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M E M O R A N D U M

DATE: July 19, 2012

TO: Denise Woodard, Senior Biologist

FROM: Jill Carpenter, Senior Biologist and Bat Specialist

SUBJECT: Preconstruction Nighttime Bat Survey Results for the Interstate 15/Interstate 215 Interchange Improvements Project, Community of Devore, San Bernardino County, California (LSA Project No. LIM0705A)

The purpose of this memorandum is to discuss the results of the nighttime bat surveys performed in June 2012 at various culverts and bridge structures situated along the Interstate 15/Interstate 215 (I-15/I-215) interchange in Devore, California, for the I-15/I-215 Interchange Improvements Project (project). A preliminary assessment of potential bat roosting and foraging habitat within the project area was conducted in October 2009, during which crevice habitat suitable for day- and night-roosting bats was observed at the I-15 bridges over Cajon Creek. Although no crevices suitable for day-roosting bats were observed within the various culverts found throughout the project area, structurally suitable components for night-roosting bats as well as bat sign (e.g., guano, urine staining) were observed during the habitat assessment at multiple culverts.

Follow-up nighttime bat surveys were conducted at all structures that were identified during the preliminary assessment as containing roosting habitat or potential roosting habitat, and that may also be directly impacted by project-related activities. Based upon LSA Associates, Inc.'s (LSA) understanding of the construction plans, the I-15 bridges over Cajon Creek and up to 10 culvert structures containing roosting habitat or potential roosting habitat will be subject to direct impacts from project construction; therefore, 11 sites were surveyed. The nighttime surveys were performed to confirm whether the structures are utilized by bats for day roosting and/or night roosting and to ascertain the level of bat foraging and roosting activity at each of these locations. Acoustic monitoring was used during these surveys to aid in identifying the bat species present and to determine an index of relative bat activity for that site on that specific evening.

Bats were visually observed roosting at 8 of the 11 sites surveyed, and were acoustically and/or audibly detected at all 11 sites. Seven bat species were acoustically detected and recorded at the various sites within the project area during these surveys; species detected included big brown bat (*Eptesicus fuscus*), California myotis (*Myotis californicus*), western small-footed myotis (*Myotis ciliolabrum*), western long-eared myotis (*Myotis evotis*), pocketed free-tailed bat (*Nyctinomops femorosaccus*), western canyon bat (*Parastrellus hesperus*), and Mexican free-tailed bat (*Tadarida brasiliensis*). The pocketed free-tailed bat is listed as a California Species of Concern (CSC) by the California Department of Fish and Game (CDFG).

METHODS

Nighttime surveys were conducted on June 14, 15, and 18-20, 2012, at 10 culverts at which night roosting was suspected based upon observations during the preliminary assessment. One additional nighttime survey was conducted on June 21, 2012, at the I-15 bridges over Cajon Creek, where crevices suitable for day- and night-roosting bats are present in the expansion joints of these three structures. The locations of all culverts and bridge structures surveyed are provided in Figure 1 (all figures attached). These nighttime surveys, which consisted of an acoustic component for species identification, exit counts at the potential day roost, and structural inspections at all potential night roosts, were performed during the summer months to permit detection of maternity colonies if present. Each survey was initiated no later than 0.5 hour before sunset and continued until at least 3 hours after sunset to permit detection of both day- and night-roosting bats.

To minimize disturbance to night-roosting bats and to maximize survey efficiency over a large number of sites, the 10 structures that were identified as containing only night-roosting habitat were surveyed using the following strategy: an ultrasonic detector was deployed at each side of two separate but adjacent culverts, and a survey team consisting of two biologists moved between the two sites throughout the survey period. Regular inspections of the interior of each culvert were performed every 30-45 minutes with a night vision monocular and/or flashlights to observe and count any night-roosting bats, and to document behavioral observations that may aid in species identification. The ultrasonic detectors remained in place at each end of both culvert structures for the duration of the survey to record any echolocation calls. This strategy allowed for two surveys to be conducted in a single evening.

