Appendix A

EDMS Air Quality Model Output

Table A-1
EDMS 5.1.4.1 Emissions Inventory Report
Emissions Inventory Summary

Year: 2015

Category	CO2	H2O	CO	THC	NMHC	VOC	TOG	NOx	SOx	PM-10	PM-2.5	PM Non-Volatile	PM Volatile Sulfates	PM Volatile Organics	Fuel Consumption
Aircraft	1302.6	510.7	183.6	8.2	8.8	8.6	9.0	1.7	0.5	0.5	0.5	0.0	0.0	0.5	412.9
GSE	N/A	N/A	5.7	N/A	0.2	0.2	0.2	0.5	0.0	0.0	0.0	N/A	N/A	N/A	N/A
APUs	N/A	N/A	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	N/A	N/A	N/A	N/A
Roadways	N/A	N/A	24.9	N/A	1.3	1.4	1.5	1.9	0.0	0.1	0.0	N/A	N/A	N/A	N/A
Grand Total	**1302.6**	**510.7**	**214.3**	**8.2**	**10.3**	**10.2**	**10.7**	**4.1**	**0.6**	**0.6**	**0.6**	**0.0**	**0.0**	**0.5**	**412.9**

Year: 2025

Category	CO2	H2O	CO	THC	NMHC	VOC	TOG	NOx	SOx	PM-10	PM-2.5	PM Non-Volatile	PM Volatile Sulfates	PM Volatile Organics	Fuel Consumption
Aircraft	3,050.5	1,196.0	387.6	18.8	20.4	20.1	20.9	4.1	1.2	1.2	1.2	0.0	0.1	1.1	966.9
GSE	N/A	N/A	4.7	N/A	0.2	0.2	0.2	0.4	0.0	0.0	0.0	N/A	N/A	N/A	N/A
APUs	N/A	N/A	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	N/A	N/A	N/A	N/A
Roadways	N/A	N/A	66.3	N/A	2.8	2.9	3.1	3.0	0.1	0.2	0.1	N/A	N/A	N/A	N/A
Grand Total	**3,050.5**	**1,196.0**	**458.8**	**18.8**	**23.4**	**23.2**	**24.2**	**7.6**	**1.4**	**1.4**	**1.3**	**0.0**	**0.1**	**1.1**	**966.9**
NET CHANGE (Tons)	**1,747.9**	**685.3**	**244.5**	**10.7**	**13.1**	**13.0**	**13.5**	**3.5**	**0.8**	**0.8**	**0.7**	**0.0**	**0.1**	**0.6**	**554.0**
				LBS. per day			**73.8**	**19.2**	**4.4**	**4.4**					

Notes:
Units are short tons per year except as noted.
GSE = Ground support unit
APU = Auxiliary power unit (in jet aircraft)

Appendix B
Biological Constraints Analysis

BIOLOGICAL CONSTRAINTS ANALYSIS
FOR THE
TRUCKEE TAHOE AIRPORT DISTRICT
MASTER PLAN UPDATE

PLACER AND NEVADA COUNTIES, CALIFORNIA

February 2015

PREPARED FOR:
Mead and Hunt
133 Aviation Boulevard, Suite 100
Santa Rosa, CA 95403
(707) 526-5010

Contact: David Dietz

PREPARED BY:
Garcia and Associates
435 Lincoln Way
Auburn, CA 95603
(530) 823-3151

Contact: Susan Dewar

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
°F	degrees Fahrenheit
CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRPR	California Rare Plant Rank
EPA	United States Environmental Protection Agency
ESA	Federal Endangered Species Act
FEIS	final environmental impact statement
GANDA	Garcia and Associates
GPS	Global Positioning System
Master Plan	Airport Master Plan Update for the Truckee Tahoe Airport
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
quad	7.5-minute topographic quadrangle
ROD	record of decision
RWQCB	Regional Water Quality Control Board
SNFPA	Sierra Nevada Forest Plan Amendment
TNF	Tahoe National Forest
TTAD	Truckee Tahoe Airport District
USACE	United States Army Corps of Engineers
USFS	United States Department of Agriculture Forest Service
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
WRCC	Western Regional Climate Center
WSS	Web Soil Survey

Summary

The Truckee Tahoe Airport District (TTAD) proposes to adopt the Airport Master Plan Update for the Truckee Tahoe Airport (Master Plan, TTAD 2014). The purpose of the Master Plan is to create a blueprint for facility and infrastructure planning over the next 10 to 15 years. The Master Plan recommends development plans and policies that best fit the needs of the airport and community, while protecting those living nearby (TTAD 2014). The Master Plan describes all of the physical improvements and property acquisitions planned through 2025. While the Master Plan describes these proposed features, it does not mandate particular construction actions, and serves as a planning tool.

Garcia and Associates (GANDA) biologists conducted background research and field reconnaissance surveys to inform the Master Plan. Habitat-level plant and animal surveys were conducted for state- and federally listed species and other special-status species as designated by the United States Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), California Native Plant Society (CNPS), and United States Department of Agriculture Forest Service (USFS). No protocol-level and/or presence/absence surveys were conducted for plant or wildlife species. Sensitive communities, including wetlands and other waters were identified and generally mapped; a jurisdictional delineation has not been performed.

The Study Area (approximately 339 acres) for the Master Plan is composed predominantly of shrubland and steppe habitats (233.92 acres), with a few inclusions of forests (37.50 acres), grasslands and herblands (39.14 acres), and human-made and managed areas (20.96 acres). A small number of potential wetlands (approximately 6.20 acres) and non-wetland water features (approximately 1.65 acres) also occur within the Study Area. The soils are predominantly coarse sandy loam, sandy loam, or loam.

A total of 66 special-status plant taxa were identified from background research and reviewed for habitat suitability. Of these, nine have moderate or high potential to occur within the Study Area (Appendix A, Table 1): Plumas ivesia (*Ivesia sericoleuca*, California Rare Plant Rank [CRPR] 1B.2 and USFS sensitive), Santa Lucia dwarf rush (*Juncus luciensis*, CRPR 1B.2 and USFS sensitive), Lemmon's milk-vetch (*Astragalus lemmonii*, CRPR 1B.2 and USFS sensitive), Davy's sedge (*Carex davyi*, CRPR 1B.3), Fresno ceanothus (*Ceanothus fresnensis*, CRPR 4.3), Truckee cryptantha (*Cryptantha glomeriflora*, CRPR 4.3), Nevada daisy (*Erigeron eatonii* var. *nevadincola*, CRPR 2B.3), amethyst stickseed (*Hackelia amethystina*, CRPR 4.3), and Sierra starwort (*Pseudostellaria sierrae*, CRPR 4.2).

A total of 32 special-status wildlife species were identified and reviewed for habitat suitability. Eight special-status wildlife species have moderate or high potential to occur within the Study Area (Appendix A, Table 2). These taxa are willow flycatcher (*Empidonax traillii*), northern goshawk (*Accipiter gentilis*), Cooper's hawk (*Accipiter cooperii*), black-backed woodpecker (*Picoides arcticus*), Sierra Nevada snowshoe hare (*Lepus americanus tahoensis*), western white-tailed jackrabbit (*Lepus townsendii townsendii*), Sierra Nevada red fox (*Vulpes vulpes necator*), and silver-haired bat (*Lasionycteris noctivagans*). No federally designated critical habitat occurs in the Study Area or within a distance of 3 miles.

A series of avoidance and minimization measures are presented that can be utilized during the implementation of the Master Plan, in order to minimize impacts to special-status species and sensitive habitats.

1.0 Introduction

1.1 Project Overview

The Truckee Tahoe Airport District (TTAD) proposes to adopt the Airport Master Plan Update for the Truckee Tahoe Airport (Master Plan, TTAD 2014). The purpose of the Master Plan is to create a blueprint for facility and infrastructure planning over the next 10 to 15 years. The Master Plan recommends development plans and policies that best fit the needs of the airport and community, while protecting those living nearby (TTAD 2014). The Master Plan describes all of the physical improvements and property acquisitions planned through 2025, including concepts for the following:

- Extension and widening of Runway 2-20 and shifting of the parallel taxiway;
- Construction of additional aircraft storage hangers, and associated taxi lanes and modification of runway exit taxiways. This includes construction of a 12,000- to 14,000-square-foot multi-purpose hangar/building, which will both house aircraft and de-icing facilities, and provide non-profit and community event space; and
- Development of non-aviation uses on a parcel that is not needed for aviation.

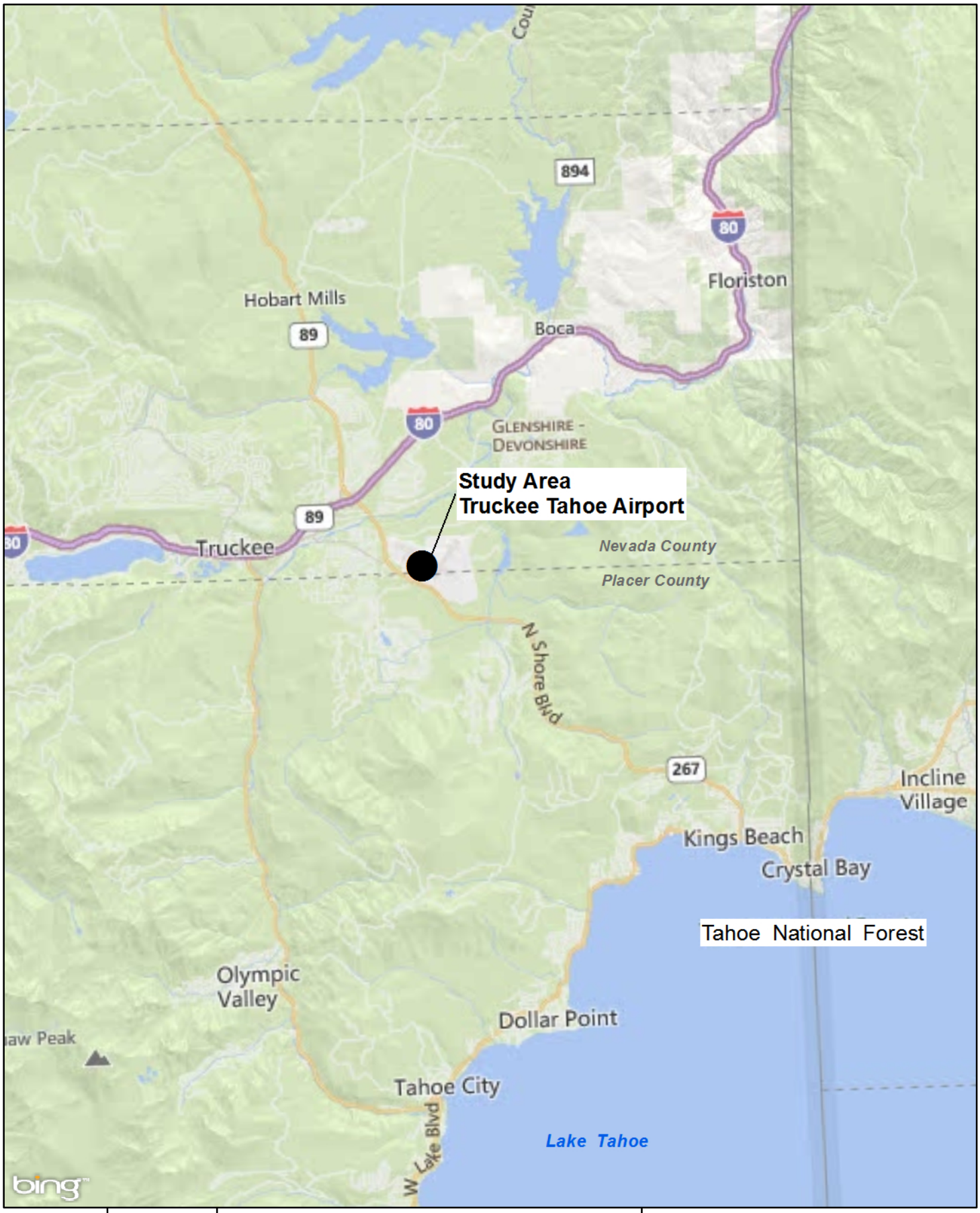
While the Master Plan describes these proposed features, it does not mandate particular construction actions, and serves as a planning tool.

1.2 Background and Objectives

Garcia and Associates (GANDA) performed a pre-field desktop review and field reconnaissance surveys in October 2014 for preparation of this report. Habitat-level plant and animal surveys were conducted for state- and federally-listed species and other special-status species as designated by the California Department of Fish and Wildlife (CDFW), California Native Plant Society (CNPS), and United States Department of Agriculture Forest Service (USFS); no protocol-level or presence/absence surveys were conducted. Sensitive communities, including wetlands and other waters were generally identified and mapped; a jurisdictional delineation has not been performed. Details of the habitat assessment and surveys are further described in Section 2.0 Methods, and Section 3.0 Results.

1.3 Study Area

The Truckee Tahoe Airport is located immediately northeast of the Town of Truckee in the northern Sierra Nevada, in Nevada and Placer counties, California. The airport is situated in the relatively flat Martis Valley at approximately 1,800 meters (5,904 feet) above mean sea level, surrounded by peaks that are as high as 2,743 to 3,353 meters (9,000 to 11,000 feet) (TTAD 2014) (Figure 1-1). The annual maximum temperature is 15.0 degrees Celsius (°C) (59.1 degrees Fahrenheit [°F]), with an annual minimum temperature of -2.3 °C (27.8 °F); the highest temperatures occur in July with an average maximum of 27.9 °C (82.3 °F), and the lowest occur in January with an average minimum of -9.7 °C (14.6 °F). The region receives an average of 0.8 meters (30.1 inches) of precipitation per year, with average snowfall of 5.1 meters (201.8 inches); most of the precipitation occurs between December and March (Western Regional Climate Center [WRCC] 2014).



GANDA

Source: Bing Maps Hybrid (2014); GANDA GIS 2014

0 4 Miles

0 4 Kilometers

1:160,643

Figure 1-1. Truckee Tahoe Airport Study Area Location Map

Nevada and Placer Counties, CA
February 2015

The entire airport property encompasses approximately 948.4 acres. Within this area, approximately 618.7 acres are "unassigned land use," 246.3 acres are runway areas, 13.6 acres are runway protection zones, and 69.8 acres are aviation development (TTAD 2014). The Study Area for this effort includes approximately 339 acres within the airport property, primarily encompassing the "unassigned land use" areas (Figure 1-1).

2.0 Methods

GANDA biologists performed a background desktop review and habitat-level site pedestrian surveys in order to determine potential for presence of special-status species and habitats within the Study Area. Methods for these investigations are described in detail below.

2.1 Biological Desktop Review

Prior to conducting field surveys, lists of special-status plant and animal species with potential to occur in the Study Area were prepared (Appendix A). Sources of background information for this desktop review included the CDFW California Natural Diversity Database (CNDDB) (CDFW 2014), the USFWS website (USFWS 2014a), and the *Online Inventory of Rare and Endangered Vascular Plants of California* (CNPS 2014). Critical habitat maps from the USFWS website were also reviewed (USFWS 2014b). The assessment area for this background research includes the United States Geological Survey (USGS) 7.5-minute topographic quadrangle (quad) that includes the Study Area (*Truckee, California*), and the eight surrounding quads (*Independence Lake, Hobart Mills, Boca, Norden, Martis Peak, Granite Chief, Tahoe City,* and *Kings Beach*).

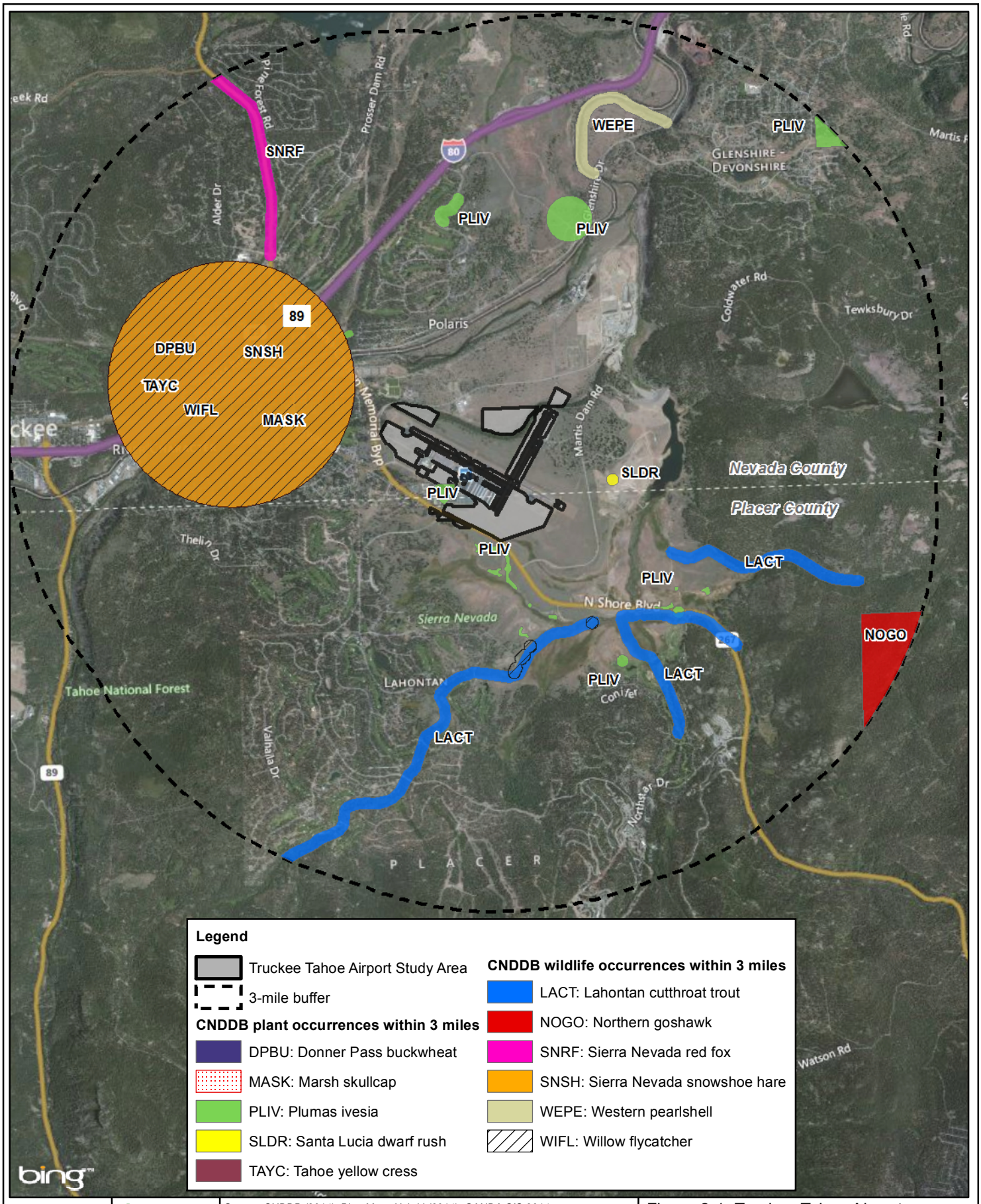
The National Wetlands Inventory (NWI) (USFWS 2014c) and USGS topographic maps (USGS 1992) were consulted to identify known wetlands and other aquatic habitats in the Study Area. Natural communities tracked by the CNDDB (CDFW 2014) were also examined. Soil information for the Study Area was obtained from the Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS) (NRCS 2014).

Locations of documented resources (special-status species and special natural communities recorded from the CNDDB [CDFW 2014] and wetlands [USFWS 2014c]) within the Study Area and a 3-mile buffer are displayed in Figure 2-1. Species occurrences were also reviewed within the nine-quad search area described above; however, a 3-mile CNDDB buffer was selected for Figure 2-1 to emphasize the resources in close proximity to the Study Area.

2.1.1 Definition of Special-status Plant Species

Potential special-status plant species include taxa that are designated as follows:

- Threatened, endangered, or a candidate for listing by the federal Endangered Species Act (ESA),
- Threatened, endangered, or rare by the California Endangered Species Act (CESA),
- Sensitive by Region 5 of the USFS, and occurring in the nine-quad search area or the Tahoe National Forest (TNF), and/or
- California Rare Plant Rank (CRPR) 1 or 2 (CNPS 2014) (Some CRPR 3 and 4 species with potential to occur were also included. See Appendix A, Table 1 footnotes for definitions of CRPRs).



GANDA

Source: CNDDB (2014); Bing Maps Hybrid (2014); GANDA GIS 2014

Miles
0
2

Kilometers
0
2

1:65,000

Figure 2-1. Truckee Tahoe Airport CNDDB Occurrences within Three Miles of the Study Area

Nevada and Placer Counties, CA
February 2015

2.1.2 Definition of Special-status Wildlife Species

Potential special-status wildlife species include taxa that are designated as follows:

- Threatened, endangered, or a candidate for listing by ESA,
- Threatened, endangered, or a candidate for listing by CESA,
- Classified as California species of special concern, fully protected, or watch listed by CDFW,
- Classified as sensitive by Region 5 of the USFS in the Sierra, Tahoe, or Lake Tahoe Basin National Forests, and/or
- Listed on CDFW's "Special Animals" list.

"Special Animals" is a broad classification used to refer to all the animal taxa tracked by the CDFW's CNDDB, regardless of their legal or protection status. CDFW considers the taxa on this list to be those of greatest conservation need (CDFW 2014). These species are listed and reviewed in Appendix A, Table 2.

2.2 Field Reconnaissance Surveys

GANDA botanists Samantha Hillaire and Susan Dewar, and biologist JoAnna Lessard, conducted habitat-level plant and wildlife field reconnaissance surveys of the Study Area on October 7 and 8, 2014. The biologists assessed the Study Area for habitat suitability for special-status species, and presence of wetlands and other special communities. No protocol-level or presence/absence surveys, or jurisdictional (wetland) delineations, were conducted.

Surveys were conducted by inspecting the Study Area for the presence of special-status plants and animals and their suitable habitat. The Study Area was accessed by driving on existing roads and walking throughout the site. Special attention was given to identification of habitat attributes associated with special-status species, such as suitable breeding or nesting habitat, unique soil types, and wetlands. Whenever resources of interest were located, they were mapped with a Trimble Juno Global Positioning System (GPS) unit capable of 1- to 3-meter accuracy. Habitats were mapped with a combination of recording areas with field GPS units and digitizing on recent aerial photographs.

The lists of special-status plant and animal species identified from background research were refined based on the presence of potential habitat identified from the field surveys (Appendix A). Those species with suitable habitat, along with wetlands and special communities that may be affected by adoption of the Master Plan, are further discussed in the Results Section (Section 3.0).

3.0 Results

3.1 Background Research

Research identified three sensitive communities, previously recorded within 3 miles of the Study Area, as follows (CDFW 2014):

- Fen,
- Great Basin Sucker/Dace/Redside Stream with Cutthroat Trout, and
- Great Basin Cutthroat Trout/Paiute Sculpin Stream.

Fens are wetlands that form in mineral-rich water, on pH neutral to alkaline soils; the soils in the Study Area are primarily acidic (Table 3-1), with only a small amount of hydric alkaline soil (Aquolls and Borolls, 0 to 5 percent slopes). Therefore, fens are unlikely to form in the Study Area except in a small area (2.5 percent of Study Area). No fens or streams occur in the Study Area.

Table 3-1. Soil Mapping Units within the Study Area

SOIL MAPPING UNIT[1]	APPROXIMATE PERCENT OF STUDY AREA	CHARACTERISTICS
Martis–Euer variant complex, 2 to 5 percent slopes	79.5	Coarse sandy loam, sandy loam, or loams. Soils formed from glacial outwash or till, and typically with volcanic sources; pH weakly to strongly acidic.
Inville–Martis variant complex, 2 to 5 percent slopes	16.0	Coarse sandy loam, sandy loam, or loams. Soils formed from glacial outwash and till, or mixed alluvium. Can have volcanic, andesite, or granitic sources; pH weakly to strongly acidic.
Kyburz–Trojan complex, 9 to 30 percent slopes	0.2	Gravelly sandy loam, sandy loam, or loam. Soils formed from schist, argillite, or volcanics including breccias and agglomerates; pH slightly to moderately acid.
Euer–Martis variant complex, 2 to 5 percent slopes	1.8	Coarse sandy loam, sandy loam, or loams. Soils formed from glacial outwash or till, and typically with volcanic source; pH weakly to strongly acidic.
Aquolls and Borolls, 0 to 5 percent slopes	2.5	Deep organic matter surface horizons are formed under seasonally or continually wet conditions. At least a portion is wet for 60 of the 90 days following the summer solstice. Soil may be calcareous, pH may be alkaline.

[1] From Web Soil Survey (NRCS 2014)

Desktop review identified 66 special-status plant taxa, which were then evaluated for their potential to occur within the Study Area (Appendix A, Table 1). Of these, nine taxa have moderate or high potential to occur in the Study Area. Of these nine, none are federally or state-

listed; five have CRPRs of 1 or 2, and four have CRPRs of 4. Of the nine, three are rated as sensitive by the USFS/TNF. Special-status plant taxa with moderate or high potential to occur within the Study Area due to known range and habitat requirements are discussed in Section 3.3 below. The remaining reviewed plant taxa are summarized in Appendix A, Table 1.

During background research, 32 special-status wildlife taxa were reviewed for their potential to occur within the Study Area. Seven of these species are federally or state-listed and one is a candidate for both state and federal listing (Appendix A, Table 2). The other 25 species listed in Appendix A, Table 2 are CDFW species of special concern, on the special animals list and/or USFS sensitive species. Among the 32 reviewed special-status species, eight have moderate potential to occur in the Study Area. More detail on these eight species, their known ranges, and habitat requirements are discussed in Section 3.4 below. The remaining reviewed animal taxa with low or no potential to occur are summarized in Appendix A, Table 2 and are not discussed further in this report.

Locations of known occurrences of special-status plant and animal taxa within 3 miles of the Study Area are presented in Figure 2-1 (CDFW 2014). Avoidance and minimization measures are listed in Section 4.0 for those special-status plant and animal species which have potential to occur in or near the Study Area for at least part of the year.

3.2 Vegetation Communities and Other Ground Cover

The Study Area was vegetated predominantly with sagebrush habitats, with inclusions of forests and human-managed areas. A small number of wetlands and drainages also occurred across the site (Appendix B). The soils were predominantly coarse sandy loam, sandy loam, or loam. The following sections describe vegetation communities that were present within the Study Area (see also Appendix B and Table 3-2).

3.2.1 Upland Communities

The upland communities in the Study Area include various types of shrubland and steppe, grassland and herbland, conifer forest, aspen stands, and ruderal vegetation. Man-made and managed areas included construction (active construction at the time of the survey), graded, and paved and graveled areas. These communities and landcover are described below. Select photographs are presented in Appendix C.

California–Vancouverian Montane and Foothill Forest

A small portion of the Study Area was vegetated with conifer forests (approximately 37.37 acres and 11.01 percent; Photo 1 in Appendix B). These forests were typically dominated by medium to tall ponderosa pine (*Pinus ponderosa*) and Jeffrey pine (*Pinus jeffreyi*) trees; sparse white fir (*Abies concolor*) and lodgepole pine (*Pinus contorta* ssp. *murrayana*) were also present in the overstory. The tree density in the forested areas varied greatly. In some areas, dense trees almost completely overshaded understory growth; in other areas, sparse to dense shrubs and herbaceous cover were observed, including big sagebrush (*Artemisia tridentata* var. *vaseyana*), mahala mats (*Ceanothus prostratus*), bitterbrush (*Purshia tridentata*), pink sierra current (*Ribes nevadense*), and woolly mule's ears (*Wyethia mollis*). The conifer forest alliances and stands mapped in the Study Area are as follows (from Sawyer, Keeler-Wolf, and Evens 2009):

- *Pinus ponderosa* alliance, and
- *Pinus jeffreyi* alliance.

The conifer forest habitats have potential to support special-status plant and animal species.

Table 3-2. Summary of Ground Cover Types within the Study Area

GROUND COVER	PERCENT OF STUDY AREA	AREA (ACRES)
Uplands		
California–Vancouverian Montane and Foothill Forest		
Pinus ponderosa alliance	5.12	17.37
Pinus jeffreyi alliance	5.89	20.00
SUBTOTAL	**11.01**	**37.37**
Western North America Cool Temperate Forest		
Populus tremuloides stands	0.04	0.13
SUBTOTAL	**0.04**	**0.13**
Shrubland and Steppe		
Artemisia tridentata ssp. *vaseyana–Purshia tridentata / Festuca idahoensis* stands	16.08	54.58
Artemisia tridentata alliance	0.13	0.44
Artemisia tridentata–Purshia tridentata stands	48.89	165.91
Purshia tridentata / Eriogonum umbellatum association	3.53	11.97
Artemisia arbuscula / Festuca idahoensis alliance	0.30	1.02
SUBTOTAL	**68.93**	**233.92**
Semi-natural Grasslands and Herblands		
Elytrigia intermedia stands	10.15	34.46
Elytrigia intermedia / Artemisia tridentata alliance	0.07	0.25
Elytrigia intermedia–Festuca idahoensis stands	0.36	1.23
Brassica and other mustards semi-natural stands	0.25	0.85
Ruderal / weedy vegetation	0.69	2.35
SUBTOTAL	**11.52**	**39.14**
Man-made and Managed Uplands		
Gravel / Rock	0.88	2.97
Graded	1.57	5.32
Spoils	0.28	0.96
Construction areas	0.30	1.03
Mowed areas	2.48	8.43
Pavement	0.67	2.25
SUBTOTAL	**6.18**	**20.96**
TOTAL UPLANDS	**97.68**	**331.52**
Wetlands		
Eleocharis macrostachya alliance	0.52	1.75
Hordeum brachyantherum herbaceous alliance	0.12	0.40
Hordeum brachyantherum / Festuca idahoensis herbaceous Alliance	1.19	4.04
Typha (*angustifolia*, *domingensis*, *latifolia*) alliance	0.01	0.01
TOTAL WETLANDS	**1.84**	**6.20**
Non-Wetland Water Features		
Ephemeral channels	0.09	0.31
Dry ditches and engineered drainages	0.39	1.34

TOTAL NON-WETLAND WATER FEATURES	**0.48**	**1.65**
TOTAL STUDY AREA	**100**	**339.37**

Western North America Cool Temperate Forest
A few quaking aspen (*Populus tremuloides*) stands were mapped in the Study Area (0.13 acre and 0.04 percent). These stands appeared semi-natural (Appendix C, Photo 9); they were located within otherwise managed areas and had either been planted or were natural stands that had been incorporated into the landscaping. Few conifers such as Jeffrey pine were present. These stands are classified as *Populus tremuloides* stands. Because these aspen stands are typically managed as part of landscaping and are located adjacent to active roadways and parking areas, they have low potential to support special-status species.

Shrubland and Steppe
The majority of the vegetation within the Study Area is comprised of various shrubland and steppe types (233.92 acres and 68.58 percent; Appendix C, Photos 2 and 7). While all the shrublands are relatively short statured (under approximately 3 feet tall), some differences are apparent. The majority of the shrubland is comprised of older decadent shrubs that grow close together with little herbaceous cover in between, though some areas contain well-spaced shrubs with a significant herbaceous layer. The well-spaced shrubs are typically present in areas that may receive frequent human disturbance (e.g., periodic mowing or clearing), or areas adjacent to wetland features. The shrubland and steppe habitats have potential to support special-status species.

The dominant species in these shrubland communities are big sagebrush, bitterbrush, sticky-leaf rabbitbrush (*Chrysothamnus viscidiflorus*), sulfur-flower buckwheat (*Eriogonum umbellatum*), and Idaho fescue (*Festuca idahoensis*). Other common species encountered include low sagebrush (*Artemisia arbuscula*), cheatgrass (*Bromus tectorum*), big squirreltail (*Elymus multisetus*), lupines (*Lupinus* species), and California needle grass (*Stipa occidentalis* var. *californica*). The shrubland and steppe alliances and associations mapped in the Study Area are as follows (from Sawyer, Keeler-Wolf, and Evens 2009):

- *Artemisia tridentata* ssp. *vaseyana–Purshia tridentata / Festuca idahoensis* stands,
- *Artemisia tridentata* alliance,
- *Artemisia tridentata–Purshia tridentata* stands,
- *Purshia tridentata / Eriogonum umbellatum* association, and
- *Artemisia arbuscula / Festuca idahoensis* alliance.

Wetland and water features, including vernal marsh, ephemeral channels, and engineered drainages were present within the larger matrix of upland shrubland and steppe vegetation (see Section 3.2.2 Wetlands and Water Features).

Semi-Natural Grasslands and Herblands
Approximately 39.14 acres (11.52 percent; Appendix C, Photo 2) of the Study Area were comprised of semi-natural grasslands and herblands. These vegetation types were common at the edges of landscaping, adjacent and between runways and taxiways, along roads, and in other

places that have occasional human disturbance or periodic vegetation management. Some of the grassland and herbland areas had apparently formed in frequently-disturbed shrublands. Other grassland areas appear to have been deliberately planted after previous human disturbances. These areas likely have low to no potential to support special-status species.

The most common semi-natural grassland type in the Study Area was intermediate wheatgrass (*Elytrigia intermedia*) stands which appeared to have been planted between and around the runways and taxiways. Occasionally, the intermediate wheatgrass was mixed with native species such as Idaho fescue, big squirreltail, Hill lotus (*Acmispon parviflorus*), western burnet (*Poteridium annuum*), or mountain jewelflower (*Streptanthus tortuosus*). However, these habitats also supported a number of weedy species, including cheatgrass, cicer milkvetch (*Astragalus cicer*), mustard (*Brassica* species), Bermuda grass (*Cynodon dactylon*), English peppergrass (*Lepidium campestre*), ox-eye daisy (*Leucanthemum vulgare*), white sweet-clover (*Melilotus albus*), prostrate knotweed (*Polygonum aviculare* ssp. *depressum*), Russian-thistle (*Salsola tragus*), yellow salsify (*Tragopogon dubius*), and woolly mullein (*Verbascum thapsus*). The grassland and herbland stands mapped in the Study Area are as follows (from Sawyer, Keeler-Wolf, and Evens 2009):

- *Elytrigia intermedia* stands,
- *Elytrigia intermedia / Artemisia tridentata* alliance,
- *Elytrigia intermedia–Festuca idahoensis* stands,
- *Brassica* and other mustards semi-natural stands, and
- Various types of ruderal/weedy vegetation.

Wetland and water features, including ephemeral channels, swales, and engineered drainages were present within the larger matrix of upland grassland and herbland vegetation (see Section 3.2.2 Wetlands and Water Features).

Man-made, Landscaped, and Managed Uplands

Approximately 20.96 acres (6.18 percent) of the Study Area were comprised of man-made and managed uplands. These disturbed areas are likely not suitable habitat for any special-status plant or animal species. The following managed and constructed habitats were mapped in the Study Area:

- Gravel / Rock,
- Graded,
- Spoils (Appendix C, Photo 4),
- Active construction areas,
- Mowed areas (Appendix C, Photo 3), and
- Pavement.

Wetland and water features, including ephemeral channels, freshwater marsh, and engineered drainages were present within the larger matrix of human-made, landscaped, and managed uplands (see Section 3.2.2 Wetlands and Water Features).

3.2.2 Wetlands and Water Features

Wetland and water feature types that occurred within the Study Area include various types of swale, engineered drainage, ditch, ephemeral channel, and freshwater and vernal marsh features. While a formal jurisdictional delineation has not been performed, approximately 7.85 acres (2.32 percent) of potential wetlands and water features were mapped within the Study Area. The non-wetland water features are generally seasonal, and embedded within larger occurrences of the upland communities described above. Select photographs are presented in Appendix C.

Wetlands

For the purposes of this report, the definition of "wetlands" is that used by the United States Army Corps of Engineers (USACE) and the United States Environmental Protection Agency (EPA): "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (USACE 1987). Wetland areas are defined by the presence of three factors: hydrophytic vegetation, wetland hydrology, and hydric soils. Approximately 6.20 acres (1.84 percent) of wetlands were mapped within the Study Area. These features may or may not meet the criteria to be waters of the United States with associated USACE jurisdiction. Regardless of USACE jurisdiction, wetlands are typically considered sensitive habitats by the CDFW.

Most of the wetlands within the Study Area appeared to be seasonal amphibious environments that fill from precipitation and local run-off. These seasonal features were dominated by annual and perennial herbs and graminoids (grasses and grass-like plants) adapted to germination and early growth under water or in saturated conditions. Late spring or summer desiccation triggers growth, followed by flowering and fruit set.

Three of the wetland features in the Study Area appeared to maintain standing water and/or saturated soils for the majority of the year. One was a small freshwater marsh vegetated with cattail (*Typha* sp.) and sandbar willow (*Salix exigua*), located in a roadside ditch immediately east of the airport rental car facility (Appendix C, Photo 5). This feature appeared to receive summer irrigation runoff from the adjacent landscaping. Another was a small detention basin, predominantly vegetated with pale spikerush (*Eleocharis macrostachya*) that receives runoff from the airport runways and taxiways (Appendix C, Photo 6). The third is a large natural swale, vegetated with many species including pale spikerush, sedges (multiple *Carex* species), and meadow barley (*Hordeum brachyantherum*), that appears to collect water from local precipitation/runoff and irrigation sources (Appendix C, Photo 7). This swale corresponds to one of the features depicted in the NWI (USFWS 2014c). The following wetland types were mapped in the Study Area:

- *Eleocharis macrostachya* alliance,
- *Hordeum brachyantherum* herbaceous alliance,
- *Hordeum brachyantherum / Festuca idahoensis* herbaceous alliance, and
- *Typha (angustifolia, domingensis, latifolia)* alliance (cattail marshes).

The wetland features in the Study Area appeared to support a high diversity of native species, and provide potential habitat for some special-status species.

Non-wetland Water Features
Non-wetland water features are those areas that may hold or carry standing or flowing water, but do not have all three wetland indicators (i.e., hydrophytic vegetation, wetland hydrology, and hydric soils). In the Study Area, these were typically natural or man-made channel features that carry water for a short duration. Sources for the water appeared to be precipitation and runoff, snow melt, or irrigation runoff. Approximately 0.32 acre (0.09 percent) of non-wetland water features were mapped in the Study Area. These features may or may not meet the criteria to be waters of the United States with associated USACE jurisdiction.

A few ephemeral channels were present in the Study Area. The ephemeral channel features likely carry water only after storms, but contain occasional low areas that have indications of ponding. The ephemeral channels were typically found on sandy and loamy soils, and provide suitable habitat for some special-status species. The remaining features were man-made native surface ditches, or engineered rock- or concrete-lined drainage channels. These man-made features were generally not suitable habitat for special-status species.

The following non-wetland water feature types were mapped in the Study Area:

- Ephemeral channels, and
- Dry ditches and engineered drainages.

3.3 Special-status Plants

A total of nine special-status plant taxa have moderate or high potential to occur within the Study Area. These taxa are Plumas ivesia (*Ivesia sericoleuca*), Santa Lucia dwarf rush (*Juncus luciensis*), Lemmon's milk-vetch (*Astragalus lemmonii*), Davy's sedge (*Carex davyi*), Fresno ceanothus (*Ceanothus fresnensis*), Truckee cryptantha (*Cryptantha glomeriflora*), Nevada daisy (*Erigeron eatonii* var. *nevadincola*), Amethyst stickseed (*Hackelia amethystina*), and Sierra starwort (*Pseudostellaria sierrae*). These taxa are discussed in detail below. Knowledge of plant species ranges is often incomplete, and special-status species not discussed here may be present if suitable habitat is present.

Plumas Ivesia (*Ivesia sericoleuca*)
Plumas ivesia is a perennial herb that has CRPR 1B.2 and is listed by the USFS as sensitive. This species grows in vernally mesic areas such as meadows, seeps, and vernal pools, in Great Basin scrub and lower montane coniferous forest between elevations of 1,310 to 2,200 meters (4,298 to 7,218 feet). Typical habitats for this species have volcanic soils (CNPS 2014). This California endemic is known from approximately 67 occurrences in Lassen, Nevada, Placer, Plumas, and Sierra counties. Threats to Plumas ivesia include anthropogenic disturbances such as timber harvest, development, grazing, and road construction; human alteration of the hydrological cycle (e.g., altering water tables) has also decreased the habitat value at some known occurrences. The species is also potentially threatened by fire suppression in Great Basin communities (CNPS 2014).

The CNDDB reports one occurrence of Plumas ivesia in the Study Area; seven additional occurrences are known within 3 miles (CDFW 2014). The location of the known occurrence

within the Study Area was visited during the October field survey and no individuals were located. The blooming period for the species is July through October; the survey took place very late in the season to identify this species, and ongoing drought for the past three years may have affected its growth. Suitable habitat for the species was observed in and adjacent to the wetland habitats in the Study Area, particularly one large natural swale (see Appendix B, maps 3 and 4, shown as *Eleocharis macrostachya* alliance, *Hordeum brachyantherum* herbaceous alliance, and *Hordeum brachyantherum/Festuca idahoensis* alliance). Therefore Plumas ivesia may be present in the Study Area.

Santa Lucia Dwarf Rush (*Juncus luciensis*)
Santa Lucia dwarf rush is an annual herb that has CRPR 1B.2 and is listed by the USFS as sensitive. This species grows in seasonally mesic areas such as meadows, seeps, and vernal pools, in chaparral, Great Basin scrub, and lower montane coniferous forest between elevations of 300 to 2,040 meters (984 to 6,693 feet) (CNPS 2014). This California endemic is known from approximately 26 occurrences which are widely separated from each other in 13 counties: Lassen, Monterey, Modoc, Napa, Nevada, Placer, Plumas, Riverside, Santa Barbara, San Benito, San Diego, Shasta, and San Luis Obispo (CNPS 2014). Human development projects are the main threat to Santa Lucia dwarf rush (CNPS 2014).

The CNDDB reports no occurrences of Santa Lucia dwarf rush in the Study Area, but one occurrence is known within 3 miles in nearby Martis Valley (CDFW 2014). No occurrences were observed during the field visit. The typical blooming time for this species is April to July, and the survey therefore did not take place at a suitable time of year to detect Santa Lucia dwarf rush. Suitable habitat was observed in the wetland habitats in the Study Area, particularly one large natural swale (see Appendix B, maps 3 and 4, shown as *Eleocharis macrostachya* alliance, *Hordeum brachyantherum* herbaceous alliance, and *Hordeum brachyantherum/Festuca idahoensis* alliance). Therefore Santa Lucia dwarf rush may be present in the Study Area.

Lemmon's Milk-vetch (*Astragalus lemmonii*)
Lemmon's milk-vetch is a perennial herb that has CRPR 1B.2 and is listed by the USFS as sensitive. This species grows in Great Basin scrub habitats, often in mesic areas such as meadows, seeps, and lake shores between elevations of 1,007 to 2,200 meters (3,304 to 7,218 feet) (CNPS 2014). This milk-vetch is known from approximately 13 widely spread occurrences in Inyo, Lassen, Mono, Modoc, Plumas, Shasta, and Sierra counties (CNPS 2014). Threats to Lemmon's milk-vetch include land-use conversion and pipeline construction (CNPS 2014).

The CNDDB does not report Lemmon's milk-vetch from the nine-quad background research area. However, the range for this species extends both north and south of the Study Area.

Suitable blooming period for the species is May to September, and the survey therefore did not take place at a suitable time to identify this species. During field surveys, surveyors observed and mapped one occurrence of an unidentifiable native milk-vetch which had finished flowering and fruiting (see Appendix B, map 4 and Appendix C, Photo 8). Suitable habitat for the species was observed in shrubland and steppe and some wetland habitats in the Study Area, particularly one large natural swale (see Appendix B, maps 3 and 4, shown as *Eleocharis macrostachya* alliance,

Hordeum brachyantherum herbaceous alliance, and *Hordeum brachyantherum/Festuca idahoensis* alliance). Therefore, Lemmon's milk-vetch may be present in the Study Area.

Davy's Sedge (*Carex davyi*)
Davy's sedge is a perennial herb with CRPR 1B.3. This species grows in upper montane and subalpine conifer forest between elevations of 1,500 to 2,000 meters (4,921 to 6,562 feet). Unlike many sedge species, suitable habitat for Davy's sedge is not necessarily mesic (CNPS 2014). This California endemic is known from approximately 19 occurrences in Alpine, Calaveras, El Dorado, Nevada, Placer, and Sierra counties. Threats to Davy's sedge include anthropogenic disturbances such as timber harvest and grazing (CNPS 2014).

The CNDDB does not report Davy's sedge within the Study Area or within 3 miles of the Study Area (CDFW 2014), though 12 occurrences are located in Nevada and Placer counties (Calflora 2014). No individuals of Davy's sedge were observed during the survey; however, the blooming period for the species is May through August, and the survey therefore did not take place at a suitable time to detect Davy's sedge. Suitable habitat for the species was observed in conifer forests in the Study Area, and Davy's sedge may be present.

