is considerably more expensive than standard fencing to construct and maintain. For these reasons it was not included as a Concept.
3. *Speed Reduction*- While lowered speed limits may help reduce the number of WVCs, it is difficult to get motorists to comply with the new lowered limit. If motorists feel the lowered speed limit is unreasonable, they are likely to engage in passing, tailgating and speeding, which can increase the severity and frequency of collisions with other vehicles. Further, speeds are regulated by the California Vehicle Code (CVC) and deviation from the CVC requires legislative approval, which is rarely granted. For these reasons reducing the speed limit within the focus area was not included as a Concept.

8. PUBLIC AND AGENCY INVOLVEMENT

A combined presentation by Caltrans and CDFW was given at the Mono County Local Transportation Commission (LTC) meeting on August 8, 2016. CDFW presented background information regarding wildlife behavior, specifically of deer, with respect to the study area and methods to reduce WVCs. Caltrans summarized the information in this report. A press release inviting public participation was published in the local papers describing the topic, the date and time. Another joint presentation is scheduled to be given to the Mono County Collaborative Planning Team on October 27, 2016.

CDFW and the USFS were consulted with in creation of this report and the Concepts described above. Timothy Taylor, CDFW, provided information regarding deer/wildlife behavior and migration patterns, and worked collaboratively with Caltrans to produce the six Concepts above. On April 5, 2016 Mr. Taylor and Cory Freeman, Caltrans Project Engineer, met at the focus area to conduct a field review. On June 8, 2016 Caltrans met with CDFW biologists and environmental planners to discuss the FSR.

Caltrans also consulted with Richard Perloff, biologist, with the Inyo National Forest and Sandra Jacobson, wildlife biologist, with the USFS Pacific Southwest Research Station. Mr. Perloff recommended contacting Ms. Jacobson. Ms. Jacobson is involved with wildlife crossing projects involving the USFS and was able to provide valuable information for this report.

Conversations between Caltrans and the TOML regarding their project to install wildlife exclusionary fencing around the Mammoth Yosemite Airport to prevent wildlife from crossing the air field have occurred. In February 2016 the TOML informed Caltrans of their plans to install the fence and to arrange a meeting to discuss it. On March 8, 2016 Caltrans and the TOML met at the airport to discuss their fence project. Subsequent to that initial meeting, numerous discussions have ensued between the TOML and Caltrans regarding their fence project and its impacts on Caltrans facility.

9. ENVIRONMENTAL DETERMINATION / DOCUMENT

The estimated time to obtain environmental approval and final environmental documents (including estimated time for specialty studies/reports, permits, and public comment period) would be 4-6 years depending upon which Concept is chosen.

10. FUNDING

A funding source has not been identified at this time. If funding is identified, the next step would be development of a Project Initiation Document (PID) to define the project scope and to program support and capital cost components.

Detailed preliminary cost estimates have been prepared for the six Concepts presented. Roadway costs consider all improvements associated with each alternative, including roadwork, signage, and drainage in the focus area. Dollar amounts represent current (FY 2016) costs without escalation. Due to the level of detail available, these cost estimates are good for long range planning purposes only.

CONSTRUCTION AND R/W CAPITAL COST ESTIMATE SUMMARY (CURRENT)				
CONCEPT	ROADWAY COST	R/W COST	STRUCTURE COST	TOTAL COST
CONCEPT 1	\$25,448,884	\$904,125	\$21,659,595	\$48,012,604
CONCEPT 2	\$20,360,240	\$865,000	\$16,337,355	\$37,562,595
CONCEPT 3	\$17,538,721	\$865,000	\$11,844,284	\$30,248,005
CONCEPT 4	\$8,742,233	\$600,000	\$5,891,838	\$15,234,071
CONCEPT 5	\$10,432,689	\$600,000	\$5,692,875	\$16,725,564
CONCEPT 6	\$4,000-29,000	\$0	\$0	\$4,000-29,000

Table 20: Summary of capital costs for Concepts 1-6.

11. DISTRICT CONTACTS

Project Manager	Dennee Alcala	760-872-0767
Design Manager	Brian Wesling	760-872-0630
Environmental Manager	Angie Calloway	760-872-2424
Landscape Architect	Jim Hibbert	760-872-0783
Planning	Brandon Fitt	760-872-0724
Traffic Operations	Terry Erlwein	760-872-0650
Right of Way	Nancy Escallier	760-872-0641
Project Engineer	Cory Freeman	760-872-0716

12. LIST OF ATTACHMENTS

Attachment A	Layouts for Concepts 1-6
Attachment B	Environmental Scoping Memo
Attachment C	Cost Estimates for Concepts 1-5
Attachment D	Conceptual Renderings
Attachment E	Deer Mortality by Post Mile US 395 Mono County

13. REFERENCES

2009 Western Transportation Institute Wildlife Detection Systems Mono County Regional Transportation Plan – 2015 Update, Mono County Local Transportation Commission, Mono County Community Development Department, Town of Mammoth Lakes Community Development Department.

Animal Vehicle Crash Mitigation using Advanced Technology, Phase 1: Review, Design and Implementation, Marcel P. Huijser, Patrick T. McGowen, Whisper Camel, Amanda Hardy, Patrick Wright, and Anthony P. Clevenger Western Transportation Institute, August 2006

Caltrans Wildlife Crossings Guidance manual 2007, California Department of Transportation

Caltrans Seeking Safe Passage Planning, California Department of Transportation, October 2015

Evaluation of the use and Effectiveness of Wildlife Crossings, National Cooperative highway Research program, NCHRP Report 615, May 2008

Evaluation of an Animal Warning System Effectiveness Phase Two – Final Report, Mohammad (Ashkan) Sharafsaleh, P.E., Marcel Huijser, PhD, Christopher Nowakowski, Mark C. Greenwood, PhD, Larry Hayden, Jonathan Felder, and May Wang, California PATH Program, University of California Berkeley, Western Transportation Institute, June 2012

Final Report – An Assessment of the Sandhouse Project’s Effects on Mule Deer Movement and Mortality along State Route 395 in Mono County, Jones and Stokes, October 1999

Highway Deer Kill Study Route 09-Mno-395, California Division of Highways, District 09, January 1973

Methods to Reduce Traffic Crashes Involving Deer: What Works and What Does Not, James H. Hedlund, Paul D. Curtis, Gwen Curtis, Allan F. Williams, Insurance Institute For Highway Safety, October 2003

Procedures and Tools for Wildlife-Vehicle Collision Hotspot Analysis; Using Caltrans District 10 as an Example, Marcel P. Huijser, PhD and James S. Begley, M.Sc., Western Transportation Institute, January 2014

SR 203 Transportation Concept Report, California Department of Transportation, Office of System Planning, District 9, June 2007.