For the exit count/emergence survey at the I-15 bridges over Cajon Creek, where crevices suitable for day-roosting bats were observed during the habitat assessment, observers were positioned on the banks of the drainage adjacent to the bridges to optimize visibility of the bridge sides and the ingress or egress of bats in relation to the crevices or any other structural feature that might be used for day-roosting. The biologists remained at this site for the entirety of the survey to aid in determining whether this structure may be used by a maternity colony for day and/or night roosting.

Pettersson D240X ultrasonic detectors were used in time expansion mode to collect acoustic data during the entirety of each survey, and digital multimedia recorders were used to record the data files. These data, consisting of full-spectrum sonograms of echolocation calls, were subsequently analyzed using Sonobat 2.9 acoustic analysis software, and were used to verify bat presence, measure activity levels, and to identify species. Species identifications were made by comparing call recordings with a library of “voucher” calls from known hand-released bats. It is important to note that although acoustic monitoring can be used to determine an index of relative bat activity for a specific site on a specific evening, it is not possible to determine the number of bats from the number of calls recorded. In addition, not all bats acoustically detected were those exiting or entering the structure in question, as some were foraging bats moving through the area; therefore, it is important to correlate calls with visual observations. Other limitations inherent in acoustic monitoring include (but are not limited to) the fact that some species are not equally detectable or may not be recorded at all. Some bats, such as Mexican free-tailed bats (*Tadarida brasiliensis mexicana*), emit loud, low-frequency echolocation calls that can be recorded from great distances and will be overrepresented in the data, while “whispering” bats, such as Townsend’s big-eared bats (*Corynorhinus townsendii*), emit faint calls that may not be recorded at all. In addition, not all call sequences are identifiable; different bat species may use similar types of echolocation calls, or the same species may use different types of

echolocation calls based on the perceptual task and the immediate environment or habitat. Finally, the species composition and activity levels recorded during a single visit to a site may not necessarily reflect long-term patterns of use (e.g., variations in seasonal and nightly use of an area).

RESULTS AND DISCUSSION

Bats were acoustically and/or audibly detected at all 11 survey sites during the nighttime surveys, and were visually observed roosting at 8 of the 11 sites surveyed. Foraging bats were observed at all survey sites, and a total of seven species of bats was detected throughout the project area. Table A presents the results of these surveys.

Table A: Results of Nighttime Acoustic Surveys

Survey Location	Survey Date	Species Detected
D41 Culvert (Kimbark)	6/14/12	MYCA†, MYCI, NYFE, TABR
D43 Culvert (East Kimbark)	6/14/12	MYCA†, NYFE, PAHE†, TABR, EPFU
D29 Culvert (Pittman Canyon)	6/15/12	MYCA†, MYEV, MYCI†, PAHE†, EPFU
D92 Tunnel (Mathews)	6/15/12	MYCA, MYEV, MYCI, PAHE, TABR
D51 Culvert (BNSF Railroad)	6/18/12	MYCA†
D53 Culvert	6/18/12	MYCA†
D23 Culvert (Middleman Cyn)	6/19/12	NYFE*
D36 Culvert	6/19/12	MYCI, EPFU, MYCA, MYEV†
D10 Culvert	6/20/12	TABR, EPFU, MYCA, MYEV†
D38 Culvert	6/20/12	TABR, NYFE, EPFU MYCA
I-15 Bridges over Cajon Creek	6/21/12	TABR††, EPFU, PAHE, MYCA

Notes:
† indicates a species visually observed night roosting in this location.
†† indicates a species observed day roosting in this location.
* indicates a species detected aurally, but not recorded with the acoustic equipment.

BNSF = Burlington Northern Santa Fe
EPFU = *Eptesicus fuscus*
MYCA = *Myotis californicus*
MYCI = *Myotis ciliolabrum*
MYEV = *Myotis evotis*
NYFE = *Nyctinomops femorosaccus*
PAHE = *Parastrellus hesperus*
TABR = *Tadarida brasiliensis*

It is important to note that although every effort was made to minimize disturbance in the vicinity of the culverts, the mere presence of observers can disturb roosting or foraging bats, resulting in behavioral changes and possibly biasing counts; therefore, the number and species composition of bats observed night roosting at the various culverts during the surveys is likely underrepresented.

