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September 30, 2003

Mathew W. Slowik
San Bernardino County Government Center
385 North Arrowhead Avenue, 1st Floor
San Bernardino, CA 92415-0182

Dear Mr. Slowik:

We are pleased to present this traffic impact analysis of the proposed approximately 92 single family dwellings east of Fawnskin on the north side of State Route 38 in the Big Bear Lake Area.

This report summarizes our methodology, analysis, findings, and recommended mitigation measures. We trust that the findings, which are summarized in the front of the report and include the mitigation measures, will be of immediate as well as continuing value to you and the County of San Bernardino in evaluating the project's traffic impacts.

It has been a pleasure to serve your needs on this project. Should you have any questions, or if we can be of further assistance, please do not hesitate to call.

Sincerely,

KUNZMAN ASSOCIATES

William Kunzman

William Kunzman, P.E.
Registration Expiration
Date: 3-31-2004

#2425b

FAWNSKIN 92 DWELLINGS

TRAFFIC ANALYSIS

KUNZMAN ASSOCIATES
TRANSPORTATION PLANNING - TRAFFIC ENGINEERING

Table of Contents

Section		Page No.
1.	Findings	2
	- Existing Traffic Conditions	
	- Traffic Impacts	
	- Mitigation Measures	
2.	Congestion Management Program (CMP) Methodology	7
	- County Congestion Management Program (CMP)	
	- Prescribed Methodology for A Traffic Impact Analysis (TIA)	
	- Mitigation Measures	
3.	Project Description	11
	- Location	
	- Proposed Development	
4.	Existing Traffic Conditions	14
	- Surrounding Street System	
	- Existing Travel Lanes and Intersection Controls	
	- Existing Daily Traffic Volumes	
	- Existing Peak Hour Turning Movement Volumes	
	- Existing Intersection Lanes	
	- Existing Intersection Delay	
	- Existing Level of Service	
5.	Project Traffic	23
	- Traffic Generation	
	- Traffic Distribution and Assignment	
	- Project-Related Traffic	
6.	Existing Plus Project Traffic Conditions	28
	- Existing Plus Project Daily Traffic Volumes	
	- Existing Plus Project Peak Hour Turning Movement Volumes	
	- Existing Plus Project Intersection Lanes	
	- Existing Plus Project Intersection Delay	
	- Existing Plus Project Level of Service	
	- Traffic Signal Warrants	

7. Existing Plus Other Development Traffic Conditions - Year 2006 33

- Other Development Growth - Year 2006
- Existing Plus Other Development Daily Traffic Volumes - Year 2006
- Existing Plus Other Development Peak Hour Turning Movement Volumes - Year 2006
- Existing Plus Other Development Intersection Lanes - Year 2006
- Existing Plus Other Development Intersection Delay - Year 2006
- Existing Plus Other Development Level of Service - Year 2006
- Traffic Signal Warrants - Year 2006

8. Existing Plus Project Plus Other Development Traffic Conditions - Year 2006 39

- Other Development Growth - Year 2006
- Cumulative Conditions Daily Traffic Volumes - Year 2006
- Cumulative Conditions Peak Hour Turning Movement Volumes - Year 2006
- Cumulative Conditions Intersection Lanes - Year 2006
- Cumulative Conditions Intersection Delay - Year 2006
- Cumulative Conditions Level of Service - Year 2006
- Traffic Signal Warrants - Year 2006

9. Existing Plus Other Development Traffic Conditions - Year 2025 43

- Other Development Growth - Year 2025
- Existing Plus Other Development Daily Traffic Volumes - Year 2025
- Existing Plus Other Development Peak Hour Turning Movement Volumes - Year 2025
- Existing Plus Other Development Intersection Lanes - Year 2025
- Existing Plus Other Development Intersection Delay - Year 2025
- Existing Plus Other Development Level of Service - Year 2025
- Traffic Signal Warrants - Year 2025

10. Existing Plus Project Plus Other Development Traffic Conditions - Year 2025 48

- Other Development Growth - Year 2025
- Cumulative Conditions Daily Traffic Volumes - Year 2025
- Cumulative Conditions Peak Hour Turning Movement

Volumes - Year 2025
- Cumulative Conditions Intersection Lanes - Year 2025
- Cumulative Conditions Intersection Delay - Year 2025
- Cumulative Conditions Level of Service - Year 2025
- Traffic Signal Warrants - Year 2025
- Pro Rata Share of Offsite Improvement Costs

11. Internal Circulation 52

- Site Access
- Internal Roadway Sizing
- Internal Circulation

Appendices

Appendix A - Glossary of Transportation Terms

Appendix B - Explanation and Calculation of Intersection Delay

Appendix C - Existing Intersection Turning Movement Counts, Plots, and Estimation of Daily Traffic Volumes

List of Figures

Figure No.	Title	Page No.
1	Project Location	12
2	Site Plan	13
3	State Highway Designations	19
4	Existing Through Travel Lanes and Intersection Controls	20
5	Existing Daily Traffic Volumes - Average Month	21
6	Existing Daily Traffic Volumes - Peak Month	22
7	Project Traffic Distribution (Weekday Peak Hours)	26
8	Project Generated Daily Traffic Volumes	27
9	Existing Plus Project Daily Traffic Volumes - Peak Month	32
10	2006 Daily Traffic Volumes - Average Month	37
11	Year 2006 Daily Traffic Volumes - Peak Month	38
12	Year 2006 Plus Project Daily Traffic Volumes - Peak Month	42
13	Year 2025 Daily Traffic Volumes - Average Month	46
14	Year 2025 Daily Traffic Volumes - Peak Month	47
15	Year 2025 Plus Project Daily Traffic Volumes - Peak Month	51

List of Tables

Table No.	Title	Page No.
1a	Summary of Intersection Delay for Unsignalized Intersection of North Shore and Stanfield Cutoff	5
1b	Summary of Intersection Delay for the Signalized Intersections	6
2	Levels of Service Description for Delay Method (1997 Methodology)	17
3	Determining Annual Growth Rates and Peak Month Factors	18
4	Project Traffic Generation	25
5	Traffic Signal Warrants	31
6	Daily Leg Volume Calculations	36

Fawnskin 92 Dwellings

Traffic Analysis

This report contains the traffic impact analysis for the proposed approximately 92 single family dwellings east of Fawnskin and on the north side of State Route 38 in the vicinity of Big Bear Lake.

The traffic report contains documentation of existing traffic conditions, traffic generated by the project, distribution of the project traffic to roads outside the project, and an analysis of future traffic conditions. Each of these topics is contained in a separate section of the report. The first section is "Findings", and subsequent sections expand upon the findings. In this way, information on any particular aspect of the study can be easily located by the reader.

Although this is a technical report, every effort has been made to write the report clearly and concisely. To assist the reader with those terms unique to transportation engineering, a glossary of terms is provided in Appendix A.

1. Findings

This section summarizes the existing traffic conditions, project traffic impacts, and the proposed mitigation measures.

Existing Traffic Conditions

a. Table 1 shows the existing Intersection Delay Values and Level of Service (LOS).

b. For existing traffic conditions, the intersection of Stanfield Cutoff and North Shore operates at Level of Service A capacity based on delay. The intersection of Stanfield Cutoff and Big Bear Boulevard operates at Level of Service E based on Delay, which is unacceptable. The solution is to convert the eastbound right turn lane to an eastbound through lane through the intersection. This may involve widening of the intersection and may involve the taking of right of way.

c. The project site is generally vacant at present, and does not generate traffic.

d. The proposed project will have access to State Route 38.

Traffic Impacts

e. Table 1 shows the existing plus project Intersection Delay values and Level of Service (LOS).

f. For existing plus project traffic conditions, the intersection of Stanfield Cutoff and North Shore operates at Level of Service B capacity based on delay. The intersection of Stanfield Cutoff and Big Bear Boulevard with the recommended mitigation measure operates at Level of Service D based on Delay, which is acceptable for a State Highway. Based on established threshold of significance criteria (Discussed in Section 2), the project has an insignificant traffic impact on Stanfield Cutoff and Big Bear Boulevard.

g. After project completion and in the year 2006, the intersection of Stanfield Cutoff and North Shore operates at Level of Service B capacity based on delay. The intersection of Stanfield Cutoff and Big Bear Boulevard with the recommended mitigation measure operates at Level of Service D based on Delay, which is acceptable for a State Highway. Based on established threshold of significance criteria (Discussed in Section 2), the project has an insignificant traffic impact on Stanfield Cutoff and Big Bear Boulevard.

h. Although the project does not have a significant impact on the intersection of Stanfield Cutoff and North Shore, this

intersection will require a traffic signal by 2025 because of background traffic growth.

i. Proposed land uses for the site is approximately 92 single family residential dwellings.

j. The project will generate 880 daily vehicle trips, 69 of which will occur during the morning peak hour, and 93 of which will occur during the evening peak hour.

k. Project-related traffic will not warrant the installation of a traffic signal at any location.

Mitigation Measures

The following measures are recommended to mitigate the impact of the existing, background growth, and project traffic:

l. Maintain a high level of service along North Shore by restricting parking.

m. A 150 foot eastbound left turn pocket should be striped for traffic on North Shore desiring to turn left into project access points. The County of San Bernardino recommends a continuous left turn lane, and Caltrans will make decision.

This is a Caltrans decision subject to agreement by the County of San Bernardino.

n. For future traffic conditions, the intersection of Stanfield Cutoff and North Shore will need a traffic signal. The project's pro rata share of the signal is $56,523.

o. For existing traffic conditions the intersection of Stanfield Cutoff and Big Bear Boulevard currently needs to have the eastbound right turn lane converted to an eastbound through lane through the intersection. The project's pro rata share of this off site road improvements is estimated to be $7,098. The eastbound right turn lane is restriped to an eastbound through lane, and involves roadway widening.

The eastbound right turn lane needs to be converted to a through lane, and this will require widening and may require additional right of way. The widening and additional right of way may be needed before or after the intersection, or both. And whether widening and a take of right of way is required at all depends on lane widths and taper lengths required by Caltrans.

The available right of way in the mountains is restricted, the topography is difficult, and in many situations there are large pine trees in a location that may preclude the use of

typical design criteria. There needs to be flexibility in design requirements in the mountains. Whatever design is accepted needs to meet minimum acceptable criteria which may be less than normal criteria.

The geometrics required is a Caltrans decision, and is subject to agreement by the County of San Bernardino. The traffic study documents the need for the lane and the possible need for widening and right of way. Whether widening and right of way is needed is a function of the design criteria that Caltrans requires. This traffic study is not a design study, and this mitigation measure is not needed by this project. The project has no significant impact on this intersection, and the traffic study merely points out that it is needed to accommodate existing and future traffic volumes.

Any design that does not meet Caltrans minimum Design Standards will need an "Exception to Design Standard" fact sheet.

The estimated pro rata share opf the cost of the widening is $17,748.

p. Construct all streets internal to the project to full ultimate cross-sections as adjacent development occurs.

q. Construct all streets bordering the project to ultimate half-section widths in conjunction with development.

r. Landscape plantings and signs should be limited to 36 inches in height within 25 feet of project access points to assure good visibility.

s. Install a STOP sign on site egress roadways to North Shore.