The Comparison of Animal Detection Systems in a Test-Bed: A Quantitative Comparison of System Reliability and Experiences with Operation and Maintenance Final Report, Marcel P. Huijser, PhD, Patrick T. McGowen, Tiffany D. Holland, BSc., Matt Blank, MSc., Mark C. Greenwood, PhD, Barrett Hubbard and Shaowei Wang, MSc. Western Transportation Institute, April 2009

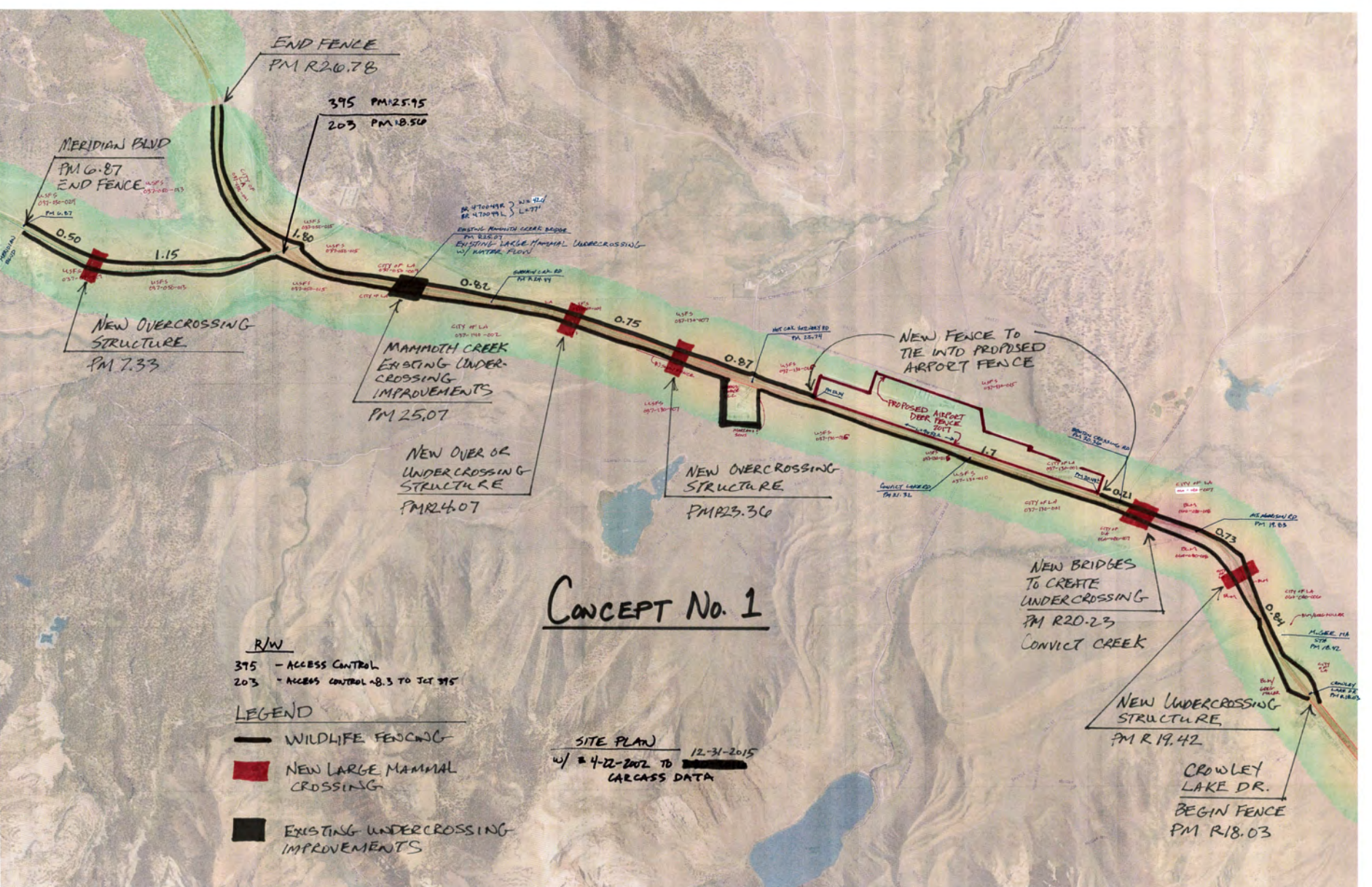
US 395 Transportation Concept Report, California Department of Transportation, Office of System Planning, District 10, November 2014.

Wildlife Crossing Structure Handbook, U.S. Department of Transportation Federal Highway Administration, FHWA-CFL/TD-11-003, March 2011

Wildlife-Vehicle Collision Reduction Study –Report to Congress, U.S. Department of Transportation Federal Highway Administration, FHWA-HRT-08-034, August 2008