D41 Culvert (Kimbark)

This corrugated metal culvert measuring approximately 10 feet (ft) in diameter is oriented in a northeast to southwest direction, and conveys water into the Cajon Creek drainage. The northeastern, upstream end of the culvert was characterized by mulefat and alluvial fan sage scrub, while the southwestern, downstream end of the culvert was dominated by alluvial fan sage scrub.

Bats were observed night roosting and foraging within the culvert throughout survey. This activity was primarily observed at the upstream end of the culvert, and no more than one or two bats were

observed at a time. A small bat was observed roosting on vegetative debris hanging from the culvert ceiling; based upon observations of flight behavior and acoustic data analysis, this bat was identified as a California myotis. Other species detected in the vicinity of the culvert openings were the western small-footed myotis, the Mexican free-tailed bat, and the pocketed free-tailed bat.

D43 Culvert (East Kimbark)

This corrugated metal culvert measuring approximately 10 ft in diameter is oriented in a northeast to southwest direction, and conveys water into the Cajon Creek drainage. It is also comprised of two sections connected by an open concrete channel surrounded by buckwheat scrub. The northernmost and upstream culvert section is steeply angled and located beneath the northbound I-215 ramp connector to the southbound I-215. The habitat at the northern, upstream end of this culvert section consists of a concrete channel surrounded by buckwheat scrub. The southernmost culvert section extends from approximately 50 ft south of the downstream end of the first culvert beneath the full width of I-15 and the northbound I-15 connector to the southbound I-215. The downstream end of this culvert section was characterized by scattered mulefat and willows with a disturbed alluvial fan sage scrub understory.

Bats were observed night roosting and foraging within this culvert. Early in the evening, a western canyon bat was observed circling at the upstream end of the main tunnel and was likely night roosting as well as foraging there. Another bat, later identified as California myotis, was observed roosting on a bolt in the culvert ceiling at the far upstream section of the culvert.

In addition, although these bats were never visually observed, echolocation calls belonging to the following species were acoustically detected and recorded in the vicinity of the culvert throughout the evening: big brown bats, Mexican free-tailed bats, and pocketed free-tailed bats. Pocketed free-tailed bats, which emit echolocation calls that fall within the range of human hearing, were also audibly detected throughout the last hour of the survey.

D29 Culvert (Pittman Canyon)

This corrugated metal culvert measuring approximately 7 ft in diameter is oriented in a northeast to southwest direction, and conveys water from the Pittman Canyon drainage into the Cajon Creek drainage. The northeastern, upstream end of the culvert was characterized by recently burned alluvial fan sage scrub, while the southwestern, downstream end of the culvert contained grouted riprap with alluvial fan sage scrub further downstream and surrounding it.

One to two bats were observed consistently night roosting and foraging at both ends of the culvert throughout the survey. According to acoustic analysis and visual observations, one or two western canyon bats were foraging and roosting near the upstream end of the culvert early in the survey period. Throughout the latter half of the survey, one to two bats were consistently observed alternately hanging on bolts in the culvert ceiling and foraging within the culvert; these bats were identified as California myotis and western small-footed myotis. Western long-eared myotis and big brown bats were also acoustically detected at this culvert.

D92 Tunnel (Mathews Ranch Road)

This corrugated metal culvert measuring approximately 20 ft in diameter serves as a crossing for a private ranch road beneath I-15 and is oriented in a northeast to southwest direction. The northeastern, upstream end of the culvert was characterized by recently burned alluvial fan sage scrub, while the southwestern, downstream end of the culvert contained mature alluvial fan sage scrub. This tunnel roughly parallels the Pittman Canyon drainage, which is situated approximately 100 ft to the southeast.

Although no bats were directly observed night roosting in this tunnel, foraging activity was observed throughout the evening at both ends of the tunnel, and it is likely that night roosting does occur at this location. In addition, bats were observed flying through this tunnel just after sunset, which suggests that commuting bats may be using it to access foraging sites along the Cajon Creek drainage from roosting sites on the other side of I-15. Bat species acoustically detected and recorded in the vicinity of this tunnel included California myotis, western small-footed myotis, western long-eared myotis, western canyon bats, and Mexican free-tailed bats.