Fresno Ceanothus (*Ceanothus fresnensis*)
Fresno ceanothus is a perennial evergreen shrub that has CRPR 4.3. This species grows in openings in cismontane woodland and lower coniferous forest between elevations of 900 to 2,103 meters (2,953 to 6,900 feet) (CNPS 2014). This California endemic is known from approximately 83 occurrences in Calaveras, El Dorado, Fresno, Madera, Mariposa, Nevada, Placer, Plumas, Tulare, and Tuolumne counties (Calflora 2014).

The CNDDB does not report Fresno ceanothus within the Study Area or within 3 miles of the Study Area (CDFW 2014), though 10 occurrences are located in Nevada and Placer counties (Calflora 2014). Ceanothus of any kind was not common in the Study Area during the survey, and only small populations of the common species mahala-mats were noted. The blooming period for Fresno ceanothus is May through July, and therefore the survey did not take place at a suitable time to observe flowering. Suitable habitat for the species was observed in and adjacent to conifer forests in the Study Area, and Fresno ceanothus may be present.

Truckee Cryptantha (*Cryptantha glomeriflora*)
Truckee cryptantha is an annual herb with CRPR 4.3. This species grows in granitic or volcanic sandy soil in openings in Great Basin scrub, meadows, and upper montane and subalpine coniferous forest between elevations of 1,800 and 3,750 meters (5,900 to 12,303 feet) (CNPS 2014). This California endemic is known from approximately 86 occurrences in Alpine, Butte, Fresno, Inyo, Lassen, Mono, Nevada, Sierra, Tulare, and Tuolumne counties (Calflora 2014).

The CNDDB does not report Truckee cryptantha within the Study Area or within 3 miles of the Study Area (CDFW 2014); however, an occurrence is reported from Nevada County, and the species is known from both north and south of the Study Area (Calflora 2014). The blooming time for Truckee cryptantha is June to September, and the survey therefore did not take place at a suitable time to detect the species. Unidentifiable cryptantha plants were commonly observed during the survey; these may be Truckee cryptantha or a common species. Suitable habitat for

the species was observed in openings in scrub and conifer forest habitats in the Study Area and Truckee cryptantha may be present.

Nevada Daisy (*Erigeron eatonii* var. *nevadincola*)
Nevada daisy is a perennial herb with CRPR 2B.3. This species grows in rocky areas in many habitats such as Great Basin scrub, lower montane coniferous forest, and pinyon and juniper woodland between elevations of 1,400 to 2,900 meters (4,593 to 9,514 feet) (CNPS 2014). In California, this species is known from approximately 27 occurrences in Lassen, Placer, Plumas, and Sierra counties (CNPS 2014). The species also grows in Nevada.

The CNDDB does not report Nevada daisy within the Study Area or within 3 miles of the Study Area (CDFW 2014); two occurrences are located in Nevada and Placer counties (Calflora 2014). The blooming period for Nevada daisy is May through July, and the survey therefore did not take place at a suitable time to detect it. Suitable habitat for the species was observed in small rocky outcrops located in areas west and north of the airport buildings and runways, and Nevada daisy may be present in the Study Area.

Amethyst Stickseed (*Hackelia amethystina*)
Amethyst stickseed is a perennial herb with CRPR 4.3. This species grows in moderately disturbed areas and other openings, such as meadows, in lower and upper montane coniferous forest between elevations of 1,500 to 2,315 meters (4,921 to 7,595 feet) (CNPS 2014). This California endemic is known from approximately 106 occurrences in Colusa, El Dorado, Glenn, Lake, Lassen, Mendocino, Placer, Plumas, Tehama, Trinity, and Tuolumne counties (Calflora 2014).

The CNDDB does not report amethyst stickseed within the Study Area or within 3 miles of the Study Area (CDFW 2014); one occurrence is located in Placer County (Calflora 2014). However, the range for the species extends both north and south of the Study Area. The blooming period for amethyst stickseed is June through August, and the survey therefore did not take place at a suitable time to detect it. Suitable habitat for the species was observed in forest openings and edges in the Study Area and amethyst stickseed may be present.

Sierra Starwort (*Pseudostellaria sierrae*)
Sierra starwort is a perennial herb with CRPR 4.2. This species grows in chaparral, cismontane woodland, and lower and upper coniferous forest between elevations of 1,225 to 2,194 meters (4,019 to 7,198 feet) (CNPS 2014). This California endemic is known from approximately 43 occurrences in Butte, Mariposa, Nevada, Placer, Plumas, and Tuolumne counties (Calflora 2014).

The CNDDB does not report Sierra starwort within the Study Area or within 3 miles of the Study Area (CDFW 2014); 22 occurrences are located in Nevada and Placer counties (Calflora 2014). The blooming period for Sierra starwort is May through August, and the survey therefore did not take place at a suitable time to detect it. Suitable habitat for the species was observed in forested areas within the Study Area, and Sierra starwort may be present.

3.4 Special-status Animal Species

A review of existing information identified eight special-status wildlife species that have moderate or high potential to occur within the Study Area (Appendix A, Table 2). These taxa are willow flycatcher (*Empidonax traillii*), northern goshawk (*Accipiter gentilis*), Cooper's hawk (*Accipiter cooperii*), black-backed woodpecker (*Picoides arcticus*), Sierra Nevada snowshoe hare (*Lepus americanus tahoensis*), western white-tailed jackrabbit (*Lepus townsendii townsendii*), Sierra Nevada red fox (*Vulpes vulpes necator*), and silver-haired bat (*Lasionycteris noctivagans*). This section provides more detail on the habitat preferences of these species.

Willow Flycatcher (*Empidonax traillii*)

Willow flycatcher is listed as endangered by the State of California and sensitive by the USFS/TNF. Historically, this species nested in California at elevations between 30 and 2,440 meters (100 to 8,000 feet), wherever willow thickets and other deciduous riparian shrubs were present (Craig and Williams 1998). In recent years the species is common at lower elevations only in the spring and fall, and the few remaining summer breeding populations in California are limited to isolated mountain meadows and other riparian habitats between 600 and 2,440 meters (2,000 to 8,000 feet) in the Cascades and northern Sierra Nevada (Craig and Williams 1998). Both breeding and foraging territories at these elevations typically consist of moist meadows, riparian streams, spring-fed areas, and similar habitats that support broken patches of willows, alders, and cottonwoods. However, the presence of water appears to be less important than the vegetation itself; in some cases dry areas maintaining a suitable type of shrubby vegetation are also used. The smallest viable territory size is about 0.25 hectare (Craig and Williams 1998). The birds typically forage by aerial gleaning or hawking insects. The beginning of the nesting season is variable, and seems dependent on weather and snow-melt; most birds leave the breeding territories by mid-August (Craig and Williams 1998).

Three occurrences of willow flycatcher are documented in the CNDDB within 3 miles of the Study Area (CDFW 2014; Figure 2-1). No suitable willow vegetation is present in the Study Area, but some potential nesting and foraging habitat is present along the margins of forested areas. Given the relatively large level of nearby human activity, however, willow flycatchers are more likely to use the areas for foraging as they are passing through, rather than for nesting.

Northern Goshawk (*Accipiter gentilis*)

Northern goshawk is designated a species of special concern by CDFW and sensitive by the USFS/TNF. Suitable nesting habitat for northern goshawk consists of mature forested habitats with large trees, dense canopy cover with at least two canopy layers, and abundant snags and downed logs (USFS 2001; USFS 2004). Habitat patches surrounding nest locations are known to range in size from 25 to 250 acres. Northern goshawks appear to be year-round residents in the Sierra Nevada, although limited altitudinal movements by some individuals may occur in winter (USFS 2001). Winter requirements of this species are poorly understood, but the few studies available show goshawk abundance in winter is primarily dependent on food source availability, not habitat preferences (Squires and Reynolds 1997). The northern goshawk breeding period extends from mid-February or early March through late August or early September.

Northern goshawks occur in forested habitats throughout the northern hemisphere (USFS 2001). The USFS estimates that approximately 600 known goshawk territories occur on National Forest

system lands in the Sierra Nevada. Territories appear to be well distributed across the Sierra; however, occupancy of many territories and general population trends are unknown due to a lack of wide-spread demography studies for this species. The CNDDB has one record for this species within 3 miles of the Study Area, which was recorded in 1999 2 miles west of Martis Peak. Suitable foraging and nesting habitat for northern goshawk is present in the Study Area.

Cooper's Hawk (*Accipiter cooperii*)

The Cooper's hawk is a CDFW watch list species. Cooper's hawk was placed on the watch list because of reduced breeding numbers in recent decades. This species is a breeding resident throughout most of the wooded portion of California and frequently nests in dense stands of live oak, deciduous riparian, second-growth conifer stands, deciduous forests, or other forest habitats near streams or other water sources. Some individuals may remain year-round where they nest, but most individuals vacate the northern half of their range during winter (Polite 1990). Nests are built in deciduous trees in crotches 3–23 meters (10–80 feet) above the ground or in conifers on horizontal branches, in the main crotch, often just below the lowest live limbs. Nesting season occurs February through October.

The Study Area is located within the current range of Cooper's hawk, but no CNDDB occurrences of this species were recorded within 3 miles of the Study Area. Potentially suitable foraging and nesting habitat for the species is present; therefore, this species may be present, or pass through, the Study Area.

Black-backed Woodpecker (*Picoides arcticus*)

In California, black-backed woodpecker is species of special concern (CDFW 2014). It was also considered for listing under CESA in 2013 (CDFW 2013); however, this species was not listed as threatened or endangered at that time. The black-backed woodpecker breeds from central Alaska and northern Canada, to montane areas of California and New England. This species is dependent on fire disturbance for feeding and is confined mostly to areas of burned-over coniferous forest sites. Black-backed woodpeckers forage opportunistically on outbreaks of wood-boring beetles in recently burned habitats (Dixon and Saab 2000). This restricted diet renders the species vulnerable to local and regional extinction as fire-suppression programs and post-fire salvage logging increase. Black-backed woodpeckers nest in cavities of both live and dead trees from April to June. Population studies of this species are difficult due to the ephemeral nature of their preferred habitat.

The Study Area is located within the current range of black-backed woodpecker; however, no CNDDB occurrences were recorded within 3 miles of the Study Area. Three occurrences have been reported within the wider nine-quad CNDDB search area. Although no recently burned areas are present within the vicinity of the Study Area, some potentially suitable foraging and nesting habitat is present. Therefore, this species may be present in low densities or pass through the Study Area.

Sierra Nevada Snowshoe Hare *(Lepus americanus tahoensis)*

The Sierra Nevada snowshoe hare is designated a species of special concern by CDFW. In California they inhabit the mid-elevations of the northern and central Sierra Nevada from approximately Mount Lassen to Yosemite National Park (north to south) and to Mono and

Mariposa counties. They have also been recorded from Nevada in the general vicinity of Lake Tahoe (Collins 1998). They are known from elevations of approximately 1,460 to 2,440 meters (4,800 to 8,000 feet).

The Sierra Nevada snowshoe hare occurs in riparian communities characterized by thickets of deciduous trees and shrubs such as willows and alders (Collins 1998). In the vicinity of Lake Tahoe, it has been reported in dense deciduous streamside vegetation; forest undergrowth; dense thickets of young conifers, especially firs where the branches droop to the ground; and patches of chaparral composed of *Ceanothus* and manzanita (*Arctostaphylos* spp.). During the summer, snowshoe hares in the Lake Tahoe area are associated with brush situated close to meadows or deciduous riparian vegetation, rather than on ridgetops or brush-covered upper slopes. Snowshoe hares typically spend the day hiding from predators under vegetation, logs, or jumbled piles of fallen trees or shrubs (Collins 1998). They do not frequent open spaces or mature closed canopy conifer forests. They are active year-round, mostly at night and early morning. In the summer, snowshoe hares feed on various green succulent plants, grasses, sedges, ferns, and forbs (Collins 1998). In the winter, their diet changes to bark and twigs of conifers, evergreen shrubs, and deciduous trees. Breeding occurs from early spring to late summer.

The Study Area is located within the current range of Sierra Nevada snowshoe hare. One CNDDB occurrence is known within 3 miles of the Study Area, but it was from 1915. Potentially suitable habitat for the species is present, therefore, this species may be present, or pass through, the Study Area.

Western White-tailed Jackrabbit *(Lepus townsendii townsendii)*

The western white-tailed jackrabbit is designated a species of special concern by CDFW. This species is a year-round resident of the crest and upper eastern slope of the Sierra Nevada, primarily from the Oregon border south to Tulare and Inyo counties. The western white-tailed jackrabbit was formerly widespread throughout its range, but it is now uncommon to rare with a fragmented and small population (Hoefler 1990). This species' preferred habitats are sagebrush, subalpine conifer, juniper, alpine dwarf-shrub, and perennial grassland. It also inhabits low sagebrush, wet meadow, and early successional stages of conifer habitats. Western white-tailed jackrabbits move seasonally from higher to lower elevations in winter (Hoefler 1990). They primarily feed in open meadows on grasses and herbaceous plants during the growing season. In winter they feed on buds, bark, and twigs of shrubs, particularly sagebrush, creambush (*Holodiscus discolor*), and small trees (Hoefler 1990). Like other hares, western white-tailed jackrabbits use shrubby underbrush and dense thickets of young conifers or low branches for cover. Breeding occurs from February to July.

The Study Area is located within the current range of western white-tailed jackrabbit; however, no CNDDB records are reported within 3 miles of the Study Area (CDFW 2014). In the wider nine-quad CNDDB search, one record for this species was documented near Tahoe City from 1920. Suitable habitat for foraging and breeding is present, including open meadows dominated by sagebrush, therefore, this species may be present, or pass through, the Study Area.

Sierra Nevada Red Fox (*Vulpes vulpes necator*)

The Sierra Nevada red fox is listed as threatened by the state, and sensitive by the USFS. These foxes utilize many habitats in the high Sierra, including barrens, conifer forests, shrublands, meadows, and subalpine woodlands (Perrine et al. 2010). They are known from elevations of

1,200 to 3,600 meters (3,937 to 11,811 feet). In the summer, they tend to live at very high elevation habitats with little cover. In the winter, they move downslope into more forested areas; their habitat is positively associated with large trees (greater than 60 centimeters diameter at breast height) and greater than 40 percent canopy closure (Perrine et al. 2010). Typically these foxes create dens in natural cavities, such as talus slopes, rock slides, or boulder piles. However, they have been known to occasionally utilize human structures for dens or create earthen dens (Perrine et al. 2010).

The Study Area is located within the current range of Sierra Nevada red fox. One CNDDB occurrence is known within 3 miles of the Study Area, and potentially suitable forested habitat for the species is present. Therefore, Sierra Nevada red fox may be present, or pass through, the Study Area.

Silver-haired Bat *(Lasionycteris noctivagans)*
Silver-haired bat is designated a species of special concern by CDFW. This species is common and widespread in California, and during spring and fall migrations can be found anywhere in the state (Harris 1990). Summer habitats include coastal and montane coniferous forests, valley foothill woodlands, pinyon-juniper woodlands, and valley foothill and montane riparian habitats. Summer range is generally below 2,750 meters (9,000 feet) (Harris 1990). These bats create roosts in hollow trees, snags, buildings, rock crevices, caves, and under bark. Open habitats are used for foraging. Individuals will often forage over water or open areas using echolocation to locate prey, typically less than 6 meters (20 feet) off the ground. Mating occurs in autumn, but females store sperm internally over winter with young being born in the spring from May through July. Silver-haired bats migrate in the winter to hibernation sites further south, likely into Mexico (Harris 1990).

The Study Area is located within the current range of silver-haired bat; however, no CNDDB records are known within 3 miles of the Study Area (CDFW 2014). One CNDDB record for this species has been recorded in the wider nine-quad research area, in the Sagehen Creek Basin from 1955. The Study Area contains conifer forests and buildings where roosts may be established. Open areas are available for foraging, although open water is not present. Therefore, silver-haired bat may be present in the Study Area. However, the Study Area has a moderate level of human disturbance and is surrounded by roadways and runway traffic, which may discourage use by this and other species of bat.

3.5 Critical Habitat

The ESA of 1973 requires the federal government to designate critical habitat for any species it lists under the ESA. Critical habitat is designated to describe areas that are both essential to the management of the species, and may require special management considerations.

No federally-designated critical habitat for any species occurs within the Study Area or within 3 miles of the Study Area.

4.0 Avoidance and Minimization Recommendations

Recommendations for additional surveys and minimization and avoidance of impacts are discussed below. The Study Area has the potential to support special-status plant and animal species; special habitats, namely wetlands, are also present. Because the project may fall under the jurisdiction of, and will likely be subject to review by both state and federal agencies, it is recommended that further biological studies be performed to a level that will best inform the permitting and review processes. These studies are discussed below.

4.1 Wetlands and Other Waters

No current information specifically detailing TTAD's plans for development of the Study Area are available. Depending on the configuration of any new development, natural habitats within the Study Area, including wetland and other water features, may or may not be impacted. At least portions of the project will likely undergo review by federal and state agencies that regulate various types of wetlands and non-wetland waters. These agencies include USACE, CDFW, USFS, and/or the Regional Water Quality Control Board (RWQCB). Information regarding the presence, type, and location and size of any wetland or water features will be needed in order to adequately address the reviews required by these agencies.

Therefore, we recommend that a jurisdictional delineation meeting the requirements of USACE be conducted in portions of the Study Area that may experience project-related disturbance, particularly if habitat mapping in the subject area has identified wetlands or other water features (Appendix B). Additional agency jurisdictions should also be addressed and mapped (CDFW, RWQCB). This delineation and other associated mapping can then be used to address specific impacts to wetlands or waters from any planned project disturbance.

4.2 Special-status Plants

No current information specifically detailing TTAD's plans for development of the Study Area are available. Depending on the configuration of any new development, natural habitats within the Study Area may or may not be impacted. These natural habitats are suitable habitat for special-status plant species. Portions of the Study Area will likely undergo review by federal and state agencies, including USFWS (federally listed species), CDFW (state-listed species, and those with CRPR status), and USFS (those with sensitive status). Information regarding the presence of special-status species, including plants, will be needed in order to adequately address the reviews required by these agencies.

Therefore, we recommend that surveys meeting the protocol requirements of CDFW (CDFG 2009) be performed in naturally vegetated portions of the Study Area that may experience project-related disturbance. This protocol includes vegetation mapping using the current version of *A Manual of California Vegetation, Second Edition* (Sawyer, Keeler-Wolf and Evens 2009), a floristic plant list, multiple visits to sites based on suitable plant bloom times, and submission of any special-status plant finds into the CNDDB.

If special-status plants are found during protocol-level surveys within areas proposed for disturbance, a rare plant mitigation plan should be developed with agency consultation.

4.3 Special-status Wildlife

No current information specifically detailing TTAD's plans for development of the Study Area are available. Depending on the configuration of any new development, most potential habitat for special-status wildlife can likely be avoided (trees, snag habitat, and wetlands). General survey or avoidance measures are presented below; however, once details of planned development activities are known, more specific and targeted surveys for special-status animal species may be necessary.

Protection Measures for Nesting Birds. To avoid or minimize potential impacts to nesting birds (including special-status species), we recommend that all project construction activities such as site grubbing, excavation, grading, and the operation of heavy equipment occur between September 1 and January 31, outside of the nesting season, to the extent feasible. If project construction activities must occur during the period from February 1 to August 31, we recommend that a qualified wildlife biologist conduct pre-construction surveys for nesting birds. During the surveys, the qualified biologist shall carefully search for active nests/burrows within the work zone and a surrounding buffer zone. If an active nest is found, the bird species shall be identified and the approximate distance from the closest work site to the nest shall be estimated. Appropriate buffer distances shall be established by a qualified biologist. If active nests are closer than the appropriate buffer distance to the nearest work site, then the active nest(s) shall be monitored for signs of disturbance. Coordination with USFWS and CDFW shall occur as necessary. Disturbance of active nests should be avoided, to the extent possible, until it is determined that nesting is complete and the young have fledged.

Protection Measures for Bats. Potential bat roosting sites occur within the Study Area. In addition to impacts to special-status bats, the project has the potential to affect native wildlife nursery sites if trees, snags, or other structures on the site support a maternity colony of any species of bat. The loss of a large colony of any native bat species (e.g., silver-haired bat, long-legged myotis [*Myotis volans*]) would be a significant impact under CEQA. All potential impacts to bats will be avoided if the project does not disturb trees or any existing buildings in the Study Area. If impacts to any medium or larger trees (greater than 30.5 centimeter [12-inch] diameter) that may harbor roosting bats cannot be avoided, we recommend that the measures described below be implemented.

1. Any medium or larger (greater than 30.5 centimeter [12-inch] diameter) tree or snag that is selected for removal would be inspected by a qualified wildlife biologist for the presence of foliage-roosting bats and potential dens (e.g., cavities, entrance holes). Cavities suitable as special-status bat roosts would be examined for roosting bats using a portable camera probe or similar technology. Buildings or other structures with potential for supporting special-status bats would be inspected by a qualified biologist for evidence of roosting colonies. If present, roosts of special-status or other bats (including day and night roosts, hibernacula, and maternity colonies) would be flagged and construction activities would be avoided within a minimum of 91.5 meters (300 feet) surrounding each occupied roost.

2. If a portion of the Study Area is being used as a winter roost, project activity would not take place during the period of hibernation (November 1 to March 1). If a portion of the Study Area is being used as a maternity colony, project activity would not occur during the maternity roost season (March 1 to July 31). If a non-maternity bat roost is found within the Study Area, the roosting bats would be safely evicted under the direction of a qualified biologist (as determined by a Memorandum of Understanding with CDFW). The qualified biologist would facilitate the removal of roosting bats using the following methods:

    a. Opening the roosting area to allow airflow through the cavity or building (air flow disturbance).

    b. Waiting a minimum of one night for roosting bats to respond to air flow disturbance, thereby allowing bats to leave during nighttime hours when predation risk is relatively low and chances of finding a new roost is greater than in the daytime.

    c. Disturbing roosts at dusk just prior to roost removal the same evening to allow bats to escape during nighttime hours.

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Appendix A
Special-status Species Identified from Background Research

Appendix A, Table 1. Special-status Plant Species Identified from Background Research			
Scientific Name **Common Name (Blooming Period)**	**Status[1] Federal/State/ CRPR/USFS**	**Suitable Habitat (Known Elevation Range)**	**Potential to Occur in Study Area[2]**
Plants within a 3-mile Buffer			
Eriogonum umbellatum var. *torreyanum* Donner Pass buckwheat (July–September)	None / None / 1B.2 / FSS	Habitat for species is volcanic, rocky areas, and mesic areas such as meadows and seeps in upper montane coniferous forest (1,855 to 2,620 meters)	Known occurrence within 3 miles (CDFW 2014), but no suitable rocky habitat in Study Area. **Not expected.**
Ivesia sericoleuca Plumas ivesia (May–October)	None / None / 1B.2 / FSS	Species is found in vernally mesic areas, such as meadows, seeps, and vernal pools, usually with volcanic soils. Also found in seasonally mesic areas in Great Basin scrub and lower montane forest communities (1,310 to 2,200 meters).	Known occurrence within and/or adjacent to Study Area (CDFW 2014) and several occurrences within 3 miles. Suitable habitat present. **High potential to occur in grassland and wetland areas.**
Juncus luciensis Santa Lucia dwarf rush (April–July)	None / None / 1B.2 / FSS	Species is found in seasonally mesic areas such as meadows, seeps, and vernal pools, in chaparral, Great Basin scrub, and lower montane coniferous forest (300 to 2,040 meters).	Known occurrence within a mile of Study Area, in a mesic area in sagebrush scrubland (CDFW 2014). Suitable habitat present. **High potential to occur in wetlands.**
Rorippa subumbellata Tahoe yellow cress (May–September)	Candidate **/ Endangered /** 1B.1 **/ Federal Endangered**	Species has a very narrow range near Lake Tahoe, and specific habitat of lake margins with decomposed granitic beaches. Historically known from riparian areas on this same soil type (1,895 to 1,900 meters).	Historical occurrence from late 1800's within 3 miles of Study Area; the exact location of this occurrence is unknown and thought to be extirpated (CDFW 2014). No suitable lake margin or beach habitat present. **Not expected.**
Scutellaria galericulata Marsh skullcap (June–September)	None / None / 2B.2 / None	Suitable habitat is long-term mesic areas such as meadows, seeps, marshes, and swamps in montane coniferous forest (0 to 2,100 meters).	Historical occurrence from late 1800's within 3 miles of Study Area; the exact occurrence location is unknown (CDFW 2014). No suitable marsh habitat present. **Not expected.**
Plants with Forest Service Sensitive Status or within Nine-quad Search (greater than 3 miles from Study Area)			
Arabis rigidissima var. *demota* Galena Creek rockcress (August)	None / None / 1B.2 / FSS	Species is known from rocky areas in broad-leaved upland forest and upper montane coniferous forest (2,255 to 2,560 meters).	Study Area lower than known distribution of the species (CNPS 2014). Only small areas of rocky habitat present. **Not expected.**
Artemisia tripartita ssp. *tripartita* Threetip sagebrush (August)	None / None / 2B.3 / None	Species is found in rocky, volcanic openings in upper montane coniferous forest (2,200 to 2,600 meters).	Suitable open areas present but taxon is not known nearby (CDFW 2014), and Study Area elevation is somewhat lower than known distribution of the species (CNPS 2014). **Low potential to occur.**
Astragalus austiniae Austin's milk-vetch (July–September)	None / None / 1B.3 / None	Species is found in high elevation rocky areas, such as alpine boulder and rock fields, or rocky areas in subalpine coniferous forest (2,440 to 2,965 meters).	Study Area much lower than known elevation range of the species (CNPS 2014), and no suitable rock or boulder fields present. **Not expected.**

Appendix A, Table 1. Special-status Plant Species Identified from Background Research			
Scientific Name **Common Name (Blooming Period)**	**Status[1] Federal/State/ CRPR/USFS**	**Suitable Habitat (Known Elevation Range)**	**Potential to Occur in Study Area[2]**
Astragalus lemmonii Lemmon's milk-vetch (May–September)	None / None / 1B.2 / FSS	Species is found in Great Basin scrub, meadows, and lake shores (1,007 to 2,200 meters).	Study Area has suitable habitat for the species (CNPS 2014). Species is not known from nine-quad search area, but known from both north and south of the Study Area. **Moderate potential to occur.**
Astragalus pulsiferae var. *coronensis* Modoc plateau milk-vetch (May–July)	None / None / 4.2 / FSS	Species is found in sandy, gravelly, or volcanic substrates in Great Basin scrub, lower montane coniferous forest, and pinyon and juniper woodland (1,345 to 1,890 meters).	Study Area has generally suitable habitat for the species, but species only known from Lassen, Modoc, and Plumas counties. **Low potential to occur.**
Astragalus webberi Webber's milk-vetch (May–July)	None / None / 1B.2 / FSS	Species is known from various habitats including broad-leaved upland forest, lower montane coniferous forest, meadows, and seeps (731 to 1,250 meters).	Study Area is well above the known elevation range of this species, and species only known from a small range in Plumas County (CNPS 2014). **Not expected**.
Astragalus whitneyi var. *lenophyllus* Woolly-leaved milk-vetch (July–August)	None / None / 4.3 / None	Species is found in high elevation rocky areas, such as alpine boulder and rock fields, or rocky areas in subalpine coniferous forest (2,135 to 3,050 meters).	Study Area somewhat lower than known elevation range of the species (CNPS 2014), and no suitable subalpine rock or boulder fields present. **Not expected.**
Boletus pulcherrimus Red-pored bolete (Late fall–mid-winter)	None / None / None / FSS	Mixed conifer/hardwood woods (Mykoweb 2014a).	No suitable mixed conifer/ hardwood forest present. **Not expected.**
Botrychium ascendens Upswept moonwort (July–August)	None / None / 2B.3 / FSS	Species is found in mesic areas such as meadows and seeps in lower montane coniferous forest (1,500 to 2,595 meters).	Limited areas of minimally suitable meadow habitat present. **Low potential to occur.**
Botrychium crenulatum Scalloped moonwort (June–September)	None / None / 2B.2 / FSS	Species is found in mesic areas such as bogs, fens, meadows, seeps, marshes, and swamps in lower and upper montane coniferous forest (1,268 to 3,280 meters).	Limited areas of minimally suitable meadow habitat present. **Low potential to occur.**
Botrychium lunaria Common moonwort (August)	None / None / 2B.3 / None	Species is found in mesic areas such as meadows or seeps in lower and upper montane coniferous forest (1,980 to 3,400 meters).	Limited areas of minimally suitable meadow habitat present. **Low potential to occur.**
Botrychium minganense Mingan moonwort (July–September)	None / None / 2B.2 / FSS	Species is found in areas such as bogs and fens in lower and upper montane coniferous forest (1,455 to 2,180 meters).	Limited areas of minimally suitable meadow habitat present. **Low potential to occur.**
Botrychium montanum Western goblin (July–September)	None / None / 2B.1 / FSS	Species is found in mesic areas such as meadows and seeps, in lower and upper montane coniferous forest (1,465 to 2,180 meters).	Limited areas of minimally suitable meadow habitat present. **Low potential to occur.**

Appendix A, Table 1. Special-status Plant Species Identified from Background Research			
Scientific Name **Common Name (Blooming Period)**	**Status[1] Federal/State/ CRPR/USFS**	**Suitable Habitat (Known Elevation Range)**	**Potential to Occur in Study Area[2]**
Bruchia bolanderi Boldander's bruchia (Moss)	None / None / 2B.2 / FSS	Suitable habitat is areas with damp soil, such as meadows or seeps, in lower or upper montane coniferous forest (1,700 to 2,800 meters).	Limited areas of minimally suitable meadow habitat present. **Low potential to occur.**
Carex davyi Davy's sedge (May–August)	None / None / 1B.3 / None	Suitable habitat is upper to subalpine montane coniferous forest (1,500 to 3,200 meters).	Moderately suitable habitat present at forested areas. **Moderate potential to occur in forested areas.**
Carex lasiocarpa Woolly-fruited sedge (June–July)	None / None / 2B.3 / None	Species is found in very mesic areas such as freshwater lake margins, or wet bogs and fens (1,700 to 2,100 meters).	No suitable lakeshore or marsh habitat present. **Not expected.**
Carex limosa Mud sedge (June–August)	None / None / 2B.2 / None	Suitable habitat is mesic areas such as bogs, fens, meadows, seeps, marshes, and swamps, in lower or upper montane coniferous forest (1,200 to 2,700 meters).	Limited amounts of minimally suitable mesic habitat present. **Low potential to occur in wetlands.**
Ceanothus fresnensis Fresno ceanothus (May–July)	None / None / 4.3 / None	Species is found in openings in cismontane woodland and lower montane coniferous forest (900 to 2,103 meters).	Not known from Truckee quad (CDFW 2014, CNPS 2014), but suitable habitat generally present. **Moderate potential to occur.**
Claytonia megarhiza Fell-fields claytonia (July–September)	None / None / 2B.3 / None	Species is found in crevices between rocks in alpine boulder and rock fields, and rocky or gravelly areas in subalpine coniferous forest (2,600 to 3,532 meters).	Study Area much lower than known elevation range of the species (CNPS 2014), and no suitable rock or boulder fields present. **Not expected.**
Cryptantha glomeriflora Truckee cryptantha (June–September)	None / None / 4.3 / None	Species is found in granitic, volcanic, and sandy areas in Great Basin scrub, meadows, and upper montane and subalpine coniferous forest (1,800 to 3,750 meters).	Not many occurrences are known in Nevada and Placer counties, but suitable open Great Basin scrub and forest habitats are present. **Moderate potential to occur.**
Cypripedium fasciculatum Clustered lady's-slipper (March–August)	None / None / 4.2 / FSS	Species is found in lower and upper lower montane coniferous forest. It can be associated with serpentinite, but not consistently. Often on shaded slopes, associated with hazelnut and dogwood (100 to 2,435 meters).	Small areas of minimally suitable forest habitat present. **Low potential to occur.**
Cypripedium montanum Mountain lady's-slipper (March–August)	None / None / 4.2 / FSS	Species is found in broad-leaved upland forest, cismontane woodland, lower montane coniferous forest, and North Coast coniferous forest. Sometimes but not always associated with a mesic area such as a seep (185 to 2,225 meters).	Forests in Study Area are not mesic. Species not known from nine-quad search area. **Not expected.**
Dendrocollybia racemosa Branched collybia (Late fall–mid-winter)	None / None / None / FSS	Species grows on decayed fungus or mushrooms, or in mixed conifer/hardwood forest duff (Mykoweb 2014b).	Suitable mixed conifer/ hardwood forest not present. **Not expected**

Appendix A, Table 1. Special-status Plant Species Identified from Background Research			
Scientific Name **Common Name (Blooming Period)**	**Status[1] Federal/State/ CRPR/USFS**	**Suitable Habitat (Known Elevation Range)**	**Potential to Occur in Study Area[2]**
Drosera anglica English sundew (June–September)	None / None / 2B.3 / None	Suitable habitat for this species is mesic areas such as bogs, fens, meadows, and seeps (1,300 to 2,255 meters).	Not known from near the Study Area (CDFW 2014), but limited areas of minimally suitable meadow habitat present in the Study Area. **Low potential to occur in wetlands.**
Epilobium howellii Subalpine fireweed (July–August)	None / None / 4.3 / None	Suitable habitat for this species consists of mesic areas such as meadows and seeps, in subalpine coniferous forest (2,000 to 3,120 meters).	Not known from near the Study Area (CDFW 2014) and Study Area below known elevation range. No subalpine coniferous forest habitat present. **Not expected.**
Epilobium oreganum Oregon fireweed (June–September)	None / None / 1B.2 / FSS (but not known from TNF)	Suitable habitat for this species is mesic areas such as bogs and fens in lower and upper montane coniferous forest (500 to 2,240 meters).	Not known from the Truckee quad (CDFW 2014, CNPS 2014), but minimally suitable wet meadow habitat present in the Study Area. **Low potential to occur.**
Erigeron eatonii var. *nevadincola* Nevada daisy (May–July)	None / None / 2B.3 / None	Species is found in rocky areas in Great Basin scrub, lower montane coniferous forest, and pinyon and juniper woodland (1,400 to 2,900 meters).	While not recorded from the Truckee quad (CDFW 2014, CNPS 2014), the known range for the taxon is both slightly north and south of the Study Area (CNPS 2014). Suitable habitat is generally present. **Moderate potential to occur.**
Erigeron miser Starved daisy (June–October)	None / None / 1B.3 / FSS	Species is found in very rocky areas in upper montane coniferous forest (1,840 to 2,620 meters).	Not recorded from the Truckee quad (CDFW 2014, CNPS 2014), and no rocky areas in upper montane coniferous forest present. **Not expected.**
Eriophorum gracile Slender cotton-grass (May–September)	None / None / 4.3 / None	Suitable habitat is mesic areas with acidic soil, such as bogs, meadows, and seeps, and similar areas in upper montane coniferous forest (1,280 to 2,900 meters).	Not recorded from the Truckee quad, but known range extends both north and south of the Study Area (CDFW 2014, CNPS 2014). Limited areas of minimally suitable meadow habitat present. **Low potential to occur.**
Fritillaria eastwoodiae Butte County fritillary (March–June)	None / None / 3.2 / FSS	Found in openings in chaparral, cismontane woodland, and lower montane coniferous forest. Sometimes associated with serpentinite substrates (50 to 1,500 meters).	No suitable serpentine substrate present. Known range is in foothills well west of the Study Area. **Not expected.**
Glyceria grandis American manna grass (June–August)	None / None / 2B.3 / None	Suitable habitat for this species is very wet areas such as marshes, swamps, streambanks, and lake margins (15 to 1,980 meters).	Limited area of minimally suitable wetland habitat present. **Low potential in wetlands.**
Hackelia amethystina Amethyst stickseed (June–August)	None / None / 4.3 / None	Suitable habitat is openings and disturbed areas in meadows, and lower and upper montane coniferous forest. (1,500 to 2,315 meters).	Not recorded from the Truckee quad, but known range extends both north and south of the Study Area (CDFW 2014, CNPS 2014). Generally suitable open habitat present. **Moderate potential to occur.**

Appendix A, Table 1. Special-status Plant Species Identified from Background Research			
Scientific Name **Common Name (Blooming Period)**	**Status[1] Federal/State/ CRPR/USFS**	**Suitable Habitat (Known Elevation Range)**	**Potential to Occur in Study Area[2]**
Helodium blandowii Blandow's bog moss (moss)	None / None / 2B.3 / FSS	Suitable habitat for this species is damp soil in meadows, seeps, and subalpine coniferous forest (1,862 to 2,700 meters).	Not known from near the Study Area (CDFW 2014), but no meadows in subalpine coniferous forest present. **Not expected.**
Ivesia aperta var. *aperta* Sierra Valley ivesia (June–September)	None / None / 1B.2 / FSS	Suitable habitat for this species is vernally mesic areas (such as vernal pools) in Great Basin scrub, lower montane coniferous forest, meadows, and pinyon and juniper woodland. Usually found on volcanic substrate (1,480 to 2,300 meters).	Suitable habitat present, but not known from near the Study Area; only known from Plumas, Sierra, and Lassen counties. **Low potential to occur.**
Ivesia aperta var. *canina* Dog Valley ivesia (June–August)	None / None / 1B.1 / FSS	Suitable habitat for this species is volcanic rocky substrate and xeric areas in meadows and openings in lower montane coniferous forest (1,600 to 2,000 meters).	Generally suitable habitat present, but taxon is known only from Dog Valley in Sierra County. Likely out of range and **not expected.**
Ivesia webberi Webber's ivesia (May–July)	Candidate / None / 1B.1 / FSS	Suitable habitat for this species is sandy or gravelly areas (with volcanic ash substrate) in Great Basin scrub, lower montane coniferous forest, and pinyon and juniper woodland (1,000 to 2,075 meters).	Generally suitable habitat present, but known only from Lassen, Plumas, and Sierra counties. Likely out of range and **not expected.**
Lewisia cantelovii Cantelow's lewisia (May–October)	None / None / 1B.2 / FSS	Suitable habitat is granitic or serpentinite rock; often mesic but can be dry. Found in broad-leaved upland forest, chaparral, cismontane woodland, or lower montane coniferous forest (330 to 1,370 meters)	Study Area well above the known elevation range of this species (CNPS 2014) and substrate not suitable. **Not expected.**
Lewisia kelloggii ssp. *hutchinsonii* Hutchinson's lewisia (May–August)	None / None / 3.2 / FSS	Suitable habitat is openings and ridgetops in upper montane coniferous forest, with slate or rhyolite tuff substrates (765 to 2,365 meters).	Taxon not known from surrounding nine-quad search area and suitable substrate not present in the Study Area. **Not expected.**
Lewisia kelloggii ssp. *kelloggii* Kellogg's lewisia (May–August)	None / None / 3.2 / FSS	Suitable habitat is openings and ridgetops in upper montane coniferous forest, with slate or rhyolite tuff substrates (1,465 to 2,365 meters).	Taxon not known from surrounding nine-quad search area and suitable substrate not present in the Study Area. **Not expected.**
Lewisia longipetala Long-petaled lewisia (July–September)	None / None / 1B.3 / FSS	Suitable habitat is granitic rocky (often mesic) substrates in high elevation areas. Suitable habitats include alpine boulder and rock field, and similar rocky areas in subalpine coniferous forest (2,500 to 2,925 meters).	Study Area much lower than known elevation range of the species (CNPS 2014), and no suitable rock or boulder fields present. **Not expected.**

Appendix A, Table 1. Special-status Plant Species Identified from Background Research			
Scientific Name **Common Name (Blooming Period)**	**Status[1] Federal/State/ CRPR/USFS**	**Suitable Habitat (Known Elevation Range)**	**Potential to Occur in Study Area[2]**
Lewisia serrata Saw-toothed lewisia (May–June)	None / None / 1B.1 / FSS	Suitable habitat is mesic, rocky slopes in broad-leaved upland forest, lower montane coniferous forest, and riparian forest (900 to 1,435 meters).	Study Area somewhat higher than known elevation range of species (CNPS 2014), forests onsite not suitable, and known from a restricted range in seven quads well west of the Study Area. **Not expected.**
Meesia triquetra Three-ranked hump moss (most often found in July)	None / None / 4.2 / None	Species is found growing on damp soil in mesic areas such as bogs, fens, meadows, and seeps in upper montane and subalpine coniferous forest (1,300 to 2,953 meters).	Minimally suitable mesic meadow habitat present. **Low potential to occur.**
Meesia uliginosa Broad-nerved hump moss (most often found in October)	None / None / 2B.2 / FSS	Suitable habitat is damp soil in mesic areas such as bogs, fens, meadows, and seeps in upper montane and subalpine coniferous forest (1,210 to 2,804 meters).	Minimally suitable mesic meadow habitat present. **Low potential to occur.**
Mielichhoferia elongata Elongate copper moss (moss)	None / None / 2B.2 / FSS	Suitable habitat is metamorphic rock (usually mesic) in cismontane woodland (500 to 1,300 meters).	Study Area has higher elevation than that known for the species, and suitable habitat otherwise not present. **Not expected.**
Monardella follettii Follett's monardella (June–September)	None / None / 1B.2 / FSS	Suitable habitat is rocky serpentine in lower montane coniferous forest (600 to 2,000 meters).	Known range well west of Study Area, and suitable substrate not present. **Not expected.**
Nardia hiroshii Hiroshi's flapwort (Liverwort)	None / None / 2B.3 / None	Suitable habitat is damp soil with granitic bedrock (2,195 meters).	Single occurrence found in the Norden quad in 2012 (CNPS 2014). Suitable granite habitat not present in Study Area. **Not expected.**
Peltigera gowardii Veined water lichen (Summer)	None / None / 4.2 / FSS	Suitable habitat is on rocks in clear perennial creeks with little sediment or disturbance (1,065 to 2,375 meters).	No suitable creek habitat in Study Area. **Not expected.**
Penstemon personatus Closed-throated beardtongue (June–October)	None / None / 1B.2 / FSS	Suitable habitat is metavolcanic soils in chaparral, and lower or upper montane coniferous forest (1,065 to 2,120 meters).	Small areas of minimally suitable habitat present, but known range is well northwest of the Study Area. **Not expected.**
Phacelia stebbinsii Stebbins' phacelia (May–July)	None / None / 1B.2 / FSS	Suitable habitat is meadows and seeps in cismontane woodland and lower montane coniferous forest (610 to 2,010 meters).	Minimally suitable habitat present in openings in forested areas, but known range west of Study Area. **Low potential to occur.**
Phaeocollybia olivacea Olive phaeocollybia (autumn)	None / None / None / FSS	Suitable habitat is mixed pine and oak woodlands. Typically found in coastal lowlands, but a few populations are known from Sierra Nevada foothills.	Suitable mixed oak/pine forests not present in Study Area. Study Area likely too high in elevation for this species. **Not expected.**
Pinus albicaulis Whitebark pine (all year)	Candidate / None / None / FSS	Suitable habitat is very high elevations in the mountains near timberline, on rock or talus slopes.	Suitable high elevation habitats not present in Study Area. **Not expected.**

Appendix A, Table 1. Special-status Plant Species Identified from Background Research			
Scientific Name **Common Name (Blooming Period)**	**Status[1] Federal/State/ CRPR/USFS**	**Suitable Habitat (Known Elevation Range)**	**Potential to Occur in Study Area[2]**
Poa sierrae Sierra blue grass (April–June)	None / None / 1B.3 / FSS	Suitable habitat is openings in lower montane coniferous forest (365 to 1,500 meters)	Study Area is somewhat higher than the known elevation for the species, and well east of known distribution. **Not expected.**
Potamogeton epihydrus Nuttall's ribbon-leaved pondweed (June–September)	None / None / 2B.2 / None	Suitable habitat is various shallow freshwater habitats (368 to 2,172 meters).	No suitable lake or other inundated habitat present. **Not expected.**
Potamogeton robbinsii Robbins' pondweed (July–August)	None / None / 2B.3 / None	Suitable habitat is lakes and similar inundated deep water areas (1,530 to 3,300 meters).	No suitable lake or other inundated habitat present. **Not expected.**
Pseudostellaria sierrae Sierra starwort (May–August)	None / None / 4.2 / None	Many habitats are suitable including chaparral, cismontane woodland, and lower and upper montane coniferous forest (1,225 to 2,194 meters).	Suitable habitat is present in the Study Area, particularly in forested areas. Known from Truckee quad. **High potential to occur.**
Pyrrocoma lucida Sticky pyrrocoma (July–October)	None / None / 1B.2 / FSS	Suitable habitat is alkaline clay substrate in meadows and seeps in lower montane coniferous forest or Great Basin scrub (700 to 1,950 meters).	Known range is somewhat northwest of Study Area, and no alkaline clay substrate apparent. **Not expected.**
Rhamnus alnifolia alder buckthorn (May–July)	None / None / 2B.2 / None	Species is known from mesic areas like meadows, seeps, and riparian areas, in lower or upper montane coniferous forest (1,370 to 2,130 meters).	No riparian areas or suitable mesic coniferous forest. **Not expected.**
Sphaeralcea munroana Munro's desert mallow (May–June)	None / None / 2B.2 / None	Suitable habitat is Great Basin scrub (2,000 meters).	Not known from Truckee quad. In California, only known from Squaw Creek (CNPS 2014). Generally suitable habitat present. **Low potential to occur.**
Stuckenia filiformis ssp. *alpina* Slender-leaved pondweed (May–July)	None / None / 2B.2 / None	Suitable habitat is shallow freshwater, such as streams, lake margins, marshes, or swamps (300 to 2,150 meters).	No suitable lake or other inundated habitat present. **Not expected.**
Subularia aquatica ssp. *americana* Water awlwort (July–September)	None / None / 4.3 / None	Suitable habitat is lake margins (or similar mesic areas) in upper montane coniferous forest (1,900 to 3,100 meters).	No suitable lake or other inundated habitat present. **Not expected.**
Tauschia howellii Howell's tauschia (June–August)	None / None / 1B.3 / FSS	Suitable habitat is granitic or gravelly openings in subalpine or upper montane coniferous forest (1,705 to 2,500 meters).	Somewhat suitable gravelly openings present in Study Area, but known range of the species is well northwest of the Study Area. **Low potential to occur.**

Appendix A, Table 1. Special-status Plant Species Identified from Background Research

Scientific Name **Common Name (Blooming Period)**	**Status[1] Federal/State/ CRPR/USFS**	**Suitable Habitat (Known Elevation Range)**	**Potential to Occur in Study Area[2]**

Sources: CNPS 2014; CNDDB (CDFW 2014); USFWS 2014a; USFS 2013

[1] Conservation status:

U.S. Fish and Wildlife Service designations:
Endangered: Any species in danger of extinction throughout all or a significant portion of its range.
Threatened: Any species likely to become endangered within the foreseeable future.
Candidate: Any species that is a candidate for listing.