Attachment A

Layouts for Concepts 1-6



END FENCE
PM R20.78

395 PM25.95
203 PM18.50

MERIDIAN BLVD
PM 6.87
END FENCE

NEW OVERCROSSING
STRUCTURE
PM 7.33

MAMMOTH CREEK
EROSION UNDER-
CROSSING
IMPROVEMENTS
PM 25.07

NEW OVER OR
UNDERCROSSING
STRUCTURE
PM R24.07

NEW OVERCROSSING
STRUCTURE
PM R23.30

NEW FENCE TO
TIE INTO PROPOSED
AIRPORT FENCE

NEW BRIDGES
TO CREATE
UNDERCROSSING
PM R20-23
CONVICT CREEK

NEW UNDERCROSSING
STRUCTURE
PM R 19.42

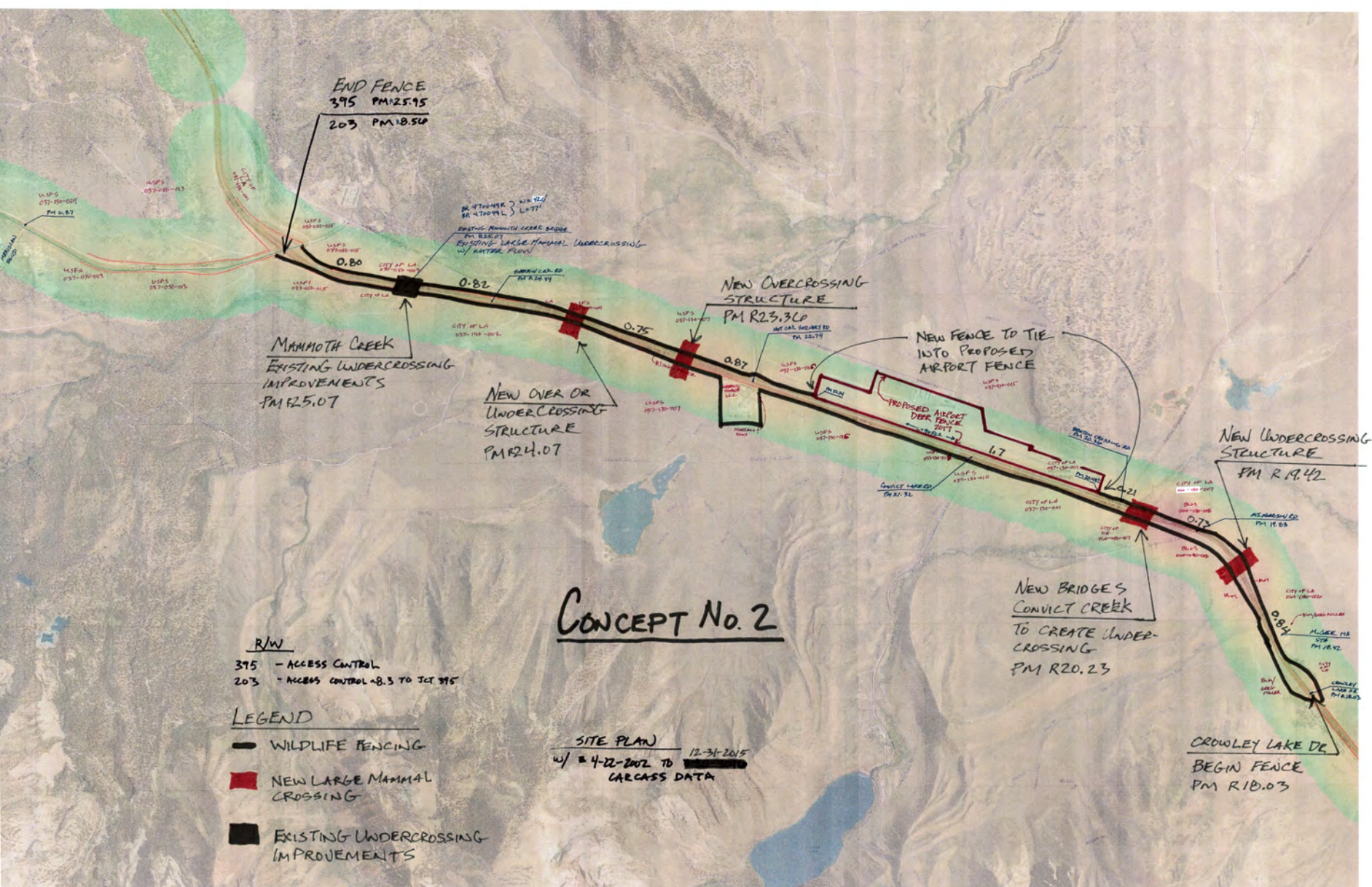
CROWLEY
LAKE DR.
BEGIN FENCE
PM R18.03

CONCEPT No. 1

- R/W
- 395 - ACCESS CONTROL
 - 203 - ACCESS CONTROL 18.3 TO JCT 395

- LEGEND
- WILDLIFE FENCING
 - NEW LARGE MAMMAL CROSSING
 - EXISTING UNDERCROSSING IMPROVEMENTS

SITE PLAN
12-31-2015
w/ 4-22-2002 TO [REDACTED]
CARCASS DATA



END FENCE
395 PM 25.95
203 PM 18.50

MAMMOTH CREEK
EXISTING UNDERCROSSING
IMPROVEMENTS
PM 25.07

NEW OVER OR
UNDER CROSSING
STRUCTURE
PM 24.07

NEW OVERCROSSING
STRUCTURE
PM 23.30