Table 1a

SUMMARY OF INTERSECTION DELAY FOR THE UNSIGNALIZED INTERSECTION OF STANFIELD CUTOFF AND NORTH SHORE

Intersection	Land Use Scenario	Peak Hour	Lanes	Intersection Control	Two Way Stop Worst Level of Service (LOS)	
					Movement(s)	Level of Service
1. Stanfield Cutoff and North Shore - Average Month	Year 2001 Without Project	AM	Existing	2 Way Stop	All	A
1. Stanfield Cutoff and North Shore - Average Month	Year 2001 Without Project	PM	Existing	2 Way Stop	All	A
1. Stanfield Cutoff and North Shore - Average Month	Year 2001 With Project	AM	Existing	2 Way Stop	All	A
1. Stanfield Cutoff and North Shore - Average Month	Year 2001 With Project	PM	Existing	2 Way Stop	All	A
1. Stanfield Cutoff and North Shore - Peak Month	Year 2001 Without Project	AM	Existing	2 Way Stop	All	A
1. Stanfield Cutoff and North Shore - Peak Month	Year 2001 Without Project	PM	Existing	2 Way Stop	All	A
1. Stanfield Cutoff and North Shore - Peak Month	Year 2001 With Project	AM	Existing	2 Way Stop	NL, SL	B
1. Stanfield Cutoff and North Shore - Peak Month	Year 2001 With Project	PM	Existing	2 Way Stop	NL, SL	B
1. Stanfield Cutoff and North Shore - Average Month	Year 2006 Without Project	AM	Existing	2 Way Stop	All	A
1. Stanfield Cutoff and North Shore - Average Month	Year 2006 Without Project	PM	Existing	2 Way Stop	All	A
1. Stanfield Cutoff and North Shore - Average Month	Year 2006 With Project	AM	Existing	2 Way Stop	All	A
1. Stanfield Cutoff and North Shore - Average Month	Year 2006 With Project	PM	Existing	2 Way Stop	All	A
1. Stanfield Cutoff and North Shore - Peak Month	Year 2006 Without Project	AM	Existing	2 Way Stop	SL	B
1. Stanfield Cutoff and North Shore - Peak Month	Year 2006 Without Project	PM	Existing	2 Way Stop	SL	B
1. Stanfield Cutoff and North Shore - Peak Month	Year 2006 With Project	AM	Existing	2 Way Stop	NL, SL	B
1. Stanfield Cutoff and North Shore - Peak Month	Year 2006 With Project	PM	Existing	2 Way Stop	SL	B

Movement: NT = Northbound Through, NR = Northbound Right, NL = Northbound Left
ST = Southbound Through, SR = Southbound Right, SL = Southbound Left
ET = Eastbound Through, ER = Eastbound Right, EL = Eastbound Left
WT = Westbound Through, WR = Westbound Right, WL = Westbound Left

Table 1b

SUMMARY OF SIGNALIZED INTERSECTION DELAY AND LEVEL OF SERVICE (LOS)

Intersection	Land Use Scenario	Peak Hour	Lanes												Delay in Seconds and Level of Service (LOS)	Intersection Capacity Utilization (ICU) and LOS	Lanes
			Northbound			Southbound			Eastbound			Westbound					
			Thr	Rt	Lt	Thr	Rt	Lt	Thr	Rt	Lt	Thr	Rt	Lt			
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Average Month Without Project	AM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	35.2 D+	0.813 D+	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Average Month Without Project	PM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	38.6 D+	0.913 E+	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Average Month With Project	AM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	36.5 D+	0.822 D+	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Average Month With Project	PM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	39.9 D+	0.918 E+	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Average Month Without Project	AM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	28.3 C	0.643 B	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Average Month Without Project	PM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	26.8 C	0.669 B	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Average Month With Project	AM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	29.2 C	0.654 B	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Average Month With Project	PM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	27.5 C	0.675 B	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Peak Month Without Project	AM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	49.3 D-	0.942 E	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Peak Month Without Project	PM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	64.3 E	1.067 F	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Peak Month With Project	AM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	51.7 D-	0.951 E	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Peak Month With Project	PM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	66.1 E	1.072 F	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Peak Month Without Project	AM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	31.7 C-	0.729 C+	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Peak Month Without Project	PM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	30.2 C-	0.762 C	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Peak Month With Project	AM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	32.7 C-	0.741 C	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2001 Peak Month With Project	PM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	31.0 C-	0.768 C	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Average Month Without Project	AM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	37.0 D+	0.839 D	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Average Month Without Project	PM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	42.0 D	0.943 E	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Average Month With Project	AM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	38.4 D+	0.847 D	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Average Month With Project	PM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	43.4 D	0.949 E	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Average Month Without Project	AM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	28.8 C	0.660 B	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Average Month Without Project	PM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	27.3 C	0.687 B-	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Average Month With Project	AM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	29.9 C	0.671 B	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Average Month With Project	PM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	28.1 C	0.693 B-	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Peak Month Without Project	AM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	55.3 E+	0.975 E-	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Peak Month Without Project	PM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	73.6 E-	1.104 F-	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Peak Month With Project	AM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	57.8 E+	0.987 E-	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Peak Month With Project	PM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	75.5 E-	1.110 F-	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Peak Month Without Project	AM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	32.7 C-	0.752 C	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Peak Month Without Project	PM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	31.1 C-	0.784 C-	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Peak Month With Project	AM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	33.8 C-	0.766 C	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2006 Peak Month With Project	PM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	31.9 C-	0.790 C-	Widen

NOTES

The Level of Service (LOS) for the Delay Method and Intersection Capacity Utilization Method differ because they are calculated entirely differently and LOS is defined differently. See Appendices for further discussion.

Table 1b continued

SUMMARY OF SIGNALIZED INTERSECTION DELAY AND LEVEL OF SERVICE (LOS)

Intersection	Land Use Scenario	Peak Hour	Lanes												Delay in Seconds and Level of Service (LOS)	Intersection Capacity Utilization (ICU) and LOS	Lanes
			Northbound			Southbound			Eastbound			Westbound					
			Thr	Rt	Lt	Thr	Rt	Lt	Thr	Rt	Lt	Thr	Rt	Lt			
1. Stanfield Cutoff (NS) and North Shore (EW)	2025 Peak Month Without Project	AM	1	1	0	1	1	0	1	1	0	1	0	0	12.0 B+	0.456 A+	Existing
1. Stanfield Cutoff (NS) and North Shore (EW)	2025 Peak Month Without Project	PM	1	1	0	1	1	0	1	1	0	1	0	0	17.8 B-	0.359 A+	Existing
1. Stanfield Cutoff (NS) and North Shore (EW)	2025 Peak Month With Project	AM	1	1	0	1	1	0	1	1	0	1	0	0	12.2 B+	0.456 A+	Existing
1. Stanfield Cutoff (NS) and North Shore (EW)	2025 Peak Month With Project	PM	1	1	0	1	1	0	1	1	0	1	0	0	19.3 B-	0.359 A+	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Average Month Without Project	AM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	48.4 D-	0.937 E	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Average Month Without Project	PM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	62.5 E+	1.060 F	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Average Month With Project	AM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	50.8 D-	0.946 E	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Average Month With Project	PM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	64.3 E	1.065 F	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Average Month Without Project	AM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	31.5 C-	0.726 C+	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Average Month Without Project	PM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	30.0 C	0.757 C	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Average Month With Project	AM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	32.6 C-	0.737 C	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Average Month With Project	PM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	30.7 C-	0.763 C	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Peak Month Without Project	AM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	86.9 F+	1.110 F-	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Peak Month Without Project	PM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	119.0 F-	1.250 F-	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Peak Month With Project	AM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	90.4 F	1.122 F-	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Peak Month With Project	PM	0.5	0.5	1	1	0	1	1	1	1	1	1	1	121.1 F-	1.255 F-	Existing
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Peak Month Without Project	AM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	37.9 D+	0.846 D	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Peak Month Without Project	PM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	36.1 D+	0.872 D	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Peak Month With Project	AM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	39.4 D+	0.860 D	Widen
2. Stanfield Cutoff (NS) and Big Bear Blvd. (EW)	2025 Peak Month With Project	PM	0.5	0.5	1	1	0	1	2	0	1	2	0	1	37.1 D+	0.877 D-	Widen

NOTES

The Level of Service (LOS) for the Delay Method and Intersection Capacity Utilization Method differ because they are calculated entirely differently and LOS is defined differently. See Appendices for further discussion.

2. Congestion Management Program (CMP) Methodology

This section discusses the County Congestion Management Program (CMP). The purpose, prescribed methodology, and definition of a significant traffic impact are discussed.

County Congestion Management Program (CMP)

The CMP is a result of Proposition 111 which was a statewide initiative approved by the voters in June, 1990. The proposition allowed for a nine cent per gallon state gasoline tax increase over a five year period.

Proposition 111 explicitly stated that the new gas tax revenues were to be used to fix existing traffic problems and was not to be used to promote future development. For a city to get its share of the Proposition 111 gas tax, it has to follow certain procedures specified by the State Legislature. The legislation requires that a Traffic Impact Analysis (TIA) be prepared for new development. The TIA is prepared to monitor and fix traffic problems caused by new development.

The Legislature requires that adjacent jurisdictions use a standard methodology for conducting a TIA. To assure that adjacent jurisdictions use a standard methodology in preparing TIA's, one common procedure is that all cities within a county, and the county agency itself, adopt and use one standard methodology for conducting TIA's.

Although each county has developed standards for preparing TIA's, TIA requirements do vary in detail from one county to another, but not in overall intent or concept. The general approach selected by each county for conducting TIA's has common elements.

The general approach for conducting a TIA is that existing weekday peak hour traffic is counted and the percent of roadway capacity currently used is determined. Then growth in traffic is accounted for and added to existing traffic and the percent of roadway capacity used is again determined. Then the project traffic is added and the percent of roadway capacity used is again determined. If the new project adds traffic to an overcrowded facility, then the new project has to mitigate the traffic impact so that the facility operates at a level which is no worse than before the project traffic was added.

If the project size is below a certain minimum threshold level, then a project does not have to have a TIA prepared, once it is shown or agreed that the project is below the minimum threshold.

In San Bernardino County a project needs a TIA if it generates more than 250 new peak hour trips. This project will generate 93 new peak hour trips (approximately). Although this project does not generate 250 new peak hour trips, nonetheless the County of San Bernardino has requested that the SanBag TIA requirements be met, with one exception. That exception is that engineering judgment can be used for determining the project's peak hour traffic distribution rather than determining the traffic distribution using the East Valley Traffic Model.

If a project is bigger than the minimum threshold size, then a TIA is required.

Prescribed Methodology for A Traffic Impact Analysis (TIA)

The TIA must include all monitored intersections to which the project adds traffic above a certain minimum amount.

In San Bernardino County, the monitored intersections are all arterial to arterial intersections.

In San Bernardino County, the CMP requires that all arterial links and their CMP intersections be included in the analysis when the anticipated project volume equals or exceeds 80 two-way trips in one peak hour. For freeways, it is 100 two-way trips in the peak hour. Based on this requirement and the distribution of project-generated trips, the project-generated arterial link volumes are less than 80 trips on all roadway links and their intersections.

In this case, the intersections of Stanfield Cutoff and North Shore Drive, and Stanfield Cutoff and Big Bear Boulevard are not CMP intersections.

If a project adds more traffic than the minimum threshold amount to an intersection, then that intersection has to be analyzed for deficiencies.

If the intersection has to be analyzed for deficiencies, then mitigation is required if the existing traffic plus anticipated traffic growth plus project traffic does cause the Intersection Delay to go above a certain point.

In San Bernardino County, mitigation is required if the intersection operates at worse than Level of Service C, ie Level of Service D, which corresponds to a maximum acceptable delay of 35 seconds for signalized intersections. The TIA guidelines require Level of Service E.

In San Bernardino County, impacted intersections are analyzed

using the Delay Methodology and the Intersection Capacity Utilization (ICU) Methodology. Although the Delay Method is required per TIA guidelines, the ICU Method is also used per TIA requirements to assure that there is no operational problems.