D51 Culvert (BNSF Railroad)

This corrugated metal culvert, measuring approximately 8 ft in diameter, is oriented in a west to east direction, and conveys water from west to east paralleling the railroad tracks before ultimately connecting with the Cajon Creek drainage. Both the upstream and downstream ends of this culvert were characterized by sandy gravel and disturbed alluvial fan sage scrub.

Early in the evening, a small bat with dark pelage, which was later identified through acoustic analysis as a California myotis, was observed roosting on a bolt at a culvert joint near the western end of this culvert. One to two individuals belonging to this species were sporadically observed foraging and night roosting in this culvert throughout the survey.

D53 Culvert

This corrugated metal culvert, measuring approximately 7 ft in diameter, is oriented in a west to east direction, and conveys water from roughly west to east beneath I-15 and ultimately connects with the Cajon Creek drainage. The western, upstream end of this culvert was characterized by disturbed mulefat scrub surrounded by buckwheat scrub with ruderal components. The downstream end of this culvert consisted of disturbed alluvial fan sage scrub. Both culvert entrances were partially obscured by vegetation.

Foraging and night-roosting California myotis were observed at the western end of this culvert; guano deposits beneath a concrete joint near the western end of the culvert suggest frequent night roosting by bats likely occurs here.

D23 Culvert (Middleman Canyon)

This corrugated metal culvert measuring approximately 7 ft in diameter is oriented in a northeast to southwest direction, and conveys water beneath I-215 into the Cajon Creek drainage. At the time of the survey, flowing water was present inside the culvert. The northeastern, upstream end of the

culvert was characterized by mulefat riparian vegetation, while the southwestern, downstream end of the culvert contained riparian vegetation including willows (*Salix* sp.), hoary nettle (*Urtica dioica*), and mugwort (*Artemisia douglasiana*) surrounded by disturbed alluvial fan sage scrub vegetation.

Although no bats were directly observed night roosting in this culvert, a large amount of dense vegetation that was not present during the 2009 assessment was obstructing both of the culvert entrances, which may preclude bats who historically use this culvert from entering it to roost. No bat species were acoustically detected or recorded during the survey at this location; however, pocketed free-tailed bats were audibly detected foraging in the vicinity 1 hour after sunset.

D36 Culvert

This corrugated metal culvert measuring approximately 7 ft in diameter is oriented in a northeast to southwest direction, and conveys water beneath I-215 into the Cajon Creek drainage. The northeastern, upstream end of the culvert was characterized by disturbed alluvial fan sage scrub vegetation, while the vegetation at the southwestern, downstream end of the culvert contained large sycamore trees and alluvial fan sage scrub vegetation.

Bats were observed night roosting and foraging throughout survey, mainly at upstream end. Guano deposits were found scattered throughout the culvert. A western long-eared myotis was observed hanging from a large bolt at culvert joint, and California myotis and western small-footed myotis were also acoustically detected and observed night roosting and foraging within the culvert. Big brown bats were also acoustically detected throughout the survey, but were not directly observed foraging or roosting within the culvert.

D10 Culvert

This corrugated metal culvert measuring approximately 6 ft in diameter is oriented in a northeast to southwest direction, and conveys water beneath I-215 into the Cajon Creek drainage. The vegetation at the northeastern, upstream end of the culvert consisted of alluvial fan sage scrub, with mature sycamores lining the drainage and a large Mexican elderberry partially obscuring the culvert entrance. The southwestern, downstream end of the culvert was characterized by grouted riprap and sand, with scattered scrub vegetation adjacent to the culvert entrance and a large sycamore tree approximately 100 ft downstream.

Bats were observed foraging throughout survey. A single western long-eared myotis individual was observed hanging on an overlapped edge at a joint in the ceiling near the middle of the culvert, and echolocation calls belonging to big brown bats, Mexican free-tailed bats, and California myotis were also recorded. Deposits of guano were observed throughout culvert, suggesting frequent use of most of the culvert area for night roosting.

D38 Culvert

This corrugated metal culvert measuring approximately 4 ft in diameter is oriented in a northeast to southwest direction and comprises two separate sections: the northeastern section conveys water

beneath I-215 and the southwestern section is situated beneath an old frontage road and ultimately empties into the Cajon Creek drainage.

