Draft
Revised and Recirculated
Environmental Impact Report
Moon Camp 50-Lot Residential Subdivision, TT No. 16136
(Based on the Revised Site Plan)
Big Bear Lake, San Bernardino County, CA
SCH # 2002021105

APPENDICES

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March 26, 2010

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Moon Camp Tentative Tract
Community of Fawnskin
San Bernardino County, California

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SECTION 1: INTRODUCTION

1.1 - Purpose and Methods of Analysis

The following air quality analysis was prepared to evaluate whether the expected criteria air pollutant emissions generated from the proposed project would cause significant impacts to air resources in the project area. This assessment was conducted within the context of the California Environmental Quality Act (CEQA, California Public Resources Code Sections 21000 et seq.). The methodology follows the CEQA Air Quality Handbook prepared by the South Coast Air Quality Management District (SCAQMD) for quantification of emissions and evaluation of potential impacts to air resources. As recommended by SCAQMD staff, URBEMIS 2002 version 8.7.0, developed and approved by the California Air Resources Control Board (CARB), was used to quantify some project-related emissions.

1.2 - Executive Summary

1.2.1 - Site Location

The Moon Camp Tentative Tract Project (Project) site is located adjacent to the northwest shore of Big Bear Lake, in the relatively undeveloped eastern portion of Fawnskin. More specifically, the site is located in the northern half of Section 13, Township 2 North, Range 1 West, San Bernardino Base and Meridian. The Project site is generally situated between Flicker Road to the north, Big Bear Lake to the south, Polique Canyon Road to the east, and Oriole Lane/Canyon Road to the west.

1.2.2 - Development Description

The Project is a proposed subdivision consisting of 50 residential lots and 3 lettered lots for open space and common area, on approximately 62.43 acres. Proposed lot sizes range from one-half acre to over two acres, and the subdivision will be developed for custom lot sales.

1.2.3 - Findings

The study found that with mitigation measures all emissions are below the applicable SCAQMD thresholds during construction and operation of the proposed project. The analysis supports the following findings:

- The project is in compliance with the SCAQMD Air Quality Management Plan (AQMP);
- The project-generated emissions will not contribute to a violation of Federal and/or State ambient air quality standards;
- The project's contribution to cumulative impacts is not significant;
- The project will not expose sensitive receptors to substantial pollutant concentrations; and
- Project-generated odors will not affect a substantial number of people.

1.2.4 - Mitigation Measures

The following mitigation measures are considered feasible, practical, and effective and would be implemented to reduce emissions from the proposed project:

AQ – 1 Fugitive Dust Control Plan

Prior to construction, the project proponent will provide a Fugitive Dust Control Plan that will describe the application of standard best management practices to control dust during construction. The Fugitive Dust Control Plan shall be submitted to the County and SCAQMD for approval and approved prior to construction. Best management practices will include, but not limited to:

- For any earth moving which is more than 100 feet from all property lines, conduct watering as necessary to prevent visible dust emissions from exceeding 100 feet in length in any direction.
- For all disturbed surface areas (except completed grading areas), apply dust suppression in a sufficient quantity and frequency to maintain a stabilized surface; any areas which cannot be stabilized, as evidenced by wind driven dust, must have an application of water at least twice per day to at least 80 percent of the unstabilized area.
- For all inactive disturbed surface areas, apply water to at least 80 percent of all inactive disturbed surface areas on a daily basis when there is evidence of wind-driven fugitive dust, excluding any areas that are inaccessible due to excessive slope or other safety conditions.
- For all unpaved roads, water all roads used for any vehicular traffic once daily and restrict vehicle speed to 15 mph.
- For all open storage piles, apply water to at least 80 percent of the surface areas of all open storage piles on a daily basis when there is evidence of wind-driven fugitive dust.

AQ – 2 Emission Reductions from Construction Equipment

To reduce emissions from the construction equipment within the project site, the construction contractor will:

- To the extent that equipment and technology is available and cost effective, the contractor shall use catalyst and filtration technologies.
- All diesel-fueled engines used in construction of the project shall use ultra-low sulfur diesel fuel containing no more than 15-ppm sulfur, or a suitable alternative fuel.
- All construction diesel engine, which have a rating of 50 hp or more, shall meet the Tier II California Emission Standards for off-road compression-ignition engines, unless certified by the contractor that such engine is not available for a particular use. In the event that a Tier II engine is not available, Tier I compliant or 1996 or newer engines will be used preferentially. Older engines will only be used if the contractor certifies that compliance is not feasible.
- Heavy duty diesel equipment will be maintained in optimum running condition.

AQ – 3 Reduce Woodburing Emissions

To reduce the emissions from woodburning apparatus; the following requirement will be placed on all new residences constructed on the proposed project's lots:

- No open-hearth fireplace will be allowed in new construction, only Environmental Protection Agency (EPA) Phase II Certified fireplaces and wood stoves, pellet stoves, and natural gas fireplaces shall be allowed.

AQ – 4 Good Neighbor Policy for Burning

To establish a "Good Neighbor Policy for Burning" that will further help reduce the potential for localized nuisance complaints related to woodburning; the proponent shall distribute an informational flyer to each purchaser of lots. At a minimum, the flyer will say:

- Know When To Burn
  - Monitor all fires; never leave a fire unattended.
  - Upgrade an older woodstove to one with a catalytic combustor that burns off excess pollutants.
  - Be courteous when visitors come to your home. Wood smoke can cause problems for people with developing or sensitive lungs (i.e. children, the elderly) and people with lung disease.
- Know What To Burn
  - Split large pieces of wood into smaller pieces and make sure it has been seasoned (allowed to dry for a year). Burning fresh cut logs = smoky fires.
  - When buying wood from a dealer, do not assume it has been seasoned.
  - Small hot fires are more efficient and less wasteful than large fires.
  - Never burn chemically treated wood or non-wood materials.
  - Manufactured firelogs provide a nice ambience, have the least impact to air quality, and are a good choice for homeowners who use a fireplace infrequently.
- Know How To Burn
  - Proper combustion is key. Make sure your wood fire is not starved; if excess smoke is coming from the chimney or stack, the fire isn't getting enough air.
  - Visually check your chimney or stack 10 to 15 minutes after you light a fire to ensure it is not emitting excess amounts of smoke.
  - Homeowners should have woodstoves and fireplaces serviced and cleaned yearly to ensure they are working properly.

1.3 - Project Description and Location

The proposed Moon Camp Tentative Tract #16136 Residential Subdivision ("Moon Camp") encompasses approximately 62.43 currently vacant acres along the northwest shore of Big Bear Lake, in the community of Fawnskin, County of San Bernardino (refer to Exhibit 1, *Regional Vicinity*).

The Project site is located adjacent to the northwest shore of Big Bear Lake, in the relatively undeveloped eastern portion of Fawnskin (refer to Exhibit 2, *Local Vicinity*). More specifically, the site is located in the northern half of Section 13, Township 2 North, Range 1 West, San Bernardino Base and Meridian. The Project site is generally situated between Flicker Road to the north, Big Bear Lake to the south, Polique Canyon Road to the east, and Oriole Lane/Canyon Road to the west. Regional access to the site is provided via State Route 38, which currently bisects the property.

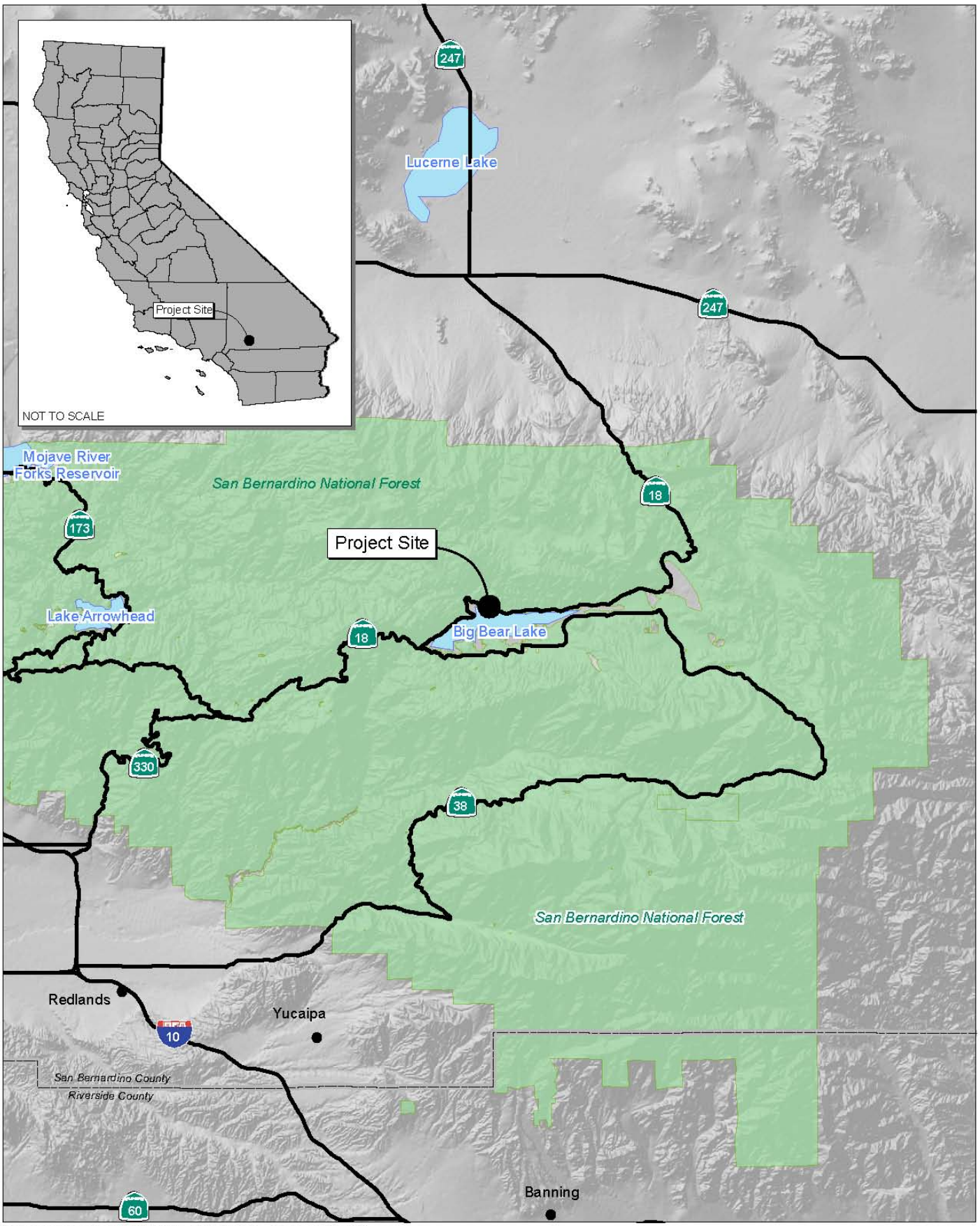
The Project is a proposed subdivision consisting of fifty (50) residential lots and three (3) lettered lots for open space and common area, on approximately 62.43 acres. Proposed lot sizes range from one-half acre to over two acres, and the subdivision will be developed for custom lot sales. Overall density of the project is 0.90 dwelling units per acre. Even though for this Project-specific grading will be limited to the construction of the interior streets and infrastructure and no grading of individual lots is proposed, for the purposes of determining the reasonably foreseeable impacts associated with full construction, this Report assumes the construction of the homes.

1.4 - Sensitive Receptors

Those who are sensitive to air pollution include children, the elderly, and persons with preexisting respiratory or cardiovascular illness. For purposes of CEQA, the SCAQMD considers a sensitive receptor to be a location where a sensitive individual could remain for 24 hours, such as residences, hospitals, or convalescent facilities. Commercial and industrial facilities are not included in the definition because employees do not typically remain onsite for 24 hours. However, when assessing the impact of pollutants with 1-hour or 8-hour standards (such as nitrogen dioxide and carbon monoxide), commercial and/or industrial facilities would be considered sensitive receptors for those purposes.

Existing sensitive receptors within the vicinity of the project site include residential uses to the east along Highway 38, to the west along Canyon Road and to the north along Flicker Road. Other sensitive receptors include the following:

- Schools
  - 2.5 miles east – North Shore Elementary School (765 N. Stanfield Cutoff)
  - 2 miles southeast – Big Bear Middle School (41275 Big Bear Boulevard)
- Hospitals
  - 2.4 miles east southeast – Big Bear Valley Community Hospital (41870 Garstin Road)



Source: Census 2000 Data, The CaSIL, MBA GIS 2007.

Michael Brandman Associates

NORTH

5 2.5 0 5 Miles

Exhibit 1-1
Regional Location Map

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SAN BERNARDINO COUNTY
MOON CAMP 50-LOT RESIDENTIAL SUBDIVISION

Source: National Agriculutre Imagery Program, San Bernardino County (2005).

Michael Brandman Associates

NORTH

2,000 1,000 0 2,000 Feet

Exhibit 1-2
Project Vicinity Map - Aerial Base

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SAN BERNARDINO COUNTY
MOON CAMP 50-LOT RESIDENTIAL SUBDIVISION

SECTION 2: SETTING

2.1 - Regulatory Setting

Air pollutants are regulated at the national, state, and air basin level; each agency has a different degree of control. The United States Environmental Protection Agency (EPA) regulates at the national level. CARB regulates at the state level and the SCAQMD regulates at the air basin level.

2.1.1 - Federal and State Regulatory Agencies

EPA handles global, international, national, and interstate air pollution issues and policies. EPA sets national vehicle and stationary source emission standards, oversees approval of all State Implementation Plans (SIP), provides research and guidance in air pollution programs, and sets National Ambient Air Quality Standards (NAAQS), also known as federal standards. There are NAAQS for six common air pollutants, called criteria air pollutants, which were identified resulting from provisions of the Clean Air Act of 1970. The six criteria pollutants are:

- Ozone
- Particulate matter (PM_{10} and $PM_{2.5}$)
- Nitrogen dioxide
- Carbon monoxide (CO)
- Lead
- Sulfur dioxide

The NAAQS were set to protect the health of sensitive individuals; thus, the standards continue to change as more medical research is available regarding the health effects of the criteria pollutants.

CARB has overall responsibility for statewide air quality maintenance and air pollution prevention. The SIP for the State of California is administered by CARB. A SIP is a document prepared by each state describing existing air quality conditions and measures that will be followed to attain and maintain NAAQS. CARB also administers California ambient air quality standards, or state standards, for the ten air pollutants designated in the California Clean Air Act (CCAA). All of the national criteria pollutants are also regulated by the state but California adds 4 pollutants. The additional state air pollutants are:

- Visibility reducing particulates
- Hydrogen sulfide
- Sulfates
- Vinyl chloride

The national and state ambient air quality standards and the most relevant effects are summarized in Table 1.

Table 1: Ambient Air Quality Standards

Air Pollutant	Averaging Time	California Standard	National Standard	Most Relevant Effects
Ozone	1 Hour	0.09 ppm	—	(a) Pulmonary function decrements and localized lung edema in humans and animals; (b) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (c) Increased mortality risk; (d) Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (e) Vegetation damage; (f) Property damage
	8 Hour	0.070 ppm	0.075 ppm	
Carbon Monoxide (CO)	1 Hour	20 ppm	35 ppm	(a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; (d) Possible increased risk to fetuses
	8 Hour	9.0 ppm	9 ppm	
Nitrogen Dioxide (NO_2)	1 Hour	0.18 ppm	—	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; (c) Contribution to atmospheric discoloration
	Mean	0.030 ppm	0.053 ppm	
Sulfur Dioxide (SO_2)	1 Hour	0.25 ppm	—	Bronchoconstriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma
	24 Hour	0.04 ppm	0.14 ppm	
	Mean	—	0.030 ppm	
Particulate Matter (PM_{10})	24 hour	50 µg/m^3	150 µg/m^3	(a) Exacerbation of symptoms in sensitive patients with respiratory or cardiovascular disease; (b) Declines in pulmonary function growth in children; (c) Increased risk of premature death from heart or lung diseases in the elderly
	Mean	20 µg/m^3	—	
Particulate Matter ($PM_{2.5}$)	24 Hour	—	35 µg/m^3	
	Mean	12 µg/m^3	15.0 µg/m^3	
Sulfates	24 Hour	25 µg/m^3	—	(a) Decrease in ventilatory function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; (f) Property damage
Lead	30-day	1.5 µg/m^3	—	(a) Learning disabilities; (b) Impairment of blood formation and nerve conduction
	Quarter	—	1.5 µg/m^3	

Abbreviations:
ppm = parts per million µg/m^3 = micrograms per cubic meter
Mean = Annual Arithmetic Mean 30-day = 30-day average Quarter = Calendar quarter

Source: South Coast Air Quality Management District, 2007 AQMP. CARB, Ambient Air Quality Standards, 2007.

2.1.2 - South Coast Air Quality Management District

The air pollution control agency for the South Coast Air Basin (Basin) is the SCAQMD. SCAQMD is responsible for controlling emissions primarily from stationary sources. SCAQMD maintains air quality monitoring stations throughout the Basin. SCAQMD, in coordination with the Southern

California Association of Governments (SCAG), is also responsible for developing, updating, and implementing the AQMP for the Basin. An AQMP is a plan prepared by an air pollution control district for a county or region designated as a nonattainment area for bringing the area into compliance with the requirements of the national and/or California ambient air quality standards. The term nonattainment area is used to refer to an air basin where ambient air quality standards are exceeded. The current AQMP for SCAQMD is the 2007 AQMP. The 2007 AQMP was adopted by the SCAQMD Governing Board on June 1, 2007 with the exception of the Transportation Conformity Budgets. The SCAQMD Governing Board adopted the 2007 AQMP Transportation Conformity Budgets at their July 13, 2007 meeting. The AQMP is designed to meet the state and federal Clean Air Act planning requirements and focuses on ozone and $PM_{2.5}$. The AQMP incorporates significant new emissions inventories, ambient measurements, scientific data, control strategies, and air quality modeling.

Rules Applicable to the Project

The rules and regulations that apply to this project include but are not limited to the following:

- SCAQMD Rule 403, which governs emissions of fugitive dust. Compliance with this rule is achieved through application of standard best management practices in construction and operation activities, such as application of water or chemical stabilizers to disturbed soils, covering haul vehicles, restricting vehicle speeds on unpaved roads to 15 miles per hour (mph), sweeping loose dirt from paved site access roadways, cessation of construction activity when winds exceed 25 mph and establishing a permanent, stabilizing ground cover on finished sites.

- SCAQMD Rule 1108 governs the sale, use, and manufacturing of asphalt and limits the ROG content in asphalt used in the South Coast Air Basin. Although this rule does not directly apply to the project, it does dictate the ROG content of asphalt available for use during the construction.

- SCAQMD Rule 1113 governs the sale, use, and manufacturing of architectural coating and limits the ROG content in paints and paint solvents. Although this rule does not directly apply to the project, it does dictate the ROG content of paints available for the use during the construction of buildings.

- SCAQMD Rule 402 governs the discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.

2.1.3 - Local Government

The local government with jurisdiction over the Project area is the County of San Bernardino. In 2007, the County of San Bernardino adopted a General Plan (SBC 2007). The General Plan contains the goals, policies, and implementing actions for a variety of issues including natural and man-made hazards and natural and man-made resources; sets the framework for decision-making regarding the County's long-term development and utilization of resources; provides the data and analyses to support that decision-making framework; provides the rules by which land can be developed (what, where, and under what conditions); provides a consensus vision of what the citizens and Board of Supervisors want for the County's future; and establishes the operating rules for achieving that vision. Listed below are policies and programs contained in the General Plan that are pertinent to the protection of air quality.

Land Use Element

- **LU 8.1** – Potentially polluting, hazardous, and other health risk facilities should be located no closer than one-quarter mile to a sensitive receptor and vice versa.
- **LU 8.2** – Review development proposals to minimize impacts, such as air emissions, on sensitive receptors.
- **LU 9.2** – Discourage leap-frog development and urban sprawl by restricting the extension or creation of new urban services or special districts to areas that cannot be sustained in a fiscally responsible manner.

Circulation and Infrastructure Element

- **CI 3.1** – Encourage the reduction of automobile usage through various incentive programs.
- **CI 4.2** – To reduce the dependence on the automobile for local trips, integrate transportation and land use planning at the community and regional levels by promoting transit-oriented development (TOD), where appropriate and feasible.
- **CI 6.1** – Require safe and efficient pedestrian and bicycle facilities in residential, commercial, industrial, and institutional developments to facilitate access to public and private facilities and to reduce vehicular trips. Install bicycle lanes and sidewalks on existing and future roadways, where appropriate and as funding is available.
- **CI 6.3** – Retain residual road dedication that may result whenever a road is changed to a lower highway designation, thus reducing the required right-of-way, until it is determined that such dedication will not be needed for bicycle, pedestrian or equestrian trail purposes.
- **M/CI 1.10** – Support the development of park and ride transit service in the mountain communities.
- **M/CI 1.11** – When population and residential densities permit or warrant, develop shuttle services from residential neighborhoods to recreational areas and major commercial centers

Housing Element

- **H 2.5** – Continue to evaluate residential developments with emphasis on energy-efficient design and siting options that are responsive to local climatic conditions and applicable laws.
- **H 2.10** – Encourage the use of energy conservation features in residential construction, remodeling, and existing homes.

Conservation Element

- **CO 4.1** – Because developments can add to the wind hazard (due to increased dust, the removal of wind breaks, and other factors), the County will require either as mitigation measures in the appropriate environmental analysis required by the County for the development proposal or as conditions of approval if no environmental document is required, that developments in areas identified as susceptible to wind hazards to address site-specific analysis of:

  a) Grading restrictions and/or controls on the basis of soil types, topography, or season.
  b) Landscaping methods, plant varieties, and scheduling to maximize successful revegetation.
  c) Dust-control measures during grading, heavy truck travel, and other dust generating activities.

- **CO 4.2** – Coordinate air quality improvement technologies with the SCAQMD and the Mojave Air Quality Management District (MAQMD) to improve air quality through reductions in pollutants from the region.

- **CO 4.3** – The County will continue to ensure through coordination and cooperation with all airport operators a diverse and efficient ground and air transportation system, which generates the minimum feasible pollutants.

- **CO 4.4** – Because congestion resulting from growth is expected to result in a significant increase in the air quality degradation, the County may manage growth by insuring the timely provision of infrastructure to serve new development.

- **CO 4.5** – Reduce emissions through reduced energy consumption.

- **CO 4.6** – Provide incentives such as preferential parking for alternative-fuel vehicles (e.g., CNG or hydrogen).

- **CO 4.8** – Replace existing vehicles in the County fleet with the cleanest vehicles commercially available that are cost-effective and meet the vehicle use needs.

- **CO 4.9** – Manage the County's transportation fleet fueling standards to improve the number of alternative fuel vehicles in the County fleet.

- **CO 4.10** – Support the development of alternative fuel infrastructure that is publicly accessible.

- **CO 4.11** – Establish programs for priority or free parking on County streets or in County parking lots for alternative fuel vehicles.

- **CO 4.12** – Provide incentives to promote siting or use of clean air technologies (e.g., fuel cell technologies, renewable energy sources, UV coatings, and hydrogen fuel).

- **CO 8.6** – Fossil fuels combustion contributes to poor air quality. Therefore, alternative energy production and conservation will be required, as follows:

  a) New developments will be encouraged to incorporate the most energy-efficient technologies that reduce energy waste by weatherization, insulation, efficient appliances, solar energy systems, reduced energy demand, efficient space cooling and heating, water heating, and electricity generation.

  b) All new subdivisions for which a tentative map is required will provide, to the extent feasible, for future natural heating or cooling opportunities in the subdivision. This can be accomplished by design of lot size and configuration for heating or cooling from solar exposure or shade and breezes, respectively.

  c) For all new divisions of land for which a tentative map is required, a condition of approval will be the dedication of easements, for the purpose of assuring solar access, across adjacent parcels or units.

- **CO 8.8** – Promote energy-efficient design features, including appropriate site orientation, use of lighter color roofing and building materials, and use of deciduous shade trees and windbreak trees to reduce fuel consumption for heating and cooling.

- **CO 8.9** – Promote the use of automated time clocks or occupant sensors to control central heating and air conditioning.

2.1.4 - Global Climate Change

Gases that trap heat in the atmosphere are called greenhouse gases (GHGs). The effect is analogous to the way a greenhouse retains heat. Common GHGs include water vapor, carbon dioxide, methane, nitrous oxides, chlorofluorocarbons, hydrofluorocarbons, Perfluorocarbons, and sulfur hexafluoride. Both natural processes and human activities emit GHGs. However, it is believed that emissions from human activities, such as electricity production and vehicle exhaust, have elevated the concentration of these gases in the atmosphere, leading to a trend of unnatural warming of the Earth's climate, known as global warming or climate change.

Global climate change alleged to be caused by GHGs is currently one of the most important and widely debated scientific, economic, and political issues in the United States. Global climate change

is a change in the average weather of the earth, which can be measured by wind patterns, storms, precipitation, and temperature. Historical records have shown that temperature changes have occurred in the past, such as during previous ice ages. Some data indicates that the current temperature record differs from previous climate changes in rate and magnitude.

The United Nations Intergovernmental Panel on Climate Change (IPCC) constructed several emission trajectories of GHGs needed to stabilize global temperatures and climate change impacts. It concluded that a stabilization of GHGs at 400-450 ppm carbon dioxide-equivalent concentration is required to keep global mean warming below 2 degrees Celsius, which is assumed to be necessary to avoid dangerous climate change (IPCC 2001).

The State of California is a substantial contributor of global GHGs as it is the second largest contributor in the U.S. and the sixteenth largest in the world (CEC 2006). The California Energy Commission calculated that in 2004 California produced 492 million metric tons of carbon dioxide equivalent (CEC 2006).

Federal Regulation

The EPA currently does not regulate GHG emissions from motor vehicles. Massachusetts v. EPA (Supreme Court Case 05-1120) was argued before the United States Supreme Court on November 29, 2006, in which it was petitioned that EPA regulate four GHGs, including carbon dioxide, under Section 202(a)(1) of the Clean Air Act. A decision was made on April 2, 2007, in which the Court held that petitioners have a standing to challenge the EPA and that the EPA has statutory authority to regulate emissions of GHGs from new motor vehicles.

State Regulation

There has been significant legislative activity regarding global climate change and GHGs in California. California Assembly Bill 1493 (Pavley), enacted on July 22, 2002, required the CARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light duty trucks. Regulations adopted by the CARB would apply to 2009 and later model year vehicles. The CARB estimates that the regulation would reduce climate change emissions from the light-duty passenger vehicle fleet by an estimated 18 percent in 2020 and by 27 percent in 2030.

California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S 3-05, the following GHG emission reduction targets:

1) by 2010, reduce GHG emissions to 2000 levels;
2) by 2020, reduce GHG emissions to 1990 levels; and
3) by 2050, reduce GHG emissions to 80 percent below 1990 levels.

Climate Action Team

To meet these targets, the Governor directed the Secretary of the Cal EPA to lead a Climate Action Team (CAT) made up of representatives from the Business, Transportation and Housing Agency; the Department of Food and Agriculture; the Resources Agency; the Air Resources Board; the Energy Commission; and the Public Utilities Commission. The CAT's Report to the Governor in 2006 (2006 CAT Report) contains recommendations and strategies to help ensure the targets in Executive Order S-3-05 are met.

AB 32

Also in 2006, the California State Legislature adopted AB 32, the California Global Warming Solutions Act of 2006, which charged the CARB to develop regulations on how the state would address global climate change. AB 32 focuses on reducing GHG emissions in California. Greenhouse gases, as defined under AB 32, include carbon dioxide, methane, nitrous oxide, HFCs, PFCs, and SF6. AB 32 requires that GHGs emitted in California be reduced to 1990 levels by the year 2020. The CARB is the state agency charged with monitoring and regulating sources of emissions of GHGs that cause global warming in order to reduce emissions of GHGs. AB 32 requires that by January 1, 2008, the CARB must determine what the statewide GHG emissions level was in 1990, and it must approve a statewide GHG emissions limit so it may be applied to the 2020 benchmark. The CARB adopted the 1990 GHG emission inventory/2020 emissions limit of 427 million metric tons of carbon dioxide equivalent ($MMTCO_2e$) on December 6, 2007.

The 2006 CAT Report contains baseline emissions as estimated by the CARB and the California Energy Commission. The emission reduction strategies reduce GHG emissions to the targets contained in AB 32; the 2006 CAT Report is consistent with AB 32.

SB 97

SB 97 was passed in August 2007. SB 97 indicates that Section 21083.05 will be added to the Public Resources Code, "(a) On or before July 1, 2009, the Office of Planning and Research shall prepare, develop, and transmit to the Resources Agency guidelines for the mitigation of GHG emissions or the effects of GHG emissions as required by this division, including, but not limited to, effects associated with transportation or energy consumption. (b) On or before January 1, 2010, the Resources Agency shall certify and adopt guidelines prepared and developed by the Office of Planning and Research pursuant to subdivision (a)" (SB 97). Section 21097 is also added to the Public Resources Code and indicates that the failure to analyze adequately the effects of GHGs in a document related to the environmental review of a transportation project funded under the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 does not create a cause of action for a violation. However, SB 97 does not safeguard non-transportation funded projects from being challenged in court for omitting a global climate change analysis.

OPR

The Governor's Office of Planning and Research (OPR) published a technical advisory on CEQA and Climate Change, as required under SB 97, on June 19, 2008. The guidance did not include a suggested threshold, but stated that the OPR has asked CARB to, "recommend a method for setting thresholds which will encourage consistency and uniformity in the CEQA analysis of GHG emissions throughout the state." The OPR does recommend that CEQA analyses include the following components:

- • Identify GHG emissions;
- • Determine Significance; and
- • Mitigate Impacts.

The OPR has also started tracking environmental documents that contain GHG analysis and mitigation measures. The website "www.ceqamap.com" contains the list of documents in electronic form and is maintained by CEQAdocs.com.

CARB

Under AB 32, the CARB published its Final Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California. Discrete early action measures are currently underway or are enforceable by January 1, 2010. Early action measures are regulatory or non-regulatory and are currently underway or to be initiated by the CARB in the 2007 to 2012 timeframe. The CARB has 44 early action measures that apply to the transportation, commercial, forestry, agriculture, cement, oil and gas, fire suppression, fuels, education, energy efficiency, electricity, and waste sectors. Of the 44 early action measures, nine are considered discrete early action measures, as they are regulatory and enforceable by January 1, 2010. The CARB estimates that implementation of all 44 recommendations will to result in reductions of at least 42 $MMTCO_2e$ by 2020, representing approximately 25 percent of the 2020 target. Note that the CARB currently defers measures involving General Plans and CEQA.

Under AB 32, the CARB has the primary responsibility for reducing GHG emissions. However, the CAT Report contains strategies that many other California agencies can take. The CAT published a public review draft of Proposed Early Actions to Mitigate Climate Change in California. Most of the strategies were in the 2006 CAT Report or are similar to the 2006 CAT strategies.

California is also exploring the possibility of cap and trade systems for GHGs. The Market Advisory Committee to the CARB published draft recommendations for designing a GHG cap and trade system for California.

Executive Order S-01-07

Executive Order S-01-07 was enacted by the Governor on January 18, 2007. The order mandates that a statewide goal shall be established to reduce the carbon intensity of California's transportation fuels

by at least 10 percent by 2020. It also requires that a Low Carbon Fuel Standard for transportation fuels be established for California.

California Air Pollution Control Officers Association White Paper

The California Air Pollution Control Officers Association has released a white paper entitled "CEQA & Climate Change," which discussed three alternative thresholds, including a no significance threshold, a zero increase threshold, and a non-zero threshold, as well as multiple analysis options. The white paper is a resource guide developed to support local governments, and details tools for GHG assessment, emission models, and mitigation strategies to reduce potentially significant GHG emissions from a project.

SCAQMD

The SCAQMD is currently in the process of developing a threshold of significance for GHG emissions. The SCAQMD's GHG CEQA Significance Thresholds Working Group released a draft threshold methodology in August 2008 (SCAQMD 2008b). The proposed threshold methodology is a "Tiered Decision Tree" approach based on the concept of business-as-usual (BAU). This approach contains a series of tiers to evaluate a project, starting with exemptions (Tier 1), continuing through consistency with regional plan GHG budgets (Tier 2), quantitative screening level threshold (Tier 3), performance standards (Tier 4), to application of emission offsets (Tier 5).

Local Public Agencies

The California Attorney General sued San Bernardino County based on the County's General Plan Update EIR. That case resulted in a settlement agreement between the County and the California Attorney General's office, filed with the Central District Superior Court of San Bernardino County on August 28, 2007. Under the settlement agreement, the County agreed to prepare an amendment to the General Plan to add a policy that describes the County's goal of reducing GHG attributable to the County's discretionary land use decisions and internal government operations. The County also agreed to prepare a Greenhouse Gas Emissions Reduction Plan. The settlement agreement details the contents of the Greenhouse Gas Emission Reduction Plan, including GHG inventories and emission reduction targets. Both the General Plan amendment and the Greenhouse Gas Emission Reduction Plan should be completed within 30 months of the execution of the settlement agreement. The settlement agreement also contains provisions for diesel engine exhaust control measures to be implemented by the County.

2.2 - Pollutants

Criteria air pollutants are those pollutants that have been determined by EPA or CARB to have detrimental health effects for "sensitive" populations such as people with asthma, children, and older adults and for which health criteria have been established. Criteria air pollutants have historically been reported in three main categories – stationary sources, areawide sources, and mobile sources. Stationary sources are those that generate emissions from a stationary location, usually associated

with manufacturing and industrial sources. Areawide sources are sources of emissions which are widely distributed and produce many emissions, individually small but collectively significant, such as consumer products, fireplaces, and solvent evaporation. Mobile source emissions are associated with motor vehicles and include on-road and off-road sources. On-road sources are emissions from vehicles, trucks, motorcycles, buses, etc. Off-road sources include equipment and vehicles in the following sectors: recreational, construction, mining, industrial, lawn and garden, farm, airport service, and rail. A brief summary of the criteria pollutants of concern follows.

2.2.1 - Carbon Monoxide

Description and Properties: Carbon monoxide (CO) is a colorless, odorless toxic gas produced by incomplete combustion of carbon-containing fuels (e.g., gasoline, diesel fuel, and biomass). CO is a primary pollutant, which means that it is emitted directly into the air (unlike secondary pollutants like ozone that are formed by the reactions of other pollutants). CO levels tend to be highest during the winter months when the meteorological conditions favor the accumulation of the pollutants. This occurs when relatively low inversion levels trap pollutants near the ground and concentrate the CO. Because CO is somewhat soluble in water, normal winter conditions of rainfall and fog can suppress CO conditions.

Health Effects: CO is essentially inert to plants and materials but can have significant effects on human health. CO gas enters the body through the lungs, dissolves in the blood, and creates a solid bond to hemoglobin, not allowing it to form a loose bond with CO_2, which is essential to the CO_2/O_2 exchange to occur. This firm binding therefore reduces available oxygen in the blood and oxygen delivery to the body's organs and tissues. Effects on humans range from slight headaches to nausea to death from asphyxiation. Elevated levels of CO can also cause visual impairments, reduced manual dexterity, poor learning ability, reduced work capacity, and trouble performing complex tasks.

Sources: The primary source of CO is from on-road motor vehicles. It is a component of on-road motor vehicle exhaust, which contributes about 47 percent of all CO emissions in the Basin portion of San Bernardino County. Other non-road engines and vehicles (such as construction equipment and recreational boats) contribute about 28 percent. Higher levels of CO generally occur in areas with heavy traffic congestion. In cities, 85 to 95 percent of all CO emissions may come from motor vehicle exhaust.

2.2.2 - Ozone

Description and Physical Properties: Ozone is what is known as a photochemical pollutant. Ozone is not emitted directly into the atmosphere, but is formed by a complex series of chemical reactions between volatile organic compounds (VOC), NO_X, and sunlight. VOC and NO_X are emitted from automobiles, solvents, and fuel combustion. In order to reduce ozone, it is necessary to control emissions of these ozone precursors. Significant ozone formation generally requires an adequate

amount of precursors in the atmosphere and several hours in a stable atmosphere with strong sunlight. A reduction of ozone precursors reduces ozone. Ozone is a regional pollutant and is generated over a large area and is transported and spread by the wind. The conditions conducive to the formation of ozone include extended periods of daylight (solar radiation) and hot temperatures. These conditions are prevalent during the summer when thermal inversions are most likely to occur. As a result, summertime conditions of long periods of daylight and hot temperatures form ozone in the greatest quantities. During the summer, thermal inversions trap ozone from dispersing vertically, and high concentrations of this pollutant are prevalent.

Health Effects: Health effects of ozone can include the following: respiratory system irritation, reduction of lung capacity, asthma aggravation, inflammation, and damage to lung cells, aggravated cardiovascular disease, and permanent lung damage. The greatest health risk is to those who are more active outdoors during smoggy periods, such as children, athletes, and outdoor workers. Ozone also damages natural ecosystems such as forests and foothill communities, and damages agricultural crops and some man-made materials such as rubber, paint, and plastics.

Sources: Ozone is a secondary pollutant, thus is not emitted directly into the lower level of the atmosphere. The ozone precursors are NO_X and VOC. Sources of NO_X and VOC are addressed below.

2.2.3 - Nitrogen Oxides

Description and Physical Properties: During combustion of fossil fuels, oxygen reacts with nitrogen to produce NO_X (NO, NO_2, NO_3, N_2O, N_2O_3, N_2O_4, and N_2O_5). This occurs primarily in motor vehicle internal combustion engines and fossil fuel-fired electric utility and industrial boilers. NO_X is also an ozone precursor, which means that when it is emitted into the atmosphere, it forms or causes ozone to be formed. When NO_X and VOC are released in the atmosphere, they can chemically react with one another in the presence of sunlight to form ozone. NO_X can also be a precursor to PM_{10} and $PM_{2.5}$.

Health Effects: EPA has concluded that the only form of NO_X that exists at a level high enough to cause public health concerns is nitrogen dioxide (NO_2). Nitrogen dioxide is a brown gas with a strong odor. NO_X can react with moisture, ammonia, and other compounds to form nitric acid and related particles. The main human health concerns of nitrogen dioxide include lung damage, increased incidence of chronic bronchitis, eye and mucus membrane damage, negative effects on the respiratory system, pulmonary dysfunction, and premature death. Small particles can penetrate deeply into the sensitive tissue of the lungs and can cause or worsen respiratory disease such as emphysema, asthma, and bronchitis, and can also aggravate existing heart disease.

Because NO_X is an ozone precursor, the health effects associated with ozone (as discussed above) are also indirect health effects associated with unhealthful levels of NO_X emissions.

Sources: Natural sources of NO_X include lightning, soils, wildfires, stratospheric intrusion, and the oceans, but natural sources only accounted for approximately two percent of emissions of NO_X in the Basin portion of San Bernardino County. The primary sources of NO_X in this area are heavy-duty diesel trucks, construction equipment and other off-road vehicles, and trains.

2.2.4 - Particulate Matter (PM_{10} and $PM_{2.5}$)

Description and Physical Properties: Particulate matter is a generic term that defines a broad group of chemically and physically different particles (either liquid droplets or solids) that can exist over a wide range of sizes. Examples of atmospheric particles include those produced from combustion (diesel soot or fly ash), light produced (urban haze), sea spray produced (salt particles), and soil-like particles from resuspended dust. In discussions of air pollution, particulate matter is typically divided into two size categories: PM_{10} and $PM_{2.5}$ because of the adverse health effects associated with the smaller sized particles. PM_{10} refers to particulate matter that is 10 microns or less in diameter (1 micron is one-millionth of a meter) and is conventionally known as Inhalable Particulate Matter. $PM_{2.5}$ refers to particulate matter that is 2.5 microns or less in diameter and is conventionally known as Fine Particulate Matter. Soil dust consists of the minerals and organic material found in soil being lifted up into the air by winds. Fugitive dust is entrained particulate matter caused by anthropogenic (grading, road dust) or natural (windblown dust) activities.

Health Effects: Particulate matter can be inhaled directly into the lungs where it can be absorbed into the bloodstream. It is a respiratory irritant and can cause direct pulmonary effects such as coughing, bronchitis, lung disease, respiratory illnesses, increased airway reactivity, and exacerbation of asthma. Particulate matter is also thought to have direct effects on the heart. Relatively recent mortality studies have shown a statistically significant direct association between mortality and daily concentrations of particulate matter in the air. Non-health effects include reduced visibility and soiling of property.

Sources: Particulate matter originates from a variety of stationary and mobile sources but in the Basin portion of San Bernardino County, the majority of PM_{10} emissions are from paved road dust and construction equipment. For $PM_{2.5}$, the same categories are major with the added category of wildfires.

Diesel Particulate Matter

A subset of particulate matter that is a matter of concern is Diesel Particulate Matter (DPM). Diesel exhaust is a mixture of many particles and gases that is produced when an engine burns diesel fuel. Many compounds found in diesel exhaust are carcinogenic, including sixteen that are classified as possibly carcinogenic by the International Agency for Research on Cancer. DPM includes the particle-phase particles in diesel exhaust. Components of DPM include elemental and organic carbon. Elemental carbon is carbon that has had hydrogen taken from it. Organic carbon contains molecules containing carbon and hydrogen, and can also contain oxygen, sulfur, and nitrogen.

Exposure to diesel exhaust can cause immediate health effects. Some of the health effects include eye, nose, and throat irritation as well as cough, nausea, and phlegm. The elderly, children, people with allergies, and those with asthma, emphysema, and chronic heart and lung disease are more susceptible to the effects of DPM.

2.2.5 - Volatile Organic Compounds and Reactive Organic Gases

Description and Physical Properties: VOC, or ROG, are defined as any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. VOC consist of nonmethane hydrocarbons and oxygenated hydrocarbons. Hydrocarbons are organic compounds that contain only hydrogen and carbon atoms. Nonmethane hydrocarbons are hydrocarbons that do not contain the unreactive hydrocarbon, methane. Oxygenated hydrocarbons are hydrocarbons with oxygenated functional groups attached.

It should be noted that there are no state or national ambient air quality standard for VOC because they are not classified as criteria pollutants. They are regulated, however, because a reduction in VOC emissions reduces certain chemical reactions that contribute to the formulation of ozone. VOC are also transformed into organic aerosols in the atmosphere, which contribute to higher PM_{10} and lower visibility.

Health Effects: Although health-based standards have not been established for ROG, health effects can occur from exposures to high concentrations because of interference with oxygen uptake. In general, concentrations of VOC are suspected to cause eye, nose, and throat irritation; headaches, loss of coordination, nausea, damage to liver, kidney, and the central nervous system.

Sources: VOC emissions result primarily from incomplete fuel combustion and the evaporation of chemical solvents and fuels. On-road mobile sources are the largest contributor to VOC emissions in the Basin portion of San Bernardino County, with most of that coming from light-duty vehicles, construction equipment and other off-road vehicles, and recreational boats. Areawide VOC sources in the area are primarily from consumer products.

2.2.6 - Greenhouse Gases

Gases that trap heat in the atmosphere are often called GHGs, analogous to a greenhouse. Greenhouse gases are emitted by natural processes and human activities. The accumulation of GHGs in the atmosphere regulates the earth's temperature. Without these natural GHGs, the Earth's surface would be about 61degrees Fahrenheit cooler (CA 2006). Emissions from human activities such as electricity production and vehicles have elevated the concentration of these gases in the atmosphere.

The California State Legislature adopted the California Global Warming Solutions Act of 2006 (AB-32), which requires CARB to adopt rules and regulations that would achieve GHG emissions equivalent to statewide levels in 1990 by 2020. Greenhouse gases as defined under AB-32 include:

carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

Carbon Dioxide: Carbon dioxide (CO_2) is an odorless, colorless natural GHG. Outdoor levels of CO_2 are not high enough to result in negative health effects. However, CO_2 can be a concern as a GHG. CO_2 is emitted from natural and anthropocentric (human) sources. Natural sources include the following: decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources are from burning coal, oil, natural gas, and wood. CO_2 can also be removed from the air by photosynthesis, dissolution into ocean water, transfer to soils and ice caps, and chemical weathering of carbonate rocks.

Methane: Methane (CH_4) is an extremely effective absorber of radiation, though its atmospheric concentration is less than CO_2 and its lifetime in the atmosphere is brief (10 to 12 years), compared to other GHGs. Methane has both natural and anthropogenic sources. It is released as part of the biological processes in low oxygen (anaerobic) environments, such as in swamplands or in rice production (at the roots of the plants). Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas, and mining coal have added to the atmospheric concentration of methane. Other anthropocentric sources include fossil-fuel combustion and biomass burning.

Nitrous Oxide: Nitrous oxide (N_2O), also known as laughing gas, is a colorless GHG. Nitrous oxide is produced by microbial processes in soil and water, including those reactions that occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load. It is used as an aerosol spray propellant, i.e., in whipped cream bottles. It is also used in potato chip bags to keep chips fresh. It is used in rocket engines and in race cars.

Chlorofluorocarbons: Chlorofluorocarbons (CFCs) are gases formed synthetically by replacing all hydrogen atoms in methane or ethane (C2H6) with chlorine and/or fluorine atoms. CFCs are no longer being used; therefore, it is not likely that health effects would be experienced. CFCs have no natural source, but were first synthesized in 1928. They were used for refrigerants, aerosol propellants, and cleaning solvents. Due to the discovery that they are able to destroy stratospheric ozone, a global effort to halt their production was undertaken and was extremely successful, so much so that levels of the major CFCs are now remaining level or declining. The proposed project is not expected to generate or be exposed to CFCs because of the ban on chlorofluorocarbons. Therefore, it is not assessed in this report.

Hydrofluorocarbons: Hydrofluorocarbons (HFCs) are synthetic man-made chemicals that are used as a substitute for CFCs. Of all the GHGs, they are one of three groups with the highest global warming potential. Most HFCs do not have health effects associated with their direct emissions. HFCs are man made for applications such as automobile air conditioners and refrigerants. The project may emit a small amount of HFC emissions from leakage and service of refrigeration and air

conditioning equipment and from disposal at the end of the life of the equipment. However, the quantity is expected to be minimal because of the relative small size of the project and is not further evaluated.

Perfluorocarbons: Perfluorocarbons (PFCs) have stable molecular structures and do not break down though the chemical processes in the lower atmosphere. High-energy ultraviolet rays about 60 kilometers above Earth's surface are able to destroy the compounds. Because of this, PFCs have very long lifetimes, between 10,000 and 50,000 years. The two main sources of PFCs are primary aluminum production and semiconductor manufacture. Since PFCs are typically used in industrial applications, it is not anticipated that the project would emit any of these GHGs.

Sulfur Hexafluoride: Sulfur hexafluoride (SF6) is an inorganic, odorless, colorless, nontoxic, nonflammable gas. Sulfur hexafluoride is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection. Since sulfur hexafluorides are typically used in industrial and specialized manufacturing applications, it is not anticipated that the project would emit any of these GHGs.

2.3 - Physical Setting

2.3.1 - Local Climate

The project is located near the community of Fawnskin, on the north shore of Big Bear Lake in San Bernardino County. This region is located within the South Coast Air Basin (Basin). Regional and local air quality is impacted by dominant airflows, topography, atmospheric inversions, location, season, and time of day.

The presence and intensity of sunlight are necessary prerequisites for the formation of ozone. Under the influence of the ultraviolet radiation of sunlight, certain primary pollutants (mainly VOC and NO_X) react to form a secondary pollutant – ozone. Since this process is time dependent, ozone can be formed many miles downwind from the emission sources. Because of the prevailing daytime winds and time-delayed nature of ozone, concentrations are highest in the inland areas of Southern California. However, a majority of the smog in the Big Bear Valley is created by the transport of pollutants from Los Angeles, Riverside, and San Bernardino Counties as opposed to local sources.

The climate in the Basin is characterized by moderate temperatures and comfortable humidities with precipitation limited to a few storms during the winter season (November through April). The average annual temperature varies little throughout the Basin, averaging 75 degrees Fahrenheit (ºF). More specifically, the Community of Fawnskin enjoys an Alpine climate. The Community is located in an area that intercepts water-laden clouds that can result in rainfall and/or snow. Precipitation at Big Bear Lake's National Weather Service station from 1960 to 2006 averaged about 18 inches for the six-month period from November to April and the average snowfall for January, February, and March is above 14 inches per month. The area's watershed is mountainous with steep upper slopes

leading to a mildly sloping valley. The coolest month of the year is January with a mean monthly temperature of 33.7 ºF. The warmest month is July with a mean monthly temperature of 63.9 ºF.

Dominant airflows provide the driving mechanism for transport and dispersion of air pollution. The mountains surrounding the Los Angeles region form natural horizontal barriers to the dispersion of air contaminants. Air pollution created in the coastal areas and around the Los Angeles area is transported inland until it reaches the mountains where the combination of mountains and inversion layers generally prevent further dispersion. The area in which the Community of Fawnskin is located offers approximately 300 days/year of clear skies and sunshine and is above the typical inversion altitudes of the Los Angeles area; however, it is still susceptible to air inversions. This traps a layer of stagnant air near the ground where it is further loaded with pollutants. These inversions cause haziness, which is caused by moisture, suspended dust, and a variety of chemical aerosols emitted by trucks, automobiles, wood stoves, and other sources.

2.3.2 - Local Air Quality

The local air quality can be evaluated by reviewing relevant air pollution concentrations near the project area. SCAQMD has divided the basin into 38 Source Receptor Areas (SRA) for evaluation purposes and operates monitoring stations within each one. Existing levels of ambient air quality and historical trends and projections of air quality in the project area are best documented from measurements made near the project site. SCAQMD operates an air monitoring station in Big Bear City, approximately 4 miles east of the project but it only measures $PM_{2.5}$. The nearest site that measures PM_{10} is located in Lucerne Valley at the Middle School, approximately 10 miles north of the project, which is operated by the Mojave Desert Air Quality Management District. The nearest ozone monitor is operated by the SCAQMD and is located at Lake Gregory – Crestline, approximately 20 miles west of the project site. Table 2 summarizes 2004-2006 published monitoring data for the nearest monitors measuring nonattainment pollutants. The SCAQMD and CARB have decided that the only pollutant of concern enough to be monitored in the area where the project is located is $PM_{2.5}$. PM_{10} and ozone monitoring information are supplied for informational purposes but may not represent accurate localized conditions of the project site.

Table 2: Air Quality Monitoring Summary

Air Pollutant, Averaging Time (Units)	2004	2005	2006
Ozone - Crestline			
Max 1 Hour (ppm)	0.163	0.182	0.164
Days > CAAQS (0.09 ppm)	75	80	73
Days > NAAQS (0.12 ppm)*	9	18	–
Max 8 Hour (ppm)	0.145	0.145	0.142
Days > CAAQS (0.070 ppm)*	–	119	103
Days > NAAQS (0.08 ppm)	66	69	59

Table 2: Air Quality Monitoring Summary (Cont.)

Air Pollutant, Averaging Time (Units)	2004	2005	2006
Particulate Matter (PM_{10}) – Lucerne Valley			
Mean (µg/m^3)	18.1	19.1	23.0
24 Hour (µg/m^3) Days > CAAQS (50 µg/m^3) Days > NAAQS (150 µg/m^3)	47 0 0	57 1 0	50 0 0
Particulate Matter ($PM_{2.5}$) – Big Bear City			
Mean (µg/m^3)	NA	NA	NA
24 Hour (µg/m^3) Days > NAAQS (35 µg/m^3)	28.6 0	38.7 0	40.0 0

Abbreviations:
> = exceed ppm = parts per million µg/m^3 = micrograms per cubic meter
NA = not available max = maximum Mean = Annual Arithmetic Mean
CAAQS = California Ambient Air Quality Standard NAAQS = National Ambient Air Quality Standard

Note: NAAQS for 1-hour ozone and the CAAQS for 8-hour are presented for the years the standards were in effect

Source: CARB Air Quality Data/Statistics/Top 4 Summary, 6/1/2007.

Local Sources of Air Pollutants

The project area is primarily a resort area with recreational activities for all four seasons. The primary source of local pollution is vehicular in both summer and winter, with the addition of wood smoke during the winter. Recreational boating is also a CO and VOC source.

2.3.3 - Alternate forms of Transportation

The Mountain Area Regional Transit Authority (MARTA) is the primary public transportation provider on the mountain-top, providing local and off-the-mountain bus service to the Big Bear Valley, Running Springs, Lake Arrowhead, Crestline, and San Bernardino. The agency operates both fixed route and demand-response services (Dial-A-Ride). MARTA has connecting services to Metrolink, Omnitrans, and Greyhound.

2.3.4 - Attainment Status

Air basins where ambient air quality standards are exceeded are referred to as “nonattainment” areas. If standards are met, the area is designated as an “attainment” area. If there is inadequate or inconclusive data to make a definitive attainment designation, they are considered “unclassified.” National nonattainment areas are classified as severe, serious, or moderate as a function of deviation from standards.

The current attainment designations for the project area are shown in Table 3. The “attainment year” is the goal of the existing 2003 AQMP and 2007 AQMP. The basin is in state non-attainment for ozone, PM_{10}, and $PM_{2.5}$, and is in federal nonattainment for ozone, CO, PM_{10}, and $PM_{2.5}$. Note that

CO is still classified as "serious nonattainment" for the federal CO standard even though the attainment date has passed and the basin met the CO standard by December 2002. In 2004, SCAQMD requested that EPA re-designate the basin as in attainment with the CO ambient air quality standard, but EPA has not made a formal action to do so. The 2003 AQMP served as a maintenance plan for CO, and the 2007 AQMP is an update to that maintenance plan.

Table 3: Attainment Status

Pollutant	State Status	National Status [Attainment Year]
Ozone (1-hour)	Nonattainment	Not Subject
Ozone (8-hour)	Nonattainment	Severe Nonattainment [2021]
Carbon Monoxide	Attainment	Serious Nonattainment [2000]
Nitrogen Dioxide	Attainment	Attainment
Sulfur Dioxide	Attainment	Attainment
PM_{10}	Nonattainment	Serious Nonattainment [2006]
$PM_{2.5}$	Nonattainment	Nonattainment [2015]
Source: State Status from CARB, 2006. National Status from U.S. EPA, 2007.		

2.4 - Global Climate Change

Global climate change alleged to be caused by GHGs is currently one of the most important and widely debated scientific, economic, and political issues in the United States. Global climate change is a change in the average weather of the earth, which can be measured by wind patterns, storms, precipitation, and temperature. Historical records have shown that temperature changes have occurred in the past, such as during previous ice ages. Some data indicates that the current temperature record differs from previous climate changes in rate and magnitude.

The United Nations Intergovernmental Panel on Climate Change (IPCC) constructed several emission trajectories of GHGs needed to stabilize global temperatures and climate change impacts. It concluded that a stabilization of GHGs at 400-450 ppm carbon dioxide-equivalent concentration is required to keep global mean warming below 2 degrees Celsius, which is assumed to be necessary to avoid dangerous climate change (IPCC 2001).

Potential Environmental Effects

Worldwide, average temperatures are likely to increase by 1.8 degrees Celsius (°C) to 4°C, or approximately 3 degrees Fahrenheit (°F) to 7 °F by the end of the 21st Century (IPCC 2007a). However, a global temperature increase does not translate to a uniform increase in temperature in all locations on the earth. Regional climate changes are dependant on multiple variables, such as topography. One region of the Earth may experience increased temperature, increased incidents of drought and similar warming effects, whereas another region may experience a relative cooling.

According to the IPCC's Working Group II Report, Climate Change impacts to North America may include (IPCC 2007b): diminishing snowpack; increasing evaporation; exacerbated shoreline erosion; exacerbated inundation from sea level rising; increased risk and frequency of wildfire; increased risk of insect outbreaks; increased experiences of heat waves; and, rearrangement of ecosystems, as species and ecosystem zones shift northward and to higher elevations.

For California, Climate Change has the potential to incur/exacerbate the following environmental impacts (CAT 2006):

- Increased frequency, duration, and intensity of conditions conducive to air pollution formation (particularly ozone);
- Reduced precipitation;
- Changes to precipitation and runoff patterns;
- Reduced snowfall (precipitation occurring as rain instead of snow);
- Earlier snowmelt;
- Decreased snowpack;
- Increased agricultural demand for water;
- Intrusion of seawater into coastal aquifers;
- Increased agricultural growing season;
- Increased growth rates of weeds, insect pests and pathogens;
- Inundation of low-lying coastal areas by sea level rise;
- Increased incidents and severity of wildfire events; and
- Expansion of the range and increased frequency of pest outbreaks.

Although certain environmental effects are widely accepted to be a potential hazard to certain locations, such as rising sea level for low-laying coastal areas, it is currently infeasible to predict all environmental effects of climate change on any one location.

SECTION 3: THRESHOLDS

3.1 - CEQA Guidelines

The following significance thresholds were derived from Appendix G of the CEQA guidelines. A significant impact would occur if the proposed project would:

a) Conflict with or obstruct implementation of the applicable air quality plan;

b) Violate any air quality standard or contribute substantially to an existing or protected air quality violation;

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);

d) Expose sensitive receptors to substantial pollutant concentrations;

e) Create objectionable odors affecting a substantial number of people; or

f) Results in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone).

While the final determination of whether or not a project is significant is within the purview of the lead agency pursuant to §15064(b) of the State CEQA Guidelines, the SCAQMD recommends that the following quantitative air pollution thresholds be used by the lead agencies in determining whether the proposed project could result in a significant impact. If the lead agency finds that the proposed project has the potential to exceed these air pollution thresholds, the project should be considered significant. These thresholds have been defined by SCAQMD for the Basin based on scientific data the SCAQMD has obtained and factual data within the federal and state Clean Air Acts. Since the project is located within the Basin and current air quality in the project area is typical of the air basin as a whole, these thresholds are considered valid and reasonable. Each of these threshold factors is discussed below.

3.2 - Regional Significance Thresholds

The following regional significance thresholds have been established by SCAQMD. Projects within the Basin region with construction- or operation-related emissions in excess of any of the thresholds presented in Table 4 are considered significant.

Table 4: SCAQMD Regional Thresholds

Pollutant	Construction (pounds per day)	Operation (pounds per day)
Oxides of Nitrogen (NO_X)	100	55
Volatile Organic Compounds (VOC)	75	55
Particulate Matter (PM_{10})	150	150
Particulate Matter ($PM_{2.5}$)	55	55
Oxides of Sulfur (SO_X)	150	150
Carbon Monoxide (CO)	550	550
Source: South Coast Air Quality Management District, 2006.		

3.3 - Local Significance Thresholds

Construction

The SCAQMD Governing Board adopted a methodology for calculating localized air quality impacts through localized significance thresholds (LSTs), which is consistent with SCAQMD's Environmental Justice Enhancement Initiative I-4. LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable state or national ambient air quality standard. The LSTs are developed based on the ambient concentrations of that pollutant for each source receptor area and are applicable to NO_X, CO, PM_{10}, and $PM_{2.5}$.

The project is located in Source Receptor Area 38. Even though the Project's construction activity is limited to the construction of the interior streets and infrastructure and no grading of individual lots is proposed, again in order to evaluate worst-case conditions, it is assumed that construction on the 50 lots will occur over a 12 month period and that a maximum of 4 acres would be disturbed per day. Using the 2003-2005 look-up tables provided in the LST Guidelines for a conservative 5 acres per day disturbed at a receptor distance of 25 meters, Table 5 shows the appropriate LST's for construction activity.

Table 5: SCAQMD Localized Thresholds for Construction

Pollutant	Localized Significance Threshold (lbs/day)
Nitrogen Dioxide (NO_2)	439
Carbon Monoxide (CO)	1,363
Particulate Matter (PM_{10})	14
Particulate Matter ($PM_{2.5}$)	9
Source: South Coast Air Quality Management District, 2003 and 2006.	

LSTs for operational emissions only apply to onsite sources. Since the primary source of emissions for this project is associated with offsite vehicle trips, an LST analysis of long-term emissions is not required.

Nuisance

The SCAQMD has a regulation that governs the discharge from any source such quantities of air contaminants, which cause a nuisance or annoyance to any considerable number of persons or to the public. Creating the potential for a violation of the SCAQMD's Nuisance Rule (Rule 402) would create a potentially significant effect.

3.4 - Global Warming Project Level Thresholds

The potential effect of GHG emissions on climate change is an emerging issue that warrants discussion under CEQA. Unlike the pollutants discussed above that may have regional and/or local effects, Project-generated GHG emissions do not directly produce local or regional environmental impacts, but may contribute to an impact on global climate. Individual projects contribute relatively small amounts of GHGs that, when added to all other GHG emitting activities around the world, result in global increases in these emissions. Local or regional environmental effects may occur if the regional or local climate is changed. For the purposes of analyzing the Project's potential to contribute to climate change, the following threshold will be used:

> Does the Project comply with provisions of an adopted Greenhouse Gas Reduction Plan or Strategy? If no such Plan or Strategy is applicable, would the Project significantly hinder or delay California's ability to meet the reduction targets contained in AB 32?

3.5 - Cumulative Impact Thresholds

Section 15130(b) of the CEQA Guidelines states the following:

> The following elements are necessary to an adequate discussion of significant cumulative impacts: 1) Either a list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency, or a summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or areawide conditions contributing to the cumulative impact.

In accordance with CEQA Guidelines 15130(b), this analysis of cumulative impacts incorporates a summary of projections. The following tiered approach is to assess cumulative air quality impacts. This approach includes the analysis of the following:

1. Regional analysis of project air pollutants;
2. Project consistency with existing air quality plans; and
3. Assessment of the cumulative health effects of the pollutants;

SECTION 4: IMPACT ANALYSIS

This section analyzes the potential impacts of the proposed project on the air quality in the area surrounding the site. It calculates the expected emissions from the construction and operation of the project as a necessary requisite for assessing the regulatory significance of project emissions on a local and regional level and contains an analysis of the criteria in the CEQA guidelines regarding air quality as well as an assessment of project conformity with the General Plan.

4.1 - Short-Term Impacts

Short-term impacts will include fugitive dust and other particulate matter, as well as exhaust emissions generated by earthmoving activities and operation of grading equipment during site preparation. Construction emissions are caused by onsite or offsite activities. Onsite emissions principally consist of exhaust emissions (NO_X, CO, VOC, PM_{10}, and $PM_{2.5}$) from heavy-duty construction equipment, motor vehicle operation, and fugitive dust (mainly PM_{10}) from disturbed soil. Offsite emissions are caused by motor vehicle exhaust from delivery vehicles, as well as worker traffic, but also include road dust (PM_{10}). Major construction-related activities include the following:

- Grading/clearing, including the excavation;
- Excavation and earth moving for infrastructure construction of the utilities, both on and offsite, and dwelling unit foundations and footings;
- Building construction;
- Asphalt paving of access roads throughout the development; and
- Application of architectural coatings for things such as dwelling stucco and interior painting.

Construction equipment such as scrapers, bulldozers, forklifts, backhoes, water trucks, and industrial saws are expected to be used on the project site and will result in exhaust emissions consisting of CO, NO_X, VOC, PM_{10}, and $PM_{2.5}$. During the finishing phase, paving operations and application of architectural coatings will release VOC emissions. Construction emission can vary substantially from day to day, depending on the level of activity, the specific type of operation, and prevailing weather conditions. For the purposes of determining worst-case emissions and including reasonably foreseeable results, this Report assumes that the only the area of the home site will be graded with approximately 4 acres being the maximum acreage graded on any one day. Equipment usage was estimated using the Recommended Construction Fleet Calculator created for their Indirect Source Review Regulation (http://www.valleyair.org/ISR/ISRResources.htm). It was assumed that construction equipment would operate for 6 to 8 hours per day and the entire construction period would last for 12 months.

4.1.1 - Unmitigated Short-Term Emissions

Table 6 summarizes these construction-related emissions (without mitigation). The emission estimates were derived from the project description using the URBEMIS 2002 Version 8.7 emission model. The URBEMIS data files are provided in Appendix A.

Table 6: Short-Term Emissions (Unmitigated)

Source	Emissions (maximum pounds per day)						
	VOC	NO_X	CO	PM_{10} Exhaust	PM_{10} Dust	$PM_{2.5}$ Exhaust	$PM_{2.5}$ Dust
Site Grading	8.09	49.85	68.64	1.81	41.60	1.67	8.74
Building Construction	69.30	53.32	67.76	1.91	0.09	1.76	0.02
Maximum lbs/day	**69.30**	**53.32**	**68.64**	**43.54**		**10.49**	
Regional Threshold	75	100	550	150		55	
Significant Impact?	No	No	No	No		No	
Local Significant Threshold	NA	439	1,363	14		9	
Significant Impact?		No	No	**Yes**		**Yes**	
NA =Not applicable Source: URBEMIS, MBA 2007							

The information shown in the above table indicates that the SCAQMD regional emission thresholds will not be exceeded by any pollutant but the locally significant thresholds will be potentially exceeded for PM_{10} and $PM_{2.5}$ emissions.

Level of Significance before Mitigation

Potentially Significant – Without mitigation, the short-term emissions are considered to have a significant local impact for particulate matter but a less than significant regional impact.

It is important to note that a previous analysis for a project on this site — Moon Camp TT #16136 EIR) — had a significant and unavoidable impact to the short-term construction emissions of ROG and NO_X. A review of the analysis showed that the majority of the ROG emissions were assigned to architectural coatings off-gas. Used in the old analysis was the default emissions factor for architectural coating, however, that does not reflect the effect of the SCAQMD's Architectural Coatings Rule (Rule 1113). The majority of the NO_X emissions from came from construction equipment exhaust. The updated URBEMIS version uses emission factors that are more up-to-date and more accurately reflect the current fleet of construction equipment.

4.1.2 - Construction Mitigation

AQ-1 Prior to construction of the project, the project proponent will provide a Fugitive Dust Control Plan that will describe the application of standard best management practices to

control dust during construction. The Fugitive Dust Control Plan shall be submitted to the County and SCAQMD for approval and approved prior to construction. Best management practices will include, but not be limited to:

- For any earth moving which is more than 100 feet from all property lines, conduct watering as necessary to prevent visible dust emissions from exceeding 100 feet in length in any direction.
- For all disturbed surface areas (except completed grading areas), apply dust suppression in a sufficient quantity and frequency to maintain a stabilized surface; any areas which cannot be stabilized, as evidenced by wind driven dust, must have an application of water at least twice per day to at least 80 percent of the unstabilized area.
- For all inactive disturbed surface areas, apply water to at least 80 percent of all inactive disturbed surface areas on a daily basis when there is evidence of wind-driven fugitive dust, excluding any areas that are inaccessible due to excessive slope or other safety conditions.
- For all unpaved roads, water all roads used for any vehicular traffic once daily and restrict vehicle speed to 15 mph.
- For all open storage piles, apply water to at least 80 percent of the surface areas of all open storage piles on a daily basis when there is evidence of wind-driven fugitive dust.

AQ-2 To reduce emissions from the construction equipment within the project site, the construction contractor will:

- To the extent that equipment and technology is available and cost effective, the contractor shall use catalyst and filtration technologies.
- All diesel-fueled engines used in construction of the project shall use ultra-low sulfur diesel fuel containing no more than 15-ppm sulfur, or a suitable alternative fuel.
- All construction diesel engines, which have a rating of 50 hp or more, shall meet the Tier II California Emission Standards for off-road compression-ignition engines, unless certified by the contractor that such engine is not available for a particular use. In the event that a Tier II engine is not available, Tier I compliant or 1996 or newer engines will be used preferentially. Older engines will only be used if the contractor certifies that compliance is not feasible.
- Heavy duty diesel equipment will be maintained in optimum running condition.

4.1.3 - Short-Term Construction Emissions after Mitigation

Using the URBEMIS model and applying construction mitigation, short-term emissions on PM_{10} and $PM_{2.5}$ after implementation of the above mitigation measures were estimated and are provided in Table 7. As shown in Table 7, short-term localized construction emissions are expected to be less than significant after application of mitigation measures.

Table 7: Short-term Emissions of PM_{10} & $PM_{2.5}$ (Mitigated)

Source	Emissions (maximum lbs/d)	
	PM_{10}	$PM_{2.5}$
Site Grading	6.57	1.64
Building Construction	6.59	1.65
Maximum lbs/day	**6.59**	**1.65**
Local Significant Threshold	14	9
Significant Impact?	No	No
Source: MBA 2007		

Level of Significance after Mitigation

Less than Significant.

4.2 - Long-Term Impacts

Long-term emissions for the proposed development are considered for project build-out. Emission sources consist of mobile emissions and stationary emissions. Mobile emissions estimates are derived from motor vehicle traffic. Stationary emissions estimates are derived from the consumption of natural gas, electricity and consumer products, as well as emissions resulting from landscape maintenance. Assumptions relevant to model input for the long-term emissions estimates are:

- The project is assumed to generate 479 average daily trips at buildout of the project (2008);
- Natural gas consumption is based on the residential land use;
- Landscape equipment emissions during the summer are based on default rates within the URBEMIS 2002 model for residential land uses at buildout year 2008; and
- Fireplace hearth emissions during the wintertime assume the conservative URBEMIS default of that 35 percent of the units would have wood stoves, 10 percent would have wood fireplaces, and 55 percent would have natural gas fireplaces;

Since the proposed project is at an altitude of over 5,000 feet and basic exhaust emission rates are based on tests at CARB's Haagen-Smit Laboratory at and altitude of 300 feet, emission rates from

vehicles in the vicinity of the project may not be accurately represented in the URBEMIS calculations. According to CARB's on-road motor vehicle emissions model methodology (CARB 2000), some older technology vehicles emit more VOC and CO emissions and fewer NO_X emissions when at higher altitudes. This is a special concern for vehicles operating above 5,000 feet elevation. At higher altitudes, the air pressure and air density is lower than that at sea level. Older technology vehicles, designed for operation at sea level, were not equipped with adaptive fuel controls to reduce the fuel flow for operation at high altitudes. Hence, older technology vehicles tended to run rich at higher altitudes. This increased VOC and CO emissions but suppressed NO_X formation due to the quenching effect of the excess fuel.

Therefore, CARB established correction factors of 1.3 for VOC, 1.9 for CO, and 0.6 for NO_X to be applied to the running exhaust and continuous starting emissions for operation above 5,000 feet (CARB 2000). However, these correction factors are only applicable to older technology gasoline fueled vehicles. Newer technology vehicles have adaptive fuel controls that compensate for higher altitudes. CARB determined that the correction factor would only apply to the Technology Groups listed in Table 8.

Table 8: Technology Groups with Altitude Correction Factors

Tech Group	Model Years	Technology Group Description
1	Pre-1975	With Secondary Air
2	Pre-1975	Without Secondary Air
3	1975-1982	No Catalyst
4	1975-1976	Oxidation Catalyst with Secondary Air
5	1975-1979	Oxidation Catalyst without Secondary Air
6	1980-1989	Oxidation Catalyst without Secondary Air
7	1977-1987	Oxidation Catalyst with Secondary Air
Source: (CARB 2000)		

An analysis of EMFAC2007 for the Basin portion of San Bernardino County for the current year (2007), buildout year (2008), and long-term operations (2030) was conducted. Results of this analysis are presented in Appendix B. The number of vehicles operating in these technology groups as a percentage of all vehicles was determined to be only 2.78 percent in 2007, 1.69 percent in 2008, and 0 percent in 2030. Therefore, it was determined that further application of correction factors would not be necessary due to the negligible effect on the total emissions.

An estimate of the daily total long-term project emissions is derived by combining both mobile and stationary emissions (natural gas consumption, consumer product consumption, hearth use, paint applications, and landscape maintenance). Using the model URBEMIS, total daily emissions were

estimated for summer and winter. Table 9 shows long-term estimated daily total summer emissions and Table 10 shows winter emissions.

Table 9: Long-Term Emissions (summer)

Pollution Source	Emissions (pounds per day)				
	VOC	NO_X	CO	PM_{10}	$PM_{2.5}$
Mobile Emissions	3.48	6.06	43.49	4.86	1.21
Natural Gas Consumption	0.05	0.63	0.27	NG	NG
Landscape Emissions	0.25	0.01	1.74	0.01	NG
Consumer Products	2.45	NG	NG	NG	NG
Architectural Coatings	1.70	NG	NG	NG	NG
Combined Emissions Totals (lbs/day)	**7.93**	**6.70**	**45.50**	**4.87**	**1.21**
Regional Threshold	55	55	550	150	55
Exceed Threshold?	No	No	No	No	No

NG = negligible
Source: URBEMIS, MBA 2007

Table 10: Long-Term Emissions (winter)

Pollution Source	Emissions (pounds per day)				
	VOC	NO_X	CO	PM_{10}	$PM_{2.5}$
Mobile Emissions	4.23	7.23	52.66	4.86	1.21
Natural Gas Consumption	0.05	0.63	0.27	NG	NG
Hearth Emissions	28.38	0.98	51.91	7.74	7.12
Consumer Products	2.45	NG	NG	NG	NG
Architectural Coatings	1.70	NG	NG	NG	NG
Combined Emissions Totals (lbs/day)	**36.81**	**8.84**	**104.84**	**12.60**	**7.39**
Regional Threshold	55	55	550	150	55
Exceed Threshold?	No	No	No	No	No

NG = negligible
Source: URBEMIS, MBA 2007

Level of Significance before Mitigation

Less than Significant – When emissions projections are compared with the SCAQMD suggested regional thresholds for significance; it is shown that long-term emissions are below all the applicable thresholds.

It is important to note that a previous analysis for a project on this site — Moon Camp TT #16136 EIR) — had a significant and unavoidable impact to the regional levels of ROG, CO, and PM_{10}. A

review of the analysis showed that the majority of the emissions were assigned to wood fireplaces. The analysis used the URBEMIS model version available at the time (Version 7G), which has been determined to have had an error in calculating emissions from hearth activities. The emissions calculated for this report used the current version of URBEMIS (Version 8.7), which is considered more reliable.

4.2.1 - CO Hotspots

Carbon monoxide (CO) is a localized problem requiring additional analysis beyond total project emissions quantification. Projects with sensitive receptors or projects that could negatively impact levels of service (LOS) of existing roads need to use the University of California Davis, Institute of Transportation Studies document *Transportation Project-Level Carbon Monoxide Protocol (CO Protocol)* (UCD 1997) (hereafter referred to as the *CO Protocol*) to determine the potential to create a CO hot spot. A CO hot spot is a localized concentration of CO that is above the State or Federal 1-hour or 8-hour ambient air standards. Localized high levels of CO are associated with traffic congestion and idling or slow-moving vehicles. The proposed project has the potential to negatively impact the LOS on adjacent roadways as well as have idling vehicles queued in the drive-thru area and therefore, requires a CO hotspot analysis.

The significance of project-related CO impacts is generally based on guidance presented in the CO Protocol. This document presents a series of criteria that are used to determine the significance of impacts. The impact on CO is considered significant if the project will:

- Degrade operation of an intersection to level of service (LOS) E or F, or
- Substantially worsen an intersection already operating at LOS F.

For the purposes of determining potential impacts on CO concentrations, a screening procedure was developed to allow the conservative evaluation of CO concentrations without having to run computational models such as EMFAC and CALINE4. Screening procedures provide a relationship among CO concentrations and the most important parameters that affect those concentrations. The screening procedure is contained in the *CO Protocol*. The Protocol states that the determination of project-level CO impacts should be carried out according to a Local Analysis flow chart.

As presented in the Moon Camp Traffic Impact Analysis (TIA) conducted by Urban Crossroads (2007), study area intersections are projected to operate at a Level of Service “C” or better during peak hours with the improvements listed. According to Section 4.7.2 of the CO Protocol, if the project does not involve any intersections with an LOS “E” or “F”, no further analysis is necessary.

Level of Significance before Mitigation

Less than Significant.

4.2.2 - Residential Woodburning

Wood stoves and fireplaces are reasonably common in the area surrounding Big Bear Lake. Some people use wood as a primary source of heat, and others have wood stoves as a back-up in case of emergencies, such as power failures. Wood heating is also popular for cultural reasons when one considers that it can be beneficial because wood is a renewable fuel. However, the smoke from wood stoves and fireplaces pollutes the air outdoors. Smoke from outside can seep into buildings, including nearby homes, also affecting indoor air quality. Smoke from neighborhood stoves and fireplaces, a common source of both odor and reduced visibility, greatly contributes to the air pollution problems people complain about most.

Complete combustion gives off light, heat, and the gases carbon dioxide and water vapor. Because when wood burns, complete combustion does not occur, it also produces wood smoke, which contains CO, NO_X, and ROG. The ROG from woodburning includes toxic and/or cancer-causing substances, such as benzene, formaldehyde and benzo-a-pyrene, a polycyclic aromatic hydrocarbon (PAH).

Most wood heaters, such as woodstoves and fireplaces, release far more air pollution, indoors and out, than heaters using other fuels. In winter, when we heat our homes the most, cold nights with little wind cause smoke and air pollutants to remain stagnate at ground level for long periods. Even though there is no shorter averaging time for particulate matter air quality standards, there is a still a potential for nuisance violations in the area.

Level of Significance before Mitigation

Potentially Significant

Conventional factory-built fireplaces are not efficient at producing heat. These fireplaces are also the source of smoke, indoors and out. To reduce the nuisance risks of smoke – indoor and outside, while still allowing homeowners the ambiance, an EPA-certified fireplace insert is suggested. Additionally, wood heat can be supplied with various EPA-certified wood stoves, pellet stoves, or natural gas heaters. While older uncertified stoves and fireplaces release 40 to 60 grams of smoke per hour, new EPA-certified stoves produce only 2 to 5 grams of smoke per hour.

CARB explains that (CARB 2007) the heating efficiency of any wood heater depends on combining two factors: 1) how completely it burns the firewood (combustion efficiency), and 2) how much of the fire's heat gets into the room, rather than going up the flue (transfer efficiency). The measured heat efficiency of an open-hearth fireplace can range from -10 percent to 10 percent. The heating efficiency of an EPA-certified stove, insert, or fireplace can range from 60 percent to 80 percent.

CARB recommends (CARB 2007) that the owner to get into the habit of glancing out at their chimney top every so often. Apart from the half hour after lighting and refueling, a properly burning fire should give off only a thin wisp of white steam. If they see smoke, they should adjust the

dampers or air inlets to let in more air. The darker the smoke, the more pollutants it contains and the more fuel is being wasted.

Homeowners choosing to use fireplaces and woodstoves need to understand that healthy outdoor and indoor air quality requires good wood burning habits. Most fireplaces will rob the house of heat because they draw air from the room and send it up the chimney. Occupants are warmed if they sit within six feet of the fire, but the rest of the house gets colder as outdoor air leaks in to replace the hot air going up the chimney. The key to burning clean and hot is to control the airflow. Most fireplaces waste wood because of unrestricted airflow. A lot of air helps the fire burn fast, but a load of wood will last only one or two hours.

AQ-3 To reduce the emissions from woodburning apparatus; the following requirement will be placed on all new residences constructed on the proposed project's lots:

- No open-hearth fireplace will be allowed in new construction, only EPA Phase II Certified fireplaces and wood stoves, pellet stoves, and natural gas fireplaces shall be allowed.

AQ-4 To establish a "Good Neighbor Policy for Burning" that will further help reduce the potential for localized nuisance complaints related to woodburning; the proponent shall distribute an informational flyer to each purchaser of lots. At a minimum, the flyer will say:

- Know When To Burn
  - Monitor all fires; never leave a fire unattended.
  - Upgrade an older woodstove to one with a catalytic combustor that burns off excess pollutants.
  - Be courteous when visitors come to your home. Wood smoke can cause problems for people with developing or sensitive lungs (i.e. children, the elderly) and people with lung disease.

- Know What To Burn
  - Split large pieces of wood into smaller pieces and make sure it has been seasoned (allowed to dry for a year). Burning fresh cut logs = smoky fires.
  - When buying wood from a dealer, do not assume it has been seasoned.
  - Small hot fires are more efficient and less wasteful than large fires.
  - Never burn chemically treated wood or non-wood materials.

- Manufactured firelogs provide a nice ambience, have the least impact to air quality, and are a good choice for homeowners who use a fireplace infrequently.

- Know How To Burn
  - Proper combustion is key. Make sure your wood fire is not starved; if excess smoke is coming from the chimney or stack, the fire isn't getting enough air.
  - Visually check your chimney or stack 10 to 15 minutes after you light a fire to ensure it is not emitting excess amounts of smoke.
  - Homeowners should have woodstoves and fireplaces serviced and cleaned yearly to ensure they are working properly.

Level of Significance after Mitigation

Less than Significant

4.3 - Contribution to Climate Change

The threshold of significance proposed in this document is not simply if the Project would result in an increase in GHG emissions, but if the Project would result in an increase in GHGs that would significantly hinder or delay the State's ability to meet the reduction targets contained in AB 32.

This analysis contains two components. One component contains the Project's GHG emission estimates. The emissions estimate describes the sources of emissions, the emissions without incorporation of mitigation measures, and the emissions after the incorporation of mitigation measures, if required. The second component contains the measures used to compare the Project's components to the applicable State and local strategies and known mitigation measures to reduce GHGs.

This analysis is structured with the unmitigated emissions estimates provided before the State and local strategies.

4.3.1 - Emissions Inventory

Emissions Estimation Assumptions

Construction. The Project would emit GHGs during construction of the Project from combustion of fuels in worker vehicles accessing the site as well as from the construction equipment. The Project would also emit GHGs during the manufacture and transportation of the cement and building materials. However, emissions resulting from materials consumption will not be incorporated into the Project's emissions estimates. CEQA does not require a 'lifecycle' analysis approach to determine significance of potential environmental impacts.

Exhaust emissions during construction for the Project were estimated using URBEMIS2007 version 9.2.4 (URBEMIS 2007). The detailed calculations are provided in Appendix C.

Operation. Greenhouse gas emissions from area emissions and motor vehicles were generated using URBEMIS 2007. Emissions of nitrous oxide and methane emissions from natural gas consumption were estimated using emission factors as described in the attached spreadsheets in Appendix B.

Electricity usage for commercial operations was estimated using emission factors as described in the attached spreadsheets in Appendix B. The California Climate Action Registry (CCAR) emission factors for electricity use are 804.54 pounds of CO_2 per MWh, 0.0067 pounds of NH4 per MWh, and 0.0037 pounds of N_2O per MWh.

Note that emissions models such as EMFAC and URBEMIS evaluate aggregate emissions and do not demonstrate, with respect to a global impact, how much of these emissions are "new" emissions specifically attributable to the proposed project. For most projects, the main contribution of GHG emissions is from motor vehicles, but how much of those emissions are "new" is uncertain.

Inventory

The emissions are estimated in tons per year, which are converted to metric tons of carbon dioxide equivalents ($MTCO_2e$). The carbon dioxide emissions from construction activity are shown in Table 11. The GHG emissions from operation of the project are shown in Table 12. At buildout, the project will emit approximately 1,591.60 $MTCO_2e$ per year. Approximately 82 percent of operational GHGs will be generated by vehicular activity associated with the project. Natural gas use and indirect emissions from electricity generation will contribute approximately 11 percent and 6 percent of the operational GHG inventory, respectively.

Table 11: Construction Generated Carbon Dioxide Emissions

Source	Total Tons	MTCO2e
Project Construction	401.22	363.99

Table 12: Operational Greenhouse Gas Emissions

Source	Tons			Metric Tons CO_2e
	Carbon Dioxide	Nitrous Oxide	Methane	
Motor Vehicles	1,378.00	0.18	0.39	1,309.49
Natural Gas	189.75	0.00	0.02	172.67
Indirect Electricity	113.17	0.00	0.00	102.83
Hearth	6.63	-	-	6.01

Table 12: Operational Greenhouse Gas Emissions (Cont.)

Source	Tons			Metric Tons CO_2e
	Carbon Dioxide	Nitrous Oxide	Methane	
Landscape Equipment	0.65	-	-	0.59
Total	**1,688.20**	**0.19**	**0.41**	**1,591.60**
Source: Michael Brandman Associates, 2008				

4.3.2 - Applicable State and Local Strategies

Under AB 32, the CARB has the primary responsibility for reducing GHG emissions. However, the many public agencies involved in land use decisions, energy use, waste streams, construction, and other areas are also involved in the creation and implementation of strategies to reduce GHG emissions in California. The CAT addresses strategies for certain California public agencies. In addition, the California Attorney General's office has been active in advising public agencies on reducing GHG emissions. Therefore, this analysis will focus on the Project's early implementation of applicable state strategies. State strategies include measures in the 2006 CAT Report and the CARB's Early Action Measures. In addition, this analysis will focus on the Project's implementation of the applicable California Attorney General's Office suggested mitigation strategies for reducing GHG emissions. To assess significance, the following documents were used.

- The 2006 Climate Action Team Report to Governor Schwarzenegger (CAT 2006).
- ARB's Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California (ARB 2007).
- California Attorney General's Office Mitigation Letter (AG 2008).

2006 CAT Report

A discussion on the background of the 2006 CAT Report is in the Regulatory Framework section. The 2006 CAT Report to Governor Schwarzenegger and the Legislature contains existing bills, regulations, and standards that help reduce California's GHG emissions. The 2006 CAT Report also contains new strategies that can be implemented by the CARB and other California agencies to help reduce California's emissions to 1990 levels in 2020. The 2006 CAT Report lists the recommendation for emission reduction strategies to be implemented in the "next two years" for the public agencies involved in the CAT. As an example, the 2006 CAT Report contains the following possible measure: the CARB could ban the retail sale of hydroflourocarbons in small cans. It is important to understand that compliance with all applicable state standards and regulations is a requirement. As such, this Project will comply with all applicable laws and standards as they are adopted.

Although the 2006 CAT Report applies to adoption of strategies by public agencies, this project can contribute to early implementation of applicable strategies by incorporating as design features or mitigation measures that help achieve the goals of the reduction strategies. An assessment of project's early implementation of applicable and feasible 2006 CAT Report strategies is contained in Table 3.2 14.

Table 13: 2006 CAT Report Strategies

Applicable and Feasible Strategy	Incorporated into Project?
Achieve 50 percent Statewide Recycling Goal: Achieving the State's 50 percent waste diversion mandate as established by the Integrated Waste Management Act of 1989, (AB 939, Sher, Chapter 1095, Statutes of 1989), will reduce climate change emissions associated with energy intensive material extraction and production as well as methane emission from landfills. A diversion rate of 48 percent has been achieved on a statewide basis. Therefore, a 2 percent additional reduction is needed.	No
Afforestation/Reforestation Projects: Reforestation projects focus on restoring native tree cover on lands that were previously forested and are now covered with other vegetative types.	No
Water Use Efficiency: Approximately 19 percent of all electricity, 30 percent of all natural gas, and 88 million gallons of diesel are used to convey, treat, distribute and use water and wastewater. Increasing the efficiency of water transport and reducing water use would reduce GHG emissions.	No
Building Energy Efficiency Standards in Place and in Progress: Public Resources Code 25402 authorizes the CEC to adopt and periodically update its building energy efficiency standards (that apply to newly constructed buildings and additions to and alterations to existing buildings).	No
Appliance Energy Efficiency Standards in Place and in Progress: Public Resources Code 25402 authorizes the Energy Commission to adopt and periodically update its appliance energy efficiency standards (that apply to devices and equipment using energy that are sold or offered for sale in California).	No
Green Buildings Initiative: Green Building Executive Order, S-20-04 (CA 2004), sets a goal of reducing energy use in public and private buildings by 20 percent by the year 2015, as compared with 2003 levels.	No
California Solar Initiative: Installation of 1 million solar roofs or an equivalent 3,000 MW by 2017 on homes and businesses; increased use of solar thermal systems to offset the increasing demand for natural gas; use of advanced metering in solar applications; and creation of a funding source that can provide rebates over 10 years through a declining incentive schedule.	No

As shown in Table 13, there are seven measures that are applicable and feasible for the project. Currently, the project does not contain design features or programs that contribute to early implementation of these measures.

ARB Early Action Measures

The CARB published its Expanded Early Actions to Mitigate Climate Change in California, which describes recommendations for discrete early action measures to reduce GHG emissions. A review of the CARB's reduction measures underway or to be initiated by the CARB in the 2007 to 2012 timeframe indicates that only one measure would be applicable to the project. This measure is the "Cool Communities Program," which is anticipated to have a CARB hearing date in the third quarter of 2008. This program is recommended to be a non-regulatory voluntary program with guidelines to foster the establishment or transition to cool communities in California. The following is a brief description of the strategies to be adopted in the Cool Communities Program guidelines:

- Cool Roofs. Cool roof programs as part of the Building Energy Efficiency standards (Title 24) can save as much as 15 percent of cooling energy use during hot months of the year. The per-house cost premium is estimated at about $500.
- Cool Pavements. Cool pavements can reduce the ambient air temperature by 1 degree Fahrenheit, thereby reducing energy cooling demand.
- Shade Trees and Urban Forest. The Tree Benefit Estimator reports that a mature tree system would save about 700 kWh of energy (1,100 kg of CO_2 per household).

If the project were to take part in the voluntary early action strategies, it would be consistent with the strategies. However, as the project is currently designed, it does not implement the Cool Communities Program.

Attorney General Mitigation

The Office of the California Attorney General maintains a list of CEQA Mitigations for Global Warming Impacts on its website. The Attorney General's Office has listed some examples of types of mitigations that local agencies may consider to offset or reduce global warming impacts from a project. The Attorney General's Office states that the presented lists are examples and not intended to be exhaustive but are instead provided as measures and policies that could be undertaken. Moreover, the measures cited may not be appropriate for every project, so the Attorney General suggests that the lead agency should use its own informed judgment in deciding which measures it would analyze, and which measures it would require, for a given project. The mitigation measures are divided into two groups—generally applicable measures and general plan measures. As this Project does not involve the development of a general plan, only the generally applicable measures were reviewed.

The Attorney General presents 'generally applicable' measures in the following areas:

- Energy efficiency;
- Renewable energy;
- Water conservation and efficiency;
- Solid waste measures;

- Land use measures;
- Transportation and motor vehicles; and
- Carbon offsets.

The project does preserve open space and existing trees (Land Use Measures). However, the size of the project, rural nature of the development, and distance to public transportation make some Land Use and Transportation measures infeasible, such as incorporating public transit into the project design. The project could, but does not currently, incorporate measures to increase energy efficiency, use of renewable energy, water conservation and efficiency, and reduce solid waste.

4.3.3 - Conclusion

The project will generate a limited amount of GHG generation during construction, and it will lead to a low-amount on-going operational emissions from the use of the 50 residential units. The project would emit less than 25 percent of the SCAQMD's draft numerical GHG threshold of significance (currently proposed as 6,500 $MTCO_2e$). Therefore, because of the size of the project, the project will not significantly hinder or delay California's ability to meet the reduction targets contained in AB 32.

It is possible to incorporate additional measures into the project to reduce the project's contribution of GHGs, thereby reducing the project's likelihood of hindering or delaying California's ability to meet the reduction targets contained in AB 32. However, as the project is less than significant, mitigation measures to further reduce this impact are not required. Measures that reduce the emissions generation motor vehicles, natural gas consumption, and electricity consumption would reduce the main operational sources of GHGs.

4.4 - Conformance with Air Quality Management Plan

The CEQA checklist indicates that a significant impact would occur if the proposed project would conflict with or obstruct implementation of the applicable air quality plan.

This assessment will use four criteria for determining project consistency with the current AQMP, as discussed below. The first and second criteria are from the SCAQMD. According to the SCAQMD, there are two key indicators of AQMP consistency: 1) whether the project will not result in an increase in the frequency or severity of existing air quality violations or cause or contribute to new violations, or delay timely attainment of air quality standards or the interim emission reductions specified in the AQMP; and 2) whether the project will exceed the assumptions in the AQMP based on the year of project build out and phase (SCAQMD 2006b). The third criterion is compliance with the control measures in the AQMP. The fourth criterion is compliance with the SCAQMD regional thresholds.

4.4.1 - Project's Contribution to Air Quality Violations

As shown above in Sections 4.1 - Short-Term Impacts and 4.2 - Long-Term Impacts, the project would not violate any air quality standard or contribute substantially to an existing or projected air quality violation. Therefore, the project meets the first indicator.

4.4.2 - AQMP Assumptions

One way to assess project compliance with the AQMP assumptions is to ensure that the population density and land use are consistent with the growth assumptions used in the air plans for the air basin. According to CARB transportation performance standards, the rate of growth in vehicle miles traveled (VMT) and trips should be held to the rate of population growth (SCAQMD 2006b). Compliance with this performance standard is one way suggested by CARB of showing compliance with the growth assumptions used in the AQMP. If the total VMT generated by the proposed project at build-out is at or below that predicted by the AQMP, then the proposed project's mobile emissions is consistent with the AQMP. It is assumed that the existing and future pollutant emissions computed in the AQMP were based on land uses from area general plans.

As the project site is currently zoned, only one lot would be allowed on the 62.43 acres. The Proposed Project will allow 50 lots in the same area. This would result in a net increase of 487 trips per day over what is in the current general plan expected growth. The TIA provided an estimation of daily traffic generated by projects planned in the area in 2030. The results indicate that the other development's trip generation would be 15,111 in 2030. The proposed project's traffic generation in 2030 would be 497 for a total of 15,608 total trips including the Project. This represents just over 3 percent of the projected cumulative growth. Whereas the increase above the parcel alone will be considerable, the relative increase above the vicinity general plan projection is minimal. Therefore, the project is consistent with the assumptions in the AQMP.

4.4.3 - Control Measures

The third criterion is compliance with the control measures in the AQMP. The AQMP contains a number of land use and transportation control measures including the following: the District's Stationary and Mobile Source Control Measures; State Control Measures proposed by CARB; and Transportation Control Measures provided by SCAG (AQMP 2003). CARB's strategy for reducing mobile source emissions include the following approaches: new engine standards; reduce emissions from in-use fleet, require clean fuels, support alternative fuels and reduce petroleum dependency, work with EPA to reduce emissions from national and state sources, and pursue long-term advanced technology measures (AQMP 2003). Transportation control measures provided by SCAG include those contained in the Regional Transportation Plans (RTP), the most current version being the 2004 RTP. The RTP has control measures to reduce emissions from on-road sources by incorporating strategies such as high occupancy vehicle interventions, transit, and information-based technology interventions (AQMP 2003). The measures implemented by CARB and SCAG effect the project

indirectly by regulating the vehicles that the residents may use and regulating public transportation. The project indirectly will comply with the control measures set by CARB and SCAG.

The project will comply with all of the District's applicable rules and regulations. Therefore, the project complies with this criterion.

4.4.4 - Compliance with the SCAQMD Regional Thresholds

Although there is no known guidance that correlates AQMP consistency with the SCAQMD regional thresholds, it is common to use the thresholds in assessing AQMP compliance.

The regional significance analysis of construction and operational emissions demonstrated that emissions would not exceed the SCAQMD regional significance thresholds. Therefore, the project is consistent with the SCAQMD regional thresholds.

Level of Significance before Mitigation

Less than Significant

4.5 - Potential for Air Quality Standard Violation

The CEQA guidelines indicate that a significant impact would occur if the proposed project would violate any air quality standard or contribute substantially to an existing or projected air quality violation.

The South Coast Air Basin, the geographical area in which the project is located, is in nonattainment for CO, PM_{10}, $PM_{2.5}$, and ozone. Levels of PM_{10} and $PM_{2.5}$ are locally high enough that contributions from new sources may add to the concentrations of those pollutants and contribute to a projected air quality violation. Although background levels of ozone are high in the basin, the project alone (without other cumulative sources) would not contribute substantially to a projected air quality violation of ozone. Project emissions of VOC and NO_X (ozone precursors) and their cumulative contribution to ozone concentrations are discussed in Cumulative Impacts below.

Although CO is still listed as a nonattainment pollutant, the basin has not exceeded the CO standard for the past several years. Additionally, as shown in Table 2, the project's source receptor area has not violated the CO standard for the past several years.

Two criteria are used to assess the significance of this impact: 1) the localized construction analysis; and 2) the CO hotspot analysis. These analyses are discussed above and have concluded that they would result in a less than significant impact.

Particulate matter emissions during operation (PM_{10} and $PM_{2.5}$) are primarily from paved road dust and fireplaces. It is not likely that the project would generate enough road dust during operation to violate a PM_{10} or $PM_{2.5}$. Also, it is not likely that particulate matter emissions from woodburning

devices in an entire day would be enough to violate the 24-hour standards for either PM_{10} or $PM_{2.5}$. In addition, the regional significance analysis demonstrated that emissions of PM_{10} and $PM_{2.5}$ are below the regional significance thresholds.

Sulfur dioxide emissions from the project are negligible. The regional analysis demonstrated that emissions are far under the regional significance threshold. Therefore, it follows that on a localized basis, emissions of sulfur dioxide would not exceed the ambient air quality standards. In addition, the basin is in attainment for sulfur dioxide and does not experience high pollutant episodes of that pollutant. Therefore, potential impacts of sulfur dioxide are less than significant.

Level of Significance before Mitigation

Less than Significant

4.6 - Cumulative Impacts

Section 15130(b) of the CEQA Guidelines states the following:

> The following elements are necessary to an adequate discussion of significant cumulative impacts, either:
>
> - A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency, or
> - A summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document, which has been adopted or certified, which described or evaluated regional or areawide conditions contributing to the cumulative impact.

In accordance with CEQA Guidelines 15130(b), this analysis of cumulative impacts incorporates a summary of projections. The following four-tiered approach is to assess cumulative air quality impacts.

- Consistency with the SCAQMD project specific thresholds for construction and operation;
- Project consistency with existing air quality plans; and
- Assessment of the cumulative health effects of the pollutants;

4.6.1 - Project Specific Thresholds

After implementation of mitigation measures, during construction, emissions of VOC, NO_X, PM_{10}, and $PM_{2.5}$ is not expected to exceed the SCAQMD regional significance thresholds. In addition, during operation, the proposed project is not expected to exceed the established regional emission thresholds for VOC, NO_X, CO, PM_{10}, and $PM_{2.5}$. The SCAQMD considers construction or

operational emissions that do not exceed the project specific thresholds will not result in a cumulative impact.

Level of Significance before Mitigation

Less than Significant

4.6.2 - Air Quality Plans

The South Coast Air Basin, in which the project is located, is in nonattainment for ozone, PM_{10}, $PM_{2.5}$, and CO. As such, the SCAQMD is required to prepare and maintain an AQMP and a SIP to document the strategies and measures to be undertaken to reach attainment of ambient air quality standards. While the SCAQMD does not have direct authority over land use decisions, it was recognized that changes in land use and circulation planning were necessary to maintain clean air. As discussed above in Section 4.4 - Conformance with Air Quality Management Plan, the project is compliant with the AQMP.

Level of Significance before Mitigation

Less than Significant

4.6.3 - Cumulative Health Impacts

The basin is in nonattainment for ozone, PM_{10}, $PM_{2.5}$, and CO, which means that the background levels of those pollutants are at times higher than the ambient air quality standards. The air quality standards were set to protect the health of sensitive individuals (i.e., elderly, children, and the sick). Therefore, when the concentration of those pollutants exceed the standard, it is likely that some of the sensitive individuals of the population experience health effects as described above in Section 2.2 - Pollutants

The localized significance analysis in Section 4.1 - Short-Term Impacts demonstrated that during construction activities, no localized significance threshold was expected to be exceeded; therefore, the emissions of particulate matter, primarily in the form of fugitive dust, would not result in a significant cumulative health impact.

Long-term operational emissions are not expected to exceed the District's significance thresholds. ROG and NO_X are precursors to ozone. Because ozone is a secondary pollutant (it is not emitted directly but formed by chemical reactions in the air), it can be formed miles downwind of the project site. Project emissions of VOC and NO_X may still contribute to the background concentration of ozone but such contributions would not be considered cumulatively considerable.

Operational emissions of PM_{10} and $PM_{2.5}$ are not expected to exceed the regional significance threshold. The combination of ozone and PM_{10} can aggravate health effects. $PM_{2.5}$ is a component of PM_{10}. The ambient air quality standard for both PM_{10} and $PM_{2.5}$ are exceeded in the Basin.

Therefore, project emissions may contribute to the background of those pollutants but such contributions would not be considered cumulatively considerable.

Long-term health effects from residential woodburning are not expected create a significant impact. Implementation of Mitigation Measures AQ-3 and AQ-4 will create the environment where woodburning activities may contribute to the local wood smoke but such contribution would not be considered cumulatively considerable.

Level of Significance before Mitigation

Less than Significance

4.7 - Expose Sensitive Receptors to Substantial Pollutant Concentrations

The CEQA guidelines indicate that a significant impact would occur if the proposed project would expose sensitive receptors to substantial pollutant concentrations.

The localized construction analysis demonstrated that without mitigation, the project would not exceed the localized thresholds for CO, NO_2, PM_{10}, or $PM_{2.5}$. Therefore, during construction, the project would not expose sensitive receptors to substantial pollutant concentrations of CO, NO_2, PM_{10}, or $PM_{2.5}$.

The construction equipment would emit diesel particulate matter, which is a carcinogen. However, the diesel particulate matter emissions are short term in nature. Determination of risk from diesel particulate matter is considered over a 70-year exposure time. Therefore, considering the dispersion of the emissions and the short time frame, exposure to diesel particulate matter is anticipated to be less than significant.

During operation of the project, a CO hotspot analysis is the appropriate tool to determine if project emissions of CO during operation would exceed ambient air quality standards. The main source of air pollutant emissions during operation are from offsite motor vehicles traveling on the roads surrounding the project. The study area intersections were projected to operate at a Level of Service “C” or better during peak hours with the improvements listed in the TIA. According to Section 4.7.2 of the CO Protocol, if the project does not involve any intersections with an LOS “E” or “F”, no further analysis is necessary. Therefore, according to this criterion, air pollutant emissions during operation would result in a less than significant impact.

During operation of the project, the addition of woodburning devices to the area would potentially expose sensitive receptors to localized concentrations of criteria and toxic pollutants. With the incorporation of mitigations, the project would not expose sensitive receptors to substantial pollutant concentrations.

Level of Significance before Mitigation

Less than Significant

4.8 - Odors

The CEQA guidelines indicate that a significant impact would occur if the proposed project would create objectionable odors affecting a substantial number of people.

The proposed project does not contain land uses typically associated with emitting objectionable odors, with the possible exception of wood smoke. Wood smoke is pleasant to some and may be a nuisance to others. Implementation and compliance with SCAQMD Rule 402 will ensure that wood smoke will not be offensive to a substantial number of people. Diesel exhaust and VOCs will be emitted during construction of the project, which are objectionable to some; however, emissions will disperse rapidly from the project site and therefore should not be at a level to induce a negative response.

Level of Significance before Mitigation

Less than Significant

SECTION 5: REFERENCES

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Appendix A:
URBEMIS Output

URBEMIS 2002 For Windows 8.7.0

File Name: E:\URBEMIS\Moon Camp\Moon Camp 2007.urb
Project Name: Moon Camp 2007
Project Location: South Coast Air Basin (Los Angeles area)
On-Road Motor Vehicle Emissions Based on EMFAC2002 version 2.2

SUMMARY REPORT
(Pounds/Day - Summer)

CONSTRUCTION EMISSION ESTIMATES

*** 2008 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (lbs/day,unmitigated)	69.31	53.38	68.71	0.00	43.51	1.91	41.60
TOTALS (lbs/day, mitigated)	69.31	42.76	68.71	0.00	6.59	0.38	6.21

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	4.45	0.63	2.01	0.02	0.01

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	3.48	6.06	43.49	0.03	4.86

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	7.92	6.70	45.50	0.04	4.87

SUMMARY REPORT
(Pounds/Day - Winter)

CONSTRUCTION EMISSION ESTIMATES

*** 2008 ***	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
TOTALS (lbs/day,unmitigated)	69.31	53.38	68.71	0.00	43.51	1.91	41.60
TOTALS (lbs/day, mitigated)	69.31	42.76	68.71	0.00	6.59	0.38	6.21

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	32.58	1.61	52.18	0.12	7.74

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	4.23	7.23	52.66	0.03	4.86

SUM OF AREA AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10
TOTALS (lbs/day,unmitigated)	36.81	8.84	104.83	0.15	12.60

DETAIL REPORT
(Pounds/Day - Winter)

Construction Start Month and Year: January, 2008
Construction Duration: 12
Total Land Use Area to be Developed: 16.67 acres
Maximum Acreage Disturbed Per Day: 4.16 acres
Single Family Units: 50 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 0

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2008***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	41.60	-	41.60
Off-Road Diesel	8.03	49.74	67.35	-	1.81	1.81	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.06	0.13	1.36	0.00	0.00	0.00	0.00
Maximum lbs/day	8.09	49.87	68.71	0.00	43.41	1.81	41.60
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	4.15	30.14	31.84	-	1.29	1.29	0.00
Bldg Const Worker Trips	0.20	0.12	2.62	0.00	0.04	0.00	0.04
Arch Coatings Off-Gas	60.45	-	-	-	-	-	-
Arch Coatings Worker Trips	0.20	0.12	2.62	0.00	0.04	0.00	0.04
Asphalt Off-Gas	0.60	-	-	-	-	-	-
Asphalt Off-Road Diesel	3.58	20.75	30.41	-	0.57	0.57	0.00
Asphalt On-Road Diesel	0.12	2.23	0.42	0.00	0.05	0.05	0.00
Asphalt Worker Trips	0.02	0.01	0.29	0.00	0.00	0.00	0.00
Maximum lbs/day	69.31	53.38	68.21	0.00	2.00	1.91	0.09
Max lbs/day all phases	69.31	53.38	68.71	0.00	43.51	1.91	41.60

Phase 1 - Demolition Assumptions: Phase Turned OFF

Phase 2 - Site Grading Assumptions
Start Month/Year for Phase 2: Jan '08
Phase 2 Duration: 1.3 months
On-Road Truck Travel (VMT): 0
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Crawler Tractors	143	0.575	8.0
1	Graders	174	0.575	8.0
1	Off Highway Trucks	417	0.490	8.0
1	Rubber Tired Loaders	165	0.465	8.0
1	Scrapers	313	0.660	8.0
1	Tractor/Loaders/Backhoes	79	0.465	8.0

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Feb '08
Phase 3 Duration: 10.7 months
Start Month/Year for SubPhase Building: Feb '08
SubPhase Building Duration: 10.7 months
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
2	Other Equipment	190	0.620	8.0

Start Month/Year for SubPhase Architectural Coatings: Nov '08
SubPhase Architectural Coatings Duration: 1.1 months
Start Month/Year for SubPhase Asphalt: Dec '08
SubPhase Asphalt Duration: 0.5 months
Acres to be Paved: 2.5
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
2	Pavers	132	0.590	8.0
2	Rollers	114	0.430	8.0

CONSTRUCTION EMISSION ESTIMATES MITIGATED (lbs/day)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2008***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	6.21	-	6.21
Off-Road Diesel	8.03	39.79	67.35	-	0.36	0.36	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.06	0.13	1.36	0.00	0.00	0.00	0.00
Maximum lbs/day	8.09	39.92	68.71	0.00	6.57	0.36	6.21
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	4.15	24.11	31.84	-	0.26	0.26	0.00
Bldg Const Worker Trips	0.20	0.12	2.62	0.00	0.04	0.00	0.04
Arch Coatings Off-Gas	60.45	-	-	-	-	-	-
Arch Coatings Worker Trips	0.20	0.12	2.62	0.00	0.04	0.00	0.04
Asphalt Off-Gas	0.60	-	-	-	-	-	-
Asphalt Off-Road Diesel	3.58	16.60	30.41	-	0.11	0.11	0.00
Asphalt On-Road Diesel	0.12	1.78	0.42	0.00	0.01	0.01	0.00
Asphalt Worker Trips	0.02	0.01	0.29	0.00	0.00	0.00	0.00
Maximum lbs/day	69.31	42.76	68.21	0.00	0.47	0.38	0.09
Max lbs/day all phases	69.31	42.76	68.71	0.00	6.59	0.38	6.21

Construction-Related Mitigation Measures

Phase 2: Soil Disturbance: Apply soil stabilizers to inactive areas
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 30.0%)
Phase 2: Soil Disturbance: Replace ground cover in disturbed areas quickly
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 15.0%)
Phase 2: Soil Disturbance: Water exposed surfaces - 2x daily
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 34.0%)
Phase 2: Off-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 2: Off-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 2: On-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 2: On-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 2: Stockpiles: Cover all stock piles with tarps
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 9.5%)
Phase 2: Unpaved Roads: Water all haul roads 2x daily
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 30.0%)
Phase 2: Unpaved Roads: Reduce speed on unpaved roads to < 15 mph
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 40.0%)
Phase 3: Off-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 3: Off-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 3: Off-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 3: Off-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 3: On-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 3: On-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 1 - Demolition Assumptions: Phase Turned OFF

Phase 2 - Site Grading Assumptions
Start Month/Year for Phase 2: Jan '08

Phase 2 Duration: 1.3 months
On-Road Truck Travel (VMT): 0
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Crawler Tractors	143	0.575	8.0
1	Graders	174	0.575	8.0
1	Off Highway Trucks	417	0.490	8.0
1	Rubber Tired Loaders	165	0.465	8.0
1	Scrapers	313	0.660	8.0
1	Tractor/Loaders/Backhoes	79	0.465	8.0

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Feb '08
Phase 3 Duration: 10.7 months
Start Month/Year for SubPhase Building: Feb '08
SubPhase Building Duration: 10.7 months
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
2	Other Equipment	190	0.620	8.0

Start Month/Year for SubPhase Architectural Coatings: Nov '08
SubPhase Architectural Coatings Duration: 1.1 months
Start Month/Year for SubPhase Asphalt: Dec '08
SubPhase Asphalt Duration: 0.5 months
Acres to be Paved: 2.5
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
2	Pavers	132	0.590	8.0
2	Rollers	114	0.430	8.0

AREA SOURCE EMISSION ESTIMATES (Winter Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.05	0.63	0.27	0	0.00
Hearth	28.38	0.98	51.91	0.12	7.74
Landscaping - No winter emissions					
Consumer Prdcts	2.45	-	-	-	-
Architectural Coatings	1.70	-	-	-	-
TOTALS(lbs/day,unmitigated)	32.58	1.61	52.18	0.12	7.74

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	4.23	7.23	52.66	0.03	4.86
TOTAL EMISSIONS (lbs/day)	4.23	7.23	52.66	0.03	4.86

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2008 Temperature (F): 40 Season: Winter

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Acreage	Trip Rate	No. Units	Total Trips
Single family housing	62.43	9.57 trips/dwelling unit	50.00	478.50
		Sum of Total Trips		478.50
		Total Vehicle Miles Traveled		3,201.40

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.00	1.60	98.00	0.40
Light Truck < 3,750 lbs	15.00	2.70	95.30	2.00
Light Truck 3,751- 5,750	16.20	1.20	97.50	1.30
Med Truck 5,751- 8,500	7.20	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.70	76.50	23.50	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			

Changes made to the default values for Land Use Trip Percentages

The Trip Rate and/or Acreage values for Single family housing
have changed from the defaults 9.57/16.67 to 9.57/62.43

Changes made to the default values for Construction

Architectural Coatings: # ROG/ft2 (residential) changed from 0.0185 to 0.00602
Architectural Coatings: # ROG/ft2 (non-res) changed from 0.0185 to 0.0116
Phase 2 mitigation measure Soil Disturbance: Apply soil stabilizers to inactive areas
has been changed from off to on.
Phase 2 mitigation measure Soil Disturbance: Replace ground cover in disturbed areas quickly
has been changed from off to on.
Phase 2 mitigation measure Soil Disturbance: Water exposed surfaces - 2x daily
has been changed from off to on.
Phase 2 mitigation measure Off-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 2 mitigation measure Off-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 2 mitigation measure On-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 2 mitigation measure On-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 2 mitigation measure Stockpiles: Cover all stock piles with tarps
has been changed from off to on.
Phase 2 mitigation measure Unpaved Roads: Water all haul roads 2x daily
has been changed from off to on.
Phase 2 mitigation measure Unpaved Roads: Reduce speed on unpaved roads to < 15 mph
has been changed from off to on.
Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 3 mitigation measure On-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 3 mitigation measure On-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.

Changes made to the default values for Area

The landscape year changed from 2005 to 2007.

Changes made to the default values for Operations

The operational emission year changed from 2005 to 2008.
The operational winter temperature changed from 50 to 40.
The operational winter selection item changed from 3 to 1.
The operational summer temperature changed from 90 to 60.
The operational summer selection item changed from 8 to 3.

DETAIL REPORT
(Pounds/Day - Summer)

Construction Start Month and Year: January, 2008
Construction Duration: 12
Total Land Use Area to be Developed: 16.67 acres
Maximum Acreage Disturbed Per Day: 4.16 acres
Single Family Units: 50 Multi-Family Units: 0
Retail/Office/Institutional/Industrial Square Footage: 0

CONSTRUCTION EMISSION ESTIMATES UNMITIGATED (lbs/day)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2008***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	41.60	-	41.60
Off-Road Diesel	8.03	49.74	67.35	-	1.81	1.81	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.06	0.13	1.36	0.00	0.00	0.00	0.00
Maximum lbs/day	8.09	49.87	68.71	0.00	43.41	1.81	41.60
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	4.15	30.14	31.84	-	1.29	1.29	0.00
Bldg Const Worker Trips	0.20	0.12	2.62	0.00	0.04	0.00	0.04
Arch Coatings Off-Gas	60.45	-	-	-	-	-	-
Arch Coatings Worker Trips	0.20	0.12	2.62	0.00	0.04	0.00	0.04
Asphalt Off-Gas	0.60	-	-	-	-	-	-
Asphalt Off-Road Diesel	3.58	20.75	30.41	-	0.57	0.57	0.00
Asphalt On-Road Diesel	0.12	2.23	0.42	0.00	0.05	0.05	0.00
Asphalt Worker Trips	0.02	0.01	0.29	0.00	0.00	0.00	0.00
Maximum lbs/day	69.31	53.38	68.21	0.00	2.00	1.91	0.09
Max lbs/day all phases	69.31	53.38	68.71	0.00	43.51	1.91	41.60

Phase 1 - Demolition Assumptions: Phase Turned OFF

Phase 2 - Site Grading Assumptions
Start Month/Year for Phase 2: Jan '08
Phase 2 Duration: 1.3 months
On-Road Truck Travel (VMT): 0
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Crawler Tractors	143	0.575	8.0
1	Graders	174	0.575	8.0
1	Off Highway Trucks	417	0.490	8.0
1	Rubber Tired Loaders	165	0.465	8.0
1	Scrapers	313	0.660	8.0
1	Tractor/Loaders/Backhoes	79	0.465	8.0

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Feb '08
Phase 3 Duration: 10.7 months
Start Month/Year for SubPhase Building: Feb '08
SubPhase Building Duration: 10.7 months
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
2	Other Equipment	190	0.620	8.0

Start Month/Year for SubPhase Architectural Coatings: Nov '08
SubPhase Architectural Coatings Duration: 1.1 months
Start Month/Year for SubPhase Asphalt: Dec '08
SubPhase Asphalt Duration: 0.5 months
Acres to be Paved: 2.5
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
2	Pavers	132	0.590	8.0
2	Rollers	114	0.430	8.0

CONSTRUCTION EMISSION ESTIMATES MITIGATED (lbs/day)

Source	ROG	NOx	CO	SO2	PM10 TOTAL	PM10 EXHAUST	PM10 DUST
*** 2008***							
Phase 1 - Demolition Emissions							
Fugitive Dust	-	-	-	-	0.00	-	0.00
Off-Road Diesel	0.00	0.00	0.00	-	0.00	0.00	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum lbs/day	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phase 2 - Site Grading Emissions							
Fugitive Dust	-	-	-	-	6.21	-	6.21
Off-Road Diesel	8.03	39.79	67.35	-	0.36	0.36	0.00
On-Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Worker Trips	0.06	0.13	1.36	0.00	0.00	0.00	0.00
Maximum lbs/day	8.09	39.92	68.71	0.00	6.57	0.36	6.21
Phase 3 - Building Construction							
Bldg Const Off-Road Diesel	4.15	24.11	31.84	-	0.26	0.26	0.00
Bldg Const Worker Trips	0.20	0.12	2.62	0.00	0.04	0.00	0.04
Arch Coatings Off-Gas	60.45	-	-	-	-	-	-
Arch Coatings Worker Trips	0.20	0.12	2.62	0.00	0.04	0.00	0.04
Asphalt Off-Gas	0.60	-	-	-	-	-	-
Asphalt Off-Road Diesel	3.58	16.60	30.41	-	0.11	0.11	0.00
Asphalt On-Road Diesel	0.12	1.78	0.42	0.00	0.01	0.01	0.00
Asphalt Worker Trips	0.02	0.01	0.29	0.00	0.00	0.00	0.00
Maximum lbs/day	69.31	42.76	68.21	0.00	0.47	0.38	0.09
Max lbs/day all phases	69.31	42.76	68.71	0.00	6.59	0.38	6.21

Construction-Related Mitigation Measures

Phase 2: Soil Disturbance: Apply soil stabilizers to inactive areas
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 30.0%)
Phase 2: Soil Disturbance: Replace ground cover in disturbed areas quickly
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 15.0%)
Phase 2: Soil Disturbance: Water exposed surfaces - 2x daily
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 34.0%)
Phase 2: Off-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 2: Off-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 2: On-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 2: On-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 2: Stockpiles: Cover all stock piles with tarps
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 9.5%)

Phase 2: Unpaved Roads: Water all haul roads 2x daily
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 30.0%)
Phase 2: Unpaved Roads: Reduce speed on unpaved roads to < 15 mph
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 40.0%)
Phase 3: Off-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 3: Off-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 3: Off-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 3: Off-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 3: On-Road Diesel Exhaust: Use diesel particulate filter
Percent Reduction(ROG 0.0% NOx 0.0% CO 0.0% SO2 0.0% PM10 80.0%)
Phase 3: On-Road Diesel Exhaust: Use diesel oxidation catalyst
Percent Reduction(ROG 0.0% NOx 20.0% CO 0.0% SO2 0.0% PM10 0.0%)
Phase 1 - Demolition Assumptions: Phase Turned OFF

Phase 2 - Site Grading Assumptions
Start Month/Year for Phase 2: Jan '08
Phase 2 Duration: 1.3 months
On-Road Truck Travel (VMT): 0
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
1	Crawler Tractors	143	0.575	8.0
1	Graders	174	0.575	8.0
1	Off Highway Trucks	417	0.490	8.0
1	Rubber Tired Loaders	165	0.465	8.0
1	Scrapers	313	0.660	8.0
1	Tractor/Loaders/Backhoes	79	0.465	8.0

Phase 3 - Building Construction Assumptions
Start Month/Year for Phase 3: Feb '08
Phase 3 Duration: 10.7 months
Start Month/Year for SubPhase Building: Feb '08
SubPhase Building Duration: 10.7 months
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
2	Other Equipment	190	0.620	8.0

Start Month/Year for SubPhase Architectural Coatings: Nov '08
SubPhase Architectural Coatings Duration: 1.1 months
Start Month/Year for SubPhase Asphalt: Dec '08
SubPhase Asphalt Duration: 0.5 months
Acres to be Paved: 2.5
Off-Road Equipment

No.	Type	Horsepower	Load Factor	Hours/Day
2	Pavers	132	0.590	8.0
2	Rollers	114	0.430	8.0

AREA SOURCE EMISSION ESTIMATES (Summer Pounds per Day, Unmitigated)

Source	ROG	NOx	CO	SO2	PM10
Natural Gas	0.05	0.63	0.27	0	0.00
Hearth - No summer emissions					
Landscaping	0.25	0.01	1.74	0.02	0.01
Consumer Prdcts	2.45	-	-	-	-
Architectural Coatings	1.70	-	-	-	-
TOTALS(lbs/day,unmitigated)	4.45	0.63	2.01	0.02	0.01

UNMITIGATED OPERATIONAL EMISSIONS

	ROG	NOx	CO	SO2	PM10
Single family housing	3.48	6.06	43.49	0.03	4.86
TOTAL EMISSIONS (lbs/day)	3.48	6.06	43.49	0.03	4.86

Does not include correction for passby trips.
Does not include double counting adjustment for internal trips.

OPERATIONAL (Vehicle) EMISSION ESTIMATES

Analysis Year: 2008 Temperature (F): 60 Season: Summer

EMFAC Version: EMFAC2002 (9/2002)

Summary of Land Uses:

Unit Type	Acreage	Trip Rate	No. Units	Total Trips
Single family housing	62.43	9.57 trips/dwelling unit	50.00	478.50
		Sum of Total Trips		478.50
		Total Vehicle Miles Traveled		3,201.40

Vehicle Assumptions:

Fleet Mix:

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	55.00	1.60	98.00	0.40
Light Truck < 3,750 lbs	15.00	2.70	95.30	2.00
Light Truck 3,751- 5,750	16.20	1.20	97.50	1.30
Med Truck 5,751- 8,500	7.20	1.40	95.80	2.80
Lite-Heavy 8,501-10,000	1.10	0.00	81.80	18.20
Lite-Heavy 10,001-14,000	0.40	0.00	50.00	50.00
Med-Heavy 14,001-33,000	1.00	0.00	20.00	80.00
Heavy-Heavy 33,001-60,000	0.90	0.00	11.10	88.90
Line Haul > 60,000 lbs	0.00	0.00	0.00	100.00
Urban Bus	0.20	0.00	50.00	50.00
Motorcycle	1.70	76.50	23.50	0.00
School Bus	0.10	0.00	0.00	100.00
Motor Home	1.20	8.30	83.30	8.40

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Rural Trip Length (miles)	11.5	4.9	6.0	10.3	5.5	5.5
Trip Speeds (mph)	35.0	40.0	40.0	40.0	40.0	40.0
% of Trips - Residential	20.0	37.0	43.0			

Changes made to the default values for Land Use Trip Percentages

The Trip Rate and/or Acreage values for Single family housing
 have changed from the defaults 9.57/16.67 to 9.57/62.43

Changes made to the default values for Construction

Architectural Coatings: # ROG/ft2 (residential) changed from 0.0185 to 0.00602
Architectural Coatings: # ROG/ft2 (non-res) changed from 0.0185 to 0.0116
Phase 2 mitigation measure Soil Disturbance: Apply soil stabilizers to inactive areas
 has been changed from off to on.
Phase 2 mitigation measure Soil Disturbance: Replace ground cover in disturbed areas quickly
 has been changed from off to on.
Phase 2 mitigation measure Soil Disturbance: Water exposed surfaces - 2x daily
 has been changed from off to on.
Phase 2 mitigation measure Off-Road Diesel Exhaust: Use diesel particulate filter
 has been changed from off to on.
Phase 2 mitigation measure Off-Road Diesel Exhaust: Use diesel oxidation catalyst
 has been changed from off to on.
Phase 2 mitigation measure On-Road Diesel Exhaust: Use diesel particulate filter
 has been changed from off to on.
Phase 2 mitigation measure On-Road Diesel Exhaust: Use diesel oxidation catalyst
 has been changed from off to on.
Phase 2 mitigation measure Stockpiles: Cover all stock piles with tarps
 has been changed from off to on.
Phase 2 mitigation measure Unpaved Roads: Water all haul roads 2x daily

has been changed from off to on.
Phase 2 mitigation measure Unpaved Roads: Reduce speed on unpaved roads to < 15 mph
has been changed from off to on.
Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel particulate filter
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Phase 3 mitigation measure Off-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.
Phase 3 mitigation measure On-Road Diesel Exhaust: Use diesel particulate filter
has been changed from off to on.
Phase 3 mitigation measure On-Road Diesel Exhaust: Use diesel oxidation catalyst
has been changed from off to on.

Changes made to the default values for Area

The landscape year changed from 2005 to 2007.

Changes made to the default values for Operations

The operational emission year changed from 2005 to 2008.
The operational winter temperature changed from 50 to 40.
The operational winter selection item changed from 3 to 1.
The operational summer temperature changed from 90 to 60.
The operational summer selection item changed from 8 to 3.

Appendix B:
EMFAC Analysis of Technology Groups

2030 Summary

Veh Type	Veh Year	TGP (x1000)
	TOTAL LDA	***0.000***
	TOTAL LDT1	***0.000***
	TOTAL LDT2	***0.000***
	TOTAL MDV	***0.000***
	TOTAL VEHICLES	1,047,886.000
	TOTAL TG 1-7	0.000
	% OF TOTAL	**0.00%**

2007 Summary

Veh Type	Veh Year	TGP (x1000)	TotP (x1000)	% of TotP
LDA	1965	2,127.114	2,129.649	99.9%
LDA	1966	1,054.100	1,055.712	99.8%
LDA	1967	937.481	939.148	99.8%
LDA	1968	910.751	911.422	99.9%
LDA	1969	1,003.926	1,005.247	99.9%
LDA	1970	893.548	895.583	99.8%
LDA	1971	739.652	740.342	99.9%
LDA	1972	872.333	875.737	99.6%
LDA	1973	895.211	897.495	99.7%
LDA	1974	681.231	684.558	99.5%
LDA	1975	406.189	414.556	98.0%
LDA	1976	455.765	463.110	98.4%
LDA	1977	555.996	593.659	93.7%
LDA	1978	732.738	816.530	89.7%
LDA	1979	771.968	948.703	81.4%
LDA	1980	241.385	718.516	33.6%
LDA	1981	149.421	919.534	16.2%
LDA	1982	166.446	1,079.029	15.4%
LDA	1983	180.102	1,406.913	12.8%
LDA	1984	33.823	2,387.082	1.4%
	TOTAL LDA	***13,809.179***		
LDT1	1965	904.890	907.484	99.7%
LDT1	1966	222.413	223.192	99.7%
LDT1	1967	199.522	200.404	99.6%
LDT1	1968	273.651	275.200	99.4%
LDT1	1969	343.665	344.312	99.8%
LDT1	1970	364.708	365.372	99.8%
LDT1	1971	420.192	422.456	99.5%
LDT1	1972	604.163	604.164	100.0%
LDT1	1973	545.358	546.010	99.9%
LDT1	1974	166.056	168.243	98.7%
LDT1	1975	110.031	110.741	99.4%
LDT1	1976	115.987	116.717	99.4%
LDT1	1977	146.099	150.429	97.1%
LDT1	1978	180.474	189.669	95.2%
LDT1	1979	238.247	264.268	90.2%
LDT1	1980	147.882	179.066	82.6%
LDT1	1981	109.117	233.525	46.7%
LDT1	1982	71.595	248.413	28.8%
LDT1	1983	20.562	278.765	7.4%
LDT1	1984	60.277	523.409	11.5%
LDT1	1985	26.775	637.906	4.2%
LDT1	1986	25.913	877.323	3.0%
LDT1	1987	14.738	866.121	1.7%
	TOTAL LDT1	***5,312.315***		

2007 Summary

Veh Type	Veh Year	TGP (x1000)	TotP (x1000)	% of TotP
LDT2	1965	39.487	39.487	100.0%
LDT2	1966	133.292	134.152	99.4%
LDT2	1967	112.417	112.417	100.0%
LDT2	1968	146.344	146.344	100.0%
LDT2	1969	243.119	244.840	99.3%
LDT2	1970	257.403	259.123	99.3%
LDT2	1971	253.366	253.366	100.0%
LDT2	1972	345.455	345.454	100.0%
LDT2	1973	367.132	367.132	100.0%
LDT2	1974	272.309	274.006	99.4%
LDT2	1975	149.987	152.844	98.1%
LDT2	1976	175.004	176.031	99.4%
LDT2	1977	228.003	231.798	98.4%
LDT2	1978	279.084	283.345	98.5%
LDT2	1979	292.667	338.422	86.5%
LDT2	1980	253.411	283.680	89.3%
LDT2	1981	186.685	354.017	52.7%
LDT2	1982	137.460	429.802	32.0%
LDT2	1983	38.697	455.725	8.5%
LDT2	1984	133.001	1,005.232	13.2%
LDT2	1985	69.562	1,473.149	4.7%
LDT2	1986	79.022	2,414.753	3.3%
LDT2	1987	43.141	2,404.837	1.8%
	TOTAL LDT2	***4,236.047***		
MDV	1965	17.103	17.103	100.0%
MDV	1966	9.366	9.366	100.0%
MDV	1967	8.602	9.087	94.7%
MDV	1968	15.797	15.798	100.0%
MDV	1969	17.925	17.925	100.0%
MDV	1970	22.565	22.566	100.0%
MDV	1971	18.638	18.639	100.0%
MDV	1972	30.914	30.916	100.0%
MDV	1973	40.836	41.389	98.7%
MDV	1974	217.067	217.068	100.0%
MDV	1975	225.970	226.665	99.7%
MDV	1976	306.338	306.339	100.0%
MDV	1977	474.019	474.700	99.9%
MDV	1978	408.403	408.405	100.0%
MDV	1979	496.554	497.294	99.9%
MDV	1980	193.758	193.761	100.0%
MDV	1981	180.549	184.238	98.0%
MDV	1982	198.413	214.750	92.4%
MDV	1983	142.619	274.586	51.9%
MDV	1984	418.633	434.835	96.3%
	TOTAL MDV	***3,444.068***		
TOTAL VEHICLES		963,536.400		
	TOTAL TG 1-7	26,801.609		
	% OF TOTAL	**2.78%**		

2010 Summary

Veh Type	Veh Year	TGP (x1000)	TotP (x1000)	% of TotP
LDA	1966	728.149	729.124	99.9%
LDA	1967	666.324	667.453	99.8%
LDA	1968	646.154	646.503	99.9%
LDA	1969	696.347	696.998	99.9%
LDA	1970	605.605	606.681	99.8%
LDA	1971	496.416	496.834	99.9%
LDA	1972	593.822	596.017	99.6%
LDA	1973	613.049	614.466	99.8%
LDA	1974	471.000	472.843	99.6%
LDA	1975	284.473	288.840	98.5%
LDA	1976	347.733	351.672	98.9%
LDA	1977	459.493	485.760	94.6%
LDA	1978	647.690	710.131	91.2%
LDA	1979	678.873	818.051	83.0%
LDA	1980	209.749	605.396	34.6%
LDA	1981	127.998	769.213	16.6%
LDA	1982	140.614	880.851	16.0%
LDA	1983	149.781	1,144.968	13.1%
LDA	1984	26.331	1,843.312	1.4%
	TOTAL LDA	***8,589.600***		
LDT1	1966	150.962	151.483	99.7%
LDT1	1967	137.079	137.599	99.6%
LDT1	1968	190.132	191.305	99.4%
LDT1	1969	239.112	239.684	99.8%
LDT1	1970	252.259	252.842	99.8%
LDT1	1971	292.306	293.966	99.4%
LDT1	1972	424.511	424.511	100.0%
LDT1	1973	387.946	388.412	99.9%
LDT1	1974	119.660	121.186	98.7%
LDT1	1975	80.816	81.314	99.4%
LDT1	1976	91.065	91.557	99.5%
LDT1	1977	121.103	124.248	97.5%
LDT1	1978	158.142	165.084	95.8%
LDT1	1979	208.044	229.687	90.6%
LDT1	1980	129.042	155.191	83.2%
LDT1	1981	94.796	202.539	46.8%
LDT1	1982	61.873	213.832	28.9%
LDT1	1983	17.427	229.042	7.6%
LDT1	1984	48.350	398.396	12.1%
LDT1	1985	20.355	475.097	4.3%
LDT1	1986	19.188	646.869	3.0%
LDT1	1987	11.031	653.041	1.7%
	TOTAL LDT1	***3,255.199***		

2010 Summary

Veh Type	Veh Year	TGP (x1000)	TotP (x1000)	% of TotP
LDT2	1966	89.585	90.439	99.1%
LDT2	1967	76.740	76.740	100.0%
LDT2	1968	101.683	101.683	100.0%
LDT2	1969	168.791	170.499	99.0%
LDT2	1970	176.806	178.514	99.0%
LDT2	1971	173.313	173.314	100.0%
LDT2	1972	239.237	239.237	100.0%
LDT2	1973	258.503	258.503	100.0%
LDT2	1974	195.013	195.353	99.8%
LDT2	1975	109.197	109.768	99.5%
LDT2	1976	135.786	136.398	99.6%
LDT2	1977	186.101	188.594	98.7%
LDT2	1978	240.544	243.047	99.0%
LDT2	1979	251.307	284.530	88.3%
LDT2	1980	217.352	243.496	89.3%
LDT2	1981	159.004	302.536	52.6%
LDT2	1982	116.658	360.235	32.4%
LDT2	1983	32.264	376.760	8.6%
LDT2	1984	104.820	781.872	13.4%
LDT2	1985	51.974	1,098.812	4.7%
LDT2	1986	57.631	1,759.146	3.3%
LDT2	1987	31.994	1,784.045	1.8%
	TOTAL LDT2	***3,174.304***		
MDV	1966	6.304	6.304	100.0%
MDV	1967	5.823	6.009	96.9%
MDV	1968	10.770	10.770	100.0%
MDV	1969	12.265	12.266	100.0%
MDV	1970	15.412	15.413	100.0%
MDV	1971	12.661	12.662	100.0%
MDV	1972	21.198	21.199	100.0%
MDV	1973	27.996	28.392	98.6%
MDV	1974	150.621	150.622	100.0%
MDV	1975	158.748	159.151	99.7%
MDV	1976	227.250	227.251	100.0%
MDV	1977	367.807	368.280	99.9%
MDV	1978	332.531	332.533	100.0%
MDV	1979	406.800	407.318	99.9%
MDV	1980	159.296	159.299	100.0%
MDV	1981	148.195	151.223	98.0%
MDV	1982	162.622	175.821	92.5%
MDV	1983	117.035	224.813	52.1%
MDV	1984	332.762	344.083	96.7%
	TOTAL MDV	***2,676.098***		
TOTAL VEHICLES		1,047,886.000		
	TOTAL TG 1-7	17,695.202		
	% OF TOTAL	**1.69%**		

Appendix C:
Summary of Operational Greenhouse Gases

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Urbemis 2007 Version 9.2.4

Combined Annual Emissions Reports (Tons/Year)

File Name: C:\Documents and Settings\mba\Desktop\Moon Camp GHG.urb924

Project Name: Moon Camp 2008

Project Location: San Bernadino County

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

Summary Report:

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2009 TOTALS (tons/year unmitigated)	0.86	3.10	2.85	0.00	3.80	0.19	3.99	0.79	0.18	0.97	401.22

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.61	0.15	0.70	0.00	0.04	0.04	197.03

OPERATIONAL (VEHICLE) EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	1.28	2.18	14.94	0.01	2.33	0.47	1,378.00

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	1.89	2.33	15.64	0.01	2.37	0.51	1,575.03

Construction Unmitigated Detail Report:

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CONSTRUCTION EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2009	0.86	3.10	2.85	0.00	3.80	0.19	3.99	0.79	0.18	0.97	401.22
Mass Grading 01/01/2009-03/30/2009	0.10	0.84	0.46	0.00	2.63	0.04	2.67	0.55	0.04	0.59	76.15
Mass Grading Dust	0.00	0.00	0.00	0.00	2.63	0.00	2.63	0.55	0.00	0.55	0.00
Mass Grading Off Road Diesel	0.10	0.83	0.41	0.00	0.00	0.04	0.04	0.00	0.04	0.04	70.79
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mass Grading Worker Trips	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.36
Fine Grading 02/19/2009-03/30/2009	0.05	0.37	0.20	0.00	1.17	0.02	1.19	0.24	0.02	0.26	33.85
Fine Grading Dust	0.00	0.00	0.00	0.00	1.17	0.00	1.17	0.24	0.00	0.24	0.00
Fine Grading Off Road Diesel	0.04	0.37	0.18	0.00	0.00	0.02	0.02	0.00	0.02	0.02	31.46
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.38
Trenching 03/19/2009-03/30/2009	0.01	0.08	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.54
Trenching Off Road Diesel	0.01	0.08	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.86
Trenching Worker Trips	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68
Asphalt 03/31/2009-04/11/2009	0.02	0.12	0.08	0.00	0.00	0.01	0.01	0.00	0.01	0.01	12.60
Paving Off-Gas	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Paving Off Road Diesel	0.01	0.09	0.05	0.00	0.00	0.01	0.01	0.00	0.01	0.01	6.38
Paving On Road Diesel	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.49
Paving Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.72

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Building 03/31/2009-11/21/2009	0.37	1.69	2.05	0.00	0.01	0.12	0.12	0.00	0.11	0.11	268.64
Building Off Road Diesel	0.33	1.47	0.97	0.00	0.00	0.11	0.11	0.00	0.10	0.10	136.99
Building Vendor Trips	0.01	0.17	0.12	0.00	0.00	0.01	0.01	0.00	0.01	0.01	28.09
Building Worker Trips	0.03	0.06	0.96	0.00	0.00	0.00	0.01	0.00	0.00	0.00	103.56
Coating 11/21/2009-12/16/2009	0.31	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.45
Architectural Coating	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coating Worker Trips	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.45

Phase Assumptions

Phase: Fine Grading 2/19/2009 - 3/30/2009 - Default Fine Site Grading/Excavation Description

Total Acres Disturbed: 16.67

Maximum Daily Acreage Disturbed: 4.17

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Mass Grading 1/1/2009 - 3/30/2009 - Default Mass Site Grading/Excavation Description

Total Acres Disturbed: 16.67

Maximum Daily Acreage Disturbed: 4.17

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

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1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Trenching 3/19/2009 - 3/30/2009 - Default Trenching Description

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

1 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 0 hours per day

Phase: Paving 3/31/2009 - 4/11/2009 - Default Paving Description

Acres to be Paved: 4.17

Off-Road Equipment:

4 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 6 hours per day

1 Pavers (100 hp) operating at a 0.62 load factor for 7 hours per day

2 Paving Equipment (104 hp) operating at a 0.53 load factor for 6 hours per day

1 Rollers (95 hp) operating at a 0.56 load factor for 7 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

Phase: Building Construction 3/31/2009 - 11/21/2009 - Default Building Construction Description

Off-Road Equipment:

1 Cranes (399 hp) operating at a 0.43 load factor for 6 hours per day

2 Forklifts (145 hp) operating at a 0.3 load factor for 6 hours per day

1 Generator Sets (49 hp) operating at a 0.74 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 8 hours per day

3 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

Phase: Architectural Coating 11/21/2009 - 12/16/2009 - Default Architectural Coating Description

Rule: Residential Interior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 100

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Rule: Residential Interior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 50

Rule: Residential Exterior Coatings begins 1/1/2005 ends 6/30/2008 specifies a VOC of 250

Rule: Residential Exterior Coatings begins 7/1/2008 ends 12/31/2040 specifies a VOC of 100

Rule: Nonresidential Interior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Rule: Nonresidential Exterior Coatings begins 1/1/2005 ends 12/31/2040 specifies a VOC of 250

Area Source Unmitigated Detail Report:

AREA SOURCE EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
Natural Gas	0.01	0.15	0.06	0.00	0.00	0.00	189.75
Hearth	0.03	0.00	0.23	0.00	0.04	0.04	6.63
Landscape	0.07	0.00	0.41	0.00	0.00	0.00	0.65
Consumer Products	0.47						
Architectural Coatings	0.03						
TOTALS (tons/year, unmitigated)	0.61	0.15	0.70	0.00	0.04	0.04	197.03

Area Source Changes to Defaults

Percentage of residences with wood stoves changed from 10% to 12.5%

Percentage of residences with wood fireplaces changed from 5% to 0%

Percentage of residences with natural gas fireplaces changed from 85% to 87.5%

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Operational Unmitigated Detail Report:

OPERATIONAL EMISSION ESTIMATES Annual Tons Per Year, Unmitigated

Source	ROG	NOX	CO	SO2	PM10	PM25	CO2
Single family housing	1.28	2.18	14.94	0.01	2.33	0.47	1,378.00
TOTALS (tons/year, unmitigated)	1.28	2.18	14.94	0.01	2.33	0.47	1,378.00

Operational Settings:

Does not include correction for passby trips

Does not include double counting adjustment for internal trips

Analysis Year: 2010 Season: Annual

Emfac: Version : Emfac2007 V2.3 Nov 1 2006

Summary of Land Uses

Land Use Type	Acreage	Trip Rate	Unit Type	No. Units	Total Trips	Total VMT
Single family housing	16.67	9.57	dwelling units	50.00	478.50	7,313.54
					478.50	7,313.54

Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Light Auto	47.3	1.3	98.5	0.2
Light Truck < 3750 lbs	9.9	3.0	91.9	5.1
Light Truck 3751-5750 lbs	20.7	1.0	99.0	0.0
Med Truck 5751-8500 lbs	11.1	0.9	99.1	0.0
Lite-Heavy Truck 8501-10,000 lbs	2.0	0.0	80.0	20.0
Lite-Heavy Truck 10,001-14,000 lbs	0.7	0.0	42.9	57.1

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Vehicle Fleet Mix

Vehicle Type	Percent Type	Non-Catalyst	Catalyst	Diesel
Med-Heavy Truck 14,001-33,000 lbs	1.0	0.0	20.0	80.0
Heavy-Heavy Truck 33,001-60,000 lbs	1.7	0.0	0.0	100.0
Other Bus	0.1	0.0	0.0	100.0
Urban Bus	0.0	0.0	0.0	0.0
Motorcycle	4.1	68.3	31.7	0.0
School Bus	0.1	0.0	0.0	100.0
Motor Home	1.3	7.7	84.6	7.7

Travel Conditions

	Residential			Commercial		
	Home-Work	Home-Shop	Home-Other	Commute	Non-Work	Customer
Urban Trip Length (miles)	12.7	7.0	9.5	13.3	7.4	8.9
Rural Trip Length (miles)	17.6	12.1	14.9	15.4	9.6	12.6
Trip speeds (mph)	30.0	30.0	30.0	30.0	30.0	30.0
% of Trips - Residential	32.9	18.0	49.1			

% of Trips - Commercial (by land use)

Summary of Operational Greenhouse Gases
Unmitigated
Moon Camp
Prepared by Michael Brandman Associates
Buildout Year 2010

	Emissions (tons per year)				
Source	**Carbon Dioxide**	**Nitrous Oxide**	**Methane**	**Other**	**Metric Tons CO2e**
Motor vehicles	1,378.00	0.18	0.39		1309.49
Natural gas	189.75	0.00	0.02		172.67
Indirect electricity	113.17	0.00	0.00		102.83
Hearth	6.63				6.01
Water transport	0	0.00	0.00		0.00
Landscape	0.65				0.59
Aerosols				0.00	0.00
Refrigerants				0.00	0.00
Total	1,688.20	0.19	0.41	0.00	1591.60

Total	1,532	0.17	0.38	0.00	metric tons per year
GWP	1	310	21	varies	
Total	1,532	52	8	0	MTCO2E per year
Total	0.0015	0.0001	0.0000	0.0000	MMTCO2E per year

Total - all gases	1,592	MTCO2e per year
	0.0016	MMTCO2e per year
California emissions in 2004	500	MMTCO2e per year
Project percent of emissions	0.000318%	
U.S. emissions in 2005	7,260.4	
Project percent of emissions	0.000022%	
Global emissions in 2004	20135	
Project percent of emissions	0.000008%	

Emissions converted from tons per year to metric tons of carbon dioxide equivalents (MTCO2e) per year by using the formula: (tons of gas) x (global warming potential) x (0.9072 metric tons)

Emissions converted to million metric tons of carbon dioxide equivalents (MMTCO2E) using the formula: MMTCO2e = (metric tons of gas) / (1,000,000).

Electricity - Indirect Emissions

Project: Moon Camp
Prepared by: Michael Brandman Associates
Prepared on: 10/1/2008

Land Use	Units	Electricity Use (kWh/unit/year)*	Electricity Use (kWh/year)
Single Family Residential	50	5,626.50	281,325.00
Total			281,325.00
			281.33 MWh/year

Greenhouse Gas	Emission Factor (pounds per MWh/year)	Emissions (pounds/year)	Emissions (tons/year)
Carbon dioxide	804.54	226,337	113
Methane	0.0067	2	0.001
Nitrous oxide	0.0037	1	0.001

Emission factor source: California Climate Action Registry. General Reporting Protocol. Reporting Entity-Wide Greenhouse Gas Emissions. Version 2.2, March 2007. www.climateregistry.org

Residential electricity usage rate: 5626.50 kwh/unit/year, from South Coast Air Quality Management 1993 CEQA Handbook, Table 9-11-A

* Table E-1 from California Energy Commission. California Commercial End-Use Survey. Consultant Report. March 2006. CEC-400-2006-005

Table E-1: Overview of Energy Usage in the Statewide Service Area

Building Type	Floor Stock (kft^2)	Annual Energy Intensities			Total Annual Usage	
		Electricity (kWh/ft^2)	Natural Gas ($therms/ft^2$)	Natural Gas ($kBtu/ft^2$)	Electricity (GWh)	Natural Gas (Mtherms)
All Commercial	4,920,114	13.63	0.26	25.99	67077	1278.60
Small Office (<30k ft^2)	361,584	13.10	0.11	10.54	4738	38.10
Large Office (>=30k ft^2)	660,429	17.70	0.22	21.93	11691	144.80
Restaurant	148,892	40.20	2.10	209.98	5986	312.60
Retail	702,053	14.06	0.05	4.62	9871	32.50
Food Store	144,209	40.99	0.28	27.60	5911	39.80
Refrigerated Warehouse	95,540	20.02	0.06	5.60	1913	5.30
Unrefrigerated Warehouse	554,166	4.45	0.03	3.07	2467	17.00
School	445,106	7.46	0.16	15.97	3322	71.10
College	205,942	12.26	0.34	34.24	2524	70.50
Health	232,606	19.61	0.76	75.53	4561	175.70
Lodging	270,044	12.13	0.42	42.40	3275	114.50
Miscellaneous	1,099,544	9.84	0.23	23.34	10817	256.60
All Offices	1,022,012	16.08	0.18	17.90	16430	182.90
All Warehouses	649,706	6.74	0.03	3.44	4380	22.40

Appendix B:
Biological Resources Assessment

B.1 - Results of Bald Eagle Survey on Tentative Tract 16136 (Bontera Consulting, 2002)

Bonterra
CONSULTING
An Environmental Planning/Resource Management Corporation

April 16, 2002

Mr. Glenn Lajoie
RBF Consulting
14725 Alton Parkway
Irvine, CA 92618-2027

VIA FACSIMILE AND MAIL
(949) 472-8373

Subject: Results of Bald Eagle surveys on Tentative Tract 16136, Moon Camp, Fawnskin, San Bernardino County, California

Dear Mr. Lajoie:

This letter report presents the results of bald eagle (*Haliaeetus leucocephalus*) surveys performed in February 2002 by William S. La Haye and Brian Kertson on Tentative Tract 16136 in unincorporated San Bernardino County, California (hereafter referred to as the project site). In addition, a summary of a records search of historic sightings of this species on and in the vicinity of the project site is also presented.

Project Location and Description

The project site consists of an approximately 62.5-acre parcel on the north shoreline of Big Bear Lake, San Bernardino County, California. The project site is covered by U.S. Geological Survey's Fawnskin, California Quadrangle at Township 2N, Range 1E and includes portions of Sections 7 and 12. Project regional location and vicinity maps are presented in Exhibits 1 and 2, respectively.

The southwestern portion of the project site includes shoreline of Big Bear Lake and Highway 38 parallels the lakeshore on the property for approximately 1/4 mile. Historically, the project site consisted of Moon Camp, a small cabin resort which existed from the early 1920s through 1951 when a forest fire destroyed most of the buildings. At some later date, most of the remnants of the cabins and foundations were removed from the site.

The project site includes a series of low, rolling hills between approximately 6,940 feet above mean sea level (msl) and 6,740 feet above msl. The vegetation on the site is primarily open Jeffrey pine (*Pinus jeffreyi*) forest near the lake and highway and gradually transitions into mixed-conifer forest towards the northeast portion of the property. Other common trees encountered on the site consist of white fir (*Abies concolor*) and black oak (*Quercus kelloggii*).

Background

The bald eagle is a large raptor which ranges from Alaska to northern Mexico. It typically nests in large trees near lakes and rivers where its prey is plentiful. This species feeds primarily on fish and waterfowl; however, it is also known to

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scavenge large mammal carcasses. The bald eagle population declined dramatically in the 1960s due to the effects of pesticides causing egg shell thinning and reproductive failure. This species is federally-listed as Threatened and state-listed as Endangered.

The bald eagle rarely nests in southern California. However, small wintering populations are found scattered throughout the region. Big Bear Lake supports the largest of these wintering populations and may include as many as 30 individuals in peak years. This species is typically observed at Big Bear Lake between November and March.

Survey Methodology

The project site and the surrounding area was observed on four separate occasions in February 2002 for approximately four hours on each occasion. Trees on the property were visually scanned using binoculars and a spotting scope. Observations were conducted from various vantage points on the property, as well as from Windy Point, approximately 1/2 mile west of the property across Grout Bay. All trees utilized by eagles for perching and/or roosting during these surveys were marked with numbered, circular tree tags. Additionally, the San Bernardino National Forest Service was contacted and a review of their historic records of bald eagle use on the north shore of Big Bear Lake was completed.

Survey Results

Bald eagle observations were performed on February 7, 12, 14, and 21, 2002. Bald eagles were observed on the project site on all four occasions. A minimum of nine, seven, three, and four individual bald eagles were seen on the four observation dates, respectively. Bald eagles were observed perching in three, eight, two, and two separate trees on the project site on the respective observation dates. Nine individual trees were used on the project site by bald eagles during surveys. The sizes and descriptions of the trees used for perching are provided in Table 1. Tree locations on the project site are presented in Exhibit 3.

The best and most reliable data for reviewing historical use of the project site by bald eagles was an unpublished report by Devaud and Devaud in 1990 which presented the findings of surveys conducted during the winter of 1989-1990. The Devauds observed, mapped, and photographed bald eagle perch trees along the north shoreline of Big Bear Lake between December 10 and April 6 of that winter. Eighty of the 176 mapped eagle sightings (45 percent) were located on the project site. The most commonly recorded use of a single perch tree was also on the project site with 51 sightings (i.e., tree number 886). This is clearly the most important eagle perch tree on the project site and potentially the most important on the north shore of Big Bear Lake. The next most commonly recorded use of a single perch tree was off the project site near the east end of the lake with 32 sightings.

Recommendations

The project site contains several trees used extensively by this wintering population of bald eagles. Removal of these trees could restrict access to and/or affect the ability of individual eagles to forage in the vicinity of Big Bear Lake. Removal of important perch trees could be considered a significant impact under the federal and state Endangered Species Acts (ESA). It is recommended that the numbered trees presented in Table 1 are avoided during project construction and preserved in place upon project completion. Additionally, all large trees (i.e., greater than 20-inches diameter at four feet from ground) within approximately 200 yards of the

high water line should be considered potential perch trees, avoided during construction, and preserved in place upon project completion, if possible.

Sincerely,

BONTERRA CONSULTING

Ann M. Johnston
Principal, Biological Services

Samuel C. Stewart IV
Assistant Project Manager

R:\Projects\RBF\J008 Eagle Survey-041602.wpd

Enclosures: Table 1 and Exhibits 1-3

References

Devaud J. & Devaud S. 1990. *Bald Eagle Habitat Use of the North Shore of Big Bear Lake, San Bernardino County, California.* Unpublished Document in San Bernardino National Forest Service Files.

Environmental Planning Consultants. 1988. *Big Bear Lake Bald Eagle Cumulative Impact Study.* Unpublished Document in San Bernardino National Forest Service Files.

B.2 - Bald Eagle Count in Area (U.S. Fish and Wildlife Service, 2009)

US Forest Service
San Bernardino National Forest

602 S. Tippecanoe Ave San Bernardino, CA 92408

FOR IMMEDIATE RELEASE
Big Bear Lake and Lake Arrowhead Contact: Robin Eliason – reliason@fs.fed.us; 909-382-2832(o) or 909-844-4131(c)
Lake Hemet Contact: Heidi Hoggan hhoggan@fs.fed.us; 909-382-2945
Silverwood Lake State Recreation Area Contact: Kathy Williams - khwilliams@parks.ca.gov; 760-389-2303(o); 760-963-7911(c); or Kevin Forester - kforrester@parks.ca.gov

BALD EAGLES SEEN IN LOCAL MOUNTAINS

SAN BERNARINO, Calif. January 10, 2009 - On Saturday January 10th, the first bald eagle count of the winter was conducted by local Federal and State biologists and volunteers around lakes in the San Bernardino and San Jacinto Mountains. Despite extremely windy conditions, large numbers of volunteers turned out for a chance to see one of our magnificent national birds. High wind gusts made standing challenging and kept knocking over some of the spotting scopes. Nonetheless, the effort was successful in tallying the bald eagles spending their winter vacations at local mountain lakes.

A grand total of twelve eagles (8 adults, 4 juveniles) were observed in the four lake areas during the 1- hour count. Six eagles (4 adults, 2 juveniles) were observed in the Big Bear/Baldwin Lake area; 2 eagles (1 adult, 1 juvenile) at Lake Arrowhead; 3 eagles (2 adults, 1 juvenile) at Silverwood Lake; and, 1 adult eagle at Lake Hemet. Juvenile eagles are distinguished by a brown head and tail; adults are recognized by the famous white head and tail - it takes 4-5 years to acquire full adult coloration. Juvenile eagles are the same size as the adults.

The count for Big Bear was a little lower than average; probably due in part to the fact that a large portion of the lake has been frozen over for several weeks. When the lake is frozen, ducks do not stay in the area. Ducks are the main prey for bald eagles; so when there are low numbers of ducks, there are low numbers of bald eagles.

Approximately 140 volunteers participated in the 1-hour eagle census at four lakes (50 at Big Bear area; 15 at Lake Arrowhead; a record 50 at Lake Hemet; and, 25 at Silverwood Lake). The Forest Service and State Recreation Area biologists would like to thank those volunteers!

The U.S. Forest Service and State Recreation Area biologists have coordinated counts of this federally-protected species since 1978. Data from our local count will be added to the nation-wide Mid-Winter Bald Eagle census to assess recovery status of the species. We rely on volunteers to gather information during the monthly winter eagle counts. Counts are conducted

for a 1-hour period from 9-10 a.m. Forest Service volunteers stationed around lakes in Big Bear, Arrowhead, and Idyllwild record all observations of bald eagles. Volunteers at Silverwood Lake State Recreation Area conduct simultaneous counts.

Bald eagles are similar to many southern Californians in that they visit the lakes of our San Bernardino and San Jacinto Mountains for their winter vacations between November and April. Instead of vacationing here for dynamite skiing, eagles come for the plentiful food supplies. As lakes and rivers up north freeze each winter, fish become unavailable under a thick layer of ice and ducks leave the frozen waters. The eagles' "grocery stores" have essentially closed for the winter. So eagles fly south looking for open water stocked with food. The lakes of the San Bernardino and San Jacinto Mountains fit the bill perfectly--they are part of the Pacific Migratory Flyway, a migration freeway for millions of ducks. Eagles like to spend their winters here because of the abundant and tasty ducks and fish.

Our bald eagles normally migrate out of the San Bernardino and San Jacinto Mountains in late March, heading back to summer homes in Montana, Wyoming, Idaho, and Alberta, Canada. In recent years, a pair of bald eagles has remained at Lake Hemet and successfully produced several eaglets.

Catching a glimpse of our breath-taking national bird is relatively easy during the winter months. There are also some fantastic opportunities for excellent close-up photography. Just look in the tallest trees around the lakeshore. Or, if the lake is partially frozen, look for eagles perched on the ice near small groups of ducks using open water pockets.

Remember that human presence may distract or disturb the eagles--so, try to limit your movements and don't make loud noises when nearby. If possible, remain in your car while observing eagles--the car acts as a blind.

Don't forget to mark your calendars now for the remaining Eagle Counts: February 14, and March 14. Volunteers need not have experience--just bring binoculars and a watch (and dress warmly!).

For More Information about Bald Eagle Counts
Big Bear Lake and Lake Arrowhead Contact:
Robin Eliason – reliason@fs.fed.us; 909-382-2832
Lake Hemet Contact: Heidi Hoggan
hhoggan@fs.fed.us; 909-382-2945
Silverwood Lake State Recreation Area Contact:
Kathy Williams - khwilliams@parks.ca.gov; 760-389-2303

For More Information about Discovery Center Eagle Events
Call 909-382-2790 or stop by the Forest Service's Big Bear Discovery Center on the north side of Big Bear Lake
http://www.bigbeardiscoverycenter.com

For information about the San Bernardino National Forest, please visit: http://www.fs.fed.us/r5/sanbernardino

For information about Silverwood State Recreation Area, please visit:

http://www.parks.ca.gov/?page_id=650

BIG BEAR LAKE EAGLE COUNT SUMMARY

(Includes Big Bear and Baldwin Lakes)

1979 - 80	20	22	13	11	3	14	22
1980 - 81	11	19	25			18	25
1981 - 82	15	27	22	6	3	15	27
1982 - 83	7	27	18	11		16	27
1983 - 84	14	28	18	10		18	28
1984 - 85	27	8	3	3		10	27
1985 - 86	20	24		9		18	24
1986 - 87	20	24		9		18	24
1987 - 88	9	17	21	16		16	21
1988 - 89	12	6	4	12		9	12
1989 - 90	15	11	19	17		16	19
1990 - 91	6	16	22	17		15	22
1991 - 92	19	19	13	9		15	19
1992 - 93	6	15	3	3		7	15
1993 - 94	9	17	15	8		12	17
1994 - 95	10	10	20	**No Count**		13	20
1995 - 96	6	14	15	10		11	15
1996 - 97	10	15	5	9		10	15
1997 - 98	8	14 - 15	15	12		12	15
1998 - 99	8	17	15 - 17	9		11	17
1999 - 00	8	13	3	13		9	13
2000 - 01	13	13	14	12		13	14
2001 - 02	7	9	11	9		9	11
2002-03	6	13	15	9		11	15
2003-04	4	14	11	7		9	14
2004-05	6	1	4	5		4	6
2005-2006	7	4	6	No Count		6	7
2006-2007	4	8	5	5		6	8
2007-2008	4	3	6	3		4	6
2008-2009	**No Count**	6					
Average	11	15	13	10	5	12.26	18.14
					Maximum	18	28
					Minimum	4	6
					Median	12	17

B.3 - Focused Flying Squirrel Trapping Report (Michael Brandman Associates, 2007)

FOCUSED FLYING SQUIRREL TRAPPING REPORT MOONCAMP PROJECT, FAWNSKIN, SAN BERNARDINO COUNTY, CALIFORNIA

Prepared for:

County of San Bernardino
Department of Land Use Services
385 N. Arrowhead Avenue, First Floor
San Bernardino, California 92415-0182

Contact: Matthew W. Slowick, Senior Planner

Prepared by:

Michael Brandman Associates
621 E. Carnegie Drive, Suite 100
San Bernardino, California 92408
909.884.2255

Contact: Mikael Romich, Project Biologist

MICHAEL BRANDMAN ASSOCIATES

September 18, 2007

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SECTION 1: SUMMARY

This report contains the findings of Michael Brandman Associates (MBA) focused trapping survey for the San Bernardino flying squirrel (*Glaucomys sabrinus californicus*) (SBFS) on an approximately 62.5-acre property known as Tentative Tract 16136 (Moon Camp) located in the Community of Fawnskin, San Bernardino County, California. During the trapping period, no SBFS were caught on the project site. This effort provides reasonable evidence (defined by the USFWS (1990) as one week of trapping) that SBFS were absent from the project site during the period trapped. A number of mitigation measures are provided to minimize the potential for indirect and direct impacts, as well as enhancement of adjacent areas to compensate for the removal of suitable habitat.

SECTION 2: INTRODUCTION

At the request of San Bernardino County, MBA conducted a focused SBFS trapping survey with methods modified from survey protocols issued by the US Fish and Wildlife Service (USFWS 1990) and United States Department of Agriculture (USDA 1991) for a 62.5-acre property located in the Community of Fawnskin, San Bernardino County, California. This property is hereinafter referred to as project site or site.

2.1 - Project Location

The site is located in the San Bernardino National Forest, north of Big Bear Lake. State Highway 38 intersects the Site on the southern portion. The site is located south of Flicker Road, east of Oriole lane, and west of Polique Canyon Road, in the unincorporated community of Fawnskin, San Bernardino County, California (Exhibits 1 and 2). The Site consists of Assessor's Parcel Numbers 0304-082-04, 0304-091-12, -13, and -21. It is within sections 7 and 12, Township 2 North and Range 1 East of the Fawnskin U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Exhibit 3).

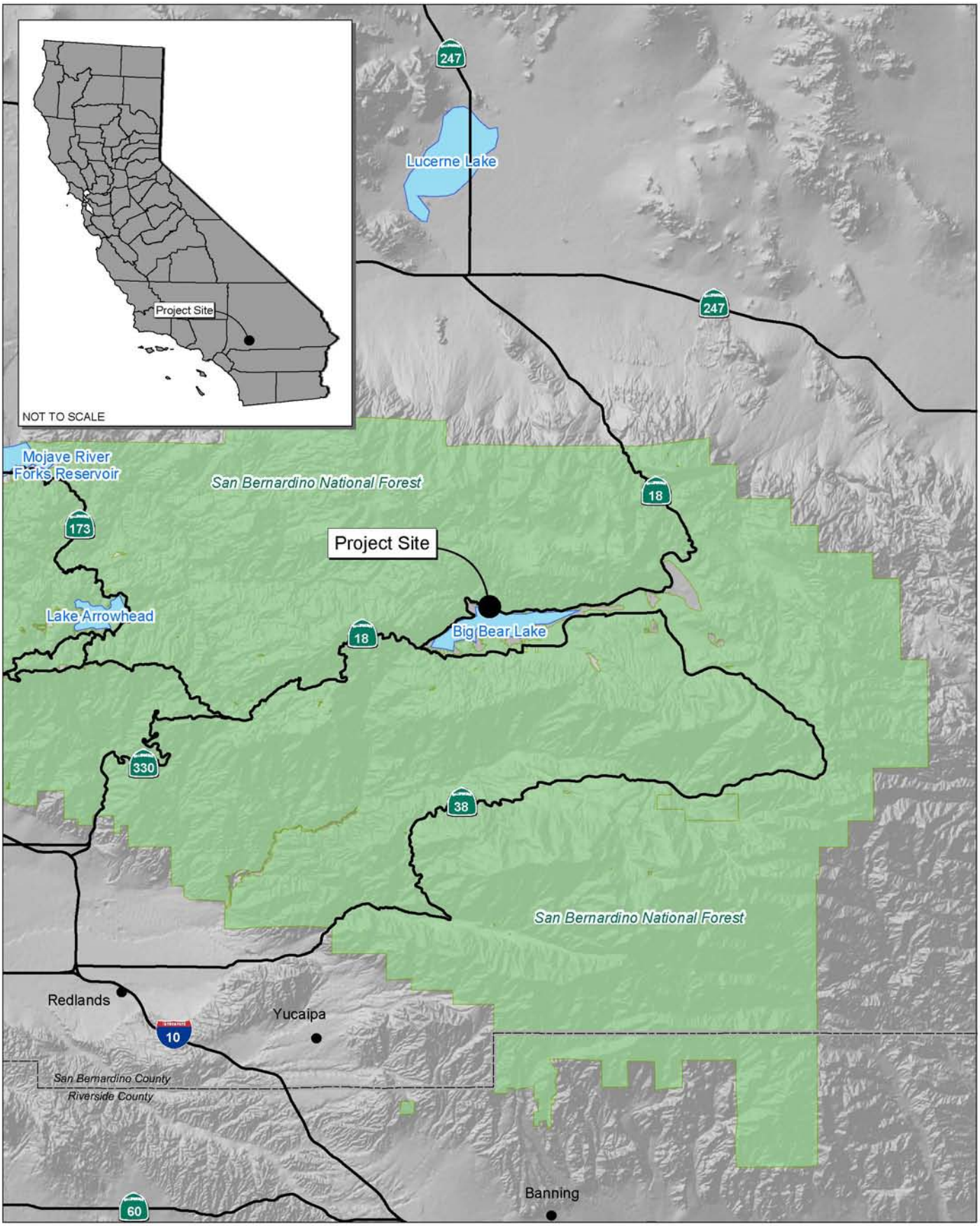
2.2 - Project Description

The proposed project is to subdivide the Site into 53 lots: fifty residential lots to be sold individually and developed into custom homes and 3 lettered lots, two of which would be designated as Open Space/Conservation easements.

2.3 - Environmental setting

Site elevations range from approximately 6,747 feet above mean sea level (msl) at the lakeshore to 6,960 feet above msl at the northeast corner of the Site. Individual slopes onsite range from five percent to forty percent. Slope orientation is generally from north to south toward the lake, except for three natural ravines on the project site that contain eastern and western slopes.

The dominant plant community observed on the site is Jeffrey pine forest (54.91 acres), which includes Jeffrey pine (*Pinus jeffreyi*), white fir (*Abies concolor*), incense cedar (*Calocedrus decurrens*), western juniper (*Juniperus occidentalis*), singleleaf pinyon pine (*Pinus monophylla*), and black oak occurring at lower densities. The Jeffrey pine forest onsite is unevenly aged composed of approximately 85 percent Jeffrey pine, eight percent western juniper, six percent singleleaf pinyon pine, and less than 1 percent of scattered white fir and black oak. The understory is sparse, consisting of scattered chaparral shrubs including greenleaf manzanita (*Arctostaphylos patula*), mountain whitethorn (*Ceanothus cordulatus*), Greg's ceanothus (*Ceanothus greggii*), deer brush (*Ceanothus integerrimus*), California mountain mahogany (*Cercocarpus betuloides*), and curl leaf mountain mahogany (*Cercocarpus ledifolius*).



Source: Census 2000 Data, The CaSIL, MBA GIS 2007.

Michael Brandman Associates

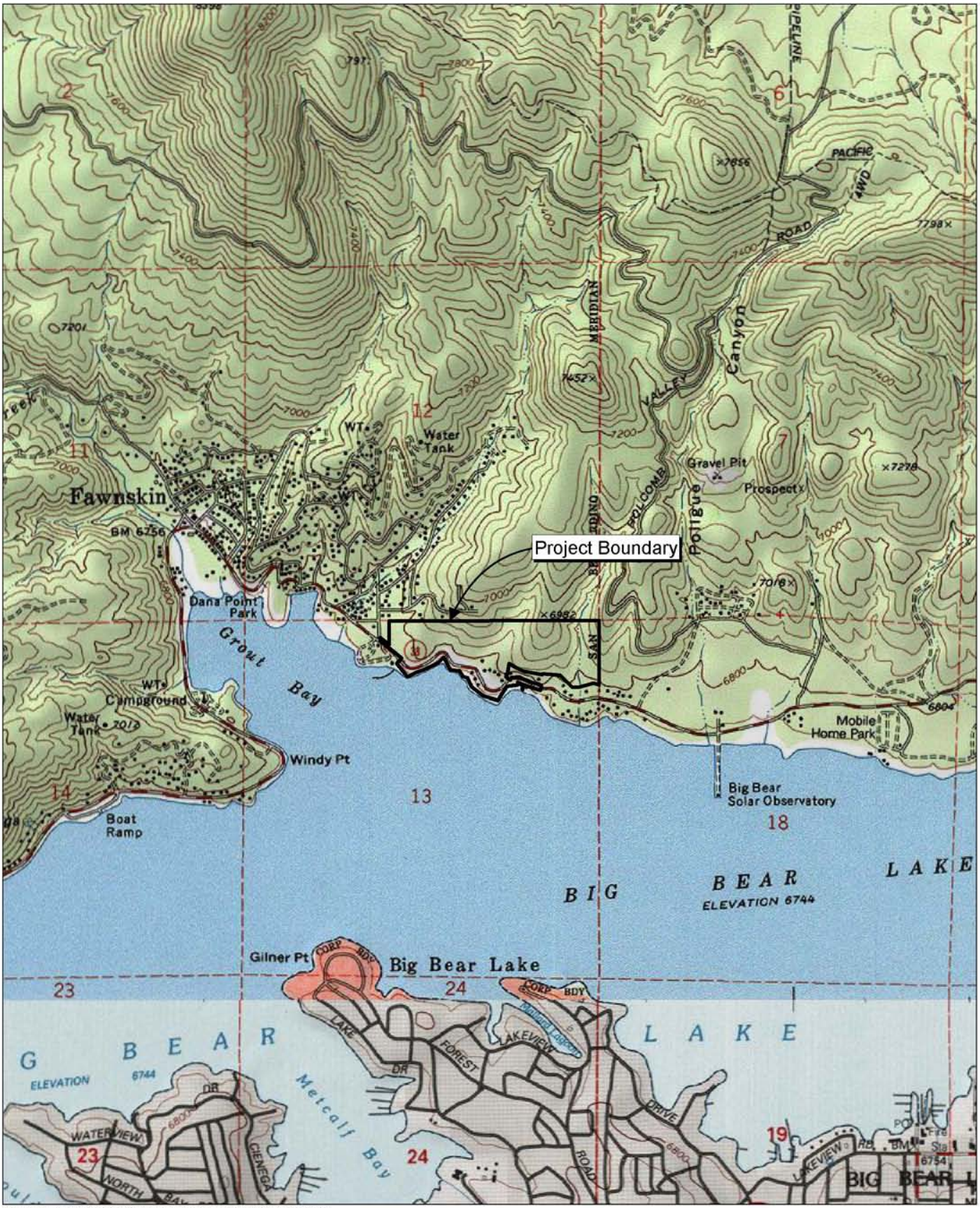
NORTH

5 2.5 0 5 Miles

Exhibit 1
Regional Location Map

00520089 • 08/2007 | 1_regional.mxd

TT 16136 • FAWSKIN, SAN BERNARDINO COUNTY, CA
FLYING SQUIRREL SURVEY REPORT



Source: TOPO! USGS Fawnskin (1996) 7.5' DRG.

NORTH

2,000 1,000 0 2,000 Feet

Michael Brandman Associates

Exhibit 2
Local Vicinity Topographic Base

00520089 • 08/2007 | 2_local_topo.mxd

TT 16136 • FAWSKIN, SAN BERNARDINO COUNTY, CA
FLYING SQUIRREL SURVEY REPORT

Source: National Agriculutre Imagery Program, San Bernardino County (2005).

Michael Brandman Associates

NORTH

2,000 1,000 0 2,000 Feet

Exhibit 3
Local Vicinity Aerial Base

00520089 • 08/2007 | 3_aerial_aerial.mxd

TT 16136 • FAWSKIN, SAN BERNARDINO COUNTY, CA
FLYING SQUIRREL SURVEY REPORT

Herbaceous cover is generally low, consisting of grasses and forbs in scattered patches. Approximately 17.38 acres of the Jeffrey pine forest on the site contain few trees and fairly open canopy. The open Jeffrey pine forest and where Wright's matting buckwheat (*Eriogonum wrightii* ssp. *subscaposum*) occur is suitable habitat for a number of sensitive plant species.

The pebble plain plant community occurs on 0.69 acre of the site north of State Route 38. It appears as a distinct open patch within open Jeffrey pine forest in the western portion of the site. The substrate in this area consists of clay soil mixed with quartzite pebbles and gravel that are continually pushed to the surface through frost action. This substrate supports a high floristic diversity consisting of small cushion-forming plants, tiny annuals, grasses, and succulents that are well spaced, low growing, and sun tolerant. Several sensitive plant species are associated with pebble plain habitat.

Approximately 4.14 acres of the southern boundary of the site is formed by the shore of Big Bear Lake. Plant species along the shore itself consisted primarily of herbaceous native and non-native species of periodically saturated soils, including willowherb (*Epilobium* sp.), wire-grass (*Juncus mexicanus*), cursed buttercup (*Ranunculus sceleratus*), and several cinquefoil species (*Potentilla* spp.). Vegetation is patchy above the high-water level where small areas of Jeffrey pine forest are interspersed among open meadows and grasslands and scattered patches of arroyo willow (*Salix lasiolepis*) and red willow (*Salix laviegata*).

2.4 - Disturbances

Recent activity on the project site includes the removal of trees, which appeared to be either taken offsite or chipped onsite. The greatest disturbance from the tree removal activity would be to cavity-dwelling birds and mammals, and sensitive plant species that have been located on the project site, including the Federally-listed Threatened and California Native Plant Society (CNPS) List 1B species, ash-gray Indian paintbrush (*Castilleja cinerea*); and three CNPS List 1B species, Parish's rock cress (*Arabis parishii*), Big Bear Valley woollypod (*Astragalus leucolobus*), and silver-haired ivesia (*Ivesia argyrocoma*). It is not known if precautions prior to tree removal were made to avoid the known locations of these plants. In addition, the ingress and egress of vehicles involved in the tree removal and the potential dragging of trees offsite has caused the understory vegetation and ground to be heavily disturbed. Finally, there appeared to be direct mechanical removal of some understory shrubs. A number of wildlife trees (or snags) were marked with "WL" and were not removed. Some thinning of trees, including black oak (*Quercus kellogii*), was evident, particularly at the lower portions of the tree trunk.

2.5 - San Bernardino Flying Squirrel

2.5.1 - Status

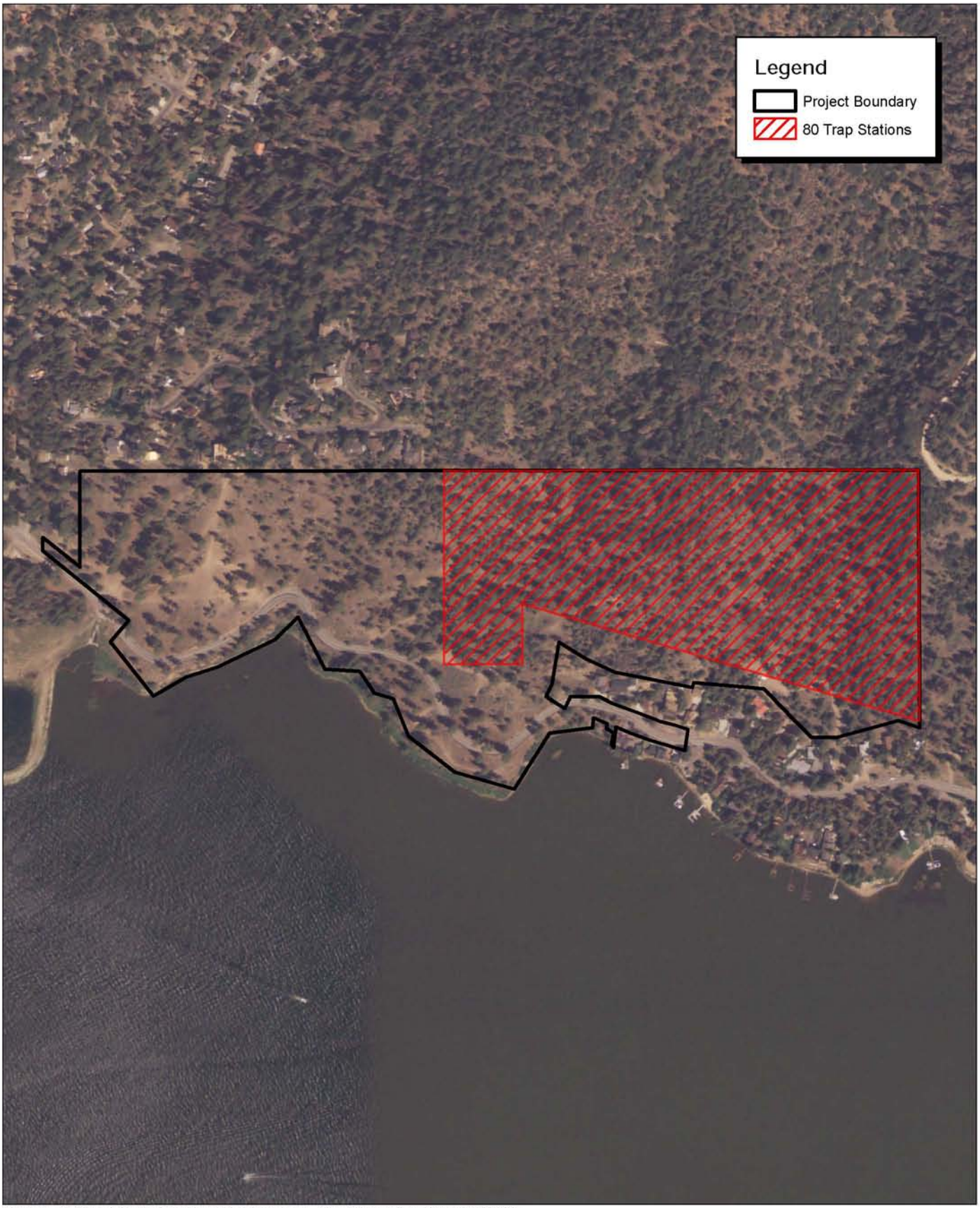
The SBFS is considered a California special concern (CSC) species by the California Department of Fish and Game (CDFG) and is on the Forest Service's sensitive wildlife species list. SBFS is a

sensitive species because of declining population levels, limited ranges, and continuing threats have made them vulnerable to extinction. The goal of designating sensitive species is to halt or reverse their decline by calling attention to their plight and addressing the issues of concern early enough to secure their long term viability.

2.5.2 - Biology

The SBFS is a subspecies of the northern flying squirrel (*Glaucomys sabrinus*), a small arboreal sciurid found in forested regions over most of North America. They are found typically in habitats dominated by conifers or with a mixed coniferous-deciduous overstory. Stomach and fecal analyses indicate that flying squirrels consume primarily hypogeous fungi (*mycophagists*) during snow-free periods and lichens during winter. A fecal analysis was conducted on SBFS in the San Bernardino Mountains (Butler et al. 1991) showing spores from three genera of hypogeous fungi (*Melanogaster*, *Hymenogastor*, and *Gymnomyces*). Other food items found in descending order of abundance included Jeffrey pine pollen, dicot and monocot plant material, and spores from epigeous fungi (associated with decomposing wood and litter) (Butler et al. 1991). SBFS do not appear to be territorial, and individuals are often seen feeding and denning together. They inhabit two types of nests, those inside tree cavities and those constructed in the canopy of conifers, especially those infected with broom rust (*Chrysomyxa*).

SBFS can occur in Jeffrey pine/white fir mixed conifer forests with some oak components. From the study efforts in the San Bernardino Mountains (Butler et al. 1991; Driessen et al. 1998), habitat at successful trapping sites can be characterized as mature to over-mature mixed conifer forest with relatively high numbers of snags and downed logs. The habitat is relatively open and lacks a dense undergrowth component. The canopy is relatively closed. The dominant species on site were Jeffrey pine and white fir. All sites also had a black oak component in the vegetation mix. The successful trapping sites can also be characterized as having a heavier duff level than surrounding areas. All of the sites also have either ephemeral streams/springs or intermittent streams with some riparian vegetation in close proximity.



Source: National Agriculutre Imagery Program, San Bernardino County (2005).

Michael Brandman Associates

NORTH

500 250 0 500 Feet

Exhibit 4
Flying Squirrel Trapping Grid

00520089 • 08/2007 | 4_flying_squirrel_trapping.mxd

TT 16136 • FAWSKIN, SAN BERNARDINO COUNTY, CA
FLYING SQUIRREL SURVEY REPORT

SECTION 3: METHODOLOGY

MBA biologists Mikael Romich and James Hickman conducted a focused SBFS trapping survey with methods modified from survey protocols issued by the USFWS (1990) and USDA (1991). To evaluate the presence of a SBFS population on the project site, traps were placed within suitable Jeffrey pine forest habitat.

The project site had a live trapping grid consisting of 80 stations located at 40-meter intervals (Exhibit 4). One Tomahawk livetrap (Model 201, Tomahawk Live Trap Company, Tomahawk, Wisconsin) equipped with shelter (plastic container) and batting (polyster fiberfill) was mounted 1.5 meters aboveground on a tree trunk at each trap station. Each trap station was selectively chosen based on the proximity of a suitable tree. The order of preference for trap locations was based on the diameter at breast height (DBH) and the height of the tree: tall dead snag (dead and dying tree) with large DBH, tall alive tree with large DBH, short dead snag with large DBH, and short alive tree with small DBH. Traps were located at each of these categories. Traps were covered with debris, such as pine needles and bark, to break the outline and provide shelter.

Squirrels were live trapped for five nights, from the evening of June 24 when traps were first set to the morning June 29, 2007 when traps were checked and picked up. Traps were set before dark each day and checked the next morning. Traps remained closed during the day. Traps were baited with a mixture of peanut butter, molasses, and whole oats. Prior to the trapping effort, traps were pre-baited with sunflower seeds that were placed on top of the closed trap for a period of three nights (June 21 to June 24, 2007). Pre-baiting allows animals to acclimate to the trap and increases capture success (USFWS 1990). These methods are summarized in Table 1.

Table 1: Summary of 2007 SBFS Trapping Survey at the Moon Camp Project Site

2007 Date	Activity
June 21	Traps placed on site and pre-baited with sunflower seeds in a locked closed position.
June 24	Traps baited with peanut butter mixture and triggered
June 25-June 28	Traps checked in morning and locked shut
June 25-28	Traps opened and triggered each evening
June 29	Traps checked in morning and collected

The timing of this trapping session occurred when SBFS were previously trapped in close proximity to the Site (approximately 0.5 mile north of the northern boundary of the project site); the 1998 survey occurred from June 25 through July 7, 1998 and a total of 6 SBFS were caught, all in Tomahawk traps that were placed on tree trunks (Driessen et al. 1998). Although Carey et al. (1991) recommends a trap placed on the ground, this was not necessary because SBFS were shown to be trappable on tree trunks.

SECTION 4: RESULTS AND DISCUSSION

SBFS was not captured on the project site. Non-target species that were caught included Merriam's chipmunk (*Tamias merriami*) (minimum known to be alive was 10 individuals), two dusky-footed woodrat (*Neotoma fuscipes*), and one Steller's jay (*Cyanocitta stelleri*).

With the presence of a Jeffrey pine/white fir mixed conifer forest, dead and downed woody debris, and snags, the conditions of the site appeared suitable to SBFS. However, the project site had been subject to a disturbance regime (tree and shrub removal activity) that may have affected its suitability for SBFS. Potential impacts of this disturbance regime include: (1) removal of trees with cavities or stick nests needed by SBFS; (2) disturbance of the substrate could reduce the quantity and quality of hypogeous (underground) fungi (truffles), which compose northern flying squirrel diets at this time of the year (Ransome and Sullivan 2004; Butler et al. 1998)). It should be noted that this trapping session occurred during a drought year, which would reduce fungal production (Villa et al. 1999) and result in a lower abundance of SBFS as they are known to be primarily limited by the availability of food resources (Ransome and Sullivan, 1997, 2004). Due to these confounding factors, mitigation measures are proposed in Section 5 that would reduce potential impacts if the survey area becomes occupied by SBFS in the future.

SECTION 5: CONCLUSION

No SBFS were trapped during this focused survey effort, which provides reasonable evidence that SBFS were absent from the project site during the period trapped. Although the USFWS (1990) recommends that an area be trapped during more than one season, it is not mandatory. However, due to the suitability of the habitat and proximity of trapping records approximately 0.5 mile to the north (Driessen et al. 1998), the Site may receive seasonal use by SBFS that would not be detectable with this survey. The following mitigation measures are recommended to minimize potential impacts to SBFS that could be seasonally using the site:

1. Minimizing the number of trees, snags, and downed wood removed for project implementation;

2. Having a biologist qualified with SBFS as a monitor during tree removal;

3. Compensating the removal of snags containing cavities; this would be achieved by constructing and erecting two nest boxes and one aggregate box per snag removed. Appendix B provides the specifications of the nest and aggregate boxes (Flying Squirrels 2007). These boxes should be located on the adjacent USFS land (with their permission) and the locations marked with a global positioning system. This locations of the boxes shall be provided to the USFS so that their biologists could monitor the boxes for occupation by SBFS.

4. Adjacent night lighting shall be reduced to the greatest extent practicable and lights shall be designed with hoods or shields that reduce the amount of light spilling into the adjacent habitat, particularly on the northern edge; and

5. Provide new homeowners with a flyer that would provide information on the biology of SBFS and how they are susceptible to depredation by cats. The flyer would also outline steps that homeowners could take to reduce their urban edge effects.

SECTION 6: CERTIFICATION

I hereby certify that the statements furnished above and in the attached exhibits present data and information required for this biological evaluation, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

Date: September 18, 2007 Signed: _____

Mikael Romich, TE068799-1

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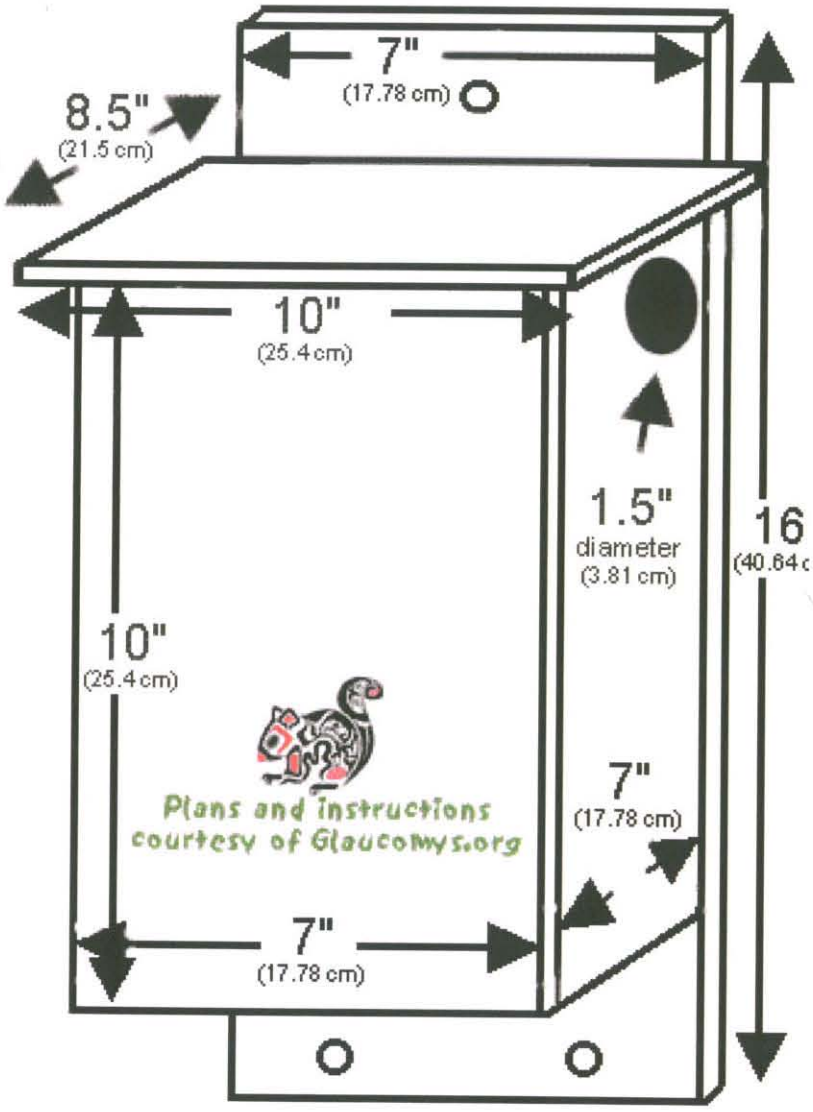
Appendix A: Nest and Aggregate Box Specifications

Simple Nesting Box Plan for the Northern Flying Squirrel

(Glaucomys sabrinus)

[for Southern Flying Squirrel (Glaucomys volans) take one inch off all dimensions. Access hole must be exactly 1.25 in. (3.175 cm). Place in deciduous or mixed forest.]

*Note - before beginning construction of this nesting box, do your research and confirm which species of flying squirrel inhabits your geographic region!



1. Ensure access hole size is no larger than specified. You may wish to install a sheet metal occluder around entrance to prevent hole enlargement by unwanted species. No sharp edges!

2. Run a bead of water-based siliconized caulking along length of top where it meets backing board to prevent water infiltration and seal all cracks and gaps accordingly. Drill (4) 1/2" (12.7mm) holes near corners of bottom and (2) 1/2" (12.7mm) holes on each side near bottom for ventilation purposes.

3. Use natural (untreated) softwood ONLY. Thickness - 3/4" (19mm) to 1" (25mm). DO NOT stain or paint interior or exterior. DO NOT use plywood or chipboard. Wear gloves when handling wood, as salt from sweaty hands will encourage porcupines to chew the box.

4. If the wood you use is smooth-planed, roughen exterior and interior panels with rasp or coarse sandpaper for better "gripability".

5. Though not absolutely necessary, it is advisable to provide a hinged access door for cleaning purposes. Clean ONLY during January or February, as box will be vacant during this period. Front or side door access is preferred over top door access. Only adults should do the cleaning, and always wear leather gardening gloves when performing a clean-out! Some other animals you might find using this nesting box are: birds, tree frogs, spiders, hornets, bumblebees and deer/white-footed mice.

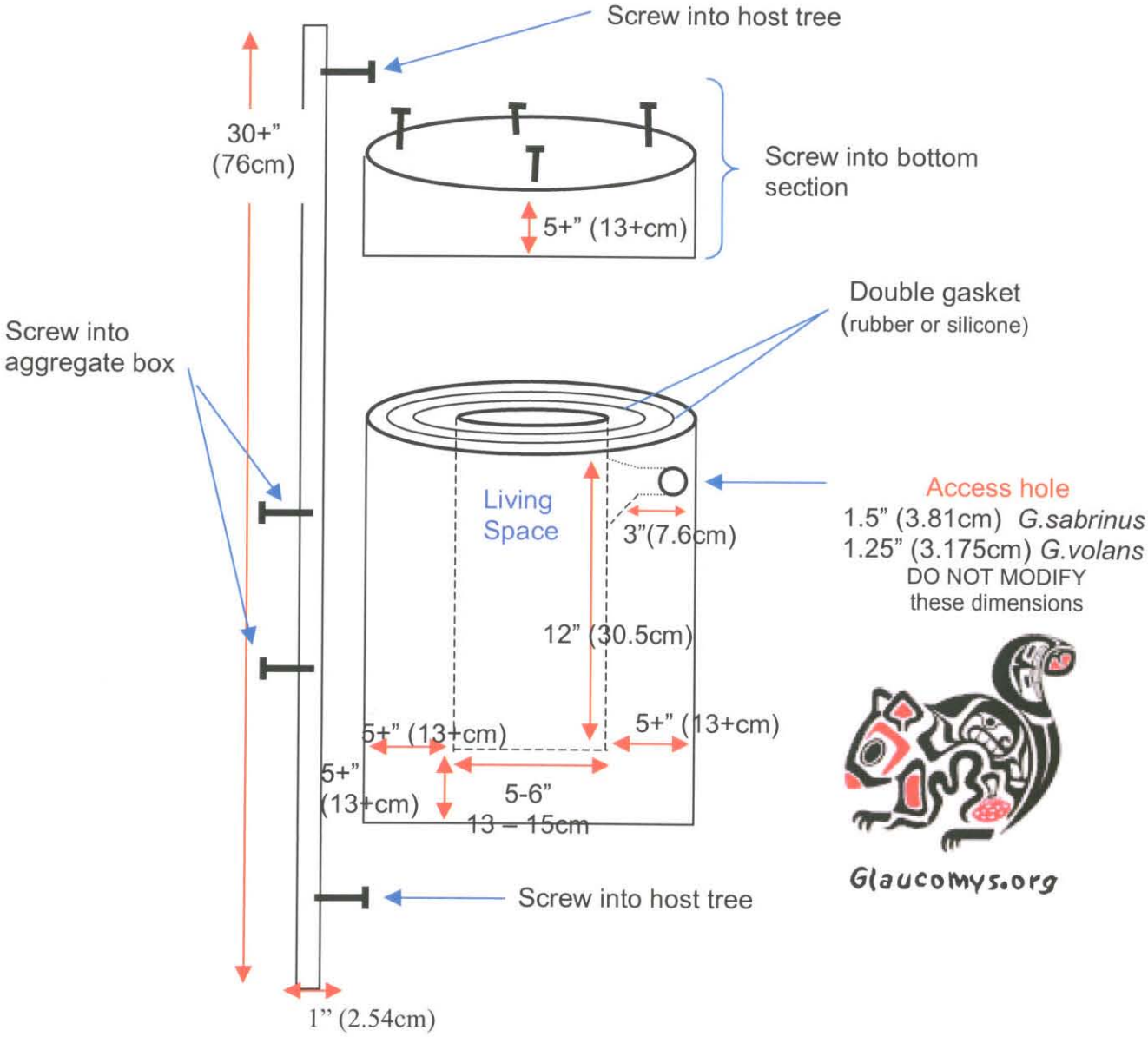
Place nesting boxes in your oldest stands of coniferous (preferred by sabrinus) or mixed forest. Min./Max. placement height is 10'/26' (3m/8m). Place so that access hole faces opposite prevailing wind. Preferably, place so that mammalian predators cannot reach box via limbs of other trees. Should arboreal snakes inhabit the area, drill another access hole at bottom of opposite side. Install within 500m of water (marsh, creek, etc.) or in mesic (wet) forest areas where possible. Install several boxes per 1/2 hectare, as flying squirrels need to have alternate nesting sites available to them for predator/parasite avoidance and rest/elimination purposes.

Monitor occasionally for occupancy by rapping or scratching tree trunk and watching access hole. If you find a flying squirrel has taken up residence, leave it alone. If you bother it too much, it will leave.

The most important feature of your nesting box is that it be waterproof. Please ensure that the inside of the nesting box will remain dry. DO NOT install any nesting boxes if you are aware of house cats (cared-for or feral) in the vicinity.

BUILDING, PLACING AND CLEANING OF NESTING BOXES CAN BE DANGEROUS.
ALL WORK DETAILED HERE SHOULD BE PERFORMED ONLY UNDER ADULT SUPERVISION.

Flying Squirrel Aggregate Box Plans



Notes:

1. Unit is made from one section of log, nominally 22" (56cm) in length, 16" (40.5cm) dia.
2. Dimensions given (except access hole diameters) are approximate and are dependant upon source log dimensions - use as a guide only.
3. Softwoods are easier to work with (building and placing). Use chainsaw to create living space. Leave bark on unit, if possible. If not, roughen exterior surface.
4. Place unit between 10' (3m) and 20' (6m) high, away from branches of other trees.
5. Place unit so that entrance hole faces away from prevailing wind.
6. Place unit so that entrance hole faces away from direct sunlight.
7. Clean unit yearly (when unoccupied - watch for active bumblebee and hornet nests!).
8. All screws should be non-rusting; countersunk, Robertson type preferred.
9. Avoid using plywood as backing board; if unavoidable, use exterior grade plywood.

B.4 - Southwestern Willow Flycatcher Focused Survey Report (Michael Brandman Associates, August 2007)

SOUTHWESTERN WILLOW FLYCATCHER FOCUSED SURVEY REPORT MOONCAMP PROJECT, FAWNSKIN, SAN BERNARDINO COUNTY, CALIFORNIA

Prepared for:

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MICHAEL BRANDMAN ASSOCIATES

August 15, 2007

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SECTION 1: SUMMARY

This report contains the findings of Michael Brandman Associates (MBA) focused survey for the southwestern willow flycatcher (*Empidonax traillii extimus*) (SWF) on an approximately 62.5-acre property known as Tentative Tract 16136 (Moon Camp) located in the Community of Fawnskin, San Bernardino County, California. This focused survey determined that the project site is not currently occupied by SWF. However, due to various bird species utilizing the site for nesting, project-related tree removal should occur outside the nesting season (March through July).

SECTION 2: INTRODUCTION

At the request of San Bernardino County, MBA conducted a focused SWF survey consistent with accepted survey protocols issued by the US Fish and Wildlife Service (USFWS 2000) for a 62.5-acre property located in the Community of Fawnskin, San Bernardino County, California. This property is hereinafter referred to as project site or site.

2.1 - Project Location

The project site is located in the San Bernardino National Forest, north of Big Bear Lake. State Highway 38 bisects the site on the southern portion. The project site is located south of Flicker Road, east of Oriole Lane, and west of Polique Canyon Road, in the unincorporated community of Fawnskin, San Bernardino County, California (Exhibits 1 and 2). The site consists of Assessor's Parcel Numbers 0304-082-04, 0304-091-12, -13, and -21. It is within sections 7 and 12, Township 2 North and Range 1 East of the Fawnskin U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Exhibit 3).

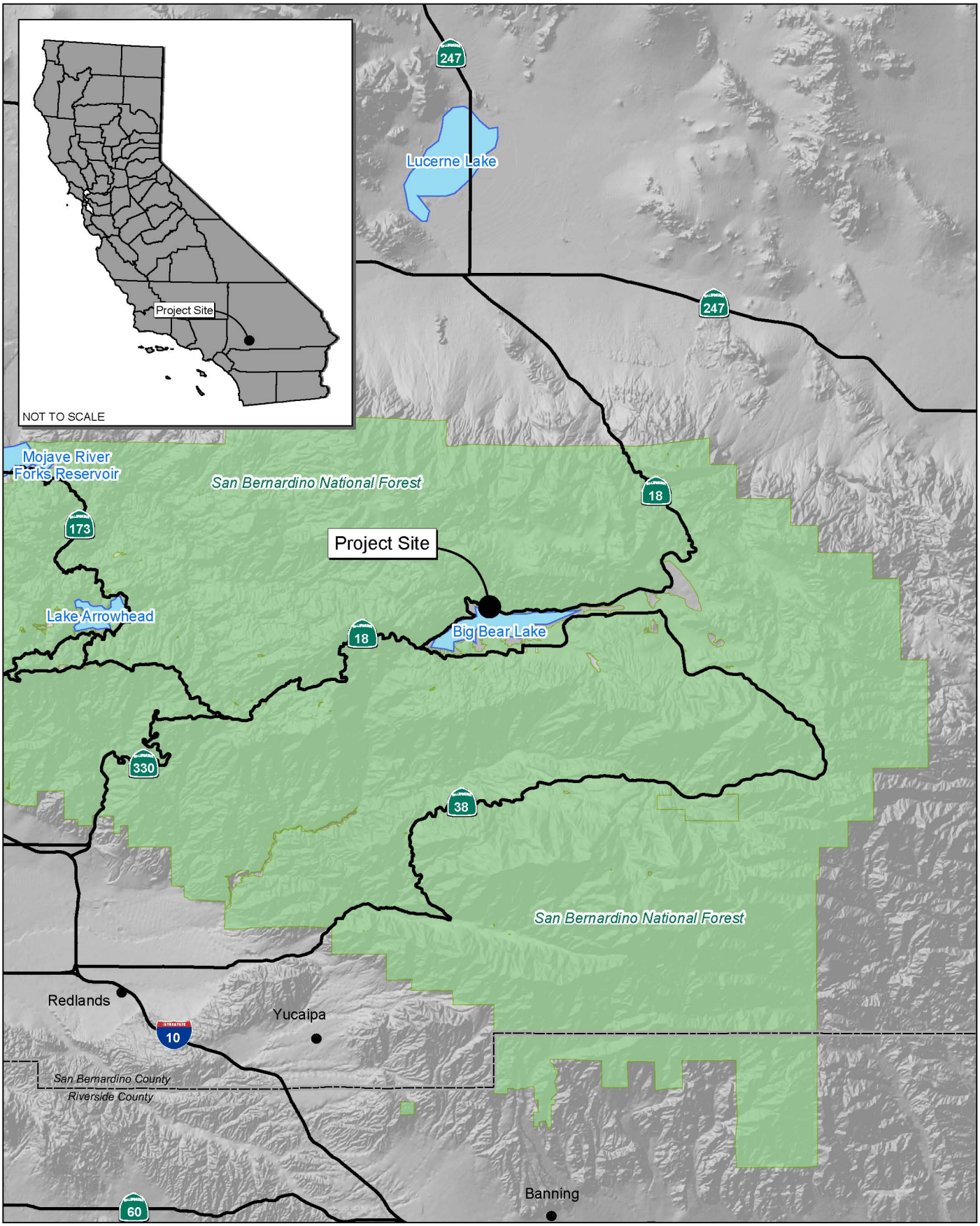
2.2 - Project Description

The proposed project is to subdivide the site into 53 lots: fifty residential lots to be sold individually and developed into custom homes and 3 lettered lots, two of which would be designated as Open Space/Conservation easements.

2.3 - Environmental setting

In addition to SR 38, several dirt roads and trails traverse the project site. Site elevations range from approximately 6,747 feet above mean sea level (msl) at the lakeshore to 6,960 feet above msl at the northeast corner of the site. Individual slopes on-site range from five percent to forty percent. Slope orientation is generally from north to south toward the lake, except for three natural ravines on the project site that contain eastern and western slopes.

The dominant plant community observed on the project site is Jeffrey pine forest (54.91 acres), which includes Jeffrey pine (*Pinus jeffreyi*), white fir (*Abies concolor*), incense cedar (*Calocedrus decurrens*), western juniper (*Juniperus occidentalis*), singleleaf pinyon pine (*Pinus monophylla*), and black oak occurring at lower densities. The Jeffrey pine forest onsite is unevenly aged composed of approximately 85 percent Jeffrey pine, eight percent western juniper, six percent singleleaf pinyon pine, and less than one percent of scattered white fir and black oak. The understory is sparse, consisting of scattered chaparral shrubs including greenleaf manzanita (*Arctostaphylos patula*), mountain whitethorn (*Ceanothus cordulatus*), Greg's ceanothus (*Ceanothus greggii*), deer brush (*Ceanothus integerrimus*), California mountain mahogany (*Cercocarpus betuloides*), and curl leaf mountain mahogany (*Cercocarpus ledifolius*).



Source: Census 2000 Data, The CaSIL, MBA GIS 2007.

Michael Brandman Associates

NORTH

5 2.5 0 5 Miles

Exhibit 1
Regional Location Map

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TT 16136 • FAWSKIN, SAN BERNARDINO COUNTY, CA
SOUTHWESTERN WILLOW FLYCATCHER FOCUSED SURVEY REPORT

Source: TOPO! USGS Fawnskin (1996) 7.5' DRG.

Exhibit 2
Local Vicinity Topographic Base

Michael Brandman Associates

NORTH

2,000 1,000 0 2,000 Feet

00520089 • 08/2007 | 2_local_topo.mxd

TT 16136 • FAWSKIN, SAN BERNARDINO COUNTY, CA
SOUTHWESTERN WILLOW FLYCATCHER FOCUSED SURVEY REPORT

Source: National Agriculutre Imagery Program, San Bernardino County (2005).

Michael Brandman Associates

NORTH

2,000 1,000 0 2,000 Feet

Exhibit 3
Local Vicinity Aerial Base

00520089 • 08/2007 | 3_aerial_aerial.mxd

TT 16136 • FAWSKIN, SAN BERNARDINO COUNTY, CA
SOUTHWESTERN WILLOW FLYCATCHER FOCUSED SURVEY REPORT

Herbaceous cover is generally low, consisting of grasses and forbs in scattered patches. Approximately 17.38 acres of the Jeffrey pine forest on the project site contain few trees and fairly open canopy. The open Jeffrey pine forest and where Wright's matting buckwheat (*Eriogonum wrightii* ssp. *subscaposum*) occur is suitable habitat for a number of sensitive plant species.

The pebble plain plant community occurs on 0.69 acre of the project site north of State Highway 38. It appears as a distinct open patch within open Jeffrey pine forest in the western portion of the Project site. The substrate in this area consists of clay soil mixed with quartzite pebbles and gravel that are continually pushed to the surface through frost action. This substrate supports a high floristic diversity consisting of small cushion-forming plants, tiny annuals, grasses, and succulents that are well spaced, low growing, and sun tolerant. Several sensitive plant species are associated with pebble plain habitat.

Approximately 4.14 acres of the southern boundary of the project site is formed by the shore of Big Bear Lake. Plant species along the shore itself consist primarily of herbaceous native and non-native species of periodically saturated soils, including willowherb (*Epilobium* sp.), wire-grass (*Juncus mexicanus*), cursed buttercup (*Ranunculus sceleratus*), and several cinquefoil species (*Potentilla* spp.). Vegetation is patchy above the high-water level where small areas of Jeffrey pine forest are interspersed among open meadows and grasslands and scattered patches of arroyo willow (*Salix lasiolepis*) and red willow (*Salix laviegata*). This plant community provided the only potentially suitable habitat on the project site for southwestern willow flycatcher.

2.4 - Disturbances

Recent activity on the project site includes the removal of trees, which appeared to be either taken off-site or chipped onsite. The greatest disturbance from the tree removal activity would be to cavity-dwelling birds and mammals, and sensitive plant species that have been located on the project site, including the Federally-listed Threatened and California Native Plant Society (CNPS) List 1B species, ash-gray Indian paintbrush (*Castilleja cinerea*); and three CNPS List 1B species, Parish's rock cress (*Arabis parishii*), Big Bear Valley woollypod (*Astragalus leucolobus*), and silver-haired ivesia (*Ivesia argyrocoma*). It is not known if precautions prior to tree removal were made to avoid the known locations of these plants. In addition, the ingress and egress of vehicles involved in the tree removal and the potential dragging of trees offsite has caused the understory vegetation and ground to be heavily disturbed. Finally, there appeared to be direct mechanical removal of some understory shrubs. A number of wildlife trees (or snags) were marked with "WL" and were not removed. Some thinning of trees, including black oak (*Quercus kellogii*), was evident, particularly at the lower portions of the tree trunk.

2.5 - Southwestern Willow Flycatcher

The SWF is an insectivorous migratory songbird that nests during the late spring and summer months in dense riparian habitats. The SWF is one of four subspecies of willow flycatcher (WIFL) that occupy relatively distinct breeding ranges in the continental United States. The breeding range of the SWF occurs in the southwestern region of the states (primarily southern California, Arizona, New Mexico, and portions of Nevada, Utah, and Colorado). SWF breeds in dense riparian vegetation near surface water or saturated soil. The other subspecies of WIFL may nest in shrubby habitats away from water. Habitat loss and brood parasitism by the brown-headed cowbird have been attributed to the decline of this species. The SWF is listed as an endangered species by the State of California (2000) and USFWS (1995). The nearest citing of southwestern willow flycatcher occurred in 2001 on Big Bear Lake in the vicinity of Boulder Bay and Metcalf Bay, California Natural Diversity Database (CNDDB 2007). The project site does not overlap designated critical habitat for SWF (USFWS 2005).

SECTION 3: METHODOLOGY

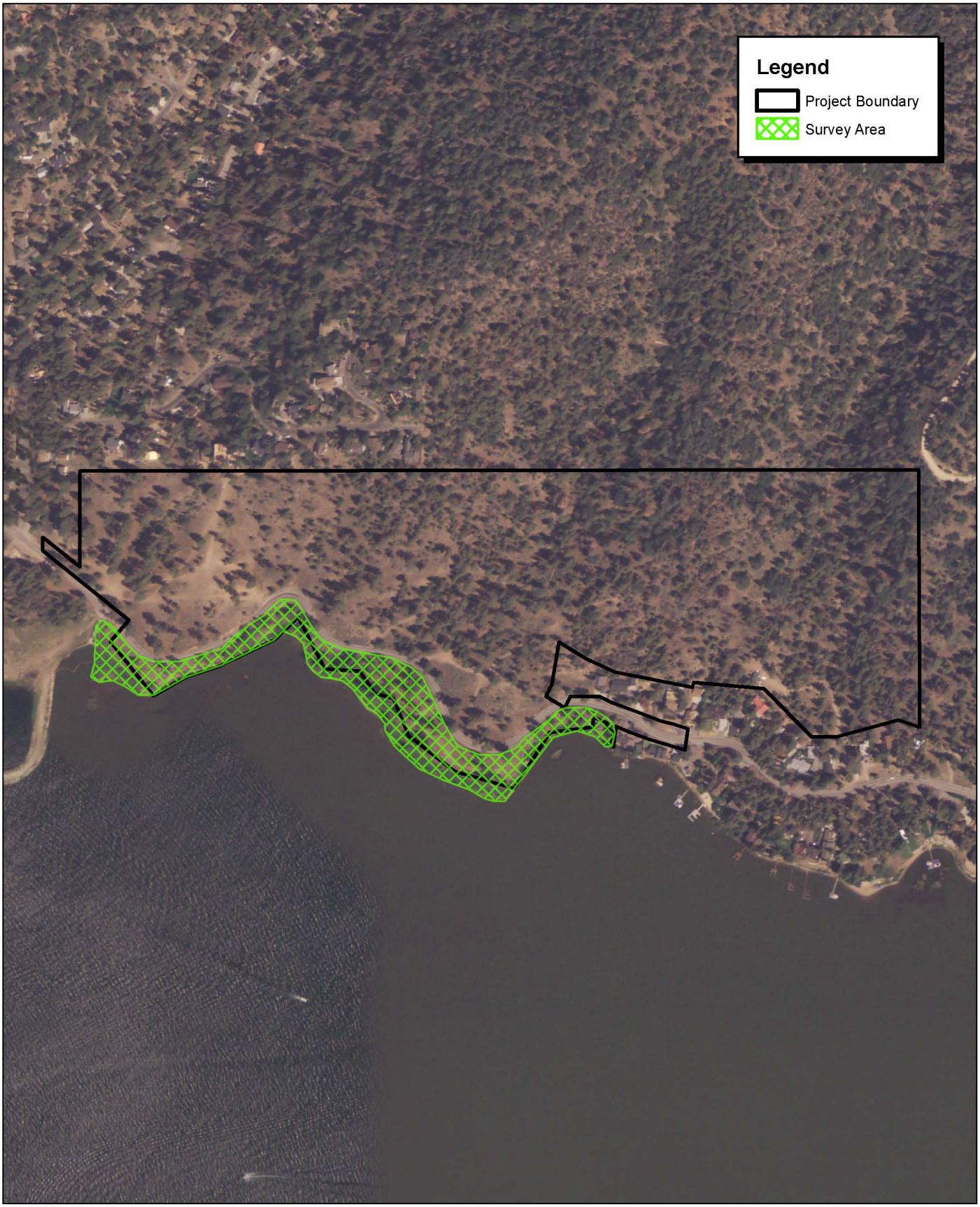
Michael Brandman Associates (MBA) permitted biologist Mikael Romich (TE068799-2) conducted the SWF surveys according to USFWS survey guidelines. To determine the presence/absence of SWF, surveys were conducted within all suitable and potential habitats on the project site. All suitable habitat (see Exhibit 4) occurs along the lakeshore and was surveyed as noted below in Table 1.

Southwestern willow flycatcher protocol requires a total of five (5) surveys between May 15 and July 17. One survey is completed May 15 to May 31; the second survey is completed June 1 to June 21; and three surveys are completed June 22 to July 17. These methods are consistent with the USFWS southwestern willow flycatcher protocol revision (2000). Surveys may begin at dawn and end at approximately 10:30 a.m, as consistent with the SWF protocol developed by Sogge *et al.* (1997).

The surveying biologist methodically moved through the survey area and, when feasible and appropriate, walked within potential habitat patches. The survey protocol included the use of taped recordings of SWF played approximately every 50 feet to elicit responses. If a flycatcher was detected, tape playing was discontinued. All bird species observed during the surveys were noted and are listed in Appendix A. Table 1 summarizes the dates, times, and weather conditions of all SWF surveys.

Table 1: Summary of 2007 SWF Surveys at the Moon Camp Project Site

2007 Date Surveyed	Time	Temperature, wind	Weather
May 31	6:00-8:00	35 F, calm	clear
June 13	7:30-9:00	46 F, calm	clear
June 24	6:30-8:00	42 F, calm	clear
July 3	6:00-7:30	43 F, calm	clear
July 13	5:45-7:15	40 F, calm	clear



Source: National Agriculutre Imagery Program, San Bernardino County (2005).

Michael Brandman Associates

NORTH

500 250 0 500 Feet

Exhibit 4
Focused Survey Area

SECTION 4: RESULTS AND DISCUSSION

4.1 - Southwestern Willow Flycatcher

No detections of SWF or WIFL occurred during the surveys at the Moon Camp project site. In fact, there were no detections of even common riparian obligate species. The lack of riparian bird species suggests that the habitat is not suitable to SWF. In general, the willows along the shoreline are patchy and lack the dense growth or willow thicket favored by this species. In addition, there is little vertical complexity to the riparian habitat on the project site.

4.2 - Bald Eagle

Although not the focus of this survey effort, a sighting of bald eagle (*Haliaeetus leucocephalus*) occurred on June 13, 2007 where an adult was observed flying along the shoreline of the project site in an east to west direction. Bald eagles have recently been delisted as a federally threatened and endangered species by the USFWS (July 9, 2007), but remain a California state endangered species. Bald eagles are known to winter on the project site (Bon Terra Consulting 2002), but breeding records in the Big Bear Lake area are scarce. However, in 2007 two bald eagle nests with potentially two pair of bald eagles were located in the Big Bear Lake area (Forest Service, June 25, 2007). One of these nests was located near Grout Bay, which is just west of the project site. Considering the amount of bald eagle use the project site receives during the winter, it would be conceivable that a nest could be established in one of the larger snags located in the interior of the site, which also affords a view of Big Bear Lake. Future studies should include nesting bald eagle surveys of the project site to ensure they have not established a nest onsite. The two nests in 2007 were discovered on February 9 and April 19, respectively. Copulation between two of the eagles was observed on March 5 and March 12. Therefore, nesting visits should be conducted in March, April, and May to confirm the continued absence of nesting bald eagle on the project site.

SECTION 5: CONCLUSION

No SWF were detected during this focused survey effort and the site is not occupied by this species. Future short-term occupation of the project site by SWF is unlikely due to the general absence of suitable habitat for this species. Additional focused surveys would not be required unless the habitat becomes more suitable for this species. No impacts to SWF would occur with implementation of the proposed project.

A bald eagle was observed flying over the southern portion of the project site. Due to nesting records from 2007 in the Big Bear Lake area, nesting surveys should be conducted in March, April, and May to confirm the continued absence of nesting bald eagle on the project site.

There are a large number of bird species that were observed to use the project site for nesting. Due to the difficulty locating nests of cavity-nesting and other species of birds, a preconstruction nesting bird survey is not feasible. Therefore, the project should time tree removal to occur outside of the nesting period for birds, generally February through July.

SECTION 6: CERTIFICATION

I hereby certify that the statements furnished above and in the attached exhibits present data and information required for this biological evaluation, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.

Date: August 15, 2007 Signed: _____

Mikael Romich, TE068799-2

SECTION 7: LITERATURE CITED

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Appendix A: Avian Species List

APPENDIX A
AVIAN SPECIES LIST

Family/Species Name	Common Name
BIRDS	
Gaviidae	**Divers, Loons**
Gavia immer	common loon
Podicipedidae	**Grebes**
Aechmophorus occidentalis	western grebe
Podiceps nigricollis	eared grebe
Podilymbus podiceps	pie-billed grebe
Ardeidae	**Egrets, Herons & Bitterns**
Ardea herodias	great blue heron
Anatidae	**Swans, Geese & Ducks**
Aix sponsa	wood duck
Anas platyrhynchos	mallard
Anas strepera	gadwall
Rallidae	**Rails and Coots**
Fulica americana	American Coot
Accipitridae	**Kites, Hawks, Eagles & Vultures**
Buteo lineatus	red-shouldered hawk
Haliaeetus leucocephalus	bald eagle
Falconidae	**Falcons**
Falco sparverius	American kestrel
Ciconiidae	**American Vultures**
Cathartes aura	turkey vulture
Phasianidae	**Pheasants, Partridges & Quail**
Oreortyx pictus	mountain quail
Scolopacidae	**Sandpipers**
Actitis macularia	spotted sandpiper
Charadriidae	**Plovers**
Charadrius vociferus	killdeer
Columbidae	**Pigeons & Doves**
Zenaida macroura	mourning dove
Picidae	**Woodpeckers**
Colaptes auratus	northern flicker
Melanerpes formicivorus	acorn woodpecker
Picoides pubescens	downy woodpecker
Picoides villosus	hairy woodpecker

Family/Species Name	Common Name
Tyrannidae	**Tyrant Flycatchers**
Contopus sordidulus	western wood-peewee
Hirundinidae	**Swallows**
Tachycineta thalassina	violet-green swallow
Corvidae	**Crows, Jays**
Corvus corax	common raven
Cyanocitta stelleri	Steller's jay
Paridae	**Titmice**
Poecile gambeli	mountain chickadee
Aegithalidae	**Bushtit**
Psaltriparus minimus	common bushtit
Sittidae	**Nuthatches**
Sitta pygmaea	pygmy nuthatch
Troglodytidae	**Wrens**
Thryomanes bewickii	Bewick's wren
Turdidae	**Thrushes**
Turdus migratorius	American robin
Sialia mexicana	western bluebird
Sturnidae	**Starlings**
**Sturnus vulgaris*	European starling
Vireonidae	**Vireos**
Vireo cassinii	Cassin's vireo
Fringillidae	**Finches, Grosbeaks, Sparrows**
Agelaius phoeniceus	red-winged blackbird
Carpodacus mexicanus	house finch
Euphagus cyanocephalus	Brewer's blackbird
Junco hyemalis	dark-eyed junco
Pipilo chlorurus	green-tailed towhee
Pipilo erythrophthalmus	spotted towhee
Spizella passerina	chipping sparrow

B.5 - Peer Review of Existing Biological Documents (Michael Brandman Associates, January 2007

Michael Brandman Associates

ENVIRONMENTAL SERVICES • PLANNING • NATURAL RESOURCES MANAGEMENT

January 31, 2007

Matthew W. Slowick, Senior Associate Planner
County of San Bernardino Land Use Services Dept.
385 N. Arrowhead Avenue, First Floor
San Bernardino, CA 92415-0182

Subject: Site Assessment and Review of Previously Prepared Biological Documentation of the Proposed Moon Camp Tentative Tract (TT) 16136 Project Site near Fawnskin, San Bernardino County, California

Dear **Mr**. Slowick:

The following is the results of a field assessment and peer review of existing biological documents for the Moon Camp TT 16136 project near Fawnskin in San Bernardino County.

Introduction

As requested by the County of San Bernardino, Michael Brandman Associates (MBA) completed a professional peer review of biological investigations and previously prepared biological documents concerning the approximately 64-acre subject property, known as the Moon Camp TT 16136 in San Bernardino County, California. The purpose of this task was to confirm that the appropriate professional practices were observed and to identify any deficiencies of information that could affect the adequacy of the environmental impact report we are preparing for this project.

Biological studies of the site were conducted by Bonterra Consulting in 2002. An EIR was prepared by RBF Consulting in December 2005.

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- *Moon Camp-Tentative Tract 16136 Draft Biological Technical Report*. BonTerra Consulting. July 9, 2003.

MBA's review methods, findings, and recommendations are presented below.

Methodology

After reviewing the reports listed above, along with a copy of the proposed tentative tract map, MBA biologist Marnie McKernan conducted a field survey of the site on December 15, 2006. The site was surveyed by vehicle and on foot. The survey was completed to verify conditions at the project site, evaluate habitat for suitability for sensitive species and to better understand potential impacts of the proposed project. The visit was not intended as a focused survey or a comprehensive inventory of the site.

Findings

Habitat Assessment and Peer Review

The site occurs on the north shore of Big Bear Lake near the community of Fawnskin. The project site sits on a south facing slope with an elevation ranging from 6,745 feet above mean sea level (msl) at the shoreline to 6,982 feet msl at the northern boundary.

The biological conditions at the site in December 2006 were consistent with the findings of the 2002 and 2003 reports prepared by BonTerra Consulting. In general, the site has remained undisturbed since the reports were prepared and still reflects the conditions outlined in those studies. The only noticeable physical change to the site is to the continued growth of the willow scrub habitat along the shoreline.

Based on MBA's field observations, we have determined that the previous BonTerra investigations accurately described the vegetation communities found onsite, and accurately identified the species of concern that are known or likely to occur within the habitats found onsite.

MBA concurs with the list of species determined to have a moderate potential to occur on the project site. One additional species that MBA recommends including on the list is the San Bernardino flying squirrel. This species is a State and San Bernardino National Forest (SBNF) Species of Special Concern. During the site assessment, MBA determined that the northern half of the site supports habitat suitable for this species. In researching this species, MBA learned that trapping efforts in 1991 for the flying squirrel by Forest Service biologists in the Fawnskin area showed a relatively high success rate (Butler et al. 1991).

Bald Eagle

The focused bald eagle survey and report by BonnTerra concluded that the project site and vicinity (Grout Bay) are very important to wintering populations of bald eagles. In fact, the report goes on to point out that one particular perch tree onsite is considered the most commonly recorded used perch tree on the north shore of Big Bear Lake. A review of several years of wintering bald eagle counts conducted by the SBNF and volunteers in the Big Bear Valley confirm that wintering bald eagles routinely use the Moon Camp site for perching.

The BonnTerra report indicated that the project site contains several perch trees used by the eagles which are primarily located adjacent to the shoreline and within 100 feet north and south of the highway. After making a site visit and consulting with a Forest Service biologist knowledgeable with the populations of bald eagle in the Big Bear Basin, MBA concluded that the entire project site likely provides suitable perch

trees for the bald eagle. Because the site is located on a moderately steep hill, the trees along the project's northern boundary provide perches with a lake view, one of the requirements of bald eagle perch trees. During the site visit, the MBA biologist, as well as the Forest Service biologist, observed a juvenile bald eagle perched in a tree on the northeast corner of the site.

The BonnTerra report recommended that all known perch trees, and those greater than 20 inches in diameter at 4 feet from the ground and within approximately 200 yards of the high water line, be avoided during construction and preserved in place. This recommendation was used as mitigation in the Draft EIR. This may conflict with the general rule of Caltrans, San Bernardino County and other agencies with jurisdiction in this immediate area to cut down large trees within falling distance to the highway, homes or any structure if there is obvious sign of dying (such as limb loss) to prevent damage to property or life. Many of the perch trees onsite are in the process of dying and their removal could be considered detrimental to the biological value of this area and to the bald eagle.

Because the data documenting the use of the Moon Camp site are fairly robust (SBNF, BonnTerra, and others), additional focused surveys are not recommended.

Sensitive Plants

The focused botanical survey was conducted in May and June of 2002 and a follow up survey in November 2002. Results of the survey indicate that that five special status plant species and one special status vegetation community occur on the project site: Parish's rock-cress (*Arabis parishii*), Big Bear Valley woollypod (*Astragalus leucolobus*), ash-gray Indian paintbrush (*Castilleja cinerea*), Heckards paintbrush (*Castilleja applegateii ssp)*,silver-haired ivesia (*Ivesia argyrocoma*), and Pebble Plain. The survey report cautioned however that due to the very dry conditions onsite caused by poor rainfall years, many of the plants with a moderate to high potential to occur onsite could not be conclusively determined to be present or absent from the site during the focused surveys. Additional focused plant surveys are needed to determine whether the following sensitive plants occur onsite.

- Rock sandwort (*Arenaria lanuginosa* ssp. *saxosa*);
- Big Bear Valley sandwort (*Arenaria ursine)*;
- Crested milk-vetch (*Astragalus bicristatus)*;
- Big Bear Valley milk-vetch (*Astragalus lentiginosus* var. *Sierrae*;
- Palmer's mariposa lily (*Calochortus palmeri* var. *Palmeri*);
- San Bernardino Mountain owl's clover (*Castilleja lasiorhyncha)*;
- San Bernardino Mountains dudleya (*Dudleya abramsii* ssp. *affinis*);
- Leafy buckwheat (*Eriogonum foliosum*);
- Jepson's bedstraw (*Galium jepsonii*);
- Johnston's bedstraw (*Galium johnsttonii*);
- Duran's rush (*Juncus duranii*);
- Short-sepaled lewisia (*Lewisia brachycalyx*);
- Baldwin Lake linanthus (*Linanthus killipii*);
- San Bernardino Mountain monkeyflower (*Mimulus exiguous*);
- Purple monkeyflower (*Mimulus purpureus* var. *purpureus*);
- Chickweed oxytheca (*Oxytheca caryophylloides*);
- Parish's yampah (*Perideridia parishii* ssp. *parishii*);
- Transverse Range phacelia (*Phacelia exilis*);

- Mojave phacelia (*Phacelia mohavensis*);
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- San Bernardino bluegrass (*Poa atropurpurea*);
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- Bird's foot checkerbloom (*Sidalcea pedata*);
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- Pine green-gentian (*Swertia neglecta*);
- California dandelion (*Taraxacum californicum*); and
- Small-flowered bluecurls (*Trichostema micranthum*).

Two separate days of surveying are recommended; one during the height of flowering and one near the end to capture the full extent of the blooming period

Southern Rubber Boa

Focused southern rubber boa (SRB) surveys were conducted in the suitable habitat within the eastern portion of the Moon Camp project site during May-August 2002 with negative results. The report by BonnTerra concluded that the SRB is not expected to occur onsite for three reasons; because of the negative results of their focused surveys, the lack of historical records for the immediate project area and the lack of rock outcrops that appear to be an important component of occupied habitat.

The draft survey guidelines developed by the CDFG for SRB includes three years of repeated intensive active searches before determination of absence can be made. Intensive active searches of suitable habitat for SRB are similar to the visual encounter survey method described by Crump and Scott (1994) in which a subsample of sites exhibiting high value habitat within the site as a whole are surveyed intensively for presence. The draft guidelines allow for negative finding in less than 3 years (2 years) if trapping is conducted. Trapping consists of the use of a system of pitfall traps connected to drift fences, known as arrays, to capture SRB.

The BonTerra focused surveys consisted of a combination of both survey techniques conducted simultaneously to maximize the probability of detecting SRB. Because the surveys were conducted for just the one season, the negative results cannot conclusively determine that SRB are absent from the project site. MBA concluded during their December assessment that the eastern portion of the Moon Camp site contains suitable habitat (well-developed soils, leaf litter accumulation, downed logs, and large rocks) for SRB. An additional habitat assessment and/or SRB focused surveys are needed to adequately characterize this species' presence or absence from the project site.

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surveys for SWF were conducted 5 years ago. Since that time, the willow habitat onsite has grown and matured, thereby providing better opportunities for the SWF to occupy the site. Focused SWF surveys are recommended to determine their presence/absence from the Moon Camp site.

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Recommendations

The following additional focused surveys are recommended for the Moon Camp TT 16136 project site for the 2007 survey season.

- San Bernardino flying squirrel;
- Southwestern willow flycatcher;
- Southern rubber boa; and
- Sensitive plants.

Should you have any further questions regarding this project please do not hesitate to contact me at (909) 884-2255.

Sincerely,

Marnie McKernan, Project Manager/Biologist
Michael Brandman Associates
621 E. Carnegie Drive, Suite 100
San Bernardino, CA 92408

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B.6 - Peer Review of Existing Biological Documents (Michael Brandman Associates, February 2007

Michael Brandman Associates

ENVIRONMENTAL SERVICES • PLANNING • NATURAL RESOURCES MANAGEMENT

February 7, 2007

Matthew W. Slowick, Senior Associate Planner
County of San Bernardino Land Use Services Dept.
385 N. Arrowhead Avenue, First Floor
San Bernardino, CA 92415-0182

Subject: Site Assessment and Review of Previously Prepared Biological Documentation of the Proposed Moon Camp Tentative Tract (TT) 16136 Project Site near Fawnskin, San Bernardino County, California

Dear **Mr**. Slowick:

The following is the results of a field assessment and peer review of existing biological documents for the Moon Camp TT 16136 project near Fawnskin in San Bernardino County.

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As requested by the County of San Bernardino, Michael Brandman Associates (MBA) completed a professional peer review of biological investigations and previously prepared biological documents concerning the approximately 64-acre subject property, known as the Moon Camp TT 16136 in San Bernardino County, California. The purpose of this task was to confirm that the appropriate professional practices were observed and to identify any deficiencies of information that could affect the adequacy of the environmental impact report we are preparing for this project.

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Recommendations

The following additional focused surveys are recommended for the Moon Camp TT 16136 project site for the 2007 survey season.

- San Bernardino flying squirrel;
- Southwestern willow flycatcher;
- Southern rubber boa; and
- Sensitive plants.

Should you have any further questions regarding this project please do not hesitate to contact me at (909) 884-2255.

Sincerely,

Marnie McKernan, Project Manager/Biologist
Michael Brandman Associates
621 E. Carnegie Drive, Suite 100
San Bernardino, CA 92408

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B.7 - Draft Vegetation and Special Status Plants Survey (Scott White Biological Consulting, August 2007)

MOON CAMP PROPERTY, FAWNSKIN AREA: VEGETATION AND SPECIAL STATUS PLANTS

PRELIMINARY DRAFT: August 2007

Prepared for:
Michael Brandman Associates
621 E. Carnegie Dr., Suite 100
San Bernardino, CA 92408

Prepared by:
Scott D. White
SCOTT WHITE BIOLOGICAL CONSULTING
201 North First Ave., No. 102
Upland, CA 91786

Project site location: USGS Fawnskin 7½-minute topographic map, Township 2 North, Range 1 West, portion of Section 13.
APN:
Owner /Applicant:
Principal Investigator: Scott D. White, Scott White Biological consulting (above).

CERTIFICATION: I hereby certify that the statements furnished in this report and in the attached exhibits present the data and information required for this biological evaluation, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief. Field work conducted for this assessment was performed by me and under my direct supervision. I certify that I have not signed a non-disclosure or consultant confidentiality agreement with the project applicant or applicant's representative and that I have no financial interest in the project.

DRAFT REPORT ONLY

DATE: _____ SIGNED: _____
Scott D. White, Report Author

Additional field work performed by:

DATE: _____ SIGNED: _____
Justin Wood

MOON CAMP PROPERTY, FAWNSKIN AREA: VEGETATION AND SPECIAL STATUS PLANTS

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Appendix 1: Special Status Species Not Addressed
Appendix 2: Special Status Species
Appendix 3: Species List

Attachment 1: Project Map
Attachment 2: California Natural Diversity Data Base query results
Attachment 3: California Natural Diversity Data Base report forms

MOON CAMP PROPERTY, FAWNSKIN AREA: VEGETATION AND SPECIAL STATUS PLANTS

Scott D. White
SCOTT WHITE BIOLOGICAL CONSULTING
PRELIMINARY DRAFT: July 2007

I: SUMMARY

The Moon Camp property supports two sensitive plant communities (Pebble Plain and meadow habitats), one federally listed plant species (ash-gray Indian paintbrush) and four State Species of Special Concern (Parish's rock-cress, Big Bear Valley woollypod, Heckard's paintbrush, and silver-haired ivesia). Project development is expected to have both direct and indirect impacts to these sensitive biological resources. Several recommendations are discussed to minimize these impacts.

II: PROJECT AND PROPERTY DESCRIPTION

The San Bernardino County Planning Department is reviewing an application for residential development on the former Moon Camp site in Fawnskin. The project site is on the north shore of Big Bear Lake, in the eastern part of Fawnskin, in unincorporated San Bernardino County. It is about 62 acres, on both sides of State Highway 38, between Oriole Lane and Polique Canyon Road (on the Fawnskin USGS 7½' quadrangle map, in the north half of Section 13, Township 2N and Range 1W). The project site slopes from north to south. Elevation ranges from 6,960 feet in the northeastern portion of the site to 6,750 feet near the lakeshore (see Exhibits 1 and 2).

The project site occurs within an area that is described by the Open Space element of San Bernardino County's General Plan as, "This area includes the entire watershed area of Big Bear Lake, and contains a number of specialized habitat areas, which support a large number of endangered plants and animals (as well as commonly occurring mountain species). Habitat values here should be maintained, potentially by controlling development to prevent damage to important habitat areas."

This report addresses the potential presence of twp special status plant communities and several sensitive plant species occurring or potentially occurring on the property.

III. FOCUSED STUDY / SPECIES OF CONCERN

There are four federally listed threatened or endangered plant species endemic to meadows and three federally listed threatened or endangered plant species endemic to "pebble plain" habitat in the Big Bear Valley area of the northern San Bernardino Mountains (USDI Fish and Wildlife Service 1984, 1998). In addition, there are numerous other special status plant species occurring in this area (Appendix 2). This report focuses on the following plant species:

Exhibit 1: TBD

Exhibit 2: TBD

Meadow Species:

- San Bernardino bluegrass (*Poa atropurpurea*) (federally endangered);
- Bird-foot checkerbloom (*Sidalcea pedata*) (federally and state endangered);
- California dandelion (*Taraxacum californicum*) (federally endangered); and
- Slender-petaled thelypodium (*Thelypodium stenopetalum*) (federally endangered).

Pebble Plain Species:

- Bear Valley sandwort (*Arenaria ursina*) (federally threatened);
- Ash-gray Indian paintbrush (*Castilleja cinerea*) (federally threatened); and
- Southern mountain buckwheat (*Eriogonum kennedyi* var. *austromontanum*) (federally threatened).

Previous surveys of the Project Site identified ash-gray Indian paintbrush as present on the site (Michael Brandman Associates 2000; White & Leatherman BioServices 2002). White and Leatherman (2002) also mapped the extent of suitable habitat for ash-gray Indian paintbrush, based on the extent of its host plant, Wright's matting buckwheat. Bear Valley sandwort was reported as occurring on the site in the California Natural Diversity Data Base (California Department of Fish and Game 2007).

IV. METHODS

Available literature relative to special status plants or plant communities known from the project site and vicinity were reviewed. Literature sources included previous biological reports (Michael Brandman Associates 2000; White & Leatherman BioServices 2002), the California Natural Diversity Data Base (California Department of Fish and Game 2007a, USGS Fawnskin, Big Bear City, Big Bear Lake, Butler Peak, Keller Peak, and Moonridge 7½' topographic quads), California Native Plant Society's *Inventory of Rare and Endangered Vascular Plants of California* (Tibor 2001), the CNPS *Electronic Inventory* (2007, for the same quads) and compendia of special status species published by the US Fish and Wildlife Service (2006) and California Department of Fish and Game (2007b). All species identified by this literature review, and others known from the general region, are included in Appendix 1 or 2 (attached). Appendix 1 lists those species not considered for this report due to elevational or geographic ranges, or specialized habitat requirements not found on the site. Appendix 2 lists special status species known from comparable habitats in the region and summarizes their natural history, conservation status, and occurrence probability onsite.

Scott D. White and Justin Wood (Scott White Biological Consulting) surveyed pebble plains habitat found on the site on 30 April, 7 June, and 8 August 2007. All plant species observed were identified in the field or collected for later identification. Plants were identified using keys, descriptions, and illustrations in Hickman (1993), Munz (1974), Abrams (1923-1960), and other regional references. All species noted on the site are listed in Appendix 3.

Surveys were conducted in conformance with California Department of Fish and Game guidelines (2000), during flowering seasons for the above listed special status plants. It should be noted that very low rainfall in 2006-2007 and surveys may not be conclusive for all annual plants.

Maps produced previously by White and Leatherman BioServices (2002) of the pebble plain habitat and open upland habitat supporting Wright's matting buckwheat (*Eriogonum wrightii* ssp. *subscaposum*) were used as base maps for this study.

V. RESULTS

Due to the drought conditions, the authors used previous reports and their own judgment of habitat quality to estimate the probability that each special status plant might occur on the site.

A. PLANT COMMUNITIES

The following two plant communities were dominant plant communities found on the site:

Jeffrey Pine Forest

Most of the site above Highway 38 is covered by the Jeffrey pine series (Sawyer and Keeler-Wolf 1995). This vegetation also matches descriptions of Jeffrey pine forest (Holland 1986; McBride 1988), and montane coniferous forest (Munz 1959). Jeffrey pine forest covers most of the eastern half of the project site and occurs in patches interspersed with pebble plains (below) in the western half (see Exhibit 3). Jeffrey pine (*Pinus jeffreyi*) is the dominant tree; white fir (*Abies concolor*), incense cedar (*Calocedrus decurrens*), western juniper (*Juniperus occidentalis*), singleleaf pinyon pine (*Pinus monophylla*), and black oak (*Quercus kellogii*) occur throughout Jeffrey pine forest, at lower densities. The understory is sparse, consisting of scattered shrubs including greenleaf manzanita (*Arctostaphylos patula*), mountain whitethorn (*Ceanothus cordulatus*), cupleaf ceanothus (*Ceanothus greggii*), deer brush (*Ceanothus integerrimus*), California mountain mahogany (*Cercocarpus betuloides*), and curl-leaf mountain mahogany (*Cercocarpus ledifolius*). Herbaceous cover is generally low, consisting of grasses and forbes in scattered patches. Jeffrey pine forest occurs in mountains throughout most of California at elevations between about 5000 and 9000 feet. Many local and regional associations have been described (Sawyer and Keeler-Wolf 1995).

Shoreline Habitats

Most plants along the shore itself are herbaceous native and non-native species of periodically saturated soils, including willowherb (*Epilobium ciliatum*), wire-grass (*Juncus arcticus*), cursed buttercup (*Ranunculus sceleratus*), and several cinquefoil species (*Potentilla* spp.). Numerous seedling cottonwood trees (*Populus balsamifera* spp. *trichocarpa*) also occur there.

Just above the high-water level, there are small patches of various upland and wetland vegetation types. These patches are too small to map. Small areas of Jeffrey pine forest are interspersed open wet meadows and grasslands and scattered patches of arroyo willow (*Salix lasiolepis*) and red willow (*Salix laevigata*). There are no alkaline meadow or dry meadow habitats (below) along the lake shore.

Sensitive Plant Communities

In addition to the above common plant communities, two sensitive plant communities were identified on the project site. Exhibit 3 shows the location of each of these sensitive plant communities.

Exhibit 3: TBD

Pebble Plain Plant Community

Pebble plain plant community occurs on XX acres within the western portion of the site north of Highway 38. This habitat occurs in smaller patches to the east (see Exhibit 3). The Pebble plain plant community (also called pavement plain) was described by Derby and Wilson (1978, 1979). A detailed discussion was prepared by the San Bernardino National Forest (1990) and brief descriptions appear in Holland (1986) and Sawyer and Keeler-Wolf (1995). This plant community is characterized by an underlying layer of clay soil with quartzite pebbles and gravel that are continually pushed to the surface, evidently through frost action (Holland 1986). Vegetation structure on these sites is similar to the mat-forming structure of alpine sites at much higher elevations. Vegetation consists largely of well-spaced cushion-forming perennials and a variety of tiny annuals. Bunchgrasses and some succulents may also occur. At least two species, both listed as endangered, are endemic to the Big Bear pebble plain plant community: Bear Valley sandwort and southern mountain buckwheat (Derby and Wilson 1978).

On the Moon Camp site, much of the pebble plain habitat has been disrupted by vehicle use on the site. This disturbance has reduced vegetation cover, disturbed the natural hydrologic pattern, and perhaps reduced habitat quality for the sensitive pebble plain plant species (San Bernardino National Forest 1990). The Forest Service has determined that vehicle disturbance does not permanently alter habitat suitability for these species. The Forest Service has fenced degraded pebble plains in the Sugarloaf area and found that plant diversity returns after a few years.

The pebble plain plant community onsite has been classified as "southern montane black sagebrush pebble plains" by CDFG (2002). This plant community is "a series or association considered rare and worthy of consideration" by the California Natural Diversity Data Base.

Meadow Habitats

Small patches of dry and wet meadows occur along the lakeshore, south of Highway 38. They grade into upland grasslands, and we could not delineate their extent due to dry conditions. Meadows in the Big Bear Valley may be perennially saturated (i.e., "wet meadows") or may have saturated soils only seasonally or during wet years (called "dry meadows," "xeric meadows," or "vernal meadows"). Meadows of the San Bernardino Mountains were described by Krantz (1994). They are generally dominated by sedges (*Carex* spp.), rushes (*Juncus* spp.) and grasses (*Poa* spp., *Elymus* spp.). Dry meadows and the margins of wet meadows support sagebrush (*Artemisia tridentata, A. rothrockii*). These meadows themselves are not ranked as special status communities by CDFG (2002) but several locally endemic plants occur in them and they, therefore, are recognized locally as important habitats (Krantz, no date).

B. SENSITIVE PLANT AND WILDLIFE SPECIES

Big Bear Valley has a high proportion of rare and locally endemic species (Krantz, no date; Krantz 1994). All of these species are addressed in Appendix 1 or 2 (habitat and range, agency status and probability of occurring on the site). Only those species potentially occurring on the site (see Appendix 2) are discussed below.

Listed Threatened or Endangered Plants Identified on the Site

Ash-gray Indian paintbrush (*Castilleja cinerea*): Ash-gray Indian paintbrush is a federally-listed threatened species and is on CNPS's List 1B. It is a root parasite on other plants, often parasitizing the listed threatened southern Mountain buckwheat (below) or a similar but common mat-forming

buckwheat (*E. wrightii* ssp. *subscaposum*). It is a perennial herb, and typically blooms between May and August. It occurs in pebble plains, meadows and seeps, and open pinyon or Jeffrey pine forest between about 5,900 and 10,000 feet elevation. It is endemic to the eastern San Bernardino Mountains (Big Bear Valley, Holcolmb Valley, Onyx Summit, Snow Valley, and Sugarloaf Ridge). It was mapped on the project site by Michael Brandman Associates (2000) and in the California Natural Diversity Data Base (2007). This survey confirmed these occurrences and noted no substantial changes to densities or distribution in 2007.

Sensitive Plants Occurring on the Site

Parish's rock-cress (*Arabis parishii*): Parish's rock cress is CNPS's List 1B. It is a perennial herb that typically blooms in April or May. It occurs in pebble plains, and other sites with heavy or rocky soils, including carbonate soils, within pinyon woodlands and montane forests between about 3,900 and 8,000 feet elevation. It is endemic to the San Bernardino Mountains. Suitable habitat occurs on the project site in areas shown on Exhibit 3. This survey confirmed its presence onsite and noted no substantial changes to densities or distribution in 2007.

Big Bear Valley woollypod (*Astragalus leucolobus*): Big Bear Valley woollypod is on CNPS's List 1B. It is a perennial herb that typically blooms between May and July. It occurs in rocky soils of montane conifer forests and woodlands and pebble plains, between about 5,600 and 8,000 feet elevation. It is endemic to the high mountains of southern California (San Bernardino, San Gabriel, San Jacinto, and Santa Rosa Mountains). Suitable habitat is found throughout the site. White & Leatherman BioServices (2002) observed it occasionally throughout the project site. This survey confirmed these occurrences and noted that it was especially common on pebble plains in 2007.

Heckard's paintbrush (*Castilleja montigena, C. applegateii* ssp. *martinii*): Heckard's paintbrush is on CNPS's List 4. It is a perennial herb, typically flowering between May and August. It occurs in montane forests between about 6,400 and 9,200 feet elevation. It is endemic to the San Bernardino Mountains, where it is common in forest habitats throughout the mountain range. It was originally described by Lawrence Heckard (1980), but Heckard regarded it as a minor variant of *Castilleja applegateii* and not as a distinct species in his Jepson Manual treatment of the genus (1993). This survey found it occurring occasionally in Jeffery pine forest on the Moon Camp site.

Silver-Haired Ivesia (*Ivesia argyrocoma*): Silver-haired ivesia is on CNPS's List 1B. It is a perennial herb that typically blooms between June and August. It occurs in alkaline meadows and seeps, pebble plains, and montane forest between about 4900 and 8800 feet elevation. It occurs in the San Bernardino Mountains and a disjunct site in the mountains of Baja California. It was reported on the project site by Michael Brandman Associates (2000) and White and Leatherman BioServices (2002). This survey observed it throughout the pebble plain habitat (Exhibit 3).

Listed and Candidate Threatened or Endangered Plants Potentially Occurring on the Site

Bear Valley sandwort (*Arenaria ursina*): Bear valley sandwort is a federally-listed as threatened and is on CNPS's List 1B. It is a perennial herb and typically blooms from May to August. It occurs in pebble plains and sometimes in carbonate soils, between about 6,400 and 6,900 feet elevation. It is endemic to Big Bear Valley in the San Bernardino Mountains. It has been reported from the Moon Camp site (CNDDB 2007), but was not observed in 2007 nor was it observed by Michael Brandman Associates (2000) or White & Leatherman BioServices (2002). Due to poor rainfall in 2006-07, this survey could not evaluate whether Bear Valley sandwort was present or absent from

the site. Suitable habitat occurs in pebble plains on the project site, and this survey determined that there is a high probability of it occurring onsite.

Southern mountain buckwheat (*Eriogonum kennedyi* var. *austromontanum*): Southern mountain buckwheat is federally listed as threatened and is on CNPS's List 1B. It is a mat-forming woody perennial, generally flowering late in the season (between about June and August). It is endemic to pebble plains habitats in Big Bear and Holcomb valleys in the San Bernardino Mountains, between about 5,800 and 7,500 feet elevation. It often serves as a host plant for the hemi-parasitic *Castilleja cinerea* (above) and also is a food plant for a newly described locally-endemic San Bernardino blue butterfly. It is very similar to a more common Wright's matting buckwheat (*E. wrightii* ssp. *subscaposum*), which is common on the project site. The two species are distinguished by presence or absence of branching in their inflorescences (Hickman 1993; Reveal 1989, 2005). We examined flowers and remains of dried inflorescences of mat-forming buckwheats throughout the project site on each site visit. Most of them were either unidentifiable (due to absence of inflorescences) or were identified as Wright's matting buckwheat, based on their branching inflorescences. Within the mapped pebble plain habitat, about 10-20% of the matting buckwheat plants had mostly unbranched inflorescences during the 8 August site visit. Reveal (2005) noted that the two plants intergrade to some extent in Big Bear Valley and A. Sanders (pers. comm.) has made similar observations. It was concluded that some of the matting buckwheats on pebble plains at the Moon Camp site are intergradations between the endangered southern mountain buckwheat and the common Wright's matting buckwheat.

San Bernardino bluegrass (*Poa atropurpurea*): San Bernardino bluegrass is a federally listed endangered species and is on CNPS's List 1B. It is a rhizomatous perennial grass that typically flowers between May and June. It occurs in mesic meadows and seeps between about 4,400 and 8100 feet elevation. It is known only from the San Bernardino Mountains and Laguna mountains (San Diego County). Although marginally suitable habitat occurs along the lakeshore areas on the project site, San Bernardino bluegrass was not observed onsite. Based on habitat, it was concluded there is a low probability that it may occur there.

Bird's foot checkerbloom (*Sidalcea pedata*): Bird's foot checkerbloom is a federally- and state-listed endangered species and is on CNPS's List 1B. It is a perennial herb that typically blooms between May and July. It occurs in meadows and seeps, between about 5,200 and 8,100 feet elevation. It is endemic to the San Bernardino Mountains. Although marginally suitable habitat occurs near the lakeshore, bird's foot checkerbloom was not observed during field surveys. It was not reported as occurring in previous surveys. Based on habitat, it was concluded that there is a low probability that it may occur.

California dandelion (*Taraxacum californicum*): California dandelion is a federally-listed endangered species and is on CNPS's List 1B. It is a perennial herb that typically blooms between May and July. It is endemic to the San Bernardino Mountains, occurring only in and around Big Bear Valley, in meadows and seeps between about 6,300 and 7,800 feet elevation. Although marginally suitable habitat occurs in meadow areas near the lakeshore, the species was not observed during the surveys or reported in prior surveys. Based on habitat, it was conclude that there is a low probability that it may occur onsite.

Sensitive Plants Potentially Occurring Onsite

Although not observed during the survey, the following sensitive plant species were judged as having a moderate or high probability of occurring onsite:

Table 1
Sensitive Plant Species Having a Moderate or High Probability of Occurring Onsite

Species	Scientific Name	Probability	Location
Rock sandwort	*Arenaria lanuginosa* ssp. *saxosa*	Moderate probability	meadow, lakeshore
Crested milk vetch	*Astragalus bicristatus*	High probability	rocky areas
Big Bear Valley milk vetch	*Astragalus lentiginosus* var. *sierrae*	High probability	open forest
Palmer's mariposa lily	*Calochortus palmeri* var. *palmeri*	Moderate probability	meadow
Western sedge	*Carex occidentalis*	Moderate probability	meadow
San Bernardino Mountain owl's clover	*Castilleja lasiorhyncha*	Moderate probability	meadow
San Bernardino Mountains dudleya	*Dudleya abramsii* ssp. *affinis*	Moderate probability	pebble plains
Southern Sierra woolly sunflower	*Eriophyllum lanatum* var. *obovatum*	High probability	forest
Jepson's bedstraw	*Galium jepsonii*	High probability	forest
Johnston's bedstraw	*Galium johnstonii*	Low to moderate probability	forest
Parry's sunflower	*Hulsea vestita* ssp. *parryi*	Low to moderate probability	open slopes
Duran's rush	*Juncus duranii*	Moderate probability	meadow
Short-sepaled lewisia	*Lewisia brachycalyx*	Moderate probability	meadow
Baldwin Lake linanthus	*Linanthus killipii*	High probability	pebble plains
San Bernardino Mountain monkeyflower	*Mimulus exiguus*	High probability	meadow margin, etc.
Purple monkeyflower	*Mimulus purpureus*	High probability	meadow margin, etc.
Chickweed oxytheca	*Oxytheca caryophylloides*	High probability	open forest
Parish's yampah	*Perideridia parishii* ssp. *parishii*	Low to moderate probability	meadow
Transverse Range phacelia	*Phacelia exilis*	High probability	meadow margin, etc.
Mojave phacelia	*Phacelia mohavensis*	High probability	meadow margin, etc.

Table 1 (Cont.)
Sensitive Plant Species Having a Moderate or High Probability of Occurring Onsite

Species	Scientific Name	Probability	Location
Bear Valley phlox	*Phlox dolichantha*	High probability	throughout
Bear Valley pyrrocoma	*Pyrrocoma uniflora* ssp. *gossypina*	Low - moderate probability	meadow
Parish's rupertia	*Rupertia rigida*	High probability	throughout
Tehachapi ragwort	*Senecio ionophyllus*	Moderate probability	throughout
Laguna Mountains jewelflower	*Streptanthus bernardinus*	Moderate probability	forest
Southern jewelflower	*Streptanthus campestris*	High probability	forest
Pine green-gentian	*Swertia neglecta*	High probability	Forest
Small-flowered bluecurls	*Trichostema micranthum*	High probability	meadow

C. SAN BERNARDINO COUNTY PROTECTED PLANTS

The San Bernardino County Native Plant Protection policy (1989) regulates removal of trees greater than 6 inches diameter at breast height (dbh), smoke trees, mesquite, creosote rings, and all plants in the agave family, including Joshua trees. Although there are no smoke trees, mesquite, creosote rings or species in the agave family that occur on property, Jeffrey pines and other native forest trees greater than 6 inches dbh do occur onsite. An arborist survey and report on these trees is recommended.

VI. IMPACTS

A. IMPACTS TO SPECIAL STATUS PLANTS AND HABITAT

Project construction includes grading new roads, driveways and building pads throughout most of the property, and the loss of some of the native vegetation. Pebble plains and open forest patches on the site are occupied by at least one threatened or endangered plant (ash-gray Indian paintbrush) and four other sensitive but unlisted plant species (Parish’s rock-cress, Heckard’s paintbrush, Bear Valley woollypod and silver-haired ivesia). Development could eliminate or substantially reduce the populations of all five plant species populations. Although these habitats are somewhat degraded by vehicles and invasive plants, adverse impacts to listed species would meet the CEQA threshold for mandatory findings of significance.

Similarly, development could eliminate or substantially reduce the populations of five other listed plants that potentially occur on the site but were not identified during previous surveys. These species include Bear Valley sandwort, southern mountain buckwheat, bird-foot checkerbloom, San Bernardino bluegrass, and California dandelion. Impacts to any of those species, if present, would meet the CEQA threshold for mandatory findings of significance if any of these listed plants occur on the site.

Impacts to the sensitive but unlisted plants listed in Table 1 generally would not meet the CEQA threshold for mandatory findings of significance.

VII. RECOMMENDATIONS

A. AGENCY CONSULTATION OR FURTHER STUDIES

To minimize loss of forest canopy on the property, we recommend that an arborist map and inventory trees on the site, and designing roads and building sites to minimize the number of overstory trees to be removed. Once those trees that must be removed are identified, we recommend applying to San Bernardino County for applicable permits under the County's native plant protection policy.

B. MITIGATION MEASURES

1. Additional Surveys

Surveys of wet meadow habitat near the lakeshore should be repeated to determine presence or absence of the listed threatened or endangered species whose presence or absence could not be determined this year. If the surveys determine that one or more listed species occurs in the meadow area, then additional compensation will be required.

2. Avoidance or Minimization

Avoiding or minimizing impacts to sensitive plant habitat is the preferred mitigation measure. However, this mitigation measure would likely reduce project feasibility. It may not provide long-term conservation of the listed plants due to the isolation that will result from project development.

3. Off-site Compensation

Off-site compensation is an available mitigation measure for impacts to ash-gray Indian paintbrush and the pebble plain habitat. The San Bernardino National Forest actively manages to preserve pebble plain habitat, including areas supporting ash-gray paintbrush. There are numerous privately-owned sites in the Big Bear Valley that support pebble plain that could be purchased and managed for conservation. In addition, the California Wildlife Foundation has established a fund, administered by the California Department of Fish and Game, for the purchase and conservation of pebble plain habitat in the Big Bear area.

It is recommended that the anticipated loss of a federally listed threatened plant (ash-gray Indian paintbrush) and pebble plain habitat be mitigated by contributing to the funding of purchase and management of off-site habitat through the California Wildlife Foundation fund. It is anticipated that mitigation will be required at 3:1 ratio.

4. Onsite Management

Impacts to the pebble plains habitat and sensitive plants will be minimized by the project's design, which will place the pebble plain area, particularly the area occupied ash-gray Indian paintbrush habitat, into a permanently protected open space. The long-term conservation value of the proposed open space requires active onsite land management to prevent "edge effects" from

existing and proposed new adjacent land uses. Exhibit 4 shows these areas on the project site that would be expected to be subject to edge effects.

The following discussion of edge effects on rare plants is based on an analysis by the Conservation Biology Institute (2000) addressing San Fernando Valley spineflower, an endemic southern California species threatened by development and surrounding land uses in the Santa Clarita Valley. Sensitive plants found near developed lands tend to die out due to a variety of edge effects, including:

- Exclusion by invasive weedy plants introduced deliberately or accidentally into developed landscapes;
- Trampling or soil damage caused by foot traffic, vehicles, bicycles, or other recreation.
- Altered hydrology caused by irrigation overspray, road runoff, or water diversions installed for erosion control;
- Direct damage by pets and feral animals (e.g., digging by dogs and cats);
- Indirect effects of non-native animals, such as elimination of native pollinators by invasive Argentine ants;
- Vegetation clearing, especially for fuel modification to reduce fire hazards to adjacent homes; and
- Pollution from over-sprayed or runoff landscaping chemicals (insecticides, herbicides, fertilizers).

Conservation planners can design "buffer areas" to separate managed sensitive species or habitat areas from the indirect effects from adjacent land uses. Roads, trails, or fuel modification land uses were not considered consistent with buffer function. The Conservation Biology Institute analysis (2000) estimated that buffer widths of 200 feet would be "highly likely to be effective" in buffering sensitive plant occurrences from a series of adverse edge effects from adjacent land uses.

Most land surrounding the proposed Moon Camp site is in private ownership, except in the northeastern corner where National Forest land is adjacent to the north and east. None of the surrounding private land is managed as either a buffer area or for conservation. Most of the adjacent land has been developed and would not be available for conservation or a buffer area. The proposed project will be subject to substantial edge effects from adjacent residential development and roads, especially Highway 38 (see Exhibit 4).

IX. CONCLUSION

Two sensitive plant communities (Pebble Plain and meadow habitats) occur on the project sites. These two plant communities support an array of endemic plant species, including the federally threatened ash-gray Indian paintbrush and four plant species of special concern (Parish's rock-cress, Big Bear Valley woollypod, Heckard's paintbrush, and silver-haired ivesia). Development of the project site is expected to result in direct and indirect impacts to the sensitive plant communities and associated endemic plant species. Several recommendations are made to help minimize these impacts.

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Appendix 1: Special Status Species Not Addressed

Appendix 1: Special Status Plants of the Bear Valley Region Not Addressed Due to Habitat or Range

Common name	Latin name	Reason for exclusion
White-margined everlasting	*Antennaria marginata*	Outside geogr. range (only local occurrences in Barton Flats area)
Pinyon rock-cress	*Arabis dispar*	Outside geogr. range (only local occurrences on desert-facing slopes)
Shockley's rock-cress	*Arabis shockleyi*	Outside geogr. range (only local occurrences on desert-facing slopes)
Cushenbury milk-vetch	*Astragalus albens*	No suitable habitat (carbonate)
Triple-ribbed milk-vetch	*Astragalus tricarinatus*	No habitat (desert shrubland), well above elev. range (below about 4000 ft.), Cushenbury Cyn report erroneous
Parish's small-scale	*Atriplex parishii*	No suitable habitat (alkali sink)
Fremont barberry	*Berberis fremontii*	No local occurrences (presumed extinct in Cushenbury area)
Scalloped moonwort	*Botrychium crenulatum*	No suitable habitat (marshes, bogs)
Plummer's mariposa lily	*Calochortus plummerae*	Above elev. range (below about 5500 ft.)
Alkali mariposa lily	*Calochortus striatus*	No habitat (desert alkaline meadows, seeps) above elev. range (below about 5300 ft.)
Parish's daisy	*Erigeron parishii*	No suitable habitat (carbonate)
Cushenbury buckwheat	*Eriogonum ovalifolium var. vineum*	No suitable habitat (carbonate)
Moss gentian	*Gentiana fremontii*	Well below elev. range (occurs in San Gorgonio Wilderness)
Los Angeles sunflower	*Helianthus nuttallii ssp. parishii*	Well above elev. range (below about 4000 ft. elev.)
Barton Flats horkelia	*Horkelia wilderae*	Outside geogr. range (endemic to Barton Flats area)
California satintail	*Imperata brevifolia*	Well above elev. range (below about 3000 ft.)
San Bernardino Mtn. bladderpod	*Lesquerella kingii ssp. bernardinus*	No habitat (carbonate)
Adder's mouth	*Malaxis monophyllos ssp. brachypoda*	Well below elev. range (occurs in San Gorgonio Wilderness)
Cienega Seca oxythexca	*Oxytheca parishii var. cienegensis*	Outside geogr. range (known only from Cienega Seca and Pipes Cyn areas)
Cushenbury oxytheca	*Oxytheca parishii var. goodmaniana*	No habitat (carbonate)
Frosted mint	*Poliomintha incana*	No suitable habitat (desert dunes and sandy flats)
Narrow-leaved cottonwood	*Populus angustifolia*	No San Bernardino Mountain occurrences (local reports unverified)
Latimer's woodland gilia	*Saltugilia latimeri*	No habitat (desert shrubland,pinyon woodland); above elev. range (below about 6200 ft.)
Slender-petaled thelypodium	*Thelypodium stenopetalum*	No habitat (alkaline meadows)

Appendix 2: Special Status Species

Appendix 2: Special Status Species Potentially Occurring on the Project Site

Special Status Plants	Habitat and Distribution	Flower season	Conservation Status	Occurrence Probability
Abronia nana ssp. *covillei* Coville's dwarf abronia	Perennial herb; carbonate and sandy soils within pinon-juniper woodlands; San Bernardino Mts. and mountains of E Mojave, about 5,200 - 10,200 ft.	May -August	Fed: none Calif: S3.2 CNPS List 4.2	Low (marginally suitable habitat)
Allium parishii Parish's onion	Bulb; open shrubland & woodland, gen. sandy bajadas or mtn slopes, often carbonate soil, about 3000 – 5,500 ft. elev.; N San Bern Mtns and Moj Des Mtns, to W Ariz.	Apr - May	Fed: none Calif: S3.3? CNPS List 4.3	Minimal (above elev. range)
Arabis parishii Parish's rock cress	Perennial herb; pebble plains, occas. on carbonate soil; open dry sites in conifer forest; about 5,800 – 9,500 ft. elev.; San Bernardino Mtns. endemic	April - May	Fed: none Calif: S2.1 CNPS List 1B. 2	Occurs (2007 survey; NDDB report)
Arenaria lanuginosa ssp. *saxosa* (*A. confusa*) Rock sandwort	Perennial herb; sandy soils, streams or meadows; about 5900 to 8600 ft. elev.; San Bernardino Mtns, W US and N Baja Calif.	July - Aug	Fed: none Calif: S1.3 CNPS List 2.3	Moderate (moderately suitable habitat)
Arenaria ursina Bear Valley sandwort	Perennial herb, pebble plains, occas. on carbonate soils, about 5,900 – 9,500 ft. elev.; San Bernardino Mtns. endemic	June - July	Fed: THR Calif: S 2.1 CNPS: List 1B.2	Occurs? (NDDB record #23)
Aster bernardinus (*Symphyotrichum defoliatum*) San Bernardino aster	Perennial herb; wetlands and margins, near sea level to about 6,700 ft. elev.; formerly widespread, Kern Co to San Diego Co, but most sites extirpated	July - Nov	Fed: none Calif: S 3.2 CNPS List 1B.2	Low (field surveys; upper margin of elev. range)
Astragalus bicristatus Crested milk vetch	Perennial herb; rocky slopes, montane conifer forest; about 5,500 – 9,000 ft. elev.; San Bernardino, San Gabriel, and San Jacinto Mtns	May - August	Fed: none Calif: S3.3 CNPS List 4.3	High (suitable habitat occurs)
Astragalus lentiginosus var. *sierrae* Big Bear Valley milk vetch	Perennial herb; open rocky soils or compacted areas in pine forest; about 5,900 – 8,500 ft. elev.; San Bernardino Mtns endemic	April - August	Fed: none Calif: S1? CNPS List 1B.2	High (suitable habitat occurs)
Astragalus leucolobus Bear Valley woollypod	Perennial herb; open or disturbed soils, pine forests and sagebrush scrub, about 5,600-8,800 ft. elev.; San Gabriel Mtns to Santa Rosa Mtns	May - July	Fed: none Calif: S 2.2 CNPS List 1B.2	Occurs

Special Status Plants	Habitat and Distribution	Flower season	Conservation Status	Occurrence Probability
Calochortus palmeri vars. *palmeri* and *munzii* Palmer's & Munz's mariposa lilies	Bulb; meadows or seasonally moist sites; about 3,300 – 7,200 ft. elev.; var. *palmeri* occurs S Coast & Transverse Ranges, reported but not verified San Jacinto Mtns; var. *munzii* endemic to San Jacintos, reported but not verified in San Bernardinos	May - July	Fed: none CNPS List 1B.2 var *palmeri*: Calif: S 2.1 var. *munzii*: Calif: S 1.2	Moderate (marginally suitable habitat)
Carex occidentalis Western sedge	Rhizomatous perennial; meadows & seeps; San Bernardino Mtns, White Mtns, scattered in western states; about 6,200 - 10,300 ft. elev.	June - Aug	Fed: none Calif: S2S3 CNPS List 2.3	Moderate (marginal habitat)
Castilleja cinerea Ash-gray Indian paintbrush	Perennial herb; pebble plains, dry meadows, about 5,900 to 9,100 ft. elev.; partially parasitic usually on matting buckwheats; San Bernardino Mtns endemic	May - August	Fed: THR Calif: S2.2 CNPS List 1B.2	Occurs (field survey and CNDDB report)
Castilleja lasiorhyncha (*Orthocarpus lasiorhynchus*) San Bernardino Mountain owl's clover	Annual; meadows, streamsides, seeps, etc., about 4,200-7,800 ft. elev.; San Bernardino Mtns. and (historically) San Jacinto Mtns.; reports from San Diego Co. unconfirmed	June - Aug	Fed: none Calif: S2.2 CNPS List 1B.2	Moderate (marginal habitat)
Castilleja applegateii ssp. *martinii* H *C. angustifolia* (=*C. montigena*, *C. martinii* var. *ewanii*) Heckard's paintbrush	Perennial herb; conifer forest; San Bernardino Mountains endemic (treated as a species by CNPS but considered a hybrid by Chuang & Heckard in Jepson Manual)	March - July	Fed: none Calif: S3.3 CNPS List 4.3	Occurs (Jeffrey pine forest)
Dryopteris filix-mas Male fern	Perennial herb; widespread in N hemisphere, esp. at high latitudes; only two reports in Calif., incl. Holcomb Valley	July - Sept.	Fed: none Calif: S 1.3 CNPS List 2.3	Low (local rarity)
Dudleya abramsii ssp. *affinis* San Bernardino Mts. dudleya	Perennial herb, pebble plains & rock outcrops (often carbonate); pinyon woodland, open pine forests, about 5,200-8,500 ft. elev.; San Bernardino Mtns endemic	April - June	Fed: none Calif: S 2.2 CNPS: List 1B.2	Moderate (marginal habitat)
Eriogonum foliosum (*E. evanidum*) Leafy buckwheat	Annual; sandy soil, woodlands or shrublands; about 3,900-7,200 ft. elev.; scattered locations, Big Bear Valley to N Baja Calif.; may be extinct in Calif.	July - Oct.	Fed: none Calif: SH CNPS List 1B.2	Minimal (presumed extinct, local rarity)

Special Status Plants	Habitat and Distribution	Flower season	Conservation Status	Occurrence Probability
Eriogonum kennedyi var. *austromontanum* Southern mountain buckwheat	Matting woody perennial; pebble plains and similar soils, about 5,800 – 7,800 ft. elev.; nearly endemic to Big Bear area, also reported at Mt. Pinos	July - August	Fed: THR Calif: S2.2 CNPS: List 1B.2	Apparent introgression w/ Wright's buckwheat (see text)
Eriogonum microthecum var. *lacus-ursi* Bear Lake buckwheat	Subshrub; montane forests and shrublands; only known occurrence at Big Bear Lake shore ca. 7,200 ft. elev.	July - Sept	Fed: none Calif: S 1 CNPS List 1B.1	Minimal (field survey)
Eriophyllum lanatum var. *obovatum* Southern Sierra woolly sunflower	Perennial herb; open montane coniferous forests, 4,200-8,200 ft. elev.; S Sierra Nevada and western San Bernardino Mtns	June - July	Fed: none Calif: S3.3 CNPS: List 4.3	High (suitable habitat occurs)
Galium jepsonii (*G. angustifolium* var. *subglabrum*) Jepson's bedstraw	Perennial herb; sandy or gravelly soils, montane conifer forest, 6,500-8,100 ft. elev.; San Gabriel and San Bernardino Mtns	July - August	Fed: none Calif: S3.3 CNPS: List 4.3	High (suitable habitat occurs)
Galium johnstonii (*G. angustifolium* var. *pinetorum*) Johnston's bedstraw	Perennial herb, dry slopes, chaparral, lower montane forest, pinyon and juniper woodland; about 4,000-7,600 ft. elev.; San Bernardino, San Gabriel, maybe San Jacinto mtns	June - July	Fed: none Calif: S3.3 CNPS: List 4.3	Low-moderate (suitable habitat occurs; margin of elev. range)
Gilia leptantha ssp. *leptantha* San Bernardino Mtn. gilia	Annual; sandy or gravelly soils, open pine forest; endemic to upper Santa Ana Riv. watershed, San Bernardino Mtns., about 5,000 to 7,700 ft. elev.	June - Aug	Fed: none Calif: S2.3 CNPS: List 1B.3	Low (probably outside geogr. range)
Heuchera hirsutissima Shaggy-haired alum root *Heuchera parishii* Parish's alumroot	Perennial herbs; rocky outcrops, cliffs, slopes; montane forest or alpine boulderfields; above about 4,800 ft. elev.; *H. hirsutissima* is endemic to San Jacinto and Santa Rosa Mtns (unconfirmed from San Bernardino Mtns); *H. parishii* endemic to San Bernardino Mtns	May - July	Fed: none Calif: S2.3 CNPS: List 1B.3	Low (poorly suitable habitat)
Hulsea vestita ssp. *parryi* Parry's sunflower	Perennial herb; gen. conifer forests, on loose eroding soil and talus; San Bernardino Mtns and Little San Bern. Mtns; about 5,500-9,500 ft. elev.	April - August	Fed: none Calif: S 3.3 CNPS: List 4.3	Low-moderate (marginal habitat)

Special Status Plants	Habitat and Distribution	Flower season	Conservation Status	Occurrence Probability
Ivesia argyrocoma Silver-haired ivesia	Perennial herb; pebble plains, seasonal meadows, drainages; about 4,900-8,800 ft. elev.; San Bernardino Mtns and a long-disjunct site in Baja Calif mtns	June - August	Fed: none Calif: S2.2 CNPS: List 1B.2	Occurs (field survey & NDDB record)
Juncus duranii Duran's rush	Perennial herb; meadows, seeps, etc., montane forest, about 5,800-9,000 ft. elev.; San Bernardino, San Gabriel, and San Jacinto Mtns	July - August	Fed: none USFS: none Calif: S 3.3 CNPS: List 4.3	Low (masrginal habitat occurs)
Lewisia brachycalyx Short-sepaled lewisia	Perennial herb; wet meadows, mesic forest openings, about 4,500-7,600 ft. elev.; San Bernardino Mtns to Baja Calif, Utah, New Mexico	May - June	Fed: none Calif: S3.2 CNPS: List 2.2	Low-Moderate (marginal habitat)
Lilium parryi Lemon lily	Bulb; meadows and streambanks, about 4,200 – 8,600 ft. elev.; mtns of S Calif. and SE Arizona	July - August	Fed: none Calif: S2.1 CNPS: List 1B.2	Low (marginal habitat)
Linanthus killipii Baldwin Lake linanthus	Annual; pebble plains, alkaline meadows, forest openings, about 5,500-7,900 ft. elev.; San Bernardino Mtns endemic	May - July	Fed: none Calif: S 2.1 CNPS: List 1B.2	High (suitable habitat occurs)
Mimulus exiguus San Bernardino Mountain monkeyflower	Annual; open, seasonally moist meadows, seeps, drainages, about 5,900 – 7,600 ft. elev.; San Bernardino Mtns. and high mtns of Baja Calif.	June - July	Fed: none Calif: S 2.2 CNPS: List 1B.2	High (suitable habitat occurs)
Mimulus purpureus Purple monkeyflower	Annual; meadow edges, forests, drainages, seeps, about 6,200 – 7,600 ft. elev.; San Bernardino Mtns and high mtns of Baja Calif.	May - July	Fed: none Calif: S 2.2 CNPS: List 1B.2	High (suitable habitat occurs)
Navarretia peninsularis Baja navarretia	Annual herb; open, seasonally wet places in coniferous forests, about 4,900 -7,600 ft. elev.; mtns of central and S Calif. and N Baja Calif.	June - August	Fed: none Calif: S2.2 CNPS: List 1B.2	Low (small patches of marginal habitat)
Oxytheca caryophylloides Chickweed oxytheca	Annual; sandy soils in conifer forests, 3,900-8,500 ft. elev.; S Sierra Nevada, Transverse Ranges, San Jacinto Mtns	July - Sept.	Fed: none Calif: S3.3 CNPS: List 4.3	High (suitable habitat occurs)
Perideridia parishii ssp. *parishii* Parish's yampah	Perennial herb; meadows, moist areas in conifer forest, about 4,800 – 9,900 ft. elev.; San Bernardino Mtns and (disjunct) AZ, Nevada, New Mexico	June - August	Fed: none Calif: S2.2? CNPS: List 2.2	Low - moderate (marginal habitat)

Special Status Plants	Habitat and Distribution	Flower season	Conservation Status	Occurrence Probability
Phacelia exilis (*P. mohavensis* var. *exilis*) Transverse Range phacelia	Annual; sandy or gravelly soils, forest openings, meadows, pebble plains, about 3,600 – 8,900 ft. elev.; S Sierra Nevada and Transverse Ranges	May - August	Fed: none Calif: S 3.3 CNPS: List 4.3	High (suitable habitat occurs)
Phacelia mohavensis Mojave phacelia	Annual; sandy or gravelly soil; dry meadows and streambeds gen. within pine forest, about 4,500-8,100 ft. elev.; San Gabriel & San Bernardino Mtns.	April - August	Fed: none Calif: S 3.3 CNPS: List 4.3	High (suitable habitat occurs)
Phlox dolichantha Bear Valley phlox	Perennial herb; montane forest and pebble plains; about 6,000 – 9,800 ft. elev.; San Bernardino Mtns endemic	May - July	Fed: none Calif: S 2.2 CNPS: List 1B.2	High (suitable habitat occurs)
Poa atropurpurea San Bernardino bluegrass	Open, flat meadows, about 6,700 – 7,500 ft. elev. in the San Bernardinos; endemic to San Bernardino Mtns and San Diego Co. (Palomar and Laguna Mtns where it ranges down to about 4,400 ft. elev.)	May - June	Fed: END Calif: S2.2 CNPS: List 1B.2	Low (habitat marginal at best)
Potentilla glandulosa ssp. *ewanii* Ewan's cinquefoil	Perennial herb; mesic conifer forest, about 6,200-7,900 ft. elev.; nearly endemic to San Gabriel Mtns., but also reported from Fawnskin area, San Bernardino Mtns.	June - July	Fed: none Calif: S 1.3 CNPS List 1B.3	Low (field survey)
Pyrrocoma uniflora ssp. *gossypina* (*Haplopappus uniflorus* ssp. *gossypinus*) Bear Valley pyrrocoma	Perennial herb; meadows (usually alkaline), pebble plains, about 5,200 – 7,600 ft. elev.; San Bernardino Mts endemic	July - August	Fed: none Calif: S2.2 CNPS: List 1B.2	Low - moderate (marginally suitable habitat occurs)
Rupertia rigida (*Psoralea rigida*) Parish's rupertia	Perennial herb; chaparral, forests, and woodlands, about 2,300-8,200 ft. elev.; San Bernardino Mtns, Peninsular Ranges, Baja Calif.	June - July	Fed: none Calif: S3.3 CNPS: List 4.3	High (suitable habitat occurs)
Selaginella asprella Bluish spike-moss	Herb; rocks, crevices, & rocky soils, dry sites in conifer forests, about 5,200-8,800 ft. elev.; scattered mtn. ranges of cent. & S Calif., Baja Calif.	July	Fed: none Calif: S3.3 CNPS: List 4.3	Low (marginal habitat)
Senecio bernardinus (*Packera bernardinoa*) San Bernardino butterweed	Perennial herb; dry meadows (incl. alkaline), about 5,900-7,600 ft. elev.; San Bernardino Mtns endemic	May - July	Fed: none Calif: S 2.2 CNPS: List 1B.2	Low (marginally suitable habitat)

Special Status Plants	Habitat and Distribution	Flower season	Conservation Status	Occurrence Probability
Senecio ionophyllus Tehachapi ragwort	Perennial herb; crevices, rocky places in dry conifer forest, about 4,800-8,900 ft. elev.; S Sierra Nevada, San Gabriel and San Bernardino Mtns	June - July	Fed: none Calif: S3.3 CNPS: List 4.3	Moderate (suitable habitat)
Sidalcea hickmanii ssp. *parishii* Parish's checkerbloom	Perennial herb; chaparral, oak shrubland or woodland, pine forest; San Bernardino Mtns. and a few Santa Barbara Co. sites, about 3,200 – 6,000 ft. elev.	June - August	Fed: none CA: Rare S 1.2 CNPS: List 1B.2	Minimal (marginal habitat, above elev. range)
Sidalcea pedata Bird's foot checkerbloom	Perennial herb; meadows (freshwater or alkaline clay), sometimes streambanks, about 5,200-8,200 ft. elev.; San Bernardino Mtns endemic	May - July	Fed: END Calif: END, 1.1 CNPS: List 1B.1	Low (habitat marginal at best)
Sphenopholis obtusata Prairie wedge grass	Perennial grass; riparian woodlands, meadows, streambanks; about 1,000 – 6,600 ft. elev.; few scattered locns in Calif. but widespread in N America	April - July	Fed: none Calif: S2.2 CNPS: List 2.2	Low (upper margin elev. range; poor habitat)
Streptanthus bernardinus Laguna Mountains jewelflower	Perennial herb; chaparral, hardwood & conifer forest, about 3,900-8,100 ft. elev.; mtns of S Calif. (gen. W half of San Bernardino Mtns)	June - July	Fed: none Calif: S 3.3 CNPS: List 4.3	Moderate (margin of geogr. range)
Streptanthus campestris Southern jewelflower	Perennial herb; shrublands, forests, woodlands, often rocky sites, about 2,900 -7,600 ft. elev.; Transverse and Peninsular Ranges, Baja Calif.	May - July	Fed: none Calif: S 2.3 CNPS: List 1B.3	High (suitable habitat occurs)
Swertia neglecta (*Frasera neglecta*) Pine green-gentian	Perennial herb; conifer forests and pinyon woodland., about 4,600-8,200 ft. elev.; S Coastal Ranges and Transverse Ranges	May - July	Fed: none Calif: S 3.3 CNPS: List 4.3	High (suitable habitat occurs)
Taraxacum californicum California dandelion	Perennial herb; wet meadows, about 5,300 – 9,200 ft. elev.; San Bernardino Mtns endemic	May - Aug	Fed: END Calif: S2.1 CNPS: List 1B.2	Low - moderate (suitable habitat occurs)
Thelypodium stenopetalum Slender-petaled thelypodium	Perennial herb; meadows (mesic, usually alkaline clay), about ,5200 – 8,200 ft. elev.; endemic to Big Bear and Holcomb Valleys	May - Aug	Fed: END Calif: END, 1.1 CNPS: List 1B.1	Minimal (no alkaline meadow habitat)
Trichostema micranthum Small-flowered bluecurls	Annual; dry margins of lakes, meadows, and streams, 5,000-7,600 ft. elev., San Bernardino Mtns and Baja Calif.	July - Sept.	Fed: none Calif: S3.3 CNPS: List 4.3	High (suitable habitat occurs)

Special Status Plants	Habitat and Distribution	Flower season	Conservation Status	Occurrence Probability
Viola pinetorum ssp. *grisea* Grey-leaved violet	Perennial herb; montane forests, about 4,900 -11,200 ft. elev.; S Sierra Nevada and reported San Bernardino Mtns (CNPS but no other source)	April - July	Fed: none Calif: S 1.3 CNPS: List 1B.3	Low (suitable habitat occurs; may be outside geogr. range)
General references: CDFG 2007a, 2007b; CNPS 2007; Hickman (ed.) 1993; Munz 1974; Sanders et al. 1995; Tibor 2001, US Fish and Wildlife Service 2006.				

Appendix 3: Species List

Appendix 3: Species Observed

The following species were observed onsite during the 2007 survey period.

Plants			
Latin Name	**Common Name**	**Frequency/Location**	**Voucher #**
CUPRESSACEAE	**CYPRESS FAMILY**		
Calocedrus decurrens	Incense cedar	Occas. / forest	
Juniperus occidentalis	Western juniper	Comm. / forest	
PINACEAE	**PINE FAMILY**		
Abies concolor	White fir	Occas. / forest	
Pinus jeffreyi	Jeffrey pine	Comm. / forest	
Pinus monophylla	Pinyon pine	Occas. /forest	
APIACEAE	**CELERY FAMILY**		
Lomatium nevadense	Nevada lomatium	Uncomm. / forest	11669
Tauschia parishii	Parish tauschia	Scarce / open places	11668
ASTERACEAE	**ASTER FAMILY**		
Achillia millefolium	California yarrow	Comm. / esp. mesic sites	
Agoseris retrorsa	Spear-leaved agoseris	Occas. / throughout	
Antennaria dimorpha	Low everlasting	Comm. / pebble plains	
Artemisia dracunculus	Tarragon	Occas. / esp. near road, lakeshore	
Artemisia ludoviciana	Western mugwort	Occas. / open places, washes	
Artemisia tridentata	Great Basin sagebrush	Comm. / open forest	
Aster frondosus	Short-rayed alkali aster	Occas.-comm. / near shore	
Chrysothamnus nauseosus	Common rabbitbrush	Occas. / throughout	
Chrysothamnus viscidiflorus	Curlleaf rabbitbrush	Occas.-comm. / throughout	
Cirsium occidentale var. californicum	California thistle	Uncomm. / open sites	
* *Cirsium vulgare*	Bull thistle	Occas. / near shore	
Erigeron breweri	Brewer's daisy	Occas. / forest	
Erigeron divergens	Diffuse daisy	Comm. / gen. open places	11667
Eriophyllum confertiflorum	Golden yarrow	Comm. / ± throughout	
Gnaphalium canescens	Perennial cudweed	Uncomm. / gen. open places	
* *Gnaphalium luteo-album*	Pearly everlasting	Occas. / roadside, shoreline	
Hymenopappus filifolius	Columbia cutleaf	Uncomm. / open forest	
* *Lactuca serriola*	Prickly lettuce	Occas. / mostly roadside	
Lessingia filaginifolia (Corethrogyne filaginifolia)	Chaparral aster	Occas. / open forest	
Madia elegans	Elegant tarplant	Occas. / forest	
* *Senecio vulgaris*	Common groundsel	Uncomm. / gen. roadside	
Solidago californica	California goldenrod	Occas. / mesic sites	
* *Sonchus oleraceus*	Common sow thistle	Occas. / near shore	

Appendix 3: Species Observed

The following species were observed onsite during the 2007 survey period.

Plants			
Latin Name	**Common Name**	**Frequency/Location**	**Voucher #**
* *Taraxacum officinale*	Common dandelion	Occas. / roadside, shoreline	
Tetradymia comosa	Hairy horsebrush	Occas. / open forest	
* *Tragopogon dubius*	Oyster plant, salsify	Occas. / roadside, forest	
BORAGINACEAE	**BORAGE FAMILY**		
Cryptantha micrantha	Purple root cryptantha	Occas. / open places	
Cryptantha simulans	Popcorn flower	Scarce / open places	11670
BRASSICACEAE	**MUSTARD FAMILY**		
Arabis holboellii (?)	Holboell's rock-cress	Occas. / open forest	
** *Arabis parishii*	Parish's rock-cress	Occas. / pebble plains	11665
Caulanthus major	Slender wild-cabbage	Occas. / forest	
Descurainia incisa (D. richardsonii)	Mountain tansy mustard	Uncomm. / near road	
Descurainia pinnata	Tansy mustard	Occas. / mostly open forest	
Erysiumum capitatum	Douglas wallflower	Occas. / ±throughout	
* *Lepidium virginicum v. pubescens*	Wild peppergrass	Occas. / mostly roadside, shoreline	
* *Sisymbrium altissimum*	Tumble mustard	Occas. / roadside	
CACTACEAE	**CACTUS FAMILY**		
Opuntia basilaris var. basilaris	Common beavertail cactus	Uncomm. / open forest	
CAPRIFOLIACEAE	**HONEYSUCKLE FAMILY**		
Symphoricarpos rotundifolius var. parishii	Parish snowberry	Occas. / shaded forest	
CARYOPHYLLACEAE	**CARNATION FAMILY**		
Silene verecunda ssp. platyota	Cuyamaca campion	Occas. / forest	
CHENOPODIACEAE	**GOOSEFOOT FAMILY**		
* *Chenopodium album (?)*	Common goosefoot	Occas. / throughout	
* *Salsola tragus*	Russian thistle, tumbleweed	Occas. / mostly roadside	
CONVOLVULACEAE	**MORNING GLORY FAMILY**		
Calystegia malacophylla ssp. fulcrata (C. fulcrata)	Morning glory	Occas. / throughout	
ERICACEAE	**MANZANITA FAMILY**		
Arctostaphylos patula	Greenleaf manzanita	Occas.-comm. / forest	
EUPHORBIACEAE	**SPURGE FAMILY**		
Chamaesyce albomarginata	Rattlesnake spurge	Occas. / open forest	
Euphorbia palmeri	Wood spurge	Occas. / uplands	
FABACEAE	**PEA FAMILY**		
Amorpha californica	California false indigo	Occas. / mesic forest	
** *Astragalus leucolobus*	Bear Valley woollypod	Comm. / pebble plains	11705
Astragalus douglasii	Douglas rattleweed	Uncomm. / open places	

Appendix 3: Species Observed

The following species were observed onsite during the 2007 survey period.

Plants			
Latin Name	**Common Name**	**Frequency/Location**	**Voucher #**
Lotus argyraeus	Silver lotus	Occas. / open forest	
Lotus nevadensis	Nevada lotus	Comm. / open places	
Lupinus cf. breweri	Silver mat lupine	Comm. / pebble plains, etc.	
Lupinus excubitus var. austromontanus	Southern mountain lupine	Occas. / ± throughout	11666
Lupinus lepidus v. confertus	Prairie lupine	Occas. / lakeshore	
* *Medicago lupulina*	Black medick	Uncomm. / near lakeshore	
* *Melilotus alba*	White sweet-clover	Occas.-comm. / roadsides, shore	
FAGACEAE	**OAK FAMILY**		
Quercus kelloggii	California black oak	Comm. / forest	
GERANIACEAE	**GERANIUM FAMILY**		
* *Erodium cicutarium*	Red-stemmed filaree	Occas.-comm. / roadsides, etc.	
HYDROPHYLLACEAE	**WATERLEAF FAMILY**		
Eridictyon trichocalyx	Yerba santa	Occas. / open forest	
Phacelia distans (?)	Common phacelia	Uncomm. / open forest	
Phacelia imbricata	Broad-sepaled phacelia	Uncomm. / open forest	
LAMIACEAE	**MINT FAMILY**		
Monardella linoides (?) (or M. odoratissima)	Flax-leaved monardella	Occas. / forest	
Scutellaria siphocampyloides (S. austinae)	Austin's skullcap	Uncomm. / mesic forest	
LOASACEAE	**STICK-LEAF FAMILY**		
Mentzelia sp.	Unid. stick-leaf	Uncomm. / uplands	11674
MALVACEAE	**MALLOW FAMILY**		
* *Malva parviflora*	Cheeseweed	Occas. / mostly lakeshore	
ONAGRACEAE	**EVENING PRIMROSE FAMILY**		
Clarkia sp.	Unid. annual clarkia	Uncomm. / shaded forest	
Epilobium brachycarpum (E. paniculatum)	Summer cottonweed	Occas.-comm. upland margins	
Epilobium ciliatum	Willow-herb	Occas. / mostly lakeshore	
Gaypohytum sp.	Unid. gayophytum	Comm. / open forest	
POLEMONIACEAE	**PHLOX FAMILY**		
Gilia latiflora (?)	Broad-flowered gilia	Uncomm. / open forest	
Gilia modocensis	Modoc gilia	Occas. /open places	11659
Eriastrum densifolium ssp. densifolium	Mojave woolly-star	Occas. / open forest	
Eriastrum sapphirinum	Sapphire woollystar	Occas. / open forest	
Linanthus breviculus	Mojave linanthus	Comm. / open forest	
Phlox gracilis	Slender phlox	Comm. / open places	11660

Appendix 3: Species Observed

The following species were observed onsite during the 2007 survey period.

Plants			
Latin Name	**Common Name**	**Frequency/Location**	**Voucher #**
POLYGONACEAE	**BUCKWHEAT FAMILY**		
Eriogonum davidsonii (=E. molestum var. davidsonii)	Davidson buckwheat	Occas. / open forest	
Eriogonum wrightii ssp. subscaposum	Wright's buckwheat	Comm. & characteristic / pebble plains	
Eriogonum umbellatum v. munzii	Munz sulfur buckwheat	Occas. / open forest	
* *Polygonum arenastrum*	Common knotweed	Occas. / roadside, lake shore	
* *Rumex crispus*	Curly dock	Occas. / mostly lakeshore	
Rumex salicifolius	Willow dock	Uncomm. / near lakeshore	
PORTULACACEAE	**PURSLANE FAMILY**		
Lewisia rediviva	Bitter root	Occas.-comm. / pebble plains	
RANUNCULACEAE	**BUTTERCUP FAMILY**		
Delphinium parishii (?)	Parish larkspur	Occas. / forest	
* *Ranunculus sceleratus*	Cursed buttercup	Occas. / lakeshore	11656
RHAMNACEAE	**BUCKTHORN FAMILY**		
Ceanothus cordulatus	Mountain whitethorn	Occas. / open forest	
Ceanothus greggii	Cupleaf ceanothus	Uncomm. / open forest	
Ceanothus integerrimus	Deerbrush	Occas. / forest	
ROSACEAE	**ROSE FAMILY**		
Amelanchier utahensis	Service berry	Comm. / ± throughout	
Cercocarpus betuloides	Birch-leaf mountain mahogany	Uncomm.	
Cercocarpus ledifolius	Curlleaf mountain mahogany	Comm. / ± throughout	
Horkelia rydbergii (H. bolanderi s. parryi)	Transverse range horkelia	Occas. / mostly near lake	
** *Ivesia argyrocoma*	Silver-haired ivesia	locally comm. / pebble pl.	11658
Potentilla anserina	Silverweed	Comm. / lakeshore	
Potentilla biennis	Biennial cinquefoil	Comm. / lakeshore	11671
Potentilla gracilis	Slender cinquefoil	Occas. / mesic places	
Potentilla wheeleri	Wheeler cinquefoil	Scarce / near lakeshore	11673
RUBIACEAE	**COFFEE FAMILY**		
* *Galium aparine*	Goose grass	Uncomm. / shaded forest	
Galium parishii	Parish bedstraw	Occas. / forest	
SALICACEAE	**WILLOW FAMILY**		
Populus balsamifera trichocarpa	Black cottonwood	Seedlings only / lakeshore	
Salix laevigata (?)	Red willow	Uncomm. / lakeshore	
Salix lasiolepis (?)	Arroyo willow	Comm. / lakeshore	

Appendix 3: Species Observed

The following species were observed onsite during the 2007 survey period.

Plants			
Latin Name	**Common Name**	**Frequency/Location**	**Voucher #**
SCROPHULARIACEAE	**SNAPDRAGON FAMILY**		
** *Castilleja cinera*	Ash-gray paintbrush	Localized / pebble plains	11657
** *Castilleja montigena (C. applegatei ssp. martinii)*	Heckerd's paintbrush	Occas. / forest	
Collinsis parviflora	Small-flowered blue-eyed Mary	Comm., patchy / peb. pl.	11661
Limosella acaulis	Mudwort	Comm.-abund. / wet lakeshore	11655
Mimulus guttatus	Seep monkeyflower	Occas. / lakeshore	
Pedicularis semibarbata	Pine-woods lousewort	Occas. / forest	11664
Penstemon eatonii	Eaton firecracker	Occas. / forest	
* *Verbascum thapsus*	Common muellin	Occas. / throughout	
SOLANACEAE	**NIGHTSHADE FAMILY**		
Solanum xanti	Chaparral nightshade	Uncomm. / forest	
STERCULIACEAE	**CACAO FAMILY**		
Fremontodendron californicum	Flannel bush	Occas.-comm. / open forest	
TAMARICACEAE	**TAMARISK FAMILY**		
Tamarix ramosissima	Mediterranean tamarisk	Occas. / lakeshore	
URTICACEAE	**NETTLE FAMILY**		
Urtica dioica ssp. holosericea	Stinging nettle	Occas. / lakeshore	
VIOLACEAE	**VIOLET FAMILY**		
Viola douglasii	Douglas violet	Occas. / pebble plains	11663
Viola purpurea	Mountain violet	Occas. / throughout	11662
VISCACEAE	**MISTLETOE FAMILY**		
Arceuthobium campylopodum	Dwarf mistletoe	Uncomm. / on yellow pines	
CYPERACEAE	**SEDGE FAMILY**		
Carex athrostachya	Slender-beaked sedge	Occas. / near lake	
Carex sp.	Unid. sedge	Uncomm. / near lakeshore	11671
JUNCACEAE	**RUSH FAMILY**		
Juncus arcticus (incl. vars. balticus and mexicanus)	Wire-grass	Occas.-comm. / mesic areas	
LILIACEAE	**LILY FAMILY**		
Allium parryi	Parry's onion	Occas. / mostly pebble plains	
Calochortus kennedyi	Kennedy's mariposa lily	Uncomm. / open forest	
POACEAE	**GRASS FAMILY**		
Agrostis sp.	Unid. bentgrass	Occas. / lakeshore	
Alopecurus aequalis	Short-awn foxtail	Comm., patchy / near shore	
Bromus carinatus	California brome	Occas. / uplands, ±throughout	

Appendix 3: Species Observed

The following species were observed onsite during the 2007 survey period.

Plants			
Latin Name	**Common Name**	**Frequency/Location**	**Voucher #**
Bromus orcuttianus (?)	Orcutt brome	Uncomm. / mesic forest	
* *Bromus tectorum*	Cheat grass	Comm. / ± throughout	
Elymus elymoides (Sitanion hystrix v. hystrix)	Bottlebrush squirreltail	Occas. / ± throughout	
Elymus glaucus	Blue wild-rye	Occas. / ± throughout	
Hordeum jubatum	Foxtail barley	Uncomm. / mostly near lake	
* *Koeleria macrantha*	Junegrass	Occas. / mesic forest, uplands	
Melica stricta	Nodding melic	Uncomm. patchy, uplands	
Muhlenbergia rigens	Deergrass	Occas. / throughout	
Poa fendleriana	Fendler bluegrass	Occas.-comm. / forest	
Poa secunda	Nodding bluegrass	Comm. / ± throughout	
* *Polypogon monspeliensis*	Rabbitfoot grass	Occas.-comm. / near shore	
Pucinellia nuttalliana	Alkali grass	Uncomm. / low-lying mesic site	
Stipa coronata ssp. depauperata (Achnatherum parishii)	Parish needlegrass	Occas. / mostly open forest	
Stipa lettermannii	Letterman's needlegrass	Occas. / forest	
Vulpia microstachys (Festuca microstachys, F. reflexa, F. pacifica, F. confusa)	Annual fescue	Uncomm. patchy / upland	

Alien species indicated by asterisk, special status species indicated by two asterisks. This list includes only species observed on the site. Others may have been overlooked or unidentifiable due to season.

Plants were identified using keys, descriptions, and illustrations in Abrams (1923-1951), Hickman (1993), Munz (1974), and other regional references. Taxonomy and nomenclature generally follow Hickman.

Some plants were collected as vouchers (see collection numbers at right) and will be donated to the Herbaria at Rancho Santa Ana Botanic Garden or UC Riverside.

Appendix 3: Species Observed

The following species were observed onsite during the 2007 survey period.

Vertebrate Animals	
Latin Name	**Common Name**
AMPHIBIA	**AMPHIBIANS**
SALAMANDRIDAE	**NEWTS**
Taricha torosa	California newt
PLETHODONTIDAE	**LUNGLESS SALAMANDERS**
Ensatina eschscholtzii	Ensatina
Aneides lugubris	Arboreal salamander
Batrachoseps pacificus	Pacific slender salamander
PELOBATIDAE	**SPADEFOOT TOADS**
** *Scaphiopus hammondii*	Western spadefoot
BUFONIDAE	**TRUE TOADS**
Bufo boreas	Western toad
Bufo woodhousei	Woodhouse toad
** *Bufo microscaphus*	Southwestern toad
Bufo punctatus	Red-spotted toad
HYLIDAE	**TREEFROGS**
Hyla cadaverina	California treefrog
Hyla regilla	Pacific treefrog
RANIDAE	**TRUE FROGS**
** *Rana aurora*	Red-legged frog
** *Rana pipiens*	Northern leopard frog
* *Rana catesbeiana*	Bullfrog
REPTILIA	**REPTILES**
EMYDIDAE	**BOX AND WATER TURTLES**
** *Clemmys marmorata*	Western pond turtle
TESTUDINIDAE	**LAND TORTOISES**
** *Gopherus agassizii (Xerobates agassizi)*	Desert tortoise
TRIONYCHIDAE	**SOFTSHELL TURTLES**
Trionyx spiniferus	Spiny softshell
GEKKONIDAE	**GECKOS**
Coleonyx variegatus	Western banded gecko
** *Coleonyx swaitaki*	Barefoot gecko
Phyllodactylus xanti	Leaf-toed gecko
IGUANIDAE	**IGUANID LIZARDS**
Dipsosaurus dorsalis	Desert iguana
Sauromalus obesus	Common chuckwalla
Callisaurus draconoides	Zebra-tailed lizard
** *Uma notata ssp. notata*	Colorado desert fringe-toed lizard
** *Uma inornata*	Coachella valley fringe-toed lizard
** *Uma scoparia*	Mojave fringe-toed lizard
Crotaphytus insularis	Desert collared lizard
Gambelia wislizenii	Long-nosed leopard lizard

The following species were observed onsite during the 2007 survey period.

Vertebrate Animals	
Latin Name	**Common Name**
Sceloporus magister	Desert spiny lizard
Sceloporus orcutti	Granite spiny lizard
Sceloporus occidentalis	Western fence lizard
Sceloporus grasiosus	Sagebrush lizard
Uta stansburiana	Side-blotched lizard
Urosaurus graciosus	Long-tailed brush lizard
Petrosaurus mearnsi	Banded rock lizard
** *Phrynosoma coronatum ssp. blainvillei*	San Diego horned lizard
Phrynosoma platyrhinos	Desert horned lizard
** *Phrynosoma mcallii*	Flat-tailed horned lizard
XANTUSIIDAE	**NIGHT LIZARDS**
Xantusia henshawi	Granite night lizard
Xantusia vigilis	Desert night lizard
SCINCIDAE	**SKINKS**
Eumeces skiltonianus	Western skink
Eumeces gilberti	Gilbert skink
TEIIDAE	**WHIPTAILS**
** *Cnemidophorus hyperythrus*	Orange-throated whiptail
** *Cnemidophorus tigris*	Western whiptail
ANGUIDAE	**ALLIGATOR LIZARDS**
Gerrhonotus multicarinatus	Southern alligator lizard
ANNIELLIDAE	**LEGLESS LIZARDS**
** *Aniella pulchra ssp. pulchra*	Silvery legless lizard
LEPTOTYPHLOPIDAE	**SLENDER BLIND SNAKES**
Leptotyphlops humilis	Western blind snake
BOIDAE	**BOAS AND PYTHONS**
** *Charina bottae ssp. umbratica*	Southern rubber boa
Lichanura trivirgata	Rosy boa
COLUBRIDAE	**COLUBRIDS**
** *Diadophis punctatus*	Ringneck snake
Phyllorhynchus decurtatus	Spotted leaf-nosed snake
Coluber constrictor	Racer
Masticophis flagellum	Coachwhip
Masticophis lateralis	California whipsnake
** *Salvadora hexalepis*	Western patch-nosed snake
Arizona elegans	Glossy snake
Pituophis melanoleucus	Gopher snake
Lampropeltis getulus	Common kingsnake
** *Lampropeltis zonata ssp. pulchra*	San Bernardino Mountain kingsnake
Rhinocheilus lecontei	Long-nosed snake
Thamnophis sirtalis	Common garter snake
Thamnophis elegans	Western terrestrial garter snake

Appendix 3: Species Observed

The following species were observed onsite during the 2007 survey period.

Vertebrate Animals	
Latin Name	**Common Name**
** *Thamnophis hammondii*	Two-striped garter snake
VIPERIDAE	**VIPERS**
Crotalus atrox	Western diamondback rattlesnake
** *Crotalus ruber*	Red diamond rattlesnake
Crotalus mitchellii	Speckled rattlesnake
Crotalus cerastes	Sidewinder
Crotalus viridis	Western rattlesnake
Crotalus scutulatus	Mojave rattlesnake
AVES	**BIRDS**
GAVIIDAE	**LOONS**
Gavia immer	Common loon
PODICIPEDIDAE	**GREBES**
Podilymbus podiceps	Pied-billed grebe
Podiceps nigricollis	Eared grebe
Aechmophorus occidentalis	Western grebe
Aechmophorus clarkii	Clark's grebe
PELECANIDAE	**PELICANS**
Pelecanus erythrorhynchos	American white pelican
** *Pelecanus occidentalis*	Brown pelican
PHALACROCORACIDAE	**CORMORANTS**
Phalacrocorax auritus	Double-crested cormorant
ARDEIDAE	**HERONS**
Botaurus lentiginosus	American bittern
Ardea herodias	Great blue heron
Casmerodius albus	Great egret
Egretta thula	Snowy egret
Bubulcus ibis	Cattle egret
Butorides striatus	Green-backed heron
** *Nycticorax nycticorax*	Black-crowned night heron
THRESKIORNITHIDAE	**IBISES AND SPOONBILLS**
** *Plegadis chihi*	White-faced ibis
ANATIDAE	**DUCKS, GEESE AND SWANS**
Anser albifrons	Greater white-fronted goose
Chen caerulescens	Snow goose
Chen rossii	Ross' goose
Branta canadensis	Canada goose
Anas crecca	Green-winged teal
Anas platyrhynchos	Mallard
Anas acuta	Northern pintail
Anas discors	Blue-winged teal
Anas cyanoptera	Cinnamon teal
Anas clypeata	Northern shoveler

Appendix 3: Species Observed

The following species were observed onsite during the 2007 survey period.

Vertebrate Animals	
Latin Name	**Common Name**
Anas strepera	Gadwall
Anas americana	American wigeon
Aythya valisineria	Canvasback
Aythya americana	Redhead
Aythya collaris	Ring-necked duck
Aythya affinis	Lesser scaup
Bucephala clangula	Common goldeneye
Bucephala albeola	Bufflehead
Mergus merganser	Common merganser
Mergus serrator	Red-breasted merganser
Oxyura jamaicensis	Ruddy duck
RALLIDAE	**RAILS, GALLINULES, COOTS**
Rallus longirostris	Clapper rail
Rallus limicola	Virginia rail
Porzana carolina	Sora
Gallinula chloropus	Common moorhen
Fulica americana	American coot
CATHARTIDAE	**VULTURES**
Cathartes aura	Turkey vulture
ACCIPITRIDAE	**HAWKS, EAGLES, HARRIERS**
** *Pandion haliaetus*	Osprey
** *Elanus caeruleus*	Black-shouldered kite
** *Aquila chrysaetos*	Golden eagle
** *Haliaeetus leucocephalus*	Bald eagle
** *Circus cyaneus*	Northern harrier
** *Accipiter striatus*	Sharp-shinned hawk
** *Accipiter cooperii*	Cooper's hawk
Buteo lineatus	Red-shouldered hawk
** *Buteo swainsoni*	Swainson's hawk
Buteo jamaicensis	Red-tailed hawk
** *Buteo regalis*	Ferruginous hawk
Buteo lagopus	Rough-legged hawk
FALCONIDAE	**FALCONS**
Falco sparverius	American kestrel
** *Falco columbarius*	Merlin
** *Falco peregrinus*	Peregrine falcon
** *Falco mexicanus*	Prairie falcon
PHASIANIDAE	**GROUSE AND QUAIL**
Alectoris chukar	Chukar
Phasianus colchicus	Ring-necked pheasant
Callipepla gambelii	Gambel's quail
Callipepla californica	California quail

The following species were observed onsite during the 2007 survey period.

Vertebrate Animals	
Latin Name	**Common Name**
Oreortyx pictus	Mountain quail
CHARADRIIDAE	**PLOVERS**
Pluvialis squatarola	Black-bellied plover
** *Charadrius alexandrinus*	Snowy plover
Charadrius semipalmatus	Semipalmated plover
Charadrius vociferus	Killdeer
** *Charadrius montanus*	Mountain plover
RECURVIROSTRIDAE	**STILTS AND AVOCETS**
Himantopus mexicanus	Black-necked stilt
Recurvirostra americana	American avocet
SCOLOPACIDAE	**SANDPIPERS**
Tringa melanoleuca	Greater yellowlegs
Tringa flavipes	Lesser yellowlegs
Catoptrophorus semipalmatus	Willet
Actitis macularia	Spotted sandpiper
Numenius phaeopus	Whimbrel
Numenius americanus	Long-billed curlew
Limosa fedoa	Marbled godwit
Arenaria interpres	Ruddy turnstone
Arenaria melanocephala	Black turnstone
Calidris canutus	Red knot
Calidris alba	Sanderling
Calidris pusilla	Semipalmated sandpiper
Calidris mauri	Western sandpiper
Calidris minutilla	Least sandpiper
Calidris alpina	Dunlin
Limnodromus griseus	Short-billed dowitcher
Limnodromus scolopaceus	Long-billed dowitcher
Gallinago gallinago	Common snipe
Phalaropus tricolor	Wilson's phalarope
Phalaropus lobatus	Red-necked phalarope
LARIDAE	**GULLS AND TERNS**
Larus philadelphia	Bonaparte's gull
Larus delawarensis	Ring-billed gull
Larus californicus	California gull
Larus argentatus	Herring gull
Larus occidentalis	Western gull
Sterna caspia	Caspian tern
Sterna hirundo	Common tern
Sterna forsteri	Forster's tern
COLUMBIDAE	**PIGEONS AND DOVES**
Columba livia	Rock dove

The following species were observed onsite during the 2007 survey period.

Vertebrate Animals	
Latin Name	**Common Name**
Columba fasciata	Band-tailed pigeon
* *Streptopelia chinensis*	Spotted dove
Zenaida asiatica	White-winged dove
Zenaida macroura	Mourning dove
Columbina passerina	Common ground-dove
CUCULIDAE	**CUCKOOS**
Geococcyx californianus	Greater roadrunner
TYTONIDAE	**BARN OWLS**
Tyto alba	Common barn-owl
STRIGIDAE	**TYPICAL OWLS**
Otus kennicottii	Western screech-owl
Bubo virginianus	Great horned owl
** *Speotyto cunicularia*	Burrowing owl
** *Asio otus*	Long-eared owl
CAMPRIMULGIDAE	**NIGHTJARS**
Chordeiles acutipennis	Lesser nighthawk
Chordeiles minor	Common nighthawk
Phalaenoptilus nuttallii	Common poorwill
APODIDAE	**SWIFTS**
Chaetura vauxi	Vaux's swift
Aeronautes saxatalis	White-throated swift
TROCHILIDAE	**HUMMINGBIRDS**
Archilochus alexandri	Black-chinned hummingbird
Calypte anna	Anna's hummingbird
Calypte costae	Costa's hummingbird
Selasphorus rufus	Rufous hummingbird
Selasphorus sasin	Allen's hummingbird
ALCEDINIDAE	**KINGFISHERS**
Ceryle alcyon	Belted kingfisher
PICIDAE	**WOODPECKERS**
Melanerpes formicivorus	Acorn woodpecker
Melanerpes lewis	Lewis' woodpecker
Sphyrapicus nuchalis	Red-naped sapsucker
Sphyrapicus thyroideus	Williamson's sapsucker
Picoides scalaris	Ladder-backed woodpecker
Picoides nuttallii	Nuttall's woodpecker
Picoides pubescens	Downy woodpecker
Picoides villosus	Hairy woodpecker
Picoides albolarvatus	White-headed woodpecker
Colaptes auratus	Northern flicker
TYRANNIDAE	**TYRANT FLYCATCHERS**
Contopus borealis	Olive-sided flycatcher

The following species were observed onsite during the 2007 survey period.

Vertebrate Animals	
Latin Name	**Common Name**
Contopus sordidulus	Western wood-pewee
Empidonax trailii	Willow flycatcher
Empidonax hammondii	Hammond's flycatcher
Empidonax oberholseri	Dusky flycatcher
Empidonax wrightii	Gray flycatcher
Empidonax difficilis	Western flycatcher
Sayornis nigricans	Black phoebe
Sayornis saya	Say's phoebe
Myiarchus cinerascens	Ash-throated flycatcher
Tyrannus vociferans	Cassin's kingbird
Tyrannus verticalis	Western kingbird
ALAUDIDAE	**LARKS**
Eremophila alpestris	Horned lark
HIRUNDINIDAE	**SWALLOWS**
Tachycineta bicolor	Tree swallow
Tachycineta thalassina	Violet-green swallow
Stelgidopteryx serripennis	Northern rough-winged swallow
Hirundo pyrrhonota	Cliff swallow
Hirundo rustica	Barn swallow
CORVIDAE	**CROWS AND JAYS**
Cyanocitta stellari	Stellar's jay
Aphelocoma coerulescens	Scrub jay
Gymnorhinus cyanocephalus	Pinyon jay
Nucifraga columbiana	Clark's nutcracker
Corvus brachyrhynchos	American crow
Corvus corax	Common raven
PARIDAE	**CHICKADEES AND TITMICE**
Parus gambeli	Mountain chickadee
Parus inornatus	Plain titmouse
REMIZIDAE	**VERDINS**
Auriparus flavipes	Verdin
AEGITHALIDAE	**BUSHTITS**
Psaltriparus minimus	Bushtit
SITTIDAE	**NUTHATCHES**
Sitta canadensis	Red-breasted nuthatch
Sitta carolinensis	White-breasted nuthatch
Sitta pygmaea	Pygmy nuthatch
CERTHIIDAE	**CREEPERS**
Certhia americana	Brown creeper
TROGLODYTIDAE	**WRENS**
Campylorhynchus brunneicapillus	Cactus wren
** *Campylorhynchus brunneicapillus*	Coastal cactus wren

The following species were observed onsite during the 2007 survey period.

Vertebrate Animals	
Latin Name	**Common Name**
Salpinctes obsoletus	Rock wren
Catherpes mexicanus	Canyon wren
Thryomanes bewickii	Bewick's wren
Troglodytes aedon	House wren
Cistothorus palustris	Marsh wren
CINCLIDAE	**DIPPERS**
Cinclus maxicanus	American dipper
MUSCICAPIDAE	**THRUSHES AND ALLIES**
Ixoreus naevius	Varied thrush
Regulus calendula	Ruby-crowned kinglet
Polioptila caerula	Blue-gray gnatcatcher
** *Polioptila melanura*	Black-tailed gnatcatcher
** *Polioptila californica*	California gnatcatcher
Sialia mexicana	Western bluebird
Sialia currucoides	Mountain bluebird
Myadestes townsendi	Townsend's solitaire
Catharus ustulatus	Swainson's thrush
Catharus guttatus	Hermit thrush
Turdus migratorius	American robin
Chamaea fasciata	Wrentit
MIMIDAE	**MOCKINGBIRDS AND THRASHERS**
Mimus polyglottos	Northern mockingbird
Oreoscoptes montanus	Sage thrasher
Toxostoma redivivum	California thrasher
** *Toxostoma crissale*	Crissal thrasher
** *Tosxostoma lecontei*	Le Conte's thrasher
MOTACILLIDAE	**WAGTAILS AND PIPITS**
Anthus spinoletta	American pipit
BOMBYCILLIDAE	**WAXWINGS**
Bombycilla cedrorum	Cedar waxwing
PTILOGONATIDAE	**SILKY FLYCATCHERS**
Phainopepla nitens	Phainopepla
LANIIDAE	**SHRIKES**
Lanius ludovicianus	Loggerhead shrike
STURNIDAE	**STARLINGS**
* *Sturnus vulgaris*	European starling
VIREONIDAE	**VIREOS**
** *Vireo bellii*	Bell's vireo
** *Vireo vicinior*	Gray vireo
Vireo solitarius	Solitary vireo
Vireo huttoni	Hutton's vireo
Vireo gilvus	Warbling vireo

The following species were observed onsite during the 2007 survey period.

Vertebrate Animals	
Latin Name	**Common Name**
EMBERIZIDAE	**SPARROWS, WARBLERS, TANAGERS**
Vermivora celata	Orange-crowned warbler
Vermivora ruficapilla	Nashville warbler
Vermivora luciae	Lucy's warbler
** *Dendroica petechia*	Yellow warbler
Dendroica coronata	Yellow-rumped warbler
Dendroica nigrescens	Black-throated gray warbler
Dendroica occidentalis	Hermit warbler
Dendroica townsendi	Townsend's warbler
Oporornis tolmiei	MacGillivray's warbler
Geothlypis trichas	Common yellowthroat
Wilsonia pusilla	Wilson's warbler
** *Icteria virens*	Yellow-breasted chat
** *Piranga rubra*	Summer tanager
Piranga ludoviciana	Western tanager
Pheucticus melanocephalus	Black-headed grosbeak
Guiraca caerulea	Blue grosbeak
Passerina amoena	Lazuli bunting
Pipilo chlorurus	Green-tailed towhee
Pipilo erythrophthalmus	Rufous-sided towhee
Pipilo crissalis	California towhee
Pipilo aberti	Abert's towhee
Aimophila ruficeps	Rufous-crowned sparrow
Spizella passerina	Chipping sparrow
Spizella breweri	Brewer's sparrow
Spizella atrogularis	Black-chinned sparrow
Pooecetes gramineus	Vesper sparrow
Chondestes grammacus	Lark sparrow
Amphispiza bilineata	Black-throated sparrow
Amphispiza belli	Sage sparrow
Passerculus sandwichensis	Savannah sparrow
Passerella iliaca	Fox sparrow
Melospiza melodia	Song sparrow
Melospiza lincolnii	Lincoln's sparrow
Zonotrichia atricapilla	Golden-crowned sparrow
Zonotrichia leucophrys	White-crowned sparrow
Junco hyemalis	Dark-eyed junco
Agelaius phoeniceus	Red-winged blackbird
** *Agelaius tricolor*	Tricolored blackbird
Sturnella neglecta	Western meadowlark
Xanthocephalus xanthocephalus	Yellow-headed blackbird

The following species were observed onsite during the 2007 survey period.

Vertebrate Animals	
Latin Name	**Common Name**
Euphagus cyanocephalus	Brewer's blackbird
Quiscalus mexicanus	Great-tailed grackle
Molothrus ater	Brown-headed cowbird
Icterus cucullatus	Hooded oriole
Icterus galbula	Northern oriole
Icterus parisorum	Scott's oriole
FRINGILLIDAE	**FINCHES**
Carpodacus purpureus	Purple finch
Carpodacus cassinii	Cassin's finch
Carpodacus mexicanus	House finch
Carduelis pinus	Pine siskin
Carduelis psaltria	Lesser goldfinch
Carduelis lawrencei	Lawrence's goldfinch
Carduelis tristis	American goldfinch
PASSERIDAE	**WEAVERS**
* *Passer domesticus*	House sparrow
MAMMALIA	**MAMMALS**
DIDELPHIDAE	**OPOSSUMS**
Didelphis marsupialis	Common opossum
VESPERTILIONIDAE	**EVENING BATS**
Pipistrellus hesperus	Western pipistrelle
LEPORIDAE	**HARES AND RABBITS**
Lepus californicus	Black-tailed hare
Sylvilagus audubonii	Audubon cottontail
Sylvilagus bachmani	Brush rabbit
Sylvilagus sp.	Cottontail
SCIURIDAE	**SQUIRRELS**
** *Citellus mohavensis*	Mohave ground squirrel
** *Citellus tereticaudis ssp. chlorus*	Coachella Valley ground squirrel
** *Glaucomys sabrinus*	Northern flying squirrel
Otospermophilus beecheyi	Beechey ground squirrel
Ammospermophilus leucurus	Antelope ground squirrel
** *Ammospermophilus nelsoni*	San Joaquin antelope ground squirrel
Eutamias merriami	Merriam chipmunk
Sciurus griseus	Western gray squirrel
GEOMYIDAE	**POCKET GOPHERS**
Thomomys bottae	Botta pocket gopher
HETEROMYIDAE	**POCKET MICE**
Perognathus sp.	Pocket mouse
Perognathus longimembris	Little pocket mouse
** *Perognathus longimembris ssp. brevinasus*	Los Angeles pocket mouse
Perognathus formosus	Long-tailed pocket mouse

Appendix 3: Species Observed

The following species were observed onsite during the 2007 survey period.

Vertebrate Animals	
Latin Name	**Common Name**
Perognathus baileyi	Bailey pocket mouse
Perognathus fallax	San Diego pocket mouse
Perognathus californicus	California pocket mouse
Perognathus spinatus	Spiny pocket mouse
Dipodomys sp.	Kangaroo rat
Dipodomys heermanni	Heermann kangaroo rat
Dipodomys panamintinus	Panamint kangaroo rat
** *Dipodomys stephensi*	Stephens' kangaroo rat
Dipodomys ingens	Giant kangaroo rat
Dipodomys merriami	Merriam kangaroo rat
** *Dipodomys merriami ssp parvus*	Cismontsne Merriam kangaroo rat
Dipodomys nitratoides	San Joaquin kangaroo rat
Dipodomys agilis	Pacific kangaroo rat
Dipodomys deserti	Desert kangaroo rat
CASTORIDAE	**BEAVERS**
Castor canadensis	Beaver
CRICETIDAE	**RATS AND MICE**
Reithrodontomys megalotis	Western harvest mouse
Peromyscus crinitus	Canyon mouse
Peromyscus californicus	California mouse
Peromyscus eremicus	Cactus mouse
Peromyscus maniculatus	Deer mouse
Onychomys torridus	Southern grasshopper mouse
Neotoma sp.	Wood rat
Neotoma albigula	White-throated wood rat
Neotoma lepida	Desert wood rat
Neotoma fuscipes	Dusky-footed wood rat
Microtus pennsylvanicus	Meadow mouse
Microtus californicus	California meadow mouse
MURIDAE	**OLD WORLD RATS AND MICE**
* *Mus musculus*	House mouse
CANIDAE	**FOXES, WOLVES AND COYOTES**
Canis latrans	Coyote
Vulpes macrotis	Kit fox
Urocyon cinereoargenteus	Gray fox
URSIDAE	**BEARS**
* *Ursus americanus*	Black bear
PROCYONIDAE	**RACCOONS**
Bassariscus astutus	Ringtail
Procyon lotor	Raccoon
MUSTELIDAE	**WEASELS AND SKUNKS**
Mustela frenata	Long-tailed weasel

The following species were observed onsite during the 2007 survey period.

Vertebrate Animals	
Latin Name	**Common Name**
** *Taxidea taxus*	American badger
Spilogale putorius	Spotted skunk
Mephitis mephitis	Striped skunk
FELIDAE	**CATS**
Felis concolor	Mountain lion
Lynx rufus	Bobcat
EQUIDAE	**HORSES, BURROS AND ZEBRAS**
* *Equus astinus*	Feral donkey
CERVIDAE	**ELKS, MOOSE, CARIBOU, DEER**
Odocoileus hemionus	Mule deer
BOVIDAE	**SHEEP AND GOATS**
Ovis canadensis	Bighorn
Alien species indicated by asterisk, special status species indicated by two asterisks. This list includes only species observed on the site. Others may have been overlooked or unidentifiable due to season.	

B.8 - Revised Vegetation and Special Status Plants Survey (Scott White Biological Consulting, February 2009)

MOON CAMP PROPERTY, FAWNSKIN AREA: VEGETATION AND SPECIAL STATUS PLANTS

October 2007
(Revised 2 February 2009)

Prepared for:
Michael Brandman Associates
621 E. Carnegie Dr., Suite 100
San Bernardino, CA 92408

Prepared by:
Scott D. White
SCOTT WHITE BIOLOGICAL CONSULTING
201 North First Ave., No. 102
Upland, CA 91786

Project site location: USGS Fawnskin 7½-minute topographic map, Township 2 North, Range 1 West, portion of Section 13.
APN: 0304-082-04, 0304-091-12, 0304-091-13, 0304-091-21
Owner: RCK Properties, Tim Wood
Applicant: Urban Environs, Redlands, Calif.
Principal Investigator: Scott D. White, Scott White Biological consulting (above).

CERTIFICATION: I hereby certify that the statements furnished in this report and in the attached exhibits present the data and information required for this biological evaluation, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief. Field work conducted for this assessment was performed by me and under my direct suprevision. I certify that I have no0t signed a non-disclosure or consultant confidentiality agreement with the project applicant or applicant's representative and that I have no financial interest in the project.

DATE: 2 Feb 2009 SIGNED: Scott D W
Scott D. White, Report Author

Additional field work performed by:

DATE: 2 Feb 2009 SIGNED: Justin Wood
Justin Wood

MOON CAMP PROPERTY, FAWNSKIN AREA: VEGETATION AND SPECIAL STATUS PLANTS

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MOON CAMP PROPERTY, FAWNSKIN AREA: VEGETATION AND SPECIAL STATUS PLANTS

Scott D. White
SCOTT WHITE BIOLOGICAL CONSULTING
2 February 2009

II: SUMMARY

This report describes results of field surveys for special status plants at the former Moon Camp site in Fawnskin (unincorporated San Bernardino County, California). The project site is about 62 acres. Several listed threatened or endangered plants occur in specialized habitat types in Big Bear Valley and have been found on the site during previous field surveys. The present field work was completed in 2007, a year of very low rainfall. Thus, these surveys cannot support a conclusion that special status plants may be absent from the site. Despite the poor rainfall, one listed threatened species (ash-gray Indian paintbrush) and apparent genetic intergrades of another listed plant (southern mountain buckwheat) with a common relative were both found on the site. Several other special status plants also were found. The proposed project would directly affect ash-gray Indian paintbrush by taking plants and occupied habitat. It also would indirectly affect ash-gray Indian paintbrush, southern mountain buckwheat intergrades, and pebble plain habitat through a variety of off-site or "edge" effects described in Section VII. of this report. The project also would remove numerous trees subject to regulation under the San Bernardino County Native Plant Protection Policy. Further, the project would necessitate alterations to drainageways that may be subject to state or federal regulation as streambeds, wetlands, or waters of the US. We recommend consulting with local, state, and federal agencies as needed to ensure compliance with these laws and policies. We also recommend follow-up botanical surveys to determine presence or absence of other special status meadow species. In order to mitigate take of federally listed plants, we recommend funding off-site habitat preservation and management at a 3:1 ratio for direct effects and at 1:1 ratio for indirect effects.

III: PROJECT AND PROPERTY DESCRIPTION

The San Bernardino County Planning Department is reviewing an application for residential development on the former Moon Camp site in Fawnskin. The project site is on the north shore of Big Bear Lake, in the eastern part of Fawnskin, in unincorporated San Bernardino County. It is about 62 acres, on both sides of State Highway 38, between Oriole Lane and Polique Canyon Road (on the Fawnskin USGS 7½' quadrangle map, in the north half of Section 13, Township 2N and Range 1W). The project site slopes from north to south. Elevation ranges from about 6750 feet near the lakeshore to about 6,960 feet in the northeastern portion of the site.

The project site is within the Big Bear Lake watershed, mapped and described in the Open Space element to San Bernardino County's General Plan (County of San Bernardino 1991), as follows: "This area includes the entire watershed area of Big Bear Lake, and contains a number of specialized habitat areas, which support a large number of endangered plants and animals (as well as commonly occurring mountain species). Habitat values here should be maintained, potentially by controlling development to prevent damage to important habitat areas."

This report addresses special status plant communities and plant species occurring or potentially occurring on the property and incorporates prior botanical work done at the same property, cited below.

IV. FOCUSED STUDY / SPECIES OF CONCERN

There are four federally listed threatened or endangered plant species nearly endemic to meadows and three endemic to "pebble plain" and similar upland habitats in the Big Bear Valley of the northern San Bernardino Mountains (USDI Fish and Wildlife Service 1984, 1998). In addition, there are numerous other special status plant species occurring in these or other habitats in the Big Bear Valley (Appendix 2). This report focuses primarily on the following listed threatened or endangered plants:

Meadow species:

- San Bernardino bluegrass (*Poa atropurpurea*)
- Bird-foot checkerbloom (*Sidalcea pedata*)
- California dandelion (*Taraxacum californicum*)
- Slender-petaled thelypodium (*Thelypodium stenopetalum*)

Pebble plain species:

- Bear Valley sandwort (*Arenaria ursina*)
- Ash-gray Indian paintbrush (*Castilleja cinerea*)
- Southern mountain buckwheat (*Eriogonum kennedyi* var. *austromontanum*)

Several special status plants including ash-gray Indian paintbrush have been reported from the project site in prior botanical surveys (Michael Brandman Associates 2000; White & Leatherman BioServices 2002). White and Leatherman (2002) also mapped the extent of suitable habitat for ash-gray Indian paintbrush, based on the extent of its host plant, Wright's matting buckwheat. Bear Valley sandwort is reported from the site in the California Natural Diversity Data Base (California Department of Fish and Game 2007). None of the listed meadow species are known from the site.

V. METHODS

Scott D. White reviewed available literature to identify special status plants or plant communities known from the project site and vicinity. Literature sources included previous biological reports addressing the site (Michael Brandman Associates 2000; White & Leatherman BioServices 2002), the California Natural Diversity Data Base (California Department of Fish and Game 2007a, USGS Fawnskin, Big Bear City, Big Bear Lake, Butler Peak, Keller Peak, and Moonridge 7½' topo quads), California Native Plant Society's *Inventory of Rare and Endangered Vascular Plants of California* (Tibor 2001), the CNPS *Electronic Inventory* (2007, for the same quads) and compendia of special status species published by the US Fish and Wildlife Service (2006) and California Department of Fish and Game (2007b). All species identified by this literature review, and others known from the general region, are included in Appendix 1 or 2 (attached). Appendix 1 lists those species not considered for this report due to elevational or geographic ranges, or specialized habitat requirements not found on the site. Appendix 2 lists special status species known from comparable habitats in the region and summarizes their natural history, conservation status, and occurrence probability on-site.

Scott D. White and Justin Wood (of Scott White Biological Consulting) visited the site on 30 April, 7 June, and 8 August 2007 to view special status habitats (pebble plains), compare present conditions with prior conditions, confirm presence of special status plants described from the site in prior reports, and to survey for additional special status plants not found during earlier surveys. During these visits we focused our attention on pebble plains and lakeshore areas, which could support listed threatened or endangered species. We walked over all pebble plain habitat on all three

field dates, and the entire length of the lakeshore on the project site on 30 April and 7 June. All plant species observed were identified in the field or collected for later identification. Plants were identified using keys, descriptions, and illustrations in Hickman (1993), Munz (1974), Abrams (1923-1960), and other regional references. All species noted on the site are listed in Appendix 3.

In conformance with California Department of Fish and Game guidelines (2000), surveys were (a) conducted during flowering seasons for the special status plants known from the area, (b) floristic in nature, (c) consistent with conservation ethics, (d) systematically covered all habitat types on the site, and (e) well documented, by this report. However, due to very low rainfall in 2006-2007 (when current surveys were done) and 2001-02 (the year of previous White & Leatherman surveys), results of these field surveys should not be used to conclude "absence" for any special status plants not found.

White and Leatherman BioServices (2002) mapped pebble plain habitat and open upland habitat supporting Wright's matting buckwheat (*Eriogonum wrightii* ssp. *subscaposum*). That mapping is incorporated here as base maps for rare plant occurrences and habitat on the site.

VI. RESULTS

Utility of field surveys during 2007 was limited on this site and throughout southern California due to a very poor rainfall year. Previous botanical field work was completed during 2002, also a drought year. Many plant species are either annual (i.e., complete their life cycles in a single year and then die) or perennial herbs (i.e., die back to the ground level each year, and persist as underground bulbs or rootcrowns). In poor rainfall years, annual and perennial herbs may not be visible, though they may exist in the soil as inactive seed, bulbs, or rootcrowns. Most of the special status plants of the Big Bear area are perennial herbs (see text below), and we were not able to make conclusive determinations of "present" or "absent" based on these field surveys. Instead, we have used previous reports and our own judgement of habitat quality to estimate the probability that each special status plant might occur on the site.

VI. A. VEGETATION

VI. A. 1. Common Vegetation Types

Jeffrey pine forest: Most of the site above Highway 38 is covered by the Jeffrey pine series (Sawyer and Keeler-Wolf 1995). This vegetation also matches descriptions of Jeffrey pine forest (Holland 1986; McBride 1988), and montane coniferous forest (Munz 1959). Jeffrey pine forest covers most of the eastern half of the project site and occurs in patches interspersed with pebble plains (below) in the western half. Jeffrey pine (*Pinus jeffreyi*) is the dominant tree; white fir (*Abies concolor*), incense cedar (*Calocedrus decurrens*), western juniper (*Juniperus occidentalis*), singleleaf pinyon pine (*Pinus monophylla*), and black oak (*Quercus kellogii*) occur throughout Jeffrey pine forest, at lower densities. The understory is sparse, consisting of scattered shrubs including greenleaf manzanita (*Arctostaphylos patula*), mountain whitethorn (*Ceanothus cordulatus*), cupleaf ceanothus (*C. greggii*), deer brush (*C. integerrimus*), California mountain mahogany (*Cercocarpus betuloides*), and curl-leaf mountain mahogany (*C. ledifolius*). Herbaceous cover is generally low, consisting of grasses and forbes in scattered patches. Jeffrey pine forest occurs in mountains throughout most of California at elevations between about 5000 and 9000 feet. Many local and regional associations have been described (Sawyer and Keeler-Wolf 1995).

Some, but not all, of the Jeffrey pine forest on the Moon Camp site provides suitable habitat for listed threatened or endangered plant species. In particular, areas of fairly open forest cover where Wright's matting buckwheat occurs are suitable for ash-gray paintbrush, a federally listed threatened species occurring in pebble plains (below) and open Jeffrey pine forest. These areas are identified on

Figure 3. Other special status plants, but not listed species, could also occur throughout the remainder of mapped Jeffrey pine forest.

Lake Shoreline: In the western half of the property, the site's southern boundary is at the shore of Big Bear Lake. Most plants along the shore itself are herbaceous native and non-native species of periodically saturated soils, including willowherb (*Epilobium ciliatum*), wire-grass (*Juncus arcticus*), cursed buttercup (*Ranunculus sceleratus*), and several cinquefoil species (*Potentilla* spp.). Numerous seedling cottonwood trees (*Populus balsamifera* spp. *trichocarpa*) also occur there.

Just above the high-water level, there are small patches of various upland and wetland vegetation types. These patches are too small to map. Small areas of Jeffrey pine forest are interspersed with open wet meadows and grasslands and scattered patches of arroyo willow (*Salix lasiolepis*) and red willow (*Salix laevigata*). There are no alkaline meadows or dry meadows (below) along the lake shore. Small patches of wet meadows may provide suitable habitat for several special status plants (below), but we were unable to determine whether they are present or absent due to poor rainfall.

VI. A. 2. Special-status Vegetation

Pebble Plain: Pebble plain occurs in a single patch at the crest of a hill, in the western portion of the site north of Highway 38 (Figure 3). Pebble plain (also called pavement plain) was described by Derby and Wilson (1978, 1979). A detailed discussion was prepared by the San Bernardino National Forest (1990) and brief descriptions appear in Holland (1986) and Sawyer and Keeler-Wolf (1995) . The substrate consists of clay soil with quartzite pebbles and gravel that are continually pushed to the surface, evidently through frost action (Holland 1986). Vegetation structure on these sites is similar to the mat-forming structure of alpine sites at much higher elevations. Vegetation consists largely of well-spaced cushion-forming perennials and a variety of tiny annuals. Bunchgrasses and some succulents may also occur. At least two species, both listed as endangered, are strictly endemic to Big Bear pebble plain habitats: Bear Valley sandwort and southern mountain buckwheat (Derby and Wilson 1978). Several other special status plants, including other listed threatened or endangered species, also occur on pebble plain habitat.

On the Moon Camp site, much of the pebble plain habitat has been disturbed by vehicles. This disturbance has reduced vegetation cover, disturbed the natural hydrologic pattern, and perhaps reduced habitat quality for special status plants (San Bernardino National Forest 1990). Based on National Forest management efforts at other sites, vehicle disturbance apparently does not permanently alter habitat suitability for these species. For example, the Forest Service has fenced degraded pebble plains in the Sugarloaf area and found that plant diversity returns after a few years.

Our habitat map (Figure 3) indicates pebble plains themselves, and also indicates adjacent open forest with high cover of Wright's matting buckwheat, where we observed suitable habitat for species which tend to occur in both pebble plains and adjacent open forest habitat.

Pebble plains of the Big Bear area (above) are classified as "southern montane black sagebrush pebble plains" by CDFG (2002), "a series or association considered rare and worthy of consideration" by the California Natural Diversity Data Base. Pebble plains on the project site support at least one listed threatened plant, possibly two other listed species, and three other special status plants.

Wet Meadow: Small patches of meadow occur along the lakeshore, south of Highway 38. They grade into upland grasslands, and we could not delineate their extent due to dry conditions. Meadows in the Big Bear Valley may be perennially saturated (i.e., "wet meadows") or may have

saturated soils only seasonally or during wet years (called "dry meadows," "xeric meadows," or "vernal meadows"). Meadows of the San Bernardino Mountains were described by Krantz (1994). They are generally dominated by sedges (*Carex* spp.), rushes (*Juncus* spp.) and grasses (*Poa* spp., *Elymus* spp.). Dry meadows and the margins of wet meadows support sagebrush (*Artemisia tridentata, A. rothrockii*). These meadows themselves are not ranked as special status communities by CDFG (2002) but several locally endemic plants occur in them and they therefore are recognized locally as important habitats (Krantz, no date). Three listed threatened or endangered plants of wet meadow habitats could occur on the Moon Camp site, though only with low or moderate probabilities: bird's foot checkerbloom (*Sidalcea pedata*), San Bernardino bluegrass (*Poa atropurpurea*), and California dandelion (*Taraxacum californicum*). Other special status or listed species of pebble plains and their margins could also occur in meadow margins (e.g., ash-gray paintbrush).

VI. B. Special status plants

Plant or animal species identified by state or federal agencies or by private conservation organizations may be assigned special conservation status due to declining numbers, vulnerability to habitat change, or restricted distributions. Some species are listed as threatened or endangered under state or federal Endangered Species Acts. Other special status plants are included in the California Native Plant Society's *Inventory* or other compilations listed in the Methods section (above) and summarized in Appendix 2. Big Bear Valley has a high proportion of rare and locally endemic species (Krantz, no date; Krantz 1994). Each special status plant species is addressed in Appendix 1 or 2 (habitat and range, agency status and probability of occurring on the site). Species observed on the site and listed or candidate species potentially occurring on the site are also described below.

VI. B. 1. Listed threatened or endangered plants occurring on the site:

Ash-gray Indian paintbrush (*Castilleja cinerea*): Ash-gray Indian paintbrush is a federally-listed threatened species and is on CNPS's List 1B. It is a root parasite on other plants, often parasitizing the listed threatened southern Mountain buckwheat (below) or a similar but common mat-forming buckwheat (*E. wrightii* ssp. *subscaposum*). It is a perennial herb, and typically blooms between May and August. It occurs in pebble plains, meadows and seeps, and open pinyon or Jeffrey pine forest between about 5,900 and 10,000 feet elevation. It is endemic to the eastern San Bernardino Mountains (Big Bear Valley, Holcolmb Valley, Onyx Summit, Snow Valley, and Sugarloaf Ridge). It was reported and mapped on the project site by Michael Brandman Associates (2000) and in the California Natural Diversity Data Base (2007). White & Leatherman BioServices (2002) found that it was more widespread than reported earlier, occurring in the pebble plains and open pine forests (Figure 3), where it appears to be parasitizing *Eriogonum wrightii* ssp. *subscaposum.* We confirmed these occurrences and noted no substantial changes to densities or distribution in 2007.

Southern mountain buckwheat (*Eriogonum kennedyi* var. *austromontanum*): Southern mountain buckwheat is federally listed as threatened and is on CNPS's List 1B. It is a mat-forming woody perennial, generally flowering late in the season (between about June and August). It is endemic to pebble plains habitats in Big Bear and Holcomb valleys in the San Bernardino Mountains, between about 5800 and 7500 feet elevation. It often serves as a host plant for the hemi-parasitic *Castilleja cinerea* (above) and also is a food plant for a newly described locally-endemic San Bernardino blue butterfly. It is very similar to a more common plant, Wright's matting buckwheat (*E. wrightii* ssp. *subscaposum*), which is common on the project site. The two species are distinguished by presence or absence of branching in their inflorescences (Hickman 1993; Reveal 1989, 2005). We examined flowers and remains of dried inflorescences of mat-forming buckwheats throughout the project site

on each site visit. Most of them were either unidentifiable (due to absence of inflorescences) or were identified as Wright's matting buckwheat, based on their branching inflorescences. But on the mapped pebble plain (Figure 3), during the 8 August site visit, about 10-20% of the matting buckwheat plants had mostly (but not exclusively) unbranched inflorescences. Reveal (2005) noted that the two plants intergrade to some extent in Big Bear Valley and A. Sanders (pers. comm.) has made similar observations. We conclude that some of the matting buckwheats on pebble plains at the Moon Camp site are intergradations between the endangered southern mountain buckwheat and the common Wright's matting buckwheat.

VI. B. 2. Special status plants occurring on the site but not listed as threatened or endangered:

Parish's rock-cress (*Arabis parishii*): Parish's rock cress is CNPS's List 1B. It is a perennial herb that typically blooms in April or May. It occurs in pebble plains and other sites with heavy or rocky soils, including carbonate soils, within pinyon woodlands and montane forests between about 3,900 and 8,000 feet elevation. It is endemic to the San Bernardino Mountains. Suitable habitat occurs on the project site in areas shown as ash-gray paintbrush habitat on Figure 3. It has been reported from the site (CNDDB 2001). White & Leatherman BioServices (2002) observed it uncommonly, scattered throughout pebble plain and adjacent open forest habitat. We confirmed these occurrences and noted no substantial changes to densities or distribution in 2007.

Big Bear Valley woollypod (*Astragalus leucolobus*): Big Bear Valley woollypod is on CNPS's List 1B. It is a perennial herb that typically blooms between May and July. It occurs in rocky soils of montane conifer forests and woodlands and pebble plains, between about 5,600 and 8,000 feet elevation. It is endemic to the high mountains of southern California (San Bernardino, San Gabriel, San Jacinto, and Santa Rosa Mountains). Suitable habitat is found throughout the site. White & Leatherman BioServices (2002) observed it occasionally throughout the project site. We confirmed these occurrences and noted that it was especially common on pebble plains in 2007.

Heckard's paintbrush (*Castilleja montigena, C. applegateii* ssp. *martinii*): Heckard's paintbrush is on CNPS's List 4. It is a perennial herb, typically flowering between May and August. It occurs in montane forests between about 6400 and 9200 feet elevation. It is endemic to the San Bernardino Mountains, where it is common in forest habitats throughout the mountain range. It was originally described by Lawrence Heckard (1980), but Heckard regarded it as a minor variant of *Castilleja applegateii* and not as a distinct species in his Jepson Manual treatment of the genus (1993). It occurs occasionally in Jeffery pine forest on the Moon Camp site.

Silver-Haired ivesia (*Ivesia argyrocoma*): Silver-haired ivesia is on CNPS's List 1B. It is a perennial herb that typically blooms between June and August. It occurs in alkaline meadows and seeps, pebble plains, and montane forest between about 4900 and 8800 feet elevation. It occurs in the San Bernardino Mountains and a disjunct site in the mountains of Baja California. It has been reported from the project site by Michael Brandman Associates (2000) and White and Leatherman BioServices (2002), and we observed it throughout areas shown as ash-gray paintbrush habitat on Figure 3.

VI. B. 3. Listed and candidate threatened or endangered plants potentially occurring on the site:

Bear Valley sandwort (*Arenaria ursina*): Bear valley sandwort is federally-listed as threatened and is on CNPS's List 1B. It is a perennial herb and typically blooms between May and August. It occurs on pebble plains and sometimes on carbonate soils, between about 6,400 and 6,900 feet elevation. It is endemic to Big Bear Valley in the San Bernardino Mountains. It has been reported from the Moon Camp site (CNDDB 2007), but we did not find it on the site in 2007 and it was not noted there by Michael Brandman Associates (2000) or White & Leatherman BioServices (2002).

Due to poor rainfall in 2001-02 and 2006-07, we cannot evaluate whether Bear Valley sandwort was absent during these field surveys due to its disappearance from the site or due to drought-induced dormancy. Suitable habitat occurs in pebble plains on the project site, and we conclude that it has a high probability of occurring.

San Bernardino bluegrass (*Poa atropurpurea*): San Bernardino bluegrass is a federally-listed Endangered species and is on CNPS's List 1B. It is a rhizomatous perennial grass that typically flowers between May and June. It occurs in mesic meadows and seeps between about 4,400 and 8,100 feet elevation. It is known only from the San Bernardino Mountains and Laguna mountains (San Diego County). Marginally suitable habitat occurs along the lakeshore areas on the project site. We did not find it during our field surveys, but we also could not find it at a known occurrence in the area, perhaps due to drought-induced dormancy. Based on habitat, we conclude there is a low probability that it may occur there.

Bird's foot checkerbloom (*Sidalcea pedata*): Bird's foot checkerbloom is a federally- and state-listed endangered species and is on CNPS's List 1B. It is a perennial herb that typically blooms between May and July. It occurs in meadows and seeps, between about 5,200 and 8,100 feet elevation. It is endemic to the San Bernardino Mountains. Marginally suitable habitat occurs near the lakeshore, though we did not find bird's foot checkerbloom during our field surveys, and it has not been reported there in prior surveys. Based on habitat, we conclude there is a low probability that it may occur.

California dandelion (*Taraxacum californicum*): California dandelion is a federally-listed endangered species and is on CNPS's List 1B. It is a perennial herb that typically blooms between May and July. It is endemic to the San Bernardino Mountains, occurring only in and around Big Bear Valley, in meadows and seeps between about 6,300 and 7,800 feet elevation. Marginally suitable habitat occurs in meadow areas near the lakeshore, though the species was not noted during our field surveys or reported in prior surveys. Based on habitat, we conclude there is a low to moderate probability that it may occur on the site.

VI. B. 4. Special status plants potentially occurring but not listed as threatened or endangered:

Other special status plant species judged as moderate or greater probability of occurring on the site, but not seen during field surveys and not listed as threatened or endangered are listed below. See also Appendix 2.

Rock sandwort (*Arenaria lanuginosa* ssp. *saxosa*): Moderate probability (meadow, lakeshore)
Crested milk vetch (*Astragalus bicristatus*): High probability (rocky areas)
Big Bear Valley milk vetch (*Astragalus lentiginosus* var. *sierrae*): High probability, open forest
Palmer's mariposa lily (*Calochortus palmeri* var. *palmeri*): Moderate probability, meadow
Western sedge (*Carex occidentalis*): Moderate probability, meadow
San Bernardino Mountain owl's clover (*Castilleja lasiorhyncha*): Moderate probability, meadow
San Bernardino Mountains dudleya (*Dudleya abramsii* ssp. *affinis*): Moderate probability, pebble plains
Southern Sierra woolly sunflower (*Eriophyllum lanatum* var. *obovatum*): High probability, forest
Jepson's bedstraw (*Galium jepsonii*): High probability, forest
Johnston's bedstraw (*Galium johnstonii*): Low to moderate probability, forest
Parry's sunflower (*Hulsea vestita* ssp. *parryi*): Low to moderate probability (open slopes)
Duran's rush (*Juncus duranii*): Moderate probability, meadow
Short-sepaled lewisia (*Lewisia brachycalyx*): Moderate probability, meadow
Baldwin Lake linanthus (*Linanthus killipii*): High probability on pebble plains

San Bernardino Mountain monkeyflower (*Mimulus exiguus*): High probability, meadow margin, etc.
Purple monkeyflower (*Mimulus purpureus*): High probability, meadow margin, etc.
Chickweed oxytheca (*Oxytheca caryophylloides*): High probability, open forest
Parish's yampah (*Perideridia parishii* ssp. *parishii*): Low to moderate probability, meadow
Transverse Range phacelia: (*Phacelia exilis*): High probability, meadow margin, etc.
Mojave phacelia (*Phacelia mohavensis*): High probability, meadow margin, etc.
Bear Valley phlox (*Phlox dolichantha*): High probability, throughout
Bear Valley pyrrocoma (*Pyrrocoma uniflora* ssp. *gossypina*): Low - moderate probability, meadow
Parish's rupertia (*Rupertia rigida*): High probability, throughout
Tehachapi ragwort (*Senecio ionophyllus*): Moderate probability, throughout
Laguna Mountains jewelflower (*Streptanthus bernardinus*): Moderate probability, forest
Southern jewelflower (*Streptanthus campestris*): High probability, forest
Pine green-gentian (*Swertia neglecta*): High probability, forest
Small-flowered bluecurls (*Trichostema micranthum*): High probability, meadow

VI. C. PROTECTED PLANTS

The San Bernardino County Plant Protection and Management policy (2007) regulates removal of native trees greater than 6 inches diameter at breast height (dbh). Jeffrey pines and other native forest trees greater than 6 inches dbh occur throughout the site.

VII. IMPACTS

VII. A. Impacts to Special Status Plants and Habitat

Project construction would result in grading new roads, driveways and building pads throughout most of the property, removing much of the native vegetation, including special status plants and habitat, and disturbing soils throughout most of the site. Even where special status plants are not removed by grading, most future land uses on individual lots (e.g., landscaping) would not be subject to environmental review and would cause further loss of these plants and habitats. Indirect project impacts (i.e., impacts outside the proposed residential lots and limits of grading) would affect rare plant habitat in a proposed set-aside area and, if it occurs, off-site to the north. Thus, project impacts would eliminate or degrade sensitive habitat types (pebble plain) and occupied rare plant habitat (Figure 3, Figure 5). Pebble plains and open forest patches on the site are occupied by at least one threatened or endangered plant (ash-gray Indian paintbrush); genetic intergrades of another listed plant (southern mountain buckwheat) with a common related species; and four other special status plants (Parish's rock-cress, Heckard's paintbrush, Bear Valley woollypod and silver-haired ivesia). Development would eliminate or substantially reduce numbers of all five plants. Although these habitats are somewhat degraded by vehicles and invasive plants (see Section VI. A. above and "edge effects," below), adverse impacts to listed species would meet the CEQA threshold for mandatory findings of significance.

Construction could also eliminate or substantially reduce numbers of five other listed threatened or endangered plants that could occur on the site but were not found there, including Bear Valley sandwort, southern mountain buckwheat, bird-foot checkerbloom, San Bernardino bluegrass, and California dandelion. The maximum possible extent of these impacts, if all four plants occur, would be loss of Bear Valley sandwort and southern mountain buckwheat in pebble plains areas discussed above, and possible loss of bird-foot checkerbloom, San Bernardino bluegrass, and California dandelion from small meadow areas bordering the lakeshore. These impacts would meet the CEQA threshold for mandatory findings of significance if any of these listed plants occur on the site.

Impacts to special status plants not listed as threatened or endangered (Section IV. B. 4.) generally would not meet the CEQA threshold for mandatory findings of significance.

Adverse project impacts to pebble plains and rare plants occurring (or potentially occurring) on pebble plains are somewhat reduced by the project's design, which designates an open space lot on the pebble plain area and part of the occupied ash-gray Indian paintbrush habitat (Figure 3). However, the long-term conservation value of the proposed open space lot would be minimal without designating buffer areas and providing for active on-site land management to prevent indirect "edge effects" of existing and proposed new adjacent land uses.

The term "edge effect" describes the effects of developed land uses on adjacent natural habitat areas (e.g., habitat adjacent to new development or in set-aside areas surrounded by development). To date, most analyses of edge effects on habitat reserves have focused on sensitive wildlife species. The following discussion of edge effects on rare plants is based on an analysis by the Conservation Biology Institute (2000) addressing San Fernando Valley spineflower, an endemic southern California species threatened by development and surrounding land uses in Los Angeles and Ventura Counties. Rare plants near developed lands tend to die out due to a variety of edge effects, including:

- Exclusion by invasive weedy plants introduced deliberately or accidently into developed landscapes.
- Trampling or soil damage caused by foot traffic, vehicles, bicycles, or other recreation.
- Altered hydrology caused by irrigation overspray, road runoff, or water diversions installed for erosion control.
- Direct damage by pets and feral animals (e.g., digging by dogs and cats).
- Indirect effects of non-native animals, such as elimination of native pollinators by invasive Argentine ants.
- Vegetation clearing, especially for fuel modification to reduce fire hazards to adjacent homes.
- Pollution from oversprayed or runoff landscaping chemicals (insecticides, herbicides, fertilizers).

Conservation planners design "buffer areas" to separate managed sensitive species or habitat reserve areas from the indirect effects of adjacent land uses. The Conservation Biology Institute (2000) modeled "buffer areas" for then-proposed San Fernando Valley spineflower preserve areas in Ventura County. In their analysis, buffer areas were defined as preserved land surrounding the rare plants, where land uses were strictly limited to activities consistent with reserve management. For example, buffer areas function to separate rare plant habitat from adverse effects of weeds propagating along trails or through fuel modification zones. Thus, roads, trails, or fuel modification land uses are not consistent with buffer function. The Conservation Biology Institute analysis (2000) estimated that buffer widths of 200 feet would be "highly likely to be effective" in buffering San Fernando Valley spineflower occurrences from a series of adverse edge effects from adjacent land uses, and "moderately effective" against two adverse edge effects (invasive animals and increased fire frequency). In their analysis, a wider hypothetical buffer (300 ft.) would not increase estimated effectiveness against fire and invasive animals. We therefore use 200 feet as the best available estimate of the range of adverse edge effects on special status plant occurrences.

The proposed project could also cause "edge effects" to proposed open space on-site and to adjacent vacant land to the north and east as new residents increase activity and disturbance to surrounding native habitat, through the effects listed above.

Most land surrounding the Moon Camp site is in private ownership, except in the northeastern

corner where National Forest land is adjacent to the north and east. None of the surrounding private land is managed or proposed for management as a conservation area. Most adjacent private land on all sides has been developed. There is a pebble plain area on National Forest land on the ridge north of the Moon Camp site, but it is more than 200 feet from the project site and thus should be sufficiently buffered from project-related edge effects. We conclude that the proposed project's off-site edge effects would not meet the CEQA threshold for mandatory findings of significance.

Much of the Moon Camp project site, including the proposed open space lot on-site, is now subject to edge effects of adjacent residential development and roads, especially Highway 38 (Figure 4). The proposed project would eliminate or further degrade most remaining occupied rare plant habitat (above) and would indirectly affect nearly all of the proposed open space lot by introducing new edge effects closer to the open space area (Figure 5). The small portion of the proposed open space lot not within 200 feet of proposed new development is already within 200 feet of Highway 38 and thus subject to existing edge effects (Figures 4 and 5).

VII. B. Impacts to Protected Plants

Tract Map approval and subsequent construction would cause substantial reduction in Jeffrey pine forest tree canopy cover throughout most of the site. This impact would not necessarily be regarded as significant under CEQA, but could conflict with San Bernardino County's general plan and would require permitting under the County's Native Plant Protection policy.

VII. C. Impacts to Jurisdictional Streambeds

Road construction and other elements of the project would alter ephemeral channels, and possibly to meadows or other lakeshore habitat that may meet state or federal jurisdictional criteria as streambeds, wetlands, or waters of the United States. These impacts would not necessarily be regarded as significant under CEQA, but could require permitting under Section 1603 of the California Fish and Game Code or Section 404 of the federal Clean Water Act through the California Department of Fish and Game or US Army Corps of Engineers, respectively.

VIII. RECOMMENDED AGENCY CONSULTATION OR FURTHER STUDIES

1. To minimize loss of forest canopy on the property, we recommend mapping and inventorying trees on the site, and designing roads and building sites to minimize the number of overstory trees to be removed. Once those trees that must be removed are identified, we recommend applying to San Bernardino County for applicable permits under the County's native plant protection policy.

2. We recommend preparing a delineation of jurisdictional streambeds, wetlands, and waters of the United States to determine whether Section 1603 of the California Fish and Game Code or Section 404 of the federal Clean Water Act are applicable on the property. The delineation report should address channels crossing the site and the lakeshore area described in this report.

3. The project would take at least one federally listed plant (ash-gray Indian paintbrush) and its occupied habitat through direct impacts (occurrences within proposed roadways or residential lots) and possibly two other federally listed plants (Bear Valley sandwort and southern mountain buckwheat) through indirect impacts to the proposed open space lot. If project development requires permitting or funding through any federal agency (e.g., the Army Corps of Engineers under Section 404 of the federal Clean Water Act) then that agency must consult with the US Fish and Wildlife Service under Section 7 of the federal Endangered Species Act.

4. Field surveys to date have occurred in very dry years and have been unable to determine presence or absence of several listed threatened or endangered plants and numerous other special status plants. We recommend further botanical surveys for these species (Sections V. B. III. and V.

B. IV., above) , to be conduced in accordance with California Department of Fish and Game (2000) guidelines. These follow-up surveys should be done in a year when precipitation is at least 40% of average for the area over the "rainfall year" period (1 July - 30 June).

IX. MITIGATION AND MONITORING RECOMMENDATIONS

IX. A. MITIGATION RECOMMENDATIONS

Under CEQA Guidelines, if a project would "reduce the number or restrict the range of a threatened or endangered species," then a lead agency must find that the project would have a significant effect. Without mitigation, the proposed development would meet this criterion for mandatory findings of significance, due to adverse impacts to the threatened ash-gray Indian paintbrush, and potential adverse impacts to listed plants not found on the site. CEQA defines mitigation as (a) avoiding the impact altogether by not taking a certain action or parts of an action, (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation, (c) rectifying the impact by repairing, rehabilitating, or restoring the impacted environment, (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action, or (e) compensating for the impact by replacing or providing substitute resources or environments. Potential application of these five types of mitigation to the proposed project are addressed below:

Avoidance or Minimization: Avoiding or minimizing impacts to the occupied listed plant habitat would necessitate either abandoning the project or redesigning it to eliminate or minimize grading or other disturbance (including long-term edge effects of new development) to soils and hydrology on the occupied habitat and throughout a substantial buffer area. These measures would substantially reduce project feasibility and, even if implemented, long term persistence of the listed plants would be doubtful due to isolation caused by existing and proposed development.

Rectifying the impact or reducing it over time: Both these types of mitigation apply only to temporary disturbances (e.g., pipeline construction, in which the disturbed ground may be revegetated following construction). These measures are not applicable for the proposed Moon Camp project.

Compensating for the impact: Compensation is widely used as mitigation for impacts to threatened or endangered species, both as mitigation for CEQA analysis and as Habitat Conservation Plans (HCPs) negotiated with the US Fish and Wildlife Service under the federal Endangered Species Act, if protection of sufficient off-site habitat can be achieved. Typically, mitigation ratios are about 3:1 (i.e., 3 acres of habitat purchased or protected for each acre lost to development).

Off-site protection is a viable measure for impacts to ash-gray Indian paintbrush and other regionally endemic threatened or endangered plants potentially occurring on the site. The San Bernardino National Forest actively manages other sites to preserve pebble plain endemic plants, including ash-gray paintbrush. Numerous other privately-owned sites in the Big Bear Valley support pebble plains where disturbances would be more manageable due to adjacent land uses and relative isolation from developed areas. The California Wildlife Foundation has established a fund, administered by the California Department of Fish and Game, for eventual purchase or protection of pebble plain habitat in the Big Bear area.

We recommend the following measures to mitigate significant or potentially significant adverse impacts to listed threatened or endangered plants:

1. We recommend compensating for anticipated loss of a federally-listed threatened plant (ash-gray Indian paintbrush), loss of pebble plain habitat, and potential impacts to other listed species (Bear Valley sandwort, southern mountain buckwheat) by contributing to the funding of purchase

and management of off-site habitat through the California Wildlife Foundation fund, described above, at a level sufficient to purchase or protect 3 acres of habitat for each acre of pebble plain habitat and ash-gray Indian paintbrush habitat to be developed, and at 1:1 ratio for habitat to be indirectly degraded by edge effects of the proposed development (see Figure 5).

2. If follow-up surveys (Section VIII., above) determine that no other listed plants occur, then we make no further mitigation recommendation. If the surveys determine that one or more listed species occurs in the meadow area, then we recommend delineating the extent of suitable or occupied habitat, evaluating direct or indirect project impacts, and compensating as stated above for impacts to rare plant habitat (i.e., 3:1 for direct impacts, 1:1 for indirect impacts or edge effects).

IX. B. MITIGATION MONITORING RECOMMENDATIONS

California law requires monitoring of mitigation measures imposed under CEQA. We recommend monitoring mitigation measures recommended here to verify compliance with conditions of approval. We recommend that the applicant maintain files of all correspondence with agencies, contractors, or other entities pertaining to compliance with the recommendations above (Section VIII and IX.A.), and provide copies of pertinent correspondence to the County upon completion or resolution of each recommendation.

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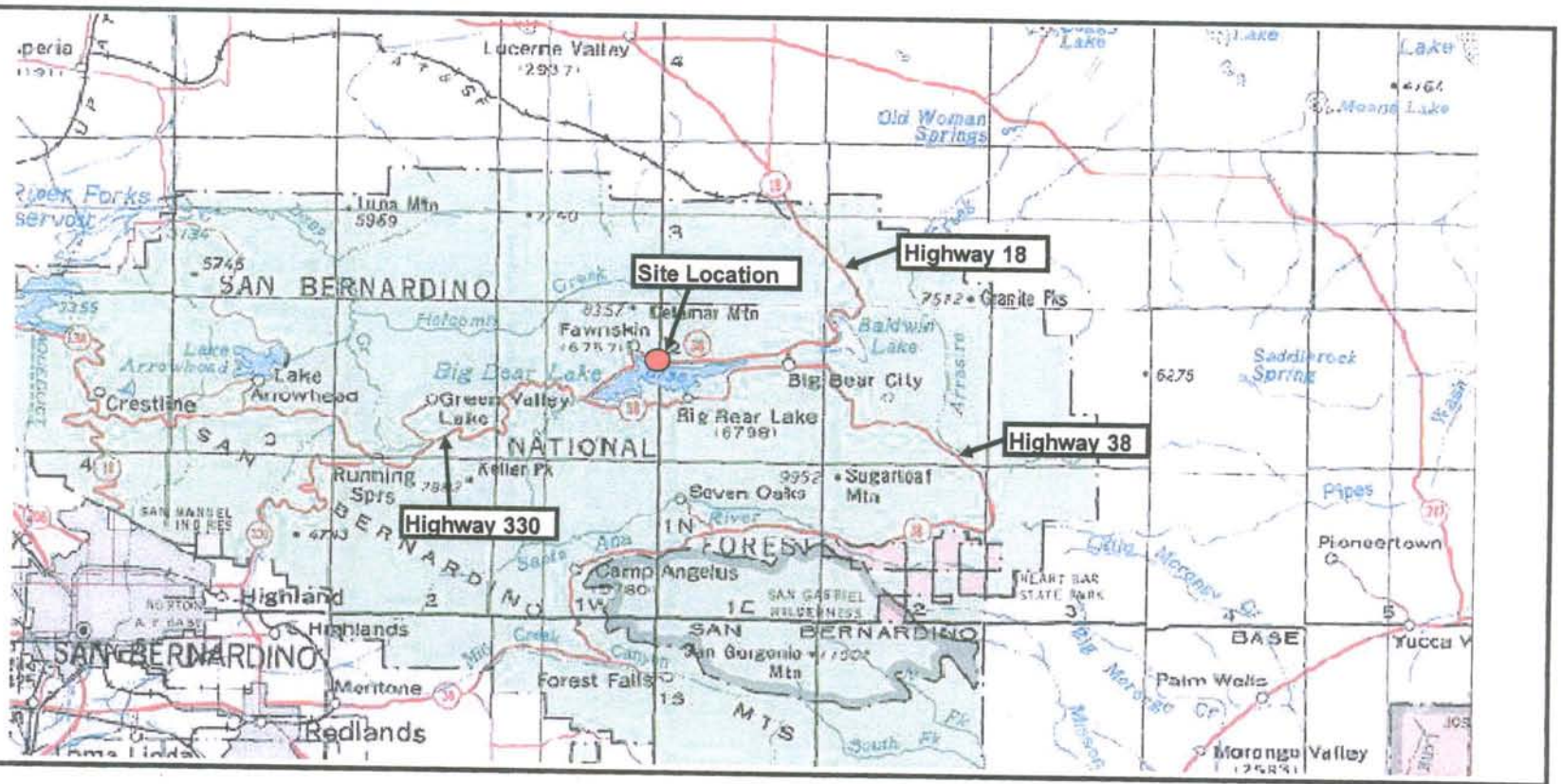
Figure 1:
Vicinity Map



Proposed Moon Camp Tenative Tract

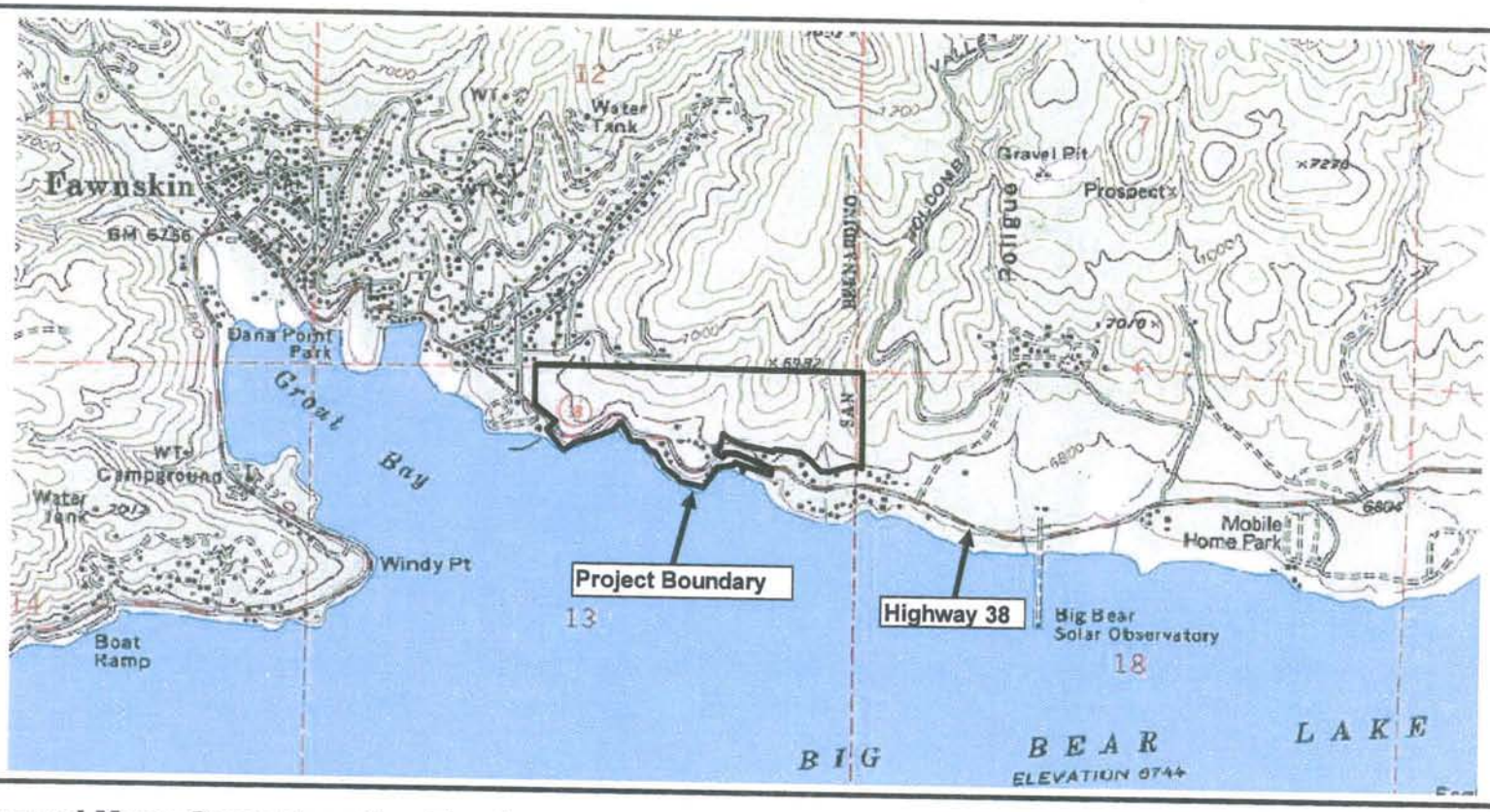
Figure 1: Vicinity Map

Scott White Biological Consulting

Map source: TOPOI 7½ minute topographic
JW: 15 Aug 2007

NORTH

Figure 2:
Project Site Map



Proposed Moon Camp Tenative Tract

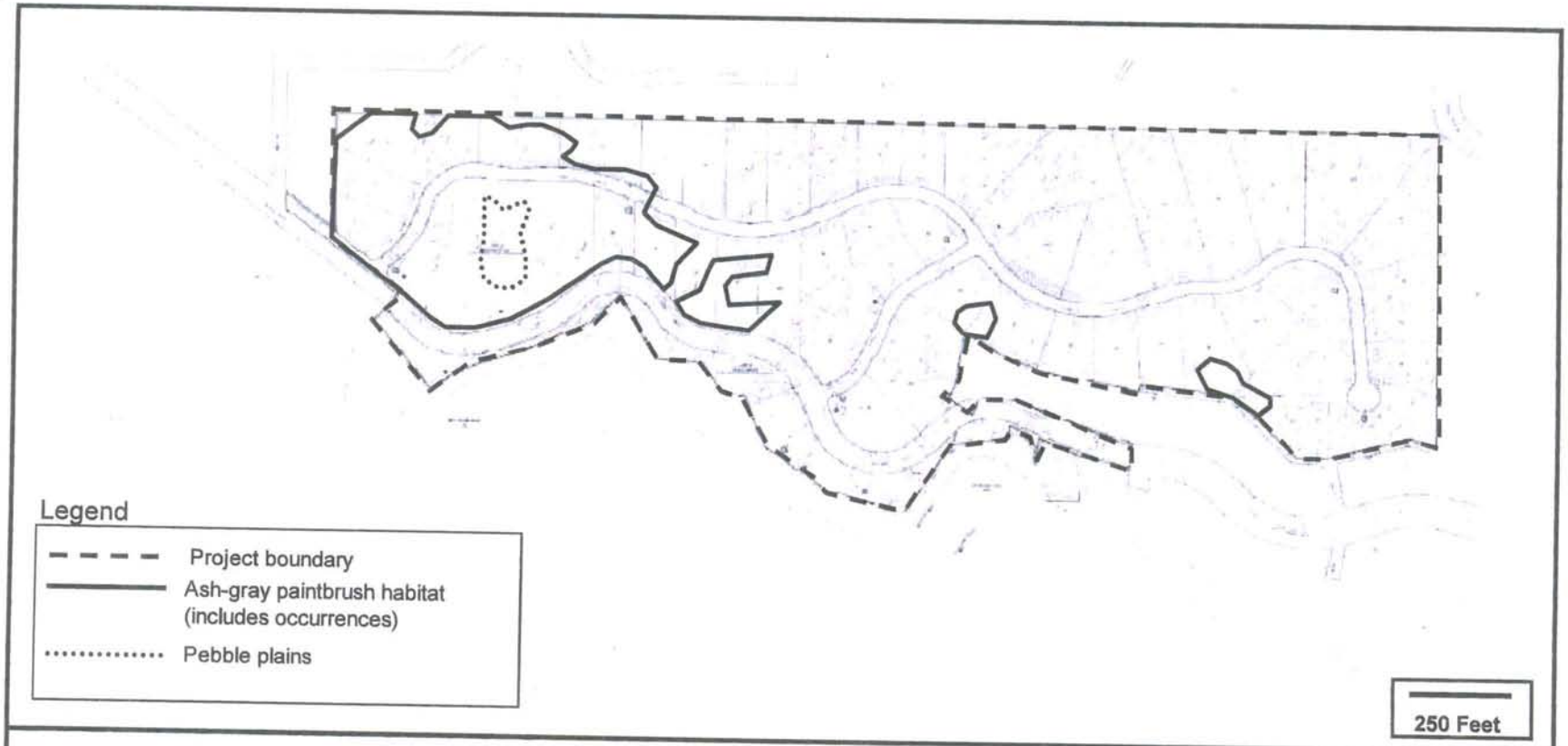
Figure 2: Site Map

Scott White Biological Consulting

Map source: TOPO! 7½ minute topographic, Fawnskin, CA
JW: 15 Aug 2007

NORTH

Figure 3:
Rare Plant Habitat



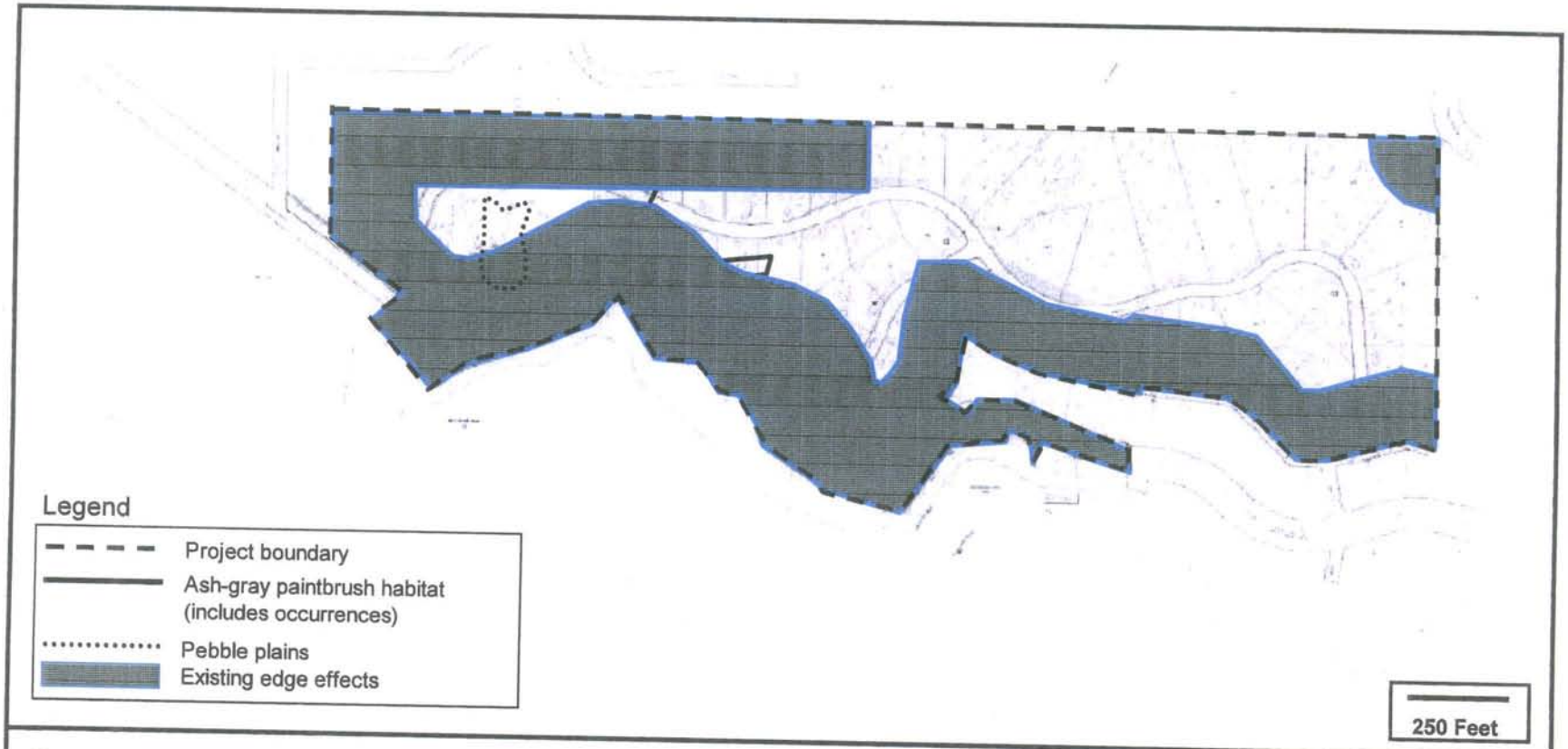
Proposed Moon Camp Tenative Tract

Figure 3: Rare Plant Habitat

Scott White Biological Consulting

Map source: Michael Brandman Associates
JW: 15 Aug 2007

Figure 4:
Edge Effect Map



Proposed Moon Camp Tenative Tract

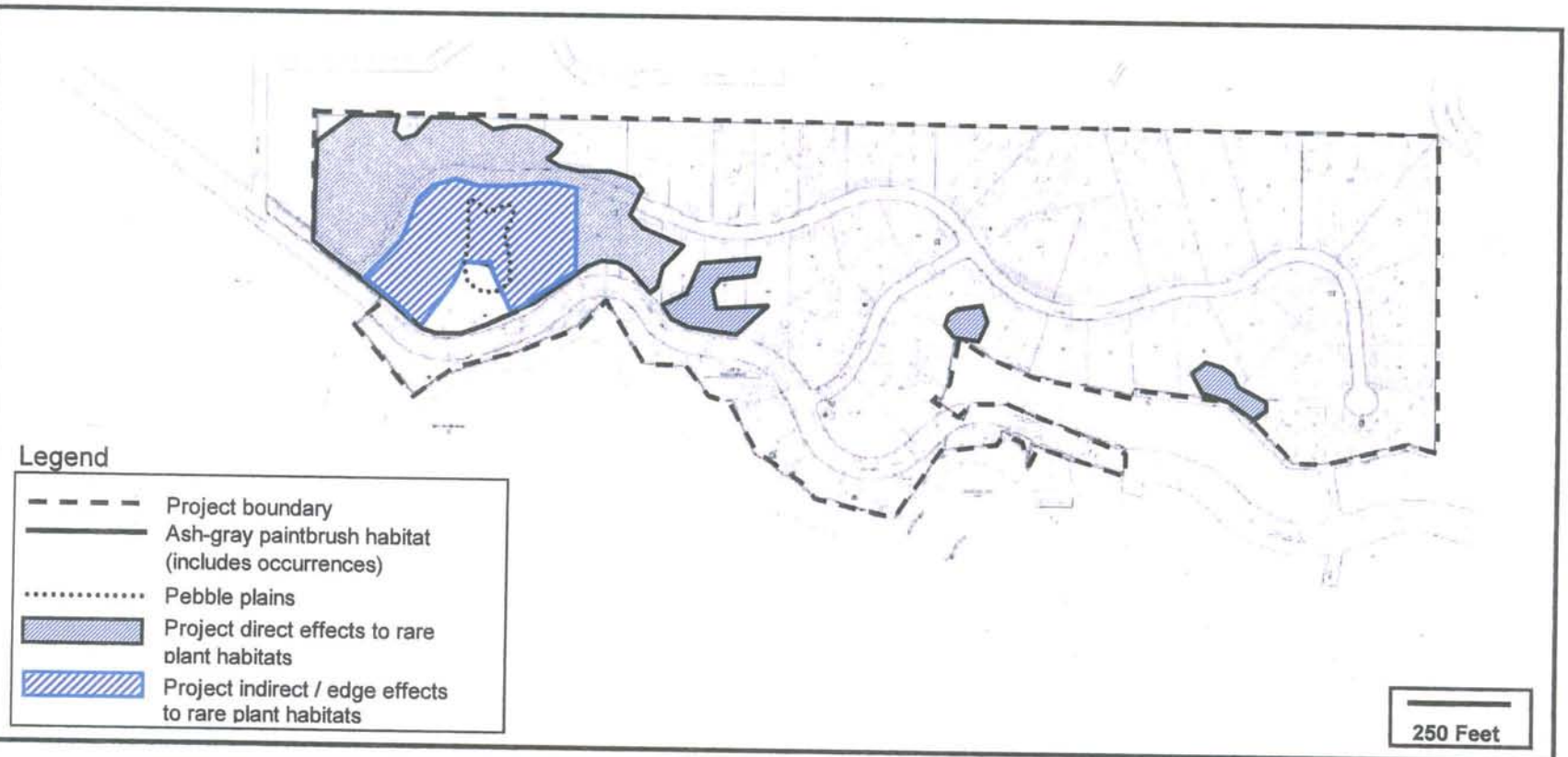
Figure 4: Existing Edge Effects

Scott White Biological Consulting

Map source: Michael Brandman Associates

JW: 15 Aug 2007

Figure 5:
Project Effects



Proposed Moon Camp Tenative Tract

Figure 5: Project Effects

Scott White Biological Consulting

Map source: Michael Brandman Associates
JW: 15 Aug 2007

Appendix 1:
Special Status Species Not Addressed

Appendix 1: Special status plants of the Bear Valley region not addressed due to habitat or range.

Common name	Latin name	Reason for exclusion
White-margined everlasting	Antennaria marginata	Outside geogr. range (only local occurrences in Barton Flats area)
Pinyon rock-cress	Arabis dispar	Outside geogr. range (only local occurrences on desert-facing slopes)
Shockley's rock-cress	Arabis shockleyi	Outside geogr. range (only local occurrences on desert-facing slopes)
Cushenbury milk-vetch	Astragalus albens	No suitable habitat (carbonate)
Triple-ribbed milk-vetch	Astragalus tricarinatus	No habitat (desert shrubland), well above elev. range (below about 4000 ft.), Cushenbury Cyn report erroneous
Parish's small-scale	Atriplex parishii	No suitable habitat (alkali sink)
Fremont barberry	Berberis fremontii	No local occurrences (presumed extinct in Cushenbury area)
Scalloped moonwort	Botrychium crenulatum	No suitable habitat (marshes, bogs)
Plummer's mariposa lily	Calochortus plummerae	Above elev. range (below about 5500 ft.)
Alkali mariposa lily	Calochortus striatus	No habitat (desert alkaline meadows, seeps) above elev. range (below about 5300 ft.)
Parish's daisy	Erigeron parishii	No suitable habitat (carbonate)
Cushenbury buckwheat	Eriogonum ovalifolium var. vineum	No suitable habitat (carbonate)
Moss gentian	Gentiana fremontii	Well below elev. range (occurs in San Gorgonio Wilderness)
Los Angeles sunflower	Helianthus nuttallii ssp. parishii	Well above elev. range (below about 4000 ft. elev.)
Barton Flats horkelia	Horkelia wilderae	Outside geogr. range (endemic to Barton Flats area)
California satintail	Imperata brevifolia	Well above elev. range (below about 3000 ft.)
San Bernardino Mtn. bladderpod	Lesquerella kingii ssp. bernardinus	No habitat (carbonate)
Adder's mouth	Malaxis monophyllos ssp. brachypoda	Well below elev. range (occurs in San Gorgonio Wilderness)
Cienega Seca oxythexca	*Oxytheca parishii* var. *cienegensis*	Outside geogr. range (known only from Cienega Seca and Pipes Cyn areas)
Cushenbury oxytheca	Oxytheca parishii var. goodmaniana	No habitat (carbonate)

Appendix 1: Special status plants of the Bear Valley region not addressed due to habitat or range.

Common name	Latin name	Reason for exclusion
Frosted mint	Poliomintha incana	No suitable habitat (desert dunes and sandy flats)
Narrow-leaved cottonwood	Populus angustifolia	No San Bernardino Mountain occurrences (local reports unverified)
Latimer's woodland gilia	Saltugilia latimeri	No habitat (desert shrubland,pinyon woodland); above elev. range (below about 6200 ft.)
Slender-petaled thelypodium	Thelypodium stenopetalum	No habitat (alkaline meadows)

Appendix 2:
Special Status Species

APPENDIX 2: Special status plants of the Big Bear Valley and surrounding mountains.

Special Status Plants	Habitat and Distribution	Flower season	Conservation Status	Occurrence Probability
Abronia nana ssp. *covillei* Coville's dwarf abronia	Perennial herb; carbonate and sandy soils within pinon-juniper woodlands; San Bernardino Mts. and mountains of E Mojave, about 5200 - 10,200 ft.	May - August	Fed: none Calif: S3.2 CNPS List 4.2	Low (marginally suitable habitat)
Allium parishii Parish's onion	Bulb; open shrubland & woodland, gen. sandy bajadas or mtn slopes, often carbonate soil, about 3000 - 5500 ft. elev.; N San Bern Mtns and Moj Des Mtns, to W Ariz.	Apr - May	Fed: none Calif: S3.3? CNPS List 4.3	Minimal (above elev. range)
Arabis parishii Parish's rock cress	Perennial herb; pebble plains, occas. on carbonate soil; open dry sites in conifer forest; about 5800 - 9500 ft. elev.; San Bernardino Mtns. endemic	April - May	Fed: none Calif: S2.1 CNPS List 1B. 2	Occurs (2007 survey; NDDB report)
Arenaria lanuginosa ssp. *saxosa* (*A. confusa*) Rock sandwort	Perennial herb; sandy soils, streams or meadows; about 5900 to 8600 ft. elev.; San Bernardino Mtns, W US and N Baja Calif.	July - Aug	Fed: none Calif: S1.3 CNPS List 2.3	Moderate (moderately suitable habitat)
Arenaria ursina Bear Valley sandwort	Perennial herb, pebble plains, occas. on carbonate soils, about 5900 - 9500 ft. elev.; San Bernardino Mtns. endemic	June - July	Fed: **THR** Calif: S 2.1 CNPS: List 1B.2	Occurs? (NDDB record #23)
Aster bernardinus (*Symphyotrichum defoliatum*) San Bernardino aster	Perennial herb; wetlands and margins, near sea level to about 6700 ft. elev.; formerly widespread, Kern Co to San Diego Co, but most sites extirpated	July - Nov	Fed: none Calif: S 3.2 CNPS List 1B.2	Low (field surveys; upper margin of elev. range)
Astragalus bicristatus Crested milk vetch	Perennial herb; rocky slopes, montane conifer forest; about 5500 - 9000 ft. elev.; San Bernardino, San Gabriel, and San Jacinto Mtns	May - August	Fed: none Calif: S3.3 CNPS List 4.3	High (suitable habitat occurs)
Astragalus lentiginosus var. *sierrae* Big Bear Valley milk vetch	Perennial herb; open rocky soils or compacted areas in pine forest; about 5900 - 8500 ft. elev.; San Bernardino Mtns endemic	April - August	Fed: none Calif: S1? CNPS List 1B.2	High (suitable habitat occurs)
Astragalus leucolobus Bear Valley woollypod	Perennial herb; open or disturbed soils, pine forests and sagebrush scrub, about 5600-8800 ft. elev.; San Gabriel Mtns to Santa Rosa Mtns	May - July	Fed: none Calif: S 2.2 CNPS List 1B.2	Occurs
Calochortus palmeri vars. *palmeri* and *munzii* Palmer's & Munz's mariposa lilies	Bulb; meadows or seasonally moist sites; about 3300 - 7200 ft. elev.; var. *palmeri* occurs S Coast & Transverse Ranges, reported but not verified San Jacinto Mtns; var. *munzii* endemic to San Jacintos, reported but not verified in San Bernardinos	May - July	Fed: none CNPS List 1B.2 var *palmeri*: Calif: S 2.1 var. *munzii*: Calif: S 1.2	Moderate (marginally suitable habitat)

APPENDIX 2: Special status plants of the Big Bear Valley and surrounding mountains.

Special Status Plants	Habitat and Distribution	Flower season	Conservation Status	Occurrence Probability
Carex occidentalis Western sedge	Rhizomatous perennial; meadows & seeps; San Bernardino Mtns, White Mtns, scattered in western states; about 6200 - 10,300 ft. elev.	June - Aug	Fed: none Calif: S2S3 CNPS List 2.3	Moderate (marginal habitat)
Castilleja cinerea Ash-gray Indian paintbrush	Perennial herb; pebble plains, dry meadows, about 5900 to 9100 ft. elev.; partially parasitic usually on matting buckwheats; San Bernardino Mtns endemic	May - August	Fed: THR Calif: S2.2 CNPS List 1B.2	Occurs (field survey and CNDDB report)
Castilleja lasiorhyncha (*Orthocarpus lasiorhynchus*) San Bernardino Mountain owl's clover	Annual; meadows, streamsides, seeps, etc., about 4200-7800 ft. elev.; San Bernardino Mtns. and (historically) San Jacinto Mtns.; reports from San Diego Co. unconfirmed	June - Aug	Fed: none Calif: S2.2 CNPS List 1B.2	Moderate (marginal habitat)
Castilleja applegateii ssp. *martinii* × *C. angustifolia* (=*C. montigena, C. martinii* var. *ewanii*) Heckard's paintbrush	Perennial herb; conifer forest; San Bernardino Mountains endemic (treated as a species by CNPS but considered a hybrid by Chuang & Heckard in Jepson Manual)	March - July	Fed: none Calif: S3.3 CNPS List 4.3	Occurs (Jeffrey pine forest)
Dryopteris filix-mas Male fern	Perennial herb; widespread in N hemisphere, esp. at high latitudes; only two reports in Calif., incl. Holcomb Valley	July - Sept.	Fed: none Calif: S 1.3 CNPS List 2.3	Low (local rarity)
Dudleya abramsii ssp. *affinis* San Bernardino Mts. dudleya	Perennial herb, pebble plains & rock outcrops (often carbonate); pinyon woodland, open pine forests, about 5200-8500 ft. elev.; San Bernardino Mtns endemic	April - June	Fed: none Calif: S 2.2 CNPS: List 1B.2	Moderate (marginal habitat)
Eriogonum foliosum (*E. evanidum*) Leafy buckwheat	Annual; sandy soil, woodlands or shrublands; about 3900-7200 ft. elev.; scattered locations, Big Bear Valley to N Baja Calif.; may be extinct in Calif.	July - Oct.	Fed: none Calif: SH CNPS List 1B.2	Minimal (presumed extinct, local rarity)
Eriogonum kennedyi var. *austromontanum* Southern mountain buckwheat	Matting woody perennial; pebble plains and similar soils, about 5800 - 7800 ft. elev.; nearly endemic to Big Bear area, also reported at Mt. Pinos	July - August	Fed: **THR** Calif: S2.2 CNPS: List 1B.2	Apparent introgression w/ Wright's buckwheat (see text)
Eriogonum microthecum var. *lacus-ursi* Bear Lake buckwheat	Subshrub; montane forests and shrublands; only known occurrence at Big Bear Lake shore ca. 7200 ft. elev.	July - Sept	Fed: none Calif: S 1 CNPS List 1B.1	Minimal (field survey)
Eriophyllum lanatum var. *obovatum* Southern Sierra woolly sunflower	Perennial herb; open montane coniferous forests, 4200-8200 ft. elev.; S Sierra Nevada and western San Bernardino Mtns	June - July	Fed: none Calif: S3.3 CNPS: List 4.3	High (suitable habitat occurs)

APPENDIX 2: Special status plants of the Big Bear Valley and surrounding mountains.

Special Status Plants	Habitat and Distribution	Flower season	Conservation Status	Occurrence Probability
Galium jepsonii (*G. angustifolium* var. *subglabrum*) Jepson's bedstraw	Perennial herb; sandy or gravelly soils, montane conifer forest, 6500-8100 ft. elev.; San Gabriel and San Bernardino Mtns	July - August	Fed: none Calif: S3.3 CNPS: List 4.3	High (suitable habitat occurs)
Galium johnstonii (*G. angustifolium* var. *pinetorum*) Johnston's bedstraw	Perennial herb, dry slopes, chaparral, lower montane forest, pinyon and juniper woodland; about 4000-7600 ft. elev.; San Bernardino, San Gabriel, maybe San Jacinto mtns	June - July	Fed: none Calif: S3.3 CNPS: List 4.3	Low-moderate (suitable habitat occurs; margin of elev. range)
Gilia leptantha ssp. *leptantha* San Bernardino Mtn. gilia	Annual; sandy or gravelly soils, open pine forest; endemic to upper Santa Ana Riv. watershed, San Bernardino Mtns., about 5000 to 7700 ft. elev.	June - Aug	Fed: none Calif: S2.3 CNPS: List 1B.3	Low (probably outside geogr. range)
Heuchera hirsutissima Shaggy-haired alum root *Heuchera parishii* Parish's alumroot	Perennial herbs; rocky outcrops, cliffs, slopes; montane forest or alpine boulderfields; above about 4800 ft. elev.; *H. hirsutissima* is endemic to San Jacinto and Santa Rosa Mtns (unconfirmed from San Bernardino Mtns); *H. parishii* endemic to San Bernardino Mtns	May - July	Fed: none Calif: S2.3 CNPS: List 1B.3	Low (poorly suitable habitat)
Hulsea vestita ssp. *parryi* Parry's sunflower	Perennial herb; gen. conifer forests, on loose eroding soil and talus; San Bernardino Mtns and Little San Bern. Mtns; about 5500-9500 ft. elev.	April - August	Fed: none Calif: S 3.3 CNPS: List 4.3	Low-moderate (marginal habitat)
Ivesia argyrocoma Silver-haired ivesia	Perennial herb; pebble plains, seasonal meadows, drainages; about 4900-8800 ft. elev.; San Bernardino Mtns and a long-disjunct site in Baja Calif mtns	June - August	Fed: none Calif: S2.2 CNPS: List 1B.2	Occurs (field survey & NDDB record)
Juncus duranii Duran's rush	Perennial herb; meadows, seeps, etc., montane forest, about 5800-9000 ft. elev.; San Bernardino, San Gabriel, and San Jacinto Mtns	July - August	Fed: none USFS: none Calif: S 3.3 CNPS: List 4.3	Low (masrginal habitat occurs)
Lewisia brachycalyx Short-sepaled lewisia	Perennial herb; wet meadows, mesic forest openings, about 4500-7600 ft. elev.; San Bernardino Mtns to Baja Calif, Utah, New Mexico	May - June	Fed: none Calif: S3.2 CNPS: List 2.2	Low-Moderate (marginal habitat)
Lilium parryi Lemon lily	Bulb; meadows and streambanks, about 4200 - 8600 ft. elev.; mtns of S Calif. and SE Arizona	July - August	Fed: none Calif: S2.1 CNPS: List 1B.2	Low (marginal habitat)
Linanthus killipii Baldwin Lake linanthus	Annual; pebble plains, alkaline meadows, forest openings, about 5500-7900 ft. elev.; San Bernardino Mtns endemic	May - July	Fed: none Calif: S 2.1 CNPS: List 1B.2	High (suitable habitat occurs)

APPENDIX 2: Special status plants of the Big Bear Valley and surrounding mountains.

Special Status Plants	Habitat and Distribution	Flower season	Conservation Status	Occurrence Probability
Mimulus exiguus San Bernardino Mountain monkeyflower	Annual; open, seasonally moist meadows, seeps, drainages, about 5900 - 7600 ft. elev.; San Bernardino Mtns. and high mtns of Baja Calif.	June - July	Fed: none Calif: S 2.2 CNPS: List 1B.2	High (suitable habitat occurs)
Mimulus purpureus Purple monkeyflower	Annual; meadow edges, forests, drainages, seeps, about 6200 - 7600 ft. elev.; San Bernardino Mtns and high mtns of Baja Calif.	May - July	Fed: none Calif: S 2.2 CNPS: List 1B.2	High (suitable habitat occurs)
Navarretia peninsularis Baja navarretia	Annual herb; open, seasonally wet places in coniferous forests, about 4900 -7600 ft. elev.; mtns of central and S Calif. and N Baja Calif.	June - August	Fed: none Calif: S2.2 CNPS: List 1B.2	Low (small patches of marginal habitat)
Oxytheca caryophylloides Chickweed oxytheca	Annual; sandy soils in conifer forests, 3900-8500 ft. elev.; S Sierra Nevada, Transverse Ranges, San Jacinto Mtns	July - Sept.	Fed: none Calif: S3.3 CNPS: List 4.3	High (suitable habitat occurs)
Perideridia parishii ssp. *parishii* Parish's yampah	Perennial herb; meadows, moist areas in conifer forest, about 4800 - 9900 ft. elev.; San Bernardino Mtns and (disjunct) AZ, Nevada, New Mexico	June - August	Fed: none Calif: S2.2? CNPS: List 2.2	Low - moderate (marginal habitat)
Phacelia exilis (*P. mohavensis* var. *exilis*) Transverse Range phacelia	Annual; sandy or gravelly soils, forest openings, meadows, pebble plains, about 3600 - 8900 ft. elev.; S Sierra Nevada and Transverse Ranges	May - August	Fed: none Calif: S 3.3 CNPS: List 4.3	High (suitable habitat occurs)
Phacelia mohavensis Mojave phacelia	Annual; sandy or gravelly soil; dry meadows and streambeds gen. within pine forest, about 4500-8100 ft. elev.; San Gabriel & San Bernardino Mtns.	April - August	Fed: none Calif: S 3.3 CNPS: List 4.3	High (suitable habitat occurs)
Phlox dolichantha Bear Valley phlox	Perennial herb; montane forest and pebble plains; about 6000 - 9800 ft. elev.; San Bernardino Mtns endemic	May - July	Fed: none Calif: S 2.2 CNPS: List 1B.2	High (suitable habitat occurs)
Poa atropurpurea San Bernardino bluegrass	Open, flat meadows, about 6700 - 7500 ft. elev. in the San Bernardinos; endemic to San Bernardino Mtns and San Diego Co. (Palomar and Laguna Mtns where it ranges down to about 4400 ft. elev.)	May - June	Fed: **END** Calif: S2.2 CNPS: List 1B.2	Low (habitat marginal at best)
Potentilla glandulosa ssp. *ewanii* Ewan's cinquefoil	Perennial herb; mesic conifer forest, about 6200-7900 ft. elev.; nearly endemic to San Gabriel Mtns., but also reported from Fawnskin area, San Bernardino Mtns.	June - July	Fed: none Calif: S 1.3 CNPS List 1B.3	Low (field survey)
Pyrrocoma uniflora ssp. *gossypina* (*Haplopappus uniflorus* ssp. *gossypinus*) Bear Valley pyrrocoma	Perennial herb; meadows (usually alkaline), pebble plains, about 5200 - 7600 ft. elev.; San Bernardino Mts endemic	July - August	Fed: none Calif: S2.2 CNPS: List 1B.2	Low - moderate (marginally suitable habitat occurs)

APPENDIX 2: Special status plants of the Big Bear Valley and surrounding mountains.

Special Status Plants	Habitat and Distribution	Flower season	Conservation Status	Occurrence Probability
Rupertia rigida (*Psoralea rigida*) Parish's rupertia	Perennial herb; chaparral, forests, and woodlands, about 2300-8200 ft. elev.; San Bernardino Mtns, Peninsular Ranges, Baja Calif.	June - July	Fed: none Calif: S3.3 CNPS: List 4.3	High (suitable habitat occurs)
Selaginella asprella Bluish spike-moss	Herb; rocks, crevices, & rocky soils, dry sites in conifer forests, about 5200-8800 ft. elev.; scattered mtn. ranges of cent. & S Calif., Baja Calif.	July	Fed: none Calif: S3.3 CNPS: List 4.3	Low (marginal habitat)
Senecio bernardinus (*Packera bernardinoa*) San Bernardino butterweed	Perennial herb; dry meadows (incl. alkaline), about 5900-7600 ft. elev.; San Bernardino Mtns endemic	May - July	Fed: none Calif: S 2.2 CNPS: List 1B.2	Low (marginally suitable habitat)
Senecio ionophyllus Tehachapi ragwort	Perennial herb; crevices, rocky places in dry conifer forest, about 4800-8900 ft. elev.; S Sierra Nevada, San Gabriel and San Bernardino Mtns	June - July	Fed: none Calif: S3.3 CNPS: List 4.3	Moderate (suitable habitat)
Sidalcea hickmanii ssp. *parishii* Parish's checkerbloom	Perennial herb; chaparral, oak shrubland or woodland, pine forest; San Bernardino Mtns. and a few Santa Barbara Co. sites, about 3200 - 6000 ft. elev.	June - August	Fed: none CA: **Rare** S 1.2 CNPS: List 1B.2	Minimal (marginal habitat, above elev. range)
Sidalcea pedata Bird's foot checkerbloom	Perennial herb; meadows (freshwater or alkaline clay), sometimes streambanks, about 5200-8200 ft. elev.; San Bernardino Mtns endemic	May - July	Fed: **END** Calif: **END**, 1.1 CNPS: List 1B.1	Low (habitat marginal at best)
Sphenopholis obtusata Prairie wedge grass	Perennial grass; riparian woodlands, meadows, streambanks; about 1000 - 6600 ft. elev.; few scattered locns in Calif. but widespread in N America	April - July	Fed: none Calif: S2.2 CNPS: List 2.2	Low (upper margin elev. range; poor habitat)
Streptanthus bernardinus Laguna Mountains jewelflower	Perennial herb; chaparral, hardwood & conifer forest, about 3900-8100 ft. elev.; mtns of S Calif. (gen. W half of San Bernardino Mtns)	June - July	Fed: none Calif: S 3.3 CNPS: List 4.3	Moderate (margin of geogr. range)
Streptanthus campestris Southern jewelflower	Perennial herb; shrublands, forests, woodlands, often rocky sites, about 2900 -7600 ft. elev.; Transverse and Peninsular Ranges, Baja Calif.	May - July	Fed: none Calif: S 2.3 CNPS: List 1B.3	High (suitable habitat occurs)
Swertia neglecta (*Frasera neglecta*) Pine green-gentian	Perennial herb; conifer forests and pinyon woodland., about 4600-8200 ft. elev.; S Coastal Ranges and Transverse Ranges	May - July	Fed: none Calif: S 3.3 CNPS: List 4.3	High (suitable habitat occurs)
Taraxacum californicum California dandelion	Perennial herb; wet meadows, about 5300 - 9200 ft. elev.; San Bernardino Mtns endemic	May - Aug	Fed: **END** Calif: S2.1 CNPS: List 1B.2	Low - moderate (suitable habitat occurs)

APPENDIX 2: Special status plants of the Big Bear Valley and surrounding mountains.

Special Status Plants	Habitat and Distribution	Flower season	Conservation Status	Occurrence Probability
Thelypodium stenopetalum Slender-petaled thelypodium	Perennial herb; meadows (mesic, usually alkaline clay), about 5200 - 8200 ft. elev.; endemic to Big Bear and Holcomb Valleys	May - Aug	Fed: **END** Calif: **END**, 1.1 CNPS: List 1B.1	Minimal (no alkaline meadow habitat)
Trichostema micranthum Small-flowered bluecurls	Annual; dry margins of lakes, meadows, and streams, 5000-7600 ft. elev., San Bernardino Mtns and Baja Calif.	July - Sept.	Fed: none Calif: S3.3 CNPS: List 4.3	High (suitable habitat occurs)
Viola pinetorum ssp. *grisea* Grey-leaved violet	Perennial herb; montane forests, about 4900 -11,200 ft. elev.; S Sierra Nevada and reported San Bernardino Mtns (CNPS but no other source)	April - July	Fed: none Calif: S 1.3 CNPS: List 1B.3	Low (suitable habitat occurs; may be outside geogr. range)

General references: CDFG 2007a, 2007b; CNPS 2007; Hickman (ed.) 1993; Munz 1974; Sanders et al. 1995; Tibor 2001, US Fish and Wildlife Service 2006.

Conservation Status

Federal designations: (federal Endangered Species Act, US Fish and Wildlife Service). Until 1996, FWS maintained a list of "category 2 candidates," described as species of concern, but with insufficient data to support listing. This list is no longer maintained and FWS has no "SOC" category.

END: Federally listed, endangered.
THR: Federally listed, threatened.
Candidate: Sufficient data are available to support federal listing, but not yet listed.
Proposed: Formally proposed for federal status shown.

State designations: (California Endangered Species Act, California Dept. of Fish and Game)

END: State listed, endangered.
THR: State listed, threatened.
RARE: State listed as rare (applied only to certain plants).
CSC: California species of special concern. Considered vulnerable to extinction due to declining numbers, limited geographic ranges, or ongoing threats.
FP: Fully protected. May not be taken or possessed without permit from CDFG.

CDF&G Natural Diversity Data Base Designations: Applied to special status plants and sensitive plant communities; where correct category is uncertain, CDF&G uses two categories or question marks.

S1: Fewer than 6 occurrences or fewer than 1000 individuals or less than 2000 acres.
S1.1: Very threatened
S1.2: Threatened
S1.3: No current threats known
S2: 6-20 occurrences or 1000-3000 individuals or 2000-10,000 acres (decimal suffixes same as above).
S3: 21-100 occurrences or 3000-10,000 individuals or 10,000-50,000 acres (decimal suffixes same as above).
S4: Apparently secure in California; this rank is clearly lower than S3 but factors exist to cause some concern, i.e., there is some threat or somewhat narrow habitat. No threat rank.
S5: Demonstrably secure or ineradicable in California. No threat rank.
SH: All California occurrences "historical" (i.e., no records in > 20 years).

APPENDIX 2: Special status plants of the Big Bear Valley and surrounding mountains.

California Native Plant Society (CNPS) designations. Note: According to CNPS (Tibor, ed., 2001 p. 54-55), plants on Lists 1A, 1B, and 2 meet definitions as threatened or endangered and "are eligible" for state listing. That interpretation of the state Endangered Species Act is not in general use.

List 1A: Plants presumed extinct in California.
List lB: Plants rare and endangered in California and throughout their range.
List 2: Plants rare, threatened or endangered in California but more common elsewhere in their range.
List 3: Plants about which we need more information; a review list.
List 4: Plants of limited distribution; a watch list.

CNPS Threat Rank:

.1 Seriously endangered in California (over 80% of occurrences threatened / high degree and immediacy of threat)
.2 Fairly endangered in California (20-80% occurrences threatened)
.3 Not very endangered in California (<20% of occurrences threatened or no current threats known)

Watch Lists: Several public and private conservation organizations maintain lists of wildlife species of concern. See CDFG 2007 introductory section for further explanations and references.
ABC: American Bird Conservancy Green List
Audubon: National Audubon Society Watch List
IUCN: World Conservation Union Species Survival Commission Red List

Definitions of occurrence probability: Estimated occurrence probabilities based literature sources cited earlier and field surveys and habitat analyses reported here.

Occurs: Observed on the site by qualified biologists.
Expected: Not observed or recorded on the site, but very likely present during at least a portion of the year.
High: Habitat is a type often utilized by the species and the site is within the known range of the species.
Moderate: Site is within the known range of the species and habitat on the site is a type occasionally used.
Low: Site is within the species' known range but habitat is rarely used, or the species was not found during focused surveys covering less than 100% of potential habitat or completed in marginal seasons.
Minimal: No suitable habitat on the site; or well outside the species' known elevational or geographic ranges; or a focused study covering 100% of all suitable habitat, completed during the appropriate season and during a year of appropriate rainfall, did not detect the species.
Unknown: No focused surveys have been performed in the region, and the species' distribution and habitat are poorly known.

Appendix 3:
Species List

Appendix 3: Species list

Latin Name	**Common Name**		
CUPRESSACEAE	CYPRESS FAMILY		
Calocedrus decurrens	Incense cedar	Occas. / forest	
Juniperus occidentalis	Western juniper	Comm. / forest	
PINACEAE	PINE FAMILY		
Abies concolor	White fir	Occas. / forest	
Pinus jeffreyi	Jeffrey pine	Comm. / forest	
Pinus monophylla	Pinyon pine	Occas. /forest	
APIACEAE	CELERY FAMILY		
Lomatium nevadense	Nevada lomatium	Uncomm. / forest	11669
Tauschia parishii	Parish tauschia	Scarce / open places	11668
ASTERACEAE	ASTER FAMILY		
Achillia millefolium	California yarrow	Comm. / esp. mesic sites	
Agoseris retrorsa	Spear-leaved agoseris	Occas. / throughout	
Antennaria dimorpha	Low everlasting	Comm. / pebble plains	
Artemisia dracunculus	Tarragon	Occas. / esp. near road, lakeshore	
Artemisia ludoviciana	Western mugwort	Occas. / open places, washes	
Artemisia tridentata	Great Basin sagebrush	Comm. / open forest	
Aster frondosus	Short-rayed alkali aster	Occas.-comm. / near shore	
Chrysothamnus nauseosus	Common rabbitbrush	Occas. / throughout	
Chrysothamnus viscidiflorus	Curlleaf rabbitbrush	Occas.-comm. / throughout	
Cirsium occidentale var. californicum	California thistle	Uncomm. / open sites	
* *Cirsium vulgare*	Bull thistle	Occas. / near shore	
Erigeron breweri	Brewer's daisy	Occas. / forest	
Erigeron divergens	Diffuse daisy	Comm. / gen. open places	11667
Eriophyllum confertiflorum	Golden yarrow	Comm. / ± throughout	
Gnaphalium canescens	Perennial cudweed	Uncomm. / gen. open places	
* *Gnaphalium luteo-album*	Pearly everlasting	Occas. / roadside, shoreline	
Hymenopappus filifolius	Columbia cutleaf	Uncomm. / open forest	
* *Lactuca serriola*	Prickly lettuce	Occas. / mostly roadside	
Lessingia filaginifolia (Corethrogyne filaginifolia)	Chaparral aster	Occas. / open forest	
Madia elegans	Elegant tarplant	Occas. / forest	
* *Senecio vulgaris*	Common groundsel	Uncomm. / gen. roadside	
Solidago californica	Calif. goldenrod	Occas. / mesic sites	
* *Sonchus oleraceus*	Common sow thistle	Occas. / near shore	
* *Taraxacum officinale*	Common dandelion	Occas. / roadside, shoreline	
Tetradymia comosa	Hairy horsebrush	Occas. / open forest	
* *Tragopogon dubius*	Oyster plant, salsify	Occas. / roadside, forest	
BORAGINACEAE	BORAGE FAMILY		
Cryptantha micrantha	Purple root cryptantha	Occas. / open places	
Cryptantha simulans	Popcorn flower	Scarce / open places	11670
BRASSICACEAE	MUSTARD FAMILY		
Arabis holboellii (?)	Holboell's rock-cress	Occas. / open forest	
** *Arabis parishii*	Parish's rock-cress	Occas. / pebble plains	11665
Caulanthus major	Slender wild-cabbage	Occas. / forest	
Descurainia incisa (D. richardsonii)	Mountain tansy mustard	Uncomm. / near road	

Alien species indicated by asterisk, special status species indicated by two asterisks. This list includes only species observed on the site. Others may have been overlooked or unidentifiable due to season. Plants were identified using keys, descriptions, and illustrations in Abrams (1923-1951), Hickman (1993), Munz (1974), and other regional references. Taxonomy and nomenclature generally follow Hickman. Some plants were collected as vouchers (see collection numbers at right) and will be donated to the Herbaria at Rancho Santa Ana Botanic Garden or UC Riverside.

BRASSICACEAE, cont.			
Descurainia pinnata	Tansy mustard	Occas. / mostly open forest	
Erysiumum capitatum	Douglas wallflower	Occas. / ±throughout	
* *Lepidium virginicum v. pubescens*	Wild peppergrass	Occas. / mostly roadside, shoreline	
* *Sisymbrium altissimum*	Tumble mustard	Occas. / roadside	
CACTACEAE	CACTUS FAMILY		
Opuntia basilaris var. basilaris	Common beavertail cactus	Uncomm. / open forest	
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY		
Symphoricarpos rotundifolius var. parishii	Parish snowberry	Occas. / shaded forest	
CARYOPHYLLACEAE	CARNATION FAMILY		
Silene verecunda ssp. platyota	Cuyamaca campion	Occas. / forest	
CHENOPODIACEAE	GOOSEFOOT FAMILY		
* *Chenopodium album (?)*	Common goosefoot	Occas. / throughout	
* *Salsola tragus*	Russian thistle, tumbleweed	Occas. / mostly roadside	
CONVOLVULACEAE	MORNING GLORY FAMILY		
Calystegia malacophylla ssp. fulcrata (C. fulcrata)	Morning glory	Occas. / throughout	
ERICACEAE	MANZANITA FAMILY		
Arctostaphylos patula	Greenleaf manzanita	Occas.-comm. / forest	
EUPHORBIACEAE	SPURGE FAMILY		
Chamaesyce albomarginata	Rattlesnake spurge	Occas. / open forest	
Euphorbia palmeri	Wood spurge	Occas. / uplands	
FABACEAE	PEA FAMILY		
Amorpha californica	Calif. false indigo	Occas. / mesic forest	
** *Astragalus leucolobus*	Bear Valley woollypod	Comm. / pebble plains	11705
Astragalus douglasii	Douglas rattleweed	Uncomm. / open places	
Lotus argyraeus	Silver lotus	Occas. / open forest	
Lotus nevadensis	Nevada lotus	Comm. / open places	
Lupinus cf. breweri	Silver mat lupine	Comm. / pebble plains, etc.	
Lupinus excubitus var. austromontanus	Southern mountain lupine	Occas. / ±throughout	11666
Lupinus lepidus v. confertus	Prairie lupine	Occas. / lakeshore	
* *Medicago lupulina*	Black medick	Uncomm. / near lakeshore	
* *Melilotus alba*	White sweet-clover	Occas.-comm. / roadsides, shore	
FAGACEAE	OAK FAMILY		
Quercus kelloggii	California black oak	Comm. / forest	
GERANIACEAE	GERANIUM FAMILY		
* *Erodium cicutarium*	Red-stemmed filaree	Occas.-comm. / roadsides, etc.	
HYDROPHYLLACEAE	WATERLEAF FAMILY		
Eridictyon trichocalyx	Yerba santa	Occas. / open forest	
Phacelia distans (?)	Common phacelia	Uncomm. / open forest	
Phacelia imbricata	Broad-sepaled phacelia	Uncomm. / open forest	
LAMIACEAE	MINT FAMILY		
Monardella linoides (?) (or M. odoratissima)	Flax-leaved monardella	Occas. / forest	
Scutellaria siphocampyloides (S. austinae)	Austin's skullcap	Uncomm. / mesic forest	
LOASACEAE	STICK-LEAF FAMILY		
Mentzelia sp.	Unid. stick-leaf	Uncomm. / uplands	11674
MALVACEAE	MALLOW FAMILY		
* *Malva parviflora*	Cheeseweed	Occas. / mostly lakeshore	
ONAGRACEAE	EVENING PRIMROSE FAMILY		
Clarkia sp.	Unid. annual clarkia	Uncomm. / shaded forest	

Appendix 3: Species list

ONAGRACEAE (cont.)			
Epilobium brachycarpum (E. paniculatum)	Summer cottonweed	Occas.-comm. upland margins	
Epilobium ciliatum	Willow-herb	Occas. / mostly lakeshore	
Gaypohytum sp.	Unid. gayophytum	Comm. / open forest	
POLEMONIACEAE	PHLOX FAMILY		
Gilia latiflora (?)	Broad-flowered gilia	Uncomm. / open forest	
Gilia modocensis	Modoc gilia	Occas. /open places	11,659
Eriastrum densifolium ssp. densifolium	Mojave woolly-star	Occas. / open forest	
Eriastrum sapphirinum	Sapphire woollystar	Occas. / open forest	
Linanthus breviculus	Mojave linanthus	Comm. / open forest	
Phlox gracilis	Slender phlox	Comm. / open places	11660
POLYGONACEAE	BUCKWHEAT FAMILY		
Eriogonum davidsonii (=E. molestum var. davidsonii)	Davidson buckwheat	Occas. / open forest	
** *Eriogonum kennedyi var. austromontanum*	Southern mountain buckwheat	Uncomm., pebble plain, intergrade w/ E. wrightii?	11760
Eriogonum wrightii ssp. subscaposum	Wright's buckwheat	Comm. & characteristic / pebble plains	
Eriogonum umbellatum v. munzii	Munz sulfur buckwheat	Occas. / open forest	
* *Polygonum arenastrum*	Common knotweed	Occas. / roadside, lake shore	
* *Rumex crispus*	Curly dock	Occas. / mostly lakeshore	
Rumex salicifolius	Willow dock	Uncomm. / near lakeshore	
PORTULACACEAE	PURSLANE FAMILY		
Lewisia rediviva	Bitter root	Occas.-comm. / pebble plains	
RANUNCULACEAE	BUTTERCUP FAMILY		
Delphinium parishii (?)	Parish larkspur	Occas. / forest	
* *Ranunculus sceleratus*	Cursed buttercup	Occas. / lakeshore	11656
RHAMNACEAE	BUCKTHORN FAMILY		
Ceanothus cordulatus	Mountain whitethorn	Occas. / open forest	
Ceanothus greggii	Cupleaf ceanothus	Uncomm. / open forest	
Ceanothus integerrimus	Deerbrush	Occas. / forest	
ROSACEAE	ROSE FAMILY		
Amelanchier utahensis	Service berry	Comm. / ± throughout	
Cercocarpus betuloides	Birch-leaf mountain mahogany	Uncomm.	
Cercocarpus ledifolius	Curlleaf mountain mahogany	Comm. / ± throughout	
Horkelia rydbergii (H. bolanderi s. parryi)	Transverse range horkelia	Occas. / mostly near lake	
** *Ivesia argyrocoma*	Silver-haired ivesia	locally comm. / pebble pl.	11658
Potentilla anserina	Silverweed	Comm. / lakeshore	
Potentilla biennis	Biennial cinquefoil	Comm. / lakeshore	11671
Potentilla gracilis	Slender cinquefoil	Occas. / mesic places	
Potentilla wheeleri	Wheeler cinquefoil	Scarce / near lakeshore	11673
RUBIACEAE	COFFEE FAMILY		
* *Galium aparine*	Goose grass	Uncomm. / shaded forest	
Galium parishii	Parish bedstraw	Occas. / forest	
SALICACEAE	WILLOW FAMILY		
Populus balsamifera trichocarpa	Black cottonwood	Seedlings only / lakeshore	
Salix laevigata (?)	Red willow	Uncomm. / lakeshore	
Salix lasiolepis (?)	Arroyo willow	Comm. / lakeshore	
SCROPHULARIACEAE	SNAPDRAGON FAMILY		
** *Castilleja cinera*	Ash-gray paintbrush	Localized / pebble plains	11657
** *Castilleja montigena (C. applegatei ssp. martinii)*	Heckerd's paintbrush	Occas. / forest	

Appendix 3: Species list

SCROPHULARIACEAE, cont.			
Collinsis parviflora	Small-flowered blue-eyed Mar	Comm., patchy / peb. pl.	11661
Limosella acaulis	Mudwort	Comm.-abund. / wet lakeshoı	11655
Mimulus guttatus	Seep monkeyflower	Occas. / lakeshore	
Pedicularis semibarbata	Pine-woods lousewort	Occas. / forest	11664
Penstemon eatonii	Eaton firecracker	Occas. / forest	
* *Verbascum thapsus*	Common muellin	Occas. / throughout	
SOLANACEAE	NIGHTSHADE FAMILY		
Solanum xanti	Chaparral nightshade	Uncomm. / forest	
STERCULIACEAE	CACAO FAMILY		
Fremontodendron californicum	Flannel bush	Occas.-comm. / open forest	
TAMARICACEAE	TAMARISK FAMILY		
Tamarix ramosissima	Mediterranean tamarisk	Occas. / lakeshore	
URTICACEAE	NETTLE FAMILY		
Urtica dioica ssp. holosericea	Stinging nettle	Occas. / lakeshore	
VIOLACEAE	VIOLET FAMILY		
Viola douglasii	Douglas violet	Occas. / pebble plains	11663
Viola purpurea	Mountain violet	Occas. / throughout	11662
VISCACEAE	MISTLETOE FAMILY		
Arceuthobium campylopodum	Dwarf mistletoe	Uncomm. / on yellow pines	
CYPERACEAE	SEDGE FAMILY		
Carex athrostachya	Slender-beaked sedge	Occas. / near lake	
Carex sp.	Unid. sedge	Uncomm. / near lakeshore	11671
JUNCACEAE	RUSH FAMILY		
Juncus arcticus (incl. vars. balticus and mexicanus)	Wire-grass	Occas.-comm. / mesic areas	
LILIACEAE	LILY FAMILY		
Allium parryi	Parry's onion	Occas. / mostly pebble plains	
Calochortus kennedyi	Kennedy's mariposa lily	Uncomm. / open forest	
POACEAE	GRASS FAMILY		
Agrostis sp.	Unid. bentgrass	Occas. / lakeshore	
Alopecurus aequalis	Short-awn foxtail	Comm., patchy / near shore	
Bromus carinatus	California brome	Occas. / uplands, ±throughout	
Bromus orcuttianus (?)	Orcutt brome	Uncomm. / mesic forest	
* *Bromus tectorum*	Cheat grass	Comm. / ± throughout	
Elymus elymoides (Sitanion hystrix v. hystrix)	Bottlebrush squirreltail	Occas. / ±throughout	
Elymus glaucus	Blue wild-rye	Occas. / ± throughout	
Hordeum jubatum	Foxtail barley	Uncomm. / mostly near lake	
* *Koeleria macrantha*	Junegrass	Occas. / mesic forest, uplands	
Melica stricta	Nodding melic	Uncomm. patchy, uplands	
Muhlenbergia rigens	Deergrass	Occas. / throughout	
Poa fendleriana	Fendler bluegrass	Occas.-comm. / forest	
Poa secunda	Nodding bluegrass	Comm. / ± throughout	
* *Polypogon monspeliensis*	Rabbitfoot grass	Occas.-comm. / near shore	
Pucinellia nuttalliana	Alkali grass	Uncomm. / low-lying mesic site	
Stipa coronata ssp. depauperata (Achnatherum parishii)	Parish needlegrass	Occas. / mostly open forest	
Stipa lettermannii	Letterman's needlegrass	Occas. / forest	
Vulpia microstachys (Festuca microstachys, F. reflexa, F. pacifica, F. confusa)	Annual fescue	Uncomm. patchy / upland	

Attachment 1:
California Natural Diversity Data Base Query Results

California Department of Fish and Game
Natural Diversity Database
Selected Elements by Scientific Name - Portrait
USGS 7½' quads: Fawnskin, Big Bear City, Big Bear Lake, Butler Pk, Keller Peak, and Moonridge

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1 ***Accipiter cooperii*** Cooper's hawk	ABNKC12040			G5	S3	SC
2 ***Antennaria marginata*** white-margined everlasting	PDAST0H1G0			G4G5	S1.3	2.3
3 ***Arabis dispar*** pinyon rock cress	PDBRA060F0			G3	S2.3	2.3
4 ***Arabis parishii*** Parish's rock cress	PDBRA061C0			G2	S2.1	1B.2
5 ***Arabis shockleyi*** Shockley's rock cress	PDBRA061V0			G3	S2.2	2.2
6 ***Arenaria lanuginosa ssp. saxosa*** rock sandwort	PDCAR040E4			G5T5	S1.3	2.3
7 ***Arenaria ursina*** Big Bear Valley sandwort	PDCAR040R0	Threatened		G2	S2.1	1B.2
8 ***Astragalus albens*** Cushenbury milk-vetch	PDFAB0F0A0	Endangered		G1	S1.1	1B.1
9 ***Astragalus lentiginosus var. sierrae*** Big Bear Valley milk-vetch	PDFAB0FB9L			G5T1	S1?	1B.2
10 ***Astragalus leucolobus*** Big Bear Valley woollypod	PDFAB0F4T0			G2	S2.2	1B.2
11 ***Astragalus tricarinatus*** triple-ribbed milk-vetch	PDFAB0F920	Endangered		G1	S1.2	1B.2
12 ***Atriplex parishii*** Parish's brittlescale	PDCHE041D0			G1G2	S1.1	1B.1
13 ***Botrychium crenulatum*** scalloped moonwort	PPOPH010L0			G3	S2.2	2.2
14 ***Calochortus palmeri var. palmeri*** Palmer's mariposa lily	PMLIL0D122			G2T2	S2.1	1B.2
15 ***Calochortus plummerae*** Plummer's mariposa lily	PMLIL0D150			G3	S3.2	1B.2
16 ***Calochortus striatus*** alkali mariposa lily	PMLIL0D190			G2	S2.2	1B.2
17 ***Castilleja cinerea*** ash-gray Indian paintbrush	PDSCR0D0H0	Threatened		G2	S2.2	1B.2
18 ***Castilleja lasiorhyncha*** San Bernardino Mountains owl's-clover	PDSCR0D410			G2	S2.2	1B.2
19 ***Chaetodipus fallax pallidus*** pallid San Diego pocket mouse	AMAFD05032			G5T3	S3	SC
20 ***Charina trivirgata*** rosy boa	ARADA02010			G4G5	S3S4	
21 ***Charina umbratica*** southern rubber boa	ARADA01011		Threatened	G5T2T3	S2S3	
22 ***Corynorhinus townsendii*** Townsend's big-eared bat	AMACC08010			G4T3T4	S2S3	SC
23 ***Dryopteris filix-mas*** male fern	PPDRY0A0B0			G5	S1.3	2.3

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
24 ***Dudleya abramsii ssp. affinis*** San Bernardino Mountains dudleya	PDCRA04013			G3T2	S2.2	1B.2
25 ***Empidonax traillii extimus*** southwestern willow flycatcher	ABPAE33043	Endangered	Endangered	G5T1T2	S1	
26 ***Erigeron parishii*** Parish's daisy	PDAST3M310	Threatened		G2	S2.1	1B.1
27 ***Eriogonum kennedyi var. austromontanum*** southern mountain buckwheat	PDPGN083B2	Threatened		G4T2	S2.2	1B.2
28 ***Eriogonum microthecum var. lacus-ursi*** Bear Lake buckwheat	PDPGN083WF			G5T1	S1.1	1B.1
29 ***Eriogonum ovalifolium var. vineum*** Cushenbury buckwheat	PDPGN084F8	Endangered		G5T1	S1.1	1B.1
30 ***Euchloe hyantis andrewsi*** Andrew's marble butterfly	IILEPA5032			G3G4T1	S1	
31 ***Gasterosteus aculeatus williamsoni*** unarmored threespine stickleback	AFCPA03011	Endangered	Endangered	G5T1	S1	
32 ***Gentiana fremontii*** moss gentian	PDGEN060Y0			G4	S2.3	2.3
33 ***Gila orcuttii*** arroyo chub	AFCJB13120			G2	S2	SC
34 ***Gilia leptantha ssp. leptantha*** San Bernardino gilia	PDPLM040W1			G4T2	S2.3	1B.3
35 ***Glaucomys sabrinus californicus*** San Bernardino flying squirrel	AMAFB09021			G5T2T3	S2S3	SC
36 ***Haliaeetus leucocephalus*** bald eagle	ABNKC10010	Threatened	Endangered	G5	S2	
37 ***Helianthus nuttallii ssp. parishii*** Los Angeles sunflower	PDAST4N102			G5TH	S1.1	1A
38 ***Heuchera parishii*** Parish's alumroot	PDSAX0E0S0			G2	S2.3	1B.3
39 ***Horkelia wilderae*** Barton Flats horkelia	PDROS0W0J0			G1	S1.1	1B.1
40 ***Hydroporus simplex*** simple hydroporus diving beetle	IICOL55050			G1?	S1?	
41 ***Icteria virens*** yellow-breasted chat	ABPBX24010			G5	S3	SC
42 ***Ivesia argyrocoma*** silver-haired ivesia	PDROS0X020			G2	S2.2	1B.2
43 ***Lampropeltis zonata (parvirubra)*** California mountain kingsnake (San Bernardino population)	ARADB19062			G4G5	S2?	SC
44 ***Lesquerella kingii ssp. bernardina*** San Bernardino Mountains bladderpod	PDBRA1N0W1	Endangered		G5T1	S1.1	1B.1
45 ***Lewisia brachycalyx*** short-sepaled lewisia	PDPOR04010			G4G5	S3.2	2.2
46 ***Lilium parryi*** lemon lily	PMLIL1A0J0			G3	S2.1	1B.2

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
47 ***Linanthus killipii*** Baldwin Lake linanthus	PDPLM090N0			G2	S2.1	1B.2
48 ***Malaxis monophyllos ssp. brachypoda*** adder's-mouth	PMORC1R010			G4?T4	S1.1	2.1
49 ***Mimulus exiguus*** San Bernardino Mountains monkeyflower	PDSCR1B140			G2	S2.2	1B.2
50 ***Mimulus purpureus*** purple monkeyflower	PDSCR1B2B0			G2	S2.2	1B.2
51 ***Myotis evotis*** long-eared myotis	AMACC01070			G5	S4?	
52 ***Myotis thysanodes*** fringed myotis	AMACC01090			G4G5	S4	
53 ***Myotis volans*** long-legged myotis	AMACC01110			G5	S4?	
54 ***Navarretia peninsularis*** Baja navarretia	PDPLM0C0L0			G3?	S2.2	1B.2
55 ***Neotamias speciosus speciosus*** Lodgepole chipmunk	AMAFB02172			G4T2T3	S2S3	
56 ***Oxytheca parishii var. cienegensis*** Cienega Seca oxytheca	PDPGN0J042			G4?T1	S1.3	1B.3
57 ***Oxytheca parishii var. goodmaniana*** Cushenbury oxytheca	PDPGN0J043	Endangered		G4?T1	S1.1	1B.1
58 ***Pebble Plains***	CTT47000CA			G1	S1.1	
59 ***Perideridia parishii ssp. parishii*** Parish's yampah	PDAPI1N0C2			G4T3T4	S2.2?	2.2
60 ***Phlox dolichantha*** Big Bear Valley phlox	PDPLM0D0P0			G2	S2.2	1B.2
61 ***Phrynosoma coronatum (blainvillii*** Coast (San Diego) horned lizard	ARACF12021			G4G5	S3S4	SC
62 ***Piranga rubra*** summer tanager	ABPBX45030			G5	S2	SC
63 ***Poa atropurpurea*** San Bernardino blue grass	PMPOA4Z0A0	Endangered		G2	S2.2	1B.2
64 ***Poliomintha incana*** frosted mint	PDLAM1L020			G5	SH	1A
65 ***Populus angustifolia*** narrow-leaved cottonwood	PDSAL01020			G5	S2S3	2.2
66 ***Potentilla glandulosa ssp. ewanii*** Ewan's cinquefoil	PDROS1B0S3			G5T1	S1.3	1B.3
67 ***Psychomastax deserticola*** desert monkey grasshopper	IIORT15010			G1G2	S1S2	
68 ***Pyrrocoma uniflora var. gossypina*** Bear Valley pyrrocoma	PDASTDT0K1			G5T2	S2.2	1B.2
69 ***Rana muscosa*** mountain yellow-legged frog	AAABH01140	Endangered		G2	S2	SC

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
70	***Saltugilia latimeri*** Latimer's woodland-gilia	PDPLM0H010			G2	S2.2	1B.2
71	***Senecio bernardinus*** San Bernardino ragwort	PDAST8H0E0			G2	S2.2	1B.2
72	***Sidalcea hickmanii ssp. parishii*** Parish's checkerbloom	PDMAL110A3	Candidate	Rare	G3T1	S1.2	1B.2
73	***Sidalcea pedata*** bird-foot checkerbloom	PDMAL110L0	Endangered	Endangered	G1	S1.1	1B.1
74	***Southern California Threespine Stickleback Stream***	CARE2320CA			G?	S?	
75	***Sphenopholis obtusata*** prairie wedge grass	PMPOA5T030			G5	S2.2	2.2
76	***Streptanthus campestris*** southern jewel-flower	PDBRA2G0B0			G2	S2.3	1B.3
77	***Symphyotrichum defoliatum*** San Bernardino aster	PDASTE80C0			G3	S3.2	1B.2
78	***Taraxacum californicum*** California dandelion	PDAST93050	Endangered		G2	S2.1	1B.2
79	***Thamnophis hammondii*** two-striped garter snake	ARADB36160			G3	S2	SC
80	***Thelypodium stenopetalum*** slender-petaled thelypodium	PDBRA2N0F0	Endangered	Endangered	G1	S1.1	1B.1

Attachment 2:
California Natural Diversity Data Base Forms

California Native Species Field Survey Form

Mail to:
Natural Diversity Database
California Dept. of Fish & Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

For office use only			
Source Code		Quad Code	
Elm Code		Occ #	
Copy to		Map Index #	

Date of Field Work (*Month – Day – Year*) *April 30 2007*

Scientific Name : *Arenaria ursina*
Common Name :

Species Found?	Yes	No	If not, why?	Total Number of Individuals:
		XX	Drought? Vehicle disturbance?	

Is this an existing NDDB occurrence?	Yes	Occurrence #	No		Is this a Subsequent Visit?	Yes	No	#s of individuals since last visit: More ?	Fewer ?	Same ?
	XX	23			Also not seen in 2002, also a drought year	XX				xx

Collected?	no	Coll. #,Museum/Herbarium:
	xx	

Reporter:	Scott D. White
Address:	Scott White Biological Consulting 201 North First Ave., No. 102 Upland, Calif. 91786
Phone: **E-mail:**	(909) 949-2686 / scottbioservices@earthlink.net

Plant Phenology Information

dormant %	sterile %	senescent %
budding %	flowering %	fruiting %

Animal Information

Age Structure:	# of adults	# of juveniles	# of unknown

Wintering	Foraging	Breeding	Roosting	Burrow site	Other

Location: *(please attach map)*
San Bernardino Mtns., just north of Big Bear Lake near community of Fawnskin at former "Moon Camp" site.

County:	Quad Name:	Landowner:
San Bernardino Co.	Fawnskin	private

Elevation:	Township	Range	Section (s)	Latitude:	Longitude:
6800-6900 ft	2N	1W	13 (N half)	Ca. 34°16' N	Ca. 116°56' W

UTM Data	Zone	Datum	Source	Accuracy	X coordinate (E)	Y coordinate (N)

Habitat Description: *(plant communities, dominants, associates, substrates/soils, aspects/slope)*
Pebble plain surrounded by arid Jeffrey pine forest.
Other rare species? Arabis parishii, Astragalus leucolobus, Ivesia argyrocoma, Castilleja cinerea, "C. montigena,"

Site Information

Current/surrounding land use: Vacant, short distance S of residential development, short distance N of well-used highway
Visible Disturbances; possible threats: Significant vehicle damage to habitat; site proposed for development

Overall site quality: ??	Excellent	Good	Fair	Poor

Comments:

Determination method:	Photographs:	Slides	Prints	Digital
[] Keyed in a site reference:	Organism			
[] Compared with other specimen	Habitat			
[] Compared with photo/sketch	Diagnostic Features			
[] By knowledgeable individual	Other			
[] Other method:	Permission to duplicate	yes []	no []	

California Native Species Field Survey Form

Mail to:
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1416 Ninth Street, 12th Floor
Sacramento, CA 95814

For office use only			
Source Code		Quad Code	
Elm Code		Occ #	
Copy to		Map Index #	

Date of Field Work (*Month – Day – Year*) *April 30 2007*

Scientific Name : *Arabis parishii*
Common Name :

Species Found?	Yes	No	*If not, why?*	*Total Number of Individuals:*
	xx			Uncommon on pebble plains

Is this an existing NDDB occurrence?	Yes	*Occurrence #*	No		**Is this a Subsequent Visit?**	Yes	No	*#s of individuals since last visit* More ?	Fewer ?	Same ?
	xx	32			Not seen in 2002			xx		

Collected?	Yes	*Coll. #,Museum/Herbarium:*
	xx	11665 / RSA

Reporter:	Scott D. White
Address:	Scott White Biological Consulting 201 North First Ave., No. 102 Upland, Calif. 91786
Phone: **E-mail:**	(909) 949-2686 / scottbioservices@earthlink.net

Plant Phenology Information

dormant	*sterile*	*senescent*
%	%	%
budding	*flowering*	*fruiting*
%	xx %	%

Animal Information

Age Structure:		*# of adults*	*# of juveniles*	*# of unknown*	
Wintering	*Foraging*	*Breeding*	*Roosting*	*Burrow site*	*Other*

Location: *(please attach map)*
San Bernardino Mtns., just north of Big Bear Lake near community of Fawnskin at former "Moon Camp" site

County:	**Quad Name:**	**Landowner:**			
San Bernardino Co.	Fawnskin	private			
Elevation:	*Township*	*Range*	*Section (s)*	*Latitude:*	*Longitude:*
6800-6900 ft	2N	1W	13 (N half)	Ca. 34°16' N	Ca. 116°56' W
UTM Data *Zone*	*Datum*	*Source*	*Accuracy*	*X coordinate (E)*	*Y coordinate (N)*

Habitat Description: *(plant communities, dominants, associates, substrates/soils, aspects/slope)*
Pebble plain surrounded by arid Jeffrey pine forest.
Other rare species? Arabis parishii, Astragalus leucolobus, Ivesia argyrocoma, Castilleja cinerea, "C. montigena,"

Site Information

Current/surrounding land use: Vacant, short distance S of residential development, short distance N of well-used highway
Visible Disturbances; possible threats: Significant vehicle damage to habitat; site proposed for development

Overall site quality: ??	*Excellent*	*Good*	*Fair*	*Poor*

Comments:

Determination method:	*Photographs:*	Slides	Prints	Digital
[x] *Keyed in a site reference:*	*Organism*			
[x] *Compared with other specimen*	*Habitat*			
[] *Compared with photo/sketch*	*Diagnostic Features*			
[x] *By knowledgeable individual*	*Other*			
[] *Other method:*	*Permission to duplicate*	yes []	no []	

California Native Species Field Survey Form

Mail to:
Natural Diversity Database
California Dept. of Fish & Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

For office use only			
Source Code		Quad Code	
Elm Code		Occ #	
Copy to		Map Index #	

Date of Field Work (*Month – Day – Year*) *April 30 2007*

Scientific Name : *Ivesia argyrocoma*
Common Name :

Species Found?	Yes	No	*If not, why?*	*Total Number of Individuals:*
	xx			Common on pebble plains

Is this an existing NDDB occurrence?	Yes	*Occurrence #*	No		**Is this a Subsequent Visit?**	Yes	No	*#s of individuals since last visit*		
	xx	24			Also noted in 02	xx		*More ?*	*Fewer ?*	*Same ?*
										xx

Collected?	Yes	*Coll. #,Museum/Herbarium:*
	xx	11658 / RSA

Reporter:	Scott D. White
Address:	Scott White Biological Consulting 201 North First Ave., No. 102 Upland, Calif. 91786
Phone: **E-mail:**	(909) 949-2686 / scottbioservices@earthlink.net

Plant Phenology Information

dormant	*sterile*	*senescent*
%	%	%
budding	*flowering*	*fruiting*
%	%	%

Animal Information

Age Structure:		*# of adults*	*# of juveniles*	*# of unknown*	
Wintering	*Foraging*	*Breeding*	*Roosting*	*Burrow site*	*Other*

Location: *(please attach map)*
San Bernardino Mtns., just north of Big Bear Lake near community of Fawnskin at former "Moon Camp" site

County:	**Quad Name:**	**Landowner:**
San Bernardino Co.	Fawnskin	private

Elevation:	*Township*	*Range*	*Section (s)*	*Latitude:*	*Longitude:*
6800-6900 ft	2N	1W	13 (N half)	Ca. 34°16' N	Ca. 116°56' W

UTM Data	*Zone*	*Datum*	*Source*	*Accuracy*	*X coordinate (E)*	*Y coordinate (N)*

Habitat Description: *(plant communities, dominants, associates, substrates/soils, aspects/slope)*
Pebble plain surrounded by arid Jeffrey pine forest.
Other rare species? Arabis parishii, Astragalus leucolobus, Ivesia argyrocoma, Castilleja cinerea, "C. montigena,"

Site Information

Current/surrounding land use: Vacant, short distance S of residential development, short distance N of well-used highway
Visible Disturbances; possible threats: Significant vehicle damage to habitat; site proposed for development

Overall site quality: ??	*Excellent*	*Good*	*Fair*	*Poor*

Comments:

Determination method:	*Photographs:*	Slides	Prints	Digital
[x] *Keyed in a site reference:*	*Organism*			
[] *Compared with other specimen*	*Habitat*			
[] *Compared with photo/sketch*	*Diagnostic Features*			
[x] *By knowledgeable individual*	*Other*			
[] *Other method:*	*Permission to duplicate*	yes []	no []	

California Native Species Field Survey Form

Mail to:
Natural Diversity Database
California Dept. of Fish & Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

For office use only			
Source Code		Quad Code	
Elm Code		Occ #	
Copy to		Map Index #	

Date of Field Work (*Month – Day – Year*) *April 30 2007*

Scientific Name : *Astragalus leucolobus*
Common Name :

Species Found?	Yes	No	*If not, why?*	*Total Number of Individuals:*
	xx			Occasional to common on pebble plains

Is this an existing NDDB occurrence?	Yes	*Occurrence #*	No		***Is this a Subsequent Visit?***	Yes	No	*#s of individuals since last visit*		
			xx		Also noted in 02	xx		*More ?*	*Fewer ?*	*Same ?*
										xx

Collected?	Yes	*Coll. #,Museum/Herbarium:*
	xx	11705

Reporter:	Scott D. White
Address:	Scott White Biological Consulting 201 North First Ave., No. 102 Upland, Calif. 91786
Phone: ***E-mail:***	(909) 949-2686 / scottbioservices@earthlink.net

Plant Phenology Information

dormant	*sterile*	*senescent*
%	%	%
budding	*flowering*	*fruiting*
%	%	%

Animal Information

Age Structure:		*# of adults*	*# of juveniles*	*# of unknown*	
Wintering	*Foraging*	*Breeding*	*Roosting*	*Burrow site*	*Other*

Location: *(please attach map)*
San Bernardino Mtns., just north of Big Bear Lake near community of Fawnskin at former "Moon Camp" site

County:	***Quad Name:***	***Landowner:***
San Bernardino Co.	Fawnskin	private

Elevation:	*Township*	*Range*	*Section (s)*	*Latitude:*	*Longitude:*
6800-6900 ft	2N	1W	13 (N half)	Ca. 34°16' N	Ca. 116°56' W

UTM Data	*Zone*	*Datum*	*Source*	*Accuracy*	*X coordinate (E)*	*Y coordinate (N)*

Habitat Description: *(plant communities, dominants, associates, substrates/soils, aspects/slope)*
Pebble plain surrounded by arid Jeffrey pine forest.
Other rare species? Arabis parishii, Astragalus leucolobus, Ivesia argyrocoma, Castilleja cinerea, "C. montigena,"

Site Information

Current/surrounding land use: Vacant, short distance S of residential development, short distance N of well-used highway
Visible Disturbances; possible threats: Significant vehicle damage to habitat; site proposed for development

Overall site quality: ??	*Excellent*	*Good*	*Fair*	*Poor*

Comments:

Determination method:	*Photographs:*	Slides	Prints	Digital
[x] *Keyed in a site reference:*	*Organism*			
[x] *Compared with other specimen*	*Habitat*			
[] *Compared with photo/sketch*	*Diagnostic Features*			
[x] *By knowledgeable individual*	*Other*			
[] *Other method:*	*Permission to duplicate*	yes []	no []	

California Native Species Field Survey Form

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California Dept. of Fish & Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

For office use only			
Source Code		Quad Code	
Elm Code		Occ #	
Copy to		Map Index #	

Date of Field Work (*Month – Day – Year*) *April 30 2007*

Scientific Name : *Castilleja cinerea*
Common Name :

Species Found?	Yes	No	If not, why?	Total Number of Individuals:
	xx			Occasional on pebble plain and open forest, with Eriogonum wrightii subscaposum

Is this an existing NDDB occurrence?	Yes	Occurrence #	No		Is this a Subsequent Visit?	Yes	No	#s of individuals since last visit: More ?	Fewer ?	Same ?
	xx	24			Also noted in 02	xx				xx

Collected?	Yes	Coll. #,Museum/Herbarium:
	xx	11657 / RSA

Reporter:	Scott D. White
Address:	Scott White Biological Consulting 201 North First Ave., No. 102 Upland, Calif. 91786
Phone: **E-mail:**	(909) 949-2686 / scottbioservices@earthlink.net

Plant Phenology Information

dormant %	sterile %	senescent %
budding %	flowering %	fruiting %

Animal Information

Age Structure:	# of adults	# of juveniles	# of unknown

Wintering	Foraging	Breeding	Roosting	Burrow site	Other

Location: *(please attach map)*
San Bernardino Mtns., just north of Big Bear Lake near community of Fawnskin at former "Moon Camp" site

County:	Quad Name:	Landowner:
San Bernardino Co.	Fawnskin	private

Elevation:	Township	Range	Section (s)	Latitude:	Longitude:
6800-6900 ft	2N	1W	13 (N half)	Ca. 34°16' N	Ca. 116°56' W

UTM Data	Zone	Datum	Source	Accuracy	X coordinate (E)	Y coordinate (N)

Habitat Description: *(plant communities, dominants, associates, substrates/soils, aspects/slope)*
Pebble plain surrounded by arid Jeffrey pine forest.
Other rare species? Arabis parishii, Astragalus leucolobus, Ivesia argyrocoma, Castilleja cinerea, "C. montigena,"

Site Information

Current/surrounding land use: Vacant, short distance S of residential development, short distance N of well-used highway
Visible Disturbances; possible threats: Significant vehicle damage to habitat; site proposed for development

Overall site quality: ??	Excellent	Good	Fair	Poor

Comments:

Determination method:	Photographs:	Slides	Prints	Digital
[x] Keyed in a site reference:	Organism			
[x] Compared with other specimen	Habitat			
[] Compared with photo/sketch	Diagnostic Features			
[x] By knowledgeable individual	Other			
[] Other method:	Permission to duplicate	yes []	no []	

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1416 Ninth Street, 12th Floor
Sacramento, CA 95814

For office use only			
Source Code		Quad Code	
Elm Code		Occ #	
Copy to		Map Index #	

Date of Field Work (*Month – Day – Year*) *April 30 2007*

Scientific Name : *Castilleja "montigena"*
Common Name :

Species Found?	Yes	No	*If not, why?*	*Total Number of Individuals:*
	xx			Occasional in forest

Is this an existing NDDB occurrence?	Yes	*Occurrence #*	No		***Is this a Subsequent Visit?***	Yes	No	*#s of individuals since last visit*		
			xx		Also seen in 02	xx		*More ?*	*Fewer ?*	*Same ?*
										xx

Collected?	Yes	*Coll. #,Museum/Herbarium:*
	No	

Reporter:	Scott D. White
Address:	Scott White Biological Consulting 201 North First Ave., No. 102 Upland, Calif. 91786
Phone: ***E-mail:***	(909) 949-2686 / scottbioservices@earthlink.net

Plant Phenology Information

dormant	*sterile*	*senescent*
%	%	%
budding	*flowering*	*fruiting*
%	%	%

Animal Information

Age Structure:		*# of adults*	*# of juveniles*	*# of unknown*	
Wintering	*Foraging*	*Breeding*	*Roosting*	*Burrow site*	*Other*

Location: *(please attach map)*
San Bernardino Mtns., just north of Big Bear Lake near community of Fawnskin at former "Moon Camp" site

County:		***Quad Name:***		***Landowner:***	
San Bernardino Co.		Fawnskin		private	
Elevation:	*Township*	*Range*	*Section (s)*	*Latitude:*	*Longitude:*
6800-6900 ft	2N	1W	13 (N half)	Ca. 34°16' N	Ca. 116°56' W
UTM Data *Zone*	*Datum*	*Source*	*Accuracy*	*X coordinate (E)*	*Y coordinate (N)*

Habitat Description: *(plant communities, dominants, associates, substrates/soils, aspects/slope)*
Arid Jeffrey pine forest; generally in relatively shaded places
Other rare species? Arabis parishii, Astragalus leucolobus, Ivesia argyrocoma, Castilleja cinerea, "C. montigena,"

Site Information

Current/surrounding land use: Vacant, short distance S of residential development, short distance N of well-used highway
Visible Disturbances; possible threats: Significant vehicle damage to habitat; site proposed for development

Overall site quality: ??	*Excellent*	*Good*	*Fair*	*Poor*

Comments:

Determination method:	*Photographs:*	Slides	Prints	Digital
[] *Keyed in a site reference:*	*Organism*			
[] *Compared with other specimen*	*Habitat*			
[] *Compared with photo/sketch*	*Diagnostic Features*			
[x] *By knowledgeable individual*	*Other*			
[] *Other method:*	*Permission to duplicate*	yes []	no []	

B.9 - Supplemental Focused Rare Plant Survey (Tim Krantz, June 2008

MOON CAMP TENTATIVE TRACT 16136

SUPPLEMENTAL FOCUSED RARE PLANT SURVEY

Prepared for:
Michael Brandman Associates
621 E. Carnegie Dr., Suite 100
San Bernardino, CA 92408

Prepared by:
Dr. Timothy P. Krantz
Timothy Krantz Environmental Consulting
(a division of Pangaea Nova LLC)
P.O. Box 33
Angelus Oaks, CA 92305

June 29, 2008

Project site location:	USGS Fawnskin 7½-minute topographic map, Township 2 North, Range 1 West, portion of Section 13.
Assessors Parcel Nos.:	0304-082-04 and 0304-091-12, 13 and 21
Owner /Applicant:	Tim Wood, P.O. Box 6820, Big Bear Lake, CA 92315
Principal Investigator:	Dr. Timothy P. Krantz, (909)748-8590

MOON CAMP TENTATIVE TRACT
SUPPLEMENTAL FOCUSED RARE PLANT SURVEY

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III. Focused Study—Species of Concern…….. 3

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V. Rare, Endangered or Sensitive Species and Habitats …….. 5

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MAPS, APPENDICES, AND ATTACHMENTS

Figure 1: Regional Location Map (from EIR)

Figure 2: Project Map (from EIR)

Figure 3: Map of Pebble Plain and Ashy-gray Paintbrush Habitat

Table 1. Special Status Species Occuring On Site

Table 2. Special Status Species Determined to Not Occur On Site

MOON CAMP TENTATIVE TRACT 16136
SUPPLEMENTAL RARE PLANT SURVEY

I. EXECUTIVE SUMMARY

A focused rare plant survey of the Moon Camp Tentative Tract 16136 was completed for the property. This survey supplements a general botanical survey of the property conducted by Scott White Biological Consulting, dated August 2007 (White 2007, henceforth, "White survey"). The White survey positively identified one federally-listed plant species—ashy-gray Indian paintbrush (*Castilleja cinerea)*—and four special-status species: Parish's rock-cress (*Arabis parishii*), Big Bear Valley woollypod (*Astragalus* leucolobus), Heckard's paintbrush (*Castilleja montigena*) and silver-haired rattails (*Ivesia argyrocoma*) (Table 1).

This supplemental survey affirmed the presence of these species, and added two additional special-status species: purple monkeyflower (*Mimulus purpureus*) and Sugarloaf phlox (*Phlox dolichantha*); and disaffirmed presence of a list of other special-status and federally-listed plant species deemed to potentially occur on the property, according to White (Table 2).

The White survey had identified 13.81 acres of ashy-gray paintbrush habitat, distributed among four occurrences (Figure 1). This supplemental survey found the two easternmost occurrences to be erroneous. No ashy-gray Indian paintbrush plants occur at those two sites. In addition, the occupied habitat of the middle occurrence was found to cover less than one-third the estimated acreage reported by White, and the western occurrence exhibited a somewhat smaller occupied habitat footprint, but was deemed to generally conform to White's estimated acreage. Altogether, the occupied habitat of ashy-gray Indian paintbrush has been recalculated to approximately 7.71 acres.

II. PROJECT AND PROPERTY DESCRIPTION

The San Bernardino County Planning Department is reviewing an application for Moon Camp Tentative Tract 16136—a proposed 50-lot residential development on the former Moon Camp site in Fawnskin. The project site is on the north shore of Big Bear Lake, in the eastern part of the community of Fawnskin, in unincorporated San Bernardino County. The project site is comprised of about 62 acres, situated on both sides of State Highway 38, between Oriole Lane and Polique Canyon Road (on the Fawnskin USGS 7½' quadrangle map, in the north half of Section 13, Township 2N and Range 1W). The project site slopes from north to south. Elevation ranges from 6,960 feet in the northeastern portion of the site to 6,750 feet near the lakeshore (see Figures 1 and 2).

The project site occurs within an area that is described by the Open Space element of San Bernardino County's General Plan as, "This area includes the entire watershed area of Big Bear Lake, and contains a number of specialized habitat areas, which support a large number of endangered plants and animals (as well as commonly occurring mountain species). Habitat values

here should be maintained, potentially by controlling development to prevent damage to important habitat areas."

III. FOCUSED STUDY / SPECIES OF CONCERN

The White survey was conducted on three dates, April 30, June 7, and August 8, during the 2007 season. The 2007 precipitation season (measured from July 1 to June 30 annually) was a record drought year for the San Bernardino Mountains, with only 11.66 inches of precipitation recorded at Big Bear Dam, compared to an average annual precipitation of 36.00 inches. For this reason, White recommended that additional surveys be accomplished to determine presence or absence of four federally-listed endangered plant species known to occur in montane meadow habitats; and that a subsequent survey should be accomplished on site to determine presence or absence of three federally-listed species known to occur on pebble plain habitat. In addition, there are numerous other special-status plant species potentially occurring in the area , particularly annual species, that would not be identifiable during extreme drought years.

The 2008 precipitation year was average, with 35.29 inches through May this year, and flowering of both annual and perennial species exhibited good anthesis.

This report focuses on determining presence or absence of the following plant species:

Montane Meadow Species:

- San Bernardino bluegrass (*Poa atropurpurea*) (federally endangered);
- Bird-foot checkerbloom (*Sidalcea pedata*) (federal- and state-endangered);
- California dandelion (*Taraxacum californicum*) (federal-endangered); and
- Slender-petaled thelypodium (*Thelypodium stenopetalum*) (federal-endangered).

Pebble Plain Species:

- Bear Valley sandwort (*Arenaria ursina*) (federally threatened);
- Ash-gray Indian paintbrush (*Castilleja cinerea*) (federal-threatened); and
- Southern mountain buckwheat (*Eriogonum kennedyi* var. *austromontanum*) (federal-threatened).

IV. METHODOLOGY

California Department of Fish and Game field survey protocols were followed for each of the target federal-listed species considered to potentially occur on site (CDFG 2000). These protocols basically require that surveys are conducted following these guidelines: (1) conducted during flowering seasons for the special status plants known from the area, (b) were floristic in nature, (c) were consistent with conservation ethics, (d) systematically covered all habitat types on the site, and (e) are well documented by this report.

A walkover of the Moon Camp property was conducted on May 5, 12 and June 6, 2008. The May 5 and 12th surveys focused on the "meadow" habitat along the lakeshore of the Big Bear Lake reservoir; and on identification of any special-status early-blooming annual plant species. The June 6 survey focused on delineation of the ashy-gray Indian paintbrush occurrences; and on identification of late-blooming annuals and perennials.

May surveys for other projects elsewhere in Big Bear Valley (North Baldwin Lake, Pan Hot Springs, Sawmill/Sugarloaf pebble plains, Eagle Point) had indicated that all seven federal-listed species considered to potentially occur on site, according to the White survey, were observed and reliably identifiable at the time of the early May surveys; and the ashy-gray paintbrush and other potential pebble plain species were readily visible, with fully-mature inflorescences, at the time of the June survey.

Positive findings (only pebble plain-associated species, including ashy-gray paintbrush) were precisely located using a Garmin GPS; and GPS data was downloaded and displayed at the Redlands Institute GIS laboratory, and transferred to the EIR consultant, Michael Brandman Associates, to their Palm Springs office; and to the project engineer, Hicks and Hartwick Engineering, in Redlands.

The meadow habitat was carefully walked throughout its narrow distribution along the lakeshore, and any other vernal springs or areas of persistent surface soil moisture were closely examined for potential endangered meadow species; and for the presence of special-status vernal annual species, such as eye-strain monkey-flower (*Mimulus exiguus*) or yellow owl's-clover (*Castilleja lasiorhyncha*).

The White survey reported four ashy-gray paintbrush occurrences, and these were the focus of the June 6 field survey—to confirm those locations and obtain an accurate GPS delineation of the ashy-gray paintbrush distribution and pebble plain habitat on the property.

V. RARE, ENDANGERED OR SENSITIVE SPECIES AND HABITATS (RESULTS)

Endangered Meadow Species

Of the four federally-listed endangered meadow species (Section 3, above), none were identified on site; and they are not considered likely to occur on site. The lakeshore habitat is not indigenous meadow habitat, such as supports the endemic meadow flora elsewhere in Big Bear Valley (Krantz 1979, 1980, 1981a, et alus); rather, it is what this author calls "ruderal" reservoir habitat. Ruderal means, "growing where the natural vegetational cover has been disturbed by man." (Webster's 9th Collegiate Dictionary) In this case, the ruderal reservoir habitat is comprised of a mix of native and non-native, aquatic and semi-aquatic plant species, existing in the zone between the high water level of the reservoir and the draw-down area. Native meadow species sometime occur along the narrow margin just above the high water level, but in the case of the Moon Camp property, this is very limited to a strand of willows (*Salix scouleriana)* and a non-diverse assemblage of common wetland species, such as wiregrass (*Juncus balticus*), yarrow (*Achillea millefolium*) and silver-leaved cinquefoil (*Potentilla anserina*).

No endangered, threatened, or special-status meadow plant species were identified on the Moon Camp property, and the potential for any occurrence of such species is considered to be extremely low.

Pebble Plain Species

The White survey had previously mapped a known pebble plain occurrence on the western portion of the property. This pebble plain contains many of the characteristic species occurring on other pebble plains in Big Bear and Holcomb Valleys, but for the Kennedy's southern mountain buckwheat (*Eriogonum kennedyi* var. *austromontanum*), which is replaced by the closely-related taxon, Wright's matting buckwheat (*Eriogonum wrightii* var. *subscaposum*), and absence of Bear Valley sandwort (*Arenaria ursina*). Kennedy's southern mountain buckwheat and Bear Valley sandwort were used as indicator species of pebble plains by the author, during his original systematic surveys of this endemic plant community (Krantz 1981b, 1983). The lack of both indicator species on the Moon Camp property resulted in this area not being indicated as pebble plain habitat during those initial surveys. However, the area indicated as "pebble plain" within Open Space Lot A has many other species commonly associated with true pebble plain habitat, and has been mapped as such on Figure 3.

Ashy-gray paintbrush (*Castilleja cinerea*) had been mapped as four distinct occurrences by White, but the author, in conjunction with this survey, found that the two eastern occurrences, indicated as occurring behind (north of) Lots 22, and 29-30-31 of the adjacent existing residential tract, do not support any ashy-gray paintbrush plants. There were openings of Wright's matting buckwheat at these locations, with silver rat-tails (*Ivesia argyrocoma*), which is sometimes associated with pebble plains, and Heckard's paintbrush (*Castilleja montigena*) was found on the perimeter of the openings, but no ashy-gray paintbrush exists at those locations. To verify that the author was, indeed, at the proper locations, the areas considered to be concurrent with those areas indicated by White were delineated with GPS data points to confirm the negative findings.

Similarly, the GPS delineation of the middle ashy-gray paintbrush occurrence was found to be less than one-third the size of the occupied habitat indicated in the White survey (0.11-acre actual occupied habitat, consisting of approximately 50 plants). This occurrence corresponds to the

southernmost portions of proposed Lots 47 and 48, adjoining Highway 18. In this case, it appeared that White had mapped the Wright's matting buckwheat distribution, without regard to association with the ashy-gray paintbrush.

Another very small ashy-gray paintbrush occurrence was located at the rear of Lot 49, comprised of 0.01-acre, and consisting of 10 plants.

A single point, representing three ashy-gray paintbrush plants, was located at the vernal spring on the rear portion of Lot 50; and the easternmost portion of the primary pebble plain occurrence on Lot A extends into Lot 50 on its southwestern quarter, comprising about 0.11-acre of occupied habitat.

The primary pebble plain (the westernmost occurrence according to White) was found to be more restricted than indicated by White at the eastern portion of the occurrence on Lots 49 and 50, but generally conformed to the area indicated by White in the area of the central pebble plain (within the proposed rare plant preserve) and toward the western portion of the pebble plain and ashy-gray paintbrush area. The actual occupied habitat of ashy-gray paintbrush on Lots 1 through 5 was calculated to comprise 2.07 acres.

The most exemplary pebble plain habitat on the Moon Camp property was found to conform to the area indicated by White, and would be entirely included within the proposed 4.2 acre conservation easement area. Fencing of the highway frontage has stopped the unauthorized off highway vehicle use that was evidenced on the pebble plain habitat from years past.

To summarize the results of the survey of ashy-gray paintbrush occupied habitat, it is distributed among four occurrences: Lot 47—0.11 acre, Lot 49—0.01 acre, Lot 50—0.11 acre, and the pebble plain and more extensive western occurrence, comprising 4.91 acres within Lot A, 2.07 acres within Lots 1-5, and 0.5 acre within Road A, for a total of 7.7 acres of occupied ashy-gray paintbrush.

Other Special Status Species

Two new special status species were added to the project list: purple monkeyflower (*Mimulus purpureus*) and Sugarloaf phlox (*Phlox dolichantha*). Purple monkeyflower was found to be rather widely distributed on the pebble plain and extending down into the draw to the east, corresponding to the southern half of proposed Lot 50. This draw exhibited vernal spring habitat characteristics; that is, an association of very tiny, ephemeral annuals, such as moss juncus (*Juncus bryoides*), hispid popcorn flower (*Plagiobothrys hispidulus*) and other minute monkeyflower species, such as *Mimulus androsaceus* and *M. suksdorfii*. Most of the purple monkeyflower distribution is included within the proposed 4.2 acre conservation easement area.

Sugarloaf phlox was found to be rather widely distributed on the Moon Camp property in open black oak woodland and under Jeffrey pines. Although restricted to Big Bear and Holcomb Valleys, its regional distribution extends up to the summit of Sugarloaf Mountain south of Big Bear Valley, and as far north as White Mountain, northwest of Holcomb Valley; the taxon is fairly common within its range, and is not considered to be a high priority candidate for listing or more formal protection (Krantz 1983).

Table 1: Special Status Species Occurring on the Moon Camp Property

Arabis parishii	Parish's rock-cress	Fed.: none; S2.1; List 1B.2
Astragalus leucolobus	Bear Valley woollypod	Fed.: none; S2.2; List 1B.2
Castilleja cinerea	Ashy-gray Indian paintbrush	Fed.Threatened; S2.2; List 1B.21B, 2-2-3;
Castilleja applegateii Ssp. *martinii*	Mountain paintbrush	Fed: none; S3.3; List 4.3
Ivesia argyrocoma	Fuzzy rat-tails	Fed: none; S2.2; List 1B.2
Mimulus purpureus	Purple Monkeyflower	Fed: none; S2.2; List 1B.2
Phlox dolichantha	Sugarloaf phlox	Fed: none; S2.2; List 1B.2

Fed. (Federal Rank)
State Rank (S), California Natural Diversity Database
- **S1**: Fewer than six occurrences or fewer than 1000 individuals or less than 2000 acres
- **S1.1**: Very threatened
- **S1.2**: Threatened
- **S1.3**: No current threats known
- **S2**: 6-20 occurrences or 1000-3000 individuals or 2000-10000
- **S3**: 21-100 occurrences or 3000-10000 individuals or 10000-50000 acres
- **S4**: Apparently secure in California; this rank is clearly lower than S3, but factors exist to cause some concern, *i.e.*, there is some threat or somewhat narrow habitat. No threat rank.
- **S5**: Demonstrably secure or ineradicable in California. No threat rank.

Table 2: Threatened or Endangered Species Determined Not to Occur On Site

Federal Threatened—FT
Federal Endangered—FE

Arenaria ursina	Bear Valley sandwort	FT
Eriogonum kennedyi var. *austromontanum*	Southern mountain buckwheat	FT
Poa atropurpurea	San Bernardino bluegrass	FE
Sidalcea pedata	Bird-foot checkerbloom	FE
Taraxacum californicum	California dandelion	FE
Thelypodium stenopetalum	Slender-petaled thelypodium	FE

VI. RECOMMENDATIONS

A. Establishment of a Conservation Easement and Rare Plant Habitat Preserve

A 4.91-acre rare plant preserve is proposed to be established over the pebble plain habitat. As indicated on the Tentative Tract map, this preserve will protect the most exemplary and best quality of the pebble plain habitat on site, including all seven of the special status species observed on site. A detailed management plan for the preserve area shall be adopted and recorded with the conservation easement, specifying the terms and conditions for allowed and disallowed uses within the preserve area.

The conservation easement shall be conveyed to the San Bernardino Mountains Land Trust or other land stewardship entity, together with a management endowment to cover annual costs of maintenance (replacing signs, mending fences). Interpretive literature, signs, and trails shall be developed for homeowners and visitors to provide an understanding of the sensitive resources occurring in the preserve area.

B. Building Envelopes for Paintbrush Habitat

Construction to the rear portions of Lots 47, 48, 49 and 50 shall be restricted by means of building envelopes or building setback lines, to prevent construction in the occupied ashy-gray paintbrush habitat. The rear portions of these lots abut the Highway 38 frontage, in any case, and are thus largely within the Caltrans right of way and required rear lot setbacks. Lot 50 is constrained by a drainage easement along the eastern length of the parcel, by the Caltrans right-of-way along the highway, and by pebble plain resources.

C. Offsite Compensation for Paintbrush Habitat

Off-site compensation for direct and indirect impacts to ashy-gray Indian paintbrush and pebble plain habitat outside of the 4.91-acre Conservation Easement and not protected by building setbacks (2.57 acres) may be accomplished by acquisition and protection of similar or better habitat resources elsewhere in the valley.

There is a limited amount of privately-held ashy-gray paintbrush and pebble plain habitat available for off-site mitigation. One of the best remaining examples of pebble plain habitat in private ownership that may be used to off-set impacts on the Moon Camp property is the "Sugarloaf pebble plain", situated at the northern terminus of Dixie Lee Lane in the unincorporated community of Sugarloaf. This is a 10-acre, high-quality pebble plain. It was fenced and has been protected from off-highway vehicles since the mid-1980s as a mitigation for construction of the Big Bear High School, the intention being to set aside a 2-acre portion of the 10-acre parcel as mitigation for impacts to pebble plains resources for the High School site, and use the remaining eight acres for mitigation of other projects. The parcel was surveyed by Hicks & Hartwick, but was never formally recorded.

The proposal for off-site mitigation of direct and indirect impacts to ashy-gray paintbrush and pebble plains resources on the Moon Camp property is to acquire fee title interest of the entire Sugarloaf Pebble Plain parcel (less a proposed road easement to accommodate the County's

westerly extension of Baldwin Lane); record the parcel, and convey a Conservation Easement to a responsible stewardship entity, such as the San Bernardino Mountains Land Trust (SBMLT). The conveyance of the easement shall be accompanied by a habitat management and monitoring endowment to be deposited into an escrow account for that purpose. In addition to the initial deposit to establish the habitat management account, Homeowner's Association fees shall be collected annually to provide funding in the long-term. Management guidelines, terms and conditions of the conservation easement shall be clearly defined in a Habitat Management Plan, to be recorded with the easement. These management conditions shall include maintenance of fencing and signs, maintenance of the trail across the pebble plain, and development of interpretive materials for the pebble plains resources.

D. Onsite Management

Impacts to the pebble plains habitat and sensitive plants will be minimized by the project's design, which will place the pebble plain area, including ashy-gray Indian paintbrush habitat and all six special-status species, into a permanently protected Conservation Easement. The long-term conservation value of the proposed open space requires active onsite land management to prevent "edge effects" from existing and proposed adjacent land uses.

A habitat management plan (HMP) should be developed for the Conservation Easement area. The HMP shall address management of the rare plant preserve with respect to the following indirect impacts:

- Removal and control of invasive non-native plants;
- Trampling or soil damage caused by foot traffic, vehicles, bicycles, or other recreation;
- Alteration of surface hydrological conditions caused by irrigation on adjacent lots, road runoff, or water diversions installed for erosion control;
- Vegetation clearing, especially for fuel modification to reduce fire hazards to adjacent homes; and

The HMP shall be administered by the SBMLT or other land stewardship entity. Funding for implementation of habitat management measures shall be derived from interest earned from the habitat management endowment and from annual Homeowner's Association fees.

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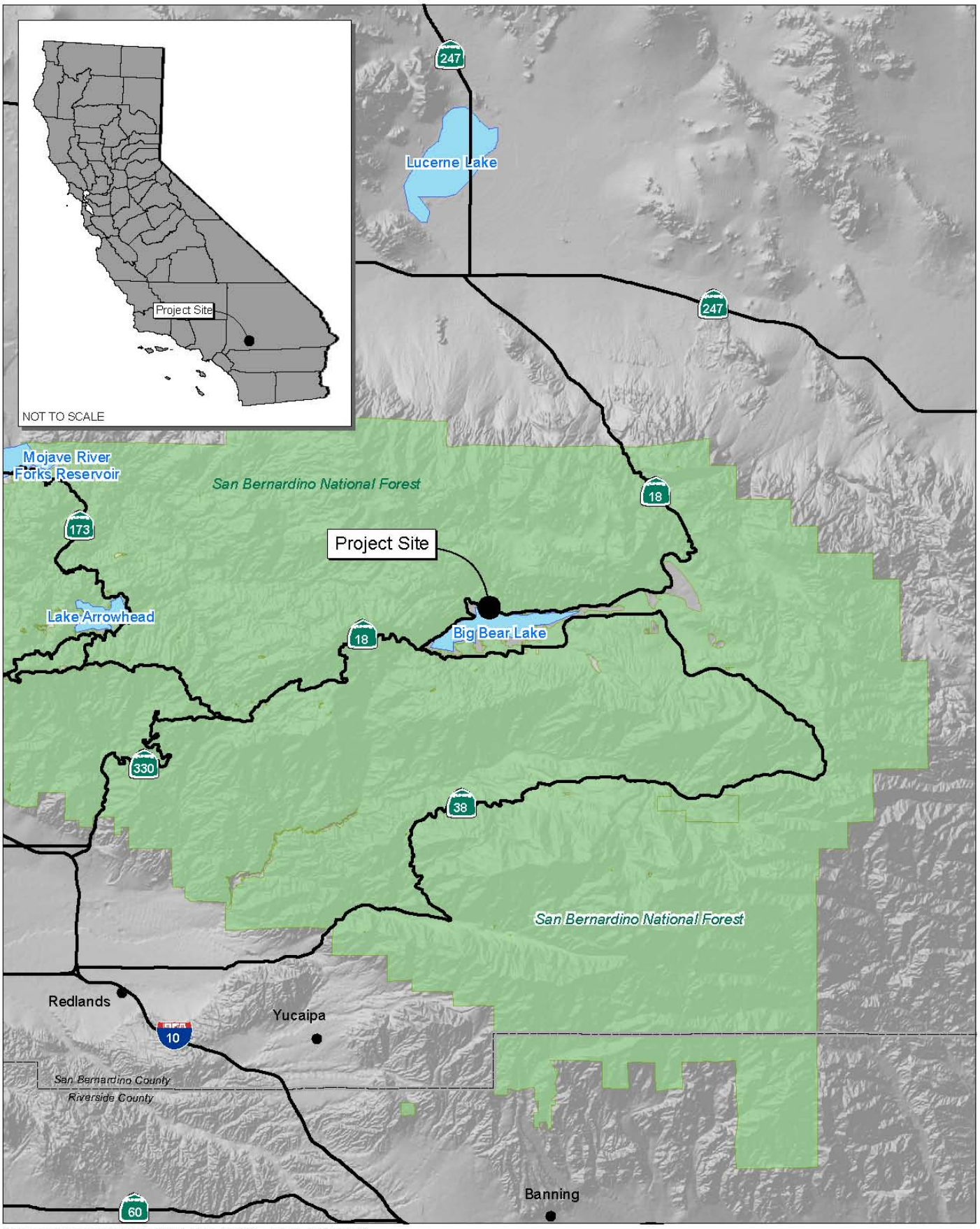
VIII. CERTIFICATION

I hereby certify that the statements furnished above and in the attached exhibits present the data and information required for this supplemental rare plant survey, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief. Field work conducted for this assessment was performed by me. I certify that I have not signed a nondisclosure or consultant confidentiality agreement with the project applicant or applicant's representative and that I have no financial interest in the project.

DATE: June 29, 2008 SIGNED: _____



Source: Census 2000 Data, The CaSIL, MBA GIS 2007.

NORTH

5 2.5 0 5 Miles

Michael Brandman Associates

Figure 1
Regional Location Map

00520089 • 07/2009 | 1_Krantz_regional.ai

MOON CAMP TENTATIVE TRACT 16136
FOCUSED RARE PLANT SURVEY

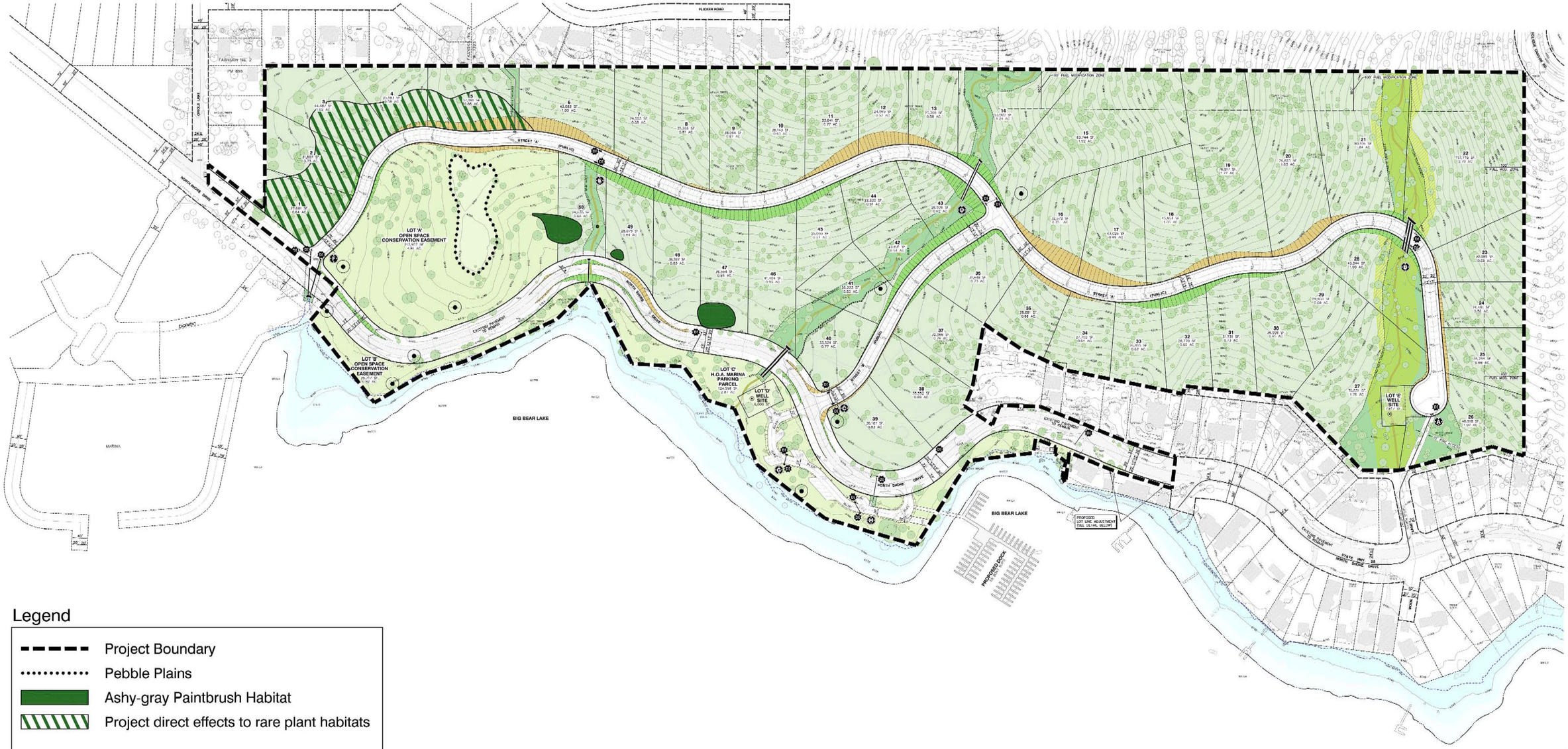
Source: Hicks & Hartwick, Inc. (July, 2009).

NORTH

260 130 0 260 Feet

Michael Brandman Associates

Figure 2
Project Map



Legend

- Project Boundary
- Pebble Plains
- Ashy-gray Paintbrush Habitat
- Project direct effects to rare plant habitats

Source: Hicks & Hartwick, Inc. (July, 2009) & Tim Krantz, Ph.D (July, 2009).

NORTH

260 130 0 260 Feet

Michael Brandman Associates

Figure 3
Map of Pebble Plain and Ash-gray Paintbrush Habitat

B.10 - Southern Rubber Boa Letter Report (Glen Stewart, February 2007)

CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

Biological Sciences
College of Science

February 18, 2007

Mr. Michael Perry
California Collaborative Solutions
P. O. Box 706
Big Bear City, CA 92314

Dear Mr. Perry,

This letter reports my observations and evaluation of potential habitat for the Southern Rubber Boa (SRB, *Charina bottae umbratica*), a State of California Threatened Species, on two properties in the Big Bear Lake area on February 9, 2007. Accompanied by you, Lisa Kegarice, and Marni McKernan, I walked the 62 acre "Moon Camp Tract" in Fawnskin between about 11:20 AM and 12:20 PM. After lunch, you and I walked about half of the 160 acre "High Timber Ranch" tract in the Moonridge area, also driving to briefly view two other parts of the tract, between approximately 1:45 PM and 3:15 PM. Lisa and Marni accompanied us for a few minutes at the beginning of our walk there.

The Moon Camp Tract in Fawnskin is immediately adjacent to the north shore of Big Bear Lake and has a south-facing exposure at an elevation of about 6,800 feet. Roughly the western third of the tract is bounded by developed property while the eastern two thirds is bounded by Forest Service land on the north and, I believe, undeveloped private property on the east. The tract is quite dry, sloping unevenly upward to the north and east with a couple of shallow, dry ravines in the eastern portion. In the western portion, the vegetation is composed of an open stand of Jeffrey Pine, with a sparse understory of Great Basin Sagebrush and herbaceous plants. Here, there also is an open "pebble plain" habitat. The stands of pine become somewhat more dense in the eastern part of the tract with larger sagebrush shrubs. Throughout the tract, litter and duff are very thin, but there are a few moderately weathered, medium-sized logs scattered around. Significantly, there are no rock outcrops, which generally are used by SRBs for hibernation sites.

My assessment of the Moon Camp Tract is that it is poor SRB habitat. Further, it is outside of the area mapped as potential SRB habitat in the 1985 Forest Service habitat management guide for the SRB, and there have been no sightings of SRBs reported in the area. My recommendations for mitigating development of the tract are that trees and downed logs be allowed to remain in place, to the extent that clearing is not required by the development process, and that a 50 foot setback be maintained along the deepest ravine at the eastern edge of the property. These measures will serve to protect a limited amount of habitat for native wildlife, such as lizards, snakes, salamanders, chipmunks, mice and wood rats, as well as incidental SRBs.

The High Timber Ranch tract is located on Moonridge, immediately west of Sawmill Canyon and Sugarloaf, with developed property existing along the southwestern boundary. It has a north-facing exposure with several shallow ravines draining to the north-northwest and alternating with gently sloping ridges oriented in the same direction. The crowns of the ridges

3801 West Temple Avenue, Pomona, CA 91768 Telephone (909) 869-4038 Fax (909) 869-4078
THE CALIFORNIA STATE UNIVERSITY *Bakersfield, Channel Islands, Chico, Dominguez Hills, Fresno, Fullerton, Hayward, Humboldt, Long Beach, Los Angeles, Maritime Academy, Monterey Bay, Northridge, Pomona, Sacramento, San Bernardino, San Diego, San Francisco, San Jose, San Luis Obispo, San Marcos, Sonoma, Stanislaus*

are rather flat with small "pebble plain" habitats. Elevation at the upper levels of the property is about 7,200 feet. The vegetation is dominated by fairly open stands of Jeffrey Pine, mixed with small Black Oaks in much of the area. A shrubby understory is present in places, but with little sagebrush. Toward the eastern portion of the property there are occasional Pinyon Pines. Leaf litter and duff are moderately thick where there are Black Oaks, and well weathered medium-sized to large logs are common throughout the site. Significantly, again, no rock outcrops were observed.

My assessment of the High timber Ranch tract is that it is marginally suitable as SRB habitat. The northern exposure, denser vegetation, thicker layers of litter and duff, and greater abundance of large logs provide potential cover for SRBs and other forest floor wildlife. However, the site is outside of the area of potential habitat mapped in the 1985 SRB habitat guide, and no SRBs have been reported in the area. Still, I recommend that the portion of the site that I was not able to survey on foot be surveyed for rock outcrops by an experience field biologist, specifically Lisa Kegarice. Mitigations for development should be similar to those recommended for the Fawnskin site, with 50 foot setbacks along the ravines. If any rock outcrops 10 feet or greater in diameter are discovered in future surveys, they also should be protected by 50 foot setbacks.

I hope that the information and assessments I have provided above are sufficient for your purposes. Please find my invoice enclosed. If you have any questions or concerns, however, please do not hesitate to contact me by e-mail (grstewart@csupomon.edu) or phone (909-869-4093).

Sincerely yours,

Glenn R. Stewart, Ph.D.
Professor Emeritus of Zoology
and Environmental Science

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SAN BERNARDINO, CA 92405
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May 1, 2007

Michael Perry
California Collaborative Solutions
P.O. Box 706
Big Bear City, CA 92314

RE: High Timber Ranch Survey

Dear Mr. Perry,

On February 9, 2007 I accompanied you and Dr. Glenn Stewart on a walking survey of the High Timber Ranch Property in the upper Moonridge area of Big Bear Lake. Dr. Stewart was able to survey approximately one half of the High Timber Ranch site that day and provided a February 18, 2007 letter report (attached) detailing his findings.

In his February 18, 2007 letter report, Dr. Stewart recommended that I survey the remainder of the High Timber site on foot to verify the absence of any rock outcrops.

On March 9, 2007, I surveyed the remainder of the site on foot with you and verified that there are no rock crops within the area of the site that Dr. Stewart did not survey on February 9, 2007.

If you need any additional information, please do not hesitate to contact me.

Sincerely,

Lisa Kegarice
Ecologist / Regulatory Specialist

Csp07/0501LK1 (CCS-193)

Appendix C:
Hydrology Study/Water Quality Management Plan

C.1 - Post Construction Water Findings (AEI CASC, October 2007)

AEI CASC CONSULTING

October 5, 2007

Nancy Ferguson
Michael Brandman Associates
220 Commerce, Suite 200
Irvine, CA 92602

Subject: Tentative Tract 16136, Moon Camp – Post Construction Water Quality Findings

Dear Ms. Fergueson,

We have reviewed the proposed Tentative Tract 16136 Moon Camp Project for Post Construction Best Management Practices (BMPs) which will address Pollutants of Concern for this project while being in compliance with the standards set forth in the document, "San Bernardino County Stormwater Program - Model Water Quality Management Plan Guidance". The purpose of this letter is to provide the results of that review.

PROJECT DESCRIPTION

The Moon Camp Project is a 62.4 acre site proposing 50 subdivided lots for individual home sale. The project also proposes a portion of the project's total acreage, approximately 8.6 acres, for dedication as open space. This project is located on the North Shore of Big Bear Lake, in the City of Big Bear, nestled in the San Bernardino Mountains.

HYDROLOGIC CONDITIONS OF CONCERN

Post-project runoff flows are proposed to generally remain in the existing natural drainage pattern, with culvert crossings occurring at low points along the highway and under interior roads, with ultimate discharge into Big Bear Lake. The Moon Camp Project development will have a minor impact on the overall existing hydrology, effecting primarily minor redirection of natural flows, with the outfall into the lake remaining largely unchanged in both location and quantity.[1] Project runoff flows will be carried to the lake via six proposed storm culverts which drain directly into the lake itself; thus, runoff from the project becomes a small part of the vast storage volume in Big Bear Lake.

The Moon Camp Project is proposing minor grading and minimal increases of impervious surfaces on each lot by utilizing stemwall construction and a reduced overall construction footprint. Each lot will further reduce project runoff with the implementation of bioretention BMPs, while roads constructed as part of the project will have runoff directed to bioretention areas. Big Bear Lake has a storage capacity of approximately 73,000 Ac-ft. The project site is estimated to produce runoff equivalent to 0.04 percent of lake volume before development and 0.09 percent of lake volume after development. Thus, project runoff is a miniscule fraction of lake storage.

[1] Tract 16136 - Moon Camp Hydrology & Hydraulic Preliminary Report, July 2007, Hicks & Hartwick, Inc.

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Big Bear Lake possesses a controlled release point for project runoff flows at Big Bear Dam, which is controlled by Big Bear Municipal Water District (BBMWD). The primary goal of the BBMWD is maintaining the water level of Big Bear Lake as level as possible given the availability of water and finances. The belief is that a constant water level increases recreational use, stabilizes property value, improves water quality and supports a healthier fish and wildlife environment. BBMWD accomplishes their goal by implementing a water management plan that includes the following: [2]

- Stabilization of Big Bear Lake by managing the amount of water released to the downstream water rights holder
- Watershed/water quality management
- Recreation management
- Bear Valley Dam and Reservoir Maintenance

In many seasons, BBMWD will elect to keep water in the lake and then purchase "in-lieu" water to meet demands of the downstream water rights holder. This "in-lieu" water is purchased from the San Bernardino Valley Municipal Water District and consists of water supplied via the State Water Project.

Releases from Big Bear Dam encounter another controlled release point further downstream at the Seven Oaks Dam, which is controlled by the United States Army Corps of Engineers (USACE). The USACE operates Seven Oaks Dam in tandem with the Prado Dam, located 40.3 miles downstream on the Santa Ana River, by implementing the following strategies: [3]

- Runoff during the early flood season is stored behind Seven Oaks Dam to build a debris pool to protect outlet works;
- Small releases from Seven Oaks Dam are made on continual basis to maintain downstream water supply;
- During a flood, Seven Oaks Dam will store runoff for as long as the reservoir pool at Prado Dam is rising;
- After the flood threat has passed, Seven Oaks Dam will release stored water at a rate which does not exceed the downstream channel capacity; and
- After the flood season, Seven Oaks Dam will be gradually drained and the Santa Ana River will flow through unhindered.

BBMWD and the USACE's regulation of their structures is a function of irrigation demand, availability of water from other sources, and flood control purposes. Because these two organizations and their structures regulate and control discharges to downstream waters, and because runoff from the project is miniscule compared to the volume stored in Big Bear Lake, Hydrologic Conditions of Concern (HCOC) for the Moon Camp Project development are independently minimal and not expected to directly and significantly impact down stream receiving waters.

[2] http://www.bbmwd.org/, Accessed Oct 1, 2007
[3] http://www.spl.usace.army.mil/resreg/htdocs/7oaks.html, Accessed Oct 1,2007

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PROJECT RECEIVING WATERS

Big Bear Lake is the primary downstream receiving water for the Moon Camp project. As project runoff flows continue westerly, further downstream receiving waters are the Santa Ana River, Reaches 6 through 1, which ultimately drain to the Pacific Ocean. As Table 1 indicates, one or more of these receiving waters are impaired.

Table 1 – Project Receiving Waters and Impairments

Storm Drains and Receiving Waters	Receiving Water Classification		Primary Hydro Unit Basin No.	303(d) Listing		TMDL Pollutants
	Proximate	Downstream		Listed?	Pollutant Causing Impairment	
Big Bear Lake	Yes	Yes	801.71	Yes	Copper, Mercury & Metals – Source: **Resource Extraction** Noxious Aquatic Plants, Nutrients & Sedimentation/siltation – Source: **Construction/Land Developement** PCBs (Polychlorinated biphenyls) – Source: **Unknown**	Adopted Phosphorus
Santa Ana River (Reach 6)	No	Yes	801.72	No	None	None
Santa Ana River (Reach 5)	No	Yes	801.52	No	None	None
Santa Ana River (Reach 4)	No	Yes	801.25	Yes	Pathogens – Non Point Source	Not Adopted
Santa Ana River (Reach 3)	No	Yes	801.21	Yes	Pathogens – "Dairies"	Not Adopted
Prado Basin Management Zone	No	Yes	802.21	No	None	None
Santa Ana River (Reach 2)	No	Yes	801.11	No	None	None
Santa Ana River (Reach 1)	No	Yes	801.11	No	None	None
Pacific Ocean	No	Yes	801.11	No	None	None

PROJECT POLLUTANTS AND POLLUTANTS OF CONCERN

Table 2 lists the pollutants likely to be associated with the development of the Moon Camp Project and compares these pollutants to pollutants causing stress in local receiving waters. When a project pollutant is the same as a pollutant causing stress in the receiving waters, the San Bernardino County Model Water Quality Management Plan Guidance requires that project runoff be treated for said pollutants utilizing BMPs that are medium to high effectiveness. Pollutants of concern for the Moon Camp project are bacteria/virus, heavy metals, nutrients, and sediments, see Table 2.

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Nutrients are of particular concern because a TMDL for phosphorus has been adopted for Big Bear Lake. The current TMDL assigned to Big Bear Lake is 475 lbs per year for Urban Waste Load Allocation for phosphorus. For urban areas, compliance with this TMDL requires compliance with the Municipal separate storm sewer system (MS4) Permit which, in turn, requires implementation of Best Management Practices (BMPs) which treat pollutants of concern at a medium to high level of effectiveness.

Table 2 – List of Project Pollutants [5]

Land Use	Associated Project Pollutants		Is Pollutant 303(d) Listed and / or TMDL for Receiving Water[4]
	Pollutants	**Status**	
Home Subdivisions of 10 units or more & Streets/Highways/Freeways	Bacteria/Virus	Expected	Yes
	Heavy Metals	Expected	Yes
	Nutrients	Expected	Yes
	Pesticides	Expected	No
	Organic Compounds	Expected	No
	Sediments	Expected	Yes
	Trash and Debris	Expected	No
	O_2 Demanding Substances	Expected	No
	Oil and Grease	Expected	No

PERMIT REGULATIONS

WQMP Requirements

The Santa Ana Regional Water Quality Control Board Order Number R8-2002-0012, NPDES Permit No. CAS618036 (Permit) requires post-construction BMPs to be implemented for new development and significant redevelopment projects, for both private and public agencies. A Water Quality Management Plan (WQMP) is then used to guide the development and implementation of a program to minimize the detrimental effects of urbanization on the beneficial uses of receiving waters, including effects caused by increased pollutants loads and changes in hydrology. [5] Under the permit's requirements, Moon Camp will be required to comply with the WQMP guidance document by implementing the following:

- Incorporate and implement site design BMPs
- Incorporate and implement all applicable source control BMPs

[4] California Regional Water Quality Control Board, 2006 CWA Section Proposed 303(d) List of Water Quality Limited Segments, approved by the USEPA October 25, 2006.

[5] San Bernardino Stormwater Program – Model Water Quality Management Plan Guidance Document, June 2005

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- Incorporate or implement Treatment Control BMPs
- Utilize a combination of site design, source control and/or treatment control that addresses all identified pollutants and hydrologic conditions of concern.

TMDL Requirements

The Santa Ana Regional Water Quality Control Board Resolution No. R8-2006-0023, amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate a Nutrient Total Maximum Daily Load (TMDL) for Dry Hydrological Conditions for Big Bear Lake, was approved by the Office of Administrative Law (OAL) on August 21, 2007. Under this resolution, it appears that the only TMDL implementation provision applicable to the Moon Camp project is the item referring to the MS4 Stormwater Permit:

> **Implementation Task 3.1** – "Waste Discharge Requirements for the San Bernardino County Flood Control and Transportation District, the County of San Bernardino and the Incorporated Cities of San Bernardino County within the Santa Ana Region, Areawide Urban Runoff, NPDES No. CAS 618036 (Regional Board Order No. R8-2002- 0012). The current Order has provisions to address TMDL issues. In light of these provisions, revision of the Order may not be necessary to address TMDL requirements."

The deadline for the Regional Board's update to the MS4 permit is February 29, 2008; however, as noted in Implementation Task 3.1, changes to the MS4 permit may not be necessary to address TMDL issues.

The County of San Bernardino, in compliance with its MS4 permit, has adopted a program that requires new development projects, such as the Moon Camp project, to prepare and implement a Water Quality Management Plan (WQMP) that includes a combination of site design, source control, and treatment control BMPs to reduce the discharge of pollutants and hydrologic conditions of concern resulting from the development. This letter report outlines the site design BMPs, source control BMPs, and treatment control BMPs to be implemented by the Moon Camp project, with said controls to ultimately be documented in a project-specific WQMP. Therefore, by preparing and implementing a WQMP including the prescribed BMPs, the Moon Camp project will be compliant with the County's requirements, and by extension, the MS4 permit and TMDL implementation plan.

PROJECT BMPs

In order to address the project POCs and to reduce the chance of pollutants entering Big Bear Lake, the project will implement a treatment BMP that is effective for all POCs and also prepare a Water Quality Management Plan (WQMP) which shall incorporate the following:

Site Design

Lots in the Moon Camp Project are proposed to be low density with stem wall construction, thereby reducing the area of construction. This criteria in planning reduces the overall footprint of construction and minimizes the imperviousness of each lot.

Source Control

Activity restrictions and property owners' education are crucial to the project's success at preserving water quality. The more informed each property owner is the more likely they are to participate in compliance with imposed water quality standards. Conditions, covenants & restrictions (CC&R) shall be utilized in this project to clearly spell out activities that are not beneficial to water quality and shall not be

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allowed on the project site. The CC&Rs will be implemented and maintained by the project's Property Owner's Association (POA).

Treatment Control

Assuming a generous average house footprint of 3,500 sf on a 43,560 sf lot, with an estimated driveway surface of 3,000 sf, produces and impervious percentage of 15. Using this average 15% yields a water quality volume (V_0) of 1.56 Ac-ft for all project lots. Calculating the water quality volume of street runoff at 90% yields a V_0 of 0.37 Ac-ft. Therefore the individual lot treatment BMPs shall be designed to address 1.56 Ac-ft of total water quality volume, approximately 0.03 Ac-ft per lot, while the street treatment BMPS shall address the remaining 0.37 Ac-ft of the water quality volume.

Table 3 –BMPs Level of Treatment [6]

Pollutant of Concern	Treatment Control BMP Categories	
	Biofilter	Filtration
Sediment/Turbidity	H/M	H/M
Nutrients	L	L/M
Organic Compounds	U	H/M
Trash & Debris	L	H/M
Oxygen Demanding Substances	L	H/M
Bacteria & Viruses	U	H/M
Oils & Grease	H/M	H/M
Pesticides (non-soil bound)	U	U
Metals	H/M	H

Bioretention is the selected treatment BMP for the Moon Camp Project and operates similar to that of a biofilter and filtration. The individual lots will each treat their water quality volume prior to discharging from the site, with maintenance provided from the site, with maintenance provided by individual owners. The street runoff will also be treated with bioretention that is located in common areas or on open space lots, with maintenance by the POA.

As shown on Table 3, the combination of a biofilter and filtration will treat the project pollutants of concern at medium to high level of effectiveness. The Caltrans Treatment BMP Technology Report (April 2007) provides results of their full-scale pilot studies performed on various BMPs. The report shows that bioretention will effectively treat nutrients from the project, including nitrogen and phosphorus, at a medium level of effectiveness, see attached fact sheet.

[6] San Bernardino Stormwater Program – Model Water Quality Management Plan Guidance Document, June 2005

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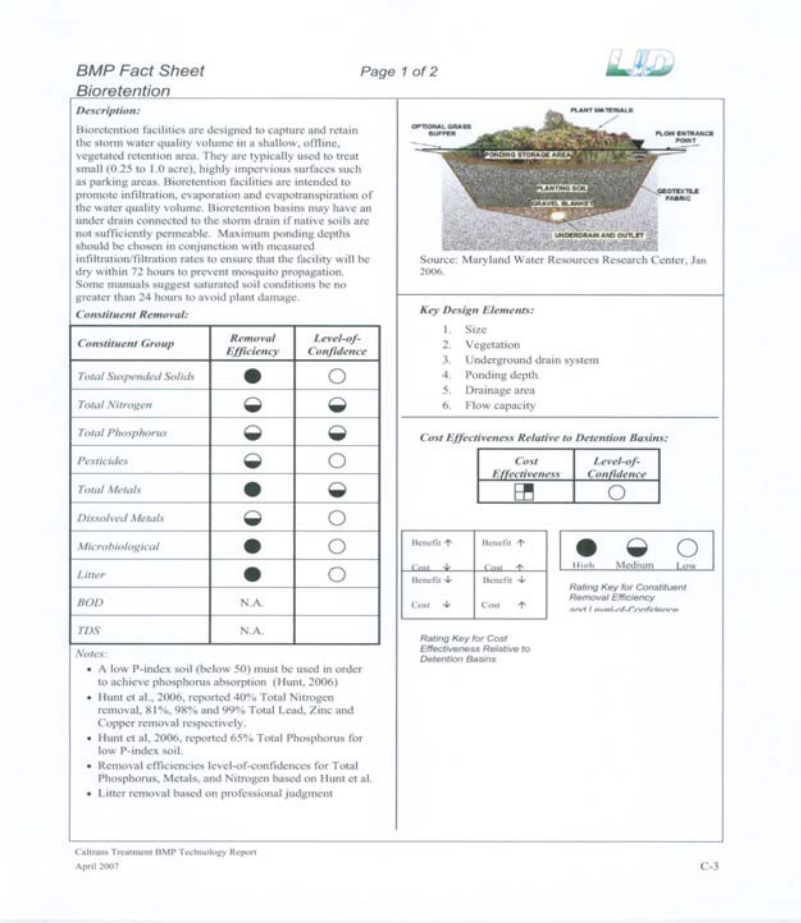


BMP Fact Sheet
Bioretention

Page 1 of 2

Description:

Bioretention facilities are designed to capture and retain the storm water quality volume in a shallow, offline, vegetated retention area. They are typically used to treat small (0.25 to 1.0 acre), highly impervious surfaces such as parking areas. Bioretention facilities are intended to promote infiltration, evaporation and evapotranspiration of the water quality volume. Bioretention basins may have an under drain connected to the storm drain if native soils are not sufficiently permeable. Maximum ponding depths should be chosen in conjunction with measured infiltration/filtration rates to ensure that the facility will be dry within 72 hours to prevent mosquito propagation. Some manuals suggest saturated soil conditions be no greater than 24 hours to avoid plant damage.

Constituent Removal:

Constituent Group	Removal Efficiency	Level-of-Confidence
Total Suspended Solids	●	○
Total Nitrogen	◒	◒
Total Phosphorus	◒	◒
Pesticides	◒	○
Total Metals	●	◒
Dissolved Metals	◒	○
Microbiological	●	○
Litter	●	○
BOD	N.A.	
TDS	N.A.	

Notes:
- A low P-index soil (below 50) must be used in order to achieve phosphorus absorption (Hunt, 2006)
- Hunt et al., 2006, reported 40% Total Nitrogen removal, 81%, 98% and 99% Total Lead, Zinc and Copper removal respectively.
- Hunt et al, 2006, reported 65% Total Phosphorus for low P-index soil.
- Removal efficiencies level-of-confidences for Total Phosphorus, Metals, and Nitrogen based on Hunt et al.
- Litter removal based on professional judgment

Source: Maryland Water Resources Research Center, Jan 2006.

Key Design Elements:
1. Size
2. Vegetation
3. Underground drain system
4. Ponding depth.
5. Drainage area
6. Flow capacity

Cost Effectiveness Relative to Detention Basins:

Cost Effectiveness	Level-of-Confidence
◪	○

Benefit ↑ Cost ↓	Benefit ↑ Cost ↑
Benefit ↓ Cost ↓	Benefit ↓ Cost ↑

Rating Key for Cost Effectiveness Relative to Detention Basins

● High ◒ Medium ○ Low

Rating Key for Constituent Removal Efficiency and Level-of-Confidence

Caltrans Treatment BMP Technology Report
April 2007

C-3

The key factor in bioretention success is utilizing soils that have an initial low phosphorus index (P-Index) rating existing in the soil. The P-Index of the soil is the measurement of how much phosphorus already exists in the soil media. The lower the P-Index, the greater the amount of phosphorus the media can capture. The success of this BMP to properly address phosphorous is based on the appropriate fill media being used.

RECOMMENDATION

Therefore, it is our recommendation that the Moon Camp Project development include site design, source control and appropriate treatment control BMPs, such as bioretention, that meet the requirements of the MS4 Permit, TMDL requirements and the requirements of the San Bernardino County Water Quality Management Plan Guidance. The bioretention areas must be situated to capture runoff from the project and must be constructed utilizing an engineered planting and filtering media with a low P-Index.

Best regards,

AEI-CASC Consulting

Melanie E. Sotelo
Design Engineer

Jeffrey D. Endicott, P.E., DEE
Engineering Director
R.C.E. 40658
Expiration 3-31-2009

DRAFT

C.2 - Drainage Study Review for "Hydrology and Hydraulics Preliminary Report" in Conjunction with Development of Tentative Tract 16136 (AEI CASC, May 2007)

AEI CASC ENGINEERING

May 7, 2007

Ms. Nancy M. Ferguson
Regional Manager
Michael Brandman Associates
340 S. Farrell Drive, A210
Palm Springs, CA 92262

Re: Drainage Study Review for "Hydrology and Hydraulics Preliminary Report" in conjunction with the development of Tract 16136 in the County of San Bernardino

Dear Ms. Ferguson:

INTRODUCTION:

Michael Brandman Associates (MBA) in conjunction with the County of San Bernardino requested AEI-CASC Consulting Inc. to provide technical services in order to assist the County in the review of the study "Hydrology and Hydraulics Preliminary Report" for Tract 16136. The study was prepared by Hicks& Hartwick, Inc. and was prepared October 2006.

DRAINAGE REVIEW AND EVALUATION COMMENTS

In general the report performed an existing and proposed hydrology analysis based on the San Bernardino County Flood Control Hydrology Manual. The rational method hydrology was performed for the 100-yr and 10-yr storm events for a drainage area of approximately 181-acres. The drainage area ~~consistence~~ consists of several natural streams that cross the State Highway 18 at various locations along the project limits. The drainage area and project are tributary to Big Bear Lake. The hydrology calculations performed are complete and in accordance with the San Bernardino County Flood Control Hydrology Manual.

Upon completing the review of the Study, we offer the following comments and recommendations:

- The Study included section in the report for "Surface Hydraulics" and "Storm Hydraulics", but calculations were not included. Calculations for these sections should be provided or the sections removed from the report.
- The Proposed hydrology map showed the proposed lot lines and street alignments, but elevations and proposed grading was not shown. To verify the proposed boundaries and conveyance of storm flows a copy of the TTM should be included in the report. Additionally, to assist in the verification of the proposed routing and drainage boundaries, the proposed TTM grading should be added to the proposed hydrology map and the scale increased to show the requested detail.

- Tract 16136 drains to Big Bear Lake, an impaired water body based on the San Bernardino County WQMP manual. The report should include a description of the proposed water quality treatment methods, calculation of treatment volumes and flows, and locations where treatment facilities are proposed. If a Preliminary WQMP report was prepared for Tract 16136 a copy of the report could be included as an appendices to the report.
- It appears that the proposed development will increase the nuisance flows ("Urban Slobber") to two or three of the existing downstream residences. Please describe how this will be mitigate and or minimized with the development.
- The proposed condition hydrology calculations show the developed flows increase the peak flow rate downstream of the project and into Big Bear Lake. Per the San Bernardino County Flood Control District Hydrology manual and guidelines, the increased flow rates should be decreased via detention basins to 90% of the existing condition flow rates or demonstrate that the increase in flow will not impact any downstream facilities. Based on the calculations provided the project does not meet this condition. The exemption of this condition should be discussed and approved by San Bernardino County Flood Control District.
- The proposed condition hydrology map shows that drainage areas "A" and "F" will be conveyed via roadway culverts and natural stream sections through project site. Due to the high flow rates and steep terrain it is recommended that a storm drain system be extended to intercept these drainage flows. The flows should include debris and bulking factor in the analysis. San Bernardino County Flood Control typically requires a bulking factor of 2.0 when a debris analysis is not performed.
- It is recommended that a flood plain analysis and review be performed for Drainage "A". The drainage flows for this stream are shown as 323.0 cfs for the 100-yr storm event (646 cfs for bulked flow condition). Additionally, a debris basin should be considered prior to discharge of flows into an underground storm drain. This recommendation could also be applied to drainage area "F".
- The proposed condition map shows that a storm drain will be extended from the project site (drainage area "A") to Big Bear Lake. The proposed alignment appears to require the acquisition of a drainage easement and/or right-of-way. Please demonstrate the size of required storm drain and that the proposed facility could be constructed through this area. Also, coordination with the affected property owner to provide the above mentioned rights should be demonstrated to the County of San Bernardino. This issue should be discussed in detail since it appears that the development will impact these existing residents.

If there are any questions or clarifications needed please feel free to call me at 951-342-7990 ext. 105

Sincerely,
AEI-CASC CONSULTING, INC.

Aric M. Torreyson, P.E.
Project Manager
AMT/bc

C.3 - Drainage Study Review for "Hydrology and Hydraulics Preliminary Report" in Conjunction with Development of Tentative Tract 16136 (AEI CASC, October 2007)

October 12, 2007

Ms. Nancy M. Ferguson
Regional Manager
Michael Brandman Associates
340 S. Farrell Drive, A210
Palm Springs, CA 92262

Re: Drainage Study Review for "Hydrology and Hydraulics Preliminary Report" in conjunction with the development of Tract 16136 in the County of San Bernardino

Dear Ms. Ferguson:

INTRODUCTION:

Michael Brandman Associates (MBA) in conjunction with the County of San Bernardino requested AEI-CASC Consulting Inc. to provide technical services in order to assist the County in the review of the study "Hydrology and Hydraulics Preliminary Report" for Tract 16136. The study was prepared by Hicks& Hartwick, Inc. and was revised July 2007.

DRAINAGE REVIEW AND EVALUATION COMMENTS

In general the report performed an existing and proposed hydrology analysis based on the San Bernardino County Flood Control Hydrology Manual. The rational method hydrology was performed for the 100-yr and 10-yr storm events for a drainage area of approximately 181-acres. The drainage area consists of several natural streams that cross the State Highway 18 at various locations along the project limits. The drainage area and project are tributary to Big Bear Lake. The hydrology calculations performed are complete and in accordance with the San Bernardino County Flood Control Hydrology Manual. Based upon the last review by AEI-CASC Consulting, the drainage report has been partially revised. Please note that no response letter addressing the comments and recommendations by AEI-CASC Consulting (May 7, 2007 letter) has been provided by Hicks& Hartwick, Inc.

Upon completing the review of the Study, we offer the following comments and recommendations:

- The Proposed hydrology map showed the proposed lot lines and street alignments, but elevations and proposed grading was not shown. To verify the proposed boundaries and conveyance of storm flows a copy of the TTM should be included in the report. Additionally, to assist in the verification of the proposed routing and drainage boundaries, the proposed TTM grading should be added to the proposed hydrology map and the scale increased to show the requested detail. *A response to this issue has not been obtained. Clarification should be provided in the report.*

CIVIL ENGINEERING PLANNING SUVEYING ENVIRONMENTAL ENGINEERING
5053 La Mart Drive, Suite 205 ♦ Riverside, CA 92517 ♦ 951.342.-7990♦ 951.275.01 FAX
www.aei-casc.com

- The proposed condition hydrology calculations show the developed flows increase the peak flow rate downstream of the project and into Big Bear Lake. Per the San Bernardino County Flood Control District Hydrology manual and guidelines, the increased flow rates should be decreased via detention basins to 90% of the existing condition flow rates or demonstrate that the increase in flow will not impact any downstream facilities. Based on the calculations provided the project does not meet this condition. The exemption of this condition should be discussed and approved by San Bernardino County Flood Control District. *A response to this issue has not been obtained. Clarification should be provided in the report or response letter format.*
- The proposed condition hydrology map shows that drainage areas "A" and "F" will be conveyed via roadway culverts and natural stream sections through the project site. Due to the high flow rates and steep terrain it is recommended that a storm drain system be extended to intercept these drainage flows. The flows should include debris and bulking factors in the analysis. San Bernardino County Flood Control District typically requires a bulking factor of 2.0 when a debris analysis is not performed. *A response to this issue has not been obtained. Clarification should be provided in the report.*
- A flood plain analysis was performed for the project. The calculations could not be review since a flood plain map showing the cross sections and floodplain widths was not provided. It is recommended that a map showing the above information be included to support the calculations.
- The proposed condition map shows that a storm drain will be extended from the project site (drainage area "A") to Big Bear Lake. The proposed alignment appears to require the acquisition of a drainage easement and/or right-of-way. Please demonstrate the size of required storm drain and that the proposed facility could be constructed through this area. Also, coordination with the affected property owner to provide the above mentioned rights should be demonstrated to the County of San Bernardino. This issue should be discussed in detail since it appears that the development will impact these existing residents. *A response to this issue has not been obtained. Clarification should be provided in the report.*

It should be noted that some of these comments and recommendations could be addressed in the final design stage of the project. It is at the discretion of San Bernardino County to postpone of eliminate any of the comments and recommendations. If there are any questions or clarifications needed please feel free to call me at 951-342-7990 ext. 105

Sincerely,
AEI-CASC CONSULTING, INC.

Aric M. Torreyson, P.E.
Project Manager
AMT/bc

C.4 - Peer Review Memorandum (AEI CASC, March 2007)

Memorandum

To: Ms. Nancy Ferguson
MICHAEL BRANDMAN ASSOCIATES

From: Aric Torreyson, P.E.
AEI-CASC Consulting

Date: March 23, 2007

Re: Moon Camp, Tentative Tract Map 1616

Cc: Ceazar Aguilar, **AEI-CASC Consulting**

Comments to the Engineer:

1st PLAN CHECK COMMENTS

HYDROLOGY AND WATER QUALITY TECHNICAL APPENDIX

AEI-CASC Engineering, Inc. has performed a review of the report entitled, "Moon Camp Tentative Tract 16136, Hydrology and Water Quality Technical Appendix", prepared by R.B.F. Consulting and we offer the following comments:

I. Hydrology Study

- In the narrative, please indicate the rainfall values, slope of intensity duration curve, and antecedent moisture condition values used in the analysis.
- Provide a hydrologic soils map and rainfall charts in the report. Show and

label the general location of the project on all maps and charts.

- For the proposed condition rational method calculations, please verify area "J". (The calculations do not match the tables shown in the narrative)
- Consider creating a large scale land use map – figure 6. (i.e. the information is difficult to read)
- Consider replacing the pictures provided for figure 5 with pictures that are more presentable.
- Please provide a FIRM map showing that there will be no existing flood hazards within the project site.
- For consistency in the narrative, please provide the pipe lengths in the tables.
- Please re-format the rational method output files to display all of the input parameters used. (i.e. slope of intensity duration curves and rainfall values)
- Please provide an R.C.E. stamp. (With signature)
- Please see the report for additional comments.
- It is mentioned in the report that the project will increase the run off to Big bear Lake. It should be noted that San Bernardino County Flood Control Hydrology Manual states that developed flows should be mitigated to 90% of existing flow rates. This project may need to provide this mitigation. Coordination with the district may be a required.

II. Hydrology Map

For the existing condition hydrology map it is recommended that the following information be provided:

- Consider creating a large scale map. (The information is difficult to read)
- Existing drainage facilities, in and around the project site, as appropriate. (and label them).
- Contour elevations.
- Add soil type "D" to the hydrologic data table.
- Label the flow path lengths.
- A vicinity map.
- Provide a leader line for all nodal points.
- Node elevations.
- Street names.
- Delete one of the north arrows.

For the proposed condition hydrology map it is recommended that the

following information be provided:

- Consider creating a large scale map. (The information is difficult to read)
- Existing drainage facilities, in and around the project site, as appropriate. (and label them).
- Contour elevations.
- Add a hydrologic data table. (See the existing hydrology map)
- A vicinity map.
- Street names.

III. Hydraulics Study

1. Please provide preliminary pipe sizes for the cross culverts.

Please include a response to comments letter with the next plan check. Failure to do so may result in the return of submittal without plan check.

Sincerely,

AEI-CASC Consulting, Inc.

Aric M. Torreyson, P.E.
Project Manager

C.5 - Water Supply Analysis (California Collaborative Solutions, February 2009)

Nancy @ MBA

California Collaborative Solutions

Water Supply Analysis

Tentative Tract No. 16136

Moon Camp Tract

Fawnskin, Ca

February 11, 2009

P.O. Box 706 Big Bear City, CA 92314 909 586-5819 calcolsol@gmail.com

Tentative Tract No. 16136 --- Moon Camp

Water Supply Analysis

February 11, 2009

Background:

The Moon Camp Tract was originally proposed as a 92 lot subdivision. An existing, onsite domestic water well, FP2, was proposed to provide the water supply for the subdivision. Well FP2 extracts its groundwater from Sub Area "A" of the North Shore Groundwater Basin. During the evaluation of the Water Supply, it was determined that the Perennial Yield of Sub Area "A" is between 14 and 44 acre-feet per year (Geoscience Support Services, December 2, 2003 Focused Geohydrologic Evaluation, Summary of North Shore Subareas, Page 3, copy attached). The Geoscience Focused Evaluation and the DWP's Master Plan (November, 2006, Table 4-2, copy attached) uses the mid-point of this range, 29 acre-feet per year, as Sub Area A's annual yield. However, County Planning Staff stated that they would only support a project that utilized the most conservative 14 acre-feet per year. ALDA Engineering completed a Final Feasibility Study that determined that 50 lots (occupied full-time) could be served by the 14 acre-feet per year (DWP report dated March 6, 2007, Page 2, copy attached). As a result, the Proposed Subdivision was redesigned as 50, one-half acre minimum lots.

During the preparation of the Draft EIR by MBA, it was discovered that the existing Private Well production within Sub Area "A" is 5 acre-feet per year (Table 4-2, DWP Water Master Plan, November, 2006, copy attached). In order to provide 5 acre-feet per year of groundwater yield to the subdivision from a groundwater basin other than Sub Area "A", the developer has drilled Well FP4 in the adjoining Grout Creek Groundwater Basin. The Grout Creek Basin has a Perennial Yield of 280 acre-feet per year; existing private well production of 7 acre-feet per year; and DWP domestic well production of 121 acre-feet per year (Tables 4-1 and 4-2, DWP Water Master Plan, November, 2006, copies attached). Based on this data, the Grout Creek Basin has 152 acre-feet per year of Perennial Yield available.

Water Well FP2:

In order to produce 9 - 14 acre-feet per year from Sub Area "A", Well FP2 would need to pump at a rate of 5.6 – 8.7 gpm. In June, 2008, Well FP2 was cleaned, pump tested and a Title 22 Water Quality Analysis was performed (Geoscience Support Services Report, August 7, 2008, copy attached). Geoscience concluded:

- Well FP2 can be pumped at a rate of 35 gpm on a long-term basis with less than 10 feet of drawdown in the well (Well FP2 is 380' deep and the static water level is 2 feet below ground surface)
- At the 35 gpm discharge rate, pumping interference with the closest private well is expected to be less than 0.3 feet (the nearest private well is approximately 1,000 feet to the east of Well FP2)

- Title 22 Ground water quality data from Well FP2 indicates the water from the well is suitable for municipal supply

The 35 gpm rate from Well FP2 can produce 56 acre-feet per year and supports Geoscience's Focused Evaluation and the DWP Master Plan's conclusion that Sub Area A can produce 29 acre-feet per year.

Water Well FP4:

In December of 2008, Harich Enterprises drilled Well FP4 to a depth of 240 feet. Well FP4 is located in the north-west corner of the proposed subdivision, within the Grout Creek Groundwater Basin. In order to produce 5 acre-feet per year from the Grout Creek Basin, Well FP4 would need to pump at a rate of 3.1 gpm. Harich pump tested Well FP4 at 3.4 gpm (Harich Driller's Report, February, 2009, copy attached) and the County's Special Districts Department obtained Title 22 Water Quality samples for analysis. The results concluded:

- Well FP4 can be pumped at a rate of 3.4 gpm on a long-term basis with 87 feet of drawdown in the well (Well FP4 is 240 feet deep and the static water level is 22 feet below ground surface)

The 3.4 gpm pumping rate from Well FP4 will produce 5.5 acre-feet per year from the Grout Creek Basin.

Water Service Provider:

Based upon the January 24, 2008 letter from LAFCO Executive Officer Kathleen Rollings-McDonald (copy attached), County Service Area 53C can own and operate the Moon Camp Subdivision Water System, including Water Wells FP2 and FP4. Special Districts staff has stated that they would operate the water system with their existing staff. Currently, Special Districts staff operate the Fawnskin Sewer System through CSA 53B.

Conclusion:

The combined pumping capacity of FP2 and FP4 is more than adequate to meet the long term water supply needs of the proposed 50 lot subdivision without adverse impacts to either Sub-Area "A" of the North Shore Basin, or the Grout Creek groundwater basin.

References:

GEOSCIENCE Support Services Inc., 2003. Focused Geohydrologic Evaluation of the Maximum Perennial Yield of the North Shore and Grout Creek Hydrologic Subunit Tributary Subareas. Prepared for the City of Big Bear Lake, Department of Water and Power. December 2, 2003.

ALDA Engineering, Inc., 2007. Final Feasibility Study to Serve the Proposed Moon Camp Residential Development (Tentative Tract No. 16136). Prepared for the City of Big Bear Lake, Department of Water and Power. March 6, 2007.

Camp, Dresser & McKee, Inc., 2006. Water Master Plan. Prepared for the City of Big Bear Lake, Department of Water and Power. November, 2006.

GEOSCIENCE Support Services Inc., 2008. Results of Rehabilitation and Aquifer Testing Moon Camp Well FP-2. Prepared for California Collaborative Solutions. August 7, 2008.

HARICH Enterprises, 2009. Well FP4 Driller's Report. February, 2009.

Local Agency Formation Commission. 2008. Memorandum, Water Service to Tentative Tract 16136; Moon Camp Residential Subdivision. Prepared by Kathleen Rollings-McDonald, Executive Officer. January 24, 2008.

Focused Geohydrologic Evaluation of the Maximum Perennial Yield of the North Shore and Grout Creek Hydrologic Subunit Tributary Subareas

Prepared for: City of Big Bear Lake Department of Water and Power

December 2, 2003

GEOSCIENCE Support Services, Inc.
Tel: (909) 920-0707
Fax: (909) 920-0403
Mailing: P. O. Box 220, Claremont, CA 91711
1326 Monte Vista Ave., Suite 3, Upland, CA 91786
email: email@geoscience-water.com

- Long-term precipitation records from weather stations within the Big Bear Lake watershed,
- Evapotranspiration data from evaporation pans and weather stations within the watershed,
- Ground water levels, and
- Ground water production.

However, most of the input parameters that are required for a detailed evaluation of the average annual ground water recharge had to be estimated or assumed from data collected outside the Grout Creek and North Shore subunits or outside the Big Bear Lake Watershed due to lack of measured data in the area. Although the assumed values are published and are from reliable sources (i.e. the U.S. Environmental Protection Agency, United States Geological Survey, etc.), they are not specific to the area of interest. Numerous additional monitoring features can be developed to collect the data necessary to refine the ground water recharge estimates. However, priority should be given to the construction of monitoring wells and the development of a reliable ground water level baseline for the tributary subareas.

The results of the ground water recharge analysis for the North Shore Subunit are as follows:

Summary of Ground Water Recharge Results
North Shore Tributary Subareas

Tributary Subarea	Area [acres]	Annual Precipitation [inches]	Average Annual Ground Water Recharge - Low Estimate [acre-ft/yr]	Average Annual Ground Water Recharge - High Estimate [acre-ft/yr]	Average of Ground Water Recharge Estimate Range [acre-ft/yr]
A	247	27.87	14	44	29
B	720	25.45	36	110	73
C	828	23.01	37	107	72
D	558	21.45	22	63	43
E	392	20.01	15	39	27
F	814	18.27	23	66	44

WATER MASTER PLAN

November 2006

Department of Water and Power
Big Bear Lake, California

Mission

The mission of the DWP is to manage our limited water resources through responsible planning in order to assure quality water and essential services in the most cost-effective manner for our current and future customers.

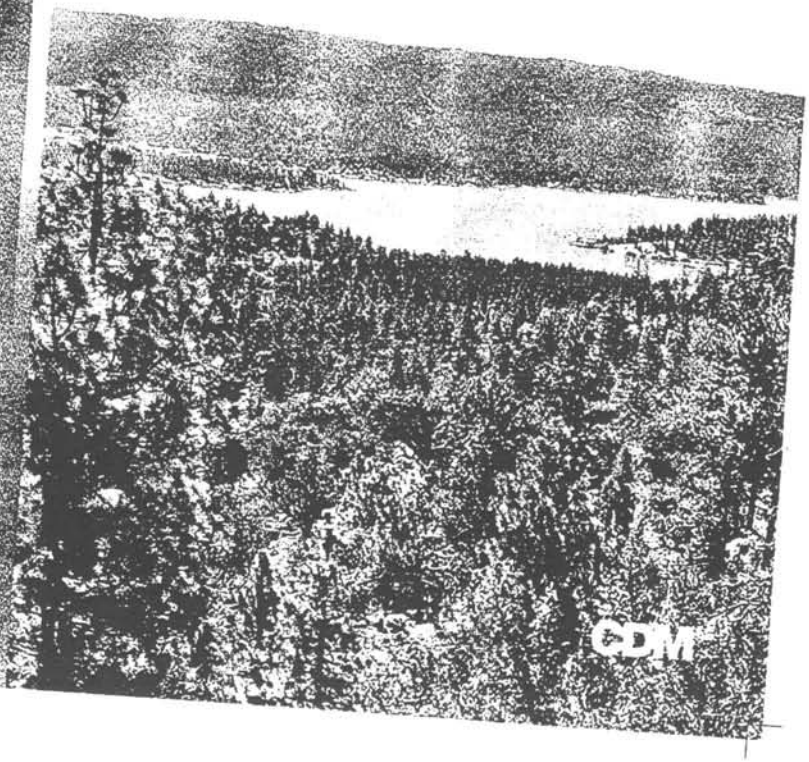


Table 4-1
Current and Projected Annual Demand and Supply Requirements by Pressure Zone

Current and Projected Annual Demand and Supply Requirements by Pressure Zone

Pressure Zone	Current		Full Development			
			25% Full-Time Equivalent		50% Full-Time Equivalent	
	Consumption (ac-ft/yr)	Supply (ac-ft/yr)	Consumption (ac-ft/yr)	Supply (ac-ft/yr)	Consumption (ac-ft/yr)	MDD (gpm)
Erwin Lake / Sugarloaf/ Lake William						
Erwin Lake	87	93	144	154	194	208
Lower Sugarloaf	173	186	225	241	339	363
Upper Sugarloaf	86	92	120	129	201	215
Lake William	28	29	45	48	57	61
Sub-total	374	400	535	572	791	846
Moonridge						
Wolf Booster	31	33	53	56	84	90
Wolf Tank	117	125	162	173	284	303
Lassen	54	58	70	75	104	111
Minton	11	12	17	18	30	32
Traventine	4	5	8	9	14	15
Lower Moonridge	162	173	207	221	286	306
High Timber Ranch	-	-	45	48	64	68
Sub-total	378	405	562	601	865	926
Big Bear Lake						
Town (1)	1,585	1,696	2,370	2,536	2,847	3,046
Conklin Booster	14	15	26	27	41	44
Ironwood Booster	18	19	35	37	48	51
Sub-total	1,617	1,730	2,431	2,601	2,935	3,141
Unmatched	61	65	--	--	--	--
"BIG FOUR" TOTAL:	2,431	2,601	3,527	3,774	4,591	4,913
Fawnskin						
Lower Fawnskin	102	109	172	184	224	240
Upper Fawnskin	19	20	32	35	51	54
Sub-total	121	129	204	219	275	294
Rim Forest	47	50	47	50	47	50
OVERALL TOTAL	2,598	2,780	3,778	4,043	4,913	5,257

(1) Includes Knickerbocker and Ponte pressure zones.

Table 4-2
Maximum Perennial Yield Estimate by Subunit (ac-ft/yr)

Maximum Perennial Yield Estimates by Hydrologic Subunit (ac-ft/yr)			
Subunit	*Perennial Yield Estimate*	*Private Wells Production*	*Available to DWP (ac-ft/yr)*
Grout Creek (1)	280	7	273
Mill Creek	100-175	3	147
Village	250	3	247
Rathbone	1,100	135	965
Division	496	2	494
North Shore			
Sub-Area A (1)	29	5	24
Sub-Area B	71		71
Sub-Area C	70		70
Sub-Area D	43		43
Sub-Area E	27		27
Sub-Area F	44		44
Erwin (2)	890	14	576
TOTAL:	3,400 - 3,475	169	2,981

(1) Assumed to be available to the Fawnskin system only.

(2) Only 576 ac-ft/yr are available to DWP from the Erwin Lake Subunit as an estimated 300 ac-ft/yr are produced by CSD. An additional 14 ac-ft/yr are produced by private wells.

The Perennial Yield from the Grout Creek subunit (280 ac-ft per year) and from Sub A of the North Shore subunit (29 ac-ft per year) is only available to the Fawnskin area. However, only 297 ac-ft per year are available to the DWP as an estimated 12 ac-ft per year are pumped by private wells. Therefore, an estimated 2,684 ac-ft per year are available to DWP to meet the water needs of the "Big Four" system on the south side of the lake. This number assumes that DWP would be able to develop all water sources in the remaining sub-areas in the North Shore subunit given that they are located in United States Forest Service (USFS) lands.

A comparison of supply requirements from Table 4-1 with available local supplies from Table 4-2 indicates that local supplies are capable of meeting current and projected water demands in the Fawnskin system. Local groundwater supplies available to the "Big Four" system are sufficient to meet current water demand of 2,601 ac-ft per year in that system; however, there would be a need to either reduce projected demands through conservation, secure additional supplies, or a combination of both options to meet demands at full development or resulting from conversion to full-time equivalent use. The supply deficit in the "Big Four" is estimated at approximately 1,090 ac-ft per year to meet projected demands at full development assuming the current distribution of full-time equivalent use is maintained; an additional 1,139 ac-ft per year of new supplies would be required to address the impact from demographics.

ALDA Engineering Inc.
9996 Orange Street
Alta Loma, CA 91737
Tel: 909-297-3741
Fax: 909-498-0423

March 6, 2007

Mr. Scott Heule, C.E.G./C.H.G., Assistant General Manager
City of Big Bear Lake
Department of Water & Power
41972 Garstin Drive
Big Bear Lake, CA 92315

Subject: **Final Feasibility Study to Serve the Proposed Moon Camp Residential Development** (Tentative Tract No. 16136)

Dear Mr. Heule:

Pursuant to your request, ALDA Engineering Inc. (ALDA) has conducted a feasibility study to determine the necessary system facilities to serve the above referenced development. This report summarizes the results of our investigation and recommendations. This report presents the project background, an assessment of demand and supply issues, the results of the system analysis, and the recommended improvements.

Project Background

The proposed Moon Camp development consists of 50 residential lots to be developed over approximately 62 acres of land. The proposed development is located along North Shore Drive, in the community of Fawnskin on the north side of Big Bear Lake, and ranges in elevation from approximately 6,750 ft. near the lake to approximately 6,950 ft. in the northeasterly quadrant. Individual lots range in size from approximately half an acre to well over two acres depending on location and are anticipated to be developed as single family residential units; average lot size is approximately one and a quarter acres. Because of its location and lot size, some of the residential units are anticipated to be fairly large and potentially exceed 4,000 square feet in size.

Water service to the proposed development will be provided off the Upper Fawnskin pressure zone as the Lower Fawnskin zone would not provide enough static head to provide the development adequate fire flow. DWP's closest pipeline off the Upper Fawnskin system is a single 6-inch diameter pipeline located near the intersection of Flicker Road and Chinook Road, approximately 2,000 ft away from the westerly boundary of the proposed development. Significant transmission improvements in the Fawnskin system are needed to provide fire flow to the proposed tract.

Currently, there are two groundwater production wells within the proposed residential tract. These wells are located in subarea A of the North Shore hydrologic subunit. It is our understanding that these wells will be deeded to the DWP at the time the tract map is recorded. The developer plans to equip the FP-2 well initially to meet the development projected water demands. The DWP will use excess capacity from this well to help reduce reliance on the leased North Shore Well No. 1. Groundwater production capacity from this well is estimated at approximately 100 gallons per minute. The second well (FP-3), located to the east of the FP-2 well, will not be initially equipped by DWP.

Pressure Zone Service Area

Based on the elevation range of the proposed development, 6,750 ft. to 6,950 ft., the development can be served off the Upper Fawnskin pressure zone. This pressure zone has an operating hydraulic grade of 7,113 ft. set by the high water level of the existing 0.25-million gallon Racoon Reservoir. Based on this hydraulic elevation, static pressures would range from a low of 71 psi at the highest point in Lot 18 to 157 psi near the lake. Individual pressure regulators would be required for all lots with static pressures exceeding 80 psi.

Water supply in the Fawnskin area is provided by two groundwater wells in the Lower Fawnskin pressure zone and by slant wells in the vicinity of the Racoon Reservoir. Excess groundwater production from the Lower Fawnskin pressure zone is conveyed to the Upper Fawnskin pressure zone through a booster station located at the Cline Miller Reservoir.

Water Demand

Projected water demand for the proposed development is based on the average consumption rate of 250 gallons per day per connection. Maximum day demand is estimated based on information provided in the recently completed water master plan and it is equivalent to 1.76 times the average day demand. Therefore, the average and maximum day demands for the proposed 50-lot subdivision are estimated as follows:

- Average Day Demand (ADD) = 12,500 gpd or 8.68 gpm
- Maximum Day Demand (MDD) = 15.27 gpm

Based on an estimated average day demand of 12,500 gallons, the annual water demand for the development is estimated at 4.56 million gallons or 14.00 ac-ft per year.

LOCAL AGENCY FORMATION COMMISSION
COUNTY OF SAN BERNARDINO

215 North "D" Street, Suite 204
San Bernardino, CA 92415-0490 • (909) 383-9900 • Fax (909) 383-9901
E-mail: lafco@lafco.sbcounty.gov
www.sbclafco.org

RECEIVED JAN 2 2008 SERVICES DEPT.

DATE: **JANUARY 24, 2008**

FROM: **KATHLEEN ROLLINGS-McDONALD, Executive Officer**

TO: **MATTHEW SLOWIK, Senior Planner**
Advance Planning Division – Land Use Services Department

SUBJECT: **WATER SERVICE TO TENTATIVE TRACT 16136; MOONCAMP RESIDENTIAL SUBDIVISION**

In response to your memorandum, dated January 15, 2008, I would like to provide a description of the three options for water service to this tract and the implications of Government Code Section 56133 to them from the LAFCO staff perspective.

First, Option #1, as previously identified to LAFCO staff, would be for the City of Big Bear Lake Department of Water and Power (hereafter DWP) to extend its infrastructure to serve the entirety of the residential subdivision. As I understand it, a portion of the tract is within the boundaries of the former SoCal Water Company which was condemned and acquired by the City of Big Lake and now operates under the DWP. Pursuant to the provisions of Government Code Section 56133 and LAFCO policies, the DWP has been authorized to continue to expand its services within the former boundaries of the SoCal system without the need for review and approval of LAFCO pursuant to Govt. Code Section 56133, but not beyond. Therefore, a review of the current project with our Special Counsel indicated that Option #1, to extend services by the DWP, was not viable since it would require consideration under §56133 which precludes service outside an agency's sphere of influence. None of the Fawnskin community is within the City of Big Bear Lake sphere of influence.

Please note that there is an area outside the existing DWP boundary defined as the former certificated service area of the SoCal Water Company that is receiving water service from DWP. The agreement between the DWP and Big

Bear Shores Homeowners Association was entered into in 1993, prior to the 1994 enactment of §56133. A copy of this agreement is included as an attachment to this memorandum.

Option #2, as presented to LAFCO staff, was the creation of a Joint Powers Authority (JPA) between the City of Big Bear Lake and County Service Area 53 Improvement Zone C (hereafter CSA 53C) to provide for domestic water service to the area outside the DWP system. CSA 53C was created with water powers to encompass the whole of the North Shore of Big Bear Lake including the entirety of the community of Fawnskin. This option is viable for the provision of domestic water service should it be the choice of the developers of the project.

Option #3, identified by LAFCO staff, would be for CSA 53C to own and/or install the domestic water system required by the project including development of wells and infrastructure and contract with the DWP to operate the system. CSA 53C, as noted above, includes the whole of the Fawnskin community, including areas inside and outside the service area of DWP, and is authorized water service as its only function. In the LAFCO staff view, such a management contract would be exempt from review by LAFCO under provisions of Government Code Section 56133 Subsection (e) which reads as follows:

> *"(e) This section does not apply to contracts or agreements solely involving two or more public agencies where the public service to be provided is an alternative to, or substitute for, public services already being provided by an existing public service provider and where the level of service to be provided is consistent with the level of service contemplated by the existing service provider..."*

The determination of exemption is made by the Commission following the receipt of a written request for consideration. The request shall include a copy of the contract for service, a map delineating the area to be served and a description of the manner in which the service is to be provided. Precedent for this procedure includes the contracts for service between the County (for law enforcement) and County Service Area 38 (Fire protection) and the City of Redlands related to service delivery to the "Donut Hole". A copy of these exemptions is included as an attachment to this memorandum.

Please contact me if you have any questions at (909) 383-9900.

/KRM

Attachments (3)

HARICH ENTERPRISES INC

Michael Perry
California Collaborative Solutions
P.O. Box 706
Big Bear City, Ca 92314

February 12, 2009

RE: Driller's Report and Pump Test for Moon Camp Well FP4

Dear Mr. Perry:

Enclosed please find the Well Completion Report and the results of the 48 hour constant rate pumping test for your Moon Camp Well FP4.

Harich Enterprises drilled Well FP4 at a 12" diameter to a total depth of 240 feet, with the screened interval from 100 to 240 feet and a 60' sanitary seal. Well FP4 is permitted through the County of San Bernardino as a municipal well. The well screen is a 6" diameter Roscoe Moss "Ful-Flo Louver" steel pipe. An Aquarium Sand filter pack was installed per the Special Districts Department specifications.

Static water level in the well was 22 feet measured on 2/4/09. The well was pumped at 3.4 gpm for 48 hours with the drawdown stabilizing at 87 feet (see enclosed Constant Rate Test Drawdown Chart).

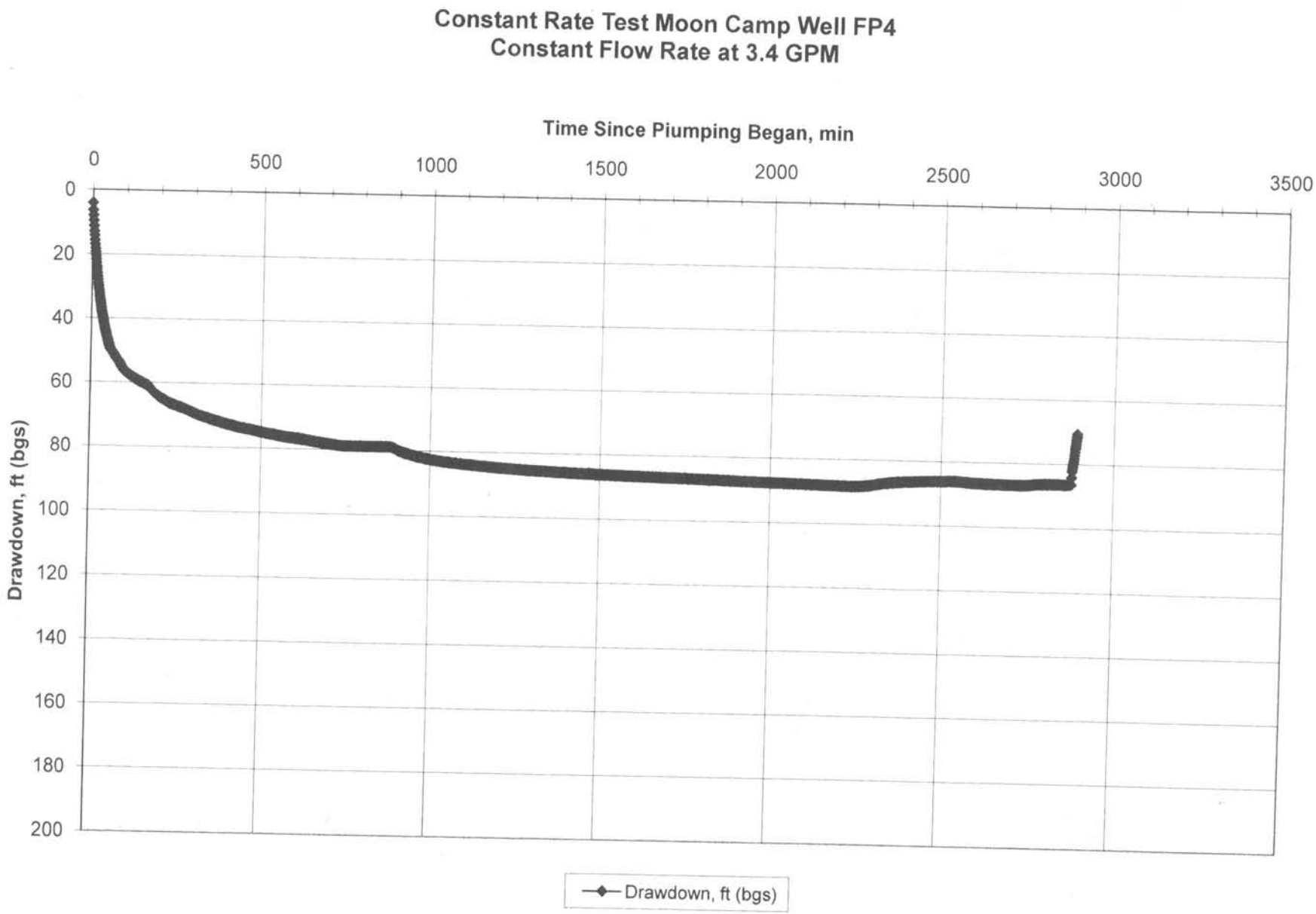
Well FP4 was drilled in the northwest corner of the Moon Camp Tract as shown on the enclosed map.

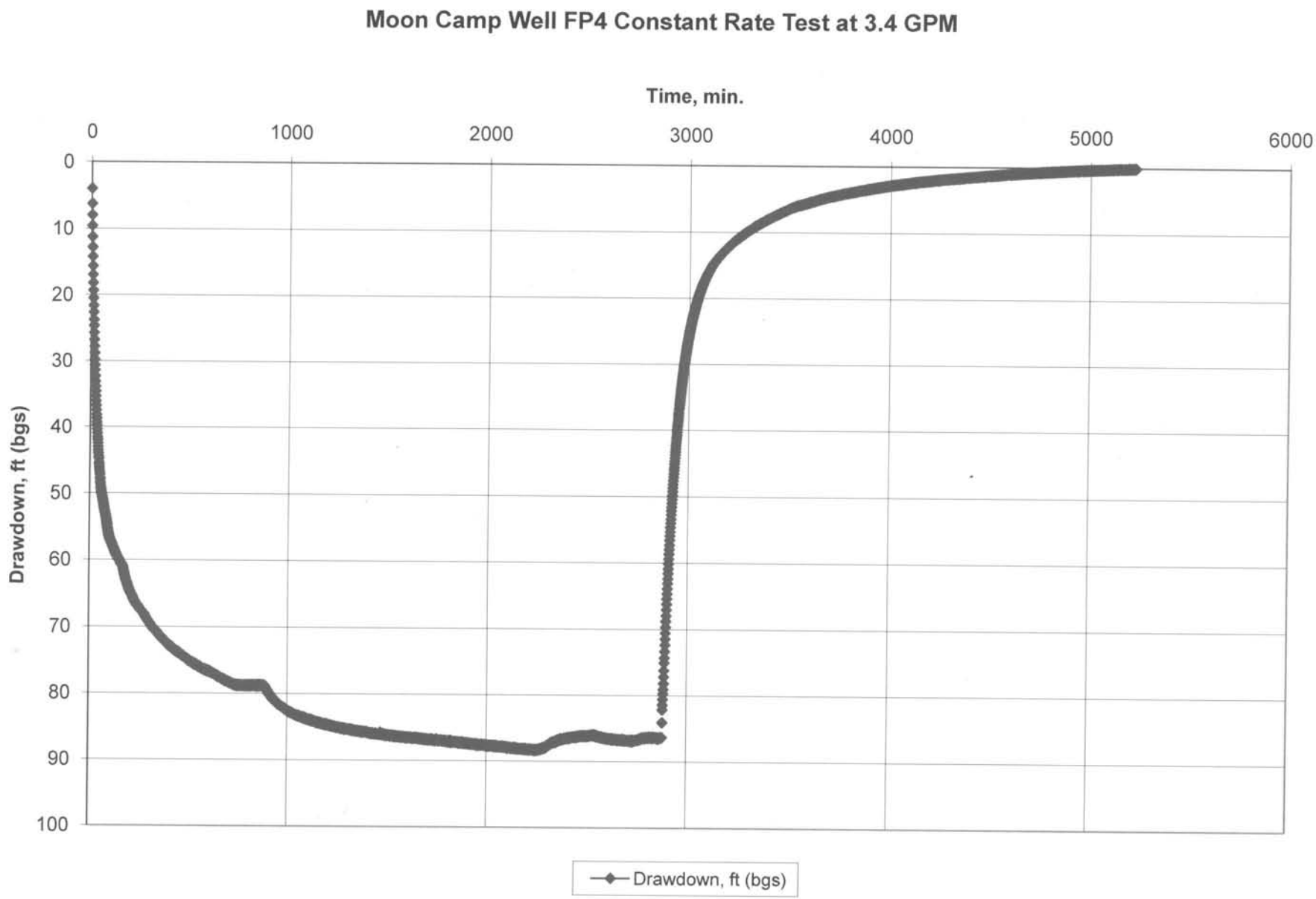
Please call me if you need any additional information.

Sincerely,

David Harich
Harich Enterprises Inc.

WATER RESOURCES DEVELOPMENT
POST OFFICE BOX 2233 RUNNING SPRINGS, CA. 92382
FAX (909)867-7759 / OFFICE (909) 867-2483


Constant Rate Test Moon Camp Well FP4
Constant Flow Rate at 3.4 GPM
Time Since Piumping Began, min
0
500
1000
1500
2000
2500
3000
3500
Drawdown, ft (bgs)
0
20
40
60
80
100
120
140
160
180
200
Drawdown, ft (bgs)


Moon Camp Well FP4 Constant Rate Test at 3.4 GPM
Time, min.
0
1000
2000
3000
4000
5000
6000
Drawdown, ft (bgs)
0
10
20
30
40
50
60
70
80
90
100
Drawdown, ft (bgs)

TRIPLICATE
Owner's Copy
Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. e0085096

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO / STATION NO
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. WELL FP4
Date Work Began 12/17/2009 Ended 2/6/2009
Local Permit Agency SAN BERNARDINO
Permit No. 2008100582 Permit Date 9/26/2008

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL — HORIZONTAL — ANGLE — (SPECIFY)
DRILLING METHOD ROTARY FLUID AIR

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION (Describe material, grain, size, color, etc.)
0 10	BROWN/RED/COBBLES/CLAY
10 20	BROWN/CLAY
20 40	BROWN/CLAY/GRAVELS
40 75	BROWN CLAY/PINK QUARTZITE
75 85	TAN/SANDS/GRAVELS/COBBLES/ 1st WATER
85 110	TAN/PINK/BLACK/COBBLES/SAND
110 120	BROWN/CLAY/GRAVELS
120 140	TAN/SAND (ADDITIONAL WATER)
140 150	TAN/GREY/BROKEN GRANITE(SMALL WATER)
150 240	GREY/SOLID GRANITE

TOTAL DEPTH OF BORING 240 (Feet)
TOTAL DEPTH OF COMPLETED WELL 240 (Feet)

WELL OWNER
Name TIM WOOD MOON CAMP
Mailing Address P.O. BOX 6820
BIG BEAR LAKE CA 92315
CITY STATE ZIP

WELL LOCATION
Address HWY 18 & CANYON RD.
City FAWNSKIN, CA CA 92333
County SAN BERNARDINO
APN Book 0304 Page 091 Parcel 22
Township 2 N Range 1 W Section 13
Latitude 34 15 56 N 116 56 15 W
DEG MIN SEC DEG MIN SEC

LOCATION SKETCH
NORTH
WEST EAST
See Attached
SOUTH
Illustrate or Describe Distances of Well from Roads, Buildings, Fences, Rivers, etc. and Attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)
✓ NEW WELL
MODIFICATION/REPAIR
Deepen
Other (Specify)
DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)
WATER SUPPLY
— Domestic ✓ Public
— Irrigation Industrial
MONITORING
TEST WELL
CATHODIC PROTECTION
HEAT EXCHANGE
DIRECT PUSH
INJECTION
VAPOR EXTRACTION
SPARGING
REMEDIATION
OTHER (SPECIFY)

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH TO FIRST WATER 80 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 22 (Ft.) & DATE MEASURED 2/4/2009
ESTIMATED YIELD 3.4 (GPM) & TEST TYPE PUMP
TEST LENGTH 48 (Hrs.) TOTAL DRAWDOWN 87 (Ft.)
May not be representative of a well's long-term yield

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 60	12"			✓		STEEL	6"	.188	
60 100	12"				✓	STEEL	6"	.188	
100 240	12"		✓			STEEL	6"	.188	.093
						(Roscoe Mo	Ful-flo	Louvered	Pipe)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 60	✓			
60 240				AQUARIUM SAND

ATTACHMENTS (✓)
Geologic Log
Well Construction Diagram
Geophysical Log(s)
Soil/Water Chemical Analysis
Other
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS

CERTIFICATION STATEMENT
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME HARICH ENTERPRISES, INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
P.O. BOX 2233 RUNNING SPRING CA 92382
ADDRESS CITY STATE ZIP
Signed
WELL DRILLER/AUTHORIZED REPRESENTATIVE
02/10/09 618447
DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV. 11-97

IF ADDITIONAL SPACE IS NEEDED USE NEXT CONSECUTIVELY NUMBERED FORM

California Collaborative Solutions
Results of Rehabilitation and Aquifer Testing
Moon Camp Well FP-2

August 7, 2008

GEOSCIENCE Support Services, Inc.
P.O. Box 220, Claremont, CA 91711
Tel: (909) 920-0707 Fax: (909) 920-0403
email: email@geoscience-water.com

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CALIFORNIA COLLABORATIVE SOLUTIONS
RESULTS OF REHABILITATION AND AQUIFER TESTING
MOON CAMP WELL FP-2

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FIGURES

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TABLE

No.	Description
1	Summary of Required Water Quality Analyses

APPENDICES

Ltr.	Description
A	Pumping Test Data
B	Water Quality Data
C	Microscopic Particulate Analysis

CALIFORNIA COLLABORATIVE SOLUTIONS
RESULTS OF REHABILITATION AND AQUIFER TESTING
MOON CAMP WELL FP-2

1.0 INTRODUCTION

This report summarizes the results of rehabilitation and testing of Well FP-2, located in the vicinity of the proposed Moon Camp development, east of Fawnskin, California (see Figures 1 and 2). Well FP-2 is a potential water source for the development, however, prior to recent activities, it had not been pumped since its construction in 1987. In order to assess the suitability of the well for water supply, GEOSCIENCE developed and implemented a well rehabilitation and testing program.

1.1 Purpose and Scope

The purpose of rehabilitation and testing of Moon Camp Well FP-2 was to:

1) Assess the current condition of the well;

2) Develop a rehabilitation program adequate to restore the specific capacity of the well so that its potential yield and water quality could be evaluated;

3) Implement the rehabilitation and testing program; and

4) Collect and analyze the data necessary for evaluating aquifer characteristics including water quality, potential interference to nearby wells, and possible hydraulic continuity with Big Bear Lake.

The scope of work to address the objectives included:

1) Conducting a downhole video survey of the well;

2) Developing a rehabilitation and testing program and coordinating implementation of the program with a rehabilitation contractor;

3) Implementing the rehabilitation program;

4) Conducting a 72-hour aquifer pumping test;

5) Collecting ground water quality samples from the well and having them analyzed for full Title 22 suite and microscopic particulate analysis (MPA); and

6) Analysis of the data and preparation of the report.

1.2 Background

The Moon Camp Well FP-2 was drilled in 1987 by Howard Pump Company of Barstow, California, using the mud rotary drilling method. A 17-inch borehole was drilled to a depth of 50 ft below ground surface (bgs), below which a 15-inch borehole was drilled to the total depth of 385 ft bgs. Well casing and screen, consisting of 8 1/8-inch inside diameter (ID) mild steel with a 1/4-inch wall thickness was installed to a total depth of 380 ft bgs. The screened portion of the well consists of Johnson Hi-Cap, a type of wire-wrap, located at depths of 60 to 120, 156 to 176, 216 to 278, and 310 to 370 ft bgs. The well was equipped with a 2-inch sounding tube that attaches to the well casing just below the ground surface. The well was filter packed using an 8 x 16 Monterey Sand from the total borehole depth to 53 ft bgs. A 2-foot bentonite layer was placed above the filter pack from 51 to 53 ft bgs and a cement annular seal was placed above the bentonite layer from 51 ft bgs to the ground surface.

Following well construction, the well was developed by bailing and pumping. Following development, an 8-hour variable rate (step drawdown) test was performed. During this test, a maximum discharge rate of 100 gallons per minute (gpm) was achieved with a pumping water level of 26 ft bgs. The specific capacity calculated from data collected during this test was approximately 5 gpm per foot of drawdown.

2.0 DOWNHOLE VIDEO SURVEY

On May 2, 2008, Pacific Surveys, LLC, conducted a downhole video survey of Well FP-2. GEOSCIENCE personnel were on site to note observations made during the survey and to direct the operation of the camera as necessary.

At the time of the video survey, the depth to static ground water level was approximately 2 ft bgs. The camera reached a depth of approximately 376 ft bgs before visibility within the water column became so reduced (i.e. blackout conditions) as to warrant the removal of the camera.

The video survey showed that the blank well casing and screen was locally scaled and corroded although no obvious structural damage was observed. The blank well casing was coated with moderate to heavy scale, with encrustants occurring in localized patches, particularly along welded casing joints. Large mounds of encrustants became more frequent and larger with depth. The wire-wrapped screen sections showed minor to complete clogging with some localized patches of encrustants and tubercles. Where screens were open, no filter pack could be seen through the screen apertures. Some of the encrusting material was observed to be relatively fragile and brittle and became dislodged from contact with the video camera.

3.0 WELL REHABILITATION PROCEDURE

Based on review of the video log, GEOSCIENCE developed a chemical and mechanical rehabilitation program for Well FP-2[1]. Rehabilitation was performed by Roadrunner Drilling & Pump Company of Winnemucca, Nevada (Contractor). The rehabilitation program was initiated on June 27, 2008.

Initial rehabilitation of Well FP-2 included mechanical dislodging of encrusted material throughout the wetted portion of the well casing and screen using a spirally-wound nylon brush. Scale and debris were dislodged by gently raising and lowering the brush throughout the specified area. The Contractor brushed each wetted foot of blank well casing for one minute and each wetted foot of screen for two minutes, for a total of 10 hours brushing time. Following brushing, a bailer was used to remove material that had accumulated at the bottom of the well.

The well was disinfected through a combination of acidification and chlorination. Using a tremie pipe, acid was introduced throughout the length of the well. The acid was mixed into the screened portion by gently lifting and lowering a bailer tool. Once the pH of the well water had been lowered to approximately 4.5 pH units, a chlorine solution was added through the tremie pipe and worked into the screened portion of the well by lifting and lowering the bailer. Once the chlorine concentration of the water in the well exceeded 200 milligrams per liter (mg/L), the well was allowed to sit idle for 24 hours.

Following chlorination, the Contractor continued rehabilitation of Well FP-2 using a combination swab and airlift tool. Swabbing was accomplished by gently lifting and lowering the double-packer tool opposite 10-foot sections of the well screen, effectively dislodging any remaining biofilm and/or fine-grained sediment from the gravel pack and near well zone. Following several passes with the swab tool through a 10-foot screened interval, the interval was

[1] Letter to Michael Perry dated May 9, 2008

pumped (air lifted) using the tool until the discharged water was clear and free of sediment. The screened portion of the well was swabbed and airlifted for a total of 20 hours.

Following swabbing and airlifting, a submersible test pump was installed within the well for final development and testing. The test pump intake was installed at a depth of approximately 130 ft bgs. Initial pumping was performed at a relatively low flow rate (approximately 30 gpm) and was gradually increased as water clarity improved and sand production decreased. Pumping was periodically interrupted to surge the well, a process where water in the pump column is allowed to flow back into the screened section of the well. This process was repeated until the discharge water was clear and the sand content was less than 0.1 parts per million (ppm). The well was developed by pumping for approximately 11 hours. The maximum discharge rate during development was approximately 150 gpm with approximately 25 feet of drawdown.

4.0 AQUIFER PUMPING TEST

A 72-hour variable rate (step-drawdown) pumping test was conducted at Well FP-2 during the period from July 1 to 4, 2008. The well was pumped in 24-hour "steps" at average discharge rates of 35 gpm, 60 gpm and 105 gpm (see Figure 3). During the pumping test, the pumping water level, discharge rate, and sand content were closely monitored (see Appendix A). Ground water levels in a nearby private well, referred to as the Fujimoto Well (see Figure 2), were also monitored during the pumping test. The pumping test was followed by 4 hours of recovery measurements in both the pumping well and the observation well. The field procedure for the pumping test followed the American Society for Testing and Materials (ASTM, 1994), Standard Test Method D4050.

4.1 Pumping Test Methodology

4.1.1 Basic Assumptions Used in Analysis of Pumping Test Data

The purpose of a pumping test is to obtain field data, which when substituted into an equation or set of equations, will yield estimates of well and aquifer properties. As certain assumptions have been used to derive these equations, it is important to consider or control these factors during the test. These assumptions are:

- The aquifer material is assumed to consist of porous media, with flow velocities being laminar and obeying Darcy's law.
- The aquifer is considered to be homogeneous, isotropic, of infinite aerial extent, and of constant thickness throughout.
- Water is released from (or added to) internal aquifer storage instantaneously upon change in water level.

- No storage occurs in the semi-confining layers of leaky aquifers.
- The storage in the well is negligible.
- The pumping well penetrates the entire aquifer and receives water from the entire thickness by horizontal flow.
- The slope of the water table or piezometric surface is assumed to be flat during the test with no natural (or other) recharge occurring, which would affect test results.
- The pumping rate is assumed constant during the entire time period of pumping during a constant-rate test, and constant during each discharge step in a variable-rate test.

4.1.2 Theis Equation

Estimation of aquifer parameters from pumping test data is based on analytical solutions of the basic differential equation of ground water flow that can be derived from fundamental laws of physics. One of the most widely used solutions of this equation for non-steady radial flow to wells is the "Theis Equation":

$$s(r,t) = \frac{114.6Q}{T} W(u) \qquad \text{"Theis Equation"} \qquad (1)$$

where:

$s(r,t)$ = Drawdown in the vicinity of an artesian well, [ft]

r = Distance from pumping well, [ft]

Q = Discharge rate of pumping well, [gpm]

T = Transmissivity of aquifer, [gpd/ft]

$W(u)$ = "Well function of Theis"

$u = \frac{1.87 r^2 S}{Tt}$

where:

S = Storativity, [fraction]

t = Time after pumping started, [days]

4.1.3 Jacob's Straight-Line (Modified Theis Non-Equilibrium) Method

According to Jacob (1950), for small values of "u" ($u < 0.05$), the Theis equation may be approximated by Jacob's equation:

$$s(r,t) = \frac{264Q}{T}\log\left(\frac{0.3\,Tt}{r^2 S}\right) \qquad \text{"Jacob's Equation"} \qquad (2)$$

Jacob's equation is valid for use for most hydrogeologic problems of practical interest, is easier to use than the Theis equation, and involves a simple graphical procedure to estimate transmissivity and storativity. This method (D 4105) is summarized by ASTM (1994).

Transmissivity (T, in gpd/ft) can be estimated as:

$$T = \frac{264Q}{\Delta s} \qquad (3)$$

where:

Q = Pumping rate, [gpm]

Δs = Change in drawdown over one log cycle of time, [ft]

4.2 Pumping Well

Well FP-2 served as the pumping well for the 72-hour constant rate pumping test. The static ground water level in the well was measured to be approximately 6 ft bgs prior to the start of pumping. Ground water levels were measured during the pumping test and recovery phase using a downhole pressure transducer programmed to collect measurements at one-minute intervals. Additionally, an electric wireline sounder was used to manually collect ground water levels in FP-2 during the pumping and recovery phases.

The discharge rate was monitored with a flowmeter equipped with a totalizer and instantaneous rate gauge. During the course of the 72-hour pumping test, Well FP-2 pumped at average discharge rates of 35, 60, and 105 gpm (Steps 1, 2, and 3, respectively). The total volume of ground water pumped during testing was 289,350 gallons.

Ground water samples were collected during the 72-hour step test after approximately 44 hours of pumping (July 2, 2008). The samples were submitted to E.S. Babcock & Sons, Inc. of Riverside, California for analysis of constituents required by the State of California Code of Regulations Title 22 Rule as well as other selected constituents. A complete list of the constituents tested and their detection limits are provided in Table 1. Laboratory results of the water quality testing are presented in Appendix B.

A microscopic particulate analysis (MPA) was performed during the first 24 hours of the step drawdown test. After approximately 1,000 gallons of discharge water were run through a filtering apparatus, the filter was submitted to BioVir laboratories, Inc. of Benicia, California. The sample was analyzed according to EPA Method 910/9-92-029 including *Giardia* species and *Cryptosporidium*. Results of the MPA are presented in Appendix C.

4.3 Observation Well

Ground water levels were monitored before, during and after the pumping test in an observation well (a private well referred to as the Fujimoto Well) located approximately 910 ft east of Well FP-2. Water level measurements were collected and recorded in this well using a pressure transducer.

5.0 PUMPING TEST RESULTS

5.1 Production Well (FP-2)

As shown on Figure 3, Well FP-2 can be pumped at a rate of 35 gpm on a long-term basis with less than 10 ft of drawdown in the well. The well can also sustain a pumping rate of 105 gpm on a long-term basis although the rate of ground water level decline is greater. Analysis of the 105 gpm step using Jacob's straight-line interpretation shows an aquifer transmissivity of approximately 14,600 gallons per day per foot of drawdown (gpd/ft; see Figure 4). At a pumping rate of 105 gpm, the specific capacity of FP-2 is approximately 4.7 gpm/ft.

The specific capacity (the inverse of specific drawdown), of the well during Step 1 was less than the specific capacity measured during Steps 2 and 3. This results in a negative trendline when plotting specific drawdown with discharge rate, and thus, well efficiency cannot be calculated (see Figure 5).

Calculated recovery is a method of analysis whereby extrapolated drawdown data is compared to actual recovery data from the pumping well. It can be used to calculate transmissivity using Jacob's straight line interpretation in a similar manner as used with the pumping drawdown data. Results of the calculated recovery analysis for well FP-2 shows an aquifer transmissivity of approximately 8,900 gpd/ft (see Figure 6). Residual drawdown analysis, a method whereby residual drawdown (the difference between the static and recovering water level) is plotted with respect to the ratio between the time since pumping stopped and the time since pumping started, can also be used for calculating aquifer transmissivity using Jacob's straight line interpretation. Results of the residual drawdown analysis for Well FP-2 shows an aquifer transmissivity of approximately 9,600 gpd/ft (see Figure 7).

5.2 Observation Well

Ground water level data collected from the observation (Fujimoto) well, located approximately 910 ft east of Well FP-2, during the pumping test shows minor ground water pumping interference that can be attributed to pumping of Well FP-2. Given that the Fujimoto well was an actively pumping well that cycled on and off periodically during the pumping test, it was necessary to interpret pumping interference from Well FP-2 through the ground water level "noise" of the pumping observation well. To account for this, static ground water levels were used to interpret interference trends (see Figure 8). Interpretation of static ground water trends during the pumping test shows a decline of approximately 0.3 ft that can be attributed to interference from pumping Well FP-2 at a rate of 35 gpm.

5.3 Ground Water Quality

Ground water quality data from Well FP-2 indicate that water produced from the well is suitable for municipal supply. The water is of calcium-bicarbonate type (see Figure 9). The total dissolved solids (TDS) concentration was reported to be 300 mg/L, below the recommended California Department of Public Health (CDPH) secondary maximum contaminant level (MCL) of 500 mg/L. Toluene was detected at a concentration of 1.2 micrograms per liter (µg/L), below the CDPH primary MCL of 150 µg/L, and is likely from materials used during installation of the test pump. Chloroform was detected at a concentration of 0.98 µg/L, below the USEPA MCL of 80 µg/L for trihalomethanes, and is likely a by-product of the chlorine used during rehabilitation of the well casing and screen. All other detected constituents were below their respective MCLs or notification levels.

The results of the water quality analyses are summarized in the following table:

Water Quality Analytical Data – Moon Camp Well FP-2

		Analysis Result	Drinking Water Regulatory Standards
Aluminum	[µg/L]	< 50	200[2]/1,000[1]
Arsenic	[µg/L]	< 2.0	10[1]
Boron	[µg/L]	< 100	1,000[3]
Chloride	[mg/L]	2.7	250-500[2]
Chromium, Hexavalent	[µg/L]	< 1.0	50[1,4]
Chromium, Total	[µg/L]	1.1	50[1]
Color	[Color Units]	< 3.0	15[2]
Fluoride	[mg/L]	< 1.0	2.0[1]
Iron	[µg/L]	< 100	300[2]
Manganese	[µg/L]	< 20	50[2]
Nitrate (as NO_3)	[mg/L]	< 1.0	45[1]
Odor	[TON]	< 1.0	3[2]
Perchlorate	[µg/L]	< 4.0	6.0[1]
pH	[pH Units]	7.5	6.5 - 8.5[5]
Silica, Total	[mg/L]	25	NA[6]
Specific Conductance	[µmhos/cm]	510	900-1,600[2]
Sulfate (as SO_4)	[mg/L]	5.2	250-500[2]
Surfactants (MBAS)	[mg/L]	< 0.05	0.5[2]
Total Dissolved Solids (TDS)	[mg/L]	300	500 - 1,000[2]
Total Hardness	[mg/L]	270	NA[6]
Turbidity	[NTU]	0.39	5[2]
Vanadium	[µg/L]	< 3.0	50[3]
1,2,3-Trichloropropane	[µg/L]	< 0.005	0.005[3]
Gross Alpha	[pCi/L]	1.74 +/- 1.33	15[1]
Radon	[pCi/L]	447 +/- 43.1	300-4,000[7]
Volatile Organic Compounds (EPA Method 524.2) except as noted below:	[µg/L]	ND	Varies with Chemical[1]
Chloroform	[µg/L]	0.98	80[8]
Toluene	[µg/L]	1.2	150[1]

1 California Department of Public Health (CDPH) primary maximum contaminant level (MCL)
2 CDPH secondary MCL.
3 CDPH notification level for unregulated chemicals.
4 Chromium-6 (hexavalent chromium) is regulated by CDPH under the 50 µg/L total chromium MCL.
5 United States Environmental Protection Agency (USEPA) secondary standard for pH.
6 Not Applicable – no current MCL.
7 USEPA proposed MCL and alternative MCL.
8 Chloroform is regulated under the 80 µg/L USEPA MCL for total trihalomethanes.
ND Not detected above laboratory detection limit.
BOLD Equal to or above current CDPH MCL or notification level.

5.4 Microscopic Particulate Analysis

Microscopic particulate analysis (MPA) did not show any primary or secondary particulates in the well discharge, with the exception of plant pollen. The plant pollen identified was determined to be pine pollen, and is likely an airborne contaminant that contacted the sampling apparatus during field set-up. Given this, there is no evidence from the MPA that the ground water produced by Well FP-2 is under the direct influence of surface water in Big Bear Lake. A copy of the complete MPA report is presented in Appendix C.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the data collected during this investigation, we have developed the following conclusions:

- Well FP-2 has successfully been rehabilitated and its specific capacity restored to near original levels;
- Extreme care should be exercised when equipping or redeveloping the well in the future to avoid damaging the wire-wrap screen. Although no clear damage was visible from the video survey, the screen design is fragile and can easily be damaged;
- Well FP-2 can yield up to 35 gpm on a long-term basis with less than 10 ft of drawdown;
- At the 35 gpm discharge rate, pumping interference with the closest private well is expected to be less than 0.3 ft;
- Ground water quality data from Well FP-2 indicates the water from the well is suitable for municipal supply;
- Microscopic particulate analysis of discharge water detected pine pollen on the sampling filter. However, the detection was likely the result of an airborne contaminant and not from ground water under the direct influence of surface water. Confirmation sampling and analysis may be necessary to verify this conclusion prior to permitting the well with the CDPH.

7.0 REFERENCES

American Society for Testing and Materials. 1994. ASTM Standards on Ground Water and Vadose Zone Investigations. 2nd Edition.

Jacob, C.E., 1950. Engineering Hydraulics. J. Wiley and Sons, New York.

Driscoll, Fletcher G., 1986. Groundwater and Wells. Second Edition. U.S. Filter/Johnson Screens, St Paul Minnesota.

C.6 - Water Supply Analysis (California Collaborative Solutions, May 2009)

California Collaborative Solutions

Water Supply Report

Tentative Tract No. 16136

Moon Camp Tract

Fawnskin, Ca

May 14, 2009

P.O. Box 706 Big Bear City, CA 92314 909 586-5819 calcolsol@gmail.com

performed above indicates that new estimates of this planning number may be lower in the future. Please feel free to contact me if you have any questions.

Thank you for your interest,

William S. La Haye
Water Resource Manager
Big Bear Lake DWP

Department of Water

May 6, 2009

Michael Perry
California Collaborative Solutions
Post Office Box 706
Big Bear City, CA 92314

Re: Moon Camp Water Feasibility Study – 250 gpd/lot

Dear Mr. Perry,

This letter is in response to your question regarding the Big Bear Lake Department of Water and Power's (DWP's) use of 250 gallons per day (gpd)/lot in the Moon Camp Water Feasibility Study. Currently, the DWP uses 250 gpd/lot for all feasibility studies for new subdivisions and this is based on historical water demand of customers within the DWP's service area.

In our 2006 Master Plan, the engineering firm contracted to produce this plan calculated our daily average water use at 165 gpd (2,720 af/14,748 customers) using 2002 water use data, and added 65 gpd for unaccounted for water and demographic factors to equal 230 gpd/customer. Prior to this work, the DWP had been using 250 gpd/lot as its planning number. The Master Plan analysis confirmed this number was reasonable and we still use it.

The calculations described above were produced with water use data collected prior to the implementation of an extremely aggressive water conservation program. Between 2001 and 2005, the water demand within our service area declined 18%. Most of these conservation measures are still in effect and the water demand within our service area remains well below the peak demand recorded in 2001. Considering we now have 950 (7%) more customers than in 2002, maintaining water demand more than 15% below the 2001 peak is encouraging.

Customer water demand was 2,424 acre feet in 2008 and the number of DWP customers that year was 15,698, which yields an average of 138 gpd/customer. If we add the same figure for unaccounted for water and demographics (65 gpd/customer), as was done in 2006, the current planning number estimate would be 203 gpd/customer. This is 19% lower than the 250gpd/customer planning number used in the Moon Camp Feasibility Study.

While the DWP has not updated the 250 gpd/lot planning number since 2006, we feel this number is the best available estimate for planning purposes at this time. The simple analysis I

Department of Water and Power, City of Big Bear Lake
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www.bbldwp.com

California
Collaborative
Solutions

909 586-5819
P.O. Box 706
Big Bear City, CA 92314
calcolsol@gmail.com

May 14, 2009

Wes Reeder
County Geologist
Land Use Services Department
County of San Bernardino
385 North Arrowhead Avenue, 1st Floor
San Bernardino, CA 92415-0181

Re: Moon Camp Tract Water Supply

Wes,

Enclosed please find the items / responses to your requests regarding the Moon Camp Tract Water Supply:

1. May 6, 2009 letter from the DWP's Water Resource Manager, William La Haye, explaining the basis for the DWP's use of 250 gallons per day (gpd) in their Water Feasibility Studies for new development.

2. Copies of the DWP's Water Usage Restrictions / Water Conservation Regulations including Ordinance No. 2005-348; Conservation Stage 1 Water Use Restrictions; Residential Tiered Water Rates; Spring & Summer Water Conservation Guide; and Fall & Winter Conservation Guide.

3. May 1, 2009 letter from Tom Harder, Groundwater Consulting, addressing your questions:
    - The minimum perennial yield for Sub Area A
    - His opinion of the potential impacts of pumping Well FP2 on Big Bear Lake
    - His opinion of potential impacts associated with utilization of Well FP4 as a supplemental water source

4. Our request to the DWP for their conceptual approval of Water Service Alternative #1 – interconnection of the Moon Camp Tract's pipelines and wells with the DWP's Fawnskin Water system in order to provide water storage and fire flow to the Tract. (Water Service Alternative #2 is the construction of an independent water system on the Tract including reservoir and fire booster station)

5. Figure 2-1, DWP Service Area, and Figure 5-1, DWP Existing Facilities, from the DWP November 2006 Master Plan; Exhibit 2-3, Land Use Designations, from the Moon Camp Draft EIR; and the DWP's September 2, 2008 Figure 1, DWP Service Area and Tributary Subarea Boundaries. These Figures and Exhibit show that the only remaining undeveloped private land within Sub Area A is a 6.8 acre parcel of land to the north of the Moon Camp Tract. This parcel is within the DWP's service area and will be served from the Grout Creek Groundwater Basin through the existing DWP water line in Flicker Road that dead ends into the western boundary of the 6.8 acre parcel.

As we discussed, the Draft EIR will include the statement: "The pumping of Well FP2 within Sub Area A of the North Shore Groundwater Basin to supply the Moon Camp Tract will be limited to 9 acre feet per year until the water purveyor can demonstrate that more than 9 acre feet per year can be withdrawn without adverse impacts to Sub Area A and the private well owners who also pump from Sub Area A."

Please call me if you have any questions.

Sincerely,

Michael Perry

Michael Perry
California Collaborative Solutions

DWP's Water Conservation / Water Usage Restrictions

The average water demand in the San Bernardino Valley (and other areas of California) is much higher than in the Big Bear area as most houses off the mountain have extensive green landscape areas to water. The DWP has been a leader in water conservation by implementing:

- Significantly increasing Tiered Water Rate Structure - $2.06/ccf to $9.77/ccf (copy attached)
- All indoor water fixtures are required to be low flow / low flush (new construction and at change of ownership)
- Water Conservation Landscape Ordinance (copy attached):
    - Limiting turf to 500 square feet for each property and approval by DWP
    - Turf irrigation must include an automatic controller that incorporates evapo-transpiration and rain shutoff features
    - Sprinklers are only allowed for turf. All other landscape plantings must be irrigated with efficient, low water use devices, such as, drip systems or bubblers.
    - All outdoor irrigation systems shall be shut off and winterized between Nov 1 – Apr 1
    - All new developments are required to install low water use landscape elements
    - Landscape plans must be approved by the DWP when proposed landscape exceeds 1,000 square feet
    - Landscape plans must demonstrate their adherence to Xeriscape principles
- Stage 1 Water Use Regulations (copy attached):
    - No washing of sidewalks, walkways, driveways, patios, porches, buildings from a hose
    - Outdoor irrigation limited to every other day
    - Outdoor irrigation before 9 am and after 6 pm only
    - No water used for compaction or dust control
    - No flooding or runoff onto driveways or streets
    - Vehicle washing using a bucket and hose equipped with an automatic shutoff nozzle

As shown in the Landscape Ordinance, outdoor irrigation in Big Bear only occurs for a maximum of 7 months a year. Due to the cold spring / fall climate, only 4 months, June – September, are warm enough for what would be called, "normal outdoor irrigation".

As shown above, water usage in Big Bear is required to be significantly different than what occurs in the San Bernardino Valley and elsewhere in California.

DEPARTMENT OF WATER (DWP)

RESIDENTIAL WATER RATES FOR 2 MONTHS

SERVICE CHARGES: (5/8" Meter)

Operation & Maintenance	$ 8.36
Debt Service	$ 35.60
System Rehabilitation Fee	$ 15.82
Total Minimum Billing Every Two Months:	**$ 59.78**

WATER USAGE CHARGE

1 unit = 1 ccf = 100 cubic feet = 748 gallons

Tier 1	First 24 ccf	$ 2.06 each
Tier 2	Next 16 ccf (25 to 40 ccf)	$ 2.86 each
Tier 3	Next 20 ccf (41 to 60 ccf)	$ 4.27 each
Tier 4	Next 40 ccf (61 to 100 ccf)	$ 7.04 each
Tier 5	All usage over 100 ccf	$ 9.77 each

The service charge and rehabilitation fees are "readiness to serve" charges applicable to all connected services. This amount is charged regardless of any water usage or whether the service is turned on or off. The purpose of the service charge is to keep the water system in a condition that is ready to serve ALL our customers at any given time. Approximately 60% of your service charges go to repay the debt for the purchase of the Water System. The remainder of the service charge (and all the usage fees) are used to fund the Operations and Maintenance Budget. The rehabilitation fee is specifically designated to fund the needed improvements to the Water System.

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Rev. 7/08

Department of Water

City of Big Bear Lake
41972 Garstin Drive, Big Bear Lake, CA 92315
909-866-5050

CONSERVATION STAGE I: WATER-USE REGULATIONS

All Department of Water (DWP) customers in the Big Bear Valley are under **Stage I Water Shortage Emergency Regulations, with the exception of Lake William, which is under Stage II Water Shortage Emergency Regulations.** Conservation stages are determined by the Board of Commissioners based on many variables, some of which are the current ground water levels, recent ground water level trends, prior year precipitation and water demand, and current and anticipated water demand. Current Stage I regulations include, but are not limited to the following:

- Outdoor irrigation will be permitted every other day based on the customer's address and the current date. **See reverse side for details.**
- All new landscapes and existing landscape modifications greater than 1,000 square feet require a landscaping permit prior to beginning work.
- New turf installations may not exceed 500 square feet in size, and must be permitted prior to installation. **See reverse side for details.**
- Irrigation systems must be shut down from November 1st to April 1st.
- No DWP water may be used for soil compaction or dust control.
- No washing of sidewalks, walkways, driveways, parking areas, patios, porches or verandas, buildings and structures using water from a hose except when needed to protect public health and safety.
- No water shall be used to clean, fill, operate, or maintain levels in decorative fountains unless such water is part of a recycling system.
- All water leaks must be repaired in a timely manner.
- Noncommercial washing of private vehicles, trailers, buses or boats must be conducted through the use of a bucket and a hose equipped with a shut-off nozzle.
- There shall be no use of water from a fire hydrant, except for fire protection purposes.
- There shall be no flooding or run-off in driveways or streets.

FOR A COMPLETE LIST OF THE WATER-USE REGULATIONS, PLEASE CALL THE CONSERVATION DEPARTMENT AT (909) 866-5050 OR VISIT WWW.BBLDWP.COM.

OUDO WATER SAVING TIPS

- **Lay mulch around trees and plants** at least one to two inches deep to retain moisture, slow evaporation, and discourage weed growth.
- **Weeds are water thieves,** robbing your plants of water and nutrients. Try to keep your lawn and garden weed-free.
- **Set a kitchen timer or invest in a sprinkler timer to help prevent over watering.** A lot of water can be wasted in a short period of time if you forget to turn your sprinklers off.
- **If it doesn't grow, don't water it.** Position sprinklers so water doesn't land in the gutters or on any paved areas.
- **Don't water on windy days.** Water will go everywhere except where it is needed.
- **Consider installing drip irrigation systems.** Drip irrigation systems allow water to flow slowly to roots and also reduce water loss due to evaporation.
- **Check for leaks** in pipes, hoses, faucets, and couplings. Leaks can waste a lot of water.

XERISCAPE

It's a Smart Choice

Salvia

Xeriscape is an attractive, sustainable landscape that conserves water and is based on sound horticultural practices. Simply stated, Xeriscape is a landscape that is water wise – using water conservatively in the landscape without wasting. Creating sustainable landscapes is one way that homeowners can lessen the impact on the local environment. Xeriscaping encourages the use of a wide variety of durable plants to create a low-maintenance landscape that is well matched to its region. Planting a beautiful Xeriscape landscape can attract hummingbirds, butterflies and beneficial insects, while enhancing the value, comfort and appearance of your property.

OUTDOOR WATE G SCHEDULE

- Before 9:00 a.m. and after 6:00 p.m.
- Every other day based on your address and the current date. If your address ends in an even number, you can water on the even days of the week, such as the 2nd, 4th, etc.

OUTDOOR WATERING GUIDELINES

Additional outdoor watering restrictions include, but are not limited to:

- New turf installations plus existing turf, may not exceed 500 square feet in size, and must be approved by the DWP prior to installation.
- No washing of sidewalks, walkways, driveways, parking areas, patios, porches or verandas, buildings and structures using water from a hose except when needed to protect public health and safety.
- No water shall be used to clean, fill, operate, or maintain levels in decorative fountains unless such water is part of a recycling system.
- Non-commercial washing of private vehicles, trailers, buses or boats must be conducted through the use of a bucket and a hose equipped with a shut-off nozzle.
- No flooding or run-off in driveways or streets.
- All water leaks must be repaired in a timely manner.

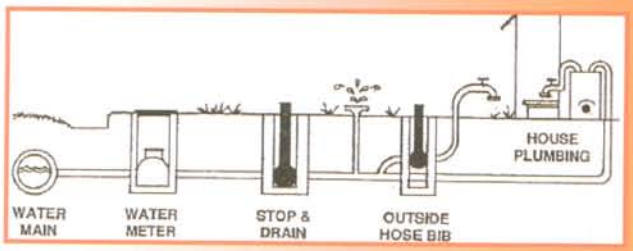
Plant Smart **Water Smart**

SPRING & SUMMER GUIDE

California Poppy

Department of Water and Power
City of Big Bear Lake
41972 Garstin Drive
Big Bear Lake, CA 92315
909-866-5050

P MBING DIAGRAM



ALTERNATIVE FREEZE PREVENTION

Instead of draining your home's water system, you may heat the home to avoid freezing pipes. However, leaving your thermostat at 45 to 55 degrees does NOT always ensure that the pipes will not freeze. Winter storms may cause power outages, which will cause some heating systems to shut off, resulting in frozen pipes.

IF YOUR PIPES FREEZE

- If you turn on the faucets and nothing comes out, call the DWP. We can send a field employee to your home to help evaluate the situation.
- If you have detected that your pipes are frozen, you may need to call a plumber or wait for the pipes to thaw out. Turning up the home's thermostat might help unfreeze the pipes.
- Open all faucets in the house. When water freezes, it expands by 1/5th its original volume. By relieving pressure, due to the expanding water, you may avoid additional pipe damage.
- Once your pipes have thawed, it is important that you carefully inspect your home for any signs of a leak. The freezing of the pipes could have caused a pinhole leak, hairline break, or large crack.

DWP (909) 866-5050

FALL G/ ENING

Fall is the perfect time for assessing, designing, and improving your landscape. The little effort you make now will help your garden survive the cold winter and thrive in the springtime.

Fall To Do Items

- Adjust your irrigation schedule to reflect your plants' reduced water needs. Turn off irrigation by November 1st.
- Prune any diseased or stressed tree and shrub limbs now, while the healthy parts of the plant are more easily differentiated.
- Cut back flowers that have stopped blooming. Wildflower and perennial seeds can be harvested and sown now or before the first snowfall.
- Eliminate weeds. Each weed you eliminate now will prevent possibly hundreds of weeds from sprouting in the spring.
- Plant your spring bulb garden now.
- Plant trees and shrubs. The soil is still warm from summer, encouraging healthy root growth.
- Mulch to help protect plant roots from fluctuating soil temperatures.

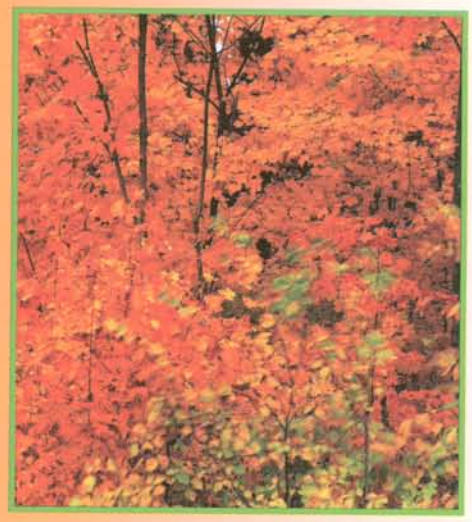
PLANNING FOR SPRING

October and November are the perfect time to start planning for the upcoming spring season. This includes planting drought-tolerant bulbs such as crocus, iris, and tulips.

If you are planning a Xeriscape garden, log on to the DWP web site to access extensive plant lists, landscaping guides, and links to water-wise gardening. If you have turf and want to replace it with beautiful Xeriscape or Native plants, hardscape, or other alternatives, please contact the DWP to learn about our turf buy-back program. Start planning your water-wise garden now!

www.bbldwp.com

FALL & WINTER GUIDE



Fall Colors

Department of Water and Power
City of Big Bear Lake
41972 Garstin Drive
Big Bear Lake, CA 92315
909-866-5050

ORDINANCE NO. 2005-348

AN ORDINANCE OF THE CITY OF BIG BEAR LAKE, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AMENDING CHAPTER 15.66 OF ARTICLE XV OF THE BIG BEAR LAKE MUNICIPAL CODE DEALING WITH THE REGULATION OF LANDSCAPING

WHEREAS, the Department of Water and Power of the City of Big Bear Lake (the "Department") has undertaken to supply existing customers with water including, most importantly, water for human consumption, sanitation, and fire protection; and

WHEREAS, the total water supply available to the Department Service Area is dependent upon local rainfall and snow melt percolation into local ground water sources, which are limited; and

WHEREAS, recent periods of insufficient natural ground water recharge in the Big Bear Valley make it necessary for the Department to implement water conservation measures; and

WHEREAS, water usage and demand by Department customers has substantially increased over the past ten years, especially as a result of landscaping; and

WHEREAS, the estimate of perennial yield of the aquifers, water usage by customers, and anticipated growth of the community indicate that water demand may exceed supply within the next ten years; and

WHEREAS, the City Council of the City of Big Bear Lake ("City") desires to maintain the Department's water resources for human consumption, sanitation, and fire protection and reduce wasteful and inefficient consumption of water; and

WHEREAS, the City Council of the City of Big Bear Lake finds inefficient landscaping practices disproportionately drains the water resources of the Department; and

WHEREAS, the City Council of the City of Big Bear Lake finds that Chapter 15.66 must be amended to adequately address inefficient landscaping practices; and

WHEREAS, pursuant to Article XI, Section 7 of the California Constitution, the City is authorized to make and enforce within its limits all local, police, sanitary, and other ordinances and regulations not in conflict with the general laws of the State.

NOW THEREFORE, THE CITY COUNCIL OF THE CITY OF BIG BEAR LAKE DOES ORDAIN AS FOLLOWS:

SECTION 1. Chapter 15.66 of Article XV of the City of Big Bear Lake Municipal Code is hereby amended in its entirety to read as follows:

Chapter 15.66

LANDSCAPING REGULATIONS

Sections:

15.66.010 **Purpose.**
15.66.020 **Application; Exception.**
15.66.030 **Goals and Objectives.**
15.66.040 **Definitions.**
15.66.050 **Water-Use Policies and Requirements.**
15.66.060 **Nonessential Water Use.**
15.66.070 **Turf Installations.**
15.66.080 **Water Feature Installation.**
15.66.090 **Landscape Plans and Permits.**
15.66.100 **New Landscape Regulations.**
15.66.110 **Regulations for Retrofitting Landscapes.**
15.66.120 **Regulations for Planning and Installation of Irrigation Systems.**
15.66.130 **Guidelines for Controlling Erosion.**
15.66.140 **Instructions for Submitting Landscape Plans.**
15.66.150 **Failure to Comply.**
15.66.160 **Removal of the Flow Restrictor.**
15.66.170 **Appeal Process.**
15.66.180 **Permit Fees.**
15.66.190 **Deposit of Penalty Monies.**
15.66.200 **Severability.**

Section 15.66.010 Purpose. The purpose of this chapter is to set forth and require all new, retrofitted, or modified landscaping to adhere to landscaping practices guided by the latest low water use technology that emphasizes water-use efficiency to maximize the benefit of existing water supplies for the citizens of, visitors to, and the economic well-being of the Big Bear Valley. These measures will significantly reduce wasteful and inefficient consumption of water, and thus make these water resources available for human consumption, sanitation, and fire protection.

Section 15.66.020 Application; Exception. The provisions of this chapter shall apply to all customers of the Department, including customers who may also take ground water from private wells not owned or operated by the Department. Some or all of the guidelines and prohibitions contained in this chapter may not apply to specific, publicly owned properties such as schools and parks, which will be evaluated on a case-by-case basis.

Section 15.66.030 Goals and Objectives. Due to the increasing demand for water by Department customers for landscaping, and the finite nature of the Big Bear Valley's water resources, the general welfare of the community is best served by using the available water supply efficiently for maximum beneficial uses. Wasteful, inefficient, and unreasonable uses of water must be prevented.

Therefore, the Department hereby declares and establishes the following goals and objectives pertaining to the use of water provided by Department for landscaping.

A. Goals.

1. Efficient use and distribution of water used for landscaping and irrigation.
2. Conservation of limited water resources.
3. Use of appropriate planning to eliminate all wasteful and inefficient uses of water from all landscape plans during the planning stage.
4. Provide reasonable and appropriate size and water-use limitations for all landscape features.

B. Objectives.

1. To conserve the available water supply.
2. To achieve an overall, per capita reduction in water use.
3. To eliminate inefficient irrigation.
4. To reduce the volume of water waste.
5. To ensure an adequate supply of water to meet the reasonable needs of all users of Department water.
6. To increase the use and installation of water-conserving plants, landscapes, mountainscapes, and Xeriscapes.
7. To require all new developments and encourage existing developments to install low water-use landscape elements and erosion control devices.

Section 15.66.040 Definitions. The following words and phrases, whenever used in this chapter, shall be construed as defined in this section, unless otherwise specified within individual sections of this chapter.

"Aquifer" means a permeable geologic unit that can transmit significant quantities of water under ordinary hydraulic gradients.

"Board" means the Department's Board of Commissioners.

"CCF" means 100 cubic feet which equals 748 gallons.

"Customer" (City and County) means all persons, residences, businesses, and entities who receive and/or use water provided by the Department within the City or County.

"Department" means the City of Big Bear Lake Department of Water and Power.

"Drought" means a series of years where precipitation is below average.

"Emitter" means any irrigation nozzle that is used to distribute water to landscape vegetation.

"Environmental sensing device" means any device that uses or recognizes weather or soil moisture to modify irrigation schedules. Typical examples of an environmental sensing device include evapotranspiration irrigation controllers, soil moisture sensors, and rainfall shut-off devices.

"Erosion" means the process of moving soil by any agent of weather, typically the result of rainfall runoff.

"Erosion control" means anything that inhibits erosion.

"Essential water use" means water necessary for human consumption, sanitation, and fire protection. All other use of water, not specifically required to meet these needs, shall be considered nonessential.

"Existing developments" means any development for which certificates of occupancy have been granted.

"Finite" means limited in quantity.

"Fire protection" means water needed to protect humans and their property from an active fire.

"Ground water" means any water derived from springs or wells.

"Hardscape" means a landscape feature that contains no vegetation. Examples of a Hardscape include walkways, decks, graveled areas, and areas covered with mulches.

"His" is a collective term independent of gender and may refer to male or female.

"Human consumption" means water directly consumed by humans and their pets or livestock.

"Inefficient" means using water in a quantity in excess of the amount required, as determined by the Department, to accomplish a given task.

"Inefficient irrigation" means the process of providing more water to landscape plants or elements than is required for healthy, normal growth and appearance.

"Irrigation" means the process of providing supplemental water supplied by the Department to landscape plants and elements.

"Landscape" means the entire parcel less the building footprint, driveways, non-irrigated portions of parking lots, hardscapes, and other non-porous areas.

"Landscape element