An intersection mitigation measure shall either fix the deficiency, or reduce both the delay and ICU so that they are below the level which occurs without the the project.

The following assumptions will be used:

Lane capacity:
1900 through
1900 right
1800 left
1700 double left
1600 triple left
2200 freeway lane

Lost time per phase: 2 seconds

Yellow time per phase: 3 seconds

Signal cycle length: 90 to 130 seconds and optimized to result in the lowest calculated delay

Random arrivals will be assumed for signal coordination, except where signal interconnection exists.

Minimum green plus yellow: 10 seconds

Peak hour factor: 0.95

Lane utilization factor: 1.00

Right turn lanes will be assumed if there is at least 10 feet of space for the right turns, whether striped or not

For freeways, a split of 55/45 percent will be assumed, and morning peak hour will be assumed to be 90 percent of evening peak hour, truck percentages will be per CalTrans, and a peak hour factor of 0.98 in congested areas and 0.95 for uncongested areas will be used.

Growth rates are calculated and applied on a simple growth rate basis rather than a compounded growth rate basis.

Project traffic is generated using rates and procedures contained in the Institute of Transportation Engineers, Trip

Generation manual. Project traffic distribution is provided by the reviewing agency or is agreed to in advance of the TIA being prepared. The TIA has to be prepared by a licensed Traffic Engineer.

This traffic analysis has been prepared in accordance with the TIA requirements except as noted. The TIA not only examined the CMP system of roads and intersections, but also other roads and intersections.

The project generated traffic was added to intersections, and a full intersection analysis was conducted, even when the project added traffic failed to meet the minimum thresholds that require an intersection analysis.

Mitigation Measures

If a project is large enough to require that a TIA be prepared, and if the project adds traffic to an intersection above a minimum threshold, and if the intersection is operating at above an acceptable level of operation, then the project must mitigate its traffic impact.

Traffic mitigation can be in many forms including adding lanes. Lanes can sometimes be obtained through restriping or elimination of parking, and sometimes require spot roadway widening.

3. Project Description

This section discusses the project's location, proposed development, and traffic characteristics of such a development. Figure 1 shows the project location. Figure 2 shows the project site plan.

Location

The project site is located east of Fawnskin on the north side of State Route 38 in the vicinity of Big Bear Lake. Access will be from North Shore.

Proposed Development

The project site is proposed to be developed with approximately 92 single family residential dwellings.

The following describes the proposed land uses from a traffic engineering viewpoint:

Single Family Detached Dwellings: The primary market for these units will be families with children. As a result, peak traffic volumes will occur during home-to-work and work-to-home trips. Child-related trips such as home-to-school or home-to-Little League are also a significant factor in the daily trip generation, but they have a smaller influence on peak hour volumes.

The project also includes 100 boat slips. The boat slips are to be used by residents who live there, and are not expected to generate additional external traffic.

In this traffic analysis it has been assumed that the homes are lived in year round by persons who commute to work. This is a maximum likely scenario. It is likely that so,me homes will be second homes and that those who do live there will tend to be retired more than typically found in Southern California.

Figure 1
Project Location

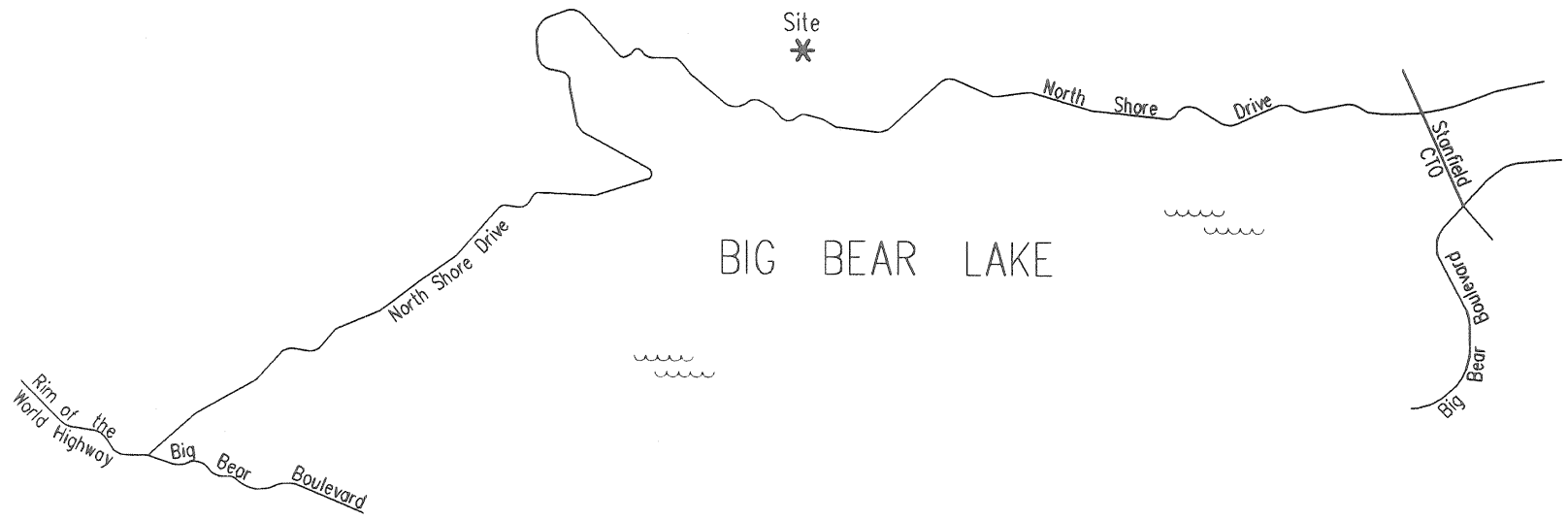

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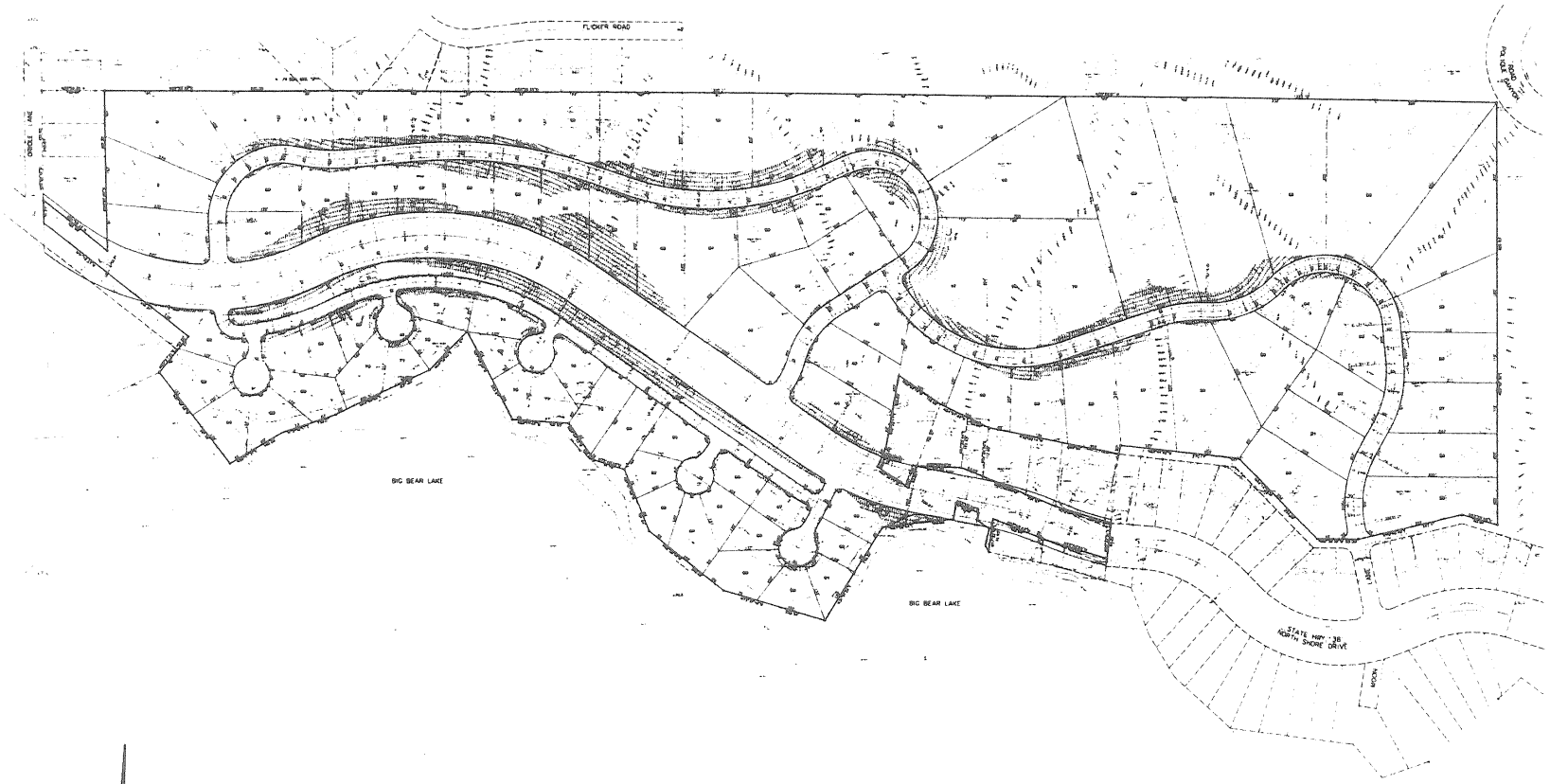
Figure 2
Site Plan



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4. Existing Traffic Conditions

The traffic conditions as they exist today are discussed below and illustrated in Figures 3 to 6.

Surrounding Street System

Because the roadway system is part of the State Highway System most people know the streets by their name rather than their State Highway number. Figure 3 was prepared to show the common name as well as State Highway number for each.

Roadways that will be utilized by the development include North Shore, Stanfield Cutoff and Big Bear Boulevard. In the vicinity of the project site, the following roadway conditions exist.

North Shore Drive:

This east-west two lane road is State Highway 38 and does not have left turn lanes at intersections. It currently has a peak month volume of 2,700 vehicle per day.

Stanfield Cutoff:

This north-south two lane road not have left turn lanes at intersections. It currently has a peak month volume of 6,000 vehicles per day.

Big Bear Boulevard:

This east-west road is four lanes west of Stanfield Cutoff and two lanes east of Stanfield Cutoff. It has a peak month volume of 21,100 vehicles per day west of Stanfield Cutoff.

Existing Travel Lanes and Intersection Controls

Figure 4 identifies the existing roadway conditions for highways near the site. The number of through lanes for existing roadways and the existing intersection controls are identified.

Existing Daily Traffic Volumes

Figures 5 and 6 depict the average and peak month daily two-way traffic volumes. Traffic volumes were obtained from the weekday peak hour intersection turning movement counts made by Kunzman Associates in March, 2001.

Table 3 shows daily traffic volumes as reported by CalTrans in Traffic Volumes for State Highways in 1989 and 1999. From this data it can be seen that a reasonable factor to convert typical month volumes to peak month volumes is 1.25.

