APPENDIX E

Traffic

APPENDIX E-1

Alpine Sierra Subdivision Traffic Impacts Analysis

Alpine Sierra Subdivision
Traffic Impact Analysis

Prepared for

Capstone Partners, LLC

Prepared by

LSC Transportation Consultants, Inc.

Alpine Sierra Subdivision
Traffic Impact Analysis

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April 16, 2015

LSC Project No. 147320

TABLE OF CONTENTS

SECTION ***PAGE***

1 INTRODUCTION 1

2 EXISTING TRAFFIC CONDITIONS 3
- Roadway Characteristics 3
- Existing Traffic Volumes 3
- Existing Transit Service 4
- Bicycling and Pedestrian Network 4

3 TRIP GENERATION, DISTRIBUTION, AND ASSIGNMENT 7
- Trip Generation 7
- Traffic Distribution and Assignment 7

4 FUTURE CUMULATIVE TRAFFIC CONDITIONS 13
- Future Cumulative Traffic Volumes 13

5 LEVEL OF SERVICE 17
- Methodology 17
- Level of Service Standards 17
- Intersection Level of Service 18

6 IMPACTS AND MITIGATION 21
- Intersection Level of Service 21
- Driver Sight Distance 21
- Intersection Spacing 22
- Lots 46 and 47 Driveway Locations 22
- Evaluation of Dead-End Road Lengths 23
- Mitigation Measures 23

APPENDIX
- A – Alpine Sierra Subdivision Site Plan
- B – Descriptions of Levels of Service
- C – Level of Service Calculations
- D – Will Serve Letter

LIST OF TABLES

TABLE ***PAGE***

1 Alpine Sierra Subdivision – Trip Generation Analysis 8
2 Alpine Sierra Subdivision – Winter Trip Distribution 9
3 Alpine Sierra Subdivision – Summer Trip Distribution 9
4 Alpine Sierra Subdivision Intersection Level of Service 19

LIST OF FIGURES

FIGURE ***PAGE***

1 Alpine Sierra Subdivision Site and Location Map 2
2 Alpine Sierra Subdivision Traffic Volumes without Project 5
3 Alpine Sierra Subdivision Project Generated Traffic Volumes 10
4 Alpine Sierra Subdivision Traffic Volumes with Project 11
5 Alpine Sierra Subdivision Future Traffic Volumes without Project 14
6 Alpine Sierra Subdivision Future Traffic Volumes with Project 15

Section 1
INTRODUCTION

The Alpine Sierra Subdivision is proposed to include 47 residential lots, with a total of up to 51 dwelling units (including up to 5 secondary/guest units and an HOA staff unit) in the Alpine Meadows community in unincorporated Placer County, California. The project site is located just below the Alpine Meadows Ski Area parking lot. Access to this project will be provided at a single point along the east side of Alpine Meadows Road between Ginzton Access Road and John Scott Trail. The project location may be seen in Figure 1 and the site plan is included in Appendix A.

The purpose of this report is to present an analysis of the traffic impacts associated with the proposed development. Initially, existing traffic conditions in the area are discussed. The proposed development is then assessed to determine the traffic that will be generated. These vehicle-trips are assigned to the nearby roadway system. Next, future cumulative conditions are discussed. The project's impact on intersection level of service (LOS) is evaluated at the following study intersections:

1. State Route 89/Alpine Meadows Road
2. Alpine Meadows Road/Site Access

In addition, the following items are evaluated:

- Driver sight distance at site access intersection
- Adequacy of proposed intersection spacing along Alpine Meadows Road
- Internal vehicular circulation at driveway locations at Lots 46/47
- Proposed cul-de-sac lengths are evaluated against County standard for maximum length.

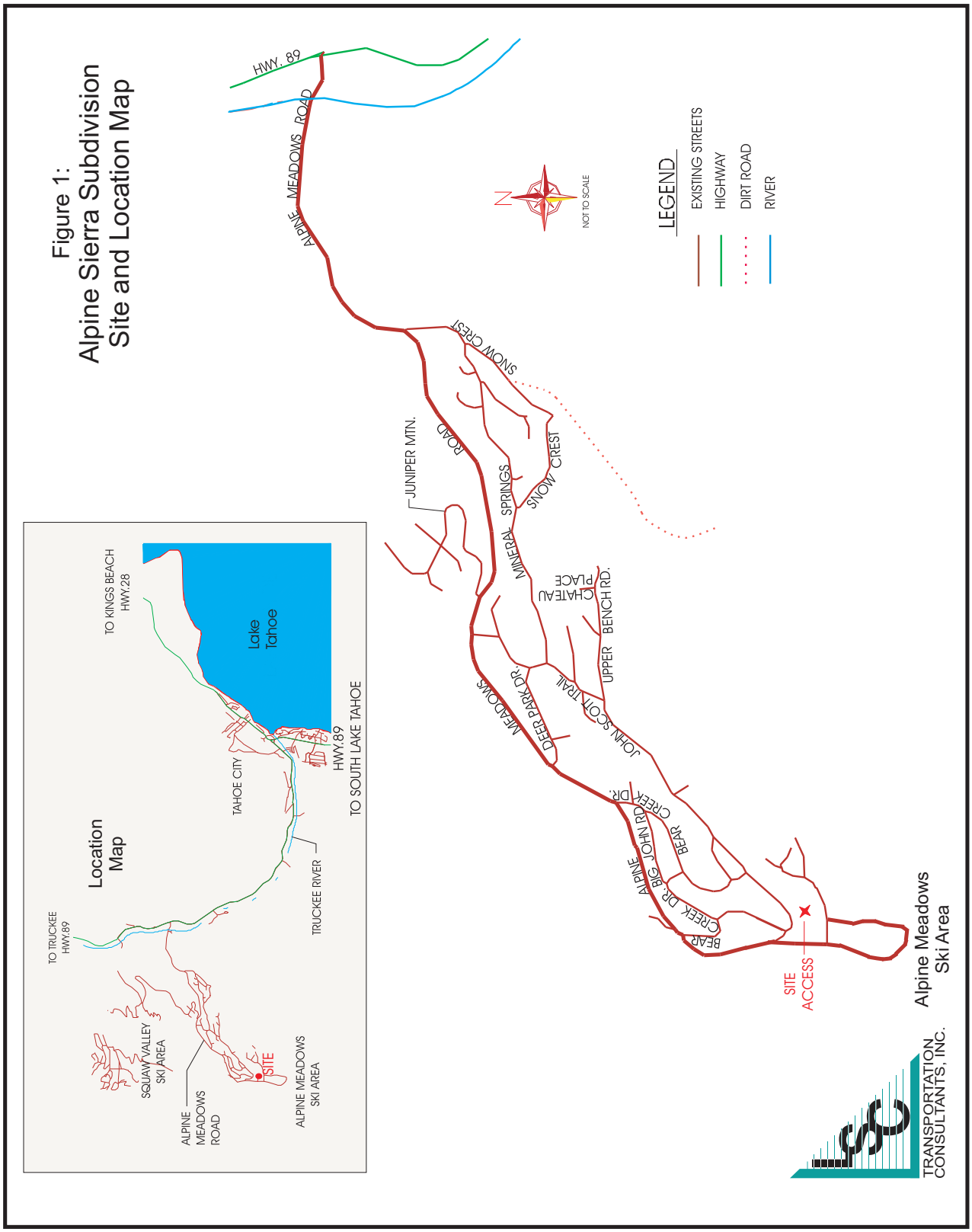
Figure 1:
Alpine Sierra Subdivision
Site and Location Map
Location Map
TO TRUCKEE HWY.89
SQUAW VALLEY SKI AREA
ALPINE MEADOWS ROAD
SITE
ALPINE MEADOWS SKI AREA
TRUCKEE RIVER
TAHOE CITY
HWY.89
TO SOUTH LAKE TAHOE
Lake Tahoe
TO KINGS BEACH HWY.28
HWY. 89
ALPINE MEADOWS ROAD
SNOW CREST
JUNIPER MTN.
ROAD
MINERAL SPRINGS
SNOW CREST
PLACE
CHATEAU
UPPER BENCH RD.
JOHN SCOTT TRAIL
DEER PARK DR.
MEADOWS
ALPINE DR.
BIG JOHN RD.
BEAR CREEK
BEAR CREEK DR.
SITE ACCESS
Alpine Meadows Ski Area
NOT TO SCALE
N
LEGEND
EXISTING STREETS
HIGHWAY
DIRT ROAD
RIVER
TRANSPORTATION CONSULTANTS, INC.

Section 2
EXISTING TRAFFIC CONDITIONS

The following discussion presents information regarding the project site and traffic conditions in the study area.

ROADWAY CHARACTERISTICS

State Route 89

State Route (SR) 89 is a two-lane roadway connecting Truckee, California, and the Interstate 80 corridor to the north with Squaw Valley, Alpine Meadows, and Tahoe City, California, to the south. Traffic volumes along State Route 89 exhibit strong seasonal variation, with congestion occurring during winter peak demand periods when adverse weather and ski area activity creates strongly peaked periods of traffic demand. Caltrans reports that the peak month Average Daily Traffic (ADT) on SR 89 in the project vicinity is 14,800 vehicles per day (Caltrans Traffic and Vehicle Data Systems Unit, 2012). SR 89 has a posted speed limit of 45 miles per hour at its intersection with Alpine Meadows Road.

Alpine Meadows Road

Alpine Meadows Road runs from SR 89 on the east to its terminus at the Alpine Meadows Ski Area approximately three miles to the west. It provides all access from SR 89 to the Alpine Meadows residential area. Alpine Meadows Road is generally two lanes in cross-section, and has a posted speed limit of 35 miles per hour.

EXISTING TRAFFIC VOLUMES

Winter Traffic Volumes

AM and PM peak-hour turning-movement counts were conducted by LSC at the State Route 89/Alpine Meadows Road intersection on Sunday, March 11, 2012 as a part of the Squaw Valley Traffic and Parking Analysis Project. The AM peak hour occurred from 10:45 to 11:45 AM and the PM peak hour occurred from 3:15 to 4:15 PM. Rather than using raw count data for analysis, the count volumes are adjusted to match a design period. It is standard traffic engineering practice to evaluate busy conditions, but not the absolute peak conditions. Placer County uses the 30th-highest winter PM peak hour as a design criteria. Based upon a review of Caltrans hourly traffic counts at a point on SR 89 immediately west of the Tahoe City "Wye" for the entire winter of 2011/2012, the estimated adjustment factor is approximately 1.6. This factor was applied to the SR 89 northbound and southbound approach volumes on the SR 89/Alpine Meadows Road intersection, in order to estimate 30th-highest winter PM peak-hour conditions. The same factor was applied to the AM peak-hour volumes on SR 89.

The adjustment factor for traffic turning to/from Alpine Meadows Road was estimated based upon the 14th-highest skier day at the Alpine Meadows Ski Area, consistent with the *Alpine Meadows Parking Lot Traffic Review* performed by LSC in 2006. Based upon a review of actual skier counts for the 2011/2012 ski season, the 14th-highest skier day occurred on April 14, 2012. The skier count on this day was compared to the skier count on March 11, 2012 (the day of the intersection counts) to estimate an adjustment factor for Alpine Meadows Road. The estimated factor of approximately 1.7 was applied to the turning movement volumes to/from Alpine Meadows Road.

The existing winter traffic volumes on Alpine Meadows Road at the proposed site access point were estimated based on the number of vehicles estimated to enter and exit the ski area parking lot during the

AM and PM peak hours on the 14th-highest skier day, and considering the traffic generated by the existing dwelling units accessed via Ginzton Access Road to the south of the site access.

Finally, as the intersection count was conducted in 2012, it is necessary to consider applying a growth factor to estimate existing year traffic conditions. Based on Caltrans historical traffic data on SR 89, there has been an increase in peak-month daily traffic volumes in the last five years of approximately 2.0 percent per year. To be conservative in this analysis, this annual adjustment was applied to the 2012 volumes to estimate existing year 2014 conditions. The resulting existing winter AM and PM peak-hour traffic volumes at the study intersections are shown in Figure 2.

Summer Traffic Volumes

PM peak-hour turning-movement counts were conducted by LSC at the State Route 89/Alpine Meadows Road intersection on Friday, August 12, 2011 as a part of the Squaw Valley Traffic and Parking Analysis Project. The PM peak hour occurred from 3:30 to 4:30 PM. A factor of approximately 1.02 was applied to the traffic volumes on SR 89, in order to reflect 30th-highest peak-hour conditions. This factor was estimated based upon a review of Caltrans 2006 hourly traffic volumes at a point on SR 89 immediately north of Squaw Valley Road (2006 was the most recent and complete set of data available, as the count station was not in full operation in more recent years). The summer traffic volumes on Alpine Meadows Road at the proposed site access point were estimated based on the assumption that about 15 percent of the traffic on Alpine Meadows Road near SR 89 has an origin or destination at a point on Alpine Meadows Road to the south of the site access point.

Finally, as the intersection count was conducted in 2011, the estimated annual growth factor of 2.0 percent was applied to the 2011 volumes to estimate existing year 2014 conditions. The estimated existing summer PM peak-hour traffic volumes at the study intersections are shown in Figure 2.

EXISTING TRANSIT SERVICE

Tahoe Area Regional Transit (TART), operated by Placer County Department of Public Works, serves stops along SR 89 at Alpine Meadows Road as part of the Highway 89 Route between Tahoe City and Truckee. This service is operated in both directions every hour from 6:00 AM to 7:22 PM in the summer, and from 6:00 AM to 6:30 PM in the winter and off-seasons. In addition, the “Night Rider” service operated under contract of the Truckee-North Tahoe Transportation Management Association provides hourly evening service from these stops to Squaw Valley and Tahoe City (and beyond) as late as 2:00 AM in summer and winter.

Squaw Valley Resort operates the “Squaw Valley – Alpine Express” every 20 minutes during periods of ski lift operations between the Alpine Meadows base area and the Squaw Valley Village area.

The “North Lake Tahoe Express” is a shuttle service connecting the North Tahoe area (including Alpine Meadows) with the Reno Tahoe International Airport. This service, which offers 3 trips per day in each direction, provides an opportunity for visitors to access the Alpine Meadows area, without the need to rent a car. Service is provided year round, although fewer runs are offered in the off-season.

BICYCLING AND PEDESTRIAN NETWORK

There are no designated bicycle or pedestrian facilities along Alpine Meadows Road. The Tahoe City Public Utility District’s Truckee River Trail parallels SR 89 between Tahoe City and Squaw Valley Road, crossing Alpine Meadows Road at grade just west of the intersection with SR 89. This consists of a paved Class I facility popular with both cyclists and pedestrians.

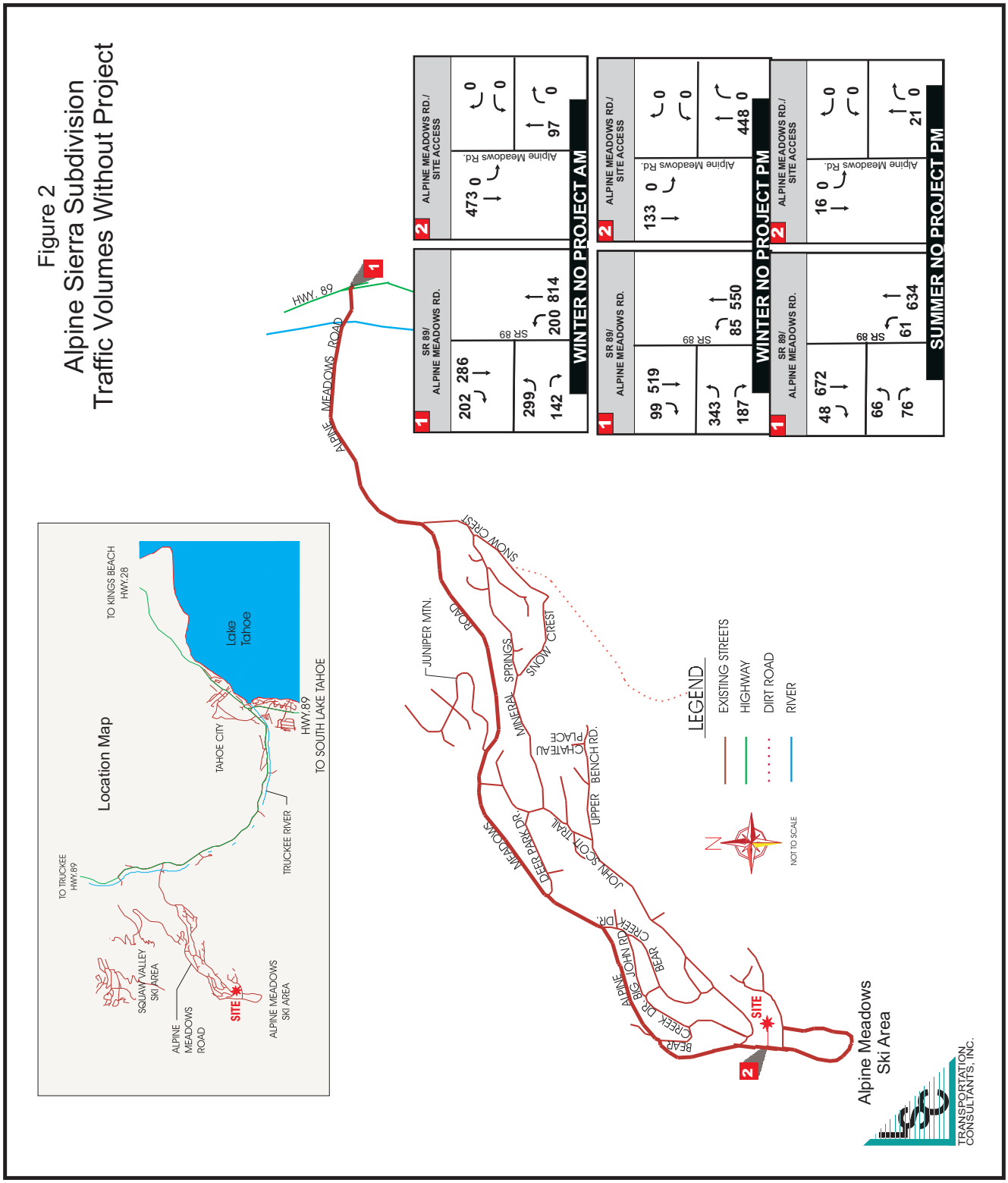
Figure 2
Alpine Sierra Subdivision
Traffic Volumes Without Project
Location Map
TO TRUCKEE HWY.89
SQUAW VALLEY SKI AREA
ALPINE MEADOWS ROAD
SITE
ALPINE MEADOWS SKI AREA
TRUCKEE RIVER
TAHOE CITY
Lake Tahoe
TO KINGS BEACH HWY.28
HWY.89
TO SOUTH LAKE TAHOE
HWY. 89
ALPINE MEADOWS ROAD
1
2
SR 89/ ALPINE MEADOWS RD.
ALPINE MEADOWS RD./ SITE ACCESS
Alpine Meadows Rd.
SR 89
WINTER NO PROJECT AM
202 286
299
142
200 814
473 0
0
0
97
WINTER NO PROJECT PM
99 519
343
187
85 550
133 0
0
0
448 0
SUMMER NO PROJECT PM
48 672
66
76
61 634
16 0
0
0
21 0
JUNIPER MTN.
ROAD
SNOW CREST
MINERAL SPRINGS
CHATEAU PLACE
UPPER BENCH RD.
JOHN SCOTT TRAIL
DEER PARK DR.
MEADOWS
ALPINE
BIG JOHN RD.
BEAR CREEK DR.
BEAR CREEK
LEGEND
EXISTING STREETS
HIGHWAY
DIRT ROAD
RIVER
N
NOT TO SCALE
Alpine Meadows Ski Area
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Section 3
TRIP GENERATION, DISTRIBUTION, AND ASSIGNMENT

TRIP GENERATION

The first step in the analysis of future traffic impacts is to prepare an estimate of the number of trips generated by the proposed project. Trip generation is the evaluation of the number of vehicle-trips that will either have an origin or destination at the project site. Daily one-way vehicle-trips and peak-hour one-way vehicle-trips must be determined in order to analyze the potential impacts from the proposed project development. Standard trip generation rates are provided in the Institute of Transportation Engineers (ITE) *Trip Generation, 8th Edition (2008)* manual (as Placer County has not adopted the *9th Edition* manual.)