California Department of Fish and Wildlife designations:
Endangered: Any species in danger of extinction throughout all or a significant portion of its range.
Threatened: Any species likely to become endangered within the foreseeable future.

California Rare Plant Rank designations (CNPS 2014):
1B Plants rare, threatened or endangered in California and elsewhere.
2 Plants rare, threatened or endangered in California, but more common elsewhere.
3 Plants about which more information is needed (review list)
4 Limited distribution (watch list).

California Rare Plant Rank threat categories:
.1 Seriously endangered in California.
.2 Fairly endangered in California.
.3 Not very endangered in California.

FSS = Included on the Region 5 USFS Sensitive Plants List (plant taxa that are not "Forest Service Sensitive" may still be included on unpublished Special Interest or Watch Lists for individual forests or districts

[2] The potential of occurrence (low, moderate, high) is based on habitat requirements (such as substrate, hydrology, vegetation type, and disturbance factors) and known spatial and elevation range, applied by using the following general guidelines:

Not Expected: Habitat within the Study Area and/or project vicinity satisfies some of the species' requirements but the vicinity of the Study Area or the Study Area itself is outside the known or expected range of the species. The species' presence within the Study Area is very unlikely.

Low: Habitat within the Study Area and/or project vicinity satisfies very few of the species' requirements and/or the range of the species overlaps with the vicinity of the Study Area, but not with the Study Area itself. The species' presence within the Study Area is unlikely.

Moderate: Habitat within the Study Area and/or Study Area vicinity meets some of the species' requirements, and known locations for the species are found in the vicinity of the Study Area. Presence of the species within the Study Area is moderately likely.

High: Habitat within the Study Area and/or Study Area vicinity meets most or all of the species' requirements, and known locations for the species are found within 3 miles of the Study Area. Presence of the species within the Study Area is highly likely.

Appendix A, Table 2. Special-Status Wildlife Species Identified from Background Research			
Scientific Name **Common Name**	**Status[1] Federal/State/ CDFW/USFS**	**Suitable Habitat**	**Potential to Occur in Study Area[2]**
Special-Status Wildlife Species within a 3-mile Buffer of Study Area			
Molluscs			
Margaritifera falcata Western pearlshell	None / None/ SA / None	Species inhabits cold creeks and rivers with clean water and sea-run salmon or native trout. Broadly distributed in western North America.	No suitable stream habitat is present within the Study Area. **No potential to occur**.
Birds			
Empidonax traillii Willow flycatcher	None / **Endangered** / SA / FSS	Suitable habitat includes montane riparian thickets; most frequent in willow thickets near ponds, meadows, etc. Breeding habitat often occurs within and adjacent to forested habitats.	The last record within 3 miles of the Study Area was in 2008 (near Martis Creek). Some potential nesting habitat occurs within forest habitats in Study Area. Foraging may occur along seasonally wet drainage ditches, swales and meadows. **Marginal foraging and nesting habitat present. Low to Moderate potential to occur.**
Accipiter gentilis Northern goshawk	None / None / SSC / FSS	Occurs throughout coniferous forests in the Southern Cascades and Sierra Nevada of California. Breed in most forested plant communities available throughout their range, including coniferous, deciduous, and mixed forest types. They may also use shrublands and open areas while foraging, migrating, or overwintering. Breeding period is from March to late August or early September.	Last recorded within 3 miles of Study Area in 1999. Coniferous and deciduous forest present in the Study Area. **Foraging and nesting habitat present. Moderate to high potential to occur.**
Mammals			
Lepus americanus tahoensis Sierra Nevada snowshoe hare	None / None / SSC / None	Inhabits mid-elevations of the northern and central Sierra Nevada from approximately Mount Lassen south through Yosemite National Park to Mono and Mariposa counties. Prefers thickets of riparian vegetation or dense small conifer trees, typically at edges of meadows.	Meadow and scrub habitat occur within the Study Area, but bordered mostly by sagebrush or tall, thin stands of trees. Record in CNDDB is from 1915 within 3 miles of Study Area. **Moderate potential to occur.**
Vulpes vulpes necator Sierra Nevada red fox	None / **Threatened** / SA / FSS	Uses high elevation conifer forests for cover/breeding, and meadows or alpine fell-fields for hunting. Prefers a mix of these habitats.	Recorded crossing SR 89 in 1994, last record within 3 miles of Study Area. Some suitable habitat within the Study Area. **Moderate potential to occur.**

Appendix A, Table 2. Special-Status Wildlife Species Identified from Background Research			
Scientific Name **Common Name**	**Status[1] Federal/State/ CDFW/USFS**	**Suitable Habitat**	**Potential to Occur in Study Area[2]**
Fish			
Oncorhynchus clarkii henshawi Lahontan cutthroat trout	**Threatened /** None / SA / None	Occurs in a wide variety of cold-water habitats and small headwater tributary streams. Prefers cool flowing water with available cover of well-vegetated and stable stream banks, where stream velocity breaks, and silt free, rocky riffle-run areas are present. Spawns in streams between February and July, depending on stream flow, elevation, and water temperature.	CNDDB indicates habitat within 3 miles of the Study Area, but no suitable lake or stream habitat is present within the Study Area. **No potential to occur**.
Special-Status Wildlife Species within 9-quad Search Area (greater than 3 miles from Study Area)			
Crustaceans			
Stygobromus lacicolus Lake Tahoe amphipod	None / None/ SA / None	Endemic to the benthos of Lake Tahoe; occurs sympatrically with *S. tahoensis*.	No suitable habitat is present within the Study Area. **No potential to occur**.
Stygobromus tahoensis Lake Tahoe stygobromid	None / None/ SA / None	Endemic to the benthos of Lake Tahoe; occurs sympatrically with *S. lacicolus*.	No suitable habitat is present within the Study Area. **No potential to occur**.
Molluscs			
Helisoma newberryi Great Basin rams-horn	None / None / SA / FSS	Found in larger lakes and slow rivers, including larger spring sources and spring-fed creeks. Requires well-oxygenated but soft substrate and clear, very cold, slow flowing water.	No suitable habitat is present within the Study Area. **No potential to occur**.
Insects			
Lepidostoma ermanae Cold Spring caddisfly	None / None / SA / None	Larvae occur in cold spring (3–4^{o} C) habitats that are permanently shaded at elevations greater than 1,830 meters.	No suitable spring habitat is present within the Study Area. **No potential to occur**.
Goeracea oregona Sagehen Creek goeracean caddisfly	None / None / SA / None	Larvae occur in relatively warm (9–11^{o} C) spring sources.	No suitable spring habitat is present within the Study Area. **No potential to occur**.
Ecclisomyia bilera Kings Creek ecclysomyian caddisfly	None / None / SA / None	Larvae live in small, cold spring sources, and are often found among rocks and gravel. Adults emerge May to August.	No suitable spring habitat is present within the Study Area. **No potential to occur**.

Appendix A, Table 2. Special-Status Wildlife Species Identified from Background Research			
Scientific Name **Common Name**	**Status[1] Federal/State/ CDFW/USFS**	**Suitable Habitat**	**Potential to Occur in Study Area[2]**
Desmona bethula amphibious caddisfly	None / None / SA / None	Larvae live in small spring streams with slow currents and in wet meadows. A population was found in a beaver pond in Sagehen Creek. Eggs and first and second instar larvae are typically found beginning in January, though early instar larvae can be encountered as late as April.	The seasonally wet meadows and wetlands within the Study Area are unlikely to have flowing water. However in wet years, these wetlands may provide marginally suitable habitat. **Very low potential to occur**.
Cryptochia excella Kings Canyon cryptochian caddisfly	None / None / SA / None	Restricted to cold spring streams and their sources. Adults emerge in June and July.	No suitable spring habitat is present within the Study Area. **No potential to occur**.
Capnia lacustra Lake Tahoe benthic stonefly	None / None / SA / None	Endemic to Lake Tahoe. This species is associated with deep-water plant beds and is most abundant at depths from 60 to 110 meters (200 to 360 feet) although it has been found as deep as 274 meters (899 feet) in McKinney Bay.	No suitable habitat is present within the Study Area. **No potential to occur**.
Reptiles and Amphibians			
Rana sierra Sierra Nevada yellow-legged frog	**Endangered** / **Threatened** / SSC / FSS	Found in lakes, ponds, tarns, and perennial streams above 1,524 meters elevation.	No suitable habitat is present within the Study Area. During wet years the wetlands and meadows may be marginally suitable, but given their distance from suitable perennial habitat may have **low potential to occur**.
Lithobates pipiens Northern leopard frog	None / None / SSC / None	Perennial streams and ponds.	No suitable habitat is present within the Study Area. During wet years the wetlands and meadows may be marginally suitable, but given their distance from suitable perennial habitat there is **low potential to occur**.
Birds			
Accipiter cooperii Cooper's Hawk	None / None / WL / None	Most frequently uses dense stands of live oak, riparian, deciduous or other forest habitats near water. Nesting season is February through October.	Coniferous and deciduous forest present in the Study Area. **Some suitable foraging and nesting habitat is present. Moderate potential to occur.**

Appendix A, Table 2. Special-Status Wildlife Species Identified from Background Research			
Scientific Name **Common Name**	**Status[1] Federal/State/ CDFW/USFS**	**Suitable Habitat**	**Potential to Occur in Study Area[2]**
Haliaeetus leucocephalus Bald eagle	Delisted / **Endangered** / FP / FSS	Forages in habitats near rivers, lakes, and other large bodies of open water with an abundance of fish. Nests in large trees near foraging habitat in areas that experience little or no disturbances from human activities. Nests usually near permanent water source. Breeding season March 1 through August 31.	Neither nesting nor foraging habitats occur within the Study Area, which is frequently disturbed by vehicle and air plane traffic. No records occur within a 3-mile radius. **Low potential to occur.**
Cypseloides niger Black swift	None / None / SSC / FSBCC	Occurs in California as a summer resident and migrant from mid-April to mid-October. Breeding is restricted to areas behind or beside permanent or semi-permanent waterfalls, on perpendicular cliffs near water (above Sierran rivers or on the sea coast), and in sea caves. Foraging habitat is poorly known, but anecdotally relies on winged insect swarms.	No nesting habitat occurs within the study area and no records occur within a 3-mile radius. **Low potential to occur.**
Grus canadensis tabida Greater sandhill crane	None / **Threatened** / FP / FSS	Found primarily in open freshwater wetlands, including shallow marshes and wet meadows. Nests in moist areas at the margins of extensive wet meadows and marshes.	The seasonally wet swales and wetlands within the Study Area that may provide foraging habitat during wet periods. No extensive wetlands suitable for nesting occur within the Study Area. **Low potential to occur**.
Pandion haliaetus Osprey	None / None / WL / None	Associated strictly with large, fish-bearing waters, primarily in ponderosa pine through mixed conifer habitats. Nesting season March 1 through August 15.	No suitable foraging habitat is present within the Study Area. During wet years the wetlands and meadows may be marginally suitable, but given their distance from suitable fish habit, species has **low potential to occur**.
Picoides arcticus Black-backed woodpecker	None / None / SA* / None	Occurs within the range of coniferous forests across northern North America. Prefers recently burned coniferous forest areas.	Coniferous and deciduous forest present in the Study Area. Some snag habitat is present. **Potential foraging and nesting habitat is present. Moderate potential to occur.**

Appendix A, Table 2. Special-Status Wildlife Species Identified from Background Research			
Scientific Name **Common Name**	**Status[1] Federal/State/ CDFW/USFS**	**Suitable Habitat**	**Potential to Occur in Study Area[2]**
Setophaga petechia Yellow warbler	None / None / SA / FSBCC	Generally occupies riparian vegetation in close proximity to water along streams and wet meadows. Occurs in California principally as a migrant and summer resident from late March through early October; breeds from April to late July.	Seasonal wetlands present within the Study Area have no riparian vegetation preferred by this species, and these areas are unlikely to be wet throughout the summer. **Low potential to occur**.
Mammals			
Ochotona princeps schisticeps gray-headed pika	None / None / SA / None	Inhabits talus fields fringed by suitable vegetation on rocky slopes of alpine areas throughout western North America. Restricted to cool, moist microhabitats on higher peaks or along watercourses.	No suitable habitat within the Study Area. **Low potential to occur.**
Pekania pennanti West Coast DPS Pacific fisher	Proposed Threatened / Candidate Threatened / SSC / FSS	Inhabits successional coniferous and mixed coniferous-deciduous forest with a high percentage of canopy cover. Large diameter trees, large snags, tree cavities, logs are most often used for den and rest sites, and are an important component of suitable habitat. Breeding season occurs March 1 through June 30.	Coniferous and deciduous forest present in the Study Area. However, tree diameters are not large and snag habitat is not abundant. **Low potential to occur.**
Lepus townsendii townsendii Western white-tailed jackrabbit	None / None / SSC / None	Prefers open grasslands but thrive in pastures and fields. This species can also be found in forested areas up to high alpine tundra, from 40 to 4,300 meters elevation.	Meadow and scrub habitat occur within the Study Area as well a mixed forest. **Moderate potential to occur.**
Martes caurina sierrae Sierra marten	None / None / SA / FSS	Occurs in forested habitats throughout boreal North America, reaching its southernmost extent in the Sierra Nevada of California. Inhabits mature, dense conifer forests or mixed conifer-hardwood forests with a high percentage canopy cover and large amounts of coarse woody debris on the forest floor.	Coniferous and deciduous forest is present in the Study Area. These forests are not dense, and the forest floor was fairly clean of wood debris. **Low potential to occur.**

Appendix A, Table 2. Special-Status Wildlife Species Identified from Background Research			
Scientific Name **Common Name**	**Status[1] Federal/State/ CDFW/USFS**	**Suitable Habitat**	**Potential to Occur in Study Area[2]**
Gulo gulo California wolverine	None / **Threatened** / FP / FSS	Occurs within a wide variety of habitats, primarily boreal forests, tundra, and western mountains. In northern California habitat includes Douglas-fir/tanoak forest.	Coniferous (ponderosa and Jeffrey pine) and deciduous forest is present in the Study Area. However, the Study Area is fairly disturbed and surrounded by roadways with moderate traffic and airport runways. **Low potential to occur.**
Aplodontia rufa californica Sierra Nevada mountain beaver	None / None / SSC / None	Typical habitat in the Sierra Nevada is montane riparian areas with frequent open and intermediate-canopy coverage with a dense understory near water. Deep, friable soils are required for burrowing, along with a cool, moist microclimate.	No suitable habitat within the Study Area. **No potential to occur.**
Myotis volans Long-legged myotis	None / None/ SA / None	Primarily found in montane forests. Can occur from sea level up to 3,200 meters, but is usually found from 2,000-3,000 meters. They establish roosts in trees, rock crevices, fissures in stream banks, and buildings.	The Study Area (at 1,800 meters) is outside the typical distribution for this species. Coniferous and deciduous forest is present in the Study Area. **Low potential to occur.**
Lasionycteris noctivagans Silver-haired bat	None / None / SA / None	Primarily a forest dweller, feeding over streams, ponds, and open brushy areas. During spring and fall migrations they may be found anywhere in California. Roosts in hollow trees, snags, buildings, rock crevices, caves, and under bark.	Coniferous and deciduous forest habitats are present in the Study Area as well as open meadows and brushy habitats. Potential roosting habitat includes trees, snags and buildings associated with the airport. **Moderate potential to occur.**

Sources: California Department of Fish and Game California Natural Diversity Database 2013; U.S. Fish and Wildlife Service 2013a.

[1] Conservation status abbreviations:

Endangered Species Act (ESA) designations regulated by U.S. Fish and Wildlife Service designations (USFWS):
- Endangered: Any species in danger of extinction throughout all or a significant portion of its range.
- Threatened: Any species likely to become endangered within the foreseeable future.
- Candidate: Species whose status is in review for listing
- Proposed for delisting

California Endangered Species Act (CESA) designations regulated by California Department of Fish and Wildlife (CDFW):
- Endangered: Any species in danger of extinction throughout all or a significant portion of its range.
- Threatened: Any species likely to become endangered within the foreseeable future
- Candidate: Species whose status is in review for listing

California Department of Fish and Wildlife (CDFW) non-listed designations:
- SSC Special Concern: Species that are at risk
- FP Fully Protected: may not be taken or possessed at any time and/or no issuance of permits for "take"
- WL Watch List: Taxa to watch
- SA Special Animals List

[2] The likelihood of occurrence (low, moderate, high) is based on habitat requirements (such as, substrate, hydrology, vegetation type, and disturbance factors) and known spatial and elevation range, applied by using the following general guidelines:

None (no potential): Habitat within the Study Area and/or project vicinity does not satisfy the species' requirements. The species' natural

Appendix A, Table 2. Special-Status Wildlife Species Identified from Background Research			
Scientific Name **Common Name**	**Status[1] Federal/State/ CDFW/USFS**	**Suitable Habitat**	**Potential to Occur in Study Area[2]**

presence within the Study Area is not probable.

Low: Habitat within the Study Area and/or project vicinity satisfies very few of the species' requirements and/or the range of the species overlaps with the vicinity of the Study Area, but not with the Study Area itself. The species' presence within the Study Area is unlikely.

Moderate: Habitat within the Study Area and/or project vicinity meets some of the species' requirements, and known locations for the species are found in the vicinity of the Study Area. Presence of the species within the Study Area is moderately likely.

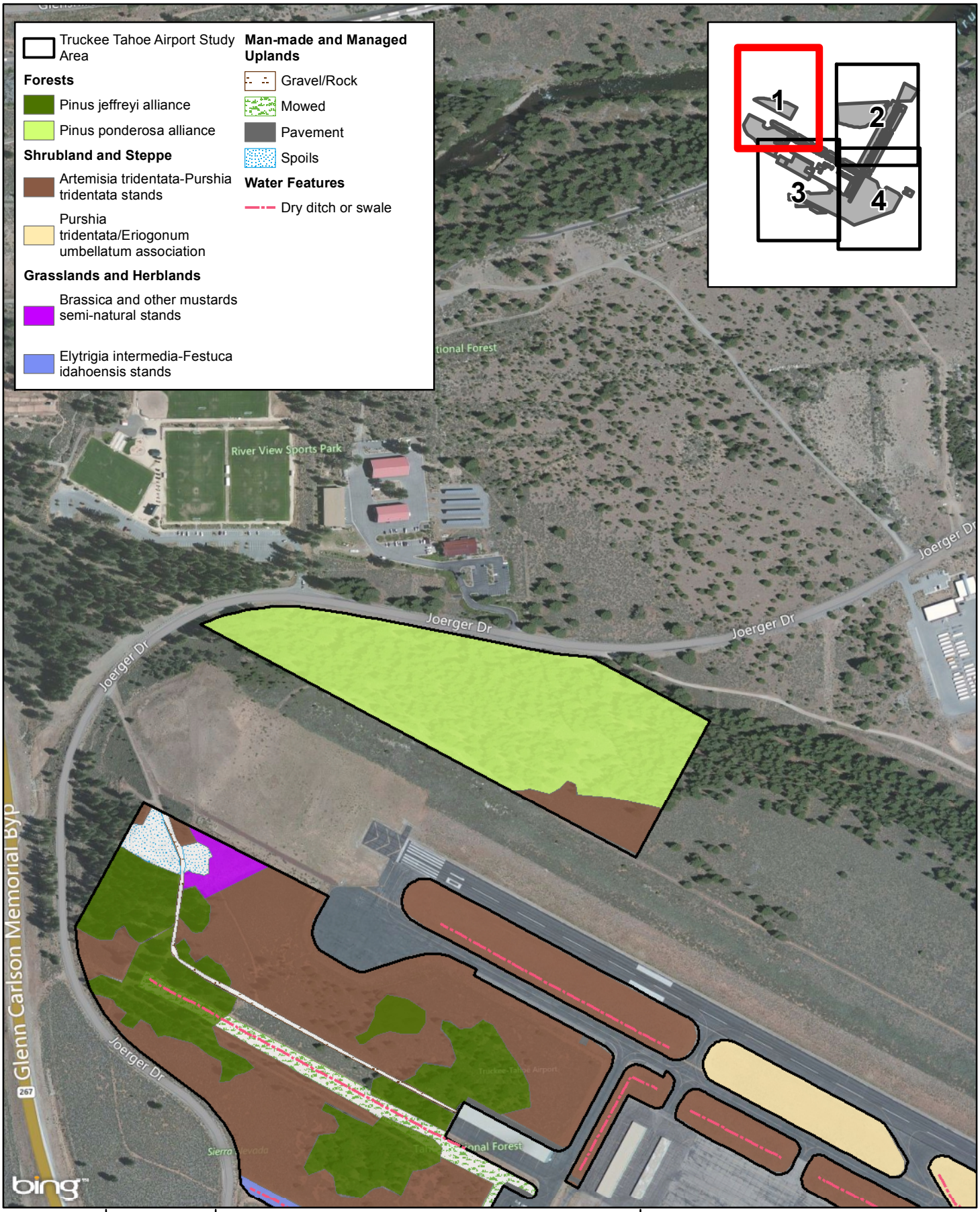
High: Habitat within the Study Area and/or project vicinity meets most or all of the species' requirements, and known locations for the species are found within 5 miles of the Study Area. Presence of the species within the Study Area is highly likely.

Present: Individuals or their sign observed in the Study Area.

USDA Forest Service, Pacific Southwest Region (Region 5) Sensitive Animals List for Sierra, Tahoe or Lake Tahoe Basin Forest Areas: FSS (Forest Service Sensitive), FSBCC (Forest Service Birds of Conservation Concern)

*The black-backed woodpecker was listed on the 2014 Special Animals List (CDFW 2014), but was omitted from the 2015 list (CDFW 2015). This taxon is retained in this report as our professional judgment indicates that this species should be retained for evaluation of potential project impacts.

Appendix B
Vegetation and Other Ground Cover Maps



Source: CNDDB (2014); Bing Maps Hybrid (2014); GANDA GIS 2014

Feet
0
500

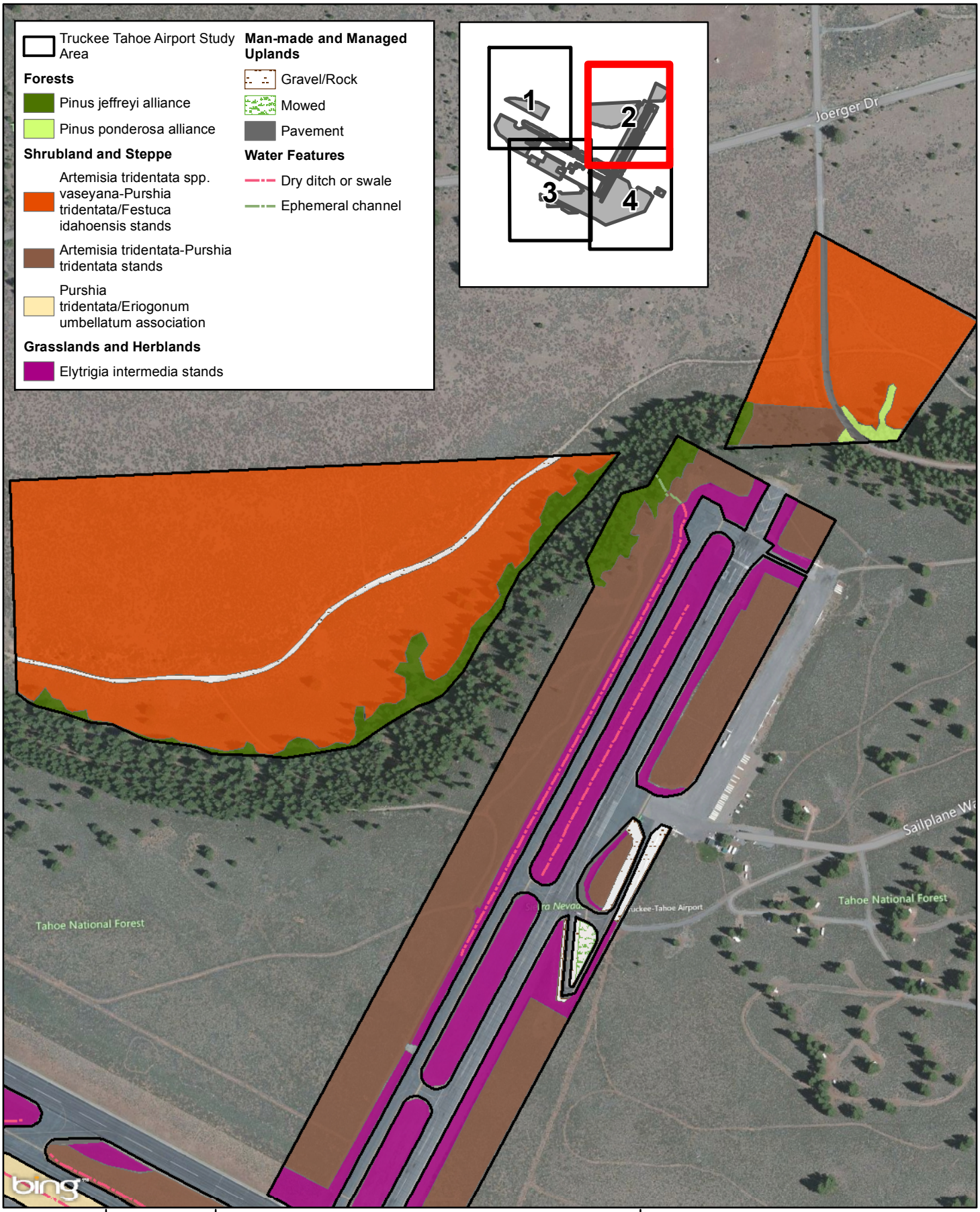
Meters
0
250

1:6,000
1 inch = 500 feet

GANDA

Appendix B. Truckee Tahoe Airport Vegetation and Other Ground Cover in the Study Area

Nevada and Placer Counties, CA
February 2015



GANDA

Source: CNDDB (2014); Bing Maps Hybrid (2014); GANDA GIS 2014

Feet
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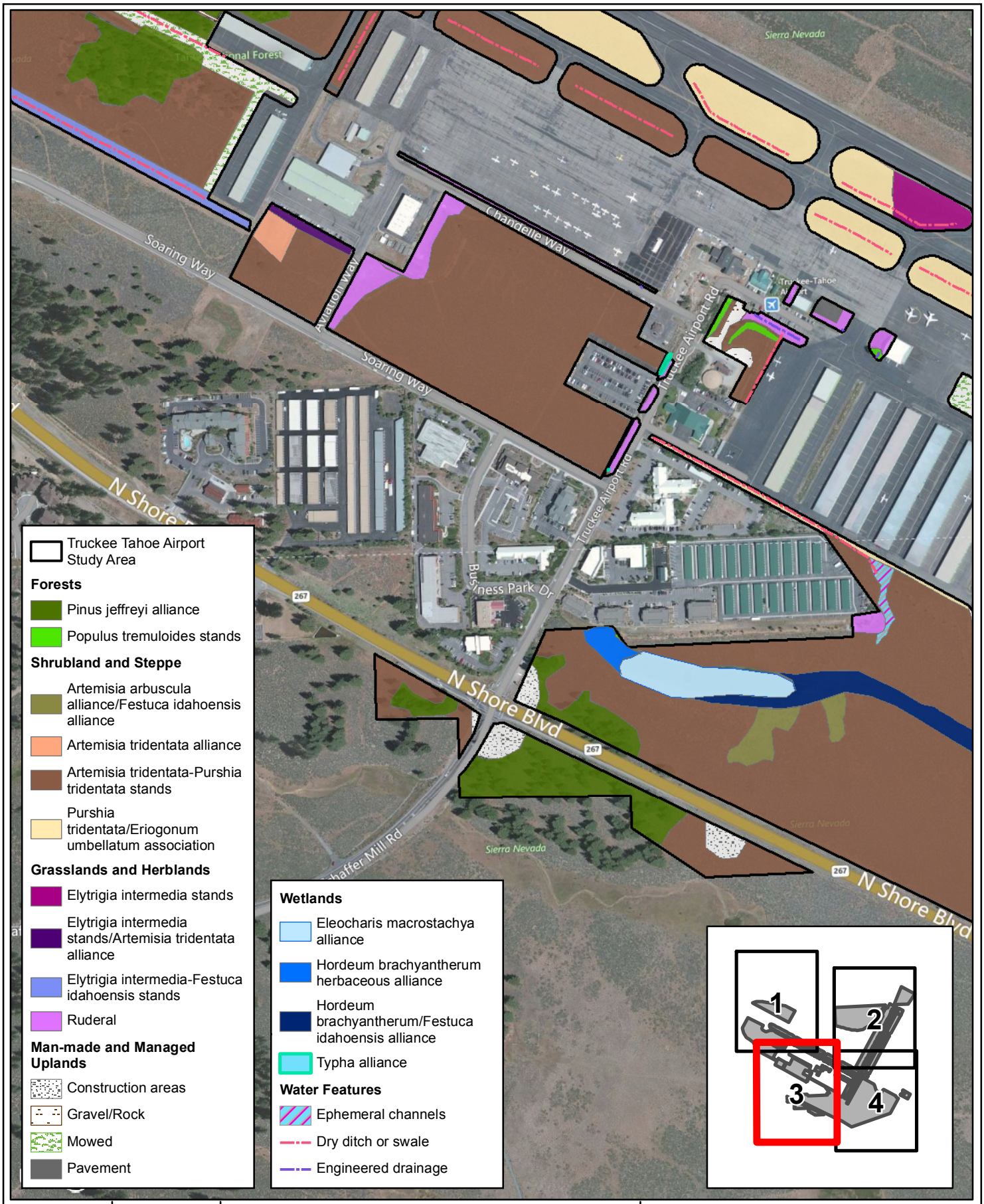
Meters
0 250

1:6,000
1 inch = 500 feet

Appendix B. Truckee Tahoe Airport Vegetation and Other Ground Cover in the Study Area

Nevada and Placer Counties, CA
February 2015



GANDA

Source: CNDDB (2014); Bing Maps Hybrid (2014); GANDA GIS 2014

Feet
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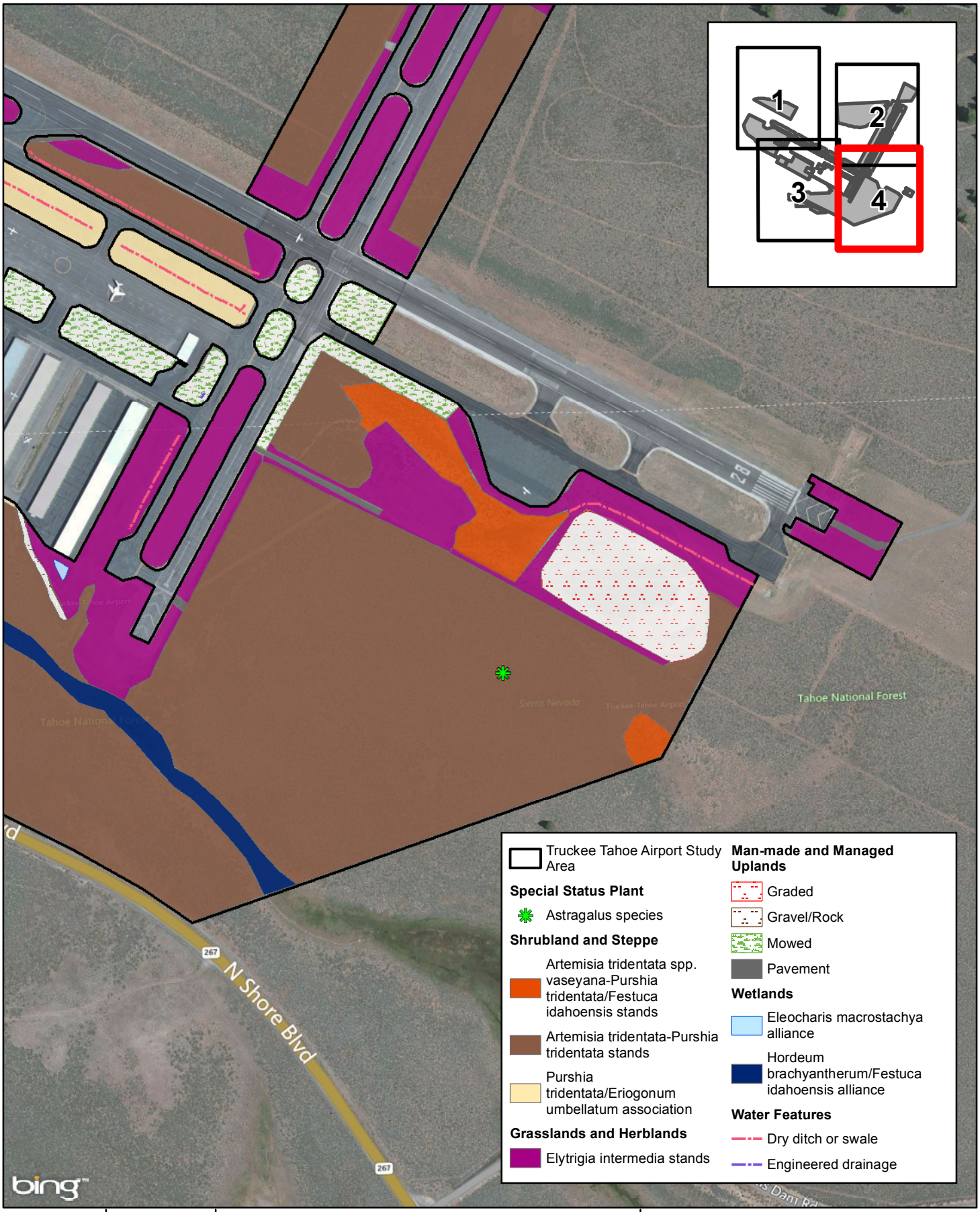
Meters
0 250

1:6,000
1 inch = 500 feet

Appendix B. Truckee Tahoe Airport Vegetation and Other Ground Cover in the Study Area

Nevada and Placer Counties, CA
February 2015



GANDA

Source: CNDDB (2014); Bing Maps Hybrid (2014); GANDA GIS 2014

Feet
0 500

Meters
0 250

1:6,000
1 inch = 500 feet

Appendix B. Truckee Tahoe Airport Vegetation and Other Ground Cover in the Study Area

Nevada and Placer Counties, CA
February 2015

Appendix C
Representative Photographs

Photo 1. Conifer forest with little understory, facing approximately northwest. October 7, 2014.

Photo 2. Decadent sagebrush scrub (left), adjacent a semi-natural stand of intermediate wheatgrass (right). Facing approximately north. October 7, 2014.

Photo 3. Mowed and mulched area within a runway island. Facing approximately north. October 7, 2014.


Photo 4. Disturbed area with spoil piles. Facing approximately north. October 7, 2014.

Photo 5. Freshwater marsh and willow scrub in an engineered ditch. Facing approximately south. October 8, 2014.

Photo 6. Detention basin with standing water. Facing approximately west. October 7, 2014.

Photo 7. Overview of wetland surrounded by sagebrush scrub. Facing approximately east. October 8, 2014.


Photo 8. Unknown milk-vetch (*Astragalus* species), possibly special-status species. Past flowering and fruiting stage. October 7, 2014.

Photo 9. Semi-landscaped aspen stand around man-made/engineered drainage feature. Facing approximately north. October 7, 2014.

Appendix C

Cultural Resources Survey

Note: All of the pages that provide site specific data on cultural finds have been removed to preserve confidentially as required by California statutes.

Report on a Cultural Resources Survey of the Proposed Truckee-Tahoe Airport Master Plan Update Project, Nevada and Placer Counties, California

By:
Sharon A. Waechter
Allen McCabe

April 2015 FINAL

Prepared for:
Mead & Hunt, Inc.
133 Aviation Blvd., Ste. 100
Santa Rosa, CA 95403

FAR WESTERN ANTHROPOLOGICAL RESEARCH GROUP, INC.
2727 Del Rio Place, Suite A, Davis, California, 95618
http://www.farwestern.com 530-756-3941

Report on a Cultural Resources Survey of the Proposed Truckee-Tahoe Airport Master Plan Update Project, Nevada and Placer Counties, California

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April 2015 FINAL

Prepared for:
Mead & Hunt, Inc.
133 Aviation Blvd., Ste. 100
Santa Rosa, CA 95403

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INTRODUCTION

At the request of Mr. David Dietz of Mead & Hunt, Inc., Far Western Anthropological Research Group, Inc., (Far Western) conducted a cultural resources study for the proposed Truckee-Tahoe Airport (Airport) Master Plan Update project, in compliance with the California Environmental Quality Act (CEQA). This study has included archival research, Native American outreach, field inventory, site recordation, and the preparation of this report. All methods and results of the study are included here. It should be noted that the confidential appendices are to be used only as necessary for project planning, and are not to be made available for public review.

PROJECT DESCRIPTION (PROVIDED BY MEAD & HUNT, INC.)

The proposed project would be located at the Truckee-Tahoe Airport in Martis Valley, immediately northeast of State Route (SR) 267 (Figures 1 and 2). The airport is operated by the Truckee-Tahoe Airport District (District), which has prepared a Master Plan to guide development of the airport for the next 20 years. The District's Board of Directors intends to adopt this plan following completion of appropriate environmental review. This review will satisfy the requirements of CEQA.

The Master Plan is a comprehensive document that includes planned modifications and additions to the airfield, terminal area, and the instrument approach procedures. It will also require additional property acquisition. The principal proposed change to the airfield will be the extension and widening of Runway 2-20. This modification will be supported by a realignment and extension of the parallel taxiway that serves Runway 2-20. Additionally, the mid-field taxiways serving Runway 11-29 and the main aircraft parking apron will be modified to meet current Federal Aviation Administration design standards. This will involve eliminating angled taxiways and increasing the size of fillets at intersections. The depth of two holding aprons serving Runway 11-29 will be reduced to meet current standards.

A variety of facilities are included in the Master Plan to address aircraft parking and storage needs. A multi-use hangar is proposed that would provide both short-term storage of aircraft (particularly in the winter) and a venue for public events. Small box hangars (60 to 65 feet on each side) are planned in the western quadrant of the airport. The main aircraft parking apron will also be expanded on its northwestern edge. The Master Plan also includes several minor elements: relocation of the aircraft wash rack, relocation of the Experimental Aircraft Association hangar, and seasonal use of an air traffic control tower in the southern quadrant.

There are also several project elements related to surface transportation. A loop road would be created in front of the terminal building, and a transit hub would be created along Airport Road that would include expanded long-term parking, a rental car facility, and a transit hub providing access to transit buses. The terminal area also contains one parcel designated for non-aviation uses. This area would be used by compatible commercial and industrial uses.

Acquisition of two parcels of land is proposed. One property is in the approach to Runway 20. It would be acquired to ensure that inappropriate development did not occur in this sensitive area. The other parcel lies abeam the threshold for Runway 11. This parcel likely will be impacted by aircraft noise.

The Airport currently has one instrument approach procedure for Runway 20 and a circle-to-land procedure available to all runway ends. The Airport is intending to seek development of a non-precision approach to Runway 11.

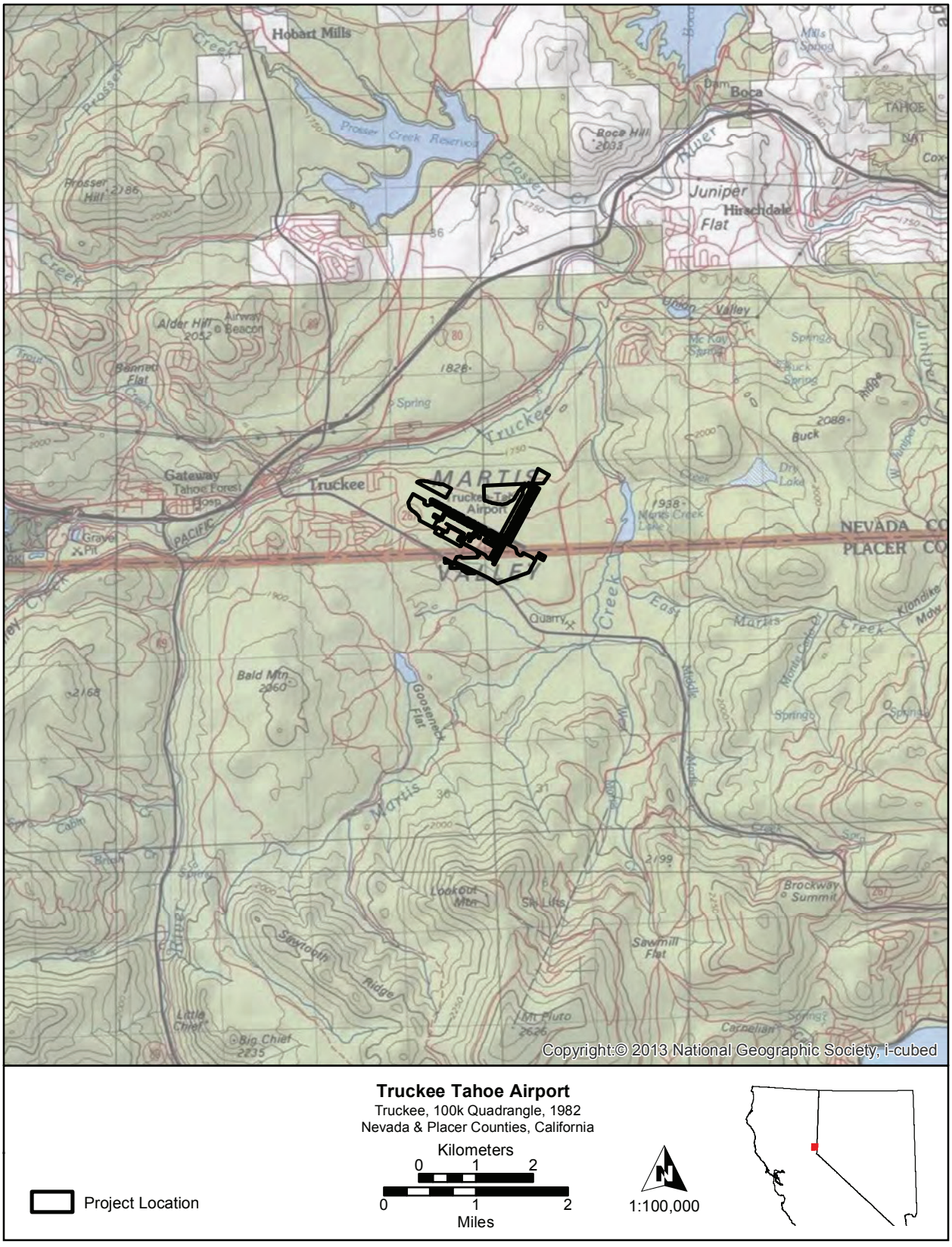

Figure 1. Project Vicinity.