The County of San Bernardino recommends a growth rate of 1.0 percent per year for the Big Bear area based on a recent analysis by the County. Typically an annual growth rate approach is better than a cumulative projects approach because the cumulative projects approach typically leads to double counted trips and everything gets worst cased so that there is a compounding of errors consideration also. The double counting occurs for instance when homes are proposed and the cumulative projects list includes a retail commercial center. The trip added from the home that goes to the store is the same trip added a second time from the store to the home. The compounding of errors leads to erroneous results when for instance in the case of residential the density is over estimated, then the trip generation is overestimated (this is particularly problematic in Big Bear where most houses are not inhabited full time, and then the trip distribution is overestimated in that the local trips are under reported and the longer trips are over reported. The County of Los Angeles uses the compounded growth rate approach. Also, it should be noted that the County of Riverside formerly used the compounded growth rate approach, then switched to the cumulative projects approach, and is now reconsidering going back to the compounded growth rate approach.

Year 2001 traffic volume estimates where not available from Caltrans "Traffic Volume, 2001" were obtained by factoring the sum of the morning and evening peak hour volumes. A factor of 5.5 was used. This method of estimating daily traffic volumes produces reasonable results. See Appendix B for more details.

Existing Peak Hour Turning Movement Volumes

Existing manual peak hour turning movement counts were made by Kunzman Associates in March, 2001.

Appendix C contains plots of the peak hour intersection turning movement volumes. Additionally, the same plots show the peak hour leg approach volumes and two-way peak hour leg volumes.

There are two peak hours in a weekday. The morning peak hour is between 7 and 9 A.M., and the evening peak hour is between 4 and 6 P.M. The actual peak hour within the two hour interval is the four consecutive 15 minute periods with the highest total volume when all movements are added together. Thus, the evening peak hour at one intersection may be 4:45 to 5:45 P.M. if those four

consecutive 15 minute periods have the highest combined volume.

Existing Intersection Lanes

The Appendix C plots of peak hour turning movement volumes for each intersection also show the number of existing intersection through and turning movement lanes. The lanes are also listed in Table 1.

Existing Intersection Delay

The technique used to assess the operation of an intersection is known as the Intersection Delay Method. To calculate the Intersection Delay value the volume of traffic using the intersection is compared with the capacity of the intersection. The Intersection Delay value is usually expressed as the average seconds of delay per vehicle using the intersection.

The Intersection Delay for the existing traffic conditions have been calculated and are shown in Table 1.

Existing Intersection Delay values are based upon manual peak hour turning movement counts, factored up to represent peak month counts.

Appendix B contains the Intersection Delay calculations. An explanation of Intersection Delay and how it is calculated is also included in Appendix B.

Existing Level of Service

From the Intersection Delay analysis, the intersection Level of Service (LOS) can be determined. LOS is directly related to Intersection Delay. Table 2 shows how LOS is related to Intersection Delay, and describes LOS. However, it should be noted that the intersection of Stanfield Cutoff and Big Bear Boulevard currently operates at an intersection capacity utilization greater than 100 percent in the peak month weekday evening peak hour. The solution is to convert the eastbound right turn lane to an eastbound through lane through the intersection. This will involve widening of the intersection and may involve the taking of right of way.

Table 2

LEVEL OF SERVICE DESCRIPTION FOR DELAY METHOD (1997 METHODOLOGY)

Level of Service	Description	Stopped Delay Per Vehicle (Seconds)
A	Level of Service A occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	0 to 10.0
B	Level of Service B generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.	10.1 to 20.0
C	Level of Service generally results when there is fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear in this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.	20.1 to 35.0
D	Level of Service D generally results in noticeable congestion. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high volume to capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	35.1 to 55.0
E	Level of Service E is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high volume to capacity ratios. Individual cycle failures are frequent occurrences.	55.1 to 80.0
F	Level of Service F is considered to be unacceptable to most drivers. This condition often occurs with over-saturation, i.e., when arrival flow rates exceed the capacity of the inter-section. It may also occur at high volume to capacity ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.	80.1 +

Source: HIGHWAY CAPACITY MANUAL, Special Report 209, Transportation Research Board, National Research Council, Washington, D.C., 1997, Pages 9-6 to 9-7.

Table 3

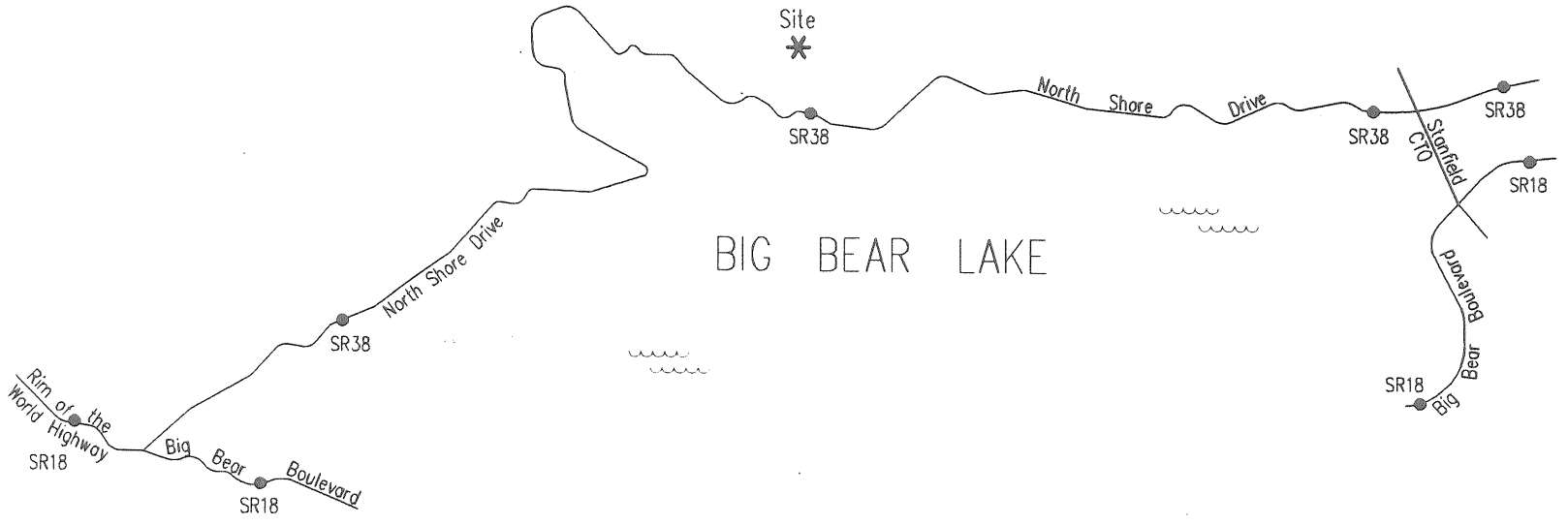
DETERMINING ANNUAL GROWTH RATES AND PEAK MONTH FACTORS

Road Location (See Figure 3 for Location References)	Year 1991			Year 2001			Growth Ratio	
	Annual Daily Traffic Volume	Peak Month Daily Traffic Volume	Peak Month Divided by Annual Daily Traffic Volume	Annual Daily Traffic Volume	Peak Month Daily Traffic Volume	Peak Month Divided by Annual Daily Traffic Volume	2001 Annual Volume Divided by 1991 Annual Volume	Annual Growth Rate (Percent)
1. Rim of the World Highway (SR18) west of Northshore Drive (SR38)	5,200	6,000	1.15	6,100	7,100	1.16	1.173	1.73%
2. Big Bear Boulevard (SR18) East of North Shore Drive (SR38)	6,900	8,000	1.16	6,300	7,300	1.16	0.913	-0.87%
3. Big Bear Boulevard (SR18) West of Stanfield Cutoff	16,000	19,100	1.19	18,000	20,500	1.14	1.125	1.25%
4. Big Bear Boulevard (SR18) East of Stanfield Cutoff	13,000	15,300	1.18	16,000	18,100	1.13	1.231	2.31%
5. North Shore Drive (SR38) North of Big Bear Boulevard (SR18) and Dam	2,000	2,350	1.18	1,600	2,300	1.44	0.800	-2.00%
6. North Shore Drive (SR38) West of Stanfield Cutoff	3,000	3,450	1.15	3,400	4,750	1.40	1.133	1.33%
7. North Shore Drive (SR38) East of Stanfield Cutoff	3,300	3,750	1.14	5,000	6,900	1.38	1.515	5.15%
Average			1.16			1.26		
Value Which Will Be Used for Traffic Study			1.25			1.25		

NOTE: SR = State Route

The peak month conditions are for a typical day in a peak month and do not necessarily include peak weekend conditions such as the Fourth of July.

Figure 3
State Highway Designations



SR = State Route

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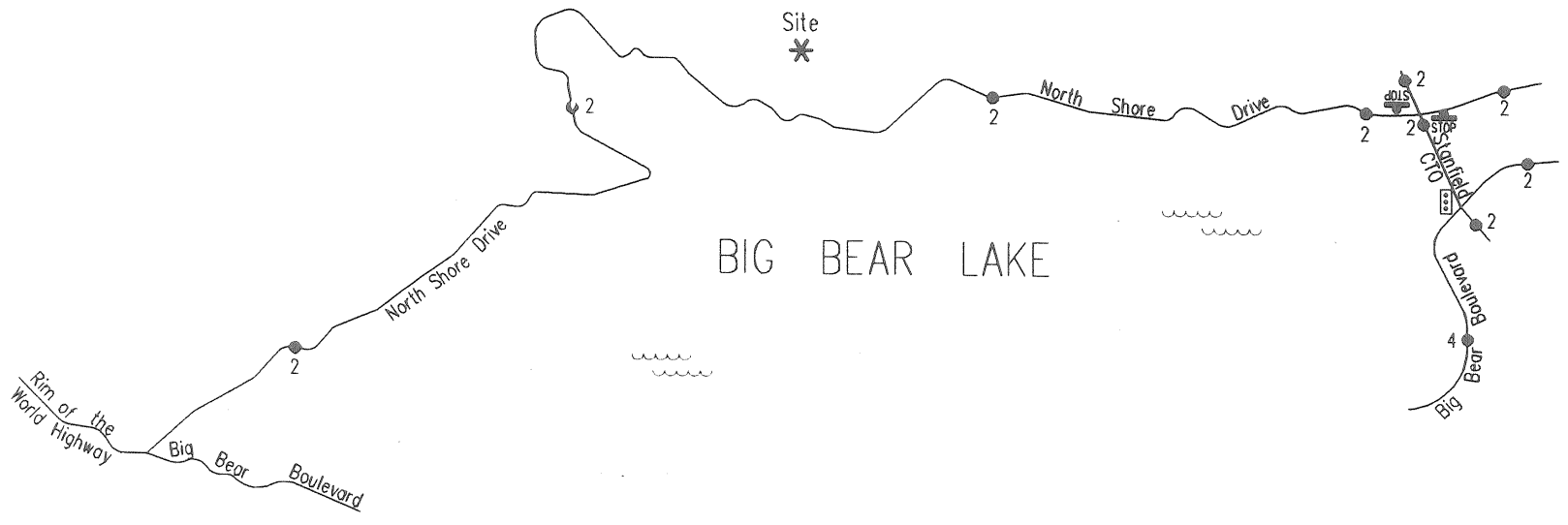
Figure 4
Existing Through Travel Lanes and Intersection Control