The project proposes to construct a total of 53 dwelling units, as follows:

- 33 single-family detached residences
- 14 duplex units
- Up to 5 guest/secondary units
- 1 small Homeowners Association (HOA) staff unit

A portion of the proposed dwelling units are expected to be vacation homes, which tend to have lower trip generation rates than primary residences. Based upon a review of the 2006-2010 American Community Survey data from the US Census, approximately 75.8 percent of dwelling units in the census tract containing the Alpine Meadows area are used as recreation homes. Therefore, about 75 percent of the proposed detached units on the project site are assumed to be vacation homes (recreation homes). The "Residential Condominium/Townhouse" land use is applied to all of the attached duplex units. A summary of AM peak hour, PM peak hour, and daily trip generation for the proposed project is presented in Table 1.

Some of the trips made between the site and the Alpine Meadows Ski Area are expected to be made via non-auto modes, considering that there is an intention to provide an Alpine Sierra HOA shuttle with frequent service to/from the ski area on peak days. Additionally, the 20 lots clustered in the western portion of the project site are located less than one-quarter mile from the base of the "Subway" lift. Residents and guests of the proposed units could potentially walk to the lift and/or ski back to within a couple hundred feet of their unit. However, as the relatively low "Recreational Homes" trip generation rates already reflect some level of non-auto travel associated with resort facilities, no additional reductions are applied for trips made via shuttle or walking, in order to remain conservative in this analysis. Similarly, no additional reduction is taken for non-auto trips during the summer season, conservatively.

As indicated in the far right columns of Table 1, a total of approximately 277 one-way vehicle-trip ends are estimated to be generated at the site access point over the course of a busy day, with approximately 24 (8 inbound and 16 outbound) occurring during the AM peak hour and 27 (16 inbound and 11 outbound) during the PM peak hour.

TRAFFIC DISTRIBUTION AND ASSIGNMENT

It is necessary to identify the proportion of trips generated by the site to and from each direction along Alpine Meadows Road, and the proportion of trips made to and from each direction along SR 89, in order to assign the trips through the study intersections. The distribution of traffic arriving and leaving the project site via State Route 89 is identified based upon the existing winter and summer traffic patterns, as

TABLE 1: Alpine Sierra Subdivision Trip Generation

Proposed Land Use	ITE Code	ITE Land Use Type	Quantity	Unit	Trip Generation Rates [1] In	Trip Generation Rates [1] Out	Trip Generation Rates [1] Total	One-Way Vehicle Trips at Site Driveway In	One-Way Vehicle Trips at Site Driveway Out	One-Way Vehicle Trips at Site Driveway Total
AM Peak Hour										
Single-Family Primary Homes	210	Single-Family Detached Housing	8	DU	0.19	0.56	0.75	2	4	6
Vacation Homes	260	Recreational Home	25	DU	0.15	0.15	0.30	4	4	8
Duplex Units	230	Residential Condo/Townhouse	14	DU	0.07	0.37	0.44	1	5	6
Guest/Secondary Units	220	Apartment	5	DU	0.10	0.41	0.51	1	2	3
HOA Staff Unit	220	Apartment	1	DU	0.10	0.41	0.51	0	1	1
Total AM Peak Hour			**53**	**DU**				**8**	**16**	**24**
PM Peak Hour										
Single-Family Primary Homes	210	Single-Family Detached Housing	8	DU	0.64	0.37	1.01	5	3	8
Vacation Homes	260	Recreational Home	25	DU	0.14	0.17	0.31	3	5	8
Duplex Units	230	Residential Condo/Townhouse	14	DU	0.35	0.17	0.52	5	2	7
Guest/Secondary Units	220	Apartment	5	DU	0.40	0.22	0.62	2	1	3
HOA Staff Unit	220	Apartment	1	DU	0.40	0.22	0.62	1	0	1
Total PM Peak Hour			**53**	**DU**				**16**	**11**	**27**
Daily										
Single-Family Primary Homes	210	Single-Family Detached Housing	8	DU	--	--	9.57	--	--	77
Vacation Homes	260	Recreational Home	25	DU	--	--	3.16	--	--	79
Duplex Units	230	Residential Condo/Townhouse	14	DU	--	--	5.81	--	--	81
Guest/Secondary Units	220	Apartment	5	DU			6.65	--	--	33
HOA Staff Unit	220	Apartment	1	DU	--	--	6.65	--	--	7
Total Daily			**53**	**DU**				**--**	**--**	**277**

DU = Dwelling Unit

Note 1: Trip generation rates are based on the Institute of Transportation Engineers (ITE) Trip Generation, 8th Edition (2008) manual.

Source: ITE, LSC Transportation Consultants, Inc.

Alpine Sierra TripCalcs2014.xlsx

well as the portion of project trips that are assumed to be made by skiers going to/from the Alpine Meadows Ski Area in the winter. The estimated winter distribution pattern for project-generated trips is shown in Table 2. As shown, about 60 percent of project trips are estimated to be made to/from the Alpine Meadows Ski Area in the peak direction during the peak hour (outbound in the AM and inbound in the PM). Similarly, 30 percent of project trips are estimated to be made to/from the ski area in the off-peak direction. The estimated distribution pattern for project-generated trips during the summer is shown in Table 3. More than half (approximately 52 percent) of project trips are assumed to be made to/from the south on SR 89.

The project traffic turning movements are calculated by applying the distribution patterns presented in Tables 2 and 3 to the project-generated trips shown in Table 1. The resulting project-generated winter AM, winter PM, and summer PM turning movements through the site access intersection and the SR 89/Alpine Meadows Road intersection are presented in Figure 3. Adding the project-generated volumes to the existing volumes yields the total traffic volumes with the project, which are shown in Figure 4.

TABLE 2: Alpine Sierra Subdivision - Winter Trip Distribution

	Distribution of Project Traffic			
	AM		PM	
Origin/Destination	Inbound	Outbound	Inbound	Outbound
Alpine Meadows Ski Area	30%	60%	60%	30%
SR 89 to/from the North	35%	27%	22%	45%
SR 89 to/from the South	35%	13%	18%	25%
TOTAL	100%	100%	100%	100%

Source: LSC Transportation Consultants, Inc. AlpineSierraTripGen.xls

TABLE 3: Alpine Sierra Subdivision - Summer Trip Distribution

Origin/Destination	PM Distribution of Project Traffic
SR 89 to/from the North	43%
SR 89 to/from the South	52%
Points Along Alpine Meadows Road	5%
TOTAL	100%

Source: LSC Transportation Consultants, Inc. AlpineSierraTripGen.xls

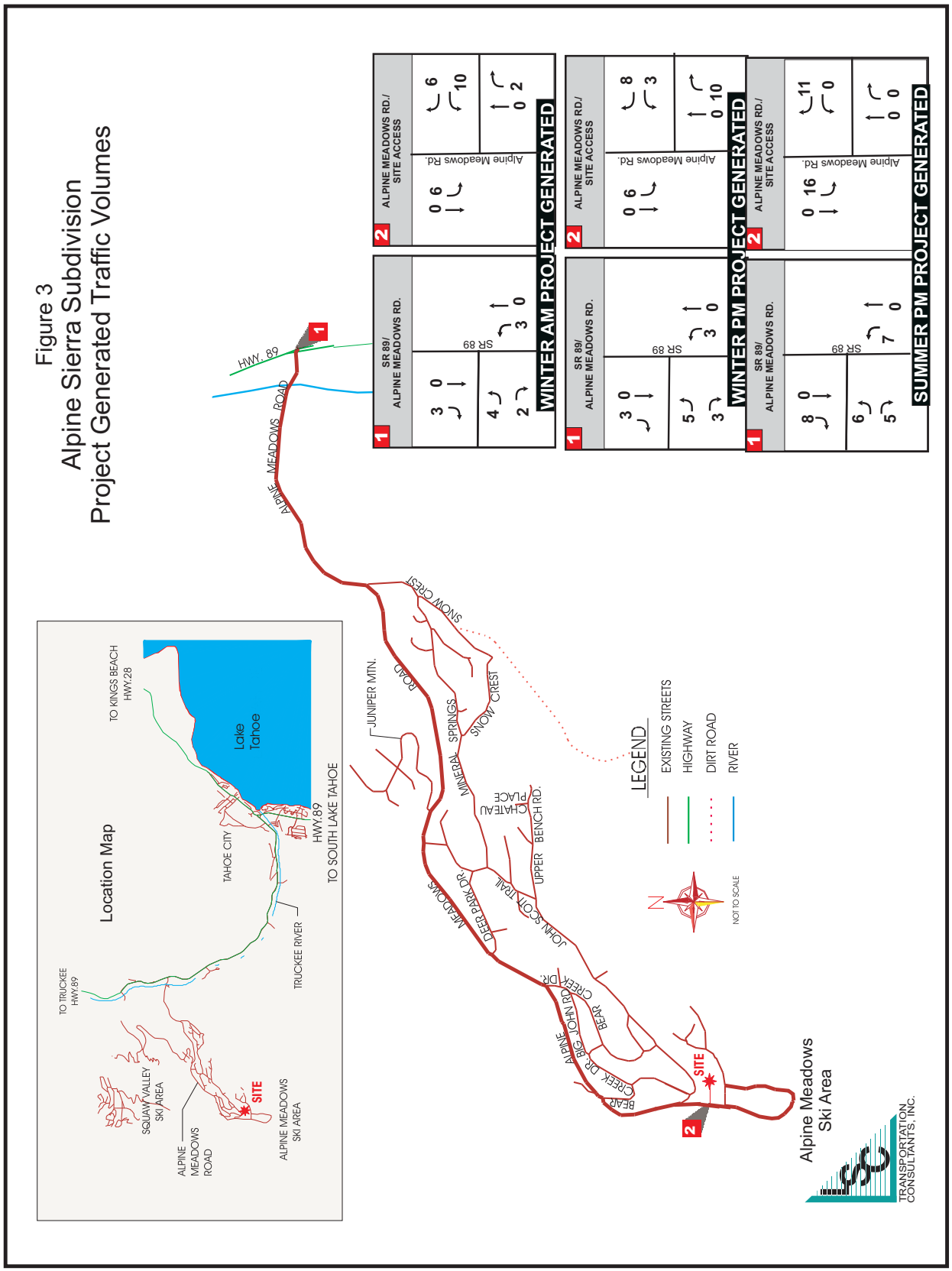
Figure 3
Alpine Sierra Subdivision
Project Generated Traffic Volumes
WINTER AM PROJECT GENERATED
WINTER PM PROJECT GENERATED
SUMMER PM PROJECT GENERATED
SR 89/ ALPINE MEADOWS RD.
ALPINE MEADOWS RD./ SITE ACCESS
Alpine Meadows Rd.
SR 89
HWY. 89
ALPINE MEADOWS ROAD
SNOW CREST
JUNIPER MTN.
ROAD
MINERAL SPRINGS
CHATEAU PLACE
UPPER BENCH RD.
JOHN SCOTT TRAIL
DEER PARK DR.
ALPINE MEADOWS
BIG JOHN RD.
BEAR CREEK DR.
BEAR CREEK
SITE
LEGEND
EXISTING STREETS
HIGHWAY
DIRT ROAD
RIVER
NOT TO SCALE
Location Map
TO TRUCKEE HWY.89
TO KINGS BEACH HWY.28
Lake Tahoe
TAHOE CITY
TRUCKEE RIVER
HWY.89
TO SOUTH LAKE TAHOE
SQUAW VALLEY SKI AREA
ALPINE MEADOWS ROAD
ALPINE MEADOWS SKI AREA
Alpine Meadows Ski Area
TRANSPORTATION CONSULTANTS, INC.

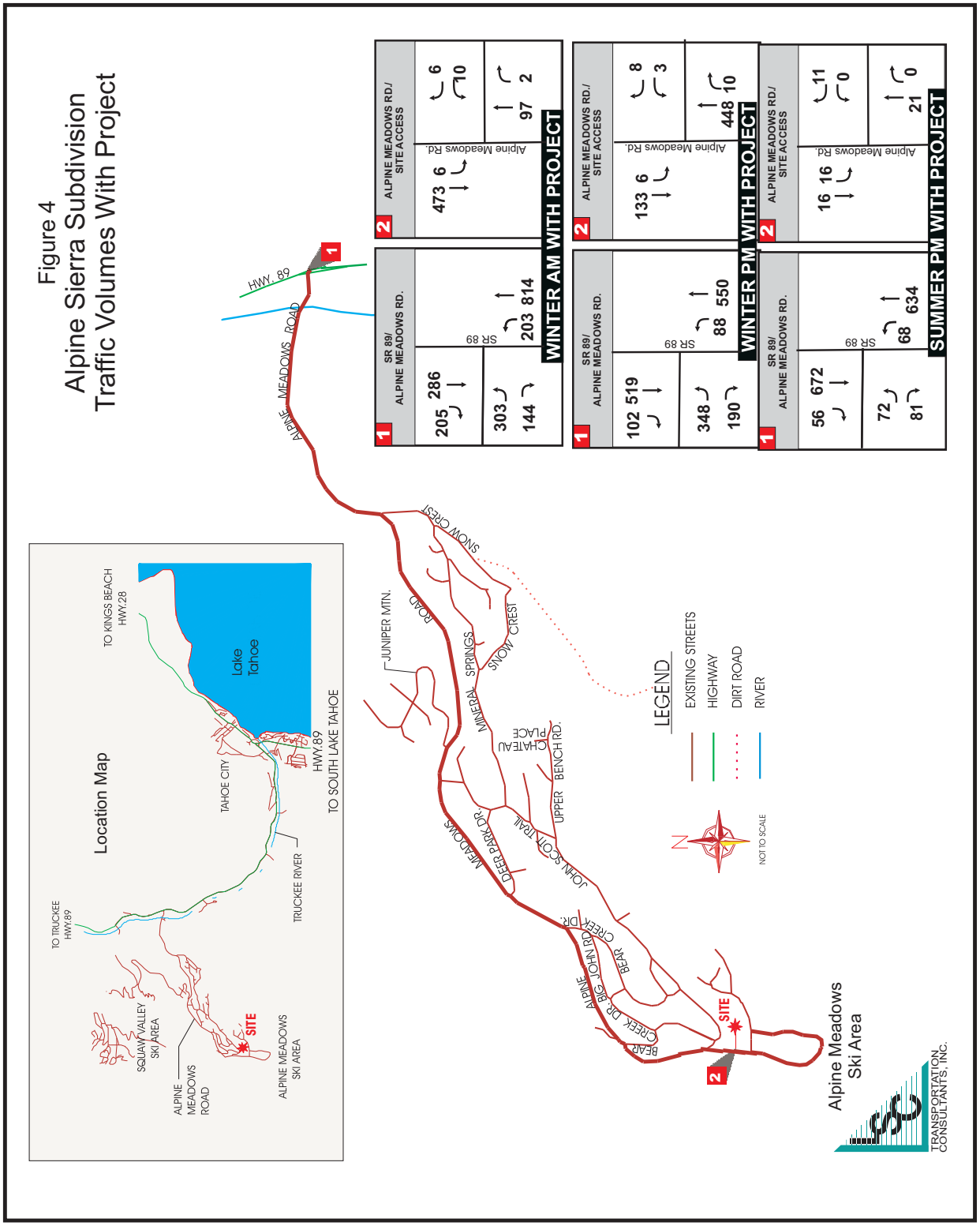
Figure 4
Alpine Sierra Subdivision
Traffic Volumes With Project
Location Map
TO TRUCKEE HWY.89
SQUAW VALLEY SKI AREA
ALPINE MEADOWS ROAD
SITE
ALPINE MEADOWS SKI AREA
TRUCKEE RIVER
TAHOE CITY
Lake Tahoe
TO KINGS BEACH HWY.28
HWY.89 TO SOUTH LAKE TAHOE
HWY. 89
ALPINE MEADOWS ROAD
JUNIPER MTN.
ROAD
SNOW CREST
MINERAL SPRINGS
PLACE
PLATEAU
BENCH RD.
UPPER
JOHN SCOTT TRAIL
DEER PARK DR.
MEADOWS
ALPINE JOHN RD.
BIG DR.
BEAR CREEK
BEAR
SITE
LEGEND
EXISTING STREETS
HIGHWAY
DIRT ROAD
RIVER
NOT TO SCALE
1
SR 89/ ALPINE MEADOWS RD.
SR 89
205 286
303 144
203 814
2
ALPINE MEADOWS RD./ SITE ACCESS
Alpine Meadows Rd.
473 6
6 10
97 2
WINTER AM WITH PROJECT
102 519
348 190
88 550
133 6
8 3
448 10
WINTER PM WITH PROJECT
56 672
72 81
68 634
16 16
11 0
21 0
SUMMER PM WITH PROJECT
Alpine Meadows Ski Area
LSC
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Section 4
FUTURE CUMULATIVE TRAFFIC CONDITIONS

The potential transportation impacts of the proposed project are evaluated under long-term (20-year horizon) cumulative conditions. First, future cumulative traffic volumes are estimated without the project. Next, future cumulative volumes with the project are estimated. Finally, intersection LOS is analyzed with and without the project.