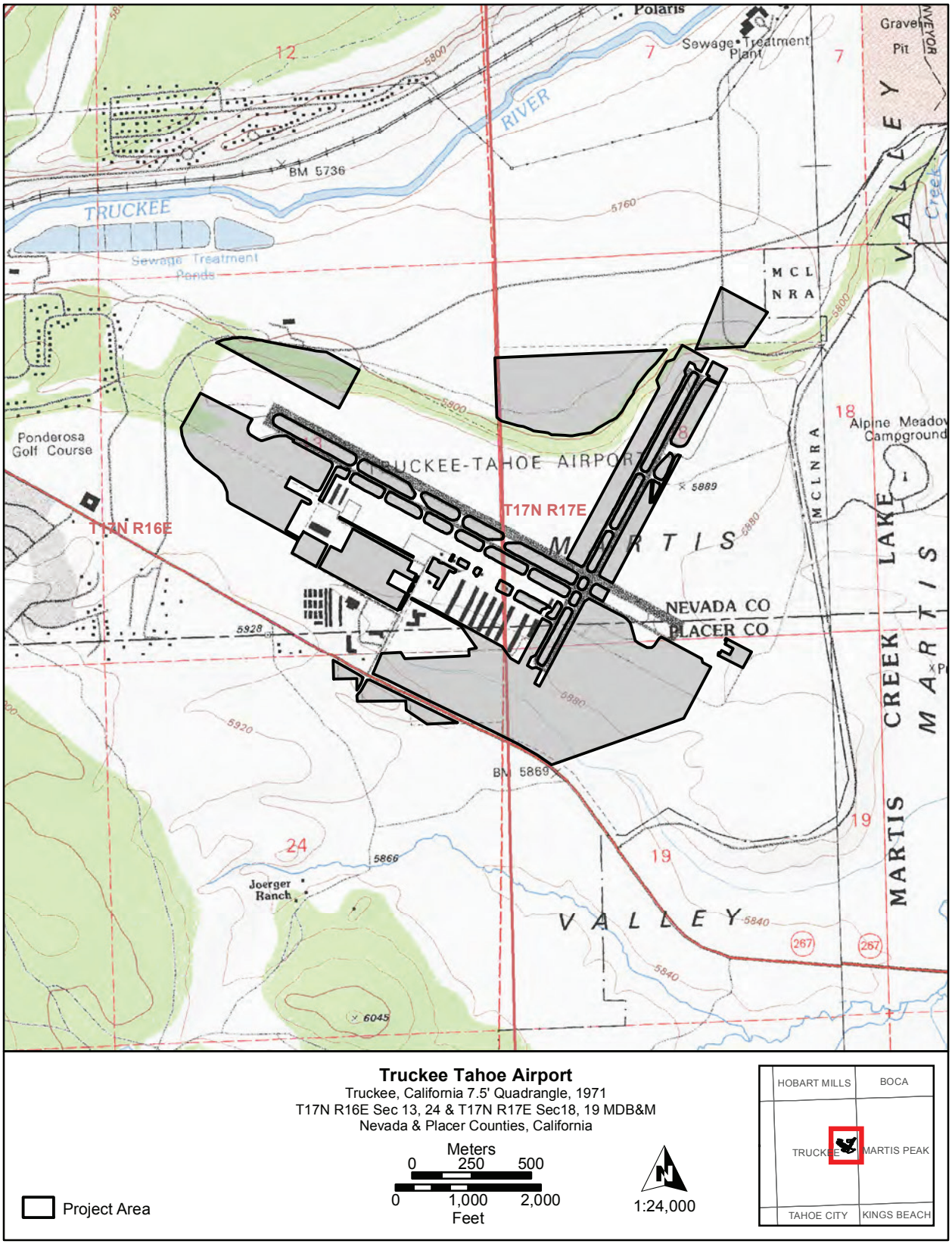

Figure 2. Project Location.

STUDY METHODS AND RESULTS

The cultural study documented here included prefield archival research, Native American outreach, and field survey. The work was carried out by Far Western's Great Basin office in Carson City, Nevada, with input from Dr. Susan Lindström and the senior author. Senior Far Western archaeologist Allen McCabe served as field director for the survey work.

PREFIELD RESEARCH

Far Western requested a records search at the North Central Information Center (NCIC) of the Historical Resources Information System, housed at California State University, Sacramento. This included a review of Information Center base maps, reports, site records, historic maps, published literature, and State Office of Historic Preservation (SHPO) data files. The records search identified 31 previous studies and 27 known resources within the records search boundary (Tables 1 and 2). Of these, 10 of the studies overlap partially with the current Area of Potential Effects (APE), and seven of the resources were reported to be in the APE (Appendix A).[1] In most cases, however, the previously surveyed areas within the APE are negligible in size, and/or the studies are quite old. With the exception of 22 acres surveyed by Kautz and Jerrems (2002), all of the current APE required a complete, updated survey.

Table 1. Records Search Results – Studies.

NCIC No.	Author(s)	Year	Title	Resources
Previous Studies Overlapping APE				
145	Lindström, Susan G.	2001	*Martis Valley Well No. 1 Pump Station and Easement Project*	P-29-1166 P-29-1167 P-29-1168
2438	Hutchins, James	2000	*A Cultural Resources Inventory Survey for a Proposed Sports Complex, Truckee Donner Recreation and Park District, Nevada County, California*	P-29-733
3415	Banka, William J.	2001	*Confidential Archaeological Addendum for Timber Operations on Non-Federal Lands in California Community Sports Park THP*	P-29-1109
3416	Bass, Henry O.	1989	*Positive Archaeological Survey Report for the Proposed Truckee Bypass Project Nevada County, California*	P-29-589 P-29-590
3474	Johnson, Gary	1980	*Archaeological Reconnaissance Report # 05-17-121 Land Exchange #2*	P-29-1186, P-31-1394 P-31-1395, P-31-1396 P-31-1397
4222	Ferrier, Doublas C.	2002	*Archaeological Addendum to the Hopkins Ranch Timber Harvest Plan*	P-31-1394 P-31-1397 P-31-1874
4238	Offerman, Janis	1993	*Report on an Archaeological Survey Across Martis Valley along State Route 267 in Placer County, California*	P-31-131, P-31-132 P-31-1895, P-31-1896 P-31-1898, P-31-1899
4239	Toland, Tanis J.	2002	*Cultural Resources Survey for a Proposed Telephone and Power Replacement Project*	None

[1] **All site locations are confidential and are provided for planning purposes only; they are not to be made available for public review.**

Table 1. Records Search Results – Studies *continued*.

NCIC No.	Author(s)	Year	Title	Resources
Previous Studies Overlapping APE continued				
8906	Kautz, Robert, and William Jerrems	2002	*Cultural Resource Survey of the Joerger Project; KEC Project 305*	P-29-3000 P-29-3001
10086	Andolina, D., S. Waechter, and S. Lindström	2009	*Cultural Resources Inventory for the Proposed 625/650 Line Upgrade Project*	34 sites in Placer County
Previous Studies in Records Search Area but Outside APE				
112	Lindström, Susan G.	1984	*A Cultural Resource Reconnaissance of the Martis Valley Mini-Storage project, Gallagher Developments, LTD, Nevada County, CA*	P-29-44 P-29-45
394	Wiant, Wayne	1984	*Negative Archeological Survey Report for Proposed Widening and Addition of a Left-turn Lane to Route 267 at Truckee Airport, East of Truckee, Placer County (03-PLA-267 PM 0.3)*	None
630	Derr, Eleanor H.	1981	*An Archaeological Survey for the Martis Valley Meadows, Placer and Nevada Counties, California*	None
1944	Jensen, Peter	1999	*Archaeological Survey, Zerweck Module Home/Subdivision Project, c. 30 acres, Nevada and Placer Counties, California*	None
2655	Offerman, Janis	1999	*Second Supplemental Historic Property Survey Report and Finding of Effect for the Proposed Truckee Bypass Project, Nevada County, California*	None
2656	Offerman, Janis	1999	*Second Addendum Archaeological Survey Report for the Proposed Truckee Bypass Project in Eastern Nevada County, California*	P-29-823 P-29-857 P-29-858
2657	Clement, Dorene	1997	*Historic Resource Evaluation and Finding of Effect for the State Route 267 Truckee Bypass, Truckee , Nevada County 03-NEV-267, P.M. 0.0./R2.8 03226-291001*	None
2658	Clement, Dorene, and Jill Hupp	1999	*Supplemental Resource Evaluation Report and Finding of Effect for the State Route 267 Truckee Bypass, Truckee, Nevada County*	P-29-857
3384	Christensen, Teri H., and Robert R. Kautz	2001	*Ponderosa Village, Town of Truckee, CA* (survey)	None
3426	Smith, Douglas	1992	*Confidential Archeological and Historical Resources Survey and Impact Assessment: A Supplemental Report for the Timberland Conversion Timber Harvest Plan*	None
3483	Jensen, Sean	2000	*Archaeological Survey, Percin Development Project, c. 5-acres, Nevada and Placer Counties, California*	None
3484	Jensen, Peter	1999	*Archaeological Inventory Survey Tahoe-Truckee Sanitation District Expansion Project, c. 500 acres near Truckee Airport, Nevada County, California*	None
3640	Lindström, Susan G.	1999	*Brockway Well Project*	P-29-1189
6189	Lindström, Susan G.	1999	*Martis Valley Mini Storage Project, Heritage Resource Inventory*	P-31-2587 P-31-2588
8907	Kimball, M., D. Simons, and R. Kautz	2003	*A Cultural Resources Inventory Survey of the Western Portion of the Proposed Truckee Pedestrian Trail; KEC Project 303*	P-29-3016, P-29-3019 P-29-3017 P-29-3018
8961	Perry, Richard	2007	*Archaeology Survey of 35 Acres at Martis Creek Dam and Spillway for the Proposed Geotechnical Boring Program*	None
9321	Caltrans	2008	*Archaeological Survey Report for the United States Route 50, Interstate 80, and State Route 89 and 267*	None
9326	Leach-Palm, Laura	2008	*Cultural Resources Inventory of Caltrans District 3 Rural Conventional Highways in Butte, Colusa, El Dorado, Glenn, Nevada, Placer, Sacramento, Sierra, Sutter, Yolo, and Yuba Counties*	50 sites in Nevada County, 52 sites in Placer County
9665	Gerike, C., S. Stewart, and B. F. Terhorst	1994	*Southwest Gas Expansion Project*	None

Table 1. Records Search Results – Studies *continued*.

NCIC No.	Author(s)	Year	Title	Resources
Previous Studies in Records Search Area but Outside APE continued				
10294	Waechter, Sharon A.	2009	*Historic Property Survey Report for the Truckee River Legacy Trail Phase 3A, Nevada County, California*	None
10711	Haney, Jeff	2011	(A) - *Historic Property Survey Report 03-PLA-267 K.P. 1.30-1.95/P.M. 0.81-1.22 EA 03-0F0100*; (B) - *Archaeological Survey Report for a Proposed Left Turn Lane along State Route 267 Placer County, California*	None

Notes: APE – Area of Potential Effects; NCIC – North Central Information Center.

Table 2. Records Search Results – Resources.

Primary No. (P-)	Trinomial (CA-)	Description
Previously Recorded Resources in APE		
29-1166	-	Remains of nineteenth-century charcoal kiln
29-1167	-	Remains of nineteenth-century charcoal kiln
29-1168	-	Segments of pre-1932 road
31-2587	PLA-1845H	Segment of Donner & Tahoe Railroad (ca. 1893-1901)
31-5504	-	Abandoned irrigation ditch, age undetermined
31-5505	-	Abandoned fenceline, age undetermined
Previously Recorded Resources in Records Search Area but Outside APE		
29-44	-	Isolated basalt projectile point
29-45	-	Segment of narrow-gauge railroad
29-87	-	Prehistoric "camp site"
29-733	-	Ca. 1900 refuse scatter
29-1109	-	Isolated basalt projectile point
29-1110	-	Isolated basalt biface
29-1186[a]	-	Historic-era refuse scatter, structural remains
29-3000	-	Refuse scatter, early/mid-twentieth century
29-3001	-	Mid-twentieth-century can scatter
29-4416	NEV-2182H	Remains of nineteenth-century charcoal kiln
29-4421	-	Hand-sawn, high-cut stumps
31-2588	-	Two chert flakes
31-3358	-	Small, sparse lithic scatter
31-3693	PLA-2332	Small concentration of flaked stone tools and debitage
31-5502	PLA-2443	Small basalt lithic scatter
31-5503	-	Early twentieth-century dirt road and debris scatter[b]
31-5506	-	Early/mid-twentieth-century road and debris scatter[b]
31-5507	-	Abandoned fenceline, age undetermined[b]
31-5520	-	Three widely scattered historic-era artifacts
31-5521	-	Seven widely scattered prehistoric artifacts
31-5620	PLA-2504H	Segment of Donner & Tahoe Railroad (ca. 1893-1901)[c]

Notes: [a] Reported in records search as inside APE but found during survey to be outside. [b] Site evaluated as part of the Martis Valley Trail project and recommended ineligible (Waechter and Lindström 2014); recommendation recently accepted by the California SHPO. [c] Note that a separate segment has been recorded under different numbers (P-31-2587/PLA-1845H). APE – Area of Potential Effects.

NATIVE AMERICAN OUTREACH

On October 8, 2014, Far Western contacted the California Native American Heritage Commission, requesting a check of their sacred land files and a list of groups and individuals with traditional ties to the project vicinity. The Commission responded on October 15, 2014, that the Sacred Land File did not identify any known Native American cultural resources in the project area, but cautioned that a negative file search did not preclude the possibility that such resources are present. They also provided a list of several groups and individuals (which, surprisingly, did not include the Washoe Tribe of Nevada and California, whose traditional territory includes the Truckee area) who might have knowledge of or interest in the area. Far Western then sent letters to the groups and individuals identified by the Commission, and to the Washoe Tribe. To date, there have been two responses: the Shingle Springs Rancheria and the Washoe Tribe have asked that consultation continue through the course of the project, and that any information obtained during the cultural study be shared with the tribes. Outreach efforts are documented in Appendix B.

FIELD SURVEY

Before fieldwork began, the Far Western field crew completed a safety program administered by Truckee-Tahoe Airport personnel. At the end of the orientation, Far Western was issued a radio to carry during the survey, so the crew could be alerted to incoming and outgoing air traffic.

The cultural survey took place over the week of November 24, 2014. Crew included Far Western senior archaeologists Allen McCabe and Steven Neidig and archaeologist Susan McCabe. The surveyors walked the entire project APE (except the 22 acres that had already been surveyed to current standards) in 15- to 30-meter transects, for a total of 323 acres. In addition to the radio, the crew carried field maps, camera, and a handheld Trimble GeoXT GPS unit containing project parcel background files and locations of the seven previously recorded archaeological resources identified during the records search. Over the course of the survey they revisited those seven resources, determining that one (P-31-1186) actually lay outside the project APE.[2] The crew also identified 15 additional resources: five sites and nine isolated finds (Table 3). Sites and isolates were differentiated on the basis of density: isolates were defined as fewer than three artifacts within a 20-meter-diameter area. Isolates identified in the project APE are listed in Table 4; these were mapped and described but not formally recorded.

The archaeologists recorded all sites on standard DPR 523 site forms. Site recordation included notes on features, artifacts, and the local environment; overview and artifact/feature photographs; and GPS mapping. Site boundaries were defined on the basis of surface indicators (e.g., artifact distributions) and topography. The surveyors recorded all cultural remains in the APE and (for linear features) for a maximum of 100 meters beyond the APE. Site datum/reference points were plotted near the center of each site (or on either end of a linear feature); no physical datum was placed on any site. Mapping included site datum/reference points, boundaries, numbered artifacts, point and linear features, and isolates; collected data were based on the Universal Transverse Mercator coordinate system, Zone 10 North, referenced to the 1983 North American Datum (NAD 83). Raw GPS data collected for site points, lines, and polygons, as well as isolate point locations, were subsequently processed by GIS specialist Melissa Murphy at the Far Western Great Basin Office. Site records are included in Appendix C.

Site Descriptions

Site locations for all sites (previously recorded and newly identified) in the APE are shown on Figure 3. Again, these are not to be made available except as necessary for project planning.

[2] Far Western collected new GPS data for this site and will supply it to the NCIC.

SUMMARY AND RECOMMENDATIONS

Prefield research, Native American outreach, and field inventory of 345 acres (including 22 acres previously surveyed) at the Truckee-Tahoe Airport in Nevada and Placer Counties has identified 11 archaeological sites and nine isolated artifacts within the boundaries of the proposed Airport Master Plan Update project. For the isolated finds, recordation has exhausted their data potential, and no additional study is recommended. However, the archaeological sites will need to be considered further.

Under CEQA, state and local public agencies must identify the environmental impacts of proposed discretionary activities or projects, determine if the impacts will be significant, and identify alternatives and mitigation measures that will substantially reduce or eliminate significant impacts to the environment. A "substantial adverse change" to an important or unique cultural resource—defined as "demolition, destruction, relocation, or alteration such that the significance of an historical resource would be impaired" (PRC Section 5020.1(q)) is considered a significant environmental impact. CEQA defines an important or unique cultural resource as one that meets the criteria for listing on the California Register of Historical Resources (California Register). Those criteria can be found on the California SHPO web site (http://ohp.parks.ca.gov/?page_id=21238).

The standard recommendations for treatment of potentially significant resources involve either (1) avoidance of impacts or (2) evaluation of site significance. Avoidance is possible where project designs can be modified to leave the resources undisturbed. Where avoidance is not feasible, any resources within the project APE will need to be evaluated for their eligibility to the California Register. Resources that are evaluated and determined ineligible require no further consideration; those that are determined eligible will require mitigation of impacts through data recovery, archival research, public interpretation, and/or other means.

Table 5 provides a preliminary assessment of significance for the 11 sites in the project APE. This assessment is *not intended as formal evaluation*, however, but only as guidance to assist the project proponents in their decision-making process. Any evaluations should be carried out by a qualified archaeologist; work at prehistoric sites should be done in consultation with the Native American community.

Table 5. Recommendations.

Primary No. (P-)	Trinomial No. (CA-)	Temporary No.	Description	Preliminary Assessment
Newly Identified Sites				
29-4470	NEV-2193	A-01 – 7149	Road segment, ca. 1865-1960s	Not likely to be eligible
29-4471	NEV-2194	A-02 – 7159	Remains of charcoal kiln, ca. 1870-1880s	Potentially eligible
29-4472	NEV-2195	A-03 – 7160	Remains of charcoal kiln complex, ca. 1870-1880s	Potentially eligible
29-447	NEV-2196	A-04 – 7161	Chinese colliers' work camp, ca. 1870-1880s	Potentially eligible
29-4474	NEV-2197	A-05 – 7162	Domestic dump, early/mid-twentieth century	Not likely to be eligible
Previously Documented Sites				
29-1166	-	MW1	Remains of charcoal kiln, ca. 1870-1880s	Potentially eligible
29-1167	-	MW2	Remains of charcoal kiln, ca. 1870-1880s	Potentially eligible
29-1168	-	MW-LF1	Road segment, 1930s to present	Not likely to be eligible
31-2587	PLA-1845H	MM-LF1	Segments of Donner & Tahoe Railroad, ca. 1893-1901	Potentially eligible
31-5504	-	MVT-1-LF2	Abandoned irrigation ditch	Ineligible (Waechter and Lindström 2014)
31-5505	-	MVT-1-LF3	Abandoned fence line	Ineligible (Waechter and Lindström 2014)

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Appendix D

Traffic Impact Analysis

Truckee Tahoe Airport Master Plan
Traffic Impact Analysis

Prepared for

Mead & Hunt, Inc.

Prepared by

LSC
TRANSPORTATION
CONSULTANTS, INC.

LSC Transportation Consultants, Inc.

TRUCKEE TAHOE AIRPORT
AIRPORT MASTER PLAN MND TRAFFIC ANALYSIS

Prepared for

Mead & Hunt, Inc.
133 Aviation Boulevard, Suite 100
Santa Rosa, CA 95403
707 • 284-8687

Prepared by

LSC Transportation Consultants, Inc.
2690 Lake Forest Road, Suite C
P.O. Box 5875
Tahoe City, California 96145
530 • 583-4053

September 18, 2015

LSC #157350

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Executive Summary

PURPOSE

This report presents the transportation impacts associated with the development of the Truckee Airport Master Plan project to be located at the Truckee Tahoe Airport in Nevada County, California. The project proposes to construct a single-story office building in the southwest corner of the Airport Road/Chandelle Way intersection, a multi-use hangar located southeast of the existing main terminal, and expansion of the aviation activities at the airport. Analysis is conducted for existing, existing with approved (but not yet built) projects, and future cumulative conditions.

FINDINGS

The findings of the Traffic Impact Analysis are as follows:

1. The project is expected to generate up to 133 one-way vehicle-trips (34 inbound and 99 outbound) at the site access points during the summer PM peak hour, and approximately 767 one-way trips over the course of a **summer** weekday.

2. The project is expected to generate up to 178 one-way vehicle-trips (25 inbound and 153 outbound) at the site access points during the winter PM peak hour, and approximately 930 one-way trips over the course of a **winter** weekday.

3. All of the study intersections operate at an acceptable Level of Service (LOS) during the PM peak hours in 2015, without or with the proposed Truckee Airport Master Plan project. With the addition of the approved projects (including the PC-3 Joerger Ranch Specific Plan Project) and the proposed project, all study intersections would operate at an acceptable LOS except the SR 267/Brockway Road/Soaring Way intersection. This intersection would operate at an unacceptable LOS F.

4. Under future cumulative conditions, the SR 267/Brockway Road/Soaring Way intersection is expected to continue to exceed the LOS thresholds during the PM peak hour, without or with the Truckee Airport Master Plan project. The SR 267/Airport Road/Schaffer Mill Road intersection is also expected to exceed the LOS thresholds during the PM peak hours without or with the proposed project. The remaining study intersections would operate at an acceptable LOS under all future cumulative scenarios.

5. Without intersection capacity improvements, traffic queues associated with the SR 267/Brockway Road/Soaring Way intersection are expected to interfere with adjacent roadways and driveways under the 'existing plus approved projects plus proposed project' and all future cumulative scenarios. In addition, the southbound left-turn queue on the SR 267/Airport Road/Schaffer Mill Road intersection is expected to exceed the available storage length under future cumulative summer conditions, with or without the proposed project. No additional traffic queuing concerns are identified.

6. No new turn lanes are warranted by the peak-hour traffic volumes at the stop-controlled study intersections or at the project access points.

7. The project is estimated to generate approximately 185 new Vehicle Miles Traveled (VMT) in the Truckee region during the summer PM peak hour.

8. Additional public transit service would not be required as a result of the proposed project. As a bus stop is provided on the site, the existing transit facilities are considered to be adequate.

9. The proposed bicycle and pedestrian facilities are considered to be adequate, so long as any roundabouts or signalized intersection improvements are designed to safely accommodate bicycle and pedestrian crossings. Furthermore, the proposed bicycle and pedestrian plans are consistent with the Truckee Trails and Bikeways Master Plan, current plans for the Legacy Trail and Truckee-Northstar trail connections, as well as related goals and policies in the Circulation Element of the Truckee General Plan.

10. Of the total crashes reported within the study area over the last 10 years, there were no fatalities and no crashes reported involving either bicyclists or pedestrians. No existing safety deficiencies are identified along Soaring Way. There were no reported crashes along Airport Road within the immediate vicinity of the project site (north of Soaring Way). No driver sight distance deficiencies or potential roadway design hazards are identified with implementation of the proposed project, so long as the final landscaping plans provide adequate corner sight distance.

11. A total of approximately 112 daily one-way vehicle trips would result over the course of a peak day during project construction-related activity, with 6 inbound and 21 outbound trips occurring during the PM peak hour. Adding this traffic to the existing summer PM peak-hour traffic is not expected to cause any study intersections to exceed the applicable LOS thresholds.

RECOMMENDATIONS

The following mitigation measures are recommended to address transportation impacts with the proposed project, and are summarized in Table ES-1:

1. No intersection LOS improvements are needed at the 267/Brockway Road/Soaring Way intersection in 2015 with the proposed project. Removal of the existing traffic signal at this intersection and construction of a dual-lane roundabout would improve the LOS to an acceptable level in 2015 with the approved development projects (including PC-3). However, a dual-lane roundabout would not achieve LOS standards under future cumulative conditions. A roundabout at this intersection is included in the Town of Truckee's traffic impact fee program.

   While provision of capacity-enhancing improvements to the existing signalized intersection would improve the LOS to an acceptable level, this may not be consistent with Town policy (Truckee General Plan Policy P7.1), which strives to replace existing traffic signals with roundabouts, including traffic signals on State Highways. General Plan Policy P7.2 states, *"Install roundabouts instead of new traffic signals or capacity-enhancing improvements to existing signalized intersections, when roundabouts will achieve the same or better Level of Service as a traffic signal, where it is physically feasible to do so, and when installation of the roundabout will not be substantially costlier than a signal."* Note that either a roundabout or traffic signal improvements would require that SR 267 be widened to four lanes in the future. The improvements to this intersection are shown to be needed, regardless of whether the proposed Truckee Airport Master Plan project is implemented.

2. No intersection LOS improvements are needed at the SR 267/Airport Road/Schaffer Mill Road intersection in 2015 with the proposed project and/or the approved development projects. Provision of two through lanes on the SR 267 approaches, as well as a reconfiguration to a separate left-turn and shared through/right-turn lanes on the minor approaches would improve the LOS to an acceptable level under the future cumulative scenarios. The Placer County traffic impact fee program includes improvement projects that are considered to address the LOS deficiencies at this intersection. According to the Placer/Truckee Regional Traffic Impact Fee Agreement, payment of appropriate fees under the Truckee impact fee program is considered to mitigate impacts on roadway improvements included in the improvements list for Placer County's Tahoe Resorts Benefit District impact fee program.

3. No traffic queuing concerns are identified under existing conditions with the proposed project. With implementation of the recommended intersection LOS mitigation measures, the following additional improvements would be needed to mitigate intersection queuing concerns at the 267/Brockway Road/Soaring Way intersection:

    a) With improvements to the existing signalized intersection, the northbound left-turn lane would need to be extended by about 180 feet in 2015 with approved projects with proposed project, and by about 475 feet under future cumulative with project conditions.

    b) Under the 'existing plus approved projects with proposed project' scenario, the southbound left-turn lane would need to be extended by approximately 25 feet.

    c) Similarly, the eastbound right-turn lane would need to be extended by about 145 feet in 2015 with approved projects with proposed project, but by only about 55 feet under future cumulative with project conditions. (The queue length is shorter under future cumulative conditions because of differing traffic patterns based on the Town of Truckee TransCAD model.)

    d) As the recommended eastbound left-turn lane would need to be designed to extend beyond the location of the intersection with Hope Court to the west under the 'existing plus approved projects with proposed project' and the future scenarios, it is recommend that "KEEP CLEAR" pavement marking be provided within the Brockway Road/Hope Court intersection in order to prevent westbound left-turns from blocking westbound through traffic on Brockway Road.

4. The final landscaping plans should provide at least 275 feet of corner sight distance.

5. As part of the mitigation of this development, the applicant shall pay the amounts determined to be appropriate to the traffic impact fee programs of the various jurisdictions. Additionally, under existing year conditions with the proposed project, although no intersection LOS or traffic queuing improvements are needed, the project may be conditioned by Nevada County to complete project-specific improvements adjacent to the project property (such as pedestrian-related improvements). Finally, additional traffic management may be required during large hangar events (considered special events).

TABLE ES-1: Truckee Airport Master Plan Project - Mitigation Measure Summary

Intersection	Jurisdiction	2015 Traffic Conditions					Future Cumulative Year Conditions			
		Without Project	With Truckee Airport Master Plan Project	With Approved Projects, With Truckee Airport Master Plan	When is Impact Triggered?	Implementation Method	Without Project	With Clear Capital Project	When is Impact Triggered?	Implementation Method
SR 267/Brockway Road/Soaring Way	Town of Truckee/ Caltrans	Improvement Not Needed	Improvement Not Needed	Replace Existing Signal With Dual-Lane Roundabout; OR Provide Capacity-Enhancing Improvements to Existing Signal	Summer PM	Included in Truckee TIF Program.	Replace Existing Signal With Dual-Lane Roundabout (Does not meet Town LOS standards); OR Provide Capacity-Enhancing Improvements to Existing Signal; AND Widen SR 267 to 4 Lanes in Either Case.	Same as Without Project Condition	Summer PM	Included in Truckee TIF Program.
SR 267/Airport Road/Schaffer Mill Road	Placer County/ Caltrans	Improvement Not Needed	Improvement Not Needed	Improvement Not Needed	n/a	n/a	Widen SR 267 to 4 Lanes and Reconfigure Minor Approaches to Provide a Left-Turn Lane and Shared Through/Right-Turn Lane	Same as Without Project Condition	Summer PM and Winter PM	Included in Placer County TIF/CIP. (Payment of Truckee TIF would mitigate this impact.)
Site Access Intersections on Airport Road and Chandelle Way	Nevada County/ Town of Truckee	Improvement Not Needed	Ensure Final Landscaping Plans Provide at Least 275 Feet of Corner Sight Distance	Same as With Project	All Hours	Project Applicant	Improvement Not Needed	Same as 2015 Conditions		

Source: LSC Transportation Consultants, Inc. *Truckee Airport MasterPlan TIA.xlsx*

Chapter 1
Introduction

The purpose of this report is to present the draft traffic impact analysis for the proposed Truckee Airport Master Plan Project to be located at the Truckee Tahoe Airport in Nevada County, California. Specifically, the project components that are expected to generate traffic are as follows:

- A new single-story office building (totaling approximately 12,840 square feet) in the area of the existing car rental facility in the southwest corner of the Airport Road/Chandelle Way intersection;
- A potential multi-use hangar facility southeast of the existing airport terminal; and
- An increase in aviation activity.

As the project site is near the Town of Truckee, three of the study intersections are located within the Town Limits. In addition, one study intersection is located in Placer County.

Scope of Study

Based upon input received from Nevada County staff and Town of Truckee staff, this study includes the following study scenarios:

1. Existing 2015 Without Project
2. Existing 2015 With Airport Master Plan Project (Full Buildout)
3. Existing 2015 With Approved Development Projects With Proposed Project
4. Future Cumulative Conditions Without Project
5. Future Cumulative Conditions With Airport Master Plan Project

The following four study intersections are included:

1. State Route (SR) 267/Brockway Road/Soaring Way
2. Joerger Drive/Soaring Way
3. Airport Road/Soaring Way
4. SR 267/Airport Road/Schaffer Mill Road

While the project is located in Nevada County, many of the project impacts and concerns are located in the Town of Truckee and Placer County. It is also highly unlikely that the project would result in additional significant impacts to Nevada County roads. As a result, Nevada County has approved utilizing Truckee and Placer County traffic analysis criteria for the purpose of this study. Consistent with the standard of practice in the area regarding similar traffic studies, traffic analysis is limited to PM peak-hour periods only.

First, existing traffic volumes are estimated. Next, the project's trip generation, distribution, and traffic assignment through the study intersections is analyzed. Level of Service (LOS) is evaluated at all of the study intersections. In addition, intersection traffic queues are reviewed, the need for new or expanded turn lanes is assessed, Vehicle Miles Traveled (VMT) impacts are estimated, multi-modal impacts are addressed, intersection and corridor safety is evaluated, and construction traffic impacts are analyzed. Finally, potential mitigation measures are identified and assessed, and traffic impact fees are discussed.

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Chapter 2
Existing Conditions

The existing infrastructure and operational traffic conditions in the vicinity of the site are documented. The purpose of this section is to provide a foundation for comparison to 'with project' conditions. Roadway conditions are studied to assess the current configuration and operating conditions of the study area roadways. Existing peak-hour traffic volumes are determined.

Existing Roadways

State Route 267

State Route (SR) 267 is a two-lane highway running in a general northwest-southeast alignment between the Interstate-80/SR 89 North/SR 267 interchange in Truckee and SR 28 in Kings Beach. SR 267 is of local and regional significance, providing access to residential, industrial, commercial and recreational land uses. It serves as the major route between the I-80 corridor in the Town of Truckee and the North Lake Tahoe communities of Kings Beach and Incline Village, Nevada. It also serves as the sole existing access to the Northstar California Resort and adjacent residential neighborhoods. The posted speed limit along SR 267 within the study area is 55 miles per hour.

Brockway Road

Brockway Road is a 1.5 mile long roadway, which runs in a generally east-west orientation between SR 267 and South River Street in Downtown Truckee. On its west end Brockway Road turns into Bridge Street which continues through Downtown Truckee. It provides access to many residential, commercial, and recreational land uses. Throughout its length, Brockway Road is a 2-lane roadway with left-turn lanes at major intersections and driveways. Within the study area, the posted speed limit is 45 miles per hour.

Soaring Way

Soaring Way is an arterial roadway that provides access to the project site. Soaring Way runs approximately two-thirds mile between SR 267 on the west and Airport Road on the east. The posted speed limit along Soaring Way is 40 miles per hour. The eastern end of Soaring way provides access to commercial land uses and the existing Truckee Tahoe Airport.

Joerger Drive

Joerger Drive is a two-lane roadway providing access from Soaring Way to the Riverview Sports Park, the Truckee Sanitation District, the Truckee Tahoe Unified School District Transportation Center, and a quarry. Joerger Drive has a posted speed limit of 40 miles per hour.

Truckee-Tahoe Airport Road

Truckee-Tahoe Airport Road provides access from SR 267 northeast to the Truckee Tahoe Airport. The roadway begins with a 3-lane cross section at its intersection with SR 267 in Placer County. Truckee Tahoe Airport Road crosses into Nevada County and the Town of Truckee at a point approximately 700

feet northeast of SR 267, and provides access to the Town government offices. The roadway transitions to a local two-lane roadway to the northeast of its intersection with Soaring Way.

Chandelle Way

Chandelle Way is local two-lane roadway located along the southwest side of the Truckee-Tahoe Airport. The roadway runs between Truckee-Tahoe Airport Road and Bus Park Drive. This roadway provides access to the project site.

Existing Traffic Volumes

Existing summer traffic volumes are estimated for all of the study intersections, consistent with Town of Truckee, Nevada County, and Placer County requirements. In addition, winter 30th-highest PM peak-hour volumes are developed for the one intersection in Placer County, consistent with Placer County's traffic study requirements.

Existing Summer Traffic Volumes

Year 2015 summer peak-hour intersection turning-movement volumes are estimated at the study intersections as described below. Summer PM peak-hour traffic counts were conducted by LSC at the study intersections as a part of the Truckee 2009 & 2014 Traffic Count Programs, as follows:

- SR 267/Brockway Road/Soaring Way (2014)
- Joerger Drive/Soaring Way (2009)
- Airport Road/Soaring Way (2014)
- SR 267/Airport Road/Schaffer Mill Road (2009)

All counts were adjusted to reflect 10th-highest summer weekday PM peak hour conditions (consistent with Town policy), based upon hourly directional traffic volumes collected along Donner Pass Road for the entire summers of 2009 and 2014. Next, it is necessary to adjust the traffic volumes to reflect Year 2015 conditions. Truckee traffic annual growth rates were estimated by comparing the 2014 intersection counts to the 2009 counts. Historical Caltrans data were also reviewed to determine the rate of traffic growth on SR 267. The resulting annual growth rate for Truckee intersections near and along the SR 267 corridor is estimated to be 2.7 percent, and the annual growth rate for SR 267 through Martis Valley was estimated to be 2.2 percent.

Traffic volumes at the two intersections counted in 2009 were adjusted to 2012 levels as part of the PC-3 Joerger Ranch Specific Plan TIA (LSC, 2014). Three additional years of growth was applied to these intersection volumes to estimate 2015 conditions. The intersection volumes were finally adjusted so that entering and exiting traffic balances between adjacent intersections. The resulting existing 2015 summer intersection turning-movement volumes are displayed in Figure 1.

Existing Winter Traffic Volumes

Year 2015 winter peak-hour turning-movement volumes without the project are estimated for the SR 267/Airport Road/Schaffer Mill Road intersection in Placer County. Traffic counts were conducted at this intersection during March of 2010 as a part of the PC-3 Joerger Ranch Specific Plan Project. In addition, a more recent count was conducted at the SR 267/Northstar Drive intersection during the busy Martin

Figure 1

2015 Summer PM Peak Hour Intersection Traffic Volumes Without Project

1 Study Intersection

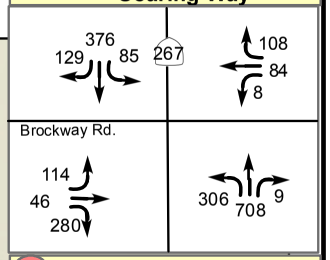
Traffic Movement

72 Summer Traffic Volume

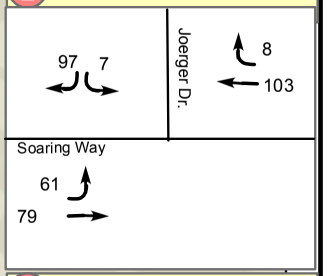
(72) Winter Traffic Volume

0 250 500 1,000 Feet

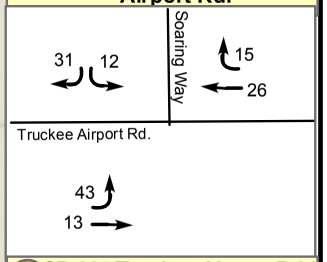
1 SR 267/Brockway Rd./ Soaring Way



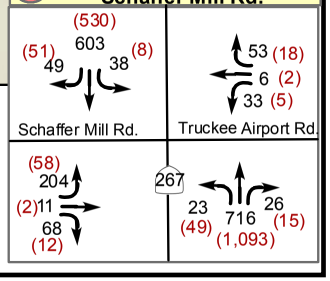
2 Soaring Way/Joerger Dr.



3 Soaring Way/Truckee Airport Rd.



4 SR 267/Truckee Airport Rd./ Schaffer Mill Rd.



Luther King Jr. holiday weekend in January of 2011. It is necessary to adjust the counts to reflect 30th-highest winter PM peak-hour conditions. The winter peak hour is technically defined as the 30th-highest hour of travel demand during the ski season (Placer County, 2003). The 30th-highest winter PM peak hour generally corresponds to a busy (but not the busiest) weekend day during the ski season during the hour that ski areas are closing and skiers departing ski areas mix with local and inter-regional traffic. The counts were adjusted to represent the 30th-highest hour of traffic during the winter, based on Caltrans hourly traffic counts at a point on SR 267 between Brockway Road and Airport Road (the only location on SR 267 for which hourly count data is available). The intersection volumes were adjusted to Year 2012 levels as part of the PC-3 TIA. Similar to the summer volumes, the annual growth rate of 2.2 percent was applied for three years in order to estimate 2015 winter traffic volumes. The resulting 2015 existing winter peak-hour intersection turning movements are presented in Figure 1.

Existing Transit Service

Both the Town of Truckee and Tahoe Area Regional Transit (TART) transit services operate within the vicinity of the project site.

Truckee Transit

The Town of Truckee offers both fixed route and Dial-A-Ride service in the Truckee area. The fixed route service varies by season. During the winter season (mid-December through the end of March) a free fixed route/ski shuttle service is offered 7 days per week throughout Truckee and the Donner Summit area from approximately 6:00 AM to Noon and 2:45 PM to 6:15 PM. This shuttle passes Soaring Way as it travels south over the SR 267 Bypass and west on Brockway Road. The closest stop to the project site is at the intersection of Brockway Road and Martis Valley Road. The shuttle passes this stop 4 times eastbound each day.

During the non-winter season (April through mid-December) buses serve the Truckee and Donner Lake areas on a fixed hourly schedule from 9:00 AM to 1:10 PM and from 2:10 PM to 5:00 PM, every day except Sunday. The westbound bus travels south over the SR 267 Bypass, east on Soaring Way to the airport, then north on SR 267 and west on Brockway Road. There is an existing stop at the airport. The shuttle passes this stop 7 times each day.

The Truckee Dial-A-Ride service is offered year-round to the general public with priority service for seniors and persons with disabilities. This paratransit service is available for trips within the Town limits, over the same hours and days as the fixed route service. Reservations must be made at least 24 hours in advance to schedule a Dial-A-Ride trip.

TART

Placer County's Tahoe Area Regional Transit (TART) fixed route buses serve the north and west shores of Lake Tahoe and the Truckee area. This service also varies by season. During the winter season (mid-December through mid-April), the SR 267 route between Truckee and Crystal Bay operates 7 days a week from 7:00 AM to 6:00 PM. This bus passes through the project area as it travels along SR 267 and Brockway Road, with stops at the airport, the Hampton Inn on SR 267, and at the intersection of Brockway Road/Martis Valley Road. The bus passes these stops 11 times each day in each direction.

During the non-winter months (mid-April through mid-December), no service has historically been provided along SR 267, although service is provided between Tahoe City and Truckee (with a connection provided at the Truckee Depot where passengers can transfer to the Town of Truckee Bus serving the SR 267 Bypass and Brockway Road. Starting in summer 2015, however, full service will be provided along SR 267 between North Stateline and Truckee on an hourly basis. After a break in service in the fall of 2015, full year-round service will be provided, for at least the next three years.

Existing Trail and Bikeway System

Truckee's existing trail and bikeway system includes recreational trails/Class I (separated) bike paths that are in place through the Truckee River Regional Park between Brockway Road and SR 267, east of SR 267 all the way to Glenshire, and in short sections north of the Pioneer Commerce Center, Gray's Crossing and Old Greenwood developments, along Brockway Road, and along Deerfield Drive. Class II bike lanes are also provided along Donner Pass Road through the Gateway area. A Class I bike path is provided adjacent to The Rock retail center along the north side of Brockway Road, and additional trails/Class I bike paths will be built in conjunction with smaller development projects in the Brockway Road area.

Several other facilities are proposed in the Truckee Trails and Bikeways Master Plan, which describes a comprehensive system of bikeways located along Truckee's existing and future roadways, as well as a dedicated network of trails and pathways for use by pedestrians, equestrians, cyclists and cross-country skiers. The facilities proposed in the Trails and Bikeways Master Plan include a major East-West Recreational Trail, Multi-User Recreational Trails, Class I Bike Paths, Class II Bike Lanes, and Class III Bike Routes.

Existing Driver Sight Distance

There are two types of driver sight distance criteria to consider in the study area: stopping sight distance and corner sight distance. Stopping sight distance is the minimum distance required by the driver of a vehicle to bring his vehicle to a stop after an object on the road becomes visible. This is the minimum distance needed for a driver on the main roadway approaching an intersection or driveway to see an object in their travel path (such as a vehicle exiting the project site) and safely come to a stop. The Caltrans Highway Design Manual specifies minimum stopping sight distance requirements as a function of roadway design speed.

Corner sight distance is the minimum distance that a driver waiting at a cross street should be able to see in either direction along the main roadway in order to accurately identify an acceptable gap in through traffic. A clear line of sight should be maintained between the driver pulling out of the minor street and any approaching vehicle on the major street. The Caltrans Highway Design Manual specifies corner sight distance values as a function of roadway design speed. In addition, "desired" and "minimum" corner sight distance requirements as a function of major road speed are provided in the Nevada County Road Standards.

Driver sight distance was reviewed at the study intersections and existing site driveways, and no existing deficiencies are identified.

Historical Crash Data

Crash data for the study area was obtained from the Statewide Integrated Traffic Records System (SWITRS) for the most recent ten-year period available (September 2004 through August 2014). Over the ten-year period, there were a total of 57 crashes reported within the study area. Of these, there were no fatalities. There were also no crashes reported involving either bicyclists or pedestrians. Of the total 57 crashes, most (49) were related to or occurred within the vicinity of the intersection of SR 267/Brockway Road/Soaring Way. Three crashes were related to or occurred within the vicinity of the intersection of SR 267/Airport Road/Schaffer Mill Road. One crash occurred on SR 267 between the intersections of Brockway Road and Airport Road. A relatively low number of crashes (four crashes) occurred along Soaring Way, as follows:

- Two occurred at or near the Soaring Way/Joerger Drive intersection
- One occurred on Soaring Way between Joerger Drive and Airport Road
- One occurred at the Soaring Way/Airport Road intersection

Three of these four crashes were injury crashes. All three injury crashes occurred under dry road conditions, and none of them involved drivers under the influence of alcohol. The crashes along Soaring Way do not exceed the statewide average crash rate for similar roadways. Furthermore, there are no existing driver sight distance deficiencies or roadway design features that would result in undue safety concerns. Therefore, no existing safety deficiencies are identified along Soaring Way. Finally, there were no reported crashes along Airport Road within the immediate vicinity of the project site (north of Soaring Way).

Chapter 3
Proposed Conditions

The proposed development will add traffic to the roadway system. The project location, the size of the project, and the planned date of completion are all important elements that need to be considered to determine the impacts of this development on roadway safety and capacity. It is also important to estimate how much new traffic will be generated, predict where traffic generated by the site will be distributed, and examine how the project traffic will operate within the existing transportation system. All of the above elements are important in assessing the traffic impacts of this project.

Project Description

The Truckee Airport Master Plan consists of the following three traffic-generating components:

- The new Clear Capital Office Building and car rental offices
- A potential multi-use hangar
- An increase in aviation activity at the airport

These components are described in detail below. In addition, the Master Plan includes a conceptual future transit-hub facility. However, any increase in traffic associated with this conceptual facility is expected to be offset by a reduction in private vehicle trips. As such, the traffic impacts of the conceptual transit facility would be minimal.

Clear Capital Building

The project proposes to construct a single-story office building (totaling approximately 12,840 square feet) in the area of the existing car rental facility. The conceptual site plan is shown in Figure 2. The proposed Clear Capital offices have a floor area of approximately 10,840 square feet, with a total of approximately 130 employees. The Clear Capital employees are expected to work in approximately four 9-hour shifts, with all shifts overlapping (all employees on-site) from about 8 AM to 2 PM. The remaining 2,000 square feet would contain two car rental offices (the existing car rental office plus one additional car rental office).