NEW FENCE TO TIE
INTO PROPOSED
AIRPORT FENCE

NEW UNDERCROSSING
STRUCTURE
PM R 19.42

NEW BRIDGES
CROWLEY CREEK
TO CREATE UNDER-
CROSSING
PM R 20.23

CROWLEY LAKE DR
BEGIN FENCE
PM R 18.03

CONCEPT No. 2

- R/W
- 395 - ACCESS CONTROL
 - 203 - ACCESS CONTROL 8.3 TO JCT 395

- LEGEND
- WILDLIFE FENCING
 - NEW LARGE MAMMAL CROSSING
 - EXISTING UNDERCROSSING IMPROVEMENTS

SITE PLAN
w/ 4-22-2002 TO ~~_____~~
12-31-2015
CARCASS DATA

END FENCE
395 PM 25.95
203 PM 18.50

MAMMOTH CREEK
EXISTING UNDERCROSSING
IMPROVEMENTS
PM R 25.07

NEW UNDER-
CROSSING
PM R 24.07

NEW OVERCROSSING
STRUCTURE
PM R 23.30

NEW FENCE TO TIE
INTO PROPOSED AIRPORT
FENCE

NEW BRIDGES
CONVICT CREEK
TO CREATE UNDER-
CROSSING
PM R 20.23

NEW UNDER CROSSING
STRUCTURE
PM R 19.42





CRAWLEY LAKE DR
BEGIN FENCE
PM R 18.03

CONCEPT No. 3

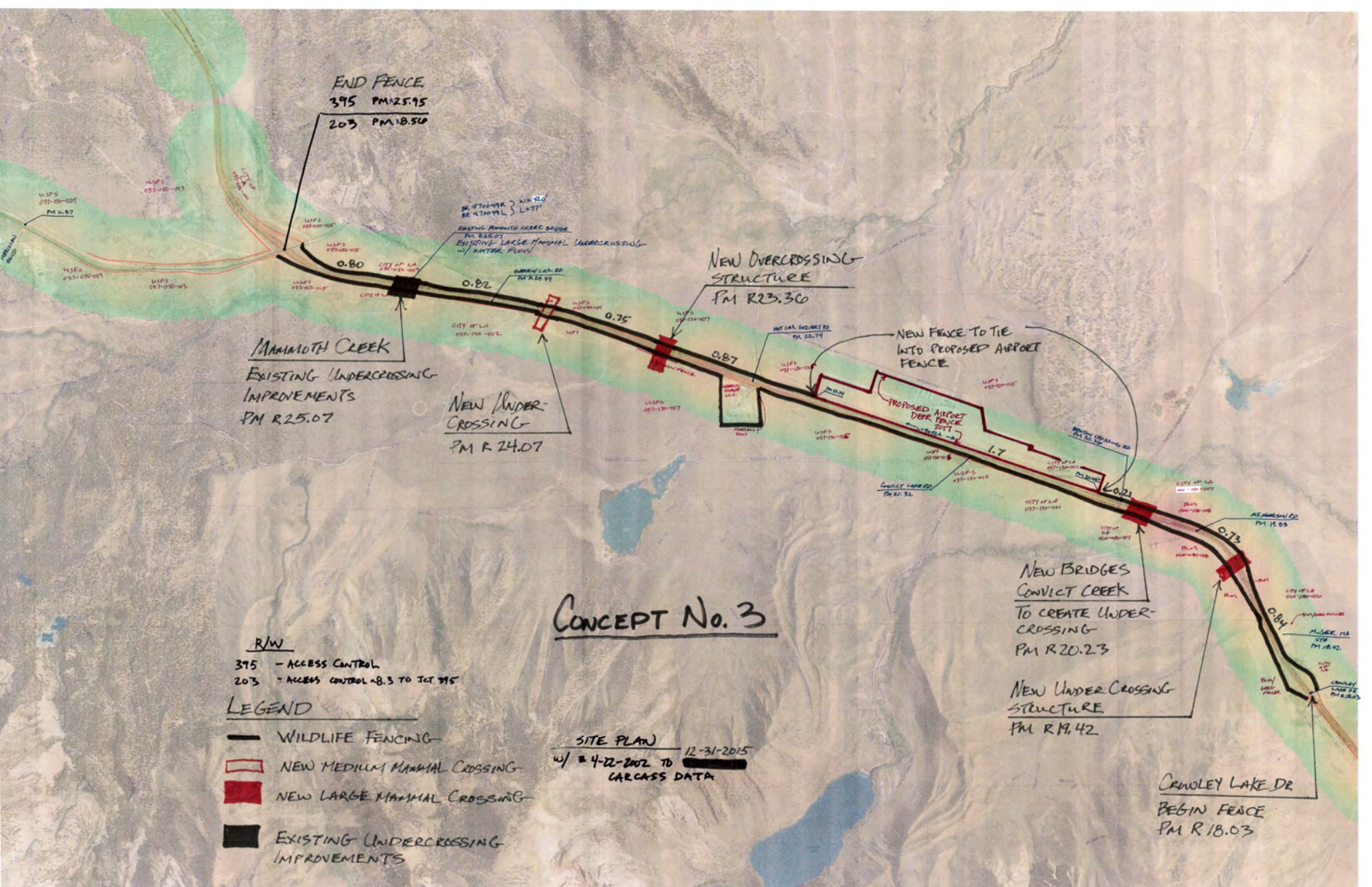
R/W

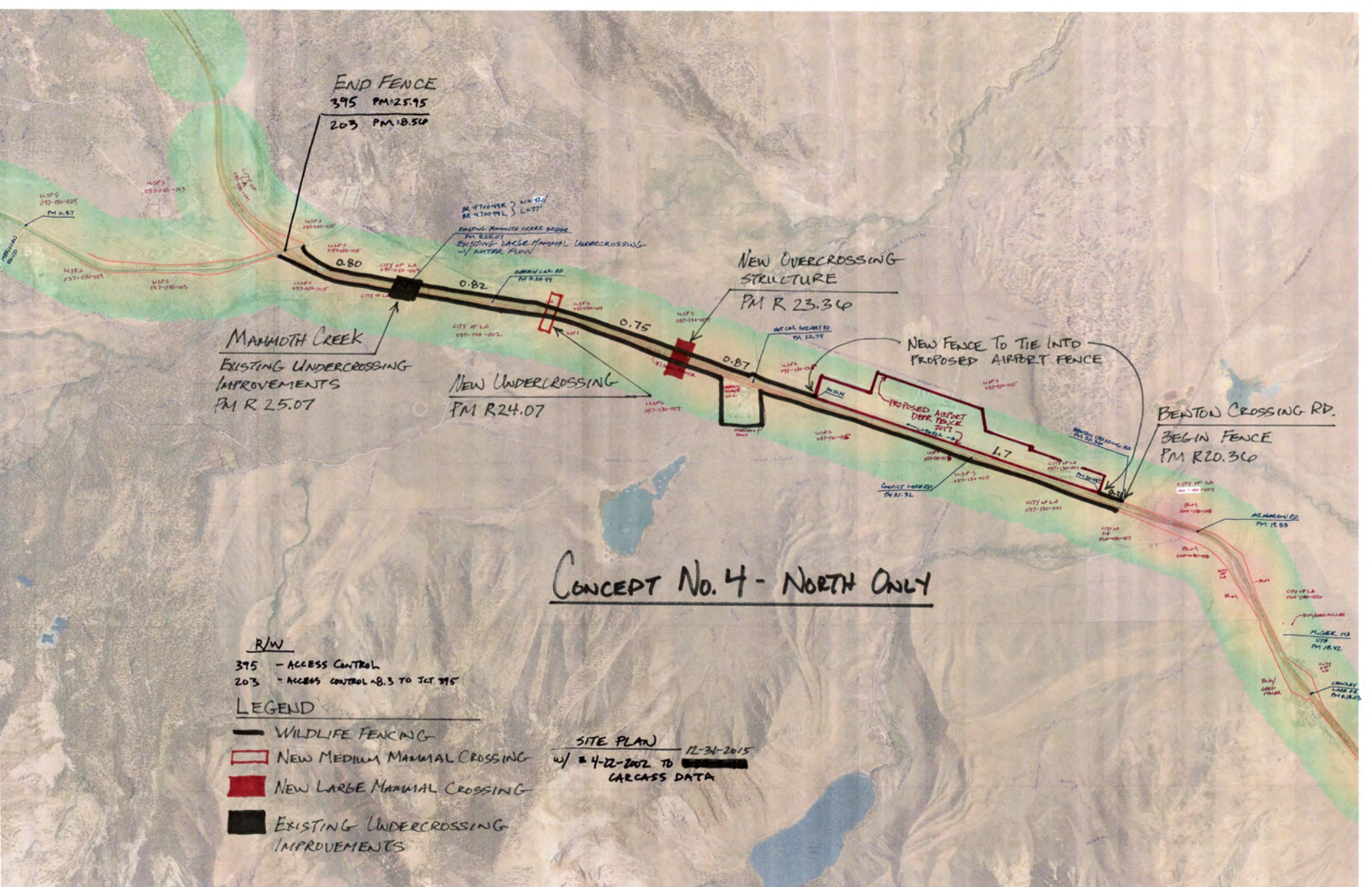
- 395 - ACCESS CONTROL
- 203 - ACCESS CONTROL 8.3 TO JCT 395