FUTURE CUMULATIVE TRAFFIC VOLUMES

Future Traffic Volumes without Project

Future cumulative (20-year horizon) traffic volume projections for SR 89 in the study area are provided in the *SR 89 Transportation Corridor Concept Report* (Caltrans, 2012). Based on a comparison of the 2010 and 2030 traffic volumes provided in that report, the average growth rate is estimated to be approximately 0.92 percent per year. This rate is applied to the existing peak-hour volumes on SR 89 in order to estimate the future cumulative volumes. As a future traffic model is not available for the Alpine Meadows area, the projected increase in housing units is used as the basis for estimating future traffic volumes along Alpine Meadows Road. Specifically, County Planning Department staff estimates the number of housing units in Alpine Meadows will increase by about 101 units over the next 20 years. Compared to the existing number of units (about 794, according to 2010 Census data), this equates to an average growth rate of approximately 0.6 percent per year. This growth rate is applied to the existing peak-hour traffic volumes on Alpine Meadows Road. The resulting future cumulative winter and summer peak-hour intersection turning movement volumes without the proposed project are shown in Figure 5.

Future Traffic Volumes with Project

Adding the project-generated traffic volumes to the ‘no project’ volumes yields the future cumulative ‘with project’ volumes illustrated in Figure 6.

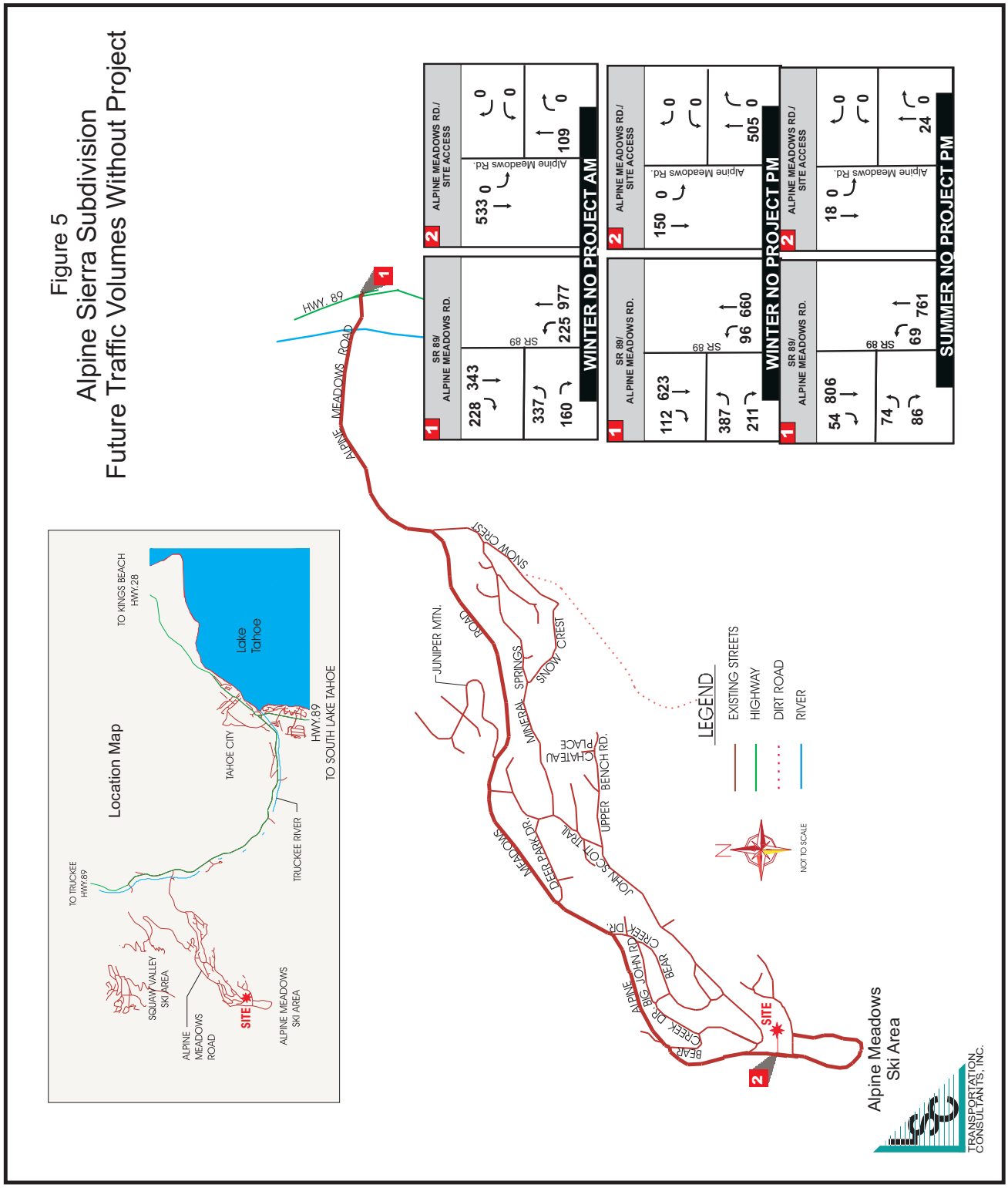
Figure 5
Alpine Sierra Subdivision
Future Traffic Volumes Without Project
Location Map
TO TRUCKEE HWY.89
SQUAW VALLEY SKI AREA
ALPINE MEADOWS ROAD
SITE
ALPINE MEADOWS SKI AREA
TRUCKEE RIVER
TAHOE CITY
Lake Tahoe
TO KINGS BEACH HWY.28
HWY.89
TO SOUTH LAKE TAHOE
HWY. 89
ALPINE MEADOWS ROAD
1
2
SR 89/ ALPINE MEADOWS RD.
ALPINE MEADOWS RD./ SITE ACCESS
SR 89
Alpine Meadows Rd.
228 343
337 160
225 977
533 0
0 0
0 0
109
WINTER NO PROJECT AM
112 623
387 211
96 660
150 0
0 0
0 0
505
WINTER NO PROJECT PM
54 806
74 86
69 761
18 0
0 0
0 0
24
SUMMER NO PROJECT PM
JUNIPER MTN.
ROAD
SNOW CREST
MINERAL SPRINGS
CHATEAU PLACE
UPPER BENCH RD.
JOHN SCOTT TRAIL
MEADOWS
DEER RAPPAR DR.
ALPINE DR.
BIG JOHN RD.
BEAR CREEK
BEAR CREEK DR.
LEGEND
EXISTING STREETS
HIGHWAY
DIRT ROAD
RIVER
NOT TO SCALE
Alpine Meadows Ski Area
TRANSPORTATION CONSULTANTS, INC.

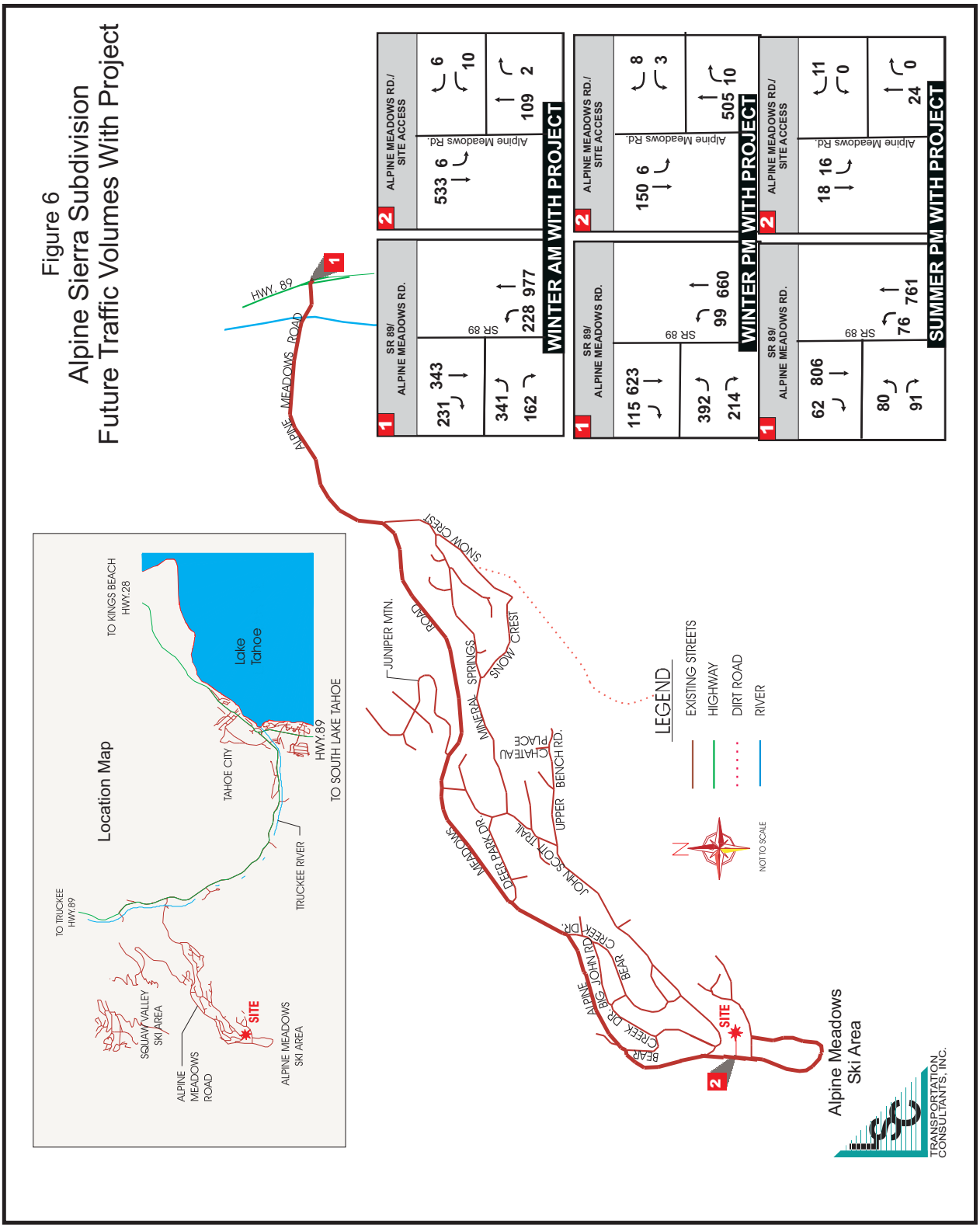
Figure 6
Alpine Sierra Subdivision
Future Traffic Volumes With Project
Location Map
TO TRUCKEE HWY.89
SQUAW VALLEY SKI AREA
ALPINE MEADOWS ROAD
SITE
ALPINE MEADOWS SKI AREA
TRUCKEE RIVER
TAHOE CITY
Lake Tahoe
TO KINGS BEACH HWY.28
HWY.89
TO SOUTH LAKE TAHOE
HWY. 89
ALPINE MEADOWS ROAD
1
SR 89/ ALPINE MEADOWS RD.
SR 89
231 343
341 162
228 977
WINTER AM WITH PROJECT
2
ALPINE MEADOWS RD./ SITE ACCESS
Alpine Meadows Rd.
533 6
6 10
109 2
WINTER PM WITH PROJECT
150 6
8 3
99 660
505 10
SUMMER PM WITH PROJECT
18 16
11 0
62 806
80 76 761
91
24 0
JUNIPER MTN.
ROAD
SNOW CREST
MINERAL SPRINGS
CHATEAU PLACE
UPPER BENCH RD.
JOHN SCOTT TRAIL
DEER PARK DR.
MEADOWS
BEAR CREEK DR.
BIG JOHN RD.
ALPINE
LEGEND
EXISTING STREETS
HIGHWAY
DIRT ROAD
RIVER
NOT TO SCALE
Alpine Meadows Ski Area
TRANSPORTATION CONSULTANTS, INC.

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Section 5
LEVEL OF SERVICE

METHODOLOGY

LOS is a quantitative and qualitative measure of traffic conditions on isolated sections of roadway or intersections. LOS ranges from "A" (with no congestion) to "F" (where the system fails with gridlock or stop-and-go conditions prevailing). Detailed LOS definitions are included in Appendix B. As is the standard for traffic engineering analyses, intersection LOS is analyzed based upon the procedures presented in the *Highway Capacity Manual* (Federal Highways Administration, 2010) using the *Synchro* software package (Version 8, TrafficWare, LLC, 2013).

Both study intersections are evaluated based on side-street stop-controlled methodologies. Delay and LOS are reported for the worst movement at each intersection. The stop-controlled analysis of the SR 89/Alpine Meadows Road intersection considers the acceleration lane present for eastbound to northbound left turns onto SR 89. This is reflected in the analysis using the two-stage left-turn analysis procedures in the HCM. Additionally, the California Highway Patrol conducts traffic control at this intersection on weekends and occasionally on busy Fridays during peak winter periods. Under TCO operation, the intersection functions similarly to a signalized intersection. Therefore, the LOS analysis for the SR 89/Alpine Meadows Road intersection for the winter PM scenarios is analyzed using the HCM signalized intersection methodology. Consistent with other traffic studies in Alpine Meadows, a 120-second cycle length is assumed with 30-second splits for eastbound left turns and northbound left turns, and a 60-second split for southbound through traffic. With the acceleration lane for eastbound left-turning traffic, northbound through traffic is not required to stop (Florida T-intersection operations).

LEVEL OF SERVICE STANDARDS

The following LOS standards are applicable to the study area:

Caltrans

According to the *SR 89 Transportation Corridor Concept Report* (Caltrans District 3, April, 2012), the minimum acceptable LOS along the entire length of SR 89 over the next 20 years is "E."

Placer County

Placer County defines its LOS standard as "D" for locations within one-half mile of a state highway, and "C" for other locations in the study area. 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 "E."

If worst movement LOS at an un-signalized intersection in Placer County exceeds LOS standards, a "Peak-Hour" signal warrant analysis, consistent with the Manual of Uniform Traffic Control Devices (MUTCD), is required. If the intersection attains minimum signal warrant volumes, mitigation is required. Placer County may allow exceptions to its LOS standards where it finds that the improvements or other measures required to achieve the LOS standards are unacceptable based on established criteria. Exceptions to the standards will only be allowed after all feasible measures and options are explored, including alternative forms of transportation.

Finally, Placer County adopted a "Methodology of Assessment – Minimum LOS" policy for County roadways and intersections (including State facilities) to ensure that mitigation measures are proportionate to the level of impact a specific project has on an intersection or roadway. This methodology establishes guidelines for when a project may be considered to exceed the minimum LOS policies.

INTERSECTION LEVEL OF SERVICE

Level of Service (LOS) was calculated for the two study intersections, and the results are summarized in Table 4. Appendix C presents detailed LOS calculations. The SR 89/Alpine Meadows Road intersection is shown to operate at LOS F during the 2014 winter AM peak hour, with or without the proposed project. During the winter PM peak hour under TCO operations as listed above, the intersection is calculated to operate at an acceptable LOS C, with or without the proposed project. The intersection also is shown to operate at an acceptable LOS C during the 2014 summer PM peak hour, with or without the proposed project. With implementation of the project in 2014, the worst movement (the site driveway) at the site access intersection is expected to operate at LOS B in the winter peak hours. During the summer, all movements on this intersection are estimated to operate at a good LOS A.

Under future cumulative conditions without the project, the average delays would increase, although the intersection LOS would not deteriorate. The SR 89/Alpine Meadows Road intersection would continue to operate at LOS F, which exceeds the LOS standard. Implementation of the proposed project in 2034 would not degrade the LOS at any study intersection under any scenario, with the exception of the summer PM peak hour. The SR 89/Alpine Meadows Road intersection is estimated to degrade from LOS C to LOS D with the project. However, the LOS standard would not be exceeded during this period.

TABLE 4: Alpine Sierra Subdivision - Intersection Level of Service

Intersection	Control Type	LOS Standard	Existing Year				Future Cumulative Year			
			No Project		With Project		No Project		With Project	
			Delay (seconds/ vehicle)	LOS	Delay (seconds/ vehicle)	LOS	Delay (seconds/ vehicle)	LOS	Delay (seconds/ vehicle)	LOS
Winter AM										
SR 89 / Alpine Meadows Road	Stop-Controlled [1]	D	**293.0**	**F**	**OVF [2]**	**F**	**OVF [2]**	**F**	**OVF [2]**	**F**
Alpine Meadows Road / Site Access	Stop-Controlled [1]	C	--	--	11.7	B	--	--	12.4	B
Winter PM										
SR 89 / Alpine Meadows Road	TCO [3]	D	22.3	C	22.5	C	24.0	C	24.2	C
Alpine Meadows Road / Site Access	Stop-Controlled [1]	C	--	--	12.0	B	--	--	12.7	B
Summer PM										
SR 89 / Alpine Meadows Road	Stop-Controlled [1]	D	16.9	C	19.8	C	24.0	C	25.1	D
Alpine Meadows Road / Site Access	Stop-Controlled [1]	C	--	--	8.5	A	--	--	8.5	A

BOLD text indicates that LOS standard is exceeded.
TCO = Traffic Control Officer
Note 1: Worst movement LOS is reported for stop-controlled intersections.
Note 2: OVF = Overflow. Overflow indicates a delay greater than 300 seconds per vehicle, for which delays cannot be accurately calculated using HCM methodologies.
Note 3: Analysis assumes TCO during winter PM period. LOS with TCO is based on HCM 2000 Traffic Signal analysis procedures. LOS is reported for total intersection.
Source: LSC Transportation Consultants, Inc. *Alpine Sierra TripCalcs2014.xlsx*

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Section 6
IMPACTS AND MITIGATION

The following areas of transportation impacts are evaluated in this section:

- Intersection Level of Service
- Driver Sight Distance
- Intersection Spacing
- Lots 46 and 47 Driveway Locations
- Evaluation of Dead-End Road Lengths

INTERSECTION LEVEL OF SERVICE

The worst movement on the SR 89/Alpine Meadows Road intersection (the left-turn movement from Alpine Meadows Road onto SR 89) currently operates at an unacceptable LOS F during peak winter AM periods. With implementation of the proposed project, this movement would continue to operate at LOS F in the winter AM peak hour. Under future cumulative conditions, this un-signalized intersection would operate at LOS F during the winter AM peak hour, with or without the project.