Although no bats were directly observed night roosting in this culvert, small deposits of guano at the downstream edge suggest that bats may occasionally roost at the edges of this small culvert. Species acoustically detected foraging in the area included big brown bats, Mexican free-tailed bats, pocketed free-tailed bats, and California myotis.

I-15 Bridges over Cajon Creek

This survey site comprised three parallel bridge structures over Cajon Creek consisting of the northbound I-15, the southbound I-15, and the northbound I-215 connector to the southbound I-15. Each of these three structures is approximately 70 ft tall and contains a single expansion joint; the crevices formed by these structural features often provide day- and/or night-roosting habitat for bats. Although the majority of each of the expansion joints in the I-15 bridges is sealed with material, the outside edges near the bridge deck do contain open crevices suitable for use by roosting bats. Prior to the initiation of the survey, the crevices containing potential day-roosting habitat were examined with a spotlight and binoculars; however, due to the above-ground height of these bridge crevices, it was difficult to see the interior of the crevices to visually inspect them for confirmation of the presence of roosting bats.

Seven bats were observed exiting the I-15 bridges over Cajon Creek during the emergence and exit count portion of the nighttime survey. Acoustic analysis indicates that some of these day-roosting bats were Mexican free-tailed bats; however, echolocation calls were not detected for all exiting bats observed, and two of the bats observed exiting the bridge structures did not resemble Mexican free-tailed bats, so individuals belonging to another species may also be roosting in the bridges. Foraging activity was observed in the vicinity of the bridges throughout the survey; bat species acoustically detected included Mexican free-tailed bats, western canyon bats, big brown bats, and California myotis. Due to the aboveground height of the structures, night roosting was difficult to visually confirm but it is possible that any of the species detected foraging could potentially night roost in the bridge structures.

White-throated swifts (*Aeronautes saxatalis*) were also observed flying into and out of some of the bridge crevices prior to dusk.

CONCLUSION AND RECOMMENDATIONS

Bats use day roosts during the day for shelter from the elements and from predators, while night roosts refer to structures used by bats during the evening to rest during foraging bouts; these roosts, which are usually cavities or crevices situated in or near a foraging area, also play an important role in the energetics and social interaction of bats. Although the culvert structures surveyed within the project area do not contain any expansion joints or other crevices suitable for day-roosting bats, these structures do provide tunnel or cave-like spaces that are sheltered from the wind and reduce air circulation, creating warm air pockets where temperatures remain generally far warmer than ambient for most of the night. These features, as well as the locations of these culverts within foraging habitat and adjacent to a probable commuting corridor along the Cajon Creek, increase the desirability of these structures to bats as night roosts. Bats were visually observed night roosting in 7 of the 10

culvert structures surveyed; however, due to the presence of guano in all of the culverts, bats are expected to night roost in all 10 structures.

Since no day-roosting habitat is present within the 10 culvert structures surveyed, removal or alteration of these culverts will not result in any impacts to day-roosting bats. However, when a night roost is eliminated or become unusable, the energetics for bats to successfully utilize the surrounding foraging area may be negatively affected, thereby resulting in impacts to foraging and night-roosting bats. Night roosts are used only in the evening; therefore, there would be little to no impacts to bats at structures identified as night roosts if construction activity is limited to daytime hours, the existing structures utilized by the bats for roosting are not removed or altered, vegetation adjacent to these structures is not cleared, and the airspace to access the structures is not restricted. If nighttime construction activity is anticipated at a culvert identified as a night roost, impacts to night-roosting bats can be minimized by implementing minimal night lighting around the structure. If major modifications such as removal or expansion of culvert structures is anticipated, impacts to bats can be mitigated by ensuring that the new or altered culverts contain structural features suitable for night roosting, so that there is no loss of roosting habitat.