Legend

- 2 – Through Travel Lane
- STOP – STOP Sign
- – Signal

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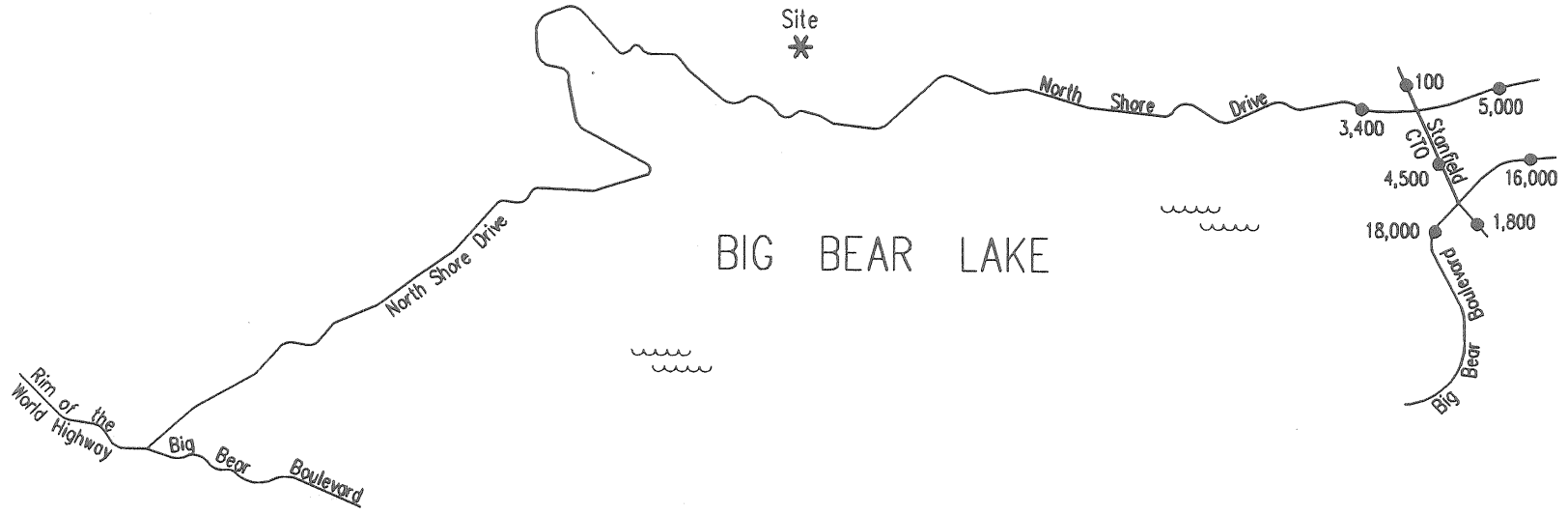
Figure 5
Existing Daily Traffic Volumes – Average Month



Source: Caltrans 2001 "Traffic Volumes" on Highways 18 and 38, and estimated for Stanfield Cutoff

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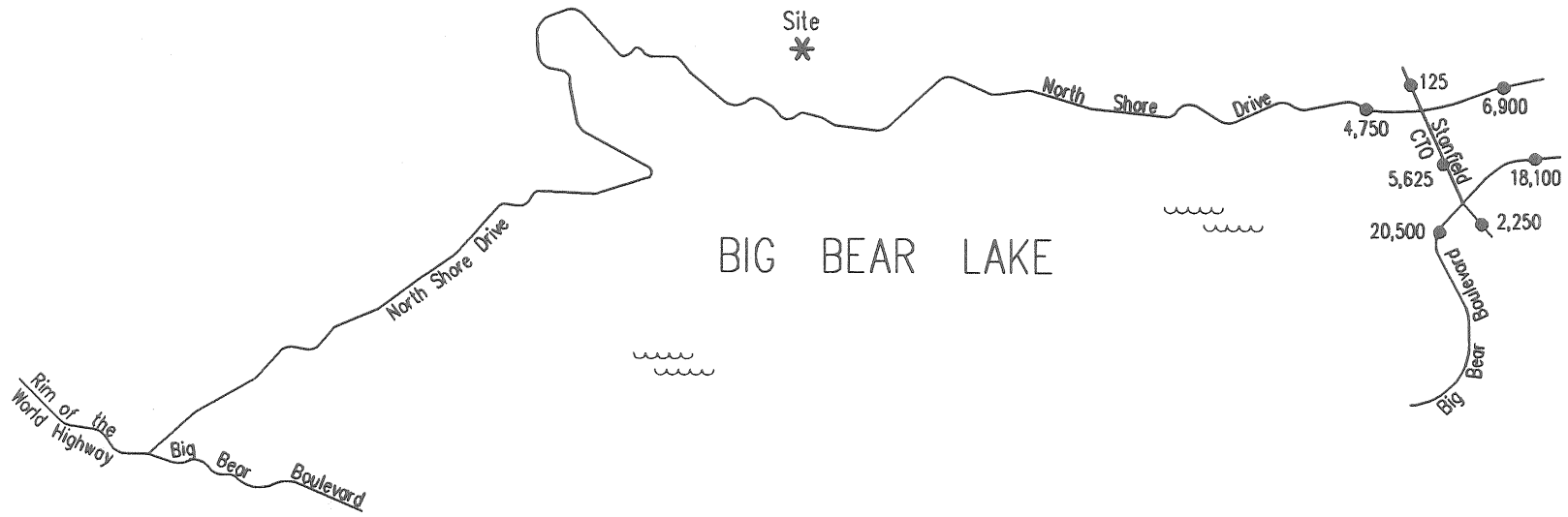
Figure 6
Existing Daily Traffic Volumes – Peak Month*



Source: Caltrans 2001 "Traffic Volumes" for Highways 18 and 38, and Stanfield volume was assumed to be 25 percent higher than the average month.

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5. Project Traffic

To estimate project-related traffic volumes at various points on the street network, a three step process is utilized. First, the traffic that will be generated by the proposed development is determined. Second, the traffic volumes are geographically distributed to major attractions of trips, such as employment centers, commercial centers, recreational areas or residential areas. Finally, the trips are assigned to specific roadways and the project-related traffic volumes are determined on a route-by-route basis.

Traffic Generation

The traffic generated by the project is determined by multiplying an appropriate trip generation rate by the quantity of land use. Trip generation rates are expressed in terms of trip ends per person, trip ends per employee, trip ends per acre, trip ends per dwelling, or trip ends per thousand square feet of floor space. For instance, if a particular land use generates six outbound trips per acre in the morning peak hour, then six vehicles are expected to leave the site in the morning peak hour for each acre of development.

Significant research efforts have been made by the Institute of Transportation Engineers and others to establish the correlation between trips and land use. From this body of information, trip generation rates can be estimated with reasonable accuracy for various land uses.

Trip generation rates are predicated on the assumption that energy costs, the availability of roadway capacity, the availability of vehicles to drive, and our life styles remain similar to what we know today. A major change in these variables may affect trip generation rates.

Trip generation rates were determined for daily traffic, morning peak hour inbound and outbound traffic, and evening peak hour inbound and outbound traffic for the proposed land uses. The trip generation rates are from Trip Generation, Sixth Edition, Institute of Transportation Engineers, 1997.

By multiplying the traffic generation rates by the land use quantities, the traffic volumes are determined. Table 4 exhibits the traffic generation rates and exhibits the peak hour and daily traffic volumes.

The project also includes 100 boat slips. The boat slips are to be used by residents who live there, and are not expected to

generate additional external traffic.

In this traffic analysis it has been assumed that the homes are lived in year round by persons who commute to work. This is a maximum likely scenario. It is likely that so,me homes will be second homes and that those who do live there will tend to be retired more than typically found in Southern California.

Traffic Distribution and Assignment

Traffic distribution is the determination of the directional orientation of traffic. It is based on the geographical location of employment centers, commercial centers, recreational areas, or residential area concentrations.

Traffic assignment is the determination of which specific route development traffic will use, once the generalized traffic distribution is determined. The basic factors affecting route selection are minimum time path and minimum distance path.

Figure 7 contains the directional distribution and assignment of the project traffic for the proposed land uses.

The County of San Bernardino requested that the following intersections be analyzed:

1. Stanfield Cutoff and North Shore Drive
2. Stanfield Cutoff and Big Bear Boulevard

Project-Related Traffic

Based on the identified traffic generation and distributions, project related daily traffic volumes are shown in Figure 8.

Table 4

PROJECT TRAFFIC GENERATION

Descriptor	Trip Generatio Rate	Trips Generated by 92 Dwellings
Units	Dwellings	Dwellings
Daily	9.57	880
Morning Peak Hour - In	0.19	17
Morning Peak Hour - Out	0.56	52
Total	0.75	69
Evening Peak Hour - In	0.65	60
Evening Peak Hour - Out	0.36	33
Total	1.01	93

SOURCE: Trip Generation, 6th Edition, Institute of Transportation Engineers, 1997, Category 210.

Figure 7
Project Traffic Distribution (Weekday Peak Hours)