According to the County's adopted "Methodology of Assessment – Minimum LOS" policy, a project may be considered to exceed the minimum LOS policy if an un-signalized intersection which currently operates below the acceptable LOS established policy will experience an increase of 2.5 seconds or more with the project. The SR 89/Alpine Meadows Road intersection is expected to experience an increase of more than 2.5 seconds (at least 7 seconds) of delay on the worst movement during the winter AM peak hour with the proposed project. As such, the project would exceed the LOS policy during this period, although the LOS policy would not be exceeded during the other analysis periods (winter PM and summer PM).

According to Placer County standards, if worst movement LOS at an un-signalized intersection exceeds LOS standards, a "Peak-Hour" signal warrant analysis is required. If the intersection attains minimum signal warrant volumes, mitigation is required. The traffic volumes at the SR 89/Alpine Meadows Road intersection currently meet the peak-hour signal warrant provided in the Manual of Uniform Traffic Control Devices (MUTCD) during winter and summer peak periods. Provision of a Traffic Control Officer (TCO) at the SR 89/Alpine Meadows Road intersection during winter peak AM periods would provide an acceptable LOS. Caltrans plans to install a traffic signal at this intersection in 2015. In addition, Placer County (in coordination with Caltrans) plans to replace the Truckee River Bridge on Alpine Meadows Road immediately west of this intersection. Construction is tentatively scheduled to start in 2015, with project completion in 2016. With a traffic signal, the SR 89/Alpine Meadows Road intersection would operate at an acceptable LOS B under existing and future cumulative conditions, with or without the proposed Alpine Sierra Subdivision Project.

As identified in the previous section, the Alpine Meadows Road/Site Access intersection is expected to operate at a relatively good LOS under all scenarios with the project. Therefore, no intersection LOS mitigation measures are necessary at this intersection.

DRIVER SIGHT DISTANCE

Driver sight distance at the proposed site access intersection was evaluated. Two measures of sight distance were evaluated: stopping sight distance and corner sight distance. Stopping sight distance is the distance that the driver of a vehicle on Alpine Meadows Road should be able to see ahead on the traveled roadway in order to have time to react and stop before striking an object (or side-street vehicle) that

comes into view at the site access location. Corner sight distance is the distance that a driver of a vehicle on the site access drive should be able to see in each direction along Alpine Meadows Road to determine if he/she can safely enter the roadway. Placer County follows the sight distance standards provided in the Caltrans Highway Design Manual (HDM).

Stopping sight distance is measured from the driver's eye height of 3.5 feet to an object on the roadway with a height of 6 inches. The required stopping sight distance is 300 feet, based on a travel speed of 40 miles per hour along Alpine Meadows Road. As the existing stopping sight distance exceeds 600 feet in both directions on Alpine Meadows Road, adequate stopping sight distance is provided.

Corner sight distance is measured from a location on the site driveway set back a minimum of 15 feet from the edge of the traveled way from the driver's eye height of 3.5 feet to an object in the center of the roadway with a height of 4.25 feet. The required corner sight distance is 440 feet. To the right looking north, more than 600 feet of corner sight distance is provided, which well exceeds the recommended distance. To the left looking south, only roughly 180 feet of corner sight distance is provided, due to the presence of the small trees along the east side of Alpine Meadows Road, as well as the horizontal curvature of the roadway. This is 260 feet short of the desired minimum distance.

With construction of the site access roadway, some of the small trees along the east side of Alpine Meadows Road immediately south of the site driveway may need to be removed or routinely trimmed in order to provide adequate corner sight distance. In addition, the final landscaping plans should not hinder the driver sight distance looking to the north and to the south along Alpine Meadows Road from the site access point. Finally, snow should be removed from the corners of the intersection to provide adequate sight distance for drivers exiting the site and judging gaps in oncoming traffic along Alpine Meadows Road. With these measures, adequate driver sight distance is expected to be provided.

INTERSECTION SPACING

The proposed intersection spacing and the interaction between the turning movements at the site access point relative to adjacent driveways and intersections was evaluated. The site access roadway is proposed to be located at a point on the east side of Alpine Meadows Road about 450 feet north of Chalet Road. There is an existing driveway located on the opposite side (west side) of Alpine Meadows Road about 160 feet to the north of the proposed site access point. Section 4.05(h) in the *Placer County Land Development Manual* (Placer County, 2006) requires that "Streets entering on opposite sides of any given street shall have their centerline directly opposite or shall be offset by at least 150 feet." As the adjacent intersections on Alpine Meadows Road are offset by more than 150 feet, the proposed site access location meets this requirement.

LOTS 46 AND 47 DRIVEWAY LOCATIONS

The proposed lot locations within the vicinity of the proposed Road A/Court B intersection were reviewed. It is recommended that the driveways be located at least 50 feet from the intersection, in order to minimize the potential for conflict between a vehicle entering/exiting the driveway and a vehicle turning at the intersection. Based upon a review of the current site plan, a driveway on either Lot 46 or Lot 47 would not meet the recommended minimum distance from the intersection. It is recommended that the site plan be revised to provide at least 50 feet from the edge of pavement on Road A to the first driveway on Court B. For instance, a shared driveway via Lot 45 could potentially be provided, as Lot 45 is located more than 50 feet from Road A.

EVALUATION OF DEAD-END ROAD LENGTHS

The Placer County Land Development Manual (Section 4.08) specifies that the maximum allowable length of a dead-end road, including all dead-end roads accessed from that dead-end road, shall not exceed the following cumulative lengths, regardless of the number of parcels served:

- parcels zoned for less than one acre: 800 feet
- parcels zoned for 1 acre to 4.99 acres: 1,320 feet

The proposed Alpine Sierra Subdivision development internal roadways are evaluated against the criteria for parcels zoned for less than one acre, as the project description specifies lots ranging from 0.39 acre to 1.17 acres (average lot size is 0.72 acre). The maximum length for dead-end roadways is therefore 800 feet. Based on the current site plan, all of the proposed parcels except parcels 45-47 are beyond the 800-foot limit specified by this code. Furthermore, parcels 1-27 are beyond the 1,320-foot limit for any of those parcels that are greater than 1 acre.

The County standards (Zoning Code, Section 17.54.100.C.1.d) for residential developments state that at least two vehicle entry/exit points shall be provided or planned for adequate circulation and emergency purposes unless otherwise determined by the Planning Commission. However, the project as proposed is on a dead-end road. No practical alternative has been identified to allow for two points of access due to surrounding terrain and ownership. Consequently, the project is required to provide mitigation to the life-safety authority to mitigate the impact of single point access. The project has obtained a will serve letter from the Alpine Springs County Water District (ASCWD) based on a series of water system improvements, improved building standards, defensible space improvements, and other terms that would mitigate the concern of the Service Provider. ASCWD contracts with the North Tahoe Fire Protection District (NTFPD), who has agreed to this mitigation. The will serve letter is contained in Appendix D.

MITIGATION MEASURES

The following mitigation measures are recommended to be implemented to offset the impacts of the Alpine Sierra Subdivision Project:

Traffic Mitigation Fee
Pursuant to the Placer County Countywide Traffic Impact Fee Program, new development within the County is required to mitigate impacts to the roadway system by paying a traffic mitigation fee. This fee is assessed at a rate of $4,714 per Dwelling Unit Equivalent (DUE) for new land uses in the Tahoe Region.

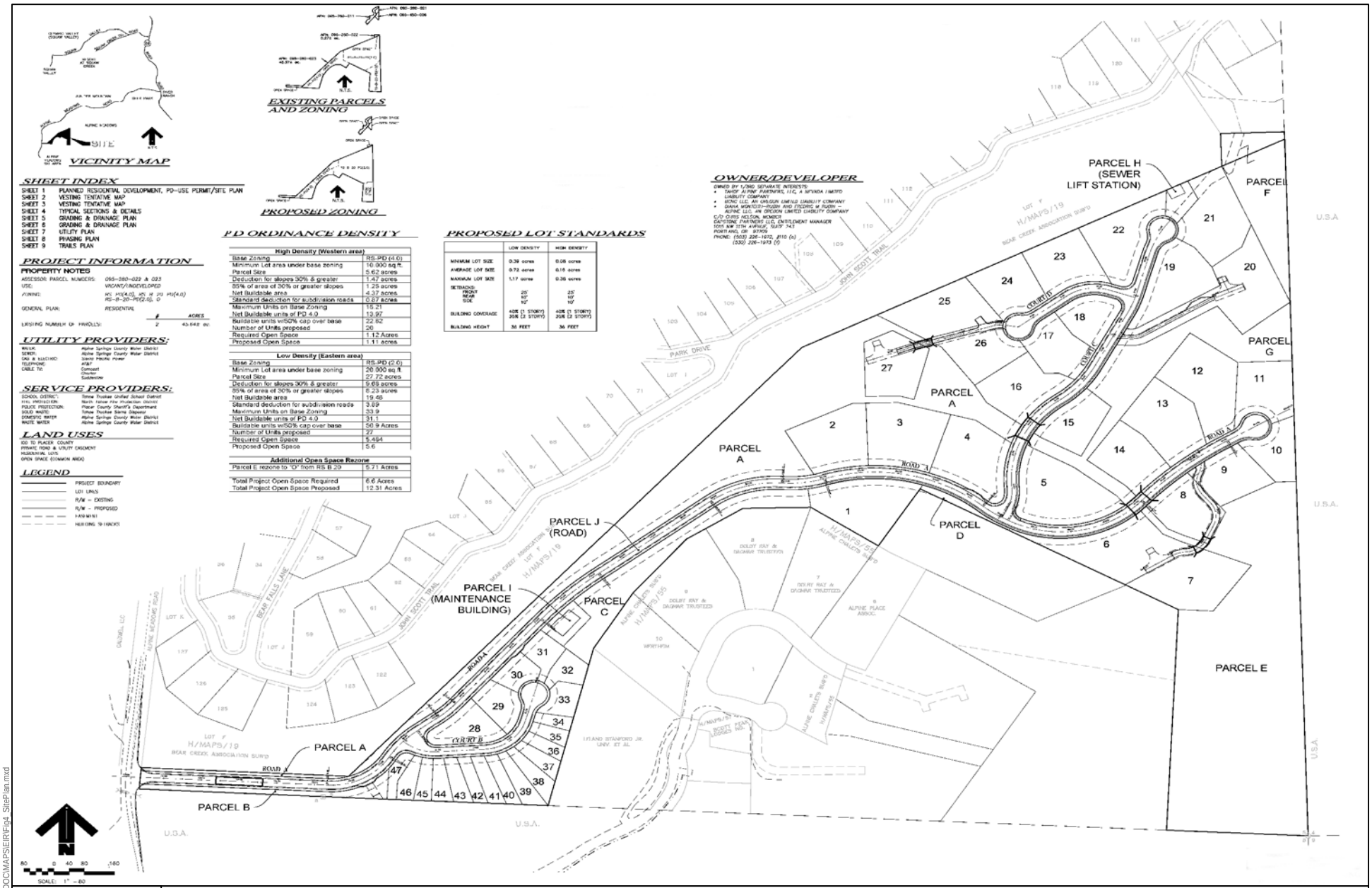
Site Access/Alpine Meadows Road Intersection
Some small trees along the east side of Alpine Meadows Road south of the proposed site driveway may need to be removed or routinely trimmed in order to provide 440 feet of corner sight distance. The final landscaping plans should not hinder the driver sight distance looking to the north and to the south along Alpine Meadows Road from the site access point. The subdivision's Homeowners' Association should be required to be responsible for removing snow from the corners of the intersection to provide adequate sight distance for drivers exiting the site and judging gaps in oncoming traffic along Alpine Meadows Road, and depositing the snow in a location off of adjacent private properties or public right-of-way.

Driveway Locations
It is recommended that the site plan be revised to provide at least 50 feet from the edge of pavement on Road A to the first driveway on Court B. For instance, a shared driveway serving Lots 45-47 could potentially be provided on Lot 45.

Dead-End Road Lengths

The project is required to provide mitigation to the life-safety authority, such as a series of water system improvements, improved building standards, defensible space improvements, and other terms to mitigate the impact of single point access. A will serve letter including mitigation measures has been provided by the ASCWD and agreed to by the NTFPD.

APPENDIX A
ALPINE SIERRA SUBDIVISION SITE PLAN



DUDEK

SOURCE: TLA Engineering & Planning, Inc. 2013

FIGURE 4

Site Plan

7688

ALPINE SIERRA SUBDIVISION

Path: Z:\Projects\768801\MAPDOC\MAPSIER\Fig4_SitePlan.mxd

APPENDIX B
DESCRIPTIONS OF LEVELS OF SERVICE

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.

APPENDIX C
LEVEL OF SERVICE CALCULATIONS

Alpine Sierra 2014 Level of Service Calculations

Intersection	
Int Delay, s/veh	46.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	299	142	200	814	286	202
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	700	400	-	-	160
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	311	148	208	848	298	210

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1563	298	298	0	-	0
Stage 1	298	-	-	-	-	-
Stage 2	1265	-	-	-	-	-
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	~ 123	741	1263	-	-	-
Stage 1	753	-	-	-	-	-
Stage 2	~ 265	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 103	741	1263	-	-	-
Mov Cap-2 Maneuver	~ 207	-	-	-	-	-
Stage 1	753	-	-	-	-	-
Stage 2	~ 221	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	202.2	1.7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1263	-	207	741	-	-
HCM Lane V/C Ratio	0.165	-	1.505	0.2	-	-
HCM Control Delay (s)	8.4	-	293	11.1	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	0.6	-	19.2	0.7	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM Signalized Intersection Capacity Analysis
1: SR 89 & Alpine Meadows Rd

8/5/2014

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	343	187	85	550	519	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	357	195	89	573	541	103
RTOR Reduction (vph)	0	130	0	0	0	42
Lane Group Flow (vph)	357	65	89	573	541	61
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4!		5	Free!	6	
Permitted Phases		4				6
Actuated Green, G (s)	40.0	40.0	12.0	120.0	56.0	56.0
Effective Green, g (s)	40.0	40.0	12.0	120.0	56.0	56.0
Actuated g/C Ratio	0.33	0.33	0.10	1.00	0.47	0.47
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	590	527	177	1863	869	738
v/s Ratio Prot	c0.20		c0.05	0.31	c0.29	
v/s Ratio Perm		0.04				0.04
v/c Ratio	0.61	0.12	0.50	0.31	0.62	0.08
Uniform Delay, d1	33.4	27.8	51.2	0.0	24.1	17.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.6	0.5	9.9	0.4	3.4	0.2
Delay (s)	38.0	28.3	61.0	0.4	27.4	18.0
Level of Service	D	C	E	A	C	B
Approach Delay (s)	34.5			8.6	25.9	
Approach LOS	C			A	C	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	66	76	61	634	672	48
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	700	400	-	-	160
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	69	79	64	660	700	50

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1488	700	700	0	-	0
Stage 1	700	-	-	-	-	-
Stage 2	788	-	-	-	-	-
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	137	439	897	-	-	-
Stage 1	493	-	-	-	-	-
Stage 2	448	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	127	439	897	-	-	-
Mov Cap-2 Maneuver	324	-	-	-	-	-
Stage 1	493	-	-	-	-	-
Stage 2	416	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.9	0.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	897	-	324	439	-	-
HCM Lane V/C Ratio	0.071	-	0.212	0.18	-	-
HCM Control Delay (s)	9.3	-	19.1	15	-	-
HCM Lane LOS	A	-	C	C	-	-
HCM 95th %tile Q(veh)	0.2	-	0.8	0.7	-	-

Intersection	
Int Delay, s/veh	48.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	303	144	203	814	286	205
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	700	400	-	-	160
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	316	150	211	848	298	214

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1569	298	298	0	-	0
Stage 1	298	-	-	-	-	-
Stage 2	1271	-	-	-	-	-
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	~ 122	741	1263	-	-	-
Stage 1	753	-	-	-	-	-
Stage 2	~ 264	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 102	741	1263	-	-	-
Mov Cap-2 Maneuver	~ 206	-	-	-	-	-
Stage 1	753	-	-	-	-	-
Stage 2	~ 220	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	210	1.7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1263	-	206	741	-	-
HCM Lane V/C Ratio	0.167	-	1.532	0.202	-	-
HCM Control Delay (s)	8.4	-$	304.6	11.1	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	0.6	-	19.7	0.8	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	10	6	97	2	6	473
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	7	105	2	7	514

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	634	107	0	0	108	0
Stage 1	107	-	-	-	-	-
Stage 2	527	-	-	-	-	-
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	443	947	-	-	1483	-
Stage 1	917	-	-	-	-	-
Stage 2	592	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	440	947	-	-	1483	-
Mov Cap-2 Maneuver	440	-	-	-	-	-
Stage 1	917	-	-	-	-	-
Stage 2	588	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.7	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	551	1483	-
HCM Lane V/C Ratio	-	-	0.032	0.004	-
HCM Control Delay (s)	-	-	11.7	7.4	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