There was no evidence of the existence of a large maternity colony in the project area during the preliminary assessment or during the follow-up nighttime surveys, and based upon the results of the nighttime surveys and the relatively small amount of guano observed beneath the expansion joint crevices at the I-15 bridges over Cajon Creek, it is unlikely that bats typically roost in large numbers at this location. However, day-roosting bats were observed emerging from the expansion joint crevices in the I-15 bridges over Cajon Creek, and it is possible that small maternity groupings consisting of mothers and flightless young may day-roost in the bridges over Cajon Creek during the spring and summer months. Therefore, if the expansion joints of these structures will be directly disturbed by construction activities, exclusionary devices should be placed in the fall (September or October) preceding construction to exclude bats from directly affected work areas and avoid potential direct impacts. It is particularly important to avoid direct impacts to bats during the maternity season (typically from March through August in Southern California), when flightless young are present. These devices would be temporary in nature and removed upon conclusion of construction activities to allow roosting bats to return to the crevices, preventing any loss of roosting habitat. Additional mitigation measures, including but not limited to the installation of bat houses or other forms of alternative bat habitat, may also be appropriate.

As construction plans with regard to these bridge and culvert structures are finalized, consultation and communication between engineers and a qualified bat biologist early in the construction planning process will aid in the determination of specific measures to minimize impacts to bats in a timely, cost-effective, and structurally successful manner.

Attachments: Figure 1 – Bat Survey Site Locations
Figure 2 – Site Photographs
Figure 3 – Site Photographs

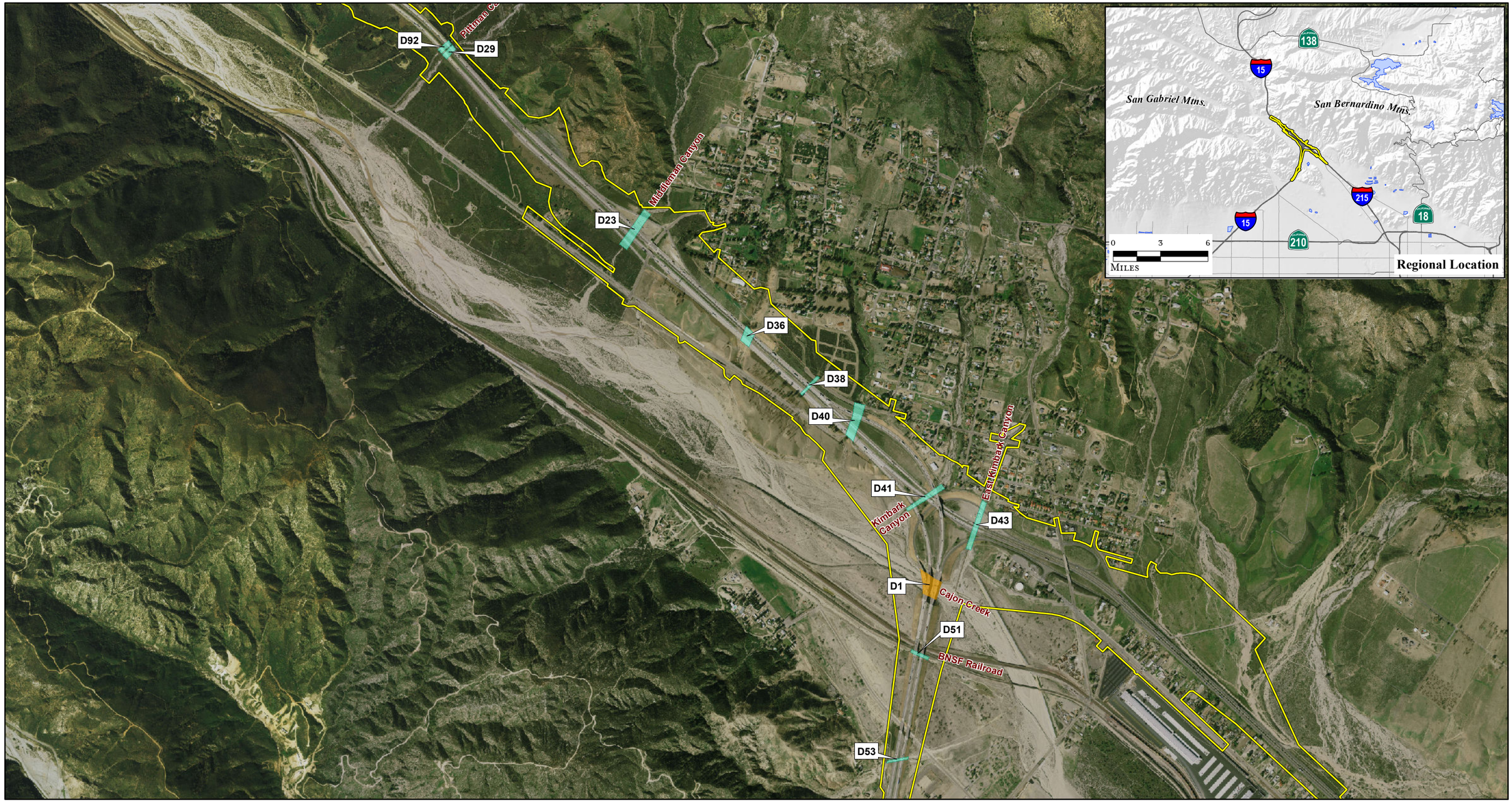
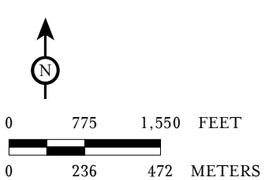