LEGEND

-  WILDLIFE FENCING
-  NEW MEDIUM MAMMAL CROSSING
-  NEW LARGE MAMMAL CROSSING
-  EXISTING UNDERCROSSING IMPROVEMENTS

SITE PLAN 12-31-2015
w/ 4-22-2012 TO [REDACTED]
CARCASS DATA



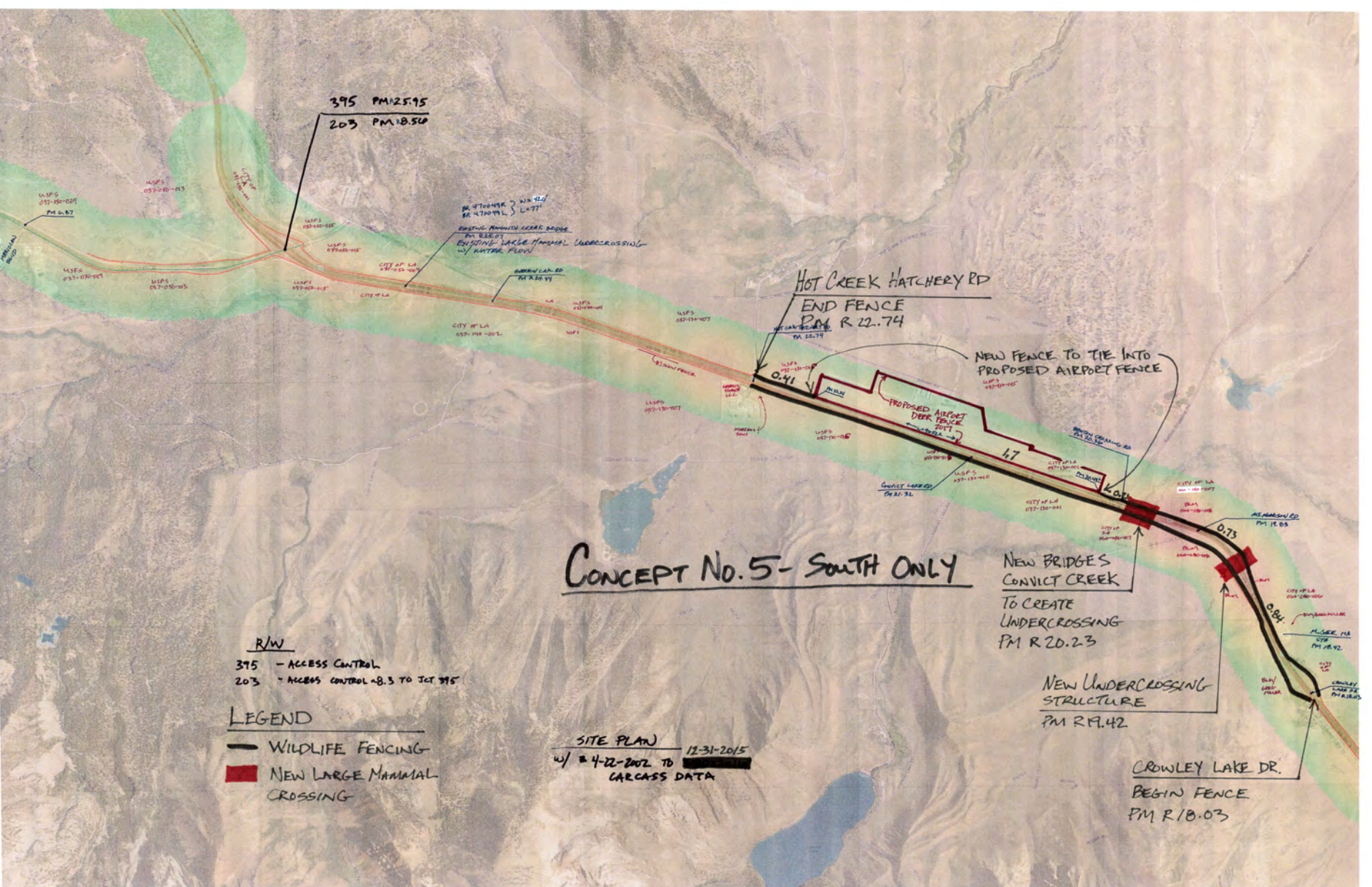


CONCEPT No. 4 - NORTH ONLY

- R/W
- 395 - ACCESS CONTROL
 - 203 - ACCESS CONTROL @ 8.3 TO JCT 395

- LEGEND
- WILDLIFE FENCING
 - NEW MEDIUM MAMMAL CROSSING
 - NEW LARGE MAMMAL CROSSING
 - EXISTING UNDERCROSSING IMPROVEMENTS

SITE PLAN
 12-31-2015
 w/ 4-22-2012 TO [REDACTED]
 CARCASS DATA



395 PM 125.95
203 PM 18.50

EXISTING MAMMAL CREEK BRIDGE
PM 836.07
EXISTING LARGE MAMMAL UNDERCROSSING
w/ WATER FLOW

HOT CREEK HATCHERY RD
END FENCE
PM R 22.74

NEW FENCE TO TIE INTO
PROPOSED AIRPORT FENCE

PROPOSED AIRPORT
DEER FENCE
2027

NEW BRIDGES
CONVICT CREEK
TO CREATE
UNDERCROSSING
PM R 20.23

NEW UNDERCROSSING
STRUCTURE
PM R 19.42

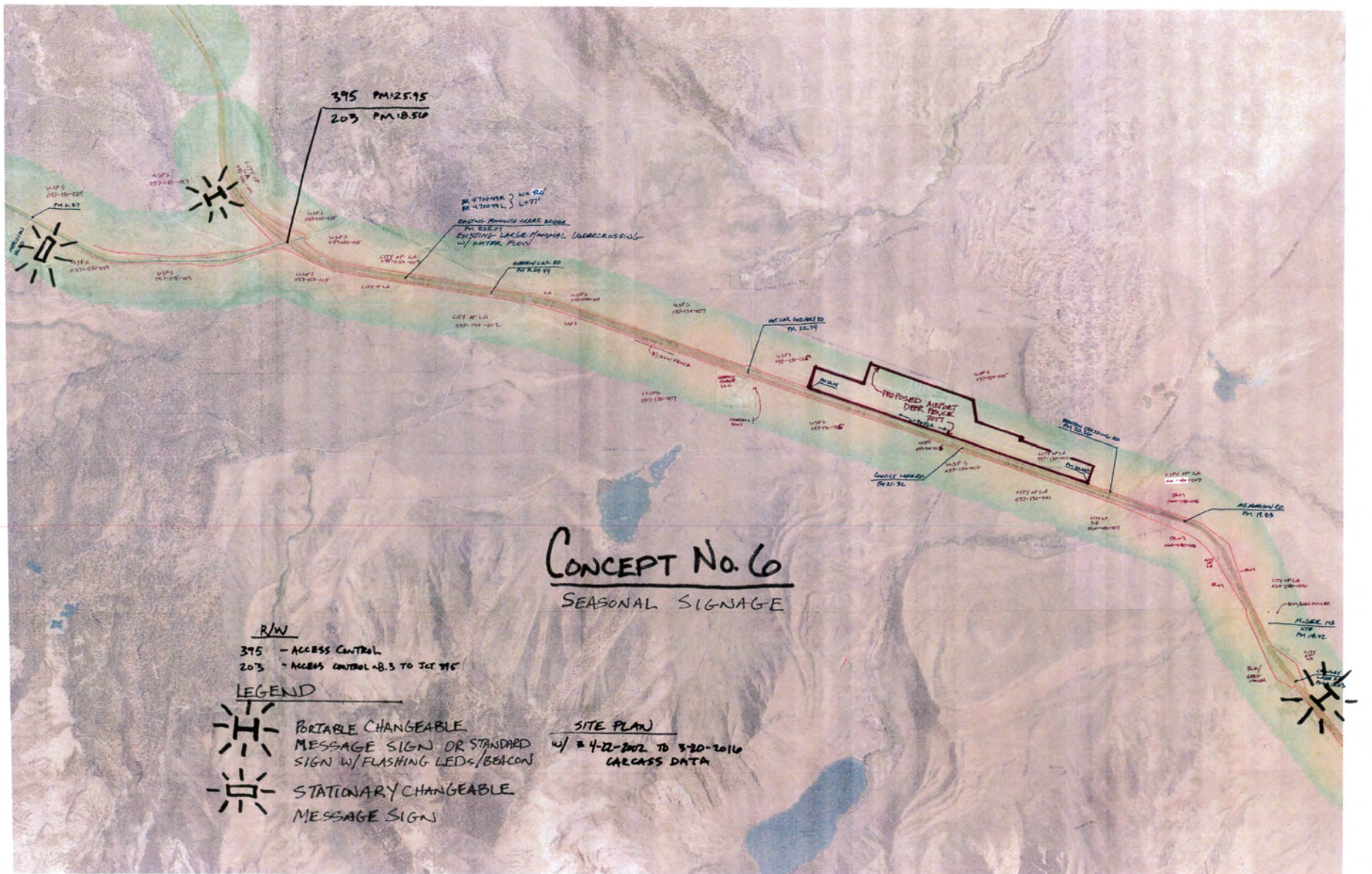
CROWLEY LAKE DR.
BEGIN FENCE
PM R 18.03

CONCEPT No.5 - South Only

- R/W
- 395 - ACCESS CONTROL
 - 203 - ACCESS CONTROL @ 8.3 TO JCT 395

- LEGEND
- WILDLIFE FENCING
 - NEW LARGE MAMMAL CROSSING

SITE PLAN 12-31-2015
w/ 4-22-2012 TO [REDACTED]
CARCASS DATA



395 PM 125.95
203 PM 10.50

EX. 470048 & 470049
EX. 470048 & 470049
EXISTING MOUNTAIN VIEW BOULEVARD
FOR BEESBY
EXISTING LAKE MOUNTAIN UNDERCROSSING
W/ WATER FLOW



MT. CANT. ROAD
TA 25.74

PROPOSED AIRPORT
DEER FENCE
TA 25.74

CONCEPT No. 6

SEASONAL SIGNAGE

R/W
395 - ACCESS CONTROL
203 - ACCESS CONTROL - 8.5 TO JCT 395

- LEGEND
-  PORTABLE CHANGEABLE MESSAGE SIGN OR STANDARD SIGN W/ FLASHING LEDS/BEACON
 -  STATIONARY CHANGEABLE MESSAGE SIGN

SITE PLAN
w/ 4-22-2002 TO 3-20-2010
CARCASS DATA



Attachment B

Environmental Scoping Memo

Memorandum

*Flex your power!
Be energy efficient!*

To: CORY FREEMAN
Project Design Engineer
District 9 Design Branch

Date: June 14, 2016

File: 09-98711
Deer-Vehicle Collision
Reduction Feasibility Study
Report (FSR)

From: ANGELA CALLOWAY 
Eastern Sierra Environmental Branch

Subject: **Initial Environmental Scoping for the Deer-Vehicle Collision reduction Feasibility Study Report (FSR)**

This memo is in response to your request from May 6, 2016 for an estimate of the Environmental Scope for the above referenced project. This memo does not take the place of an actual Preliminary Environmental Analysis Report (PEAR) or other environmental documentation, which will be required if the proposal is programmed as a project.

The Purpose and Need, Description of Work, and Project Alternatives are discussed in the Environmental Scoping Request memo from May 6, 2016 and this memo is based upon only the "Full Build Out" option of the project.

The anticipated environmental documents for this proposed project could be:
CEQA: Environmental Impact Report (EIR) and **NEPA:** Environmental Assessment (EA). This is assuming that the project does have a significant effect on the environment. If the project is determined to have lower environmental impacts, then a lesser level of environmental document may be required.

The estimated time to obtain environmental approval and the final environmental document will be 4 to 6 years from the milestone "Begin Environmental" – two to three to achieve PA and ED; two to three to ascertain and complete permits and mitigation.

As currently scoped, at "Full Build Out," the project will require the following permits: 401, 404, and a 1602; possibly to include a 2080.1 permit; also, the project may require a Biological Opinion (BO) from USFWS and a wetland delineation report. It would also require a Visual Impact Study, Cultural resource studies from Phase 1, to as high a Phase 3. A 4(f) study will be required and a number of hazardous waste studies will also be required.

It is anticipated for the currently proposed Purpose and Need statement that this project will require permits and mitigation. If the level effect of the project changes to become less than the "Full Build Out" option and an EIR/EIS, then the environmental compliance process would need to be reassessed for the physical needs of the project and any effect on the environment.

Deer-Vehicle FSR
June 14, 2016
Page 2 of 2

Disclaimer

This Feasibility Study Memo provides approximate information only to support future possible programming of the proposed project, and is not an environmental determination or document. Preliminary analysis and estimated mitigation costs will be provided in a future PEAR, based on project description provided in any future Project Study Report. The estimates and conclusions in this Memo are approximate and are based on probable effects of the proposed project. Any changes in project scope or alternatives will require Environmental reevaluation efforts.

Cc: Environmental Files 09-98711

Attachment C

Cost Estimates for Concepts 1-6

Concept 1 Quantity & Cost Estimate

	QTY	UNIT	UNIT COST	PRICE	
develop water supply	1	LS	\$ 150,000	\$	150,000
jump outs	30	EA	\$ 10,000	\$	300,000
Deer Fencing	95409	LF	\$ 10.50	\$	1,001,795
Cattle Guards	31	EA	\$ 8,000	\$	248,000
over crossing structures	3	EA	\$ 5,322,240	\$	15,966,720
Under Crossing structure McGee	1	EA	\$ 2,252,875	\$	2,252,875
Retaining Walls	1	LS	\$ 225,848	\$	225,848
Convict Creek Bridges (NB & SB)	1	LS	\$ 3,440,000	\$	3,440,000
Midwest Guardrail System	5965	LF	\$ 30	\$	178,950
Concrete Barrier Type 60	2160	LF	\$ 85	\$	183,600
traffic control	1	LS	\$ 500,000	\$	500,000
Erosion Control	6	ACRES	\$ 20,000	\$	114,000
imported borrow	124,026	CY	\$ 20	\$	2,480,519
Roadway Excavation	38357	CY	\$ 25	\$	958,928
Temp Railing Type K	22000	LF	\$ 30	\$	660,000
RSP (1/2 Ton Method A)	765	CY	\$ 100	\$	76,481
Planting	5.7	ACRES	\$ 42,000	\$	239,400
HMA TYPE A	3645	TON	\$ 400	\$	1,457,946
CL2 aggregate base	277	CY	\$ 400	\$	110,726
Remove Existing Deer Fence	230	LF	\$ 20	\$	4,600
Clear and Grub	1	LS	\$ 350,000	\$	350,000
Temp Pavement Delineation	186000	LF	\$ 0.5	\$	93,000
Final Pavement Delineation	54450	LF	\$ 0.2	\$	10,890
Construction Area Signs	1	LS	\$ 100,000	\$	100,000
24" Culverts for small animal crossings	5	EA	\$ 2,000	\$	10,000
storm water (5% of project costs)	1	LS	\$ 608,604	\$	608,604
SUB-TOTAL				\$	31,722,881
MINOR ITEMS (10%)				\$	3,172,288.14
MOBILIZATION (5%)				\$	1,744,758.48
SUPPLEMENTAL WORK (10%)				\$	3,489,516.95
CONTENGENCIES (20%)				\$	6,979,033.90
TOTAL ROADWAY AND STRUCTURES				\$	47,108,479
RIGHT OF WAY				\$	904,125
TOTAL PROJECT CAPITAL OUTLAY COSTS				\$	48,012,604

Concept 2 Quantity & Cost Estimate

	QTY	UNIT	UNIT COST	PRICE	
develop water supply	1	LS	\$ 150,000	\$	150,000
jump outs	25	EA	\$ 10,000	\$	250,000
Deer Fencing	69880	LF	\$ 10.50	\$	733,740
Cattle Guards	28	EA	\$ 8,000	\$	224,000
over crossing structures	2	EA	\$ 5,322,240	\$	10,644,480
Under Crossing structure McGee	1	EA	\$ 2,252,875	\$	2,252,875
Retaining Walls	1	LS	\$ 225,848	\$	225,848
Convict Creek Bridges (NB & SB)	1	LS	\$ 3,440,000	\$	3,440,000
MGS	5309	LF	\$ 30	\$	159,270
Concrete Barrier Type 60	1440	LF	\$ 85	\$	122,400
traffic control	1	LS	\$ 500,000	\$	500,000
Erosion Control	6	ACRES	\$ 20,000	\$	114,000
imported borrow	83,741	CY	\$ 20	\$	1,674,815
Roadway Excavation	38357	CY	\$ 25	\$	958,928
Temp Railing Type K	17600	LF	\$ 30	\$	528,000
RSP (1/2 Ton Method A)	765	CY	\$ 100	\$	76,481
Planting	4.3	ACRES	\$ 42,000	\$	180,600
HMA TYPE A	3024	TON	\$ 400	\$	1,209,706
CL2 aggregate base	277	CY	\$ 400	\$	110,726
Remove Existing Deer Fence	230	LF	\$ 20	\$	4,600
Clear and Grub	1	LS	\$ 350,000	\$	350,000
Temp Pavement Delineation	148800	LF	\$ 0.5	\$	74,400
Final Pavement Delineation	43560	LF	\$ 0.2	\$	8,712
Construction Area Signs	1	LS	\$ 100,000	\$	100,000
24" Culverts for small animal crossings	5	EA	\$ 2,000	\$	10,000
storm water (5% of project costs)	1	LS	\$ 608,604	\$	608,604
SUB-TOTAL				\$	24,712,185
MINOR ITEMS (10%)				\$	2,471,218.52
MOBILIZATION (5%)				\$	1,359,170.18
SUPPLEMENTAL WORK (10%)				\$	2,718,340.37
CONTENGENCIES (20%)				\$	5,436,680.74
TOTAL ROADWAY AND STRUCTURES				\$	36,697,595
RIGHT OF WAY				\$	865,000
TOTAL PROJECT CAPITAL OUTLAY COSTS				\$	37,562,595

Concept 3 Quantity & Cost Estimate

	QTY	UNIT	UNIT COST	PRICE	
develop water supply	1	LS	\$ 150,000	\$	150,000
jump outs	25	EA	\$ 10,000	\$	250,000
Deer Fencing	69880	LF	\$ 10.50	\$	733,740
Cattle Guards	28	EA	\$ 8,000	\$	224,000
Medium Mammal Crossing at PM ~24	1	EA	\$ 343,750	\$	343,750
McGee Undercrossing	1	EA	\$ 2,512,446	\$	2,512,446
over crossing structures	1	EA	\$ 5,322,240	\$	5,322,240
Convict Creek Bridges (NB & SB)	1	EA	\$ 3,440,000	\$	3,440,000
Retaining Walls	1	LS	\$ 225,848	\$	225,848
MGS	5309	LF	\$ 30	\$	159,270
Concrete Barrier Type 60	1440	LF	\$ 85	\$	122,400
traffic control	1	LS	\$ 600,000	\$	600,000
Erosion Control	6.1	ACRES	\$ 20,000	\$	122,224
imported borrow	83,741	CY	\$ 20	\$	1,674,815
Roadway Excavation	17246	CY	\$ 25	\$	431,150
Temp Railing Type K	17600	LF	\$ 30	\$	528,000
RSP (1/2 Ton Method A)	550	CY	\$ 100	\$	55,000
Planting	4.3	ACRES	\$ 42,000	\$	180,600
HMA TYPE A	3354	TON	\$ 400	\$	1,341,511
CL2 aggregate base	445	CY	\$ 400	\$	178,059
Remove Existing Deer Fence	230	LF	\$ 20	\$	4,600
Clear and Grub	1	LS	\$ 350,000	\$	350,000
Temp Pavement Delineation	148800	LF	\$ 0.5	\$	74,400
Final Pavement Delineation	43560	LF	\$ 0.2	\$	8,712
Construction Area Signs	1	LS	\$ 100,000	\$	100,000
24" Culverts for small animal crossings	5	EA	\$ 2,000	\$	10,000
storm water (5% of project costs)	1	LS	\$ 643,770	\$	643,770
SUB-TOTAL				\$	19,786,535
MINOR ITEMS (10%)				\$	1,978,653.54
MOBILIZATION (5%)				\$	1,088,259.45
SUPPLEMENTAL WORK (10%)				\$	2,176,518.90
CONTENGENCIES (20%)				\$	4,353,037.79
TOTAL ROADWAY AND STRUCTURES				\$	29,383,005
RIGHT OF WAY				\$	865,000
TOTAL PROJECT CAPITAL OUTLAY COSTS				\$	30,248,005

Concept 4 Quantity & Cost Estimate

	QTY	UNIT	UNIT COST	PRICE
develop water supply	1	LS	\$ 150,000	\$ 150,000
jump outs	20	EA	\$ 12,000	\$ 240,000
Deer Fencing	41046	LF	\$ 14	\$ 574,644
Cattle Guards	9	EA	\$ 8,000	\$ 72,000
Medium Mammal Crossing at PM 23.88	1	EA	\$ 343,750	\$ 343,750
over crossing structures	1	EA	\$ 5,322,240	\$ 5,322,240
Retaining Walls	1	LS	\$ 225,848	\$ 225,848
MGS	656	LF	\$ 30	\$ 19,680
Concrete Barrier Type 60	720	LF	\$ 85	\$ 61,200
traffic control	1	LS	\$ 250,000	\$ 250,000
Erosion Control	2	ACRES	\$ 20,000	\$ 36,224
imported borrow	41870	CY	\$ 20	\$ 837,407
Roadway Excavation	500	CY	\$ 25	\$ 12,500
Temp Railing Type K	8800	LF	\$ 30	\$ 264,000
RSP (1/2 Ton Method A)	450	CY	\$ 100	\$ 45,000
Planting	1	ACRES	\$ 42,000	\$ 58,800
HMA TYPE A	1571	TON	\$ 400	\$ 628,285
CL2 aggregate base	168	CY	\$ 400	\$ 67,333
Remove Existing Deer Fence	230	LF	\$ 20	\$ 4,600
Clear and Grub	1	LS	\$ 150,000	\$ 150,000
Temp Pavement Delineation	111600	LF	\$ 1	\$ 55,800
Final Pavement Delineation	32670	LF	\$ 0	\$ 6,534
Construction Area Signs	1	LS	\$ 100,000	\$ 100,000
24" Culverts for small animal crossings	5	EA	\$ 2,000	\$ 10,000
storm water (5% of project costs)	1	LS	\$ 318,748	\$ 318,748
SUB-TOTAL			\$ 6,945,711	\$ 9,854,593
MINOR ITEMS (10%)				\$ 985,459.32
MOBILIZATION (5%)				\$ 542,002.63
SUPPLEMENTAL WORK (10%)				\$ 1,084,005.26
CONTENGENCIES (20%)				\$ 2,168,010.51
TOTAL ROADWAY AND STRUCTURES				\$ 14,634,071
RIGHT OF WAY				\$ 600,000
TOTAL PROJECT CAPITAL OUTLAY COSTS				\$ 15,234,071

Concept 5 Quantity & Cost Estimate

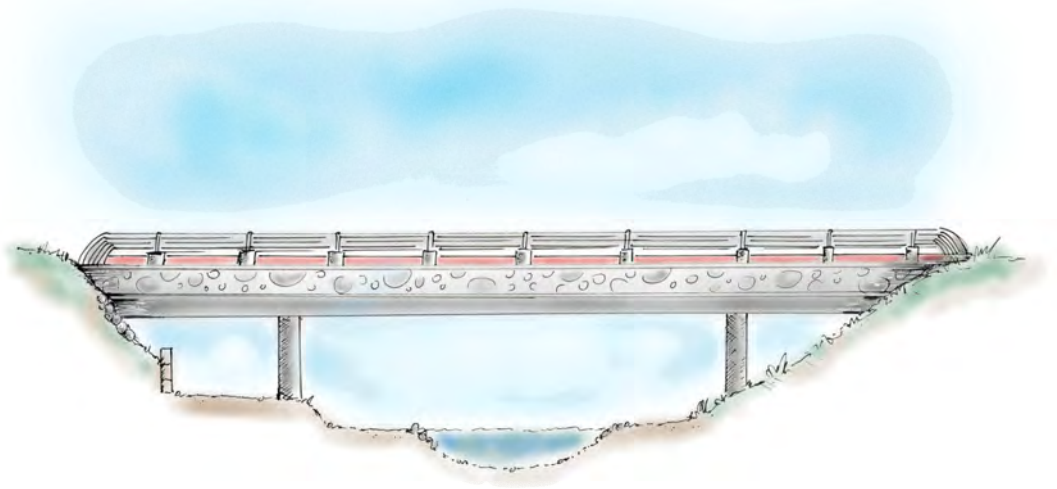
	QTY	UNIT	UNIT COST	PRICE	
develop water supply	1	LS	\$ 150,000	\$	150,000
jump outs	20	EA	\$ 10,000	\$	200,000
Deer Fencing	33,119	LF	\$ 14.00	\$	463,666
Cattle Guards	16	EA	\$ 8,000	\$	128,000
Under Crossing structure McGee	1	EA	\$ 2,252,875	\$	2,252,875
Convict Creek Bridge	1	EA	\$ 3,440,000	\$	3,440,000
MGS	3997	LF	\$ 30	\$	119,910
traffic control	1	LS	\$ 500,000	\$	500,000
Erosion Control	2	ACRES	\$ 20,000	\$	30,000
Roadway Excavation	21111	CY	\$ 25	\$	527,778
Temp Railing Type K	22000	LF	\$ 30	\$	660,000
RSP (1/2 Ton Method A)	315	CY	\$ 100	\$	31,481
Planting	1.5	ACRES	\$ 42,000	\$	63,000
HMA TYPE A	3645	TON	\$ 400	\$	1,457,946
CL2 aggregate base	277	CY	\$ 400	\$	110,726
Temp Pavement Delineation	186000	LF	\$ 0.5	\$	93,000
Final Pavement Delineation	54450	LF	\$ 0.2	\$	10,890
Construction Area Signs	1	LS	\$ 100,000	\$	100,000
24" Culverts for small animal crossings	3	EA	\$ 2,000	\$	6,000
storm water (5% of project costs)	1	LS	\$ 313,694	\$	313,694
clear and grub	1	LS	\$ 200,000	\$	200,000
SUB-TOTAL				\$	10,858,966
MINOR ITEMS (10%)				\$	1,085,896.59
MOBILIZATION (5%)				\$	597,243.12
SUPPLEMENTAL WORK (10%)				\$	1,194,486.25
CONTENGENCIES (20%)				\$	2,388,972.49
TOTAL ROADWAY AND STRUCTURES				\$	16,125,564
RIGHT OF WAY				\$	600,000
TOTAL PROJECT CAPITAL OUTLAY COSTS				\$	16,725,564

Attachment D

Conceptual Renderings



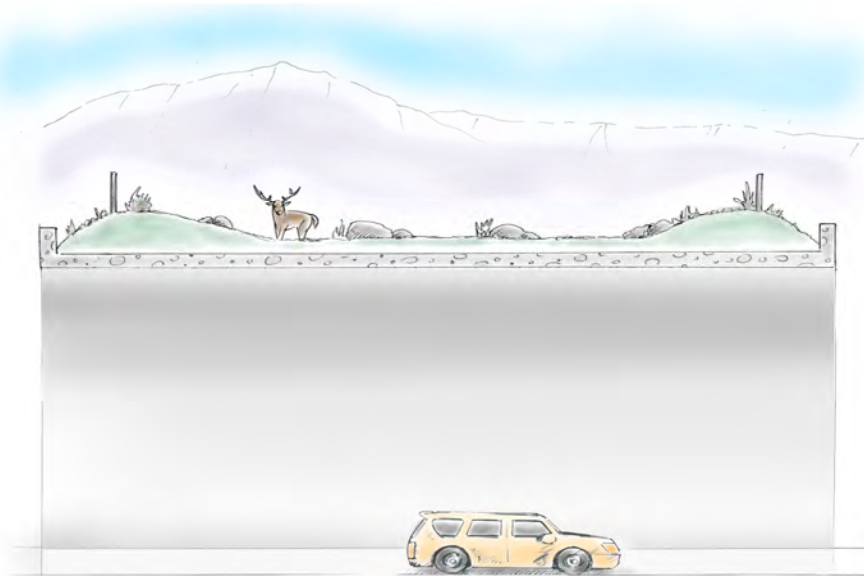
Improvements at Mammoth Creek Crossing



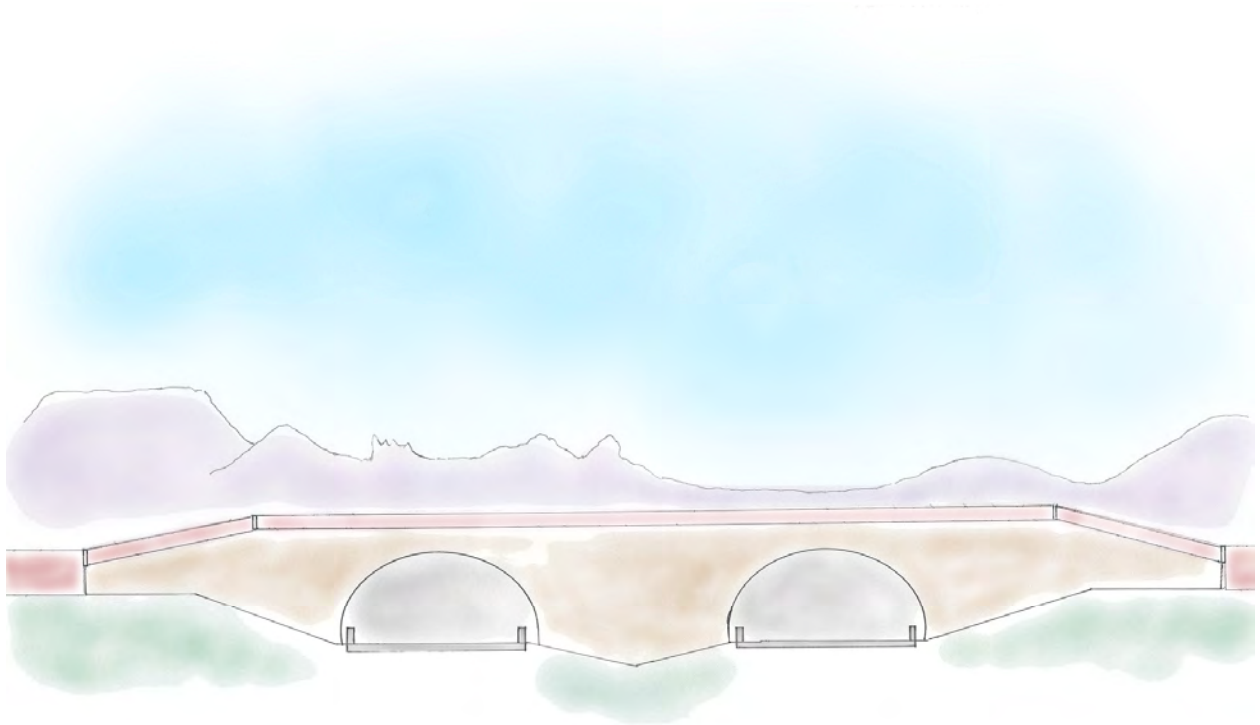
Mammoth Creek Crossing Cross Section
(New crossing at Convict Creek would be similar)



Overcrossing Structure on SR 203
(Overcrossing structures on US 395 would be similar)



Typical Cross Section Through Overcrossing Structure



Typical Overcrossing Elevation on US 395

Attachment E

Deer Mortality by Post Mile US 395 Mono County

US 395 MONO CO TOTAL DEER MORTALITY By POST MILE 2002-2015

Total Deer Mortality= 1668

Legend:
Post Mile, Deer Mortality