HCM Signalized Intersection Capacity Analysis
1: SR 89 & Alpine Meadows Rd

8/6/2014

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	348	190	88	550	519	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	362	198	92	573	541	106
RTOR Reduction (vph)	0	132	0	0	0	44
Lane Group Flow (vph)	362	66	92	573	541	62
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4!		5	Free!	6	
Permitted Phases		4				6
Actuated Green, G (s)	40.0	40.0	12.0	120.0	56.0	56.0
Effective Green, g (s)	40.0	40.0	12.0	120.0	56.0	56.0
Actuated g/C Ratio	0.33	0.33	0.10	1.00	0.47	0.47
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	590	527	177	1863	869	738
v/s Ratio Prot	c0.20		c0.05	0.31	c0.29	
v/s Ratio Perm		0.04				0.04
v/c Ratio	0.61	0.13	0.52	0.31	0.62	0.08
Uniform Delay, d1	33.5	27.8	51.3	0.0	24.1	17.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.7	0.5	10.5	0.4	3.4	0.2
Delay (s)	38.2	28.3	61.8	0.4	27.4	18.0
Level of Service	D	C	E	A	C	B
Approach Delay (s)	34.7			8.9	25.9	
Approach LOS	C			A	C	

Intersection Summary			
HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	3	8	448	10	6	133
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	9	487	11	7	145

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	650	492	0	0	498	0
Stage 1	492	-	-	-	-	-
Stage 2	158	-	-	-	-	-
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	434	577	-	-	1066	-
Stage 1	615	-	-	-	-	-
Stage 2	871	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	431	577	-	-	1066	-
Mov Cap-2 Maneuver	431	-	-	-	-	-
Stage 1	615	-	-	-	-	-
Stage 2	865	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12	0	0.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	528	1066	-
HCM Lane V/C Ratio	-	-	0.023	0.006	-
HCM Control Delay (s)	-	-	12	8.4	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	72	81	68	634	672	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	700	400	-	-	160
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	75	84	71	660	700	58

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1502	700	700	0	-	0
Stage 1	700	-	-	-	-	-
Stage 2	802	-	-	-	-	-
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	134	439	897	-	-	-
Stage 1	493	-	-	-	-	-
Stage 2	441	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	123	439	897	-	-	-
Mov Cap-2 Maneuver	318	-	-	-	-	-
Stage 1	493	-	-	-	-	-
Stage 2	406	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	17.3	0.9	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	897	-	318	439	-	-
HCM Lane V/C Ratio	0.079	-	0.236	0.192	-	-
HCM Control Delay (s)	9.4	-	19.8	15.1	-	-
HCM Lane LOS	A	-	C	C	-	-
HCM 95th %tile Q(veh)	0.3	-	0.9	0.7	-	-

Intersection	
Int Delay, s/veh	3.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	11	20	0	16	16
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	12	22	0	17	17

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	74	22	0	0	22	0
Stage 1	22	-	-	-	-	-
Stage 2	52	-	-	-	-	-
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	930	1055	-	-	1593	-
Stage 1	1001	-	-	-	-	-
Stage 2	970	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	920	1055	-	-	1593	-
Mov Cap-2 Maneuver	920	-	-	-	-	-
Stage 1	1001	-	-	-	-	-
Stage 2	959	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.5	0	3.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1055	1593	-
HCM Lane V/C Ratio	-	-	0.011	0.011	-
HCM Control Delay (s)	-	-	8.5	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

2014 w/ Signal

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	303	144	203	814	286	205
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3
Adj Flow Rate, veh/h	316	150	211	848	298	214
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	412	612	274	1084	624	898
Arrive On Green	0.23	0.23	0.15	0.58	0.33	0.33
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	316	150	211	848	298	214
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	7.2	2.8	4.9	15.1	5.5	2.9
Cycle Q Clear(g_c), s	7.2	2.8	4.9	15.1	5.5	2.9
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	412	612	274	1084	624	898
V/C Ratio(X)	0.77	0.25	0.77	0.78	0.48	0.24
Avail Cap(c_a), veh/h	658	832	576	1555	778	1029
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	15.5	9.0	17.5	6.9	11.3	4.7
Incr Delay (d2), s/veh	3.0	0.2	4.6	1.7	0.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	2.9	2.8	8.0	2.8	2.0
LnGrp Delay(d),s/veh	18.5	9.2	22.1	8.6	11.9	4.8
LnGrp LOS	B	A	C	A	B	A
Approach Vol, veh/h	466			1059	512	
Approach Delay, s/veh	15.5			11.3	8.9	
Approach LOS	B			B	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		29.1		14.0	10.7	18.4		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	14.0	18.0		
Max Q Clear Time (g_c+I1), s		17.1		9.2	6.9	7.5		
Green Ext Time (p_c), s		8.0		0.9	0.3	5.7		

Intersection Summary	
HCM 2010 Ctrl Delay	11.6
HCM 2010 LOS	B

Alpine Sierra 2034 Level of Service Calculations

Intersection	
Int Delay, s/veh	94.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	337	160	225	977	343	228
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	700	400	-	-	160
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	351	167	234	1018	357	238

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1843	357	357	0	-	0
Stage 1	357	-	-	-	-	-
Stage 2	1486	-	-	-	-	-
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	~ 83	687	1202	-	-	-
Stage 1	708	-	-	-	-	-
Stage 2	~ 207	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 67	687	1202	-	-	-
Mov Cap-2 Maneuver	~ 157	-	-	-	-	-
Stage 1	708	-	-	-	-	-
Stage 2	~ 167	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 426.2	1.6	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1202	-	157	687	-	-
HCM Lane V/C Ratio	0.195	-	2.236	0.243	-	-
HCM Control Delay (s)	8.7	-	$ 622.9	11.9	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	0.7	-	28.8	0.9	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM Signalized Intersection Capacity Analysis
1: SR 89 & Alpine Meadows Rd

8/7/2014

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	387	211	96	660	623	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	403	220	100	688	649	117
RTOR Reduction (vph)	0	149	0	0	0	40
Lane Group Flow (vph)	403	72	100	688	649	77
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4!		5	Free!	6	
Permitted Phases		4				6
Actuated Green, G (s)	39.0	39.0	12.0	120.0	57.0	57.0
Effective Green, g (s)	39.0	39.0	12.0	120.0	57.0	57.0
Actuated g/C Ratio	0.32	0.32	0.10	1.00	0.48	0.48
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	575	514	177	1863	884	751
v/s Ratio Prot	c0.23		c0.06	0.37	c0.35	
v/s Ratio Perm		0.05				0.05
v/c Ratio	0.70	0.14	0.56	0.37	0.73	0.10
Uniform Delay, d1	35.4	28.6	51.5	0.0	25.4	17.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.0	0.6	12.4	0.6	5.4	0.3
Delay (s)	42.4	29.2	63.9	0.6	30.8	17.7
Level of Service	D	C	E	A	C	B
Approach Delay (s)	37.7			8.6	28.8	
Approach LOS	D			A	C	

Intersection Summary			
HCM 2000 Control Delay	24.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	74	86	69	761	806	54
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	700	400	-	-	160
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	77	90	72	793	840	56

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1776	840	840	0	-	0
Stage 1	840	-	-	-	-	-
Stage 2	936	-	-	-	-	-
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	91	365	795	-	-	-
Stage 1	424	-	-	-	-	-
Stage 2	382	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	83	365	795	-	-	-
Mov Cap-2 Maneuver	266	-	-	-	-	-
Stage 1	424	-	-	-	-	-
Stage 2	347	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	20.8	0.8	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	795	-	266	365	-	-
HCM Lane V/C Ratio	0.09	-	0.29	0.245	-	-
HCM Control Delay (s)	10	-	24	18	-	-
HCM Lane LOS	A	-	C	C	-	-
HCM 95th %tile Q(veh)	0.3	-	1.2	1	-	-

Intersection	
Int Delay, s/veh	99.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	341	162	228	977	343	231
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	700	400	-	-	160
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	355	169	238	1018	357	241

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1850	357	357	0	-	0
Stage 1	357	-	-	-	-	-
Stage 2	1493	-	-	-	-	-
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	~ 82	687	1202	-	-	-
Stage 1	708	-	-	-	-	-
Stage 2	~ 205	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 66	687	1202	-	-	-
Mov Cap-2 Maneuver	~ 154	-	-	-	-	-
Stage 1	708	-	-	-	-	-
Stage 2	~ 164	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 447.9	1.7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1202	-	154	687	-	-
HCM Lane V/C Ratio	0.198	-	2.307	0.246	-	-
HCM Control Delay (s)	8.7	-	$ 655	11.9	-	-
HCM Lane LOS	A	-	F	B	-	-
HCM 95th %tile Q(veh)	0.7	-	29.6	1	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	10	6	109	2	6	533
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	11	7	118	2	7	579

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	712	120	0	0	121	0
Stage 1	120	-	-	-	-	-
Stage 2	592	-	-	-	-	-
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	399	931	-	-	1467	-
Stage 1	905	-	-	-	-	-
Stage 2	553	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	396	931	-	-	1467	-
Mov Cap-2 Maneuver	396	-	-	-	-	-
Stage 1	905	-	-	-	-	-
Stage 2	549	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.4	0	0.1
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	505	1467	-
HCM Lane V/C Ratio	-	-	0.034	0.004	-
HCM Control Delay (s)	-	-	12.4	7.5	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

HCM Signalized Intersection Capacity Analysis
1: SR 89 & Alpine Meadows Rd

8/7/2014

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	392	214	99	660	623	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1770	1583	1770	1863	1863	1583
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1770	1583	1770	1863	1863	1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	408	223	103	688	649	120
RTOR Reduction (vph)	0	151	0	0	0	41
Lane Group Flow (vph)	408	72	103	688	649	79
Turn Type	Prot	Perm	Prot	NA	NA	Perm
Protected Phases	4!		5	Free!	6	
Permitted Phases		4				6
Actuated Green, G (s)	39.0	39.0	12.0	120.0	57.0	57.0
Effective Green, g (s)	39.0	39.0	12.0	120.0	57.0	57.0
Actuated g/C Ratio	0.32	0.32	0.10	1.00	0.48	0.48
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	575	514	177	1863	884	751
v/s Ratio Prot	c0.23		c0.06	0.37	c0.35	
v/s Ratio Perm		0.05				0.05
v/c Ratio	0.71	0.14	0.58	0.37	0.73	0.11
Uniform Delay, d1	35.5	28.7	51.6	0.0	25.4	17.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.2	0.6	13.2	0.6	5.4	0.3
Delay (s)	42.8	29.2	64.8	0.6	30.8	17.7
Level of Service	D	C	E	A	C	B
Approach Delay (s)	38.0			8.9	28.7	
Approach LOS	D			A	C	

Intersection Summary			
HCM 2000 Control Delay	24.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		

! Phase conflict between lane groups.

c Critical Lane Group

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	3	8	505	10	6	150
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	3	9	549	11	7	163

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	730	554	0	0	560	0
Stage 1	554	-	-	-	-	-
Stage 2	176	-	-	-	-	-
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	389	532	-	-	1011	-
Stage 1	575	-	-	-	-	-
Stage 2	855	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	386	532	-	-	1011	-
Mov Cap-2 Maneuver	386	-	-	-	-	-
Stage 1	575	-	-	-	-	-
Stage 2	848	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.7	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	482	1011	-
HCM Lane V/C Ratio	-	-	0.025	0.006	-
HCM Control Delay (s)	-	-	12.7	8.6	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	80	91	76	761	806	62
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	700	400	-	-	160
Veh in Median Storage, #	2	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	83	95	79	793	840	65

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1791	840	840	0	-	0
Stage 1	840	-	-	-	-	-
Stage 2	951	-	-	-	-	-
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	89	365	795	-	-	-
Stage 1	424	-	-	-	-	-
Stage 2	375	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 80	365	795	-	-	-
Mov Cap-2 Maneuver	261	-	-	-	-	-
Stage 1	424	-	-	-	-	-
Stage 2	338	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21.5	0.9	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	795	-	261	365	-	-
HCM Lane V/C Ratio	0.1	-	0.319	0.26	-	-
HCM Control Delay (s)	10	-	25.1	18.3	-	-
HCM Lane LOS	B	-	D	C	-	-
HCM 95th %tile Q(veh)	0.3	-	1.3	1	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	0	11	24	0	16	18
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	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	12	26	0	17	20

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	80	26	0	0	26	0
Stage 1	26	-	-	-	-	-
Stage 2	54	-	-	-	-	-
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	922	1050	-	-	1588	-
Stage 1	997	-	-	-	-	-
Stage 2	969	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	912	1050	-	-	1588	-
Mov Cap-2 Maneuver	912	-	-	-	-	-
Stage 1	997	-	-	-	-	-
Stage 2	958	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	8.5	0	3.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	1050	1588	-
HCM Lane V/C Ratio	-	-	0.011	0.011	-
HCM Control Delay (s)	-	-	8.5	7.3	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0	0	-

2034 w/signal

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	341	162	228	977	343	231
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	186.3	186.3	186.3	186.3	186.3	186.3
Adj Flow Rate, veh/h	355	169	238	1018	357	241
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	425	639	291	1142	698	973
Arrive On Green	0.24	0.24	0.16	0.61	0.37	0.37
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	355	169	238	1018	357	241
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	10.3	3.9	7.0	25.3	8.0	3.8
Cycle Q Clear(g_c), s	10.3	3.9	7.0	25.3	8.0	3.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	425	639	291	1142	698	973
V/C Ratio(X)	0.84	0.26	0.82	0.89	0.51	0.25
Avail Cap(c_a), veh/h	524	727	360	1238	722	993
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	19.6	10.8	21.9	8.9	13.1	4.8
Incr Delay (d2), s/veh	9.5	0.2	11.4	8.0	0.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.1	4.1	4.4	15.3	4.2	2.6
LnGrp Delay(d),s/veh	29.1	11.0	33.2	17.0	13.7	4.9
LnGrp LOS	C	B	C	B	B	A
Approach Vol, veh/h	524			1256	598	
Approach Delay, s/veh	23.2			20.1	10.1	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		37.2		17.0	12.9	24.3		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	11.0	21.0		
Max Q Clear Time (g_c+I1), s		27.3		12.3	9.0	10.0		
Green Ext Time (p_c), s		5.9		0.7	0.1	7.1		

Intersection Summary	
HCM 2010 Ctrl Delay	18.3
HCM 2010 LOS	B

APPENDIX D
WILL SERVE LETTER

ALPINE SPRINGS COUNTY WATER DISTRICT
Directors: Janet S. Grant, Jon Northrop, Don Priest, Virginia Quinan, Evan Salke
General Manager: John M. Collins, P.E.

February 7, 2014

Alex Fisch, Senior Planner
County of Placer
Community Development Resource Agency
3091 County Center Drive, Suite 190
Auburn, CA 95603

Re: Will Serve Letter for Alpine Sierra Subdivision

Dear Mr. Fisch,

This letter shall serve as evidence of the Alpine Springs County Water District's (ASCWD) acknowledgement of its obligation to provide water, sewer, garbage and fire service to the Alpine Sierra Subdivision, a 47 unit subdivision with accessory buildings (the Project), proposed by Alpine Sierra Subdivision (Applicant) subject to the terms and conditions set forth below.

ASCWD contracts with NTFPD to provide structure fire protection and related emergency services within its jurisdiction. In light of this, ASCWD requested that NTFPD identify measures that will allow for the safe implementation of the Project as well as improvements to the fire protection capabilities of ASCWD throughout its service area. Enclosed please find a Will Serve letter prepared by the North Tahoe Fire Protection District (NTFPD) for Project. This letter identifies the necessary measures to mitigate the Project's impacts on ASCWD's provision of fire service.

In addition to these mitigation measures, the Applicant and ASCWD have reached an agreement on necessary mitigation measures and other requirements for ASCWD to provide water and sewer service to the Project. These measures are more particularly described below and in the enclosed October 17, 2013 letter from Douglas Cylde, the Applicant's consultant.

Provided that the Applicant provides the agreed upon mitigation measures, ASCWD will provide water, sewer, garbage and fire service to the Project. As these mitigation measures and other requirements will be memorialized in one or more agreements between the Applicant and ASCWD, ASCWD respectfully requests that Placer County include the following condition of approval in any entitlement for the Project:

The Alpine Springs County Water District will provide water, sewer garbage and fire protection services to the Project as long as an agreement is entered into between ASCWD and Alpine Sierra Subdivision (and such agreement remains in effect), which includes the following terms:

270 Alpine Meadows Road, Alpine Meadows, CA 96146
Phone: (530) 583-2342 ● Fax: (530) 583-0228 ● www.alpinesprings.org

1. Alpine Sierra Subdivision to fund a standard 4 x 4 Type I fire apparatus (new pumper truck) with 1,500 gpm pump and 750 gallon water tank per NTFPD specifications. The pumper truck shall be fully equipped per NFPA 1901 and NTFPD standards and specifications and ready for service.

2. The Project area includes a heavily wooded fir ecosystem within the Alpine Meadows Valley (Valley), to the south and east of the Alpine Meadows Road, which is sandwiched in between the national forest, the Stanford Chalet and Alpine Chalet condominiums. As with similar forest environments, the Valley as a whole is teetering on edge of significant forest decay and serious fire risk in the absence of intervention. The ASCWD in cooperation with NTFPD retained a Registered Professional Forester (RPF) who has recently provided for grant funded fuel reduction work within existing developed areas in the Valley. This work was sponsored by a grant obtained in conjunction with the Sierra Nevada Conservancy (SNC) Fuels Reduction Grant Program. Fuels reduction programs are taking place throughout the Sierras in an effort to manage risk and improve forest health, but by and large, there is no permanent authority or financing to implement these programs. The Project will provide for both the necessary authority and required financing.

   Alpine Sierra Subdivision proposes to retain a RPF to design and implement a defensible space and forest health management plan for all of the property encompassed in the Project (i.e. not limited to areas immediately adjacent to home sites). The Alpine Sierra Subdivision will obligate the future home owners within the Project to continue that work in perpetuity at the direction of the ASCWD, and absent that cooperation, allow the ASCWD to perform that work at the homeowner's expense through a Service Agreement with the ASCWD.

3. An enhanced standard for fire protection within the Project shall be implemented, including fire sprinklers and fire-safe building materials, per current California State Fire and building codes as well as the ASCWD Fire Code.

   The building standards within the project will provide an enhanced level of safety over the vast majority of existing structures within the Valley by implementing the standards of the California Building Code, Chapter 7A. In addition to the Defensible Space required by the Wild lands Urban Interface Code (WUI), the Project will require

that all lands within the boundaries of the Project be managed as defensible space and, to the greatest extent practical, will modify the fuel types to a lower level of risk than found in the surrounding forest. Subdivision design standards for the Project shall require that all propane tanks installed throughout the project be buried. These improvements will be maintained at the homeowner's expense and insured through a mitigation agreement with the NTFPD and the ASCWD. The Project's covenants, conditions and restrictions will also bind individual homeowners to those agreements.