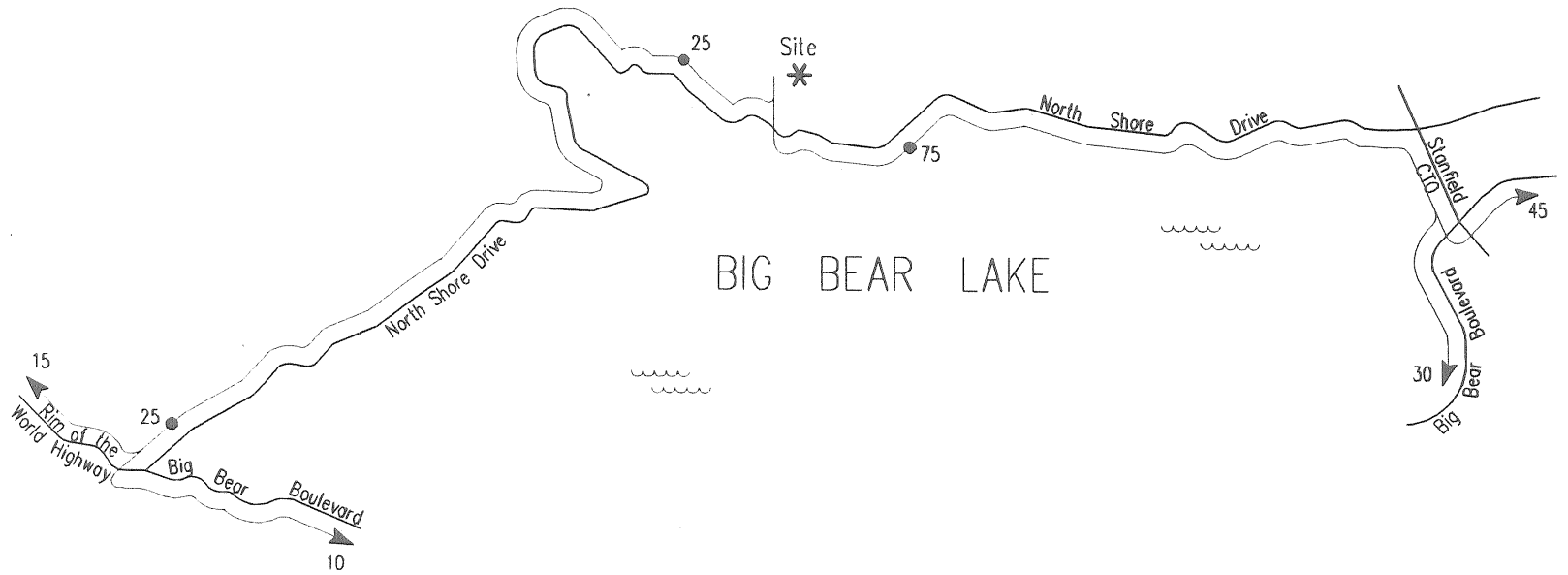

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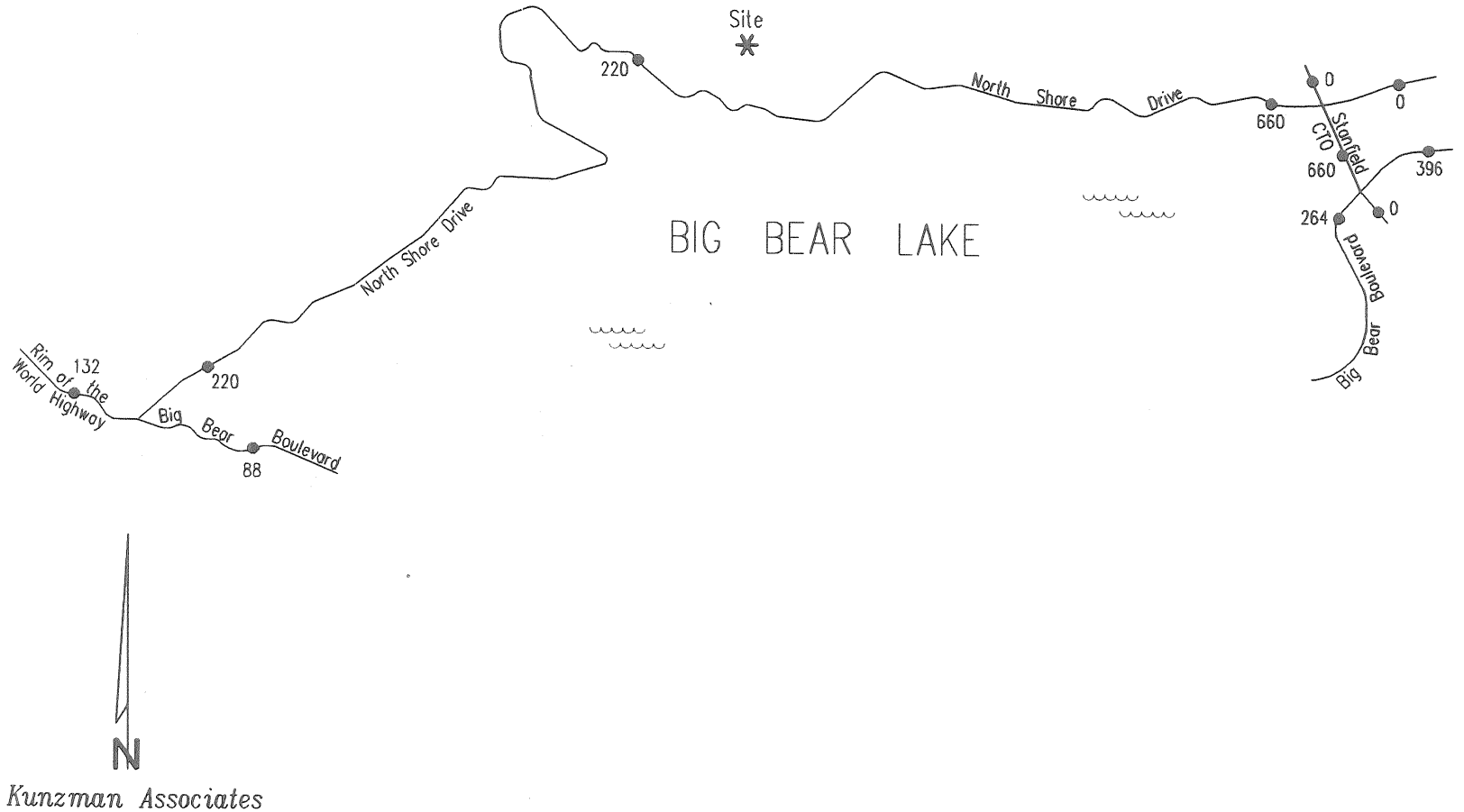
Figure 8
Project Generated Daily Traffic Volumes



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6. Existing Plus Project Traffic Conditions

Once the project-related traffic is assigned to the existing street network and added to existing volumes, the traffic impact can be assessed. Figure 9 illustrates the existing plus project traffic conditions for the peak month.

Existing Plus Project Daily Traffic Volumes

Upon project completion and occupancy the expected daily two-way traffic volumes are as illustrated in Figure 9. Figure 9 shows expected peak month daily traffic volumes for existing plus project traffic conditions.

Existing Plus Project Peak Hour Turning Movement Volumes

Appendix C contains plots of the existing plus project peak hour intersection turning movement volumes. Additionally, the same plots show the peak hour leg approach volumes and two-way peak hour leg volumes.

Existing Plus Project Intersection Lanes

The Appendix C plots of peak hour turning movement volumes for each intersection also show the number of existing plus project intersection through and turning movement lanes. The lanes are also listed in Table 1.

Existing Plus Project Intersection Delay

The Intersection Delay for the existing plus project traffic conditions have been calculated and are shown in Table 1.

Appendix B contains the Intersection Delay calculations. An explanation of Intersection Delay and how it is calculated is also included in Appendix B.

Existing Plus Project Level of Service

From the Intersection Delay analysis, the intersection Level of Service (LOS) can be determined. LOS is directly related to Intersection Delay. Table 2 shows how LOS is related to Intersection Delay, and describes LOS.

From Table 1, it can be seen that all intersections in the vicinity of the site operate at a LOS D or better for existing plus project peak hour traffic conditions, based on Delay. However, it should be noted that the intersection of Stanfield Cutoff and Big Bear Boulevard currently operates at an intersection capacity utilization greater than 100 percent in the peak month weekday evening peak hour. The solution is to convert the eastbound right turn lane to an eastbound through lane through the intersection. The project does not have a significant impact on this intersection based on the thresholds of significance described in Section 2. It therefore is not required to mitigate this deficiency.

The eastbound right turn lane needs to be converted to a through lane, and that this will require widening and may require additional right of way. The widening and additional right of way may be needed before or after the intersection, or both. And whether widening and a take of right of way is required at all depends on lane widths and taper lengths required by Caltrans.

The available right of way in the mountains is restricted, the topography is difficult, and in many situations there are large pine trees in a location that may preclude the use of typical design criteria. There needs to be flexibility in design requirements in the mountains. Whatever design is accepted needs to meet minimum acceptable criteria which may be less than normal criteria.

The geometrics required is a Caltrans decision, and is subject to agreement by the County of San Bernardino. The traffic study documents the need for the lane and the possible need for widening and right of way. Whether widening and right of way is needed is a function of the design criteria that Caltrans requires. This traffic study is not a design study, and this mitigation measure is not needed by this project. The project has no significant impact on this intersection, and the traffic study merely points out that it is needed to accommodate existing and future traffic volumes.

Any design that does not meet Caltrans minimum Design Standards will need an "Exception to Design Standard" fact sheet.

Traffic Signal Warrants

Traffic signals will not be warranted at the intersection of Stanfield Cutoff and North Shore Drive based on Rural Warrants. Rural Warrants are applicable for roadways with speeds over 40 miles per hour.

Traffic signal warrants have been adopted by the Federal Highway Administration and CalTrans. These warrants are based upon the eight highest hour volumes in a day. It is assumed by CalTrans that the eighth highest hour is 62.5 percent of the peak hour, and the peak hour is generally 10 percent of the daily traffic.

Thus, the signal warrants can also be expressed in terms of daily traffic volumes. Rural traffic volume warrants are utilized when the 85th percentile speed of the major street traffic exceeds 40 miles per hour or when the intersection lies within the built up area of an isolated community having a population of less than 10,000. Table 5 shows the signal warrants in terms of daily traffic volumes.

When calculating signal volume warrants, the volumes of both the major and minor street must meet or exceed those listed in Table 5. Determining the major street daily signal warrant volume involves calculating the number of daily vehicles approaching the intersection on both major street legs; usually the daily approach volume is 50 percent of the street's daily two-way volume on each leg. Finding the minor street daily signal warrant volume involves calculating the number of daily vehicles approaching the intersection on only the highest volume leg; usually the daily approach volume is 50 percent of the street's two-way daily volume. If the minor street forms a tee intersection with the major street, then the minor street volume is the highest volume because there is no other volume.

Table 5

TRAFFIC SIGNAL WARRANTS

(Based on Estimated Average Daily Traffic - See Note 2)

Signal Warrant URBAN ..... RURAL.....XXXXX..... Use RURAL if critical speed equals or exceeds 40 MPH	Minimum Requirements Estimated Average Daily Traffic (EADT)	
1. Minimum Vehicular Satisfied YES (2025) Not Satisfied _____	Vehicles per day on major street (total of both approaches)	Vehicles per day on higher-volume minor-street approach (one direction only)
Number of lanes for moving traffic on each approach		
Major Street / Minor Street	Urban / Rural	Urban / Rural
1 ..... 1	8,000 / 5,600<<<<	2,400 / 1,680<<<<
2 or more 1	9,600 / 6,720	2,400 / 1,680
2 or more ..... 2 or more	9,600 / 6,720	3,200 / 2,240
1 ..... 2 or more	8,000 / 5,600	3,200 / 2,240
2. Interruption of Continuous Traffic Satisfied _____ Not Satisfied _____	Vehicles per day on major street (total of both approaches)	Vehicles per day on higher-volume minor-street approach (one direction only)
Number of lanes for moving traffic on each approach		
Major Street / Minor Street	Urban / Rural	Urban / Rural
1 ..... 1	12,000 / 8,400<<<<	1,200 / 850<<<<
2 or more 1	14,400 / 10,080	1,200 / 850
2 or more ..... 2 or more	14,400 / 10,080	1,600 / 1,120
1 ..... 2 or more	12,000 / 8,400	1,600 / 1,120
3. Combination Satisfied _____ Not Satisfied _____ No one warrant satisfied but following warrants fulfilled 80% or more ..... _____ 1 _____ 2	2 Warrants	2 Warrants

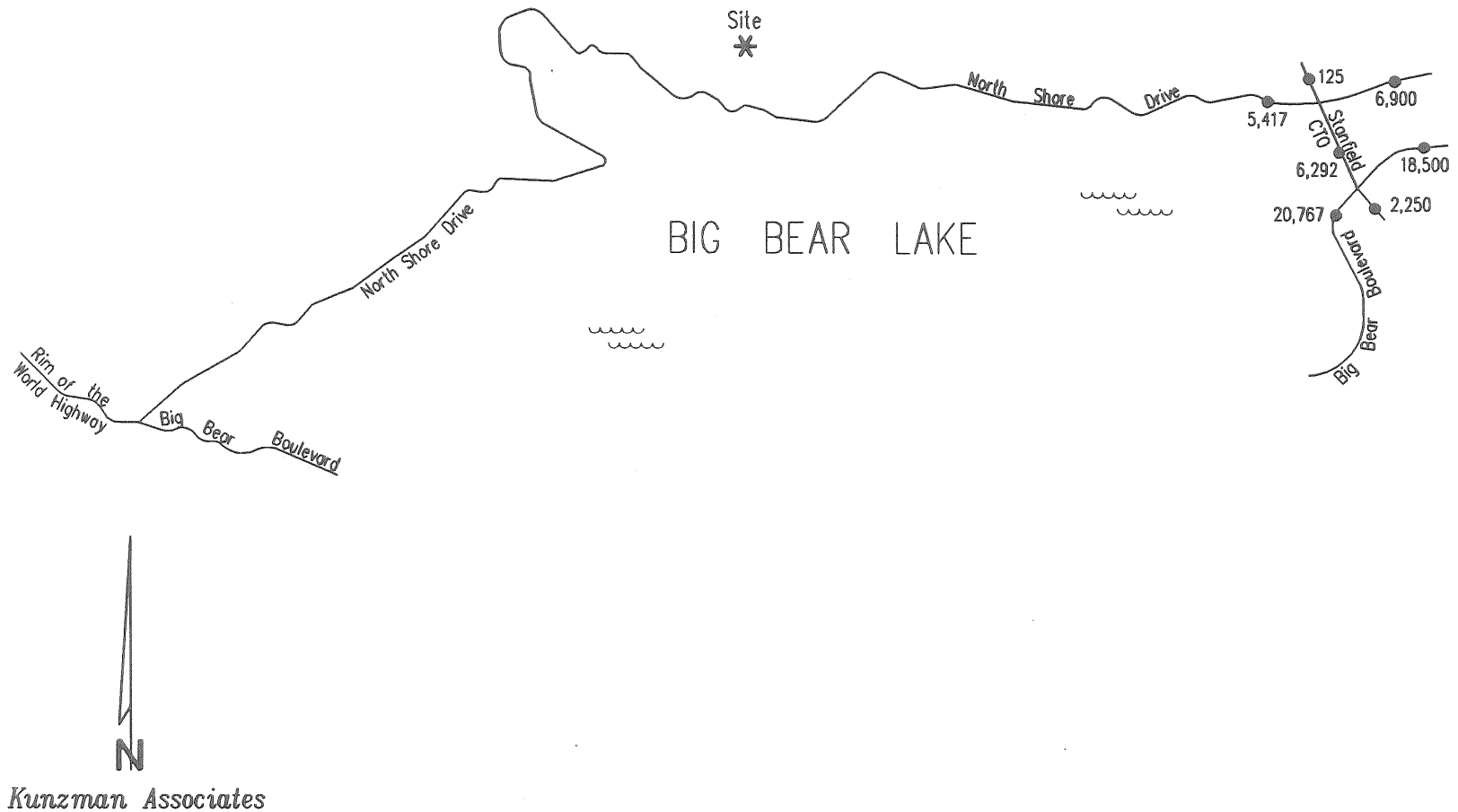
NOTE:

1. Heavier left turn movement from the major street may be included with minor street volume if a separate signal phase is to be provided for the left-turn movement.
2. To be used only for NEW INTERSECTIONS or other locations where actual traffic volumes cannot be counted.

Source: CalTrans, TRAFFIC MANUAL, page 9-8

<<<< These are the warrant volumes that apply to Stanfield Cutoff and North Shore Drive

Figure 9
Existing Plus Project Daily Traffic Volumes – Peak Month



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7. Existing Plus Other Development Traffic Conditions - Year 2006

After background traffic growth has been added to existing volumes, the traffic impact can be assessed. Figure 10 illustrates the existing plus other development traffic conditions for an average month and Figure 11 for a peak month. The time frame of projection is Year 2006.

Other Development Growth - Year 2006

To account for growth which can be expected in the area, a growth rate of 1 percent per year compounded annually for 5 years has been assumed. The total compounded growth over 5 years is 5 percent. The basis of this growth rate assumption is the County of San Bernardino.

Existing Plus Other Development Daily Traffic Volumes - Year 2006

For existing plus other development traffic conditions the expected daily two-way traffic volumes are as illustrated in Figure 10. See Table 6 for the calculation of intersection leg daily traffic volumes.

Existing Plus Other Development Peak Hour Turning Movement Volumes - Year 2006

Appendix C contains plots of the existing plus other development peak hour intersection turning movement volumes. Additionally, the same plots show the peak hour leg approach volumes and two-way peak hour leg volumes.

Existing Plus Other Development Intersection Lanes - Year 2006

The Appendix C plots of peak hour turning movement volumes for each intersection also show the number of existing plus other development intersection through and turning movement lanes. The lanes are also listed in Table 1.

Existing Plus Other Development Intersection Delay - Year 2006

The Intersection Delay for the existing plus other development traffic conditions have been calculated and are shown in Table 1.

Appendix B contains the Intersection Delay calculations. An explanation of Intersection Delay and how it is calculated is also included in Appendix B.

Existing Plus Other Development Level of Service - Year 2006

From the Intersection Delay analysis, the intersection Level of Service (LOS) can be determined. LOS is directly related to Intersection Delay. Table 2 shows how LOS is related to Intersection Delay, and describes LOS.

From Table 1, it can be seen that all intersections in the vicinity of the site operate at a LOS E or better for existing plus other development peak hour traffic conditions based on delay. However, it should be noted that the intersection of Stanfield Cutoff and Big Bear Boulevard currently operates at an intersection capacity utilization greater than 100 percent in the peak month weekday evening peak hour. The solution is to convert the eastbound right turn lane to an eastbound through lane through the intersection.

The eastbound right turn lane needs to be converted to a through lane, and that this will require widening and may require additional right of way. The widening and additional right of way may be needed before or after the intersection, or both. And whether widening and a take of right of way is required at all depends on lane widths and taper lengths required by Caltrans.

The available right of way in the mountains is restricted, the topography is difficult, and in many situations there are large pine trees in a location that may preclude the use of typical design criteria. There needs to be flexibility in design requirements in the mountains. Whatever design is accepted needs to meet minimum acceptable criteria which may be less than normal criteria.

The geometrics required is a Caltrans decision, and is subject to agreement by the County of San Bernardino. The traffic study documents the need for the lane and the possible need for widening and right of way. Whether widening and right of way is needed is a function of the design criteria that Caltrans requires. This traffic study is not a design study, and this mitigation measure is not needed by this project. The project has no significant impact on this intersection, and the traffic study merely points out that it is needed to accommodate existing and future traffic volumes.

Any design that does not meet Caltrans minimum Design Standards

will need an "Exception to Design Standard" fact sheet.

Traffic Signal Warrants - Year 2006

Traffic signals will not be warranted at the intersections of Stanfield Cutoff and North Shore Drive based on Rural Warrants. The applicability of Rural Warrants was previously discussed.

Traffic signal warrants have been adopted by the Federal Highway Administration and CalTrans. These warrants are based upon the eight highest hour volumes in a day. It is assumed by CalTrans that the eighth highest hour is 62.5 percent of the peak hour, and the peak hour is generally 10 percent of the daily traffic. Thus, the signal warrants can also be expressed in terms of daily traffic volumes. Rural traffic volume warrants are utilized when the 85th percentile speed of the major street traffic exceeds 40 miles per hour or when the intersection lies within the built up area of an isolated community having a population of less than 10,000. Table 5 shows the signal warrants in terms of daily traffic volumes.

When calculating signal volume warrants, the volumes of both the major and minor street must meet or exceed those listed in Table 5. Determining the major street daily signal warrant volume involves calculating the number of daily vehicles approaching the intersection on both major street legs; usually the daily approach volume is 50 percent of the street's daily two-way volume on each leg. Finding the minor street daily signal warrant volume involves calculating the number of daily vehicles approaching the intersection on only the highest volume leg; usually the daily approach volume is 50 percent of the street's two-way daily volume. If the minor street forms a tee intersection with the major street, then the minor street volume is the highest volume because there is no other volume.

It should be noted that signals should be installed only when warranted and that installation of unwarranted signals can increase accident potential, energy consumption, and air pollutant emissions, while costing governmental jurisdictions approximately $500 per month for maintenance and utilities.

Table 6

DAILY LEG VOLUME CALCULATIONS

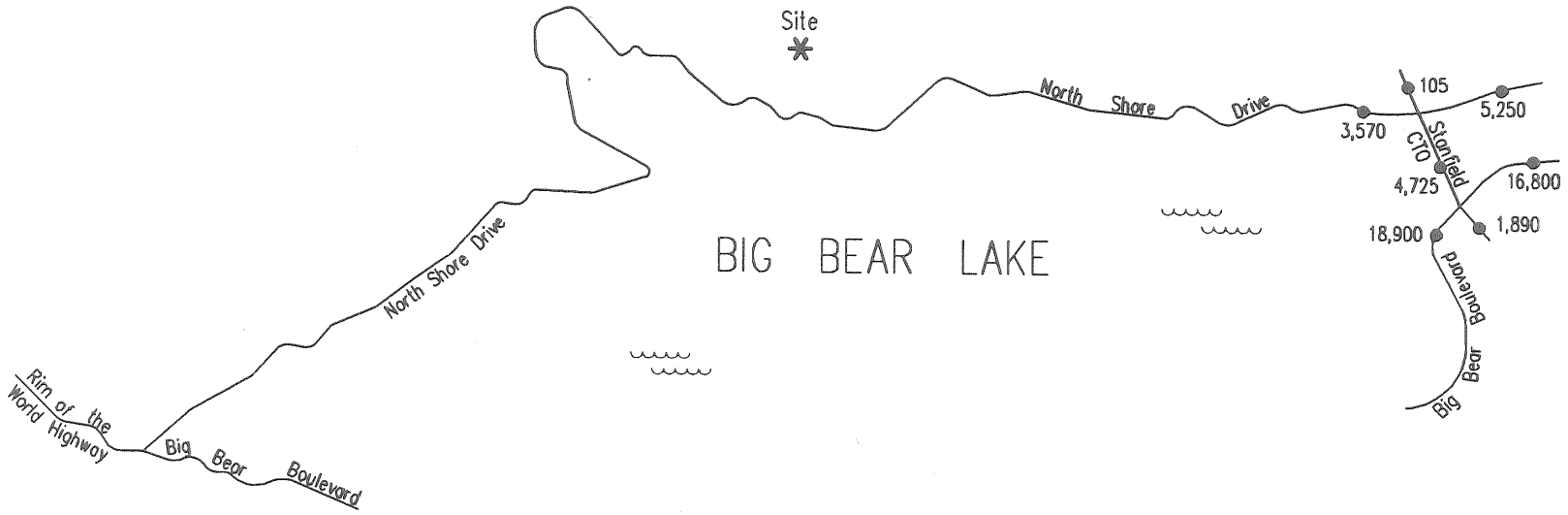
Intersection	Inter-section Leg	Project Added Daily Leg Volume	Existing Year 2001		Year 2006		Year 2025	
			Existing Daily Volumes	With Project Volumes	Existing Plus Background Growth Daily Volumes	With Project Volumes	Existing Plus Background Growth Daily Volumes	With Project Volumes
1. Stanfield Cutoff (NS) and North Shore Drive (EW)	North	0	100	100	105	105	124	124
	South	667	4,500	5,167	4,725	5,392	5,580	6,247
	East	0	4,500	4,500	4,725	4,725	5,580	5,580
Average Month	West	667	2,100	2,767	2,205	2,872	2,604	3,271
2. Stanfield Cutoff (NS) and Big Bear Boulevard (EW)	North	667	4,500	5,167	4,725	5,392	5,580	6,247
	South	0	1,800	1,800	1,890	1,890	2,232	2,232
	East	400	13,800	14,200	14,490	14,890	17,112	17,512
Average Month	West	267	16,900	17,167	17,745	18,012	20,956	21,223
1. Stanfield Cutoff (NS) and North Shore Drive (EW)	North	0	125	125	131	131	155	155
	South	667	6,000	6,667	6,300	6,967	7,440	8,107
	East	0	6,000	6,000	6,300	6,300	7,440	7,440
Peak Month	West	667	2,700	3,367	2,835	3,502	3,348	4,015
2. Stanfield Cutoff (NS) and Big Bear Boulevard (EW)	North	667	6,000	6,667	6,300	6,967	7,440	8,107
	South	0	2,200	2,200	2,310	2,310	2,728	2,728
	East	400	17,300	17,700	18,165	18,565	21,452	21,852
Peak Morth	West	267	21,100	21,367	22,155	22,422	26,164	26,431

NOTE: Background Growth Rate is assumed to be as follows in percent: 1.000

From Year 2001 to Year 2006 is 5 years. The calculated simple growth factor is: 1.050

From Year 2001 to Year 2025 is 24 years. The calculated simple growth factor is: 1.240