Potential Multi-Use Hangar

A potential multi-use hangar is proposed on the airport property, southeast of the existing terminal. The hangar would be used as the venue for various events. A potential schedule of events in the hangar is shown in Table 1, including the number of attendees expected at each event. This information was analyzed in order to determine the "design day" assumptions for this study. The right-hand columns show the chain of logic used in determining the design day events. The Town's traffic study standards are based on summer weekday conditions. In the Tahoe area of Placer County, summer traffic impacts are typically evaluated based on a Friday in August, which is assumed to reflect peak summer conditions. As shown, not all of the events scheduled in the hangar would generate traffic during the Town of Truckee or Placer County standard analysis periods.

Figure 2 - Rpsaicc ?gpnmpr Conceptual Site Plan

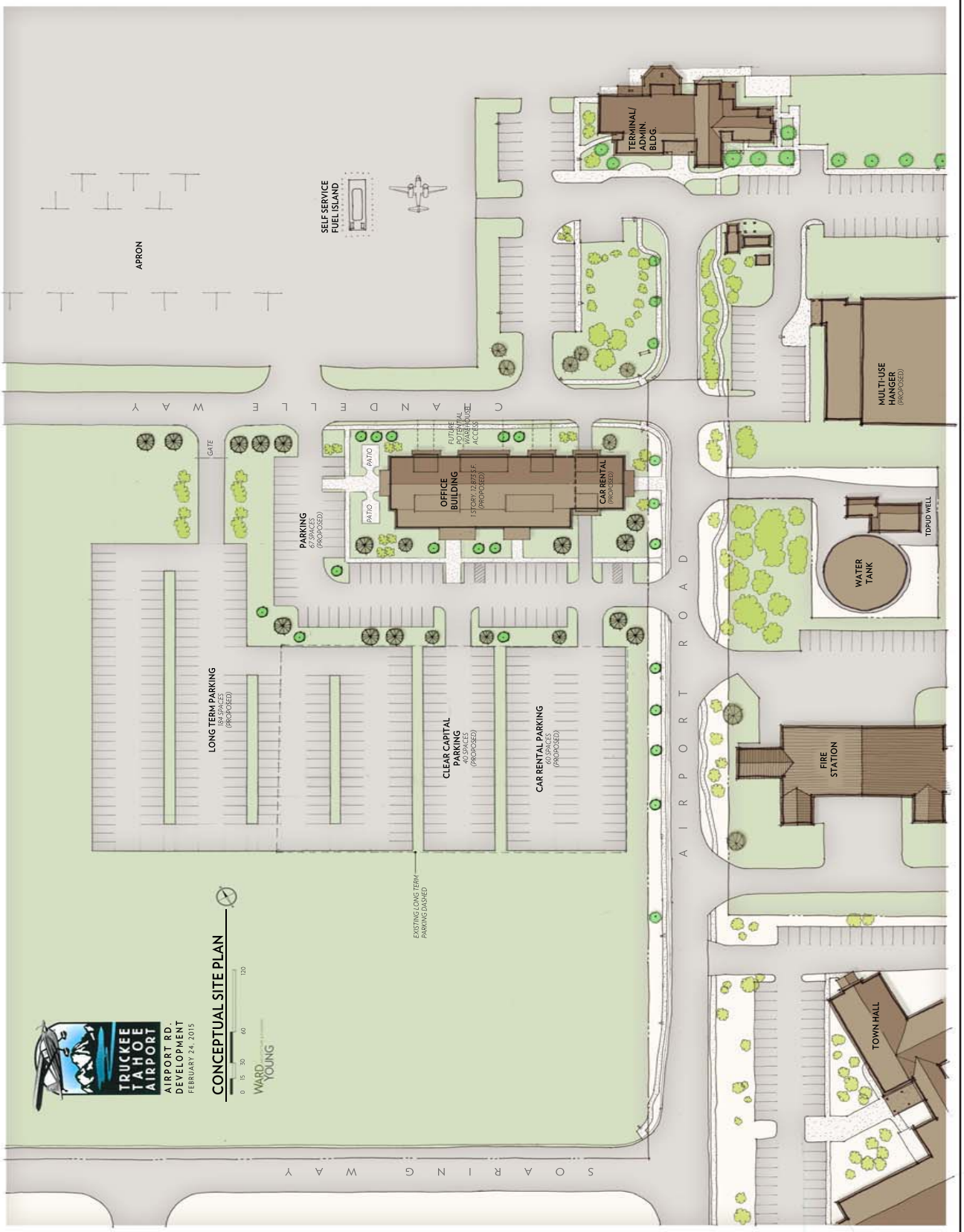


TABLE 1: Truckee Airport Multi-Use Hangar - Potential Schedule of Events

		Schedule				Periods of Potential Traffic Impacts					
Event	Attendees	Date	DAY	Time	Season	Summer?	Winter?	Weekday?	PM Peak Hour?	Potential to Impact Town of Truckee Analysis Period?	Approved for Design Day?
BIG BROTHER BIG SISTERS	70	5/22/2014	THUR.	4:30 pm -7:30 pm	Spring/Fall	No	No	Yes	Yes	No	No
CIVILIAN SPECIALIST TRAINING	70	1/22/2014 - 1/24/2014	WED. - FRI.	9:00 am - 4:30 pm	WINTER	No	Yes	Yes	Yes	No	**Winter**
BIG BROTHERS BIG SISTERS PILOT BENEFIT	35	5/30/2014	THUR.	5:30 pm - 9:30 pm	Spring/Fall	No	No	Yes	Yes	No	No
MISSION TO MARS	24	6/24/2014 - 6/28/2014	TUE. - FRI.	9:00 am - 4:30 pm	SUMMER	Yes	No	Yes	Yes	Yes	**Summer**
BOYS AND GIRLS CLUB OF NORTH LAKE TAHOE	250	5/10/2014	SAT.	9:00 am -12:00 pm	Spring/Fall	No	No	No	No	No	No
ALDER CREEK MIDDLE SCHOOL GRADUATION	220	6/13/2013	THUR.	7:00 pm -10:00 pm	Spring/Fall	No	No	Yes	No	No	No
SOROPTISHOP	200	11/12/2013	THUR.	3:00 pm - 9:00 pm	Spring/Fall	No	No	Yes	Yes	No	No
WIZARDS LAB SCIENCE FAIR	500	3/8/2014 - 3/9/2014	THUR. - FRI.	10:00 am - 2:00 pm	WINTER	No	Yes	Yes	No	No	No
APPETIZER FOR THE ARTS	300	5/9/2014	FRI.	6:00pm - 10:30 pm	Spring/Fall	No	No	Yes	Yes	No	No
SANTA FLY - IN	600	12/13/2014	SAT.	9:00 am - 12:00 pm	WINTER	No	Yes	No	No	No	No
POTENTIAL FUTURE EVENTS ESTIMATES											
TRUCKEE CHILI COOK - OFF	600	6/22/2014	SAT.	12:00 pm - 6:00 pm	SUMMER	Yes	No	No	Yes	No	No
TRUCKEE CRAB FEED	600	3/23/2014	SAT.	5:00 pm - 9:00 pm	WINTER	No	Yes	No	Yes	No	No
BINGO NIGHT /SPAGHETTI DINNER	500	1/30/2014	SAT.	5:00 pm - 9:00 pm	WINTER	No	Yes	No	Yes	No	No

Summer Design Day Event

As shown in the table, only two events are described to occur during the summer season, as follows:

- Mission to Mars (4-day event with approximately 24 attendees)
- Potential Future Chili Cook-Off (on a Saturday with about 600 attendees)

The Chili Cook-Off is considered to be a special event. Traffic impacts of special events occurring once a year are not typically evaluated, although traffic management during the busy periods of event-related traffic activity could be a concern. In this case, as the event goes from noon to 6 PM, the attendee arrival and departure activity would be spread throughout the 6-hour period (rather than concentrated within a particular hour), and would therefore not be expected to generate traffic operational concerns. Therefore, the other summer event, Mission to Mars, is assumed to occur on the summer design day. It is also the only event with a potential impact during the Town of Truckee's standard analysis period (summer weekday PM peak hour).

Winter Design Day Event

There are five potential events during the winter season, as follows:

- Civilian Specialist Training (70 attendees and 4 large support vehicles)
- Wizards Lab Science Fair (500 attendees, with most arriving in 40 buses)
- Santa Fly-In (600 attendees, with some arriving in 4 buses)
- Potential Future Crab Feed (600 attendees)
- Potential Future Bingo/Spaghetti Dinner (400-500 attendees)

The potential future Crab Feed and Bingo/Spaghetti events would each occur on a Saturday night from about 5 PM to 9 PM. Although these events start during the PM peak hour, they are considered to be special events, and not reflective of typical busy conditions at the hangar facility. The Science Fair occurs for two weekdays from 10 AM – 2 PM. For projects within Placer County, the peak periods of skier-related traffic typically occur on weekends. As the Science Fair does not occur on the weekend, and it ends well before the PM peak hour of winter traffic activity, it is not considered a candidate for the winter design day. The Santa Fly-In occurs on a Saturday morning in mid-December from 9 AM – noon, which does not coincide with the winter PM peak hour. Additionally, winter traffic volumes in early to mid-December (before Christmas week) are generally lower than during the peak winter season. As such, this event is not analyzed.

The remaining event, Civilian Specialist Training, occurs for 3 weekdays in late January, and it potentially generates traffic during the winter PM peak hour. This event is assumed to be representative of typical busy traffic associated with the hangar.

<u>Increase in Aviation Activity</u>

The proposed Airport Master Plan is expected to generate an increase of approximately 18 flights over the course of a busy day.

Access

Properly located access points are essential to allow for the safe and orderly movement of traffic into and out of a site. Access to the new Clear Capital building would be provided via two driveways, one on Airport Road and one on Chandelle Way. An additional single-lane driveway would be provided on Chandelle Way to serve the rental car facility. With the project, two existing driveways along Airport Road would be eliminated, and the total number of driveways on Chandelle Way would increase by two. The proposed driveway locations for the Clear Capital building are illustrated in Figure 2. Access to the potential multi-use hangar would be provided via Truckee Tahoe Airport Road.

Trip Generation

"Trip generation analysis" is the process by which transportation analysts identify the number of vehicle-trips that a specific proposed land use plan would add to local roadways. First, the trip generation of the three project components is estimated. Next, the "project net impact" on total trip generation through the study area is determined. The trip generation analysis is summarized in Table 2.

Trip Generation of Proposed Clear Capital Office Building

The daily and peak-hour trip generation of the proposed Clear Capital offices is estimated based on standard trip generation rates provided in the Institute of Transportation Engineers (ITE) Trip Generation, 9th Edition manual (ITE, 2012) for the 'Single-Tenant Office Building' land use type. Note that this land use type has a relatively high rate compared with other types of office, such as 'General Office Building' and 'Corporate Headquarters Building'. In order to analyze the most conservative (highest) trip generation scenario, the PM peak-hour trip generation calculations assume the total 130 employees.

In accordance with the "Process for Selecting Average Rate or Equation" (Trip Generation Handbook, 3rd Edition, ITE, 2014), the equations are applied to the proposed use (rather than average trip rates). The employee-based equations are applied in this analysis, as they yield higher (more conservative) trip generation results than the floor area-based equations.

Some trips made to/from the Clear Capital offices are expected to be made via non-auto modes (transit, pedestrian, bicycle). The standard ITE trip rates are derived from development sites with little or no public transit service and little or no convenient pedestrian access. A 5-percent reduction is applied to the Clear Capital trips to reflect non-auto travel, considering the following:

- During the non-winter season (April through mid-December), Truckee buses serve the Truckee and Donner Lake areas on a fixed hourly schedule from 9:00 AM to 1:10 PM and from 2:10 PM to 5:00 PM. The westbound bus travels south over the SR 267 Bypass, east on Soaring Way to the airport, then north on SR 267 and west on Brockway Road. There is an existing stop at the main airport building (roughly 230 feet from the office building site). The shuttle passes this stop 7 times each day.

TABLE 2: Truckee Airport Master Plan Trip Generation

Description	ITE Land-Use Code	ITE Land Use Type	Quantity	Unit	Trip Generation Rates [1] Daily	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Non-Auto Trips Reduction	One-Way Vehicle Trips at Site Driveway Daily (DVTE)	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
Clear Capital Building													
Clear Capital Offices	715	Single Tenant Office Building [2]	130	Employee	5.05	0.10	0.60	0.70	5%	624	13	74	87
Additional Car Rental Office													
Additional Employees	n/a	n/a	2	Employee	4.00	0.00	0.50	0.50	0%	8	0	1	1
Additional Customers	n/a	n/a	15	Customers	3.00	0.38	0.38	0.75	0%	45	6	6	12
Subtotal Rental Car Office										*53*	*6*	*7*	*13*
Subtotal Clear Capital Building										*677*	*19*	*81*	*100*
Increase in Aviation	022	General Aviation Airport	18	Flights	1.97	0.17	0.14	0.30	0%	35	3	2	5
Multi-Use Hangar Event													
- Summer - "Mission to Mars"	n/a	n/a	24	Attendees	2.00	0.50	0.50	1.00	0%	48	12	12	24
- Staff	n/a	n/a	4	Staff	1.82	0.05	0.86	0.91	0%	7	0	4	4
- Winter - "Civilian Specialist Training	n/a	n/a	70	Attendees	2.73	0.05	0.86	0.91	0%	191	3	61	64
- Staff	n/a	n/a	10	Staff	2.73	0.05	0.86	0.91	0%	27	0	9	9
Multi-Use Hangar Subtotal - SUMMER										*55*	*12*	*16*	*28*
Multi-Use Hangar Subtotal - WINTER										*218*	*3*	*70*	*73*
PROJECT NET IMPACT ON TRIP GENERATION - SUMMER										***767***	***34***	***99***	***133***
PROJECT NET IMPACT ON TRIP GENERATION - WINTER										***930***	***25***	***153***	***178***

Note 1: Trip generation rates are based either on the Institute of Transportation Engineers (ITE) Trip Generation, 9th Edition (2012) manual, or a person-trip analysis.
Note 2: Daily and peak hour trip rates for this land use are based on ITE regression equations.

Source: LSC Transportation Consultants, Inc.

Truckee Airport MasterPlan TIA.xlsx

- Placer County's TART fixed route buses serve the north and west shores of Lake Tahoe and the Truckee area. During the winter season (mid-December through mid-April), the SR 267 route between Truckee and Crystal Bay operates 7 days a week from 7:00 AM to 6:00 PM. This bus passes near the project area as it travels along SR 267 and Brockway Road, with a stop at the airport. The bus passes this stop 11 times each day in each direction.

- Truckee's existing trail and bikeway system includes recreational trails/Class I bike paths that are in place through the Truckee River Regional Park between Brockway Road and SR 267, east of SR 267 all the way to Glenshire, and along most of Brockway Road.

Car Rental Facility

The trip generation of the existing car rental facility is reflected in the existing traffic volumes. However, it is necessary to estimate the trip generation of the proposed additional (second) car rental facility, in order to estimate the net increase in trip generation. As standard trip generation rates are not available for car rental offices, it is necessary to perform a 'person-trip analysis' in order to accurately estimate the total number of daily and PM peak-hour trips generated by this use. The person-trip analysis for the proposed car rental office is based on the following information and assumptions:

- Approximately 2 employees are assumed to report to the additional car rental office over the course of a busy day.

- Each employee is assumed to make 4 daily one-way vehicle trips to/from the site (2 one-way trips commuting to/from work, plus 1 round-trip off-site during the day for lunch, fueling rental cars, etc.).

- One employee is assumed to depart the site during the PM peak hour.

- The additional car rental office is estimated to serve approximately 15 customers per day. Note that the additional car rental office is not expected to see as many rentals as the existing car rental office (which sees about 20 to 30 rentals on a busy day).

- About one-quarter of the car rental customers are expected either walk to/from the airport or travel to/from the site via transit. About half of the car rental customers are assumed to get dropped-off or picked-up at the site. Note that those customers would generate 3 one-way vehicle trips per day (as the vehicle dropping-off or picking-up generates 1 inbound and 1 outbound trip, and the customer would make another 1-way trip arriving or departing in the rental car). The remaining one-quarter of the customers are assumed to make 1 inbound and 1 outbound vehicle trip at the site.

- No additional reduction is applied for non-auto travel, as the non-auto trips are reflected in the customer trip generation rates.

As shown in the far right columns of the table, the proposed Clear Capital building would generate approximately 677 daily one-way vehicle trips, with 100 (19 inbound and 81 outbound) occurring during the PM peak hour.

Trip Generation of Proposed Increase in Aviation Activities

The daily and peak-hour trip generation of the proposed increase in aviation activities at the Truckee-Tahoe Airport is estimated based on standard trip generation rates provided in the ITE Trip Generation manual for the 'General Aviation Airport' land use type.

The Truckee-Tahoe Airport Master Plan proposes to increase aviation activity by approximately 18 flights per day. This increase in aviation activity would generate approximately 35 daily one-way vehicle trips with 5 (3 inbound and 2 outbound) trips occurring during the PM peak hour.

Trip Generation of Proposed Multi-Use Hangar Site

The ITE *Trip Generation* Manual does not contain trip rates for an event center, or for the events proposed for the potential multi-use hangar. Therefore, trip generation for the hangar is based on a person-trip analysis. The person trip analysis is based on the following assumptions:

- It is assumed that all of the attendees to "Mission to Mars" are not old enough to drive and are therefore dropped-off and picked-up from the event. A vehicle-occupancy of two event attendees per vehicle is assumed, consistent with assumptions for similar projects in the Town of Truckee. Each "pick-up" generates two vehicle trips at the site (one inbound and one outbound) and each "drop-off" generates two vehicle trips at the site. Dividing by the vehicle occupancy yields a daily trip rate of 2.0 vehicle trips per event attendee.

- It is assumed that all event attendees will be picked-up during the PM peak-hour period. Dividing by the vehicle occupancy yields a peak-hour trip rate of 1.0 vehicle trip per event attendee, with half of the trips entering the site and half exiting the site.

- It is assumed that there will be four staff associated with "Mission to Mars."

- Staff persons are assumed to generate two vehicle trips at the site per day (one entering and exiting). An average vehicle occupancy rate of 1.1 is assumed for staff trips (consistent with vehicle occupancy data from Town of Truckee), resulting in a daily trip rate for staff of 1.82.

- It is assumed that half of the daily staff trips will occur during the PM peak hour, with five percent entering the site and ninety-five percent exiting the site.

- The daily trip rate for the "Civilian Specialist Training" is based on inbound and one outbound trip per person per day. This rate is divided by the average vehicle occupancy for staff or employees in the Town of Truckee of 1.1 persons per vehicle. Half of the event attendees are assumed to make one additional trip off-site per day (for lunch, errands, etc.). This results in a daily trip rate of 2.73 vehicle trips per event attendee.

- It is assumed that each event attendee will generate one person-trip during the PM peak hour. Dividing by the vehicle-occupancy of 1.1 yields a peak-hour vehicle trip rate of 0.91 vehicle trips per event attendee, with 5 percent of trips entering the site and 95 percent of trips departing the site.

- Ten staff are assumed to attend the Civilian Specialist Training event in addition to the 70 event attendees. Vehicle-occupancy trip rates for staff are assumed to be the same as for the event attendees.

It is estimated by these assumptions that the multi-use hangar would generate 55 daily and 28 (12 entering, 16 exiting) PM peak hour vehicle trips during the summer, and 218 daily and 73 (3 entering and 70 exiting) PM peak hour vehicle trips during the winter.

Total Trip Generation for Truckee Airport Master Plan

As shown in the lower portion of Table 2, during the summer design period, the proposed project is estimated to result in a net increase of approximately 767 daily one-way trips, with 133 trips (34 inbound and 99 outbound) occurring during the PM peak hour. During the winter design period, the proposed project is estimated to result in a net increase of approximately 930 daily one-way trips, with 178 trips (25 inbound and 153 outbound) occurring during the PM peak hour.

Trip Distribution and Assignment

The distribution of traffic arriving and departing the project site is estimated based on existing traffic patterns, the location of the site relative to residential and commercial uses in the region, and regional access patterns. Separate and specific trip distributions are assumed for the Clear Capital Office Building, the increase in aviation activities, and the potential multi-use hangar.

The trip distribution for Clear Capital is based on the criteria listed above, as well as employee residence locations. Based on a review of the employee residence zip codes, approximately 83 percent reside in Truckee. About 12 percent reside in the Tahoe Basin, with the remaining 5 percent residing outside the Truckee-Tahoe areas. Trip distribution for the increase in aviation activities is based on the locations of existing residential areas, as well as previous records regarding aircraft owners' and employees' residence locations. Most of the aviation-related trips are expected to be made to/from points accessed via the SR 267 to the north (35 percent) or south (35 percent).

Trip distribution for the multi-use hangar is based on the locations of local residential areas and regional access patterns. About 40 percent of hangar event trips are assumed to be made to/from the north on SR 267. The estimated trip distribution pattern for trips made to/from the project site for each project component is presented in Table 3.

TABLE 3: Truckee Airport Master Plan - Trip Distribution

	Proposed Use		
Origin / Destination	Clear Capital	Multi-Use Hangar	Aviation
SR 267 Bypass	45%	40%	35%
SR 267 South of Airport Road / Schaffer Mill Road	14%	25%	35%
Brockway Road West	40%	34%	25%
Schaffer Mill Road	1%	1%	5%
Total	100%	100%	100%

Source: LSC Transportation Consultants, Inc. *Truckee Airport MasterPlan TIA.xlsx*

The project-net-impact trips are assigned through the study intersections by applying the trip distribution pattern to the project-net-impact trips from Table 2. The resulting project net impact on PM peak-hour intersection volumes is shown in Figure 3. Adding these traffic volumes to the existing volumes yields the 'existing with project' volumes illustrated in Figure 4.

Figure 3

Truckee Airport Master Plan Project Net Impact on PM Peak Hour Traffic Volumes

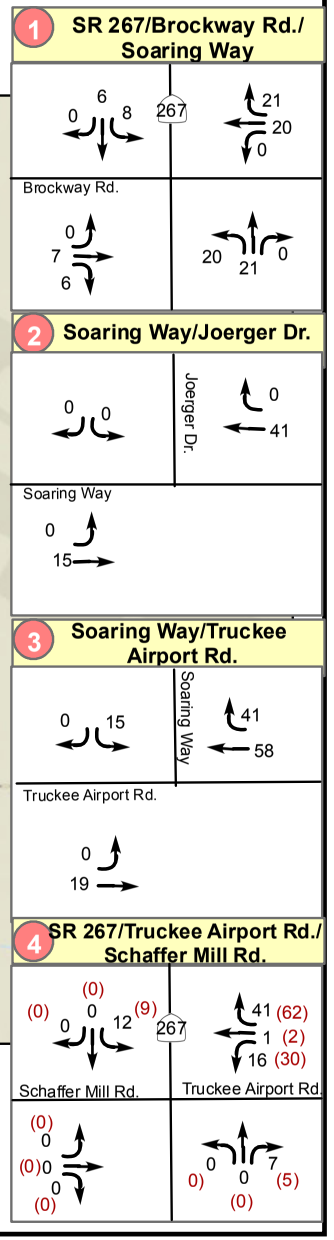
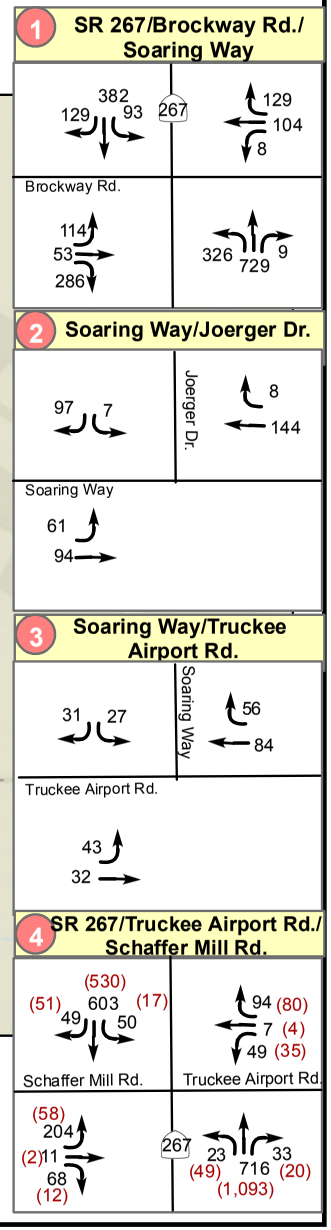


Figure 4

2015 PM Peak Hour Traffic Volumes With Truckee Airport Master Plan



1 Study Intersection

Traffic Movement

72 Summer Traffic Volume

(72) Winter Traffic Volume

0 250 500 1,000 Feet

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Chapter 4
Near-Term Conditions

The purpose of this section is to estimate how much new traffic will be generated through the study area by approved (but not yet built) development projects in the near term, and to examine traffic volumes with the existing transportation system and the approved development projects, as well as with the proposed project traffic.

Existing Conditions With Approved Development Projects

Consistent with the Nevada County Traffic Impact Study Guidelines, approved (but not yet built) development projects which contribute 25 or more peak-hour trips are included in the "existing with approved projects" scenario. Table 4 presents the list of approved development projects within Nevada County, the Town of Truckee, and Martis Valley that are included in this study. The peak-hour traffic volumes generated by the approved developments through the study area were estimated, based upon available traffic studies, and considering the type and location of each development.

The sources for the trip generation of each project are indicated in the far right column of the table. Note that the Railyard Phase 1 uses that were approved as a part of the 2008 Railyard Master Plan EIR, as well as the approved PC-1 Coldstream Specific Plan Project uses, were considered in this analysis. However, as each of these projects is estimated to generate less than 25 peak-hour trips through the study area, they are not included in this study. Also note that the trip generation analysis for the PC-3 Joerger Ranch Specific Plan was completely revised to include the most recent proposed land uses as part of the Brockway Road Corridor Study (LSC Transportation Consultants, Inc., August 2015).

Adding the traffic volumes generated by the approved developments to the 'existing with project' volumes shown in Figure 4 yields the 'existing with approved projects with proposed project' volumes shown in Figure 5. Note that a single-lane roundabout is assumed to be installed at the Soaring Way/Joerger Drive intersection as a part of the approved PC-3 Project.

TABLE 4: Approved Development Projects

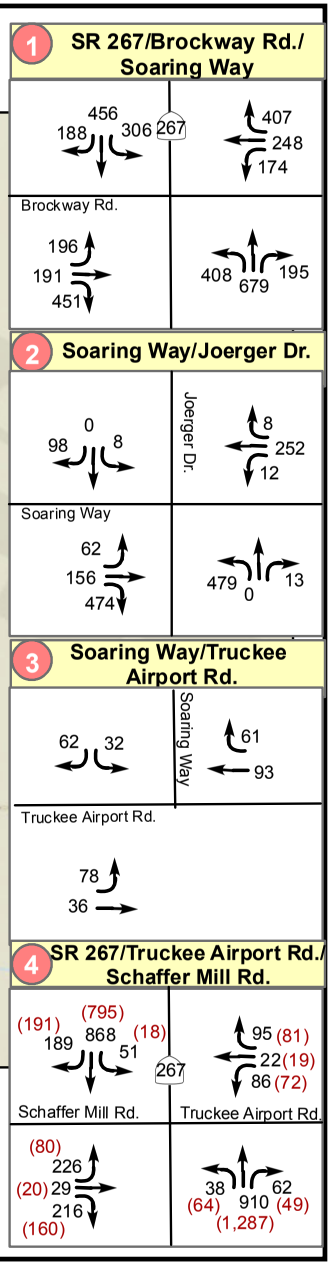
Projects Contributing 25 or More Peak-Hour Trips Through the Study Area.

Development	Jurisdiction	Approved Land Uses: Single-Family Dwelling Units (DU)	Multi-Family Dwelling Units (DU)	Commercial Floor Area (KSF)	Manufacturing/ Industrial Floor Area (KSF)	Other Land Uses Involved	Source
Truckee							
PC-3 Joerger Ranch Specific Plan	Town of Truckee	0	80	214	213	12-space trailhead parking lot	PC-3 Brockway Road Corridor Traffic Analysis (LSC, August 2015)
Hilltop Master Plan/Pollard Station	Town of Truckee	45	311	52.3	0		Hilltop/Pollard/Reynolds TIA, Scenario #6 (LSC, July 2013)
Martis Valley							
Lahontan II	Placer County	Total Project includes 73 Single Family DU's and Golf Course					Truckee TransCAD Traffic Model (Town and LSC, 2015)
Schaffer Mill (formerly Timilick, Eaglewood)	Placer County	Total Project includes 462 Single Family DU's and Golf Course					
Martis Camp (formerly Siller Ranch)	Placer County	Total Project includes 653 Single Family DU's and Golf Course					
The Highlands	Placer County	Total Project includes 1,450 Multi-Family DU's, 12 KSF of Commercial, Hotel & Amenities, & Employee Housing					
Northstar Village and Northside	Placer County	Total Project includes 350 Multi-Family DU's and 106 KSF of Commercial					

Note: KSF = 1,000 Square Feet.
Note: All projects in Martis Valley are partially built. The growth in traffic was estimated by subtracting the existing traffic from the total buildout traffic.
Source: LSC Transportation Consultants, Inc.

Truckee Airport MasterPlan TIA.xlsx

Figure 5 2015 PM Peak Hour Traffic Volumes With Approved Projects With Truckee Airport Master Plan



1 Study Intersection

Traffic Movement

72 Summer Traffic Volume

(72) Winter Traffic Volume

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Chapter 5

Future Cumulative Conditions

The purpose of this section is to examine traffic volumes under future cumulative conditions, and to evaluate the potential traffic impacts of the proposed project under future cumulative conditions. Future cumulative long-term traffic volumes are estimated without the project, and with the project.

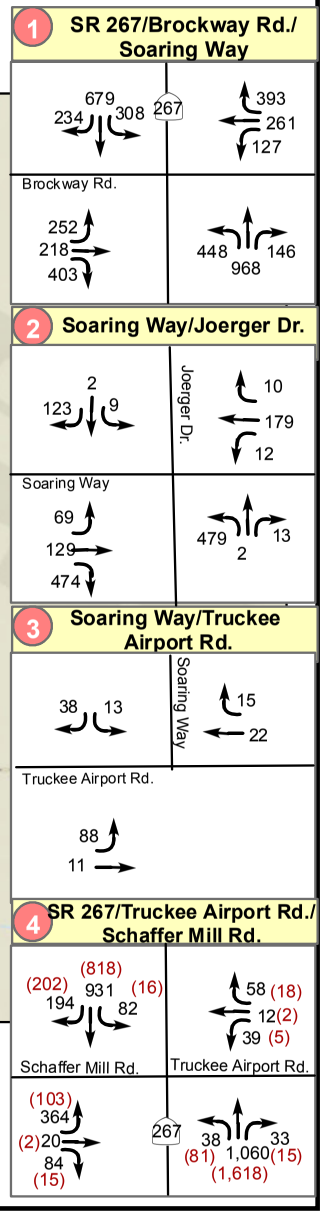
Future Cumulative Traffic Conditions

The recently revised (2014) Town of Truckee TransCAD model is used as the basis for developing future cumulative traffic volumes. The model was run to estimate the future volumes at the four study intersections. Next, the existing model volumes were subtracted from the future model volumes to identify the forecast growth in traffic volumes. This growth was then added to the existing traffic volumes (Figure 1) to estimate the future cumulative intersection turning-movement volumes. Growth from the model for the traffic analysis zone containing the airport activities and proposed office building was then subtracted from the total model growth in order to estimate the future cumulative intersection turning-movement volumes without the proposed project.

The resulting future cumulative summer (and winter, where applicable) PM peak-hour turning movements without the Truckee Airport Master Plan are displayed in Figure 6. Adding the 'project net impact' on traffic volumes to the future cumulative without project volumes yields the future cumulative with Truckee Airport Master Plan volumes presented in Figure 7.

Figure 6

Future PM Peak Hour Traffic Volumes Without Truckee Airport Master Plan



1 Study Intersection

Traffic Movement

72 Summer Traffic Volume

(72) Winter Traffic Volume

0 250 500 1,000 Feet

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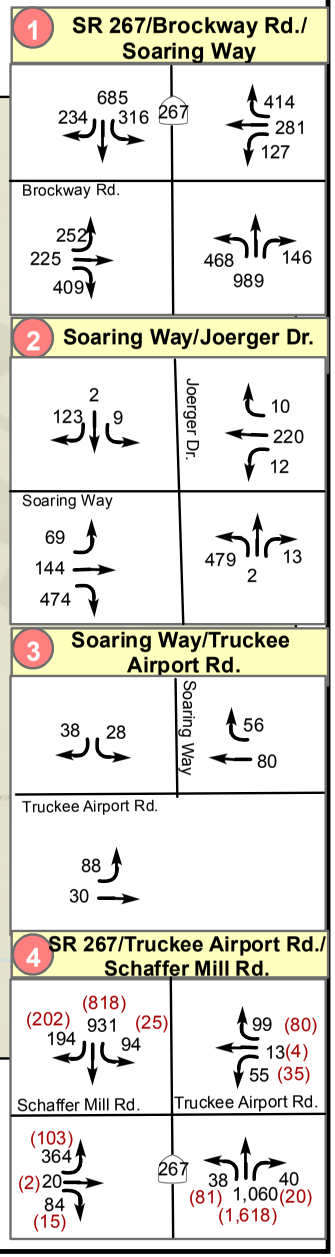
Figure 7

Future PM Peak Hour Traffic Volumes With Truckee Airport Master Plan



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1 Study Intersection

Traffic Movement

72 Summer Traffic Volume

(72) Winter Traffic Volume

0 250 500 1,000 Feet

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Chapter 6
Level of Service Analysis (LOS)

Traffic operations are assessed in terms of Level of Service (LOS). LOS is a concept that was developed by transportation engineers to quantify the level of operation of intersections and roadways (as presented in the Highway Capacity Manual). Intersection LOS is classified in grades "A" through "F." At unsignalized intersections, LOS "A" reflects full freedom of operation for a driver while LOS "F" represents the worst conditions, where drivers are forced to wait for adequate gaps in conflicting traffic. These grades of LOS are quantified in terms of average delay per vehicle. A detailed description of LOS criteria is provided in Appendix A.

Level of Service Standards

The LOS thresholds applicable to the study area are discussed below.

Town of Truckee

As stated in the Truckee 2025 General Plan, the Town's LOS standards are as follows:

"Policy P2.1 – Establish and maintain a Level of Service D or better on road segments and for total intersection movements in portions of the Town outside of the Downtown Study Area". Establish and maintain a Level of Service E or better on arterial and collector road segments and for total intersection movements within the Downtown Specific Plan Area. Throughout the Town, individual turning movements at unsignalized intersections shall not be allowed to reach LOS F and to exceed a cumulative vehicle delay of four vehicle hours. Both of these conditions shall be met for traffic operations to be considered unacceptable."

Placer County

Placer County defines its LOS standard as "D" for locations within one-half mile of a state highway. According to County policy, the County's LOS standards for the state highway system shall be no worse than those adopted in the Placer County Congestion Management Program (CMP). The LOS standard in the CMP for roadways and signalized intersections located along state highways is LOS E.

Nevada County

Nevada County's LOS standard is that the minimum acceptable level of service for areas identified as *Community Regions* in the General Plan (such as the project area) shall be LOS D, except where the existing LOS is less than D. In those situations, the LOS shall not be allowed to drop below the existing LOS.

Martis Valley Community Plan

The adopted Martis Valley Community Plan (Placer County, 2003) specifies that the County shall develop and manage its roadway system to maintain the following minimum levels of service (LOS):

- LOS “C” on rural roadways, except within one-half mile of state highways where the standard shall be LOS “D.”

- LOS “C” on urban/suburban roadways except within one-half mile of state highways where the standards shall be LOS “D.”

It also states that the County’s LOS standard for SR 267 shall be no worse than LOS “E.”

Caltrans

According to the *SR 267 Transportation Corridor Concept Report* (Caltrans District 3, 2012), the minimum acceptable LOS along the entire length of SR 267 over the next 20 years is “D.”

The applicable LOS standards for each study intersection are shown in the middle column of Table 5.

Methodology

Intersection (LOS) is largely evaluated using the methodologies documented in the 2010 Highway Capacity Manual (HCM), as applied in the Synchro 8.0 Software package developed by TrafficWare. The Highway Capacity Software (HCS 2010) is utilized for the SR 267/Airport Road/Schaffer Mill Road intersection, given the presence of the shared left/through lanes. The detailed LOS calculations for all intersections are provided in Appendix B.

Intersection LOS Analysis

LOS analyses were performed at all of the study intersections under existing year and future year scenarios, and the results are presented in Tables 5 and 6, respectively.

LOS Under Existing Conditions

As indicated in Table 5, all study intersections currently operate at a relatively good LOS (LOS B or better). With implementation of the proposed Truckee Airport Master Plan project in 2015, all intersections would continue to operate at an acceptable level (LOS C or better).

LOS Under Existing Conditions With Approved Development Projects

With implementation of the proposed project as well as other approved development projects in 2015, all intersections would operate at an acceptable level (LOS D or better), with the exception of the SR 267/Brockway Road/Soaring Way intersection. This signalized intersection would degrade to an unacceptable LOS F, with an average delay of over 200 seconds per vehicle.

LOS Under Future Cumulative Conditions

LOS under future cumulative conditions, both without and with the proposed project, is presented in Table 6. As shown, the two signalized intersections along SR 267 would degrade to unacceptable Levels of Service in the future, without the proposed Truckee Airport Master Plan project. The SR 267/Brockway Road/Soaring Way intersection is shown to operate at LOS F with an average delay greater than 200 seconds per vehicle. The SR 267/Airport Road/Schaffer Mill Road intersection is shown

TABLE 5: Truckee Airport Master Plan - Existing Year Intersection LOS Summary

Intersection	Control Type [1,2]	Jurisdiction	LOS Threshold	Existing Year: Without Airport Master Plan Delay (sec/veh)	Existing Year: Without Airport Master Plan LOS	Existing Year: With Airport Master Plan Delay (sec/veh)	Existing Year: With Airport Master Plan LOS	Existing Year With Approved Projects: With Airport Master Plan Delay (sec/veh)	Existing Year With Approved Projects: With Airport Master Plan LOS
Summer LOS									
SR 267 / Brockway Road / Soaring Way	Signal	Caltrans/Town of Truckee	D	19.9	B	22.7	C	**OVF**	**F**
SR 267 / Airport Road / Schaffer Mill Road	Signal	Caltrans/Placer County	D	17.8	B	18.5	B	33.3	C
Soaring Way / Joerger Drive	Stop Controlled / Roundabout [3]	Town of Truckee	(4)	9.6	A	9.9	A	10.9	B
Airport Road / Soaring Way	Stop Controlled	Town of Truckee	(4)	9.5	A	10.3	B	11.3	B
Winter LOS									
SR 267 / Airport Road / Schaffer Mill Road	Signal	Caltrans/Placer County	D	15.1	B	19.7	B	54.3	D

BOLD text indicates that LOS standard has been exceeded.
OVF = Overflow. Overflow indicates a delay greater than 200 seconds per vehicle, which cannot be accurately calculated using HCM methodology.
NOTE 1: Level of service for signalized intersections is reported for the total intersection.
NOTE 2: Level of service for unsignalized intersections is reported for the worst movement.
NOTE 3: A single lane roundabout is assumed at the Soaring Way/Joerger Drive intersection in the 'Approved Projects' scenarios, as a part of the PC-3 Joerger Ranch project.
NOTE 4: The Town of Truckee LOS standard states that "individual turning movements at unsignalized intersections shall not be allowed to reach LOS F and to exceed a cumulative vehicle delay of four vehicle hours."
Source: LSC Transportation Consultants, Inc. *Truckee Airport MasterPlan TIA.xlsx*

TABLE 6: Truckee Airport Master Plan - Future Cumulative Intersection LOS Summary

Intersection	Control Type [1,2]	Jurisdiction	LOS Threshold	Future Cumulative Conditions: Without Truckee Airport Master Plan Delay (sec/veh)	Without Truckee Airport Master Plan LOS	With Truckee Airport Master Plan Delay (sec/veh)	With Truckee Airport Master Plan LOS
Summer LOS							
SR 267 / Brockway Road / Soaring Way	Signal	Caltrans/Town of Truckee	D	**OVF**	**F**	**OVF**	**F**
SR 267 / Airport Road / Schaffer Mill Road	Signal	Caltrans/Placer County	D	**62.8**	**E**	**66.1**	**E**
Soaring Way / Joerger Drive	Roundabout [3]	Town of Truckee	(4)	9.6	A	9.8	A
Airport Road / Soaring Way	Stop Controlled	Town of Truckee	(4)	10.1	B	11.1	B
Winter LOS							
SR 267 / Airport Road / Schaffer Mill Road	Signal	Caltrans/Placer County	D	**70.7**	**E**	**73.4**	**E**

BOLD text indicates that LOS standard has been exceeded.

OVF = Overflow. Overflow indicates a delay greater than 200 seconds per vehicle, which cannot be accurately calculated using HCM methodology.

NOTE 1: Level of service for signalized intersections is reported for the total intersection.

NOTE 2: Level of service for unsignalized intersections is reported for the worst movement.

NOTE 3: A single lane roundabout is assumed at the Soaring Way/Joerger Drive intersection in the 'Future Cumulative' scenarios, as a part of the PC-3 Joerger Ranch project.

NOTE 4: The Town of Truckee LOS standard states that "individual turning movements at unsignalized intersections shall not be allowed to reach LOS F and to exceed a cumulative vehicle delay of four vehicle hours."

Source: LSC Transportation Consultants, Inc. *Truckee Airport MasterPlan TIA.xlsx*

to operate at an unacceptable LOS E under both summer and winter traffic volumes. The remaining intersections are expected to operate at good levels (LOS A or LOS B) in the future. Although implementation of the proposed project would result in a slight increase in average vehicular delays, it would not affect the LOS under future cumulative conditions.

Intersection Traffic Queuing Analysis

The potential for intersection traffic queues to interfere with adjacent roadways or intersections was evaluated. Specifically, the existing lane storage lengths and the 95th-percentile traffic queue lengths at the study intersections were reviewed, and the results are shown in Table 7 for scenarios that exceed the LOS standard.

Existing Year Traffic Queuing

No traffic queuing concerns are identified under existing conditions with the proposed Truckee Airport Master Plan project. However, with implementation of the approved projects and the proposed project in 2015, the traffic queues on all approaches on the SR 267/Brockway Road/Soaring Way intersection would exceed the available storage lengths. The northbound queues are calculated to extend near to the signalized SR 267/Airport Road/Schaffer Mill Road intersection to the south. The eastbound traffic queues on Brockway Road are calculated to extend beyond the Brockway Road/Hope Court and Brockway Road/Martis Drive intersections to the west. The westbound traffic queue along Soaring way is calculated to extend beyond its intersection with Airport Road to the east. No queuing concerns are identified at the other study intersections under all Year 2015 scenarios.

Future Cumulative Year Traffic Queuing

Under future cumulative conditions, the traffic queues on the northbound and southbound approaches on the SR 267/Brockway Road/Soaring Way intersection are expected to be longer than described above. The estimated 95th percentile queue lengths are calculated to exceed all turn-lane storage capacities on the northbound and southbound approaches. The eastbound traffic queue along Brockway Road is estimated to extend past Martis Valley Road. Although the westbound queues would exceed the available storage length, they would be slightly shorter than those under the 'existing with approved' scenario. (This can be explained by the fact that some of the future cumulative intersection volumes vary slightly from the 'existing with approved projects' scenario, given that the PC-3 project assumptions in the TransCAD model may contain different assumptions for land use and trip distribution.) Nevertheless, the westbound queue along Soaring Way would extend beyond its intersection with Airport Road to the east. With implementation of the proposed project in the future, the traffic queue lengths at this intersection would generally increase, although no additional movements would exceed the available storage length.

The traffic queue length on the southbound left-turn movement on the SR 267/Airport Road/Schaffer Mill Road intersection (left turns from SR 267 onto Airport Road) would exceed the available storage length under future cumulative summer conditions only, with or without the proposed Truckee Airport Master Plan project. All other movements at this intersection are expected to be accommodated within the existing storage lengths under all future cumulative scenarios. No queuing concerns are identified at the remaining study intersections under the future cumulative scenarios.

TABLE 7: Truckee Airport Master Plan - Unmitigated Intersection Queue Lengths

Queue lengths shown in feet. Assumes 25-foot vehicle length.