4. Alpine Sierra Subdivision to provide new easements and improvements, as determined by ASCWD, to existing ASCWD domestic and fire flow water infrastructure on the Alpine Sierra property for the benefit of the ASCWD.

5. Alpine Sierra Subdivision will fund the Project's share of upgrades to three system-wide pump stations known as Booster Pumps B, C and D due upon ASCWD's final approval of the initial map for the Project.

6. Alpine Sierra Subdivision to pay all connection and other general fees owed to ASCWD for water and sewer service.

7. Alpine Sierra Subdivision will dedicate access easements to ASCWD on either end of the Project that will allow ASCWD to improve emergency access to both residents of the area as well as ski resort visitors in times of emergency at some future time should the United States Forest Service and/or BCA agree to grant easements in the future. Alpine Sierra Subdivision shall ensure that these obligations remain binding on future property owners as agreed to by ASCWD.

8. Any other mitigation measures or improvements set forth in the NTFPD will serve letter or October 17, 2013 letter from Douglas Clyde.

Please let me know if you have any questions.

Sincerely,

John M. Collins, General Manager
Alpine Springs County Water District

Enclosures

cc:
Tim Alameda, Fire Marshal, North Tahoe Fire Protection District
Chris Nelson, Alpine Sierra Subdivision
Doug Clyde, Alpine Sierra Subdivision
Stephen C. Lieberman, Attorney, North Tahoe Fire Protection District
Schwartz, Mike, Fire Chief, North Tahoe Fire Protection District
Josh Nelson, Attorney, Alpine Springs County Water District

NORTH TAHOE FIRE PROTECTION DISTRICT ***Tim Alameda, Fire Marshal***

P.O. Box 5879
222 Fairway Drive
Tahoe City, CA 96145
530.583.6913
Fax 530.583.6909
alameda@ntfire.net

Mike Schwartz, Fire Chief

February 7, 2014

Alex Fisch, Senior Planner
Placer County Community Development Resource Agency

Re: Will Serve for Alpine Sierra Subdivision.

The North Tahoe Fire Protection District (NTFPD) acknowledges the obligation to serve the Alpine Sierra Subdivision project, a 47 unit subdivision with accessory buildings (the Project), located within the Alpine Springs County Water District (ASCWD) and as shown on the attached Alpine Sierra Subdivision Vesting Tentative Map dated August 2013 (Plans). ASCWD has contracted with the NTFPD for fire and rescue services and administrative services of the NTFPD Fire Prevention Bureau. NTFPD has the primary responsibility for structure fire protection and related emergency services. The Project is also within the boundaries of the land classified as State Responsibility Area (SRA). The California Department of Forestry and Fire Protection (Cal Fire) has responsibility and authority for wildland fire protection within SRA lands.

In order to address the fire safety concerns of ASCWD and its contract service provider, NTFPD, with respect to the Project, measures have been identified and agreed to that allow for the safe implementation of the Project and for improvements to the fire protection capabilities of the ASCWD throughout its service area. These improvements will provide enhanced fire protection that will benefit residents in existing subdivisions throughout the Alpine Meadows Valley (the Valley) and by extension, the larger surrounding areas.

The mitigation proposed for this Project includes the following:

1. Alpine Sierra Subdivision shall fund a standard 4 x 4 Type I fire apparatus (new pumper truck) with a 1,500 gallons per minute (gpm) pump and 750 gallon water tank per NTFPD specifications. The pumper truck shall be fully equipped per NFPA 1901 and NTFPD standards and specifications and ready for service.

   The NTFPD fire protection facilities and equipment have evolved over the years to include the current fire station and fire apparatus located at the ASCWD's offices at the bottom of the Valley. The ASCWD contracts with NTFPD to provide service for the Valley from that station. The ASCWD and the NTFPD have identified an unfunded need to upgrade the fire apparatus in that facility to current standards. This would involve replacing the current Type II fire apparatus with a standard 4x4 Type I fire apparatus providing 1,500 gpm pump and 750 gallon water tank that will be able to provide improved fire protection to the entire Valley.

2. Alpine Sierra Subdivision shall add significant defensible space through a fuel modification plan approved by NTFPD and Cal Fire for lands within the Project.

The Project area includes a heavily wooded fir ecosystem within the Valley, to the south and east of the Alpine Meadows Road, which is sandwiched in between the national forest, the Stanford Chalet and Alpine Chalet condominiums. As with similar forest environments, the Valley as a whole is teetering on edge of significant forest decay and serious fire risk in the absence of intervention. The ASCWD in cooperation with NTFPD retained a Register Professional Forester (RPF) who has recently provided for grant funded fuel reduction work within existing developed areas in the Valley. This work was sponsored by a grant obtained in conjunction with the Sierra Nevada Conservancy (SNC) Fuels Reduction Grant Program. Fuels reduction programs are taking place throughout the Sierras in an effort to manage risk and improve forest health, but by and large, there is no permanent authority or financing to implement these programs. The Project will provide for both the necessary authority and required financing.

Alpine Sierra Subdivision proposes to retain a RPF to design and implement a defensible space and forest health management plan for all of the property encompassed in the Project (i.e. not limited to areas immediately adjacent to home sites). The Alpine Sierra Subdivision will obligate the future home owners within the subdivision to continue that work in perpetuity at the direction of the ASCWD, and absent that cooperation, allow the ASCWD to perform that work at the homeowner's expense through a Service Agreement with the ASCWD.

3. An enhanced standard for fire protection within the Project shall be implemented, including fire sprinklers and fire-safe building materials, per current California State Fire and building codes as well as the ASCWD Fire Code.

   The building standards within the project will provide an enhanced level of safety over the vast majority of existing structures within the Valley by implementing the standards of the CA Building Code, Chapter 7A. In addition to the Defensible Space required by the Wild lands Urban Interface Code (WUI), the Project will require that all lands within the boundaries of the Project be managed as defensible space and, to the greatest extent practical, will modify the fuel types to a lower level of risk than found in the surrounding forest. Subdivision design standards for the Project shall require that all propane tanks installed throughout the project be buried. These improvements will be maintained at the homeowner's expense and insured through a mitigation agreement with the NTFPD and the ASCWD. The Project's CC&Rs will also bind individual homeowners to those agreements.

4. Alpine Sierra Subdivision shall provide new easements and improvements to existing ASCWD domestic and fire flow water infrastructure on the Alpine Sierra Subdivision for the benefit of the ASCWD.

The improvements to fire flow, a new Type I fire apparatus, Defensible Space, current building and fire codes and easements will contribute significantly to the overall Valley fire safety rating and will assist the ASCWD in maintaining or improving its ISO rating.

Tim Alameda, Fire Marshal
North Tahoe Fire Protection District

cc:
John Collins john@alpinesprings.org
Chris Nelson <cnelson@capstone-partners.com> (cnelson@capstone-partners.com)
Doug Clyde <dclyde@allwest.net>
Stephen C. Lieberman lieberman@portersimon.com
Schwartz, Mike <schwartz@ntfire.net>

DOUGLAS CLYDE
Mountain Resort Consulting Services, LLC

P.O. Box 561
5258 N. New Lane
Oakley, UT 84055

October 17, 2013

To: John Collins, General Manager
Alpine Springs County Water District

Michael S. Schwartz, Fire Chief
North Tahoe Fire Protection District

Tim Alameda, Fire Marshal
North Tahoe Fire Protection District

Re: Updated Alpine Sierra Project Mitigation Summary based on Final Stantec Technical Memorandum 8-26-13

Overview

The Alpine Sierra project (the Project) is a proposed 47 unit subdivision (and up to 5 accessory dwellings) located within the Alpine Springs County Water District (ASCWD). The Project owners (the Sponsor) initiated a formal land use approval process by submitting a pre-application meeting request to Placer County in November 2011 and had a pre-application meeting with Placer County and North Tahoe Fire Protection (NTFPD) representatives on December 13, 2011. Since that meeting, the Sponsor has been in discussions with ASCWD and the North Tahoe Fire Protection District (NTFPD) regarding the provision of water, sewer and fire protection services to the Project and the mitigation proposed by the Sponsor.

On January 2, 2013, Sponsor submitted a formal application to Placer County to process entitlements to obtain approvals for the Project including an Environmental Impact Report (EIR). Placer County expects to issue a Notice of Preparation of the EIR in November 2013. Sponsor requests NTFPD issue a will serve letter for the Project based on the general outline presented in this memorandum.

Sponsor, ASCWD and NTFPD had completed a Fire Safety Mitigation Agreement in February 2004 for a previous subdivision application but the Sponsor ultimately withdrew its application to Placer County and the agreement was never executed. In September 2010, Sponsor funded an independent water and sewer capacity study with the ASCWD's engineer (Stantec). Stantec issued its first report on March 17, 2011 (Technical Memorandum) to the ASCWD and this report was shared with the ASCWD Board. The Board authorized its General Manager John Collins (Manager) to negotiate a Development Agreement related to the provision of water and sewer for the Project.

The intent of Sponsor, ASCWD and NTFPD is to update the previous Fire Safety Mitigation Agreement to address current requirements of ASCWD and the NTFPD and incorporate recommendations outlined in an updated Stantec Technical Memorandum updated by Stantec on 8-26-13 (Stantec Report). The updated Stantec Report was required by Placer County based on Sponsors change from 39 units to 47 units.

The purpose of this letter is to outline an updated mitigation package for the Project as discussed and agreed to at meetings between the parties on May 24, 2013 and incorporates additional requirements from the updated Stantec Report that will be the basis for a will serve letter from NTFPD.

Upon final approval of the Project by Placer County, a formal Fire Safety Mitigation and Development Agreement specific to the Project will be executed by ASCWD, NTFPD and Sponsor.

Project Description

The Project description, site plan for the proposed Project, the 8-26-13 Stantec Report and previous draft Fire Safety Mitigation Agreement dated February 26, 2004 are all appended to this letter for reference.

Proposed Mitigation

In an effort to address the fire safety concerns of ASCWD and its contract service provider NTFPD with respect to the Project, measures have been identified that allow for the safe implementation of the Project as well as improvements to the fire protection capabilities of the ASCWD throughout its service area. These improvements will provide enhanced fire protection that will benefit residents in existing subdivisions throughout the Alpine Meadows Valley (the Valley) and, by extension, the larger surrounding landscape.

The mitigation proposed for this Project includes the following:

- Sponsor to fund of a standard 4 x 4 Type I fire apparatus (new pumper truck) with 1,500 gpm pump and 1,000 gallon water tank[1].
- Sponsor to fund[2] the Project's share of cost to upgrade three system-wide pump stations (Booster Pumps B, C and D) equal to $56,286 per the Stantec Report due upon ASCWD's final approval of the Initial Map for the initial phase of the Project development.
- Sponsor to add significant defensible space through a fuel modification plan acceptable to NTFPD within the Project.

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[1] The cost of this apparatus was established in the previous draft Fire Safety Mitigation Agreement as indexed by the CPI to present (see attached document)

[2] The funding of joint water system improvements are subject to a cost sharing arrangement between ASCWD and the Sponsor

- An enhanced standard for fire protection within the proposed residences and subdivision including fire sprinklers and fire-safe building materials.
- Agreement of Sponsor to grant several new easements for existing ASCWD water and sewer infrastructure on the Alpine Sierra property for the benefit of the ASCWD.
- Sponsor to dedicate access easements on either end of the Project that will allow the ASCWD (and other emergency response providers) to improve emergency access to both the residents of the Valley as well as the ski resort visitors in times of emergency at some future time should the Forest Service and/or BCA agree to grant easements in the future.
- Sponsor to contribute $592,529 in Connection Fees to the ASCWD based on the current Connection Fee schedule of $12,607 per unit (includes Water, Sewer and Infiltration and Inflow Surcharge Fees). Connection Fees are due prior to ASCWD's signature of the applicable first phase Final Map or subsequent Final Map(s) based on the Connection Fee of $12,607 x applicable # of dwelling units per phase of the Project's development. The fees will contribute to funding ASCWD System Improvements as recommended and prioritized in the Stantec Report (see Table 9 and recommended improvements as Items #4 – 11).

The details of these improvements are presented below.

1. Water Supply Capacity

The impact of the proposed Project on the ASCWD's system and an update to the ASCWD's water master plan were analyzed by the ASCWD's Engineer (Stantec), and summarized in a Technical Memorandum dated March 17, 2011 and updated again on 8-26-13 in the attached Stantec Report. The results of that analysis determined that the Project could be served by the ASCWD with routine extension of services and some modest systemwide improvements. However, Stantec determined that the water service within the Valley does not meet the current standards for fire flow in some of the existing subdivisions including portions of Juniper Mountain, Bear Creek and Alpine Meadows Estates. This is not an unusual situation when older developments are compared to current standards, but it does represent a substandard condition for many of the existing homes in the Valley that can be improved.

As a result of that study, several priority improvements and upgrades to the ASCWD's water system were identified that will result in a significant increase in fire flows, and redundancy of those flows, for the entire Valley.

2. Fire Protection Apparatus

The NTFPD fire protection facilities and equipment have evolved over the years to include the current fire station and fire apparatus located at the ASCWD's offices at the bottom of the Valley. The ASCWD contracts with NTFPD to provide service for the Valley from that station. The ASCWD and the NTFPD have identified an unfunded need to upgrade the fire apparatus in that facility to current standards. This would involve replacing the current Type II fire apparatus with a standard 4 x4 Type I fire apparatus providing 1,500 gpm pump and 1,000 gallon water tank that will be able to provide improved fire protection to the entire Valley.

3. Defensible Space

The Project area includes a heavily wooded fir ecosystem within the Valley to the south and east of the Alpine Meadows Road that is sandwiched in between the national forest, the Stanford Chalet and Alpine Chalet condominiums. As with similar forests, the Valley as a whole is teetering on edge of significant forest decay and serious fire risk in the absence of intervention. The ASCWD in cooperation with NTFPD retained a Register Professional Forester (RPF) who has recently completed fuel reduction work within existing developed areas in the Valley. This work was sponsored by a grant obtained in conjunction with the Sierra Nevada Conservancy (SNC) Fuels Reduction Grant program. Fuels reduction programs are taking place throughout the Sierras in an effort to manage risk and improve forest health, but by and large they have no permanent authority or financing to implement these programs. The Project will provide for both.

The Sponsor proposes to retain a RPF to design and implement a defensible space and forest health management plan for the entire Property (i.e. not limited to areas immediately adjacent to home sites). In addition the Sponsor will obligate the future home owners within the subdivision to continue that work in perpetuity at the direction of the ASCWD, and absent that cooperation, allow the ASCWD to perform that work at the homeowner's expense through the Service Agreement with the ASCWD.

4. Improved Structure Fire Safety

The building standards within the project will provide an enhanced level of safety over the vast majority existing structures within the Valley by implementing the standards of the CA Building Code Chapter 7A. In addition to the Defensible space required by the Wildlands Urban Interface Code (WUI), the Project will require that all lands within the boundaries of the project be managed as defensible space and, to the greatest extent practical, will modify the fuel types to

a lower level of risk then found in the surrounding forest. The Project's subdivision design standards will require that all propane tanks installed throughout the project be buried. These improvements will be maintained at the homeowner's expense and insured through a mitigation agreement with the NTFPD and the ASCWD. The Project's CC&Rs will also bind individual homeowners to those agreements.

5. Valley-wide Fire Safety Rating

The improvements to fire flow and new Type I fire apparatus will contribute significantly to the overall Valley fire safety rating and will assist the ASCWD in maintaining or improving its ISO rating which, among other things, can provide a direct decrease in insurance costs for the residents of the Valley.

Conclusion

In conclusion there are several opportunities for cooperation between the ASCWD, NTFPD and the Sponsor to provide fire safety for the Project while at the same time enhancing service to all of its customers in the Valley. While the latter is not the responsibility of the Project, the proposed mitigation and connection fees can play an important role in the overall fire safety program for the Valley.

Sincerely,

CC: Chris Nelson, Alpine Sierra Property Owner

Appendix of background information

Project Description

The Alpine Sierra property consists of 45.7 acres of land (the Property) zoned for residential development in the Alpine Meadows Valley within the ASCWDs service area. The Project's owners (Sponsor) propose to subdivide the Property into 47 single family units in a combination of duplex dwellings plated as townhomes and individual dwellings on single family lots. Up to 5 accessory dwelling units may be built on the single family sites on the east side of the project. The Property connects to the Alpine Meadows Road just below (North) of the Ginzton Access road. The Project concept plan is attached.

Regulatory Setting

The Property is located on Assessor Parcel Numbers 095-280-022 and 023. Parcel 023 is approximately 45 acres; parcel 022 is about one quarter acre. The parcels are zoned residential development and open space and subject to the Placer County Planned Development overlay. Very limited portions of the Property are within a Placer County designated Potential Avalanche Hazard Area (PAHA) overlay. The Property is within the area of the Placer County General Plan for the Alpine Meadows area adopted September 10, 1969 which is consistent with the land uses proposed for the Project.

Previous Applications

The Sponsor previously proposed a subdivision of the Property to Placer County in 2003. During that application process, the Sponsor negotiated a Fire Safety Mitigation Agreement for service with the North Tahoe Fire Protection District (NTFPD) and the ASCWD. As a result the NTFPD issued a Project Approval Letter dated February 23, 2004 (see attached). The Mitigation Agreement and Project Approval Letter outlined mitigation measures acceptable to NTFPD and the ASCWD at that time for a project of similar size and scope to the current proposal. However, the application for the previous subdivision was terminated in March of 2004 by the applicant, consequently the Sponsor, NTFPD, and the ASCWD did not execute the Mitigation Agreement.

APPENDIX E-2

Alternative B Trip Generation Memo

TRANSPORTATION CONSULTANTS, INC.