Figure 10
2006* Daily Traffic Volumes – Average Month



* Year 2006 volumes are assumed to be 5 percent higher than Year 2001 volumes

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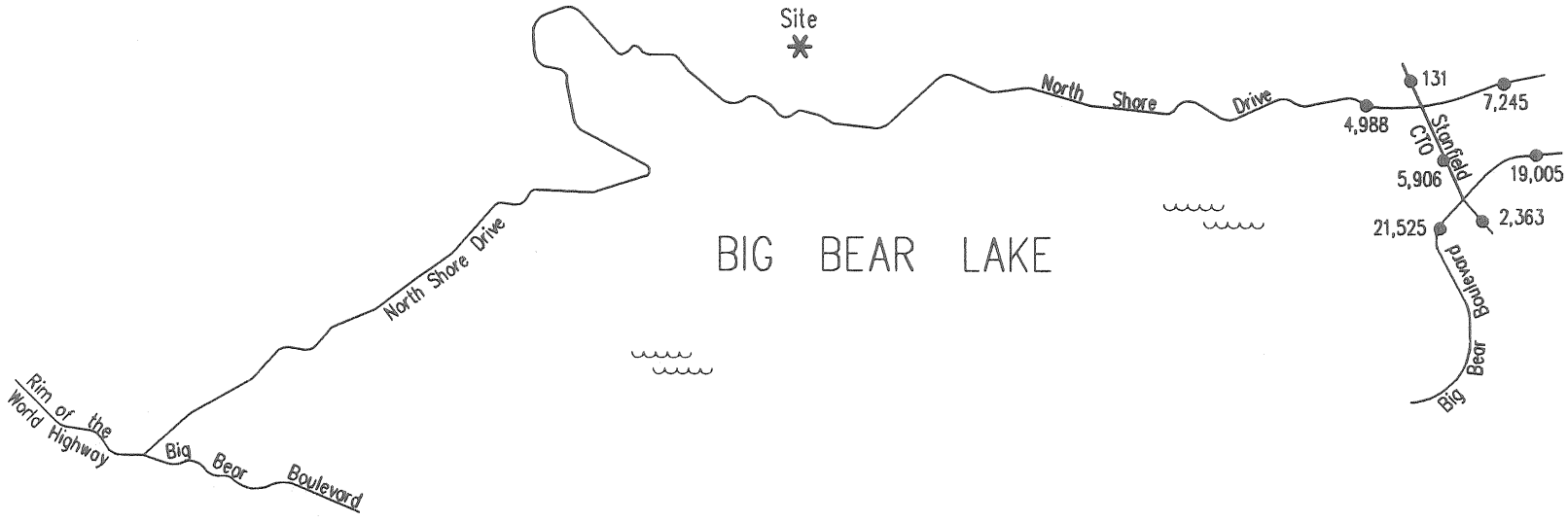
Figure 11
Year 2006 Daily Traffic Volumes – Peak Month*



* Peak month volumes are assumed to be 25 percent higher than average month

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8. Existing + Project + Other Development Traffic Conditions - Year 2006

Substantial additional development is presently planned in the vicinity of the site. To assess future traffic conditions, project traffic is combined with existing traffic and traffic from other surrounding development. Figure 12 illustrates traffic conditions including other planned development with the project.

Other Development Growth - Year 2006

To account for growth which can be expected in the area, a growth rate of 1 percent per year compounded annually for 5 years has been assumed. The total compounded growth over 5 years is 5 percent. The basis of this growth rate assumption is the County of San Bernardino.

Cumulative Conditions Daily Traffic Volumes - Year 2006

Figure 12 displays the cumulative traffic volumes that exist in the peak month when the project traffic volumes and other future development traffic volumes are added to existing traffic volumes. See Table 6 for the calculation of intersection leg daily traffic volumes.

Cumulative Conditions Peak Hour Turning Movement Volumes - Year 2006

Appendix C contains plots of the cumulative conditions peak hour intersection turning movement volumes. Additionally, the same plots show the peak hour leg approach volumes and two-way peak hour leg volumes.

Cumulative Conditions Intersection Lanes - Year 2006

The Appendix C plots of peak hour turning movement volumes for each intersection also show the number of cumulative conditions intersection through and turning movement lanes. The lanes are also listed in Table 1.

Cumulative Conditions Intersection Delay - Year 2006

The Intersection Delay for the cumulative traffic conditions have been calculated and are shown in Table 1.

Appendix B contains the Intersection Delay calculations. An explanation of Intersection Delay and how it is calculated is also included in Appendix B.

Cumulative Conditions Level of Service - Year 2006

From the Intersection Delay analysis, the intersection Level of Service (LOS) can be determined. LOS is directly related to Intersection Delay. Table 2 shows how LOS is related to Intersection Delay, and describes LOS.

From Table 1, it can be seen that all intersections in the vicinity of the site operate at a LOS F or better for cumulative peak hour traffic conditions based on delay. However, it should be noted that the intersection of Stanfield Cutoff and Big Bear Boulevard currently operates at an intersection capacity utilization greater than 100 percent in the peak month weekday evening peak hour. The solution is to convert the eastbound right turn lane to an eastbound through lane through the intersection. The project does not have a significant impact on this intersection based on the thresholds of significance described in Section 2. It therefore is not required to mitigate this deficiency.

The eastbound right turn lane needs to be converted to a through lane, and that this will require widening and may require additional right of way. The widening and additional right of way may be needed before or after the intersection, or both. And whether widening and a take of right of way is required at all depends on lane widths and taper lengths required by Caltrans.

The available right of way in the mountains is restricted, the topography is difficult, and in many situations there are large pine trees in a location that may preclude the use of typical design criteria. There needs to be flexibility in design requirements in the mountains. Whatever design is accepted needs to meet minimum acceptable criteria which may be less than normal criteria.

The geometrics required is a Caltrans decision, and is subject to agreement by the County of San Bernardino. The traffic study documents the need for the lane and the possible need for widening and right of way. Whether widening and right of way is needed is a function of the design criteria that Caltrans requires. This traffic study is not a design study, and this mitigation measure is not needed by this project. The project has no significant impact on this intersection, and the traffic study merely points out that it is needed to accommodate existing and future traffic volumes.

Traffic Signal Warrants - Year 2006

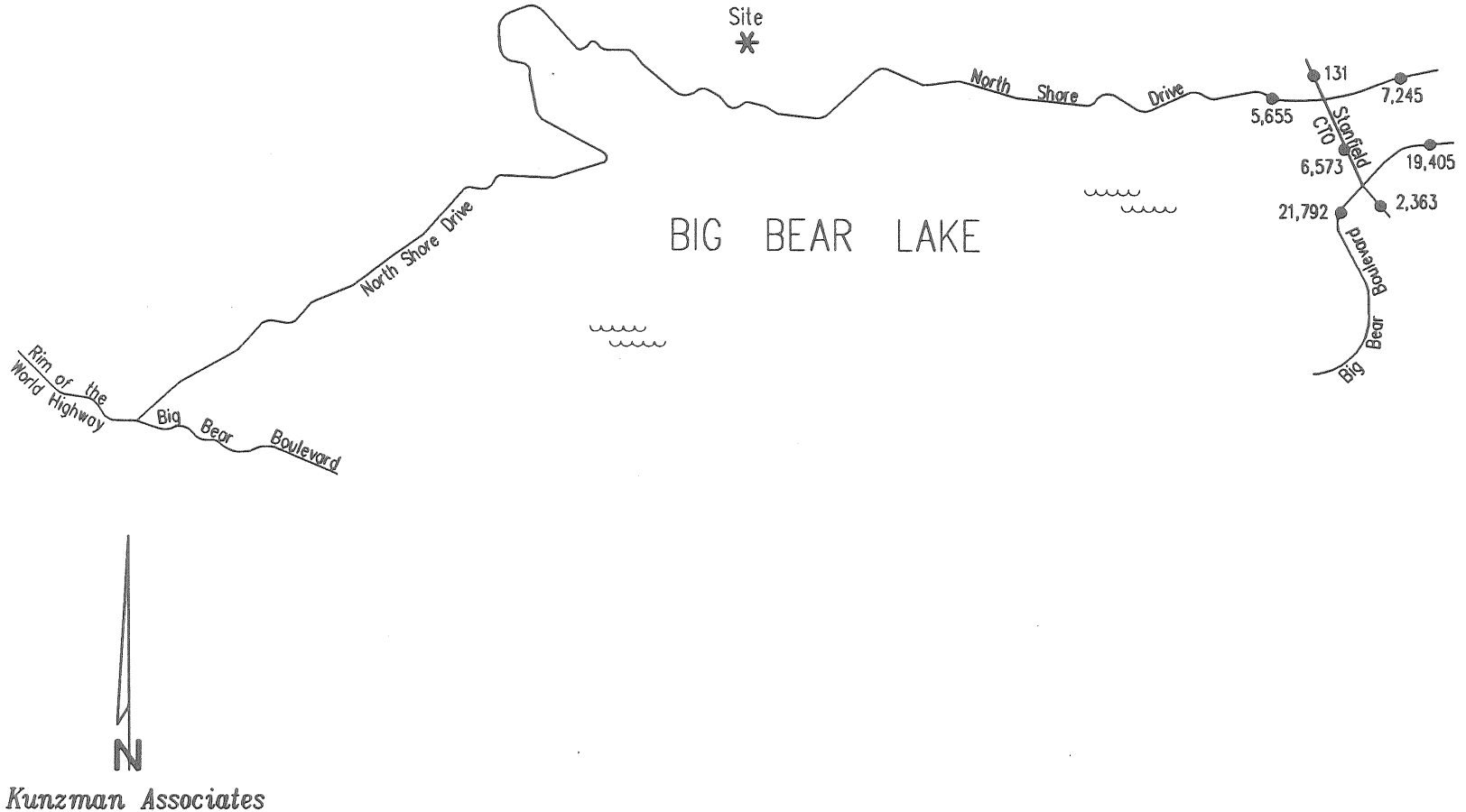
Traffic signals will not be be warranted at the intersection of Stanfield Cutoff and North Shore Drive based on Rural Warrants. The applicability of Rural Warrants was previously discussed.

Traffic signal warrants have been adopted by the Federal Highway Administration and CalTrans. These warrants are based upon the eight highest hour volumes in a day. It is assumed by CalTrans that the eighth highest hour is 62.5 percent of the peak hour, and the peak hour is generally 10 percent of the daily traffic. Thus, the signal warrants can also be expressed in terms of daily traffic volumes. Rural traffic volume warrants are utilized when the 85th percentile speed of the major street traffic exceeds 40 miles per hour or when the intersection lies within the built up area of an isolated community having a population of less than 10,000. Table 5 shows the signal warrants in terms of daily traffic volumes.

When calculating signal volume warrants, the volumes of both the major and minor street must meet or exceed those listed in Table 5. Determining the major street daily signal warrant volume involves calculating the number of daily vehicles approaching the intersection on both major street legs; usually the daily approach volume is 50 percent of the street's daily two-way volume on each leg. Finding the minor street daily signal warrant volume involves calculating the number of daily vehicles approaching the intersection on only the highest volume leg; usually the daily approach volume is 50 percent of the street's two-way daily volume. If the minor street forms a tee intersection with the major street, then the minor street volume is the highest volume because there is no other volume.

It should be noted that signals should be installed only when warranted and that installation of unwarranted signals can increase accident potential, energy consumption, and air pollutant emissions, while costing governmental jurisdictions approximately $500 per month for maintenance and utilities.

Figure 12
Year 2006 Plus Project Daily Traffic Volumes – Peak Month



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