FIGURE 1

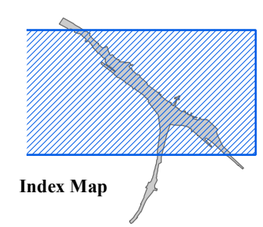


Biological Study Area (BSA)

Type of Structure Surveyed

Bridge (Day and Night Roost)

Culvert (Night Roost)



EA 08-0K7100 SBd 15/215
I-15 PM 14.0/R 16.4, I-215 PM 16.0/17.8
I-15/I-215 Interchange Improvements Project
Preconstruction Nighttime Bat Surveys

Bat Survey Site Locations

SOURCE: AirPhotoUSA (2008): LAN Engineering (2010).

I:\LIM0705\Reports\BatSurvey\fig1_BatSurvey.mxd (07/11/12)

A. View of the downstream entrance to the D41 (Kimbark) culvert.

B. View of the downstream entrance to the D43 (East Kimbark) culvert.

C. View of a California myotis (*Myotis californicus*) individual observed night roosting on a bolt in the ceiling of the D43 culvert.

D. View of a California myotis (*Myotis californicus*) individual observed night roosting on vegetative debris hanging from the ceiling of the D41 culvert.

E. View of the upstream entrance to the D53 culvert and its surrounding vegetation.

F. View of the downstream entrance to the D51 culvert and its surrounding vegetation.

FIGURE 2

I-15/I-215 Interchange Improvements Project

Site Photographs

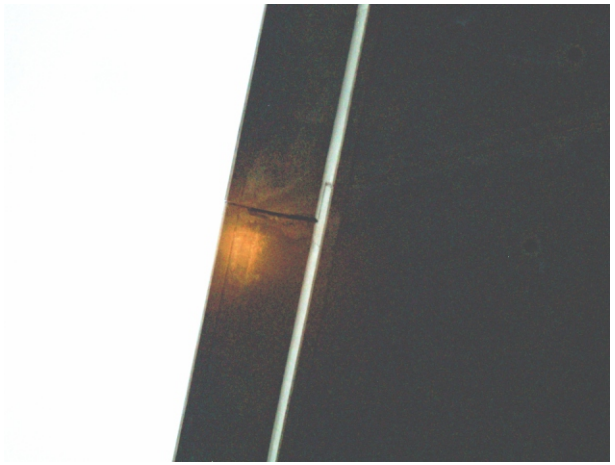
A. View of the downstream entrance to the D10 culvert and its surrounding vegetation.

B. View of the upstream entrance to the D10 culvert and its surrounding vegetation.

C. View of scattered guano deposits observed throughout the D10 culvert.

D. View of a western long-eared myotis (*Myotis evotis*) individual observed night roosting on an overlap joint in the ceiling of the D36 culvert.

E. View looking southeast at the I-15 bridges over Cajon Creek, and the adjacent vegetation.



F. View of a hinge in one of the I-15 bridges over Cajon Creek, showing the sealed main crevice as well as the unsealed portion along the edge.

FIGURE 3

I-15/I-215 Interchange Improvements Project

Site Photographs