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MEMORANDUM

DATE: December 19, 2014

TO: Chris Nelson, Capstone Partners, LLC
Doug Clyde, Mountain Resort Consulting Services, LLC

FROM: Sara Hawley, LSC

SUBJECT: Alpine Sierra Subdivision Traffic Study – Staff Alternative

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The purpose of this memorandum is to address the potential traffic impacts associated with the "Staff Alternative" for the Alpine Sierra Subdivision Project. The proposed project evaluated in the *Alpine Sierra Subdivision Traffic Impact Analysis* (LSC Transportation Consultants, Inc., August 18, 2014) included construction of a total of 53 dwelling units in the Alpine Meadows community. In the potential Staff Alternative, the proposed duplex units would be replaced by single-family homes, resulting in a reduction of 9 units, for a total of 44 dwelling units. The site plan for the Staff Alternative is attached, and the land use assumptions are as follows:

- 38 single-family detached residences
- Up to 5 guest/secondary units
- 1 small Homeowners Association (HOA) staff unit

First, the trip generation of the Staff Alternative is estimated and compared to that of the original alternative. Next, the site plan is reviewed with regards to lot locations and dead-end roads. Finally, the impact on the conclusions and recommendations made in the previous study are discussed.

Trip Generation

The trip generation analysis for the Staff Alternative is presented in Table A. Consistent with the previous traffic analysis, about 75 percent of the proposed detached units on the project site are assumed to be vacation homes (recreation homes). As indicated in the far right columns of the table, a total of approximately 224 one-way vehicle-trip ends are estimated to be generated at the site access point over the course of a busy day, with approximately 20 (7 inbound and 13 outbound) occurring during the AM peak hour and 23 (13 inbound and 10 outbound) during the PM peak hour. In comparison with the original project, the Staff Alternative would result in a lower level of traffic generation during all analysis periods. As such, implementation of this alternative would provide the same or better intersection Level of Service as the original project.

Lot Locations

The lot locations within the vicinity of the Road A/Court B intersection (the first intersection along the internal site roadway) were reviewed under the Staff Alternative. As indicated in the previous study, it is recommended that the driveways be located at least 50 feet from the intersection, in order to minimize the potential for conflict between a vehicle entering/exiting a driveway and a vehicle turning at the intersection. Based upon a review of the attached site plan, a driveway on Lot 1 would not meet the recommended minimum distance from the intersection. It is recommended that the site plan be revised to provide at least 50 feet from the edge of pavement on Road A to the first driveway on Court B. For instance, a shared driveway via Lot 2 could potentially be provided, as Lot 2 is located more than 50 feet from Road A.

Evaluation of Dead-End Road Lengths

As discussed in the previous analysis, the maximum allowable length of a dead-end road on this project site, including all dead-end roads accessed from that dead-end road, shall not exceed a cumulative length of 800 feet. Based on the attached site plan, all of the proposed parcels except the westernmost parcels 1-2 are beyond the 800-foot limit specified by the County code. Furthermore, parcels 1-27 on the east are beyond the limit (1,320 feet) for any of those parcels that are greater than 1 acre.

The County standards (Zoning Code, Section 17.54.100.C.1.d) for residential developments state that at least two vehicle entry/exit points shall be provided or planned for adequate circulation and emergency purposes unless otherwise determined by the Planning Commission. However, the project as proposed is on a dead-end road. No practical alternative has been identified to allow for two points of access due to surrounding terrain and ownership. Consequently, the project is required to provide mitigation to the life-safety authority to mitigate the impact of single point access. The project has obtained a will serve letter from the Alpine Springs County Water District (ASCWD) based on a series of water system improvements, improved building standards, defensible space improvements, and other terms that would mitigate the concern of the Service Provider. ASCWD contracts with the North Tahoe Fire Protection District (NTFPD), who has agreed to this mitigation.

Conclusions

In comparison with the proposed project, the Staff Alternative would result in a lower level of traffic generation during all analysis periods. Implementation of the Staff Alternative would not affect the conclusions in the previous traffic analysis regarding intersection Level of Service, driver sight distance, or intersection spacing. Similar to the previous analysis, the recommendations regarding internal circulation under the Staff Alternative are as follows:

- *Driveway Locations* - It is recommended that the site plan be revised to provide at least 50 feet from the edge of pavement on Road A to the first driveway on Court B. For instance, a shared driveway serving Lots 1-2 could potentially be provided on Lot 2.

- *Dead-End Road Lengths* - The project is required to provide mitigation to the life-safety authority, such as a series of water system improvements, improved building standards, defensible space improvements, and other terms to mitigate the impact of single point access. A will serve letter including mitigation measures has been provided by the ASCWD and agreed to by the NTFPD.

The remaining recommendations in the previous study remain valid under the Staff Alternative.

TABLE A: Alpine Sierra Subdivision Trip Generation - Staff Alternative

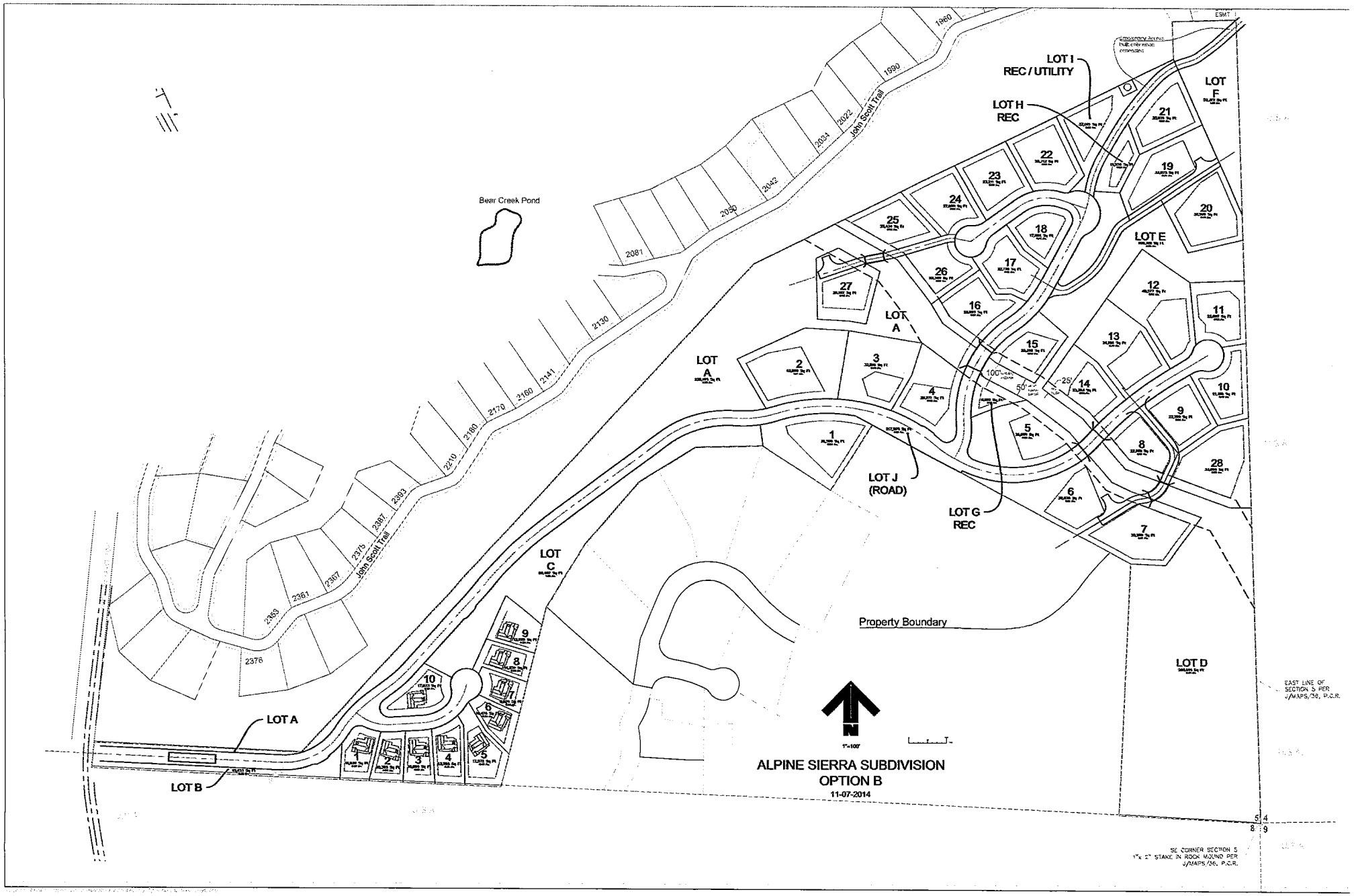
Proposed Land Use	ITE Code	ITE Land Use Type	Quantity	Unit	Trip Generation Rates [1] In	Trip Generation Rates [1] Out	Trip Generation Rates [1] Total	One-Way Vehicle Trips at Site Driveway In	One-Way Vehicle Trips at Site Driveway Out	One-Way Vehicle Trips at Site Driveway Total
AM Peak Hour										
Single-Family Primary Homes	210	Single-Family Detached Housing	10	DU	0.19	0.56	0.75	2	6	8
Vacation Homes	260	Recreational Home	28	DU	0.15	0.15	0.30	4	4	8
Guest/Secondary Units	220	Apartment	5	DU	0.10	0.41	0.51	1	2	3
HOA Staff Unit	220	Apartment	1	DU	0.10	0.41	0.51	0	1	1
Total AM Peak Hour			**44**	**DU**				**7**	**13**	**20**
PM Peak Hour										
Single-Family Primary Homes	210	Single-Family Detached Housing	10	DU	0.64	0.37	1.01	6	4	10
Vacation Homes	260	Recreational Home	28	DU	0.14	0.17	0.31	4	5	9
Guest/Secondary Units	220	Apartment	5	DU	0.40	0.22	0.62	2	1	3
HOA Staff Unit	220	Apartment	1	DU	0.40	0.22	0.62	1	0	1
Total PM Peak Hour			**44**	**DU**				**13**	**10**	**23**
Daily										
Single-Family Primary Homes	210	Single-Family Detached Housing	10	DU	--	--	9.57	--	--	96
Vacation Homes	260	Recreational Home	28	DU	--	--	3.16	--	--	88
Guest/Secondary Units	220	Apartment	5	DU			6.65	--	--	33
HOA Staff Unit	220	Apartment	1	DU	--	--	6.65	--	--	7
Total Daily			**44**	**DU**				**--**	**--**	**224**

DU = Dwelling Unit

Note 1: Trip generation rates are based on the Institute of Transportation Engineers (ITE) Trip Generation, 8th Edition (2008) manual.

Source: ITE, LSC Transportation Consultants, Inc.

Alpine Sierra TripCalcs2014.xlsx


ALPINE SIERRA SUBDIVISION
OPTION B
11-07-2014
1"=100'
N
Bear Creek Pond
John Scott Trail
LOT A
LOT B
LOT C
LOT D
LOT E
LOT F
LOT G
REC
LOT H
REC
LOT I
REC / UTILITY
LOT J
(ROAD)
Property Boundary
EAST LINE OF
SECTION 5 PER
J/MAPS/38, P.C.R.
SE CORNER SECTION 5
1"x 2" STAKE IN ROCK MOUND PER
J/MAPS/36, P.C.R.
ESMT
100'
50'
25'

APPENDIX E-3

Alpine Sierra LOS Memo

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MEMORANDUM

DATE: January 15, 2016

TO: Doug Clyde, Mountain Resort Consulting Services, LLC

FROM: Sara Hawley and Jason Briedis, LSC

SUBJECT: Alpine Sierra Subdivision – SR 89/Alpine Meadows Road Level of Service

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The purpose of this memorandum is to respond to the County's request for additional details regarding the Level of Service (LOS) at the signalized State Route (SR) 89/Alpine Meadows Road intersection. This analysis is based on the assumptions, methodology, and technical analysis provided in the *Alpine Sierra Subdivision Traffic Impact Analysis* (LSC Transportation Consultants, Inc., April 16, 2015).

Intersection Level of Service

The LOS analysis for the SR 89/Alpine Meadows Road intersection for all scenarios is analyzed using the HCM signalized intersection methodology. The results are summarized in the attached Table A. As shown, the signalized intersection is estimated to operate at an acceptable LOS A during the summer PM peak hour under existing and future cumulative conditions, with or without the proposed Alpine Sierra Subdivision Project. During the winter AM and PM peak hours, the intersection operates at an acceptable LOS B under existing and future cumulative conditions, with or without the proposed project. Implementation of the proposed project would result in an increase in total intersection delay of less than 1.0 second under all scenarios.

Intersection Traffic Queues

Traffic queue lengths were reviewed. The 95th-percentile traffic queues forming in the turn lanes on SR 89 are expected to be accommodated within the existing lane storage lengths under all scenarios. Additionally, the 95th-percentile queue length on the eastbound Alpine Meadows Road approach is accommodated within the existing storage length under all existing year scenarios, both with and without Alpine Sierra, as well as for the future summer scenarios.

During future winter peak periods of skier-related traffic activity (AM and PM), the calculated 95th-percentile eastbound queues would extend past the adjacent driveway intersection on Alpine Meadows Road. However, considering that the traffic volumes accessing the driveway on the south side of Alpine Meadows Road (the condominiums driveway) are minimal during

peak periods, and that drivers wishing to turn left from the driveway on the north side (serving the Crest Café and other uses) have the option of using a second driveway to the west, no traffic queuing concerns are identified on Alpine Meadows Road.

TABLE A: Intersection LOS at SR 89/Alpine Meadows Road Traffic Signal

Scenario	Average Delay	LOS	95th-Percentile Queues Exceed Available Storage?
Existing Scenarios			
Summer PM - No Project	7.2	A	No
Summer PM - With Alpine Sierra	7.5	A	No
Winter AM - No Project	11.9	B	No
Winter AM - With Alpine Sierra	12.1	B	No
Winter PM - No Project	12.4	B	No
Winter PM - With Alpine Sierra	12.6	B	No
Future Scenarios			
Summer PM - No Project	9.0	A	No
Summer PM - With Alpine Sierra	9.4	A	No
Winter AM - No Project	18.5	B	EB-LT - 253 feet
Winter AM - With Alpine Sierra	18.8	B	EB-LT - 255 feet
Winter PM - No Project	16.6	B	EB-LT - 275 feet
Winter PM - With Alpine Sierra	17.3	B	EB-LT - 285 feet

Note: EB = Eastbound, LT = left-turn movement
Source: LSC Transportation Consultants, Inc.

Alpine Meadows Signal LOS.xlsx

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	66	76	61	634	672	48
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	69	79	64	660	700	50
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	152	136	92	1303	1006	991
Arrive On Green	0.09	0.09	0.05	0.70	0.54	0.54
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	69	79	64	660	700	50
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	1.4	1.8	1.3	6.1	10.3	0.5
Cycle Q Clear(g_c), s	1.4	1.8	1.3	6.1	10.3	0.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	152	136	92	1303	1006	991
V/C Ratio(X)	0.45	0.58	0.69	0.51	0.70	0.05
Avail Cap(c_a), veh/h	762	681	191	1801	1401	1327
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	16.2	16.4	17.4	2.6	6.3	2.7
Incr Delay (d2), s/veh	2.1	3.9	9.0	0.3	0.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.4	3.1	1.6	5.5	9.1	0.4
LnGrp Delay(d),s/veh	18.3	20.3	26.3	2.9	7.2	2.7
LnGrp LOS	B	C	C	A	A	A
Approach Vol, veh/h	148			724	750	
Approach Delay, s/veh	19.3			5.0	6.9	
Approach LOS	B			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		30.0		7.2	5.9	24.1		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	4.0	28.0		
Max Q Clear Time (g_c+I1), s		8.1		3.8	3.3	12.3		
Green Ext Time (p_c), s		10.2		0.3	0.0	7.8		

Intersection Summary	
HCM 2010 Ctrl Delay	7.2
HCM 2010 LOS	A

HCM 2010 Signalized Intersection Summary
1: SR 89 & Alpine Meadows Rd

12/29/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	72	81	68	634	672	56
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	75	84	71	660	700	58
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	161	144	99	1299	999	993
Arrive On Green	0.09	0.09	0.06	0.70	0.54	0.54
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	75	84	71	660	700	58
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	1.5	1.9	1.5	6.3	10.6	0.5
Cycle Q Clear(g_c), s	1.5	1.9	1.5	6.3	10.6	0.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	161	144	99	1299	999	993
V/C Ratio(X)	0.46	0.58	0.72	0.51	0.70	0.06
Avail Cap(c_a), veh/h	750	669	187	1772	1378	1315
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	16.3	16.5	17.6	2.7	6.5	2.7
Incr Delay (d2), s/veh	2.1	3.7	9.4	0.3	1.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.5	3.3	1.7	5.8	9.4	0.5
LnGrp Delay(d),s/veh	18.4	20.2	27.0	3.0	7.5	2.8
LnGrp LOS	B	C	C	A	A	A
Approach Vol, veh/h	159			731	758	
Approach Delay, s/veh	19.4			5.3	7.1	
Approach LOS	B			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		30.4		7.4	6.1	24.3		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	4.0	28.0		
Max Q Clear Time (g_c+I1), s		8.3		3.9	3.5	12.6		
Green Ext Time (p_c), s		10.3		0.3	0.0	7.7		

Intersection Summary	
HCM 2010 Ctrl Delay	7.5
HCM 2010 LOS	A

HCM 2010 Signalized Intersection Summary
1: SR 89 & Alpine Meadows Rd

12/29/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	299	142	200	814	286	202
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	311	148	208	848	298	210
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	408	364	269	1086	629	899
Arrive On Green	0.23	0.23	0.15	0.58	0.34	0.34
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	311	148	208	848	298	210
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	7.0	3.4	4.8	14.9	5.4	2.8
Cycle Q Clear(g_c), s	7.0	3.4	4.8	14.9	5.4	2.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	408	364	269	1086	629	899
V/C Ratio(X)	0.76	0.41	0.77	0.78	0.47	0.23
Avail Cap(c_a), veh/h	663	592	539	1567	827	1067
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	15.4	14.0	17.4	6.8	11.2	4.6
Incr Delay (d2), s/veh	3.0	0.7	4.7	1.6	0.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.7	5.7	4.9	12.7	5.1	3.4
LnGrp Delay(d),s/veh	18.4	14.7	22.1	8.5	11.7	4.7
LnGrp LOS	B	B	C	A	B	A
Approach Vol, veh/h	459			1056	508	
Approach Delay, s/veh	17.2			11.1	8.8	
Approach LOS	B			B	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		29.0		13.8	10.5	18.5		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	13.0	19.0		
Max Q Clear Time (g_c+I1), s		16.9		9.0	6.8	7.4		
Green Ext Time (p_c), s		8.1		0.9	0.3	6.1		