	Northbound			Southbound			Eastbound			Westbound		
Intersection / Scenario	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
SR 267 / Brockway Road / Soaring Way [1]												
- Existing Storage Length (feet)	380	--	--	460	--	260	--	--	200	--	--	--
- Existing with Approved Projects with Truckee Airport Master Plan	**1,578**	**3,043**	--	**1,168**	693	260	--	**1,068**	**393**	--	**4,795**	--
- Future without Truckee Airport Master Plan	**1,788**	**4,120**	--	**1,203**	1,813	**305**	--	**1,765**	**358**	--	**4,315**	--
- Future with Truckee Airport Master Plan	**1,903**	**4,290**	--	**1,253**	1,885	**308**	--	**1,820**	**360**	--	**4,555**	--
SR 267 / Airport Road / Schaffer Mill Road												
- Existing Storage Length (feet)	300	--	--	150	--	150	--	--	190	--	--	180
- Future Summer Without Truckee Airport Master Plan	63	1,430	--	**238**	843	108	--	515	80	--	53	50
- Future Summer With Truckee Airport Master Plan	63	1,465	--	**293**	843	108	--	515	80	--	73	50
- Future Winter Without Truckee Airport Master Plan	115	2,163	--	25	363	60	--	150	8	--	10	10
- Future Winter With Truckee Airport Master Plan	115	2,255	--	40	365	60	--	150	8	--	53	10

Bold indicates storage length is exceeded.

Note 1: Under "overflow" conditions, the traffic queue lengths may not be precisely calculated by the HCM methodology.

Source: LSC Transportation Consultants, Inc.

Truckee Airport MasterPlan TIA.xlsx

Chapter 7

Transportation Impacts and Mitigation

The following potential areas of transportation impacts are addressed in this chapter:

- Intersection Level of Service
- Intersection Traffic Queuing
- Analysis of the Need for New Turn Lanes
- Impact on Vehicle-Miles Traveled (VMT)
- Multi-Modal Impacts
- Driver Sight Distance and Roadway Design Hazards
- Construction Traffic Impacts
- Traffic Impact Fees

Intersection Level of Service

The following intersections are expected to exceed the LOS thresholds in 2015:

- SR 267/Brockway Road/Soaring Way – 'existing + approved projects' scenario

All other study intersections are calculated to operate within the applicable LOS thresholds under all 2015 scenarios.

The following intersections are expected to exceed the LOS thresholds under future cumulative conditions, with or without the proposed Truckee Airport Master Plan project:

- SR 267/Brockway Road/Soaring Way
- SR 267/Airport Road/Schaffer Mill Road (summer and winter)

All other study intersections are expected to operate within the applicable LOS thresholds under the future cumulative scenarios, with or without the proposed project.

Potential intersection LOS mitigation measures are evaluated for the two study intersections exceeding the LOS thresholds. The LOS calculations with intersection mitigation measures are contained in Appendix C.

<u>SR 267/Brockway Road/Soaring Way Intersection</u>

No intersection LOS improvements are needed under existing conditions with the proposed project. However, potential intersection LOS mitigation measures are considered for the SR 267/Brockway Road/Soaring Way intersection (as it would exceed the LOS thresholds in the 2015 summer PM peak hour with the proposed project and the other approved development projects, and under the future cumulative scenarios).

Existing With Approved Projects With Truckee Airport Master Plan Scenario

Table 8 provides the mitigated LOS for the SR 267/Brockway Road/Soaring Way intersection under the existing plus approved projects with Airport Master Plan scenario. Two mitigation scenarios are analyzed: improvements to the current signalized intersection and conversion to a roundabout. As indicated, the intersection could be modified to achieve acceptable LOS under both configurations. The specific improvements required to achieve acceptable LOS as a signalized intersection would include exclusive turn lanes for all intersection movements on all approaches, and new overlap phasing for westbound right-turns. A detailed summary of the specific lane and phasing configuration and resulting LOS on each movement is provided in Appendix C.

Note that while provision of capacity-enhancing improvements to the existing signalized intersection would improve the LOS to an acceptable level, this may not be consistent with Truckee General Plan Policy P7.1, which strives to replace existing traffic signals with roundabouts, including traffic signals on State Highways. General Plan Policy P7.2 states, "*Install roundabouts instead of new traffic signals or capacity-enhancing improvements to existing signalized intersections, when roundabouts will achieve the same or better Level of Service as a traffic signal, where it is physically feasible to do so, and when installation of the roundabout will not be substantially costlier than a signal*."

The removal of the existing traffic signal and construction of a dual-lane roundabout would also improve the LOS to an acceptable level. A roundabout at this intersection is included in the Town of Truckee's traffic impact fee program. The detailed lane configuration for the roundabout is provided in Appendix C. As shown in Table 8, this roundabout configuration would operate with worst movement (westbound right-turn) LOS E, and with total intersection average delay in the LOS D range, thereby achieving acceptable LOS under Town of Truckee and Caltrans standards. Overall, the roundabout option would provide shorter traffic queues and less delay than the traffic signal option under the existing plus approved projects with Truckee Airport Master Plan scenario. However, the roundabout option would require the widening of SR 267 to two through-traffic lanes north of and south of the intersection.

Future Cumulative Conditions

Table 8 provides the mitigated LOS for each intersection movement on the SR 267/Brockway Road/Soaring Way intersection under future cumulative conditions, both without and with the Airport Master Plan. Two mitigation scenarios are analyzed: improvements to the current signalized intersection and conversion to a roundabout.

As shown, the traffic signal option achieves acceptable LOS both without and with the proposed project. The traffic signal analyzed under this scenario assumes that SR 267 is widened to two through-traffic lane in each direction north of and south of the intersection. Otherwise, this analysis assumes the same turn-lane and phasing conditions as the under the 'existing plus approved projects with Truckee Airport Master Plan' scenario. This configuration would achieve an acceptable intersection LOS D.

Alternatively, a dual-lane roundabout mitigation scenario is analyzed for the SR 267/Brockway Road/Soaring Way intersection. The analysis considers the largest roundabout configuration that is recognized by HCM 2010 methodology, which includes two approach lanes on each approach with an additional right-turn slip or bypass lane added to each approach (three total approach lanes on all legs of the intersection). The results indicate that the movement with the worst LOS – in this case the northbound through-traffic movement – would operate at LOS F with approximately 21.7 and 26.3

TABLE 8: Truckee Airport Master Plan - Intersection LOS Mitigation Summary

Intersection	Mitigation Measure	Mitigated LOS No Project		Mitigated LOS With Proposed Project [1]	
		Delay (sec/veh)	LOS [2,3]	Delay (sec/veh)	LOS [2,3]
Existing Year With Approved Projects Mitigation					
SR 267 / Brockway Road / Soaring Way	Improve Traffic Signal Capacity: Provide Exclusive Turn Lanes for All Movements from Brockway Road and Soaring Way. Add NB Right-Turn lane on SR 267. Add right-turn overlap phasing on westbound approach. No additional widening is necessary on SR 267; OR	Scenario not within Scope		46.7	D
	Construct Dual-Lane Roundabout. [4]	Scenario not within Scope		27.3	D
Future Year Mitigation					
SR 267 / Brockway Road / Soaring Way	Provide Exclusive Turn Lanes for All Movements from Brockway Road and Soaring Way. Add NB Right-Turn lane on SR 267. Add right-turn overlap phasing on westbound approach. Widen SR 267 to 2 thru-traffic lanes in both directions; OR	41.0	D	44.9	D
	Construct Dual-Lane Roundabout with Right-Turn Bypass Lanes on All Approaches. [5,6]	**104.1**	**F**	**122.4**	**F**
SR 267 / Airport Road / Schaffer Mill Road (Summer)	Widen SR 267 to 2 thru-traffic lanes in both directions. Re-configure EB and WB approaches to left-turn lane, thru/right-turn lane.	25.0	C	28.2	C
WINTER	- SAME -	14.0	B	15.3	B

BOLD text indicates that LOS standard has been exceeded.

NOTE 1: Existing plus Project scenario includes approved developments.

NOTE 2: Level of service for signalized intersections is reported for the total intersection.

NOTE 3: Level of service for roundabouts and other unsignalized intersections is reported for the worst movement.

NOTE 4: See Appendix C, Table C1 for details regarding existing year roundabout mitigation.

NOTE 5: See Appendix C, Table C2 for details regarding future year roundabout mitigation.

NOTE 6: A dual-lane roundabout would not satisfy Town of Truckee LOS standards under future cumulative conditions without or with the proposed project.

Source: LSC Transportation Consultants, Inc. *Truckee Airport MasterPlan TIA.xlsx*

vehicle-hours of delay, respectively, without and with the proposed project. The average total intersection delay falls into the LOS E range for both scenarios. As such, a dual-lane roundabout configuration does not achieve acceptable LOS under Town of Truckee or Caltrans LOS criteria.

A three-lane roundabout configuration is not analyzed as a part of this study. Three-lane roundabout analysis procedures are not available using current HCM 2010 methodologies. The implementation of modern three-lane roundabout is rare in the United States. A Federal Highway Administration (FHWA) publication suggests that:

The use of three-lane roundabouts raises the concern that low comprehension and compliance could be a bigger problem than at two-lane roundabouts for the following reasons: (1) the larger radii of three-lane roundabouts enable higher speeds, (2) angles of impact in three-lane roundabout may be more severe when errant vehicles stray across multiple lanes from their assigned lane, and (3) traffic volumes will be higher, and thus, more vehicles will be affected by incidents.[1]

Note that either roundabout or traffic signal improvements would require that SR 267 be widened to four lanes in the future. This improvement is shown to be needed, regardless of whether the proposed Truckee Airport Master Plan project is implemented.

SR 267/Airport Road/Schaffer Mill Road Intersection

No intersection LOS improvements are needed at this intersection under existing conditions with the proposed Truckee Airport Master Plan project. However, potential intersection LOS mitigation measures are considered for the SR 267/Airport Road/ Schaffer Mill Road intersection under future cumulative conditions (as it would exceed the LOS thresholds in the future summer and winter PM peak hours, with or without the proposed project), and the results are summarized in Table 8. As shown, widening SR 267 to four lanes and reconfiguring both side-street approaches to provide exclusive left-turn lanes and shared thru/right-turn lanes would improve this intersection's operations to acceptable levels under all scenarios.

The Placer County traffic impact fee program includes the following improvement projects:

- SR 267: County line to Brockway Summit – Widen to four lanes/intersections improvements
- SR 267: at Schaffer Mill/Airport – Intersection improvements

These improvement projects are considered to address the improvements at the SR 267/Airport Road/Schaffer Mill Road intersection. According to the Placer/Truckee Regional Traffic Impact Fee Agreement, payment of appropriate fees under the Truckee impact fee program is considered to mitigate impacts on roadway improvements included in the improvements list for Placer County's Tahoe Resorts Benefit District impact fee program.

Intersection Traffic Queuing

No traffic queuing concerns are identified under existing conditions with the proposed Truckee Airport Master Plan project. However, with implementation of the approved projects and the proposed project in 2015, the traffic queues on all approaches on the SR 267/Brockway Road/Soaring Way intersection

[1] FHWA Publication No.: FHWA-HRT-10-030 (Bared, Joe, March 2010)

would exceed the available storage lengths. No queuing concerns are identified at the other study intersections under all Year 2015 scenarios.

Under future cumulative conditions, the traffic queues on all approaches on the SR 267/Brockway Road/Soaring Way intersection are expected to exceed the available storage lengths. Additionally, the traffic queue length on the southbound left-turn movement on the SR 267/Airport Road/Schaffer Mill Road intersection (left turns from SR 267 onto Airport Road) would exceed the available storage length under future cumulative summer conditions only. With implementation of the proposed project in the future, the traffic queue lengths at these intersections would generally increase, although no additional movements would exceed the available storage lengths.

Table 9 summarizes the traffic queue lengths with implementation of the intersection LOS improvements indicated in Table 8. As indicated, most queuing concerns would be reduced or resolved, with the exception of the following concerns at the 267/Brockway Road/Soaring Way intersection:

- With improvements to the existing signalized intersection, the northbound left-turn queue would exceed the available storage length. In order to accommodate the 95th-percentile left-turn queue entirely outside the through lane, the existing left-turn lane would need to be extended by about 180 feet in 2015 with approved projects with proposed project, and by about 475 feet under future cumulative with project conditions.

- Under the existing plus approved project with proposed project scenario, the southbound left-turn queue would exceed the available storage length. In order to accommodate the 95th-percentile left-turn queue entirely outside the through lane, the existing left-turn lane would need to be extended by approximately 25 feet.

- Similarly, the eastbound right-turn lane would need to be extended by about 145 feet in 2015 with approved projects with proposed project, but by only about 55 feet under future cumulative with project conditions. (The queue length is shorter under future cumulative conditions because of differing traffic patterns based on the Town of Truckee TransCAD model.)

- The recommended eastbound left-turn lane would need to be designed to accommodate the 95th percentile queue length. This distance is estimated to extend beyond the location of the intersection with Hope Court to the west under the existing plus approved projects with proposed project, as well as the future scenarios both without and with the proposed project. It is recommend that "KEEP CLEAR" pavement marking be provided within the Brockway Road/Hope Court intersection in order to prevent westbound left-turns from blocking through traffic on Brockway Road.

Additionally, the 95th percentile queue would potentially exceed the storage lane for the southbound left-turn at the SR 267/Airport Road/Schaffer Mill Road intersection under future conditions with the proposed project during the summer design period, but by only about 10 feet (less than one vehicle).

Analysis of the Need for New Turn Lanes

The need for left- and right-turn lanes along a main roadway is evaluated based on the guidelines specified by National Cooperative Highway Research Program (NCHRP) Report 457 "Evaluating Intersection Improvements: An Engineering Study Guide" (Transportation Research Board, 2001). The turn lane warrant criteria charts are included in Appendix D. The need for new turn lanes is evaluated

TABLE 9: Truckee Airport Master Plan - Mitigated Intersection Queue Lengths

Queue lengths shown in feet. Assumes 25-foot vehicle length.

	Northbound			Southbound			Eastbound			Westbound		
Intersection / Scenario	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
SR 267 / Brockway Road / Soaring Way												
- Existing Storage Length (feet)	380	--	--	460	--	260	--	400	200	--	425	--
Mitigated w/ Signal												
- Existing with Approved Projects with Truckee Airport Master Plan	**558**	818	178	**483**	475	190	**445**	203	**345**	265	255	343
- Future without Truckee Airport Master Plan	**800**	468	125	398	325	228	**530**	195	**253**	138	228	268
- Future with Truckee Airport Master Plan	**855**	538	143	455	383	260	**575**	213	**255**	150	260	298
Mitigated w/ Roundabout												
- Existing with Approved Projects with Truckee Airport Master Plan	175	225	25	175	--	200	--	150	200	50	100	250
- Future without Truckee Airport Master Plan	475	625	25	175	225	50	75	50	25	100	100	25
- Future with Truckee Airport Master Plan	550	700	25	200	250	50	75	50	25	100	125	25
SR 267 / Airport Road / Schaffer Mill Road												
- Existing Storage Length (feet) [1]	300	--	--	150	--	150	--	--	--	--	--	--
- Future Summer Without Truckee Airport Master Plan	38	423	435	123	313	120	318	68	--	25	45	--
- Future Summer With Truckee Airport Master Plan	45	470	485	**160**	340	135	360	75	--	40	80	--
- Future Winter Without Truckee Airport Master Plan	58	423	440	13	173	75	68	10	--	3	13	--
- Future Winter With Truckee Airport Master Plan	60	448	463	20	173	75	70	10	--	23	53	--

Bold indicates storage length is exceeded.

Source: LSC Transportation Consultants, Inc.

Truckee Airport MasterPlan TIA.xlsx

only for side-street stop-controlled intersections, as the need for turn lanes at signalized and roundabout-controlled intersections is determined by level of service.

Left-Turn Lane Warrant Analysis

Left-turn lane volume warrants are defined by volume thresholds of opposing traffic versus advancing traffic, as well as the percentage of left-turns on the advancing approach. The warrant chart is attached. The need for a new eastbound left-turn lane along Soaring Way at Joerger Drive was evaluated. The peak-hour traffic volumes along Soaring Way do not meet the left-turn lane warrant criteria under existing conditions, with or without the proposed project. Note that the left-turn lane warrant criteria is not applicable under the scenario with the approved development projects nor the future cumulative scenario, considering that a roundabout is assumed to be installed at the Soaring Way/Joerger Drive intersection as a part of the PC-3 project.

Right-Turn Lane Warrant Analysis

Right-turn lane warrants are based on a graphical curve of right-turning volumes versus total traffic in the travel lane. The warrant chart is attached. The peak-hour traffic volumes do not meet the right-turn lane warrant at any of the unsignalized study intersections under any of the study scenarios.

New turn lanes are not expected to be necessary at any of the site access intersections, considering the relatively low peak-hour traffic volumes under any of the existing or future cumulative project scenarios.

Impact on Vehicle Miles Traveled (VMT)

The PM peak-hour Vehicle Miles of Travel (VMT) generated by the project was estimated based upon the PM peak-hour trip rates and percent new trips provided in Table 7 of the Town of Truckee Traffic Impact Fee (TIF) Program. This table is contained in Appendix E. The VMT analysis is presented in Table 10. As a land use similar to the multi-use hangar is not provided, the VMT for this land use is estimated based on the trip generation rate assumed in this study (Table 2), and the trip length and percent new trips from the "School" land use in the TIF Program Table. The 'school' land use category is chose because it would have the most similar trip characteristics of the proposed summer day-camp.

The Truckee TIF Program also does not contain a land use category for airports. Therefore, the 'industrial' category was chosen to best represent the trip characteristics of the proposed increase in aviation activities. As indicated, the proposed project is estimated to generate a total of approximately 185 new VMT in the region during the summer PM peak hour. For the purposes of this analysis, the "region" is assumed to be the area included in the Town of Truckee TransCAD model. (This region is bound by the I-80/Donner Lake Road interchange on the west, the SR 89/West River Street intersection on the southwest, Brockway Summit on the south, the I-80/Floriston interchange on the east, and the Truckee Town Limits to the north.)

TABLE 10: Truckee Airport Master Plan - Vehicle Miles Traveled (VMT)

Proposed Land Use	ITE Code	Land Use (Table 7 from TIF Program)	Quantity	Units	Summer PM Peak Hour Trips [1]	Average Trip Length (miles) [2]	Percent New Trips [2]	PM Peak Hour VMT per Unit [2]	VMT [3]
Clear Capital Building									
Clear Capital Offices	715	Office	10.84	KSF	87	3.7	87%	5.44	59
Additional Car Rental Office	n/a	Retail	2.00	KSF	13	3.8	49%	11.32	23
Credit for existing Car Rental Facility	n/a	Retail	-0.50	KSF	--	3.8	49%	11.32	-6
Subtotal Clear Capital Building									*76*
Increase in Aviation	022	Industrial	18	Flights	5	3.7	92%	--	17
Multi-Use Hangar Event									
- Summer - "Mission to Mars"	n/a	School	24	Attendees	24	4.1	80%	--	79
- Staff	n/a	Office	4	Staff	4	3.7	87%	--	13
Multi-Use Hangar Subtotal									*92*
Truckee Airport Master Plan - TOTAL VMT									***185***

KSF = 1,000 Square Feet
TIF = Traffic Impact Fee
Note 1: Reference Trip Generation, Table 2.
Note 2: Source: Town of Truckee Traffic Impact Mitigation Fee Study, Table 7.
Note 3: VMT is estimated using the "PM Peak Hour VMT per Unit" where available, or otherwise by the product of the PM peak hour trips, average trip length, and percent new trips.
Source: LSC Transportation Consultants, Inc. *Truckee Airport MasterPlan TIA.xlsx*

Multi-Modal Impacts

Multi-modal impacts (such as impacts to transit, pedestrian, and bicycle modes) are evaluated.

Transit Impacts

The impact of the proposed project on transit services and facilities is evaluated. Based upon the increase in employment generated by the proposed project, transit ridership is not expected to increase by more than 2 passenger-trips in the peak hour and 5 passenger-trips over the day. The existing TART transit services between Truckee and Northstar (serving the airport) do not presently have capacity constraints. As such, additional public transit service would not be required. In addition, Placer County plans to expand TART service serving the airport to year-round, starting in Summer 2016. As a bus stop is provided on the site, the existing transit facilities are considered to be adequate.

Project Impact on Trails and Bikeways

The project proposes to provide a paved pedestrian path along the new office building site frontages. No bicycle facilities are proposed along the site access roadways. The proposed bicycle and pedestrian plans were compared against the Truckee Trails and Bikeways Master Plan, current plans for the Legacy Trail and Truckee-Northstar trail connections, as well as related goals and policies in the Circulation Element of the Truckee General Plan. The Truckee Trails and Bikeways Master Plan proposes a Class II bike lane along SR 267 within the Town. The project would not preclude construction of any of the proposed facilities. No inconsistencies were identified. The proposed bicycle and pedestrian facilities are therefore considered to be adequate.

Driver Sight Distance and Roadway Design Hazards

No existing driver sight distance deficiencies are identified at the study intersections and existing site driveways. With implementation of the proposed project, adequate driver sight distance conditions are expected to be provided, so long as the final landscaping plans provide at least 275 feet of corner sight distance (based on Town of Truckee/Caltrans standards at 25 miles per hour). Finally, the project plans were reviewed regarding potential roadway design hazards, and no concerns are identified.

Construction Traffic Impacts

Traffic impacts during the project's construction phase are analyzed. Table 11 lists the personnel and equipment expected to be onsite over the course of a peak construction day, based on information provided by the project proponent. The following assumptions are applied in this analysis:

- Half of the construction employees are assumed to make one round-trip off-site during the day (for lunch, errands, etc.), in addition to commuting to/from work.

- About 70 percent of the employees are assumed to depart the site during the PM peak hour.

- Each inspector or visitor or "Other Crew" is assumed to make one entering trip and one exiting trip over the course of the day. Half of the "Other Crew" are estimated to depart the site during the peak hour.

- The construction employees are estimated to have an average vehicle occupancy rate of approximately 1.2 employees per vehicle, based on data from the *U.S. Census 2005-2009 American Community Survey* for the Truckee area.

- Six material delivery trucks are each assumed to generate four round-trips to/from the project site per day, with one round-trip occurring during the peak hour.

- One fueling truck is estimated to make a one round-trip to/from the project site. This trip is not expected to occur during the peak hour.

TABLE 11: Truckee Airport Master Plan Project - Construction Trip Generation

		Trip Generation Rates [1]				One-Way Vehicle Trips at Site Driveways			
			PM Peak Hour				PM Peak Hour		
Quantity	Description	Daily	In	Out	Total	Daily	In	Out	Total
6	Material Delivery	8.00	1.00	1.00	2.00	48	6	6	12
20	Paving Crew [2]	2.50	0.00	0.58	0.58	50	0	12	12
6	Other Crew	2.00	0.00	0.50	0.50	12	0	3	3
1	Fueler	2.00	0.00	0.00	0.00	2	0	0	0
Total Trip Generation During Construction						**112**	**6**	**21**	**27**

Note 1: Trip generation rates are based on a person-trip analysis.
Note 2: Construction employees are assumed to have an average vehicle occupancy rate of approximately 1.2 persons per vehicle.
Source: LSC Transportation Consultants, Inc. *Truckee Airport MasterPlan TIA.xlsx*

Based on these assumptions, it is calculated that a total of about 112 daily one-way vehicle trips would result due to construction-related activity, with 27 trips (6 entering, 21 exiting) occurring during the PM peak hour. Adding this traffic to the existing summer PM peak-hour traffic is not expected to cause any study intersections to exceed the applicable LOS thresholds.

Traffic Impact Fees

As part of the mitigation of this development, the applicant shall pay the amounts determined to be appropriate to the traffic impact fee programs of the various jurisdictions. Additionally, under existing year conditions with the proposed project, although no intersection LOS or traffic queuing improvements are needed, the project may be conditioned by Nevada County to complete project-specific improvements adjacent to the project property (such as pedestrian-related improvements). Finally, additional traffic management may be required during large hangar events (considered special events).

Appendix A

LOS Descriptions

DESCRIPTIONS OF LEVELS OF SERVICE

The concept of level of service is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level of service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations, from A to F, with level of service A representing the best operating conditions and level of service F the worst.

Level of Service Definitions

In general, the various levels of service are defined as follows for uninterrupted flow facilities:

- **Level of service A** represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent.

- **Level of service B** is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A, because the presence of others in the traffic stream begins to affect individual behavior.

- **Level of service C** is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

- **Level of Service D** represents high-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

- **Level of service E** represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to “give way” to accommodate such maneuvers. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.

- **Level of service F** is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go waves, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level of service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of vehicles or pedestrians discharged from the queue may be quite good. Nevertheless, it is the point at which arrival flow exceeds discharge flow which causes the queue to form, and level of service F is an appropriate designation for such points.

Existing LOS

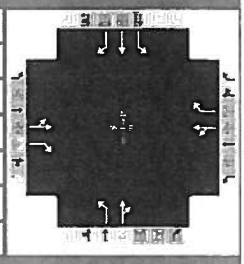
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	114	46	280	8	84	108	306	708	9	85	376	129
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	121	49	298	9	89	115	326	753	10	90	400	137
Adj No. of Lanes	0	1	1	0	1	0	1	1	0	1	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	318	111	703	73	172	209	378	860	11	120	601	511
Arrive On Green	0.23	0.23	0.23	0.23	0.23	0.23	0.21	0.47	0.47	0.07	0.32	0.32
Sat Flow, veh/h	901	483	1583	26	747	908	1774	1834	24	1774	1863	1583
Grp Volume(v), veh/h	170	0	298	213	0	0	326	0	763	90	400	137
Grp Sat Flow(s),veh/h/ln	1384	0	1583	1681	0	0	1774	0	1858	1774	1863	1583
Q Serve(g_s), s	0.0	0.0	7.2	0.0	0.0	0.0	9.9	0.0	20.6	2.8	10.3	3.6
Cycle Q Clear(g_c), s	5.6	0.0	7.2	6.1	0.0	0.0	9.9	0.0	20.6	2.8	10.3	3.6
Prop In Lane	0.71		1.00	0.04		0.54	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	430	0	703	455	0	0	378	0	871	120	601	511
V/C Ratio(X)	0.40	0.00	0.42	0.47	0.00	0.00	0.86	0.00	0.88	0.75	0.67	0.27
Avail Cap(c_a), veh/h	787	0	1134	904	0	0	430	0	1118	175	853	725
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.6	0.0	10.6	18.9	0.0	0.0	21.1	0.0	13.3	25.5	16.3	14.0
Incr Delay (d2), s/veh	0.8	0.0	0.6	0.3	0.0	0.0	13.5	0.0	5.5	4.6	0.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.3	0.0	5.7	5.2	0.0	0.0	10.3	0.0	17.3	2.7	9.1	2.8
LnGrp Delay(d),s/veh	19.4	0.0	11.2	19.1	0.0	0.0	34.6	0.0	18.9	30.1	16.7	14.1
LnGrp LOS	B		B	B			C		B	C	B	B
Approach Vol, veh/h		468			213			1089			627	
Approach Delay, s/veh		14.2			19.1			23.6			18.1	
Approach LOS		B			B			C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	15.4	24.0		16.3	7.3	32.1		16.3
Change Period (Y+Rc), s	3.5	6.0		3.5	3.5	6.0		3.5
Max Green Setting (Gmax), s	13.5	25.5		28.0	5.5	33.5		28.0
Max Q Clear Time (g_c+I1), s	11.9	12.3		8.1	4.8	22.6		9.2
Green Ext Time (p_c), s	0.1	3.8		3.7	0.0	3.5		3.7

Intersection Summary	
HCM 2010 Ctrl Delay	19.9
HCM 2010 LOS	B

HCS 2010 Signalized Intersection Results Summary

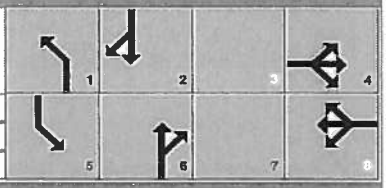
General Information				Intersection Information	
Agency	LSC			Duration, h	0.25
Analyst	JHB	Analysis Date	Apr 16, 2015	Area Type	Other
Jurisdiction	Caltrans/Placer County	Time Period	Summer PM	PHF	0.92
Intersection	267/Airport/Shaffer Mill	Analysis Year	2015	Analysis Period	1> 7:00
File Name	267 Airport HCS.xus				
Project Description	Clear Capital TIA - Existing Without Project				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	204	11	68	33	6	53	23	716	26	38	603	49

Signal Information			
Cycle, s	70.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	1.5	0.7	39.7	13.1	0.0	0.0	
Yellow	4.0	0.0	4.0	4.0	0.0	0.0	
Red	1.0	0.0	1.0	1.0	0.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	1	6	5	2
Case Number		7.0		7.0	2.0	4.0	2.0	3.0
Phase Duration, s		18.1		18.1	6.5	44.7	7.2	45.4
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		4.5		4.5	3.8	0.0	3.8	0.0
Queue Clearance Time (g_s), s		12.7		3.7	3.0		3.6	
Green Extension Time (g_e), s		0.4		1.2	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	0.38		0.55	
Max Out Probability		1.00		0.06	1.00		1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		234	63		42	47	25	796		41	655	42
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1468	1579		1724	1579	1774	1855		1774	1863	1579
Queue Service Time (g_s), s		9.3	2.4		0.0	1.7	1.0	22.7		1.6	16.1	0.8
Cycle Queue Clearance Time (g_c), s		10.7	2.4		1.4	1.7	1.0	22.7		1.6	16.1	0.8
Green Ratio (*g/C*)		0.19	0.19		0.19	0.19	0.02	0.57		0.03	0.58	0.58
Capacity (*c*), veh/h		374	295		417	295	39	1053		56	1075	911
Volume-to-Capacity Ratio (*X*)		0.624	0.214		0.102	0.158	0.641	0.756		0.738	0.610	0.047
Available Capacity (c_a), veh/h		413	338		457	338	150	1053		150	1075	911
Back of Queue (*Q*), veh/ln (95th percentile)		6.8	1.6		1.0	1.2	0.8	12.2		1.3	8.8	0.4
Queue Storage Ratio (*RQ*) (95th percentile)		0.00	0.22		0.00	0.15	0.07	0.00		0.21	0.00	0.05

Uniform Delay (d_1), s/veh		27.3	24.1		23.7	23.8	34.0	11.5		33.6	9.7	6.4
Incremental Delay (d_2), s/veh		1.6	0.1		0.0	0.1	6.3	5.1		6.9	2.6	0.1
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh		28.9	24.2		23.7	23.9	40.3	16.5		40.5	12.3	6.5
Level of Service (LOS)		C	C		C	C	D	B		D	B	A
Approach Delay, s/veh / LOS	27.9	C		23.8	C		17.3	B		13.5	B	
Intersection Delay, s/veh / LOS	17.8						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.2	B	2.2	B
Bicycle LOS Score / LOS	1.0	A	0.6	A	1.8	A	1.7	A

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	61	79	103	8	7	97
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	68	88	114	9	8	108

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	123	0	-	0	342	119
Stage 1	-	-	-	-	119	-
Stage 2	-	-	-	-	223	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1464	-	-	-	654	933
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	814	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1464	-	-	-	622	933
Mov Cap-2 Maneuver	-	-	-	-	622	-
Stage 1	-	-	-	-	906	-
Stage 2	-	-	-	-	774	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1464	-	-	-	903
HCM Lane V/C Ratio	0.046	-	-	-	0.128
HCM Control Delay (s)	7.6	0	-	-	9.6
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	12	31	43	13	26	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	120	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	34	48	14	29	17

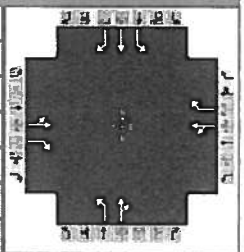
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	147	37	46	0	-	0
Stage 1	37	-	-	-	-	-
Stage 2	110	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	845	1035	1562	-	-	-
Stage 1	985	-	-	-	-	-
Stage 2	915	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	819	1035	1562	-	-	-
Mov Cap-2 Maneuver	819	-	-	-	-	-
Stage 1	985	-	-	-	-	-
Stage 2	887	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.9	5.7	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1562	-	819	1035	-	-
HCM Lane V/C Ratio	0.031	-	0.016	0.033	-	-
HCM Control Delay (s)	7.4	-	9.5	8.6	-	-
HCM Lane LOS	A	-	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	0.1	-	-

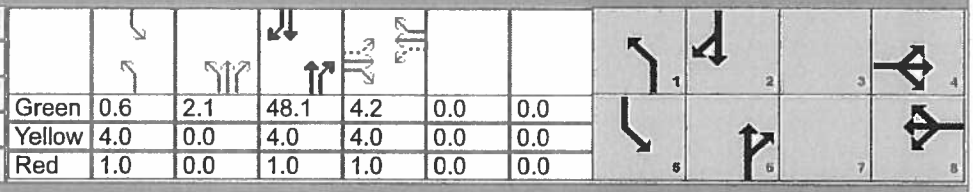
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	LSC			Duration, h	0.25
Analyst	JHB	Analysis Date	Apr 16, 2015	Area Type	Other
Jurisdiction	Caltrans/Placer County	Time Period	Winter PM	PHF	0.92
Intersection	267/Airport/Shaffer Mill	Analysis Year	2015	Analysis Period	1> 7:00
File Name	267 Airport Winter HCS.xus				
Project Description	Clear Capital TIA - Existing Without Project				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	58	2	12	5	2	18	49	1093	15	8	530	51

Signal Information			
Cycle, s	70.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	0.6	2.1	48.1	4.2	0.0	0.0
Yellow	4.0	0.0	4.0	4.0	0.0	0.0
Red	1.0	0.0	1.0	1.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	1	6	5	2
Case Number		7.0		7.0	2.0	4.0	2.0	3.0
Phase Duration, s		9.2		9.2	7.7	55.2	5.6	53.1
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		4.4		4.4	3.8	0.0	3.8	0.0
Queue Clearance Time (g_s), s		5.1		2.4	4.1		2.3	
Green Extension Time (g_e), s		0.1		0.2	0.1	0.0	0.0	0.0
Phase Call Probability		0.80		0.80	0.64		0.16	
Max Out Probability		0.01		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		65	2		8	9	53	1193		9	576	45
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1448	1579		1758	1579	1774	1861		1774	1863	1579
Queue Service Time (g_s), s		2.8	0.1		0.0	0.4	2.1	35.4		0.3	9.8	0.6
Cycle Queue Clearance Time (g_c), s		3.1	0.1		0.3	0.4	2.1	35.4		0.3	9.8	0.6
Green Ratio (*g/C*)		0.06	0.06		0.06	0.06	0.04	0.72		0.01	0.69	0.69
Capacity (*c*), veh/h		188	95		194	95	68	1334		16	1280	1085
Volume-to-Capacity Ratio (*X*)		0.347	0.023		0.039	0.092	0.786	0.895		0.551	0.450	0.041
Available Capacity (c_a), veh/h		407	338		427	338	375	1334		375	1280	1085
Back of Queue (*Q*), veh/ln (95th percentile)		2.0	0.1		0.2	0.3	1.7	13.4		0.3	3.8	0.2
Queue Storage Ratio (*RQ*) (95th percentile)		0.00	0.01		0.00	0.03	0.14	0.00		0.05	0.00	0.03

Uniform Delay (d_1), s/veh		32.3	31.0		31.0	31.1	33.4	7.8		34.5	5.0	3.5
Incremental Delay (d_2), s/veh		0.4	0.0		0.0	0.2	7.3	9.5		10.7	1.1	0.1
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh		32.7	31.0		31.1	31.2	40.7	17.4		45.2	6.1	3.6
Level of Service (LOS)		C	C		C	C	D	B		D	A	A
Approach Delay, s/veh / LOS	32.7	C		31.2	C		18.4	B		6.5	A	
Intersection Delay, s/veh / LOS	15.1						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.2	B	2.2	B
Bicycle LOS Score / LOS	0.6	A	0.5	A	2.5	B	1.5	A

HCM 2010 Signalized Intersection Summary
13: SR 267 & Brockway Rd/Soaring Way

8/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	114	53	286	8	104	129	326	729	9	93	382	129
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	121	56	304	9	111	137	347	776	10	99	406	137
Adj No. of Lanes	0	1	1	0	1	0	1	1	0	1	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	283	113	725	68	180	212	395	869	11	126	601	510
Arrive On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.22	0.47	0.47	0.07	0.32	0.32
Sat Flow, veh/h	768	479	1583	22	766	899	1774	1835	24	1774	1863	1583
Grp Volume(v), veh/h	177	0	304	257	0	0	347	0	786	99	406	137
Grp Sat Flow(s),veh/h/ln	1247	0	1583	1686	0	0	1774	0	1859	1774	1863	1583
Q Serve(g_s), s	0.0	0.0	7.6	0.0	0.0	0.0	11.2	0.0	22.8	3.2	11.2	3.8
Cycle Q Clear(g_c), s	7.7	0.0	7.6	8.0	0.0	0.0	11.2	0.0	22.8	3.2	11.2	3.8
Prop In Lane	0.68		1.00	0.04		0.53	1.00		0.01	1.00		1.00
Lane Grp Cap(c), veh/h	396	0	725	460	0	0	395	0	880	126	601	510
V/C Ratio(X)	0.45	0.00	0.42	0.56	0.00	0.00	0.88	0.00	0.89	0.78	0.68	0.27
Avail Cap(c_a), veh/h	702	0	1101	854	0	0	405	0	1052	165	802	682
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	20.0	0.0	10.8	20.4	0.0	0.0	22.2	0.0	14.2	27.0	17.4	14.9
Incr Delay (d2), s/veh	1.1	0.0	0.6	0.4	0.0	0.0	18.3	0.0	7.9	12.1	0.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	4.8	0.0	6.1	6.9	0.0	0.0	12.0	0.0	19.5	3.6	9.8	3.0
LnGrp Delay(d),s/veh	21.1	0.0	11.3	20.8	0.0	0.0	40.6	0.0	22.1	39.2	18.0	15.0
LnGrp LOS	C		B	C			D		C	D	B	B
Approach Vol, veh/h		481			257			1133			642	
Approach Delay, s/veh		14.9			20.8			27.7			20.6	
Approach LOS		B			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	16.7	25.1		17.4	7.7	34.0		17.4
Change Period (Y+Rc), s	3.5	6.0		3.5	3.5	6.0		3.5
Max Green Setting (Gmax), s	13.5	25.5		28.0	5.5	33.5		28.0
Max Q Clear Time (g_c+I1), s	13.2	13.2		10.0	5.2	24.8		9.7
Green Ext Time (p_c), s	0.0	3.8		3.9	0.0	3.2		3.9

Intersection Summary	
HCM 2010 Ctrl Delay	22.7
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	61	94	144	8	7	97
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	68	104	160	9	8	108

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	169	0	-	0	404	164
Stage 1	-	-	-	-	164	-
Stage 2	-	-	-	-	240	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1409	-	-	-	603	881
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	800	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1409	-	-	-	572	881
Mov Cap-2 Maneuver	-	-	-	-	572	-
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	759	-

Approach	EB	WB	SB
HCM Control Delay, s	3	0	9.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1409	-	-	-	850
HCM Lane V/C Ratio	0.048	-	-	-	0.136
HCM Control Delay (s)	7.7	0	-	-	9.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.2	-	-	-	0.5

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	27	31	43	32	84	56
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	120	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	30	34	48	36	93	62

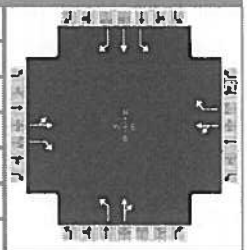
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	255	124	156	0	-	0
Stage 1	124	-	-	-	-	-
Stage 2	131	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	734	927	1424	-	-	-
Stage 1	902	-	-	-	-	-
Stage 2	895	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	709	927	1424	-	-	-
Mov Cap-2 Maneuver	709	-	-	-	-	-
Stage 1	902	-	-	-	-	-
Stage 2	865	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.6	4.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1424	-	709	927	-	-
HCM Lane V/C Ratio	0.034	-	0.042	0.037	-	-
HCM Control Delay (s)	7.6	-	10.3	9	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.1	0.1	-	-

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	LSC			Duration, h	0.25
Analyst	JHB	Analysis Date	Apr 16, 2015	Area Type	Other
Jurisdiction	Caltrans/Placer County	Time Period	Summer PM	PHF	0.92
Intersection	267/Airport/Shaffer Mill	Analysis Year	2015	Analysis Period	1> 7:00
File Name	267Airport +P.xus				
Project Description	Truckee Airport TIA - Existing With Project				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	204	11	68	49	7	94	23	716	33	50	603	49

Signal Information			
Cycle, s	70.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	1.5	1.2	39.3	13.0	0.0	0.0	
Yellow	4.0	0.0	4.0	4.0	0.0	0.0	
Red	1.0	0.0	1.0	1.0	0.0	0.0	

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	1	6	5	2
Case Number		7.0		7.0	2.0	4.0	2.0	3.0
Phase Duration, s		18.0		18.0	6.5	44.3	7.7	45.5
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		4.5		4.5	3.8	0.0	3.8	0.0
Queue Clearance Time (g_s), s		12.5		5.5	3.0		4.1	
Green Extension Time (g_e), s		0.5		1.4	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	0.38		0.65	
Max Out Probability		1.00		0.16	1.00		1.00	

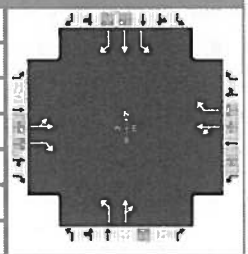
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		234	63		61	91	25	803		54	655	42
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1488	1579		1715	1579	1774	1852		1774	1863	1579
Queue Service Time (g_s), s		8.5	2.4		0.0	3.5	1.0	23.5		2.1	16.0	0.8
Cycle Queue Clearance Time (g_c), s		10.5	2.4		2.0	3.5	1.0	23.5		2.1	16.0	0.8
Green Ratio (*g/C*)		0.19	0.19		0.19	0.19	0.02	0.56		0.04	0.58	0.58
Capacity (*c*), veh/h		377	293		415	293	39	1040		68	1077	912
Volume-to-Capacity Ratio (*X*)		0.621	0.215		0.147	0.312	0.641	0.772		0.794	0.609	0.046
Available Capacity (c_a), veh/h		417	338		456	338	152	1040		152	1077	912
Back of Queue (*Q*), veh/ln (95th percentile)		6.8	1.6		1.5	2.3	0.8	12.7		1.7	8.7	0.4
Queue Storage Ratio (*RQ*) (95th percentile)		0.00	0.22		0.00	0.30	0.07	0.00		0.28	0.00	0.05

Uniform Delay (d_1), s/veh		27.2	24.2		24.0	24.6	34.0	11.9		33.4	9.6	6.4
Incremental Delay (d_2), s/veh		1.5	0.1		0.1	0.2	6.3	5.6		7.5	2.6	0.1
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh		28.7	24.3		24.1	24.9	40.3	17.5		40.9	12.2	6.5
Level of Service (LOS)		C	C		C	C	D	B		D	B	A
Approach Delay, s/veh / LOS	27.8	C		24.5	C		18.1	B		13.9	B	
Intersection Delay, s/veh / LOS	18.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.2	B	2.2	B
Bicycle LOS Score / LOS	1.0	A	0.7	A	1.9	A	1.7	A

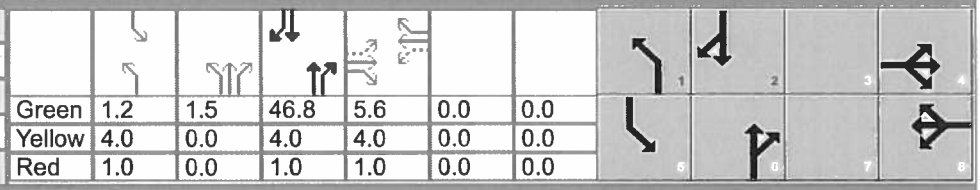
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	LSC			Duration, h	0.25
Analyst	JHB	Analysis Date	Aug 27, 2015	Area Type	Other
Jurisdiction	Caltrans/Placer County	Time Period	Winter PM	PHF	0.92
Intersection	267/Airport/Shaffer Mill	Analysis Year	2015	Analysis Period	1> 7:00
File Name	267Airport Winter +P.xus				
Project Description	Truckee Airport TIA - Existing With Project				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	58	2	12	35	4	80	49	1093	20	17	530	51

Signal Information			
Cycle, s	70.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	1.2	1.5		46.8	5.6	0.0	0.0					
Yellow	4.0	0.0		4.0	4.0	0.0	0.0					
Red	1.0	0.0		1.0	1.0	0.0	0.0					

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	1	6	5	2
Case Number		7.0		7.0	2.0	4.0	2.0	3.0
Phase Duration, s		10.6		10.6	7.7	53.2	6.2	51.8
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		4.5		4.5	3.8	0.0	3.8	0.0
Queue Clearance Time (g_s), s		4.6		5.3	4.1		2.7	
Green Extension Time (g_e), s		0.5		0.5	0.1	0.0	0.0	0.0
Phase Call Probability		0.97		0.97	0.64		0.30	
Max Out Probability		0.02		0.03	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		65	2		42	76	53	1199		18	576	45
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1539	1579		1629	1579	1774	1860		1774	1863	1579
Queue Service Time (g_s), s		1.1	0.1		0.0	3.3	2.1	39.5		0.7	10.4	0.7
Cycle Queue Clearance Time (g_c), s		2.6	0.1		1.5	3.3	2.1	39.5		0.7	10.4	0.7
Green Ratio (*g/C*)		0.08	0.08		0.08	0.08	0.04	0.69		0.02	0.67	0.67
Capacity (*c*), veh/h		224	126		227	126	68	1281		31	1244	1054
Volume-to-Capacity Ratio (*X*)		0.292	0.017		0.187	0.605	0.787	0.936		0.604	0.463	0.042
Available Capacity (c_a), veh/h		415	338		422	338	340	1281		340	1244	1054
Back of Queue (*Q*), veh/ln (95th percentile)		1.9	0.1		1.2	2.3	1.7	17.5		0.6	4.4	0.2
Queue Storage Ratio (*RQ*) (95th percentile)		0.00	0.01		0.00	0.29	0.14	0.00		0.10	0.00	0.03

Uniform Delay (d_1), s/veh		30.8	29.7		30.3	31.2	33.4	9.5		34.2	5.6	4.0
Incremental Delay (d_2), s/veh		0.3	0.0		0.1	1.7	7.3	13.9		6.9	1.2	0.1
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh		31.0	29.7		30.5	32.9	40.7	23.4		41.1	6.8	4.0
Level of Service (LOS)		C	C		C	C	D	C		D	A	A
Approach Delay, s/veh / LOS	31.0	C		32.0	C		24.1	C		7.6	A	
Intersection Delay, s/veh / LOS	19.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.2	B	2.2	B
Bicycle LOS Score / LOS	0.6	A	0.7	A	2.6	B	1.5	A

HCM 2010 Signalized Intersection Summary
13: SR 267 & Brockway Rd/Soaring Way

8/27/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	196	191	451	174	248	407	408	679	195	306	456	188
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	209	203	480	185	264	433	434	722	207	326	485	200
Adj No. of Lanes	0	1	1	0	1	0	1	1	0	1	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	197	154	973	31	9	9	234	448	128	184	546	464
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.13	0.32	0.32	0.10	0.29	0.29
Sat Flow, veh/h	328	318	1583	0	19	18	1774	1393	399	1774	1863	1583
Grp Volume(v), veh/h	412	0	480	882	0	0	434	0	929	326	485	200
Grp Sat Flow(s),veh/h/ln	646	0	1583	37	0	0	1774	0	1792	1774	1863	1583
Q Serve(g_s), s	0.0	0.0	23.5	0.0	0.0	0.0	18.5	0.0	45.0	14.5	34.9	14.3
Cycle Q Clear(g_c), s	67.5	0.0	23.5	67.5	0.0	0.0	18.5	0.0	45.0	14.5	34.9	14.3
Prop In Lane	0.51		1.00	0.21		0.49	1.00		0.22	1.00		1.00
Lane Grp Cap(c), veh/h	350	0	973	49	0	0	234	0	576	184	546	464
V/C Ratio(X)	1.18	0.00	0.49	18.08	0.00	0.00	1.85	0.00	1.61	1.77	0.89	0.43
Avail Cap(c_a), veh/h	350	0	973	49	0	0	234	0	576	184	546	464
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.0	0.0	14.9	45.8	0.0	0.0	60.8	0.0	47.5	62.8	47.3	40.1
Incr Delay (d2), s/veh	105.0	0.0	0.6	7723.4	0.0	0.0	399.1	0.0	283.7	369.6	16.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	42.7	0.0	15.7	191.8	0.0	0.0	63.1	0.0	121.7	46.7	27.7	10.4
LnGrp Delay(d),s/veh	145.0	0.0	15.5	7769.2	0.0	0.0	459.9	0.0	331.2	432.3	63.3	40.3
LnGrp LOS	F		B	F			F		F	F	E	D
Approach Vol, veh/h		892			882			1363			1011	
Approach Delay, s/veh		75.3			7769.2			372.1			177.7	
Approach LOS		E			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	22.0	47.0		71.0	18.0	51.0		71.0
Change Period (Y+Rc), s	3.5	6.0		3.5	3.5	6.0		3.5
Max Green Setting (Gmax), s	18.5	41.0		67.5	14.5	45.0		67.5
Max Q Clear Time (g_c+I1), s	20.5	36.9		69.5	16.5	47.0		69.5
Green Ext Time (p_c), s	0.0	2.4		0.0	0.0	0.0		0.0

Intersection Summary		
HCM 2010 Ctrl Delay	1833.8	
HCM 2010 LOS	F	

Intersection	
Intersection Delay, s/veh	10.2
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	769	302	559	135
Demand Flow Rate, veh/h	784	308	570	137
Vehicles Circulating, veh/h	39	626	255	842
Vehicles Exiting, veh/h	940	199	568	92
Follow-Up Headway, s	2.800	2.800	2.800	2.800
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	10.9	9.5	10.2	7.9
Approach LOS	B	A	B	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	4.200	4.200	4.200	4.200
Entry Flow, veh/h	784	308	570	137
Cap Entry Lane, veh/h	1247	790	1054	668
Entry HV Adj Factor	0.980	0.982	0.980	0.983
Flow Entry, veh/h	769	302	559	135
Cap Entry, veh/h	1223	776	1034	657
V/C Ratio	0.629	0.390	0.541	0.205
Control Delay, s/veh	10.9	9.5	10.2	7.9
LOS	B	A	B	A
95th %tile Queue, veh	5	2	3	1

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	32	62	78	36	93	61
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	120	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	36	69	87	40	103	68

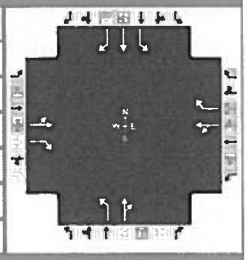
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	350	137	171	0	-	0
Stage 1	137	-	-	-	-	-
Stage 2	213	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	647	911	1406	-	-	-
Stage 1	890	-	-	-	-	-
Stage 2	823	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	607	911	1406	-	-	-
Mov Cap-2 Maneuver	607	-	-	-	-	-
Stage 1	890	-	-	-	-	-
Stage 2	772	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10	5.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1406	-	607	911	-	-
HCM Lane V/C Ratio	0.062	-	0.059	0.076	-	-
HCM Control Delay (s)	7.7	-	11.3	9.3	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.2	0.2	-	-

HCS 2010 Signalized Intersection Results Summary

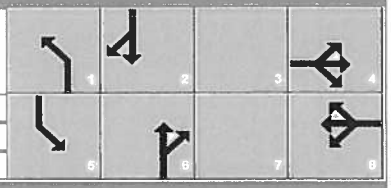
General Information				Intersection Information	
Agency	LSC			Duration, h	0.25
Analyst	JHB	Analysis Date	Aug 27, 2015	Area Type	Other
Jurisdiction	Caltrans/Placer County	Time Period	Summer PM	PHF	0.92
Intersection	267/Airport/Shaffer Mill	Analysis Year	2015	Analysis Period	1> 7:00
File Name	267Airport EAP+P.xus				
Project Description	Existing With Approved Projects With Project				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	226	29	216	86	22	95	38	910	62	51	868	189

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	2.6	1.0	51.8	19.6	0.0	0.0	
Yellow	4.0	0.0	4.0	4.0	0.0	0.0	
Red	1.0	0.0	1.0	1.0	0.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	1	6	5	2
Case Number		7.0		7.0	2.0	4.0	2.0	3.0
Phase Duration, s		24.6		24.6	7.6	56.8	8.6	57.7
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		4.6		4.6	3.8	0.0	3.8	0.0
Queue Clearance Time (g_s), s		18.5		7.2	4.1		4.8	
Green Extension Time (g_e), s		1.2		2.8	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	0.64		0.75	
Max Out Probability		1.00		0.09	1.00		1.00	

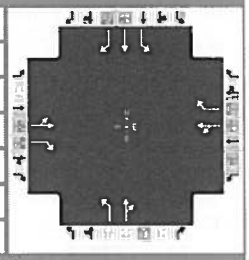
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		277	224		117	92	41	1046		55	943	195
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1454	1579		1656	1579	1774	1845		1774	1863	1579
Queue Service Time (g_s), s		11.3	11.6		0.0	4.4	2.1	50.0		2.8	38.3	5.2
Cycle Queue Clearance Time (g_c), s		16.5	11.6		5.2	4.4	2.1	50.0		2.8	38.3	5.2
Green Ratio (*g/C*)		0.22	0.22		0.22	0.22	0.03	0.58		0.04	0.59	0.59
Capacity (*c*), veh/h		393	345		433	345	52	1061		71	1091	925
Volume-to-Capacity Ratio (*X*)		0.705	0.650		0.271	0.268	0.795	0.986		0.782	0.865	0.210
Available Capacity (c_a), veh/h		430	386		471	386	125	1061		125	1091	925
Back of Queue (*Q*), veh/ln (95th percentile)		10.2	8.1		3.9	3.0	1.8	31.1		2.3	21.2	2.8
Queue Storage Ratio (*RQ*) (95th percentile)		0.00	1.15		0.00	0.38	0.15	0.00		0.37	0.00	0.35

Uniform Delay (d_1), s/veh		33.8	32.0		29.5	29.2	43.4	18.8		42.8	15.6	8.8
Incremental Delay (d_2), s/veh		3.7	2.2		0.1	0.2	9.8	24.4		6.8	9.2	0.5
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh		37.5	34.2		29.6	29.4	53.2	43.2		49.6	24.8	9.3
Level of Service (LOS)		D	C		C	C	D	D		D	C	A
Approach Delay, s/veh / LOS	36.0	D		29.5	C		43.5	D		23.4	C	
Intersection Delay, s/veh / LOS	33.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.3	A	0.8	A	2.3	B	2.5	B

HCS 2010 Signalized Intersection Results Summary

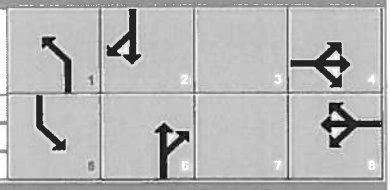
General Information				Intersection Information	
Agency	LSC			Duration, h	0.25
Analyst	JHB	Analysis Date	Aug 27, 2015	Area Type	Other
Jurisdiction	Caltrans/Placer County	Time Period	Winter PM	PHF	0.92
Intersection	267/Airport/Shaffer Mill	Analysis Year	2015	Analysis Period	1> 7:00
File Name	267Airport Winter EAP+P.xus				
Project Description	Existing With Approved Projects With Project				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	80	20	160	72	19	81	64	1287	49	18	795	191

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	1.5	3.0	58.0	12.4	0.0	0.0	
Yellow	4.0	0.0	4.0	4.0	0.0	0.0	
Red	1.0	0.0	1.0	1.0	0.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	1	6	5	2
Case Number		7.0		7.0	2.0	4.0	2.0	3.0
Phase Duration, s		17.4		17.4	9.6	66.0	6.5	63.0
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		4.6		4.6	3.8	0.0	3.8	0.0
Queue Clearance Time (g_s), s		10.9		7.1	5.5		3.0	
Green Extension Time (g_e), s		1.5		1.7	0.1	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	0.82		0.39	
Max Out Probability		0.09		0.02	0.01		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	1	6	16	5	2	12
Adjusted Flow Rate (*v*), veh/h		109	163		99	77	70	1441		20	864	197
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1519	1579		1527	1579	1774	1853		1774	1863	1579
Queue Service Time (g_s), s		0.6	8.9		0.0	4.0	3.5	61.0		1.0	27.7	4.6
Cycle Queue Clearance Time (g_c), s		5.7	8.9		5.1	4.0	3.5	61.0		1.0	27.7	4.6
Green Ratio (*g/C*)		0.14	0.14		0.14	0.14	0.05	0.68		0.02	0.64	0.64
Capacity (*c*), veh/h		282	218		283	218	90	1256		31	1200	1017
Volume-to-Capacity Ratio (*X*)		0.386	0.748		0.350	0.354	0.770	1.147		0.641	0.720	0.193
Available Capacity (c_a), veh/h		437	386		438	386	267	1256		267	1200	1017
Back of Queue (*Q*), veh/ln (95th percentile)		4.0	6.4		3.6	2.8	2.8	59.4		0.9	14.1	2.2
Queue Storage Ratio (*RQ*) (95th percentile)		0.00	0.90		0.00	0.35	0.24	0.00		0.14	0.00	0.28

Uniform Delay (d_1), s/veh		35.8	37.3		35.6	35.1	42.2	14.5		44.0	10.6	6.5
Incremental Delay (d_2), s/veh		0.3	1.9		0.3	0.4	5.1	76.0		8.1	3.7	0.4
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh		36.1	39.2		35.9	35.5	47.3	90.5		52.0	14.4	6.9
Level of Service (LOS)		D	D		D	D	D	F		D	B	A
Approach Delay, s/veh / LOS	38.0	D		35.7	D		88.5	F		13.7	B	
Intersection Delay, s/veh / LOS	54.3						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.2	B	2.2	B
Bicycle LOS Score / LOS	0.9	A	0.8	A	3.0	C	2.3	B

Future LOS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	252	225	409	127	281	414	468	989	146	316	685	234
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	265	237	431	134	296	436	493	1041	154	333	721	246
Adj No. of Lanes	0	1	1	0	1	0	1	1	0	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	161	109	939	30	22	23	234	555	82	171	585	498
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.13	0.35	0.35	0.10	0.31	0.31
Sat Flow, veh/h	265	237	1583	0	49	49	1774	1587	235	1774	1863	1583
Grp Volume(v), veh/h	502	0	431	866	0	0	493	0	1195	333	721	246
Grp Sat Flow(s),veh/h/ln	501	0	1583	98	0	0	1774	0	1821	1774	1863	1583
Q Serve(g_s), s	0.0	0.0	21.3	0.0	0.0	0.0	18.5	0.0	49.0	13.5	44.0	17.7
Cycle Q Clear(g_c), s	64.5	0.0	21.3	64.5	0.0	0.0	18.5	0.0	49.0	13.5	44.0	17.7
Prop In Lane	0.53		1.00	0.15		0.50	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	270	0	939	75	0	0	234	0	637	171	585	498
V/C Ratio(X)	1.86	0.00	0.46	11.59	0.00	0.00	2.10	0.00	1.87	1.95	1.23	0.49
Avail Cap(c_a), veh/h	270	0	939	75	0	0	234	0	637	171	585	498
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.4	0.0	15.9	37.4	0.0	0.0	60.8	0.0	45.5	63.2	48.0	39.0
Incr Delay (d2), s/veh	399.8	0.0	0.5	4792.9	0.0	0.0	510.6	0.0	399.5	446.6	118.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	72.8	0.0	14.4	182.2	0.0	0.0	76.1	0.0	171.6	50.1	75.4	12.3
LnGrp Delay(d),s/veh	442.3	0.0	16.4	4830.3	0.0	0.0	571.3	0.0	445.0	509.9	166.6	39.3
LnGrp LOS	F		B	F			F		F	F	F	D
Approach Vol, veh/h		933			866			1688			1300	
Approach Delay, s/veh		245.6			4830.3			481.9			230.4	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	22.0	50.0		68.0	17.0	55.0		68.0
Change Period (Y+Rc), s	3.5	6.0		3.5	3.5	6.0		3.5
Max Green Setting (Gmax), s	18.5	44.0		64.5	13.5	49.0		64.5
Max Q Clear Time (g_c+I1), s	20.5	46.0		66.5	15.5	51.0		66.5
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	0.0		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		1154.2
HCM 2010 LOS		F

Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	724	256	520	140
Demand Flow Rate, veh/h	738	261	530	143
Vehicles Circulating, veh/h	24	590	238	764
Vehicles Exiting, veh/h	883	178	524	87
Follow-Up Headway, s	2.800	2.800	2.800	2.800
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.8	8.2	9.2	7.5
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	4.200	4.200	4.200	4.200
Entry Flow, veh/h	738	261	530	143
Cap Entry Lane, veh/h	1262	813	1068	710
Entry HV Adj Factor	0.981	0.982	0.981	0.979
Flow Entry, veh/h	724	256	520	140
Cap Entry, veh/h	1238	798	1048	695
V/C Ratio	0.585	0.321	0.496	0.201
Control Delay, s/veh	9.8	8.2	9.2	7.5
LOS	A	A	A	A
95th %tile Queue, veh	4	1	3	1

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	28	38	88	30	80	56
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	120	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	29	40	93	32	84	59

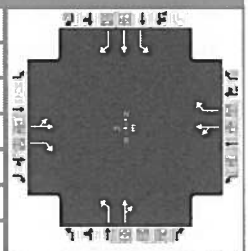
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	331	114	143	0	-	0
Stage 1	114	-	-	-	-	-
Stage 2	217	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	664	939	1440	-	-	-
Stage 1	911	-	-	-	-	-
Stage 2	819	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	621	939	1440	-	-	-
Mov Cap-2 Maneuver	621	-	-	-	-	-
Stage 1	911	-	-	-	-	-
Stage 2	766	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.9	5.7	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1440	-	621	939	-	-
HCM Lane V/C Ratio	0.064	-	0.047	0.043	-	-
HCM Control Delay (s)	7.7	-	11.1	9	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.1	-	-

HCS 2010 Signalized Intersection Results Summary

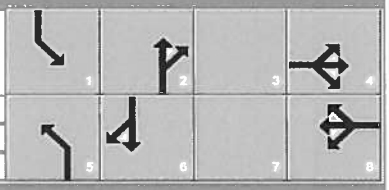
General Information				Intersection Information	
Agency	LSC			Duration, h	0.25
Analyst	JHB	Analysis Date	Aug 27, 2015	Area Type	Other
Jurisdiction	Caltrans/Placer County	Time Period	Summer PM	PHF	0.95
Intersection	267/Airport/Shaffer Mill	Analysis Year	2035	Analysis Period	1> 7:00
File Name	267Airport Future +P.xus				
Project Description	Truckee Airport TIA - Future With Project				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	364	20	84	55	13	99	38	1060	40	94	931	194

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	3.5	1.5	67.0	33.0	0.0	0.0	
Yellow	4.0	0.0	4.0	4.0	0.0	0.0	
Red	1.0	0.0	1.0	1.0	0.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		7.0	2.0	4.0	2.0	3.0
Phase Duration, s		38.0		38.0	8.5	72.0	10.0	73.5
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		4.5		4.5	3.8	0.0	3.8	0.0
Queue Clearance Time (g_s), s		35.0		7.5	4.7		7.0	
Green Extension Time (g_e), s		0.0		2.9	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	0.74		0.96	
Max Out Probability		1.00		0.00	1.00		1.00	

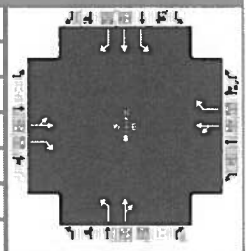
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		404	78		72	94	40	1147		99	980	194
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1433	1579		1785	1579	1774	1854		1774	1863	1579
Queue Service Time (g_s), s		29.4	4.5		0.0	5.5	2.7	67.0		5.0	57.1	7.2
Cycle Queue Clearance Time (g_c), s		33.0	4.5		3.6	5.5	2.7	67.0		5.0	57.1	7.2
Green Ratio (*g/C*)		0.28	0.28		0.28	0.28	0.03	0.56		0.04	0.57	0.57
Capacity (*c*), veh/h		453	434		545	434	51	1035		74	1064	902
Volume-to-Capacity Ratio (*X*)		0.893	0.179		0.131	0.216	0.783	1.109		1.339	0.921	0.215
Available Capacity (c_a), veh/h		453	434		545	434	74	1035		74	1064	902
Back of Queue (*Q*), veh/ln (95th percentile)		20.6	3.2		2.9	0.0	2.5	58.6		11.7	33.7	4.3
Queue Storage Ratio (*RQ*) (95th percentile)		0.00	0.45		0.00	0.00	0.21	0.00		1.85	0.00	0.55

Uniform Delay (d_1), s/veh		43.7	33.2		32.8	33.5	57.9	26.5		57.5	23.3	12.6
Incremental Delay (d_2), s/veh		19.1	0.1		0.0	0.1	16.9	62.7		219.3	14.1	0.5
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh		62.8	33.2		32.9	33.6	74.8	89.2		276.8	37.4	13.1
Level of Service (LOS)		E	C		C	C	E	F		F	D	B
Approach Delay, s/veh / LOS	58.0	E		33.3	C		88.7	F		52.3	D	
Intersection Delay, s/veh / LOS	66.1						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.3	A	0.8	A	2.4	B	2.6	B

HCS 2010 Signalized Intersection Results Summary

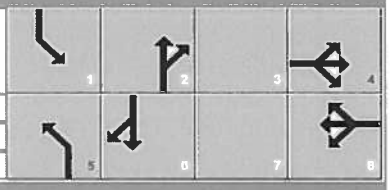
General Information				Intersection Information	
Agency	LSC			Duration, h	0.25
Analyst	JHB	Analysis Date	Apr 16, 2015	Area Type	Other
Jurisdiction	Caltrans/Placer County	Time Period	Winter PM	PHF	0.95
Intersection	267/Airport/Shaffer Mill	Analysis Year	2035	Analysis Period	1> 7:00
File Name	267Airport Winter Future +P.xus				
Project Description	Truckee Airport TIA - Future With Project				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	103	2	15	35	4	80	81	1618	20	25	818	202

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	2.3	0.1	86.2	11.4	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	1.0	1.0	1.0	1.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		7.0	2.0	4.0	2.0	3.0
Phase Duration, s		16.4		16.4	12.4	96.3	7.3	91.2
Change Period, (Y+R_c), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		4.5		4.5	3.8	0.0	3.8	0.0
Queue Clearance Time (g_s), s		10.5		7.3	7.7		3.8	
Green Extension Time (g_e), s		0.9		0.9	0.2	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	0.94		0.58	
Max Out Probability		0.00		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		111	5		41	74	85	1714		26	861	202
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1493	1579		1734	1579	1774	1861		1774	1863	1579
Queue Service Time (g_s), s		6.0	0.4		0.0	5.3	5.7	91.3		1.8	29.1	5.0
Cycle Queue Clearance Time (g_c), s		8.5	0.4		2.5	5.3	5.7	91.3		1.8	29.1	5.0
Green Ratio (g/C)		0.09	0.09		0.09	0.09	0.06	0.76		0.02	0.72	0.72
Capacity (*c*), veh/h		201	150		222	150	109	1415		35	1338	1134
Volume-to-Capacity Ratio (X)		0.549	0.035		0.185	0.491	0.779	1.211		0.762	0.644	0.178
Available Capacity (c_a), veh/h		456	434		482	434	393	1415		393	1338	1134
Back of Queue (*Q*), veh/ln (95th percentile)		6.0	0.3		2.1	0.1	4.6	90.2		1.6	14.6	2.4
Queue Storage Ratio (*RQ*) (95th percentile)		0.00	0.04		0.00	0.01	0.39	0.00		0.25	0.00	0.31

Uniform Delay (d_1), s/veh		52.8	49.3		50.3	51.5	55.5	14.4		58.6	8.9	5.5
Incremental Delay (d_2), s/veh		0.9	0.0		0.1	0.9	4.5	101.8		12.0	2.4	0.3
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh		53.7	49.3		50.4	52.5	60.0	116.1		70.6	11.2	5.8
Level of Service (LOS)		D	D		D	D	E	F		E	B	A
Approach Delay, s/veh / LOS	53.5	D		51.7	D		113.5	F		11.7	B	
Intersection Delay, s/veh / LOS	73.4						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.2	B	2.2	B
Bicycle LOS Score / LOS	0.7	A	0.7	A	3.5	C	2.3	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	252	218	403	127	261	393	448	968	146	308	679	234
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1863	1863	1900	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	265	229	424	134	275	414	472	1019	154	324	715	246
Adj No. of Lanes	0	1	1	0	1	0	1	1	0	1	1	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	165	108	927	30	22	22	234	565	85	171	599	509
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.13	0.36	0.36	0.10	0.32	0.32
Sat Flow, veh/h	276	239	1583	0	48	49	1774	1582	239	1774	1863	1583
Grp Volume(v), veh/h	494	0	424	823	0	0	472	0	1173	324	715	246
Grp Sat Flow(s),veh/h/ln	515	0	1583	97	0	0	1774	0	1821	1774	1863	1583
Q Serve(g_s), s	0.0	0.0	21.2	0.0	0.0	0.0	18.5	0.0	50.0	13.5	45.0	17.5
Cycle Q Clear(g_c), s	63.5	0.0	21.2	63.5	0.0	0.0	18.5	0.0	50.0	13.5	45.0	17.5
Prop In Lane	0.54		1.00	0.16		0.50	1.00		0.13	1.00		1.00
Lane Grp Cap(c), veh/h	273	0	927	74	0	0	234	0	650	171	599	509
V/C Ratio(X)	1.81	0.00	0.46	11.15	0.00	0.00	2.01	0.00	1.80	1.89	1.19	0.48
Avail Cap(c_a), veh/h	273	0	927	74	0	0	234	0	650	171	599	509
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.8	0.0	16.4	36.5	0.0	0.0	60.8	0.0	45.0	63.2	47.5	38.2
Incr Delay (d2), s/veh	377.8	0.0	0.5	4592.4	0.0	0.0	470.8	0.0	367.9	423.5	103.1	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	70.6	0.0	14.3	172.6	0.0	0.0	71.5	0.0	164.8	48.1	72.5	12.2
LnGrp Delay(d),s/veh	420.6	0.0	16.9	4628.9	0.0	0.0	531.6	0.0	412.9	486.7	150.6	38.4
LnGrp LOS	F		B	F			F		F	F	F	D
Approach Vol, veh/h		918			823			1645			1285	
Approach Delay, s/veh		234.2			4628.9			447.0			213.8	
Approach LOS		F			F			F			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	22.0	51.0		67.0	17.0	56.0		67.0
Change Period (Y+Rc), s	3.5	6.0		3.5	3.5	6.0		3.5
Max Green Setting (Gmax), s	18.5	45.0		63.5	13.5	50.0		63.5
Max Q Clear Time (g_c+I1), s	20.5	47.0		65.5	15.5	52.0		65.5
Green Ext Time (p_c), s	0.0	0.0		0.0	0.0	0.0		0.0

Intersection Summary		
HCM 2010 Ctrl Delay		1077.8
HCM 2010 LOS		F

Intersection	
Intersection Delay, s/veh	8.9
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	708	212	520	140
Demand Flow Rate, veh/h	722	216	530	143
Vehicles Circulating, veh/h	24	590	222	719
Vehicles Exiting, veh/h	838	162	524	87
Follow-Up Headway, s	2.800	2.800	2.800	2.800
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.6	7.5	9.1	7.2
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	4.200	4.200	4.200	4.200
Entry Flow, veh/h	722	216	530	143
Cap Entry Lane, veh/h	1262	813	1082	735
Entry HV Adj Factor	0.981	0.983	0.981	0.979
Flow Entry, veh/h	708	212	520	140
Cap Entry, veh/h	1238	798	1061	719
V/C Ratio	0.572	0.266	0.490	0.195
Control Delay, s/veh	9.6	7.5	9.1	7.2
LOS	A	A	A	A
95th %tile Queue, veh	4	1	3	1

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	13	38	88	11	22	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	120	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	40	93	12	23	16

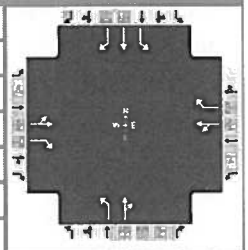
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	228	31	39	0	-	0
Stage 1	31	-	-	-	-	-
Stage 2	197	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	760	1043	1571	-	-	-
Stage 1	992	-	-	-	-	-
Stage 2	836	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	715	1043	1571	-	-	-
Mov Cap-2 Maneuver	715	-	-	-	-	-
Stage 1	992	-	-	-	-	-
Stage 2	787	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9	6.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1571	-	715	1043	-	-
HCM Lane V/C Ratio	0.059	-	0.019	0.038	-	-
HCM Control Delay (s)	7.4	-	10.1	8.6	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	0.1	0.1	-	-

HCS 2010 Signalized Intersection Results Summary

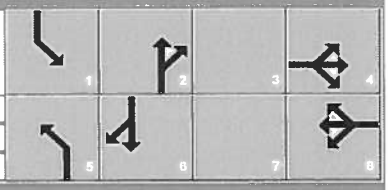
General Information				Intersection Information	
Agency	LSC			Duration, h	0.25
Analyst	JHB	Analysis Date	Aug 27, 2015	Area Type	Other
Jurisdiction	Caltrans/Placer County	Time Period	Summer PM	PHF	0.95
Intersection	267/Airport/Shaffer Mill	Analysis Year	2035	Analysis Period	1> 7:00
File Name	267Airport Future NP.xus				
Project Description	Truckee Airport TIA - Future Without Project				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	364	20	84	39	12	58	38	1060	33	82	931	194

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	3.5	1.5	67.0	33.0	0.0	0.0	
Yellow	4.0	0.0	4.0	4.0	0.0	0.0	
Red	1.0	0.0	1.0	1.0	0.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		7.0	2.0	4.0	2.0	3.0
Phase Duration, s		38.0		38.0	8.5	72.0	10.0	73.5
Change Period, (*Y*+*Rc*), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		4.5		4.5	3.8	0.0	3.8	0.0
Queue Clearance Time (g_s), s		35.0		4.9	4.7		7.0	
Green Extension Time (g_e), s		0.0		2.7	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	0.74		0.94	
Max Out Probability		1.00		0.00	1.00		1.00	

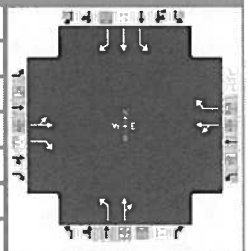
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		404	78		54	51	40	1140		86	980	194
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1435	1579		1789	1579	1774	1856		1774	1863	1579
Queue Service Time (g_s), s		30.3	4.5		0.0	2.9	2.7	67.0		5.0	57.1	7.2
Cycle Queue Clearance Time (g_c), s		33.0	4.5		2.7	2.9	2.7	67.0		5.0	57.1	7.2
Green Ratio (*g*/*C*)		0.28	0.28		0.28	0.28	0.03	0.56		0.04	0.57	0.57
Capacity (*c*), veh/h		453	434		545	434	51	1036		74	1064	902
Volume-to-Capacity Ratio (*X*)		0.892	0.179		0.099	0.116	0.783	1.100		1.168	0.921	0.215
Available Capacity (c_a), veh/h		453	434		545	434	74	1036		74	1064	902
Back of Queue (*Q*), veh/ln (95th percentile)		20.6	3.2		2.1	2.0	2.5	57.2		9.5	33.7	4.3
Queue Storage Ratio (*RQ*) (95th percentile)		0.00	0.45		0.00	0.26	0.21	0.00		1.51	0.00	0.55

Uniform Delay (d_1), s/veh		43.7	33.2		32.5	32.6	57.9	26.5		57.5	23.3	12.6
Incremental Delay (d_2), s/veh		18.9	0.1		0.0	0.0	16.9	59.6		157.0	14.1	0.5
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh		62.6	33.2		32.5	32.6	74.8	86.1		214.5	37.4	13.1
Level of Service (LOS)		E	C		C	C	E	F		F	D	B
Approach Delay, s/veh / LOS	57.8	E		32.6	C		85.7	F		45.8	D	
Intersection Delay, s/veh / LOS	62.8						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.3	B	2.3	B
Bicycle LOS Score / LOS	1.3	A	0.7	A	2.4	B	2.6	B

HCS 2010 Signalized Intersection Results Summary

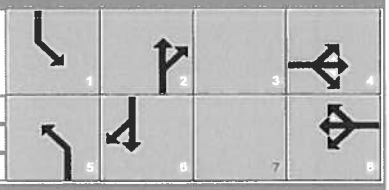
General Information				Intersection Information	
Agency	LSC			Duration, h	0.25
Analyst	JHB	Analysis Date	Apr 16, 2015	Area Type	Other
Jurisdiction	Caltrans/Placer County	Time Period	Winter PM	PHF	0.95
Intersection	267/Airport/Shaffer Mill	Analysis Year	2035	Analysis Period	1> 7:00
File Name	267Airport Winter Future NP.xus				
Project Description	Truckee Airport TIA - Future Without Project				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	103	2	15	5	2	18	81	1618	15	16	818	202

Signal Information			
Cycle, s	120.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	1.7	0.7	86.2	11.4	0.0	0.0	
Yellow	4.0	4.0	4.0	4.0	0.0	0.0	
Red	1.0	1.0	1.0	1.0	0.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2	1	6
Case Number		7.0		7.0	2.0	4.0	2.0	3.0
Phase Duration, s		16.4		16.4	12.4	96.9	6.7	91.2
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0	5.0	5.0
Max Allow Headway (*MAH*), s		4.4		4.4	3.8	0.0	3.8	0.0
Queue Clearance Time (g_s), s		11.1		2.6	7.7		3.1	
Green Extension Time (g_e), s		0.4		0.5	0.2	0.0	0.0	0.0
Phase Call Probability		0.99		0.99	0.94		0.43	
Max Out Probability		0.00		0.00	0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		111	5		7	8	85	1708		17	861	202
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1432	1579		1773	1579	1774	1862		1774	1863	1579
Queue Service Time (g_s), s		8.6	0.4		0.0	0.6	5.7	91.9		1.1	29.0	5.0
Cycle Queue Clearance Time (g_c), s		9.1	0.4		0.4	0.6	5.7	91.9		1.1	29.0	5.0
Green Ratio (*g/C*)		0.09	0.09		0.09	0.09	0.06	0.77		0.01	0.72	0.72
Capacity (*c*), veh/h		195	149		219	149	109	1426		25	1339	1134
Volume-to-Capacity Ratio (*X*)		0.567	0.035		0.034	0.056	0.779	1.198		0.663	0.643	0.178
Available Capacity (c_a), veh/h		450	434		492	434	394	1426		394	1339	1134
Back of Queue (*Q*), veh/ln (95th percentile)		6.0	0.3		0.4	0.4	4.6	86.5		1.0	14.5	2.4
Queue Storage Ratio (*RQ*) (95th percentile)		0.00	0.04		0.00	0.05	0.39	0.00		0.16	0.00	0.31

Uniform Delay (d_1), s/veh		53.2	49.3		49.4	49.4	55.5	14.0		58.9	8.8	5.4
Incremental Delay (d_2), s/veh		1.0	0.0		0.0	0.1	4.5	96.2		10.5	2.4	0.3
Initial Queue Delay (d_3), s/veh		0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh		54.2	49.4		49.4	49.5	60.0	110.2		69.3	11.2	5.8
Level of Service (LOS)		D	D		D	D	E	F		E	B	A
Approach Delay, s/veh / LOS	54.0	D		49.4	D		107.8	F		11.1	B	
Intersection Delay, s/veh / LOS	70.7						E					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.3	B	2.5	B	2.2	B	2.2	B
Bicycle LOS Score / LOS	0.7	A	0.5	A	3.4	C	2.3	B

Appendix C

LOS calculations with intersection mitigation measures

TABLE C1: Truckee Airport Master Plan - SR 267/Brockway Road/Soaring Way - Existing Year Intersection Mitigation

		Traffic Signal Option						Roundabout Option					
Intersection	Movement	# Lanes/ Config	Phasing	Avg. Delay (Sec)	LOS	95th Percentile Queue (vehicles)	95th Percentile Queue (feet)	# Lanes/ Config	Avg. Delay (Sec)	LOS	Vehicle-Hours of Delay	95th Percentile Queue (vehicles)	95th Percentile Queue (feet)
SR 267 / Brockway Road / Soaring Way	NBL	1	Prot	68.1	E	22.3	558	Shared	24.3	C	--	7	175
	NBT	1		53.7	D	32.7	818	2	29.0	D	--	9	
With Approved Projects	NBR	1	Perm	20.7	C	7.1	178	Yield	8.2	A	--	1	25
With Airport Master Plan	SBL	1	Prot	88.0	F	19.3	483	Shared	25.5	D	--	7	175
	SBT	1		36.3	D	19.0	475	2	--	--	--	--	--
	SBR	1	Perm	25.7	C	7.6	190	Shared	29.1	D	--	8	200
	EBL	1	Perm	129.5	F	17.8	445	Shared	--	--	--	--	--
	EBT	1		29.4	C	8.1	203	1	24.4	C	--	6	150
	EBR	1	Overlap	16.3	B	13.8	345	1	29.0	D	--	8	200
	WBL	1	Perm	65.4	E	10.6	265	1	16.9	C	--	2	50
	WBT	1		30.2	C	10.2	255	1	20.6	C	--	4	100
	WBR	1	Overlap	20.2	C	13.7	343	Yield	46.4	E	--	10	250
	Total Intersection	--		46.7	D	--	--	2 Lanes	27.3	D	--	--	--
					MEETS TOWN STANDARD					**MEETS TOWN STANDARD**			

Truckee Airport MasterPlan TIA.xlsx

TABLE C2: Truckee Airport Master Plan - SR 267/Brockway Road/Soaring Way - Future Year Intersection Mitigation

		Traffic Signal Option						Roundabout Option					
Intersection	Movement	# Lanes/ Config	Phasing	Avg. Delay (Sec)	LOS	95th Percentile Queue (vehicles)	95th Percentile Queue (feet)	# Lanes/ Config	Avg. Delay (Sec)	LOS	Vehicle-Hours of Delay	95th Percentile Queue (vehicles)	95th Percentile Queue (feet)
SR 267 / Brockway Road / Soaring Way	NBL	1	Prot	88.2	F	32.0	800	Shared	**77.5**	**F**	**14.3**	19	475
	NBT	2		34.7	C	18.7	468	2	**104.1**	**F**	**21.7**	25	625
Without Project	NBR	1	Perm	22.2	C	5.0	125	Yield	7.5	A	--	1	25
	SBL	1	Prot	63.9	E	15.9	398	Shared	26.9	D	--	7	175
	SBT	2		31.7	C	13.0	325	2	31.0	D	--	9	225
	SBR	1	Perm	28.6	C	9.1	228	Yield	12.5	B	--	2	50
	EBL	1	Perm	128.9	F	21.2	530	Shared	17.8	C	--	3	75
	EBT	1		23.4	C	7.8	195	2	14.0	B	--	2	50
	EBR	1	Overlap	11.1	B	10.1	253	Free	0.0	A	--	1	25
	WBL	1	Perm	32.3	C	5.5	138	Shared	31.2	D	--	4	100
	WBT	1		23.8	C	9.1	228	2	29.5	D	--	4	100
	WBR	1	Overlap	13.7	B	10.7	268	Free	0.0	A	--	1	25
	Total Intersection	--		41.0	D	--	--	2 Lanes	**40.9**	**E**	--	--	--
		MEETS TOWN STANDARD						**DOES NOT MEET TOWN STANDARD**					
SR 267 / Brockway Road / Soaring Way	NBL	1	Prot	76.9	F	34.2	855	Shared	**93.6**	**F**	**17.8**	22	550
	NBT	2		41.8	D	21.5	538	2	**122.4**	**F**	**26.3**	28	700
With Airport Master Plan	NBR	1	Perm	25.2	C	5.7	143	Yield	7.6	A	--	1	25
	SBL	1	Prot	75.3	E	18.2	455	Shared	31.2	D	--	8	200
	SBT	2		42.0	D	15.3	383	2	36.8	E	--	10	250
	SBR	1	Perm	36.0	D	10.4	260	Yield	13.4	B	--	2	50
	EBL	1	Perm	139.7	F	23.0	575	Shared	18.3	C	--	3	75
	EBT	1		24.6	C	8.5	213	2	14.6	B	--	2	50
	EBR	1	Overlap	10.0	A	10.2	255	Free	0.0	A	--	1	25
	WBL	1	Perm	34.1	C	6.0	150	Shared	36.2	E	--	4	100
	WBT	1		25.2	C	10.4	260	2	34.4	D	--	5	125
	WBR	1	Overlap	14.4	B	11.9	298	Free	0.0	A	--	1	25
	Total Intersection	--		44.9	D	--	--	2 Lanes	**48.3**	**E**	--	--	--
		MEETS TOWN STANDARD						**DOES NOT MEET TOWN STANDARD**					

TABLE C3: Truckee Airport Master Plan - SR 267/Airport Road/Schaffer Mill Road - Future Year Intersection Mitigation

		Without Airport Master Plan						With Airport Master Plan					
Intersection	Movement	# Lanes/ Config	Phasing	Avg. Delay (Sec)	LOS	95th Percentile Queue (vehicles)	95th Percentile Queue (feet)	# Lanes/ Config	Phasing	Avg. Delay (Sec)	LOS	95th Percentile Queue (vehicles)	95th Percentile Queue (feet)
SR 267 / Airport Road / Schaffer Mill Road	NBL	1	Prot	39.5	D	1.5	38	1	Prot	45.7	D	1.8	45
	NBT	2		28.8	C	16.9	423	2		32.0	C	18.8	470
Summer Traffic Volumes	NBR	Shared	Perm	28.5	C	17.4	435	Shared	Perm	31.7	C	19.4	485
	SBL	1	Prot	71.0	E	4.9	123	1	Prot	82.5	F	6.4	160
	SBT	2		18.3	B	12.5	313	2		20.0	B	13.6	340
	SBR	1	Perm	14.3	B	4.8	120	1	Perm	15.9	B	5.4	135
	EBL	1	Perm	30.1	C	12.7	318	1	Perm	36.1	D	14.4	360
	EBT	1		16.5	B	2.7	68	1		17.5	B	3.0	75
	EBR	Shared		--	--	--	--	Shared		--	--	--	--
	WBL	1	Perm	18.2	B	1.0	25	1	Perm	19.7	B	1.6	40
	WBT	1		16.1	B	1.8	45	1		17.7	B	3.2	80
	WBR	Shared		--	--	--	--	Shared		--	--	--	--
	Total Intersection	--		25.0	C	--	--	--		28.2	C	--	--
					MEETS COUNTY STANDARD						**MEETS COUNTY STANDARD**		
SR 267 / Airport Road / Schaffer Mill Road	NBL	1	Prot	27.9	C	2.3	58	1	Prot	28.4	C	2.4	60
	NBT	2		16.4	B	16.9	423	2		17.9	B	17.9	448
Winter Traffic Volumes	NBR	Shared	Perm	16.2	B	17.6	440	Shared	Perm	17.8	B	18.5	463
	SBL	1	Prot	30.6	C	0.5	13	1	Prot	29.7	C	0.8	20
	SBT	2		8.1	A	6.9	173	2		8.2	A	6.9	173
	SBR	1	Perm	7.1	A	3.0	75	1	Perm	7.2	A	3.0	75
	EBL	1	Perm	22.5	C	2.7	68	1	Perm	25.0	C	2.8	70
	EBT	1		20.3	C	0.4	10	1		20.4	C	0.4	10
	EBR	Shared		--	--	--	--	Shared		--	--	--	--
	WBL	1	Perm	20.5	C	0.1	3	1	Perm	21.2	C	0.9	23
	WBT	1		20.3	C	0.5	13	1		22.1	C	2.1	53
	WBR	Shared		--	--	--	--	Shared		--	--	--	--
	Total Intersection	--		14.0	B	--	--	--		15.3	B	--	--
					MEETS COUNTY STANDARD						**MEETS COUNTY STANDARD**		

Mitigated LOS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	196	191	451	174	248	407	408	679	195	306	456	188
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	209	203	480	185	264	433	434	722	207	326	485	200
Adj No. of Lanes	1	1	1	1	1	1	1	1	1	1	1	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	195	528	853	220	528	742	453	747	635	329	617	524
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.26	0.40	0.40	0.19	0.33	0.33
Sat Flow, veh/h	745	1863	1583	755	1863	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	209	203	480	185	264	433	434	722	207	326	485	200
Grp Sat Flow(s),veh/h/ln	745	1863	1583	755	1863	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	16.5	8.8	20.0	19.5	11.8	20.0	24.1	37.8	9.0	18.3	23.5	9.7
Cycle Q Clear(g_c), s	28.3	8.8	20.0	28.3	11.8	20.0	24.1	37.8	9.0	18.3	23.5	9.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	195	528	853	220	528	742	453	747	635	329	617	524
V/C Ratio(X)	1.07	0.38	0.56	0.84	0.50	0.58	0.96	0.97	0.33	0.99	0.79	0.38
Avail Cap(c_a), veh/h	195	528	853	220	528	742	453	750	637	329	619	526
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.7	28.8	15.3	42.1	29.9	19.4	36.7	29.2	20.6	40.6	30.2	25.6
Incr Delay (d2), s/veh	84.7	0.7	1.1	23.2	0.3	0.8	31.5	24.5	0.1	47.3	6.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	17.8	8.1	13.8	10.6	10.2	13.7	22.3	32.7	7.1	19.3	19.0	7.6
LnGrp Delay(d),s/veh	129.5	29.4	16.3	65.4	30.2	20.2	68.1	53.7	20.7	88.0	36.3	25.7
LnGrp LOS	F	C	B	E	C	C	E	D	C	F	D	C
Approach Vol, veh/h		892			882			1363			1011	
Approach Delay, s/veh		45.8			32.7			53.3			50.9	
Approach LOS		D			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	29.0	39.1		31.8	22.0	46.1		31.8
Change Period (Y+Rc), s	3.5	6.0		3.5	3.5	6.0		3.5
Max Green Setting (Gmax), s	25.5	33.2		28.3	18.5	40.2		28.3
Max Q Clear Time (g_c+I1), s	26.1	25.5		30.3	20.3	39.8		30.3
Green Ext Time (p_c), s	0.0	3.3		0.0	0.0	0.2		0.0

Intersection Summary		
HCM 2010 Ctrl Delay	46.7	
HCM 2010 LOS	D	

Intersection	
Intersection Delay, s/veh	27.3
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	892	882	1363	1011
Demand Flow Rate, veh/h	910	900	1390	1032
Vehicles Circulating, veh/h	1017	1392	753	901
Vehicles Exiting, veh/h	916	540	1174	949
Follow-Up Headway, s	2.800	2.800	2.800	2.800
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	26.9	32.5	24.0	27.4
Approach LOS	D	D	C	D

Lane	Left	Right	Left	Right	Bypass	Left	Right	Bypass	Left	Right
Designated Moves	LT	R	L	TR	R	LT	TR	R	LT	TR
Assumed Moves	LT	R	L	TR	R	LT	TR	R	LT	TR
RT Channelized					Yield			Yield		
Lane Util	0.462	0.538	0.413	0.587		0.470	0.530		0.470	0.530
Critical Headway, s	4.200	4.000	4.200	4.000		4.200	4.000		4.200	4.000
Entry Flow, veh/h	420	490	189	269	442	554	625	211	485	547
Cap Entry Lane, veh/h	583	617	435	470	498	716	746	749	638	671
Entry HV Adj Factor	0.981	0.980	0.979	0.980	0.980	0.980	0.980	0.980	0.980	0.980
Flow Entry, veh/h	412	480	185	264	433	543	612	207	475	536
Cap Entry, veh/h	572	604	426	461	488	702	731	735	625	657
V/C Ratio	0.720	0.794	0.434	0.572	0.887	0.774	0.837	0.282	0.760	0.816
Control Delay, s/veh	24.4	29.0	16.9	20.6	46.4	24.3	29.0	8.2	25.5	29.1
LOS	C	D	C	C	E	C	D	A	D	D
95th %tile Queue, veh	6	8	2	4	10	7	9	1	7	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	252	218	403	127	261	393	448	968	146	308	679	234
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	265	229	424	134	275	414	472	1019	154	324	715	246
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	239	608	919	261	608	830	451	1164	521	351	964	431
Arrive On Green	0.33	0.33	0.33	0.33	0.33	0.33	0.25	0.33	0.33	0.20	0.27	0.27
Sat Flow, veh/h	751	1863	1583	776	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	265	229	424	134	275	414	472	1019	154	324	715	246
Grp Sat Flow(s),veh/h/ln	751	1863	1583	776	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	18.6	8.4	13.6	14.2	10.3	14.9	22.5	24.0	6.4	15.9	16.3	11.8
Cycle Q Clear(g_c), s	28.9	8.4	13.6	22.5	10.3	14.9	22.5	24.0	6.4	15.9	16.3	11.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	239	608	919	261	608	830	451	1164	521	351	964	431
V/C Ratio(X)	1.11	0.38	0.46	0.51	0.45	0.50	1.05	0.88	0.30	0.92	0.74	0.57
Avail Cap(c_a), veh/h	239	608	919	261	608	830	451	1223	547	351	1024	458
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.1	22.9	10.6	31.5	23.6	13.6	33.0	28.0	22.1	34.9	29.4	27.7
Incr Delay (d2), s/veh	90.7	0.5	0.5	0.7	0.2	0.2	55.1	6.7	0.1	29.0	2.3	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	21.2	7.8	10.1	5.5	9.1	10.7	32.0	18.7	5.0	15.9	13.0	9.1
LnGrp Delay(d),s/veh	128.9	23.4	11.1	32.3	23.8	13.7	88.2	34.7	22.2	63.9	31.7	28.6
LnGrp LOS	F	C	B	C	C	B	F	C	C	E	C	C
Approach Vol, veh/h		918			823			1645			1285	
Approach Delay, s/veh		48.2			20.1			48.9			39.2	
Approach LOS		D			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	26.0	30.1		32.4	21.0	35.1		32.4
Change Period (Y+Rc), s	3.5	6.0		3.5	3.5	6.0		3.5
Max Green Setting (Gmax), s	22.5	25.6		28.9	17.5	30.6		28.9
Max Q Clear Time (g_c+I1), s	24.5	18.3		24.5	17.9	26.0		30.9
Green Ext Time (p_c), s	0.0	4.5		3.1	0.0	3.1		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	41.0
HCM 2010 LOS	D

Intersection	
Intersection Delay, s/veh	40.9
Intersection LOS	E

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	918	823	1645	1285
Demand Flow Rate, veh/h	936	839	1677	1310
Vehicles Circulating, veh/h	1196	1790	834	898
Vehicles Exiting, veh/h	761	564	866	1309
Follow-Up Headway, s	2.800	2.800	2.800	2.800
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.6	15.0	83.7	25.9
Approach LOS	A	C	F	D

Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Designated Moves	LT	TR	R	LT	TR	R	LT	TR	R	LT	TR	R
Assumed Moves	L	TR	R	LT	TR	R	LT	TR	R	LT	TR	R
RT Channelized			Free			Free			Yield			Yield
Lane Util	0.536	0.464		0.470	0.530		0.470	0.530		0.470	0.530	
Critical Headway, s	4.200	4.000		4.200	4.000		4.200	4.000		4.200	4.000	
Entry Flow, veh/h	270	234	432	196	221	422	714	806	157	498	561	251
Cap Entry Lane, veh/h	507	542	1938	320	353	1938	672	704	731	639	672	601
Entry HV Adj Factor	0.981	0.980	0.980	0.980	0.980	0.980	0.981	0.980	0.980	0.980	0.981	0.980
Flow Entry, veh/h	265	229	424	192	217	414	701	790	154	488	551	246
Cap Entry, veh/h	498	531	1900	313	346	1900	659	690	717	627	660	589
V/C Ratio	0.532	0.432	0.223	0.613	0.626	0.218	1.062	1.145	0.215	0.779	0.835	0.418
Control Delay, s/veh	17.8	14.0	0.0	31.2	29.5	0.0	77.5	104.1	7.5	26.9	31.0	12.5
LOS	C	B	A	D	D	A	F	F	A	D	D	B
95th %tile Queue, veh	3	2	1	4	4	1	19	25	1	7	9	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	252	225	409	127	281	414	468	989	146	316	685	234
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	265	237	431	134	296	436	493	1041	154	333	721	246
Adj No. of Lanes	1	1	1	1	1	1	1	2	1	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	235	648	990	266	648	862	492	1148	513	349	862	386
Arrive On Green	0.35	0.35	0.35	0.35	0.35	0.35	0.28	0.32	0.32	0.20	0.24	0.24
Sat Flow, veh/h	721	1863	1583	766	1863	1583	1774	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	265	237	431	134	296	436	493	1041	154	333	721	246
Grp Sat Flow(s),veh/h/ln	721	1863	1583	766	1863	1583	1774	1770	1583	1774	1770	1583
Q Serve(g_s), s	22.3	9.4	13.9	15.7	12.2	17.2	27.5	27.9	7.2	18.4	19.2	13.8
Cycle Q Clear(g_c), s	34.5	9.4	13.9	25.1	12.2	17.2	27.5	27.9	7.2	18.4	19.2	13.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	235	648	990	266	648	862	492	1148	513	349	862	386
V/C Ratio(X)	1.13	0.37	0.44	0.50	0.46	0.51	1.00	0.91	0.30	0.95	0.84	0.64
Avail Cap(c_a), veh/h	235	648	990	266	648	862	492	1178	527	349	892	399
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.9	24.2	9.6	33.5	25.1	14.2	35.8	32.1	25.1	39.4	35.6	33.6
Incr Delay (d2), s/veh	97.9	0.5	0.4	0.6	0.2	0.2	41.1	9.8	0.1	36.0	6.4	2.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	23.0	8.5	10.2	6.0	10.4	11.9	34.2	21.5	5.7	18.2	15.3	10.4
LnGrp Delay(d),s/veh	139.7	24.6	10.0	34.1	25.2	14.4	76.9	41.8	25.2	75.3	42.0	36.0
LnGrp LOS	F	C	A	C	C	B	F	D	C	E	D	D
Approach Vol, veh/h		933			866			1688			1300	
Approach Delay, s/veh		50.6			21.2			50.5			49.4	
Approach LOS		D			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	31.0	30.2		38.0	23.0	38.2		38.0
Change Period (Y+Rc), s	3.5	6.0		3.5	3.5	6.0		3.5
Max Green Setting (Gmax), s	27.5	25.0		34.5	19.5	33.0		34.5
Max Q Clear Time (g_c+I1), s	29.5	21.2		27.1	20.4	29.9		36.5
Green Ext Time (p_c), s	0.0	2.7		5.0	0.0	2.2		0.0

Intersection Summary		
HCM 2010 Ctrl Delay	44.9	
HCM 2010 LOS	D	

Intersection	
Intersection Delay, s/veh	48.3
Intersection LOS	E

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	933	866	1688	1300
Demand Flow Rate, veh/h	952	884	1722	1326
Vehicles Circulating, veh/h	1212	1835	852	942
Vehicles Exiting, veh/h	805	582	872	1332
Follow-Up Headway, s	2.800	2.800	2.800	2.800
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.9	17.5	99.7	30.2
Approach LOS	A	C	F	D

Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Designated Moves	LT	TR	R	LT	TR	R	LT	TR	R	LT	TR	R
Assumed Moves	L	TR	R	LT	TR	R	LT	TR	R	LT	TR	R
RT Channelized			Free			Free			Yield			Yield
Lane Util	0.527	0.473		0.469	0.531		0.470	0.530		0.470	0.530	
Critical Headway, s	4.200	4.000		4.200	4.000		4.200	4.000		4.200	4.000	
Entry Flow, veh/h	270	242	440	206	233	445	736	829	157	505	570	251
Cap Entry Lane, veh/h	501	536	1938	309	342	1938	663	695	718	618	651	575
Entry HV Adj Factor	0.981	0.980	0.980	0.981	0.978	0.980	0.980	0.981	0.980	0.981	0.980	0.980
Flow Entry, veh/h	265	237	431	202	228	436	721	813	154	495	558	246
Cap Entry, veh/h	492	525	1900	303	334	1900	649	682	704	606	638	564
V/C Ratio	0.539	0.452	0.227	0.668	0.682	0.229	1.111	1.193	0.219	0.817	0.875	0.437
Control Delay, s/veh	18.3	14.6	0.0	36.2	34.4	0.0	93.6	122.4	7.6	31.2	36.8	13.4
LOS	C	B	A	E	D	A	F	F	A	D	E	B
95th %tile Queue, veh	3	2	1	4	5	1	22	28	1	8	10	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	364	20	84	39	12	58	38	1060	33	82	931	194
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	383	21	88	41	13	61	40	1116	35	86	980	204
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	500	104	436	467	95	444	55	1307	41	103	1417	634
Arrive On Green	0.33	0.33	0.33	0.33	0.33	0.33	0.03	0.37	0.37	0.06	0.40	0.40
Sat Flow, veh/h	1320	314	1316	1279	286	1341	1774	3503	110	1774	3539	1583
Grp Volume(v), veh/h	383	0	109	41	0	74	40	564	587	86	980	204
Grp Sat Flow(s),veh/h/ln	1320	0	1630	1279	0	1626	1774	1770	1843	1774	1770	1583
Q Serve(g_s), s	19.6	0.0	3.3	1.6	0.0	2.2	1.5	20.1	20.1	3.3	15.8	6.1
Cycle Q Clear(g_c), s	21.8	0.0	3.3	4.9	0.0	2.2	1.5	20.1	20.1	3.3	15.8	6.1
Prop In Lane	1.00		0.81	1.00		0.82	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	500	0	540	467	0	538	55	660	688	103	1417	634
V/C Ratio(X)	0.77	0.00	0.20	0.09	0.00	0.14	0.72	0.85	0.85	0.83	0.69	0.32
Avail Cap(c_a), veh/h	500	0	540	480	0	555	103	697	726	103	1419	635
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.7	0.0	16.5	18.2	0.0	16.1	32.9	19.8	19.8	32.0	17.1	14.2
Incr Delay (d2), s/veh	6.4	0.0	0.1	0.0	0.0	0.0	6.6	9.1	8.8	39.1	1.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	12.7	0.0	2.7	1.0	0.0	1.8	1.5	16.9	17.4	4.9	12.5	4.8
LnGrp Delay(d),s/veh	30.1	0.0	16.5	18.2	0.0	16.1	39.5	28.8	28.5	71.0	18.3	14.3
LnGrp LOS	C		B	B		B	D	C	C	E	B	B
Approach Vol, veh/h		492			115			1191			1270	
Approach Delay, s/veh		27.1			16.9			29.1			21.2	
Approach LOS		C			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.1	34.5		28.0	8.0	32.6		28.0
Change Period (Y+Rc), s	4.0	* 7		* 5.3	4.0	7.0		5.3
Max Green Setting (Gmax), s	4.0	* 28		* 23	4.0	27.0		22.7
Max Q Clear Time (g_c+I1), s	3.5	17.8		6.9	5.3	22.1		23.8
Green Ext Time (p_c), s	0.0	5.9		1.2	0.0	3.5		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	25.0
HCM 2010 LOS	C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	364	20	84	55	13	99	38	1060	40	94	931	194
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	383	21	88	58	14	104	40	1116	42	99	980	204
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	477	111	466	486	68	503	53	1299	49	113	1443	645
Arrive On Green	0.35	0.35	0.35	0.35	0.35	0.35	0.03	0.37	0.37	0.06	0.41	0.41
Sat Flow, veh/h	1269	314	1316	1279	191	1421	1774	3478	131	1774	3539	1583
Grp Volume(v), veh/h	383	0	109	58	0	118	40	568	590	99	980	204
Grp Sat Flow(s),veh/h/ln	1269	0	1630	1279	0	1612	1774	1770	1840	1774	1770	1583
Q Serve(g_s), s	23.6	0.0	3.6	2.6	0.0	4.0	1.8	23.1	23.2	4.3	17.7	6.9
Cycle Q Clear(g_c), s	27.6	0.0	3.6	6.2	0.0	4.0	1.8	23.1	23.2	4.3	17.7	6.9
Prop In Lane	1.00		0.81	1.00		0.88	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	477	0	578	486	0	571	53	661	687	113	1443	645
V/C Ratio(X)	0.80	0.00	0.19	0.12	0.00	0.21	0.76	0.86	0.86	0.87	0.68	0.32
Avail Cap(c_a), veh/h	477	0	578	497	0	585	91	701	729	113	1471	658
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.2	0.0	17.5	19.6	0.0	17.6	37.7	22.6	22.6	36.3	19.0	15.7
Incr Delay (d2), s/veh	8.9	0.0	0.1	0.0	0.0	0.1	8.0	9.4	9.1	46.2	1.0	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	14.4	0.0	3.0	1.6	0.0	3.2	1.8	18.8	19.4	6.4	13.6	5.4
LnGrp Delay(d),s/veh	36.1	0.0	17.5	19.7	0.0	17.7	45.7	32.0	31.7	82.5	20.0	15.9
LnGrp LOS	D		B	B		B	D	C	C	F	B	B
Approach Vol, veh/h		492			176			1198			1283	
Approach Delay, s/veh		32.0			18.3			32.3			24.1	
Approach LOS		C			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.3	38.9		33.0	9.0	36.2		33.0
Change Period (Y+Rc), s	4.0	* 7		* 5.3	4.0	7.0		5.3
Max Green Setting (Gmax), s	4.0	* 33		* 28	5.0	31.0		27.7
Max Q Clear Time (g_c+I1), s	3.8	19.7		8.2	6.3	25.2		29.6
Green Ext Time (p_c), s	0.0	7.1		1.6	0.0	4.0		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	28.2
HCM 2010 LOS	C

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

HCM 2010 Signalized Intersection Summary
14: SR 267 & Schaffer Mill Rd/Airport Rd

9/11/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	103	2	15	5	2	18	81	1618	15	16	818	202
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	108	2	16	5	2	19	85	1703	16	17	861	213
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	275	19	152	278	16	154	108	1978	19	30	1793	802
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.06	0.55	0.55	0.02	0.51	0.51
Sat Flow, veh/h	1385	179	1431	1389	153	1453	1774	3593	34	1774	3539	1583
Grp Volume(v), veh/h	108	0	18	5	0	21	85	838	881	17	861	213
Grp Sat Flow(s),veh/h/ln	1385	0	1610	1389	0	1606	1774	1770	1857	1774	1770	1583
Q Serve(g_s), s	3.8	0.0	0.5	0.2	0.0	0.6	2.4	20.2	20.3	0.5	7.9	3.8
Cycle Q Clear(g_c), s	4.4	0.0	0.5	0.7	0.0	0.6	2.4	20.2	20.3	0.5	7.9	3.8
Prop In Lane	1.00		0.89	1.00		0.90	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	275	0	171	278	0	170	108	974	1022	30	1793	802
V/C Ratio(X)	0.39	0.00	0.11	0.02	0.00	0.12	0.79	0.86	0.86	0.57	0.48	0.27
Avail Cap(c_a), veh/h	286	0	184	308	0	206	249	1028	1079	142	1879	841
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.2	0.0	20.2	20.5	0.0	20.2	23.1	9.6	9.6	24.4	8.0	7.0
Incr Delay (d2), s/veh	0.3	0.0	0.1	0.0	0.0	0.1	4.8	6.8	6.6	6.2	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.7	0.0	0.4	0.1	0.0	0.5	2.3	16.9	17.6	0.5	6.9	3.0
LnGrp Delay(d),s/veh	22.5	0.0	20.3	20.5	0.0	20.3	27.9	16.4	16.2	30.6	8.1	7.1
LnGrp LOS	C		C	C		C	C	B	B	C	A	A
Approach Vol, veh/h		126			26			1804			1091	
Approach Delay, s/veh		22.2			20.4			16.8			8.3	
Approach LOS		C			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.0	32.3		10.6	4.8	34.5		10.6
Change Period (Y+Rc), s	4.0	* 7		* 5.3	4.0	7.0		5.3
Max Green Setting (Gmax), s	7.0	* 27		* 6.4	4.0	29.0		5.7
Max Q Clear Time (g_c+I1), s	4.4	9.9		2.7	2.5	22.3		6.4
Green Ext Time (p_c), s	0.0	10.3		0.1	0.0	5.2		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	14.0
HCM 2010 LOS	B

Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

WINTER

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	103	2	15	35	4	80	81	1618	20	25	818	202
Number	3	8	18	7	4	14	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1863
Adj Flow Rate, veh/h	108	2	16	37	4	84	85	1703	21	26	861	213
Adj No. of Lanes	1	1	0	1	1	0	1	2	0	1	2	1
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	219	20	160	282	8	170	108	1950	24	43	1798	804
Arrive On Green	0.11	0.11	0.11	0.11	0.11	0.11	0.06	0.54	0.54	0.02	0.51	0.51
Sat Flow, veh/h	1304	179	1431	1389	72	1522	1774	3580	44	1774	3539	1583
Grp Volume(v), veh/h	108	0	18	37	0	88	85	841	883	26	861	213
Grp Sat Flow(s),veh/h/ln	1304	0	1610	1389	0	1594	1774	1770	1855	1774	1770	1583
Q Serve(g_s), s	3.1	0.0	0.5	1.3	0.0	2.6	2.4	21.0	21.1	0.7	8.1	3.9
Cycle Q Clear(g_c), s	5.7	0.0	0.5	1.8	0.0	2.6	2.4	21.0	21.1	0.7	8.1	3.9
Prop In Lane	1.00		0.89	1.00		0.95	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	219	0	180	282	0	178	108	964	1010	43	1798	804
V/C Ratio(X)	0.49	0.00	0.10	0.13	0.00	0.49	0.79	0.87	0.87	0.61	0.48	0.26
Avail Cap(c_a), veh/h	219	0	180	301	0	200	243	1006	1055	139	1839	823
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.4	0.0	20.3	21.1	0.0	21.3	23.6	10.1	10.1	24.6	8.2	7.1
Incr Delay (d2), s/veh	0.6	0.0	0.1	0.1	0.0	0.8	4.8	7.8	7.7	5.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	2.8	0.0	0.4	0.9	0.0	2.1	2.4	17.9	18.5	0.8	6.9	3.0
LnGrp Delay(d),s/veh	25.0	0.0	20.4	21.2	0.0	22.1	28.4	17.9	17.8	29.7	8.2	7.2
LnGrp LOS	C		C	C		C	C	B	B	C	A	A
Approach Vol, veh/h		126			125			1809			1100	
Approach Delay, s/veh		24.4			21.8			18.3			8.5	
Approach LOS		C			C			B			A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.1	32.9		11.0	5.2	34.8		11.0
Change Period (Y+Rc), s	4.0	* 7		* 5.3	4.0	7.0		5.3
Max Green Setting (Gmax), s	7.0	* 27		* 6.4	4.0	29.0		5.7
Max Q Clear Time (g_c+I1), s	4.4	10.1		4.6	2.7	23.1		7.7
Green Ext Time (p_c), s	0.0	10.3		0.1	0.0	4.7		0.0

Intersection Summary	
HCM 2010 Ctrl Delay	15.3
HCM 2010 LOS	B

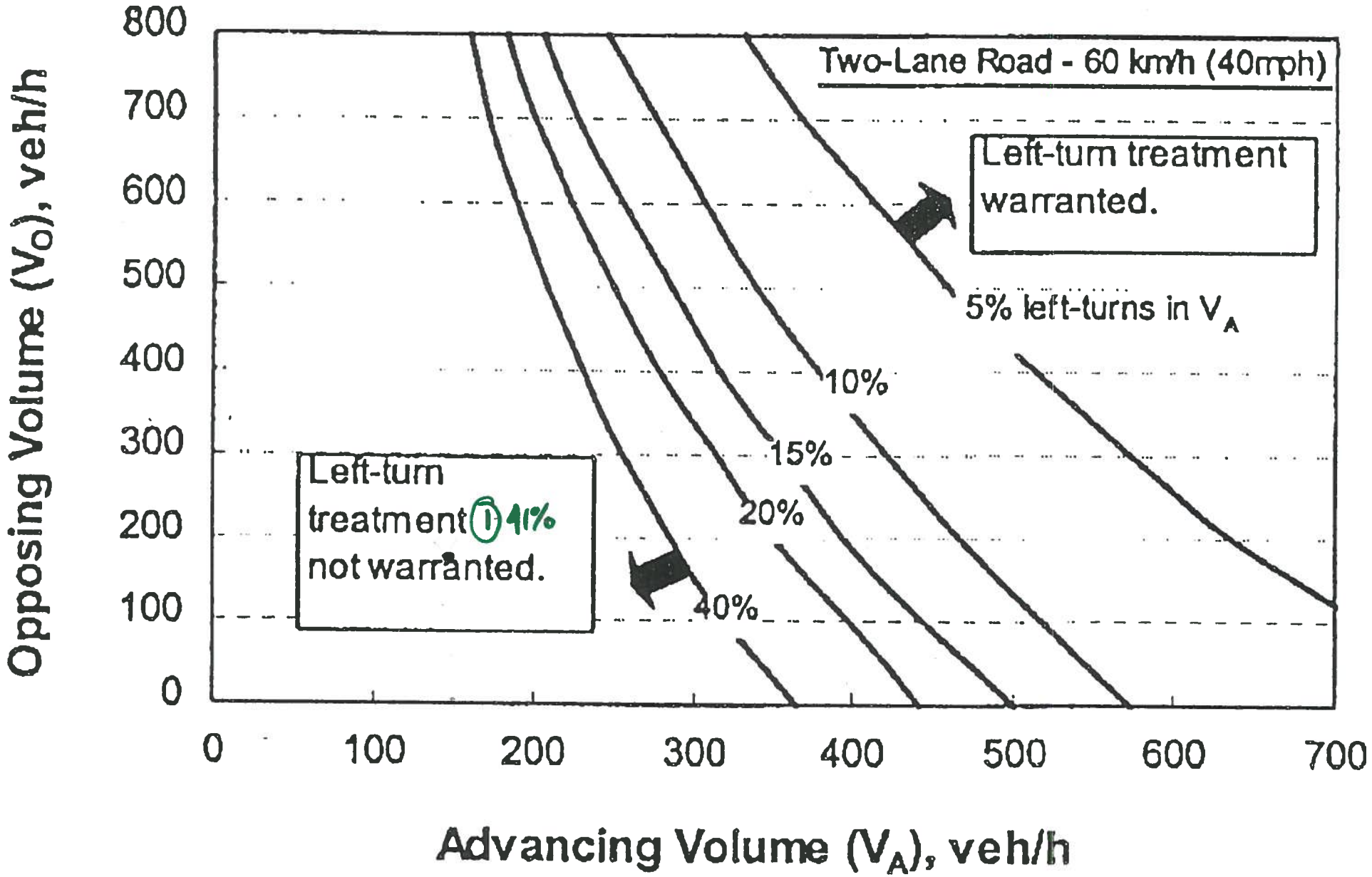
Notes

* HCM 2010 computational engine requires equal clearance times for the phases crossing the barrier.

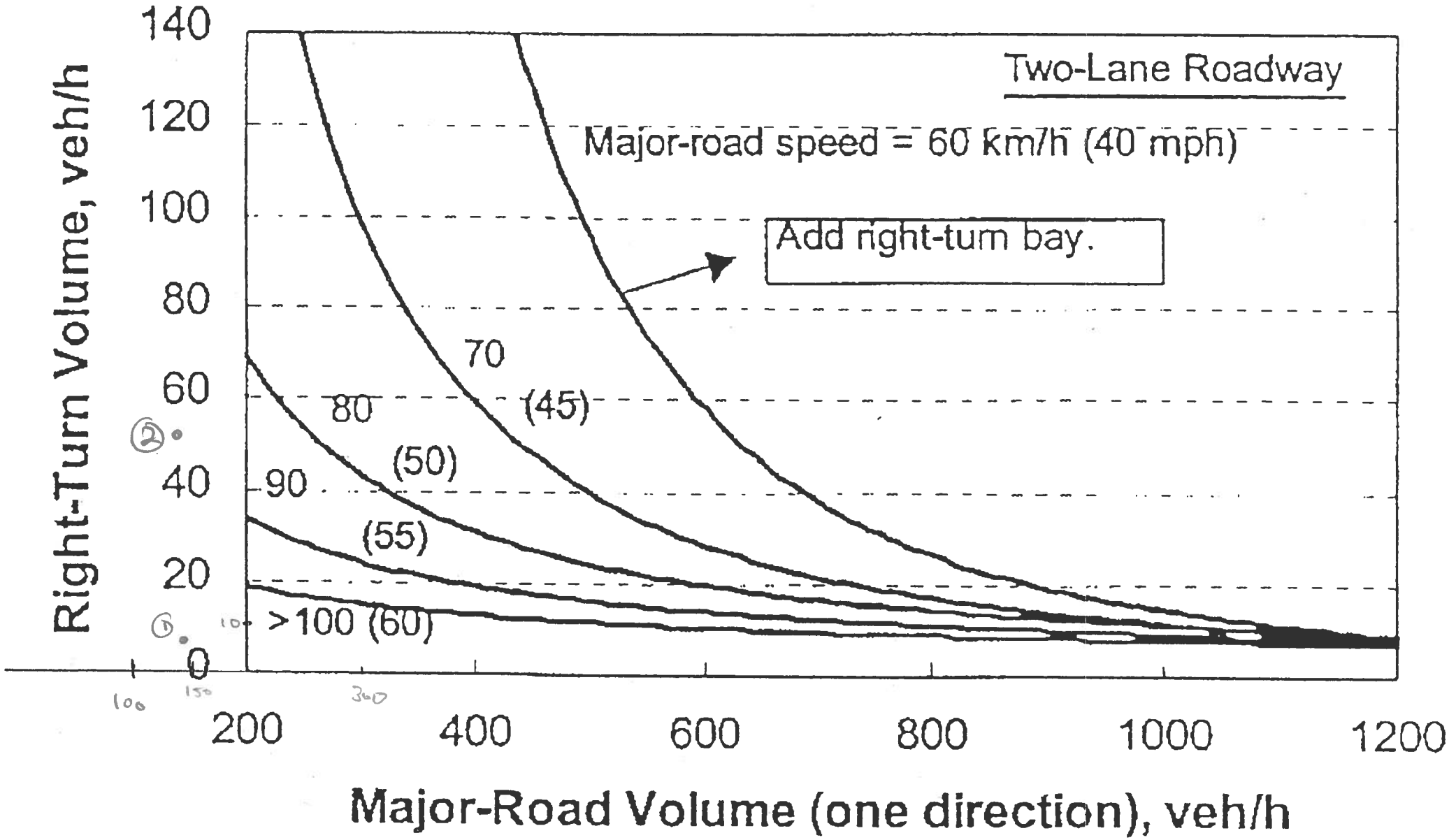
WINTER

Appendix D

Turn Lane Warrant Charts


Two-Lane Road - 60 km/h (40mph)
Left-turn treatment warranted.
5% left-turns in V_A
10%
15%
20%
40%
Left-turn treatment not warranted.
Opposing Volume (V_O), veh/h
Advancing Volume (V_A), veh/h
800
700
600
500
400
300
200
100
0
0
100
200
300
400
500
600
700

(a)


Two-Lane Roadway
Major-road speed = 60 km/h (40 mph)
Add right-turn bay.
70
(45)
80
(50)
90
(55)
>100 (60)
Right-Turn Volume, veh/h
Major-Road Volume (one direction), veh/h
0
20
40
60
80
100
120
140
200
400
600
800
1000
1200

(a)

Appendix E

Truckee TIF Table

ATTACHMENT A

TABLE 7: DUE (Dwelling Unit Equivalent) and Fee Calculations

Fee Formula: *$5,169 x DUE per Unit x Units (from Project) = fee*

Land Use Category	Unit	ITE Land Use Code	PM Peak Hour Trip Rate Per Unit[3]	Trip Length (miles)	% New Trips	VMT per Unit	DUE per Unit
Residential							
Single-family[1]	DU	210	1.01	4.3	100%	4.34	1.00
Multi-family[2]	DU	220	0.62	4.3	100%	2.67	0.62
Mobile Home	DU	240	0.59	4.3	100%	2.54	0.59
Retirement	DU	252	0.26	4.3	100%	1.12	0.26
Hotel/Motel	Room	310	0.87	3.4	71%	2.10	0.48
Office	1,000 s.f.	710, 720	1.69	3.7	87%	5.44	1.25
Commercial							
General Retail	1,000 s.f.	Note 4	6.08	3.8	49%	11.32	2.61
Restaurant - Quality or High-Turnover	1,000 s.f.	931, 932	9.21	3.4	38%	11.90	2.74
Fast Food Restaurant / Coffee Shop	1,000 s.f.	933, 934	31.72	2.6	30%	24.74	5.70
Supermarket	1,000 s.f.	850	10.45	2.6	34%	9.24	2.13
Factory Outlet	1,000 s.f.	823	2.29	5.5	72%	9.05	2.09
Convenience Market	1,000 s.f.	851	52.41	2.3	24%	28.93	6.67
Discount Club	1,000 s.f.	861	4.24	3.8	54%	8.70	2.00
Bank	1,000 s.f.	912	45.74	2.4	28%	30.74	7.08
Gas Station	Fueling Position	944	13.86	2.9	14%	5.63	1.30
Day Care	1,000 s.f.	565	13.18	2.0	74%	19.51	4.50
Health Fitness Club	1,000 s.f.	492	4.05	4.6	75%	13.97	3.22
Drinking Place	1,000 s.f.	936	11.34	2.9	57%	18.75	4.32
Industrial							
Light Industrial	1,000 s.f.	110	0.98	3.7	92%	3.34	0.77
Heavy Industrial	1,000 s.f.	120	0.68	3.7	92%	2.31	0.53
Warehouse	1,000 s.f.	150	0.47	3.7	92%	1.60	0.37
Hospital	1,000 s.f.	610	1.18	3.8	77%	3.45	0.79
Convalescent Home	bed	620	0.22	3.8	74%	0.62	0.14
School	Student	520	0.14	4.1	80%	0.46	0.11

Note 1: A secondary dwelling with a floor area greater than 850 square feet shall be considered a single-family residence for the purpose of this Ordinance. Any single-family residence in excess of three bedrooms will be assessed an additional 0.33 DUE per bedroom in excess of three bedrooms.

Note 2: Multifamily units are any attached units (including duplex). In addition, a secondary dwelling with a floor area of 850 square feet or less shall be considered a multifamily residence for the purpose of this Ordinance.

Note 3: PM peak-hour of adjacent street traffic.

Note 4: Trip generation rate based on calibrated Town of Truckee Model.

Appendix E

Mitigation Monitoring Plan

Mitigation Monitoring Plan for Truckee Tahoe Airport Master Plan				
Mitigation Measure	**Responsibility for Implementation**	**Method for Compliance**	**Timing of Compliance**	**Monitoring Completed**
AIR-1: These mitigation measures are grouped by category as listed in NSAQMD's Guidelines: *1. Mitigations for Use During Design and Construction Phases* a. Alternatives to open burning of vegetative material will be used unless otherwise deemed infeasible by the District. Among suitable alternatives are chipping, mulching, or conversion to biomass fuel. b. Grid power shall be used (as opposed to diesel generators) for job site power needs where feasible during construction. c. Temporary traffic control shall be provided during all phases of the construction to improve traffic flow as deemed appropriate by local transportation agencies and/or Caltrans. d. Construction activities shall be scheduled to direct traffic flow to off-peak hours as much as practicable. *2. Mitigation for Public Transit* a. Streets shall be designed to maximize pedestrian access to transit stops. *3. Mitigation for Traffic Emissions* a. The project shall provide for pedestrian access between bus service and major transportation points within the project, and between separate sections of the project, where feasible.	TTAD	Inclusion in design plans and construction specifications.	Inclusion prior to issuance of building or grading permit.	
AIR-2: Dust Control Measures. A Dust Control Plan shall be submitted to NSAQMD for approval prior to any surface disturbance, including clearing of vegetation. Approved dust control measures shall be included in the General Notes and/or the Grading Plan for the project, under a descriptive heading such as "Dust Control." The following conditions constitute an approvable Plan under Rule 226. Conditions should be more stringent for projects near sensitive receptors or for mitigation purposes. 1. The applicant shall be responsible for ensuring that all adequate dust control measures are implemented in a timely manner during all phases of project development and construction. 2. All material excavated, stockpiled, or graded shall be sufficiently watered, treated, or covered to prevent fugitive dust from leaving the property boundaries and causing a public nuisance or a violation of an ambient air standard. Watering should occur at least twice daily, with complete site coverage. 3. All areas with vehicle traffic shall be watered or have dust palliative applied as necessary for regular stabilization of dust emissions. 4. All on-site vehicle traffic shall be limited to a speed of 15 mph on unpaved roads. 5. All land clearing, grading, earth moving, or excavation activities on a	TTAD	Obtaining letter of approval/permit from NSAQMD.	Obtain prior to issuance of issuance of a building or grading permit.	

project shall be suspended as necessary to prevent excessive windblown dust when winds are expected to exceed 20 mph. 6. All inactive portions of the development site shall be covered, seeded, or watered until a suitable cover is established. Alternatively, the applicant may apply County-approved non-toxic soil stabilizers (according to manufacturer's specifications) to all inactive construction areas (previously graded areas which remain inactive for 96 hours) in accordance with the local grading ordinance. 7. All material transported off-site shall be either sufficiently watered or securely covered to prevent public nuisance, and there must be a minimum of six (6) inches of freeboard in the bed of the transport vehicle. 8. Paved streets adjacent to the project shall be swept or washed at the end of each day, or more frequently if necessary, to remove excessive or visibly raised accumulations of dirt and/or mud which may have resulted from activities at the project site. 9. Prior to final occupancy, the applicant shall re-establish ground cover on the site through seeding and watering in accordance with the local grading ordinance.				
AIR-3: Minimize Construction Equipment Idling. In order to reduce emissions from construction equipment, the Airport shall include the following standard note on the grading and improvement plans: "During construction, the contractor shall minimize idling time to a maximum of 5 minutes for all diesel powered equipment. Signs shall be posted in the designated queuing areas of the construction site to remind off-road equipment operators that idling is limited to a maximum of 5 minutes. Idling of construction-related equipment and construction related vehicles is not recommended within 1,000 feet of any sensitive receptor."	TTAD	Inclusion in design specifications.	Include prior to issuance of building or grading permit.	
AIR 4: Use Low-VOC Architectural Coatings for the Proposed Structure. To ensure that the project will not result in the significant generation of VOCs, all architectural coating shall utilize low-VOC paint (no greater than 50g/L VOC). Prior to building permit issuance, the developer shall submit their list of low-VOC coatings to the NSAQMD for review and approval. The developer shall then provide written verification from NSAQMD that all architectural coatings meet NSAQMD thresholds to be considered "low-VOC. Finally, all building plans shall include a note documenting which low-VOC architectural coatings will be used in construction.	TTAD	Inclusion in design specifications.	Include prior to issuance of building or grading permit.	

BIO-1: Special-status plant surveys meeting the protocol requirements of CDFW will be performed in naturally vegetated portions of the airport that may experience project-related disturbance. This protocol includes vegetation mapping using the current version of A Manual of California Vegetation, Second Edition (Sawyer, Keeler-Wolf and Evens 2009), a floristic plant list, multiple visits to sites based on suitable plant bloom times, and submission of any special-status plant finds into the CNDDB. If special-status plants are found during protocol-level surveys within areas proposed for disturbance, a rare plant mitigation plan would be developed with agency consultation.	TTAD	Inclusion in CEQA environmental documentation.	Inclusion in CEQA document prior to approval by TTAD	
BIO-2: Protection Measure for Birds. To avoid or minimize potential impacts to nesting birds (including special-status species), construction activities such as site grubbing, excavation, grading, and the operation of heavy equipment will occur between September 1 and January 31, outside of the nesting season, to the extent feasible. If project construction activities must occur during the period from February 1 to August 31, a qualified wildlife biologist will conduct pre-construction surveys for nesting birds. During the surveys, the qualified biologist shall carefully search for active nests/burrows within the work zone and a surrounding buffer zone. If an active nest is found, the bird species shall be identified and the approximate distance from the closest work site to the nest shall be estimated. Appropriate buffer distances shall be established by a qualified biologist. If active nests are closer than the appropriate buffer distance to the nearest work site, then the active nest(s) shall be monitored for signs of disturbance. Coordination with USFWS and CDFW shall occur as necessary. Disturbance of active nests should be avoided, to the extent possible, until it is determined that nesting is complete and the young have fledged.	TTAD	Evaluation of potential for construction to occur out of nesting season during preliminary design phase. If construction will occur during nesting season, the preconstruction survey must take place prior to construction. If buffer distances are established, they shall be enforced by construction inspector.	Prior to completion of preliminary design phase. No more than 30 days prior to construction. Daily during construction until nesting is completed.	
BIO-3: Protection Measures for Bats. All potential impacts to bats will be avoided if the project does not disturb trees or any existing buildings in the Study Area. If impacts to any medium or larger trees (greater than 30.5 centimeter [12-inch] diameter) that may harbor roosting bats cannot be avoided, the measures described below will be implemented. 1. Any medium or larger (greater than 30.5 centimeter [12-inch] diameter) tree or snag that is selected for removal would be inspected by a qualified wildlife biologist for the presence of foliage-roosting bats and potential dens (e.g., cavities, entrance holes). Cavities suitable as special-status bat roosts would be examined for roosting bats using a portable camera probe or similar technology. Buildings or other structures with potential for supporting special-status bats would be inspected by a qualified biologist for evidence of roosting colonies. If present, roosts of special-status or other bats (including day and night roosts, hibernacula, and maternity colonies) would be flagged and construction activities would be avoided within a minimum of 91.5 meters (300 feet) surrounding each occupied roost. 2. If a portion of the Study Area is being used as a winter roost, project activity would not take place during the period of hibernation	TTAD	Evaluation of potential for construction to affect existing trees or buildings during preliminary design phase. If trees or buildings will be affected, they will be inspected during development of CEQA documentation to determine if bats are present. If bats are present, a construction buffer will be established. If a winter roost or maternity colony is found, limitation of construction period. If a non-maternity roost is	Prior to completion of preliminary design phase. Prior to completion of CEQA documentation. Prior to start of construction. Inclusion in construction specifications. Prior to construction that would affect roost.	

(November 1 to March 1). If a portion of the Study Area is being used as a maternity colony, project activity would not occur during the maternity roost season (March 1 to July 31). If a non-maternity bat roost is found within the Study Area, the roosting bats would be safely evicted under the direction of a qualified biologist (as determined by a Memorandum of Understanding with CDFW). The qualified biologist would facilitate the removal of roosting bats using the following methods: a. Opening the roosting area to allow airflow through the cavity or building (air flow disturbance). b. Waiting a minimum of one night for roosting bats to respond to air flow disturbance, thereby allowing bats to leave during nighttime hours when predation risk is relatively low and chances of finding a new roost is greater than in the daytime. c. Disturbing roosts at dusk just prior to roost removal the same evening to allow bats to escape during nighttime hours.		found, eviction of bats using the protocol described.		
BIO-4: A jurisdictional delineation meeting the requirements of USACE will be conducted in portions of the airport that may experience project-related disturbance, particularly if habitat mapping in the subject area has identified wetlands or other water features. The delineation and other associated mapping can then be used to address specific impacts to wetlands or waters from any planned project disturbance and avoid, minimize, or mitigate for any potential impacts.	TTAD	Inclusion of biological site reconnaissance as part of CEQA documentation for each project in areas identified in Biological Constraints Analysis as potentially having jurisdictional waters of the US. Preparation of a wetland delineation if potential wetlands identified. Obtain verification from the USACE for delineation.		
CUL-1: Affected sites will be evaluated by a qualified archaeologist in consultation with the Native American community to determine eligibility. Truckee Tahoe Airport, in consultation with a qualified archaeologist and the Native American community, will develop a site specific plan to ensure that any eligible sites are protected to the extent practicable. The plan would include elements such as data recovery, archival research, public interpretation, and/or other means.	TTAD	Review Cultural Resources Survey to determine if project might affect known sites. If appropriate, development of site specific plan during preparation of CEQA documentation.	Prior to approval of CEQA document.	
GEO-1: Provide Sediment and Erosion Control Measures during Construction Activities. To minimize soil erosion, best management practices will be utilized during construction. Disturbed areas will be seeded following construction. A Storm Water Pollution Prevention Plan (SWPPP) will be developed and implemented for this project. Construction contractors will adhere to California erosion and sediment control programs as required by the SWPPP and Water Pollution Control Program developed for the project.	TTAD	Inclusion of sediment and erosion control measures in construction plans and specifications. Monitoring by construction inspector to ensure that measures are implemented.	Prior to issuance of a building or grading permit. Daily during construction period.	

GHG-1: Where feasible, given the type of structure, include the following features in new building construction: 1. The building shall include energy efficient indoor and outdoor lighting and light colored "cool" roofs. 2. Size and orientation of windows & doors shall be designed to take advantage of sun, shade & wind conditions to minimize the requirement on mechanical heating and cooling systems. Site buildings to take advantage of solar orientation. Proper building orientation facilitates the use of natural daylight. 3. Incorporate natural cooling by utilizing shading from tree canopies where feasible. Any combination of natural cooling techniques can be used to reduce overheating, reduce the need for air conditioning and reduce energy. This measure will largely be applicable to nonaviation commercial uses. 4. All windows and doors shall be Energy Star rated. 5. Upgrade insulation to exceed California Title 24 requirements. 6. The applicant shall consider the use of a renewable electricity generation, such as a solar photovoltaic system. Solar systems must be evaluated for compatibility with airport operations using the then current Federal Aviation Administration guidance.	TTAD	Evaluate potential to include features in structure's design. Include all feasible features in structure design specification.	During preliminary design. Prior to obtaining grading or building permit.	
GHG-2: Encourage the use of transit services by: 1. Actively pursuing development of a transit hub on Truckee Tahoe Airport Road in conjunction with local transit agencies. 2. Communicate the availability of transit services to Airport users and tenants	TTAD	Actively work with local transit agencies to develop a transit hub. Implement a strategy to communicate the availability of transit services to Airport users and tenants.	Begin the process within 90 days of approval of the mitigated negative declaration. Begin development of a strategy within 90 days of adoption of the mitigated negative declaration.	
NOI-1: Limit construction work hours on the nonaviation commercial/industrial parcel 7:00 a.m. to 10:00 p.m. Monday through Saturday. Prior to issuance of grading and building permits improvement plans shall reflect the permitted hours of construction.	TTAD	Inclusion of the limitations on working hours in construction specifications.	Prior to issuance of a grading or building permit.	
TRAF-1: When each element of the proposed plan is implemented, the applicant shall pay the amounts determined to be appropriate to the traffic impact fee programs of the various jurisdictions.	TTAD	Payment of traffic impact fees.	Prior to commencement of construction.	
TRAF-2: The final landscaping plans for each element of the project when implemented will provide at least 275 feet of corner sight distance.	TTAD	Inclusion in construction plans and specifications.	Prior to commencement of construction.	
NOTES: NSAQMD = Northern Sierra Air Quality Management District TTAD = Truckee Tahoe Airport District USACE = United States Army Corps of Engineers				