Intersection Summary	
HCM 2010 Ctrl Delay	11.9
HCM 2010 LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	303	144	203	814	286	205
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	316	150	211	848	298	214
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	412	368	274	1084	624	898
Arrive On Green	0.23	0.23	0.15	0.58	0.33	0.33
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	316	150	211	848	298	214
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	7.2	3.5	4.9	15.1	5.5	2.9
Cycle Q Clear(g_c), s	7.2	3.5	4.9	15.1	5.5	2.9
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	412	368	274	1084	624	898
V/C Ratio(X)	0.77	0.41	0.77	0.78	0.48	0.24
Avail Cap(c_a), veh/h	658	588	576	1555	778	1029
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	15.5	14.0	17.5	6.9	11.3	4.7
Incr Delay (d2), s/veh	3.0	0.7	4.6	1.7	0.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	6.9	5.8	5.0	12.7	5.1	3.6
LnGrp Delay(d),s/veh	18.5	14.8	22.1	8.6	11.9	4.8
LnGrp LOS	B	B	C	A	B	A
Approach Vol, veh/h	466			1059	512	
Approach Delay, s/veh	17.3			11.3	8.9	
Approach LOS	B			B	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		29.1		14.0	10.7	18.4		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	14.0	18.0		
Max Q Clear Time (g_c+I1), s		17.1		9.2	6.9	7.5		
Green Ext Time (p_c), s		8.0		0.9	0.3	5.7		

Intersection Summary	
HCM 2010 Ctrl Delay	12.1
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
1: SR 89 & Alpine Meadows Rd

12/29/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	343	187	85	550	519	99
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	357	195	89	573	541	103
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	457	408	112	1049	764	1057
Arrive On Green	0.26	0.26	0.06	0.56	0.41	0.41
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	357	195	89	573	541	103
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	8.3	4.6	2.2	8.7	10.8	1.0
Cycle Q Clear(g_c), s	8.3	4.6	2.2	8.7	10.8	1.0
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	457	408	112	1049	764	1057
V/C Ratio(X)	0.78	0.48	0.79	0.55	0.71	0.10
Avail Cap(c_a), veh/h	716	639	199	1421	1045	1296
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	15.4	14.0	20.6	6.2	10.9	2.6
Incr Delay (d2), s/veh	2.9	0.9	11.9	0.4	1.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	7.9	7.7	2.6	7.9	9.6	1.5
LnGrp Delay(d),s/veh	18.3	14.9	32.4	6.6	12.3	2.7
LnGrp LOS	B	B	C	A	B	A
Approach Vol, veh/h	552			662	644	
Approach Delay, s/veh	17.1			10.1	10.8	
Approach LOS	B			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		29.1		15.5	6.8	22.3		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		34.0		18.0	5.0	25.0		
Max Q Clear Time (g_c+I1), s		10.7		10.3	4.2	12.8		
Green Ext Time (p_c), s		7.5		1.2	0.0	5.5		

Intersection Summary	
HCM 2010 Ctrl Delay	12.4
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
1: SR 89 & Alpine Meadows Rd

12/29/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	348	190	88	550	519	102
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	362	198	92	573	541	106
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	462	412	116	1044	755	1054
Arrive On Green	0.26	0.26	0.07	0.56	0.41	0.41
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	362	198	92	573	541	106
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	8.5	4.7	2.3	8.7	10.9	1.1
Cycle Q Clear(g_c), s	8.5	4.7	2.3	8.7	10.9	1.1
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	462	412	116	1044	755	1054
V/C Ratio(X)	0.78	0.48	0.79	0.55	0.72	0.10
Avail Cap(c_a), veh/h	715	639	238	1419	1002	1264
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	15.3	14.0	20.5	6.2	11.1	2.7
Incr Delay (d2), s/veh	3.1	0.9	11.2	0.5	1.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	8.0	7.7	2.6	8.1	9.9	1.5
LnGrp Delay(d),s/veh	18.4	14.8	31.8	6.7	12.8	2.7
LnGrp LOS	B	B	C	A	B	A
Approach Vol, veh/h	560			665	647	
Approach Delay, s/veh	17.1			10.2	11.1	
Approach LOS	B			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		29.0		15.6	6.9	22.1		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		34.0		18.0	6.0	24.0		
Max Q Clear Time (g_c+I1), s		10.7		10.5	4.3	12.9		
Green Ext Time (p_c), s		7.5		1.2	0.0	5.2		

Intersection Summary	
HCM 2010 Ctrl Delay	12.6
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
1: SR 89 & Alpine Meadows Rd

12/29/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	74	86	69	761	806	54
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	77	90	72	793	840	56
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	167	149	95	1339	1065	1054
Arrive On Green	0.09	0.09	0.05	0.72	0.57	0.57
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	77	90	72	793	840	56
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	1.8	2.3	1.7	8.9	15.1	0.5
Cycle Q Clear(g_c), s	1.8	2.3	1.7	8.9	15.1	0.5
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	167	149	95	1339	1065	1054
V/C Ratio(X)	0.46	0.60	0.75	0.59	0.79	0.05
Avail Cap(c_a), veh/h	663	592	166	1567	1219	1185
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	18.4	18.6	20.0	2.9	7.1	2.5
Incr Delay (d2), s/veh	2.0	3.9	11.4	0.4	3.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.7	3.9	2.0	8.1	13.1	0.5
LnGrp Delay(d),s/veh	20.3	22.5	31.4	3.4	10.3	2.5
LnGrp LOS	C	C	C	A	B	A
Approach Vol, veh/h	167			865	896	
Approach Delay, s/veh	21.5			5.7	9.8	
Approach LOS	C			A	A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		34.8		8.0	6.3	28.5		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	4.0	28.0		
Max Q Clear Time (g_c+I1), s		10.9		4.3	3.7	17.1		
Green Ext Time (p_c), s		12.8		0.3	0.0	7.4		

Intersection Summary	
HCM 2010 Ctrl Delay	9.0
HCM 2010 LOS	A

HCM 2010 Signalized Intersection Summary
1: SR 89 & Alpine Meadows Rd

12/29/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	80	91	76	761	806	62
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	83	95	79	793	840	65
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	175	156	100	1335	1058	1056
Arrive On Green	0.10	0.10	0.06	0.72	0.57	0.57
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	83	95	79	793	840	65
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	1.9	2.5	1.9	9.1	15.4	0.6
Cycle Q Clear(g_c), s	1.9	2.5	1.9	9.1	15.4	0.6
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	175	156	100	1335	1058	1056
V/C Ratio(X)	0.47	0.61	0.79	0.59	0.79	0.06
Avail Cap(c_a), veh/h	654	584	164	1546	1202	1178
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	18.5	18.7	20.2	3.0	7.4	2.5
Incr Delay (d2), s/veh	2.0	3.8	12.6	0.5	3.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	1.8	4.2	2.3	8.1	13.5	0.6
LnGrp Delay(d),s/veh	20.5	22.5	32.8	3.5	10.7	2.5
LnGrp LOS	C	C	C	A	B	A
Approach Vol, veh/h	178			872	905	
Approach Delay, s/veh	21.6			6.1	10.1	
Approach LOS	C			A	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		35.1		8.3	6.5	28.6		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	4.0	28.0		
Max Q Clear Time (g_c+I1), s		11.1		4.5	3.9	17.4		
Green Ext Time (p_c), s		12.8		0.4	0.0	7.3		

Intersection Summary	
HCM 2010 Ctrl Delay	9.4
HCM 2010 LOS	A

HCM 2010 Signalized Intersection Summary
1: SR 89 & Alpine Meadows Rd

12/29/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	337	160	225	977	343	228
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	351	167	234	1018	357	238
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	422	376	287	1144	704	975
Arrive On Green	0.24	0.24	0.16	0.61	0.38	0.38
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	351	167	234	1018	357	238
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	10.1	4.8	6.9	25.1	8.0	3.7
Cycle Q Clear(g_c), s	10.1	4.8	6.9	25.1	8.0	3.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	422	376	287	1144	704	975
V/C Ratio(X)	0.83	0.44	0.81	0.89	0.51	0.24
Avail Cap(c_a), veh/h	526	470	362	1243	725	993
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	19.5	17.5	21.8	8.9	12.9	4.7
Incr Delay (d2), s/veh	9.1	0.8	10.9	7.9	0.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	10.1	7.9	7.6	21.3	7.5	4.7
LnGrp Delay(d),s/veh	28.6	18.3	32.7	16.7	13.5	4.8
LnGrp LOS	C	B	C	B	B	A
Approach Vol, veh/h	518			1252	595	
Approach Delay, s/veh	25.3			19.7	10.0	
Approach LOS	C			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		37.1		16.8	12.7	24.4		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	11.0	21.0		
Max Q Clear Time (g_c+I1), s		27.1		12.1	8.9	10.0		
Green Ext Time (p_c), s		6.0		0.7	0.1	7.1		

Intersection Summary	
HCM 2010 Ctrl Delay	18.5
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
1: SR 89 & Alpine Meadows Rd

12/29/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	341	162	228	977	343	231
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	355	169	238	1018	357	241
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	425	379	291	1142	698	973
Arrive On Green	0.24	0.24	0.16	0.61	0.37	0.37
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	355	169	238	1018	357	241
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	10.3	4.9	7.0	25.3	8.0	3.8
Cycle Q Clear(g_c), s	10.3	4.9	7.0	25.3	8.0	3.8
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	425	379	291	1142	698	973
V/C Ratio(X)	0.84	0.45	0.82	0.89	0.51	0.25
Avail Cap(c_a), veh/h	524	468	360	1238	722	993
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	19.6	17.5	21.9	8.9	13.1	4.8
Incr Delay (d2), s/veh	9.5	0.8	11.4	8.0	0.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	10.2	8.1	7.8	21.7	7.5	4.8
LnGrp Delay(d),s/veh	29.1	18.4	33.2	17.0	13.7	4.9
LnGrp LOS	C	B	C	B	B	A
Approach Vol, veh/h	524			1256	598	
Approach Delay, s/veh	25.6			20.1	10.1	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		37.2		17.0	12.9	24.3		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		36.0		16.0	11.0	21.0		
Max Q Clear Time (g_c+I1), s		27.3		12.3	9.0	10.0		
Green Ext Time (p_c), s		5.9		0.7	0.1	7.1		

Intersection Summary	
HCM 2010 Ctrl Delay	18.8
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
1: SR 89 & Alpine Meadows Rd

12/29/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	387	211	96	660	623	112
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	403	220	100	688	649	117
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	477	426	128	1076	800	1106
Arrive On Green	0.27	0.27	0.07	0.58	0.43	0.43
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	403	220	100	688	649	117
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	11.2	6.2	2.9	12.9	16.0	1.3
Cycle Q Clear(g_c), s	11.2	6.2	2.9	12.9	16.0	1.3
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	477	426	128	1076	800	1106
V/C Ratio(X)	0.84	0.52	0.78	0.64	0.81	0.11
Avail Cap(c_a), veh/h	577	515	204	1247	891	1183
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	18.1	16.2	23.8	7.4	13.1	2.6
Incr Delay (d2), s/veh	9.5	1.0	9.9	0.9	5.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	11.0	9.5	3.2	11.0	14.3	1.9
LnGrp Delay(d),s/veh	27.5	17.2	33.8	8.3	18.3	2.6
LnGrp LOS	C	B	C	A	B	A
Approach Vol, veh/h	623			788	766	
Approach Delay, s/veh	23.9			11.5	15.9	
Approach LOS	C			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		34.2		18.1	7.8	26.4		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		35.0		17.0	6.0	25.0		
Max Q Clear Time (g_c+I1), s		14.9		13.2	4.9	18.0		
Green Ext Time (p_c), s		8.9		0.8	0.0	4.5		

Intersection Summary	
HCM 2010 Ctrl Delay	16.6
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
1: SR 89 & Alpine Meadows Rd

12/29/2015

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	392	214	99	660	623	115
Number	7	14	5	2	6	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	408	223	103	688	649	120
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	479	427	131	1081	804	1111
Arrive On Green	0.27	0.27	0.07	0.58	0.43	0.43
Sat Flow, veh/h	1774	1583	1774	1863	1863	1583
Grp Volume(v), veh/h	408	223	103	688	649	120
Grp Sat Flow(s),veh/h/ln	1774	1583	1774	1863	1863	1583
Q Serve(g_s), s	11.7	6.4	3.1	13.1	16.3	1.3
Cycle Q Clear(g_c), s	11.7	6.4	3.1	13.1	16.3	1.3
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	479	427	131	1081	804	1111
V/C Ratio(X)	0.85	0.52	0.78	0.64	0.81	0.11
Avail Cap(c_a), veh/h	564	503	166	1219	906	1197
HCM Platoon Ratio	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
Uniform Delay (d), s/veh	18.5	16.6	24.3	7.5	13.3	2.6
Incr Delay (d2), s/veh	10.6	1.0	17.2	0.9	4.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(95%),veh/ln	11.4	9.8	3.8	11.3	14.4	1.9
LnGrp Delay(d),s/veh	29.1	17.6	41.5	8.4	18.2	2.6
LnGrp LOS	C	B	D	A	B	A
Approach Vol, veh/h	631			791	769	
Approach Delay, s/veh	25.0			12.7	15.8	
Approach LOS	C			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		35.0		18.4	8.0	27.1		
Change Period (Y+Rc), s		4.0		4.0	4.0	4.0		
Max Green Setting (Gmax), s		35.0		17.0	5.0	26.0		
Max Q Clear Time (g_c+I1), s		15.1		13.7	5.1	18.3		
Green Ext Time (p_c), s		8.9		0.8	0.0	4.8		

Intersection Summary	
HCM 2010 Ctrl Delay	17.3
HCM 2010 LOS	B

APPENDIX E-4

Parking Management Plan

Alpine Sierra Parking Provision and Management Plan
Alternative B

8-20-17

Overview

The Alpine Sierra project is a PUD located in mountainous terrain within Alpine Meadows Valley in Placer County. In the design of the project, the cross sections of the roads were limited to the greatest extent practical in order to limit both physical and visual impacts from associated cuts and fills. As a result, the majority of the project was designed so that on-street parking is not accommodated adjacent to most residents, with the exception of the first cul de sac (cul de sac "B" on the west side of the project). On that cul de sac, parking is allowed on one side of the road to provide sufficient parking to meet County Code. On the balance of the project (the east side) where on-street parking is not provided for, the County Code requires that additional parking be provided within each lot over and above the two outside spaces normally required for each residential unit.

Design Approach

In an effort to limit cuts, fills and redundant impervious surface on each lot and the overall project, the project incorporates a faceted approach to providing the requisite spaces in a combination of: additional surface parking within most lots, common parking lots in the project, parking on one side of cul de sac "B" and additional garage space. While garage space is not normally counted to the requirement of offsetting the absence of on-street parking, given the climate, enclosed parking stalls play a more significant role in mountainous developments (snow country) than they do in areas where snow is not a consideration. Also, three car garages are expected to be the norm in the large lots on the east side of the project due to the size of the lots and market demand. Therefore, as part of the project's parking plan, garages are proposed to be part of the overall off-street parking count. While three car garages will be the common condition within the large lot development to the east, they will not be an option on the small lot development to the west. Consequently, cul de sac "B" has been widened to allow for parking on one side and some common parking is proposed on the east side located on the common area parcels H and I. These areas are accounted for in the limits of disturbance calculations for the overall project.

Enforcement

The HOA will be responsible for plowing of the roads and insuring sufficient life-safety access throughout the project over the life of the development. As a result, it is their responsibility to keep roads clear and enforce parking standards. It will be within the scope of the HOA to ensure that garage space that is accorded to the project parking allocation is available for use as needed (the 3rd space within the garage). Further, the HOA will be in charge of the parking in the common parking lots both from maintenance perspective and controlling use or availability as required to provide for off-street parking.

Parking Count

As a basic design element, and in compliance with County Code, each dwelling unit will have two parking stalls which are directly in front of each garage. In the 28 east side lots a minimum of 80% of the units will have three car garages. The front access to these garage doors automatically add one surface space (see LOD calculation for surface parking discussion). In the event that only a two-car garage is provided, an allowance is made for at least one additional outside space through a requirement for 20' wide portion of the driveway. This space is in addition to the area in front of the garage doors and will require additional paving beyond that space, i.e. the driveway will have to be both long enough and wide enough to provide for 3 cars outside of the interior garage space. While this may result in tandem parking, this is acceptable as it is both within the residence's control and their obligation to keep their cars off the street.

Within the 10-unit high-density lots to the west, two car garages will be the norm with two spaces in front, however, some driveways will have sufficient length to allow for tandem parking as well. In addition, 10 spaces are provided by on street parking on one side of the cul de sac.

Beyond the parking noted above for each unit, the project will provide 12 spaces of parking that can be used by any of the residents within the project as controlled by the HOA (lots H & I).

Alternative B of the project has a total of 38 units. The total parking requirement for off street parking is therefore 4x38=152 plus 5 spaces for the accessory dwellings = 158. This parking plan provides for those spaces as follows:

- 76 from normal 2 cars in front of garages
- 22 spaces for additional garage space (counting one inside garage space =28 x 0.8)
- 22 spaces for additional parking in front of the 3rd garage stall
- 12 spaces in additional driveway paving (tandem parking in wider & longer driveways)
- 5 additional paved spaces for accessory dwellings
- 12 spaces within common area on Lots H & I
- 10 spaces of on street parking within cul de sac "B" (west side)

Preliminarily, this plan adds to 159 spaces and is only for the purposes of demonstrating that the overall parking requirement can be met or exceeded. The use of additional garage space to meet the requirement is proposed for the purpose of limiting impervious surface, reducing overall snow storage and better utilization of built space. While specific parking on each lot is subject to final building design, the master developer, and ultimately the HOA, will be required to submit projections at the time of each residential building permit to ensure that this parking count can be obtained within the overall project. While the system is designed to make the "full" parking count readily accessible to each home, this Parking Management Plan is the obligation of the HOA to enforce. Enforcement can be legally binding on the Project through the adoption of a mitigation and monitoring plan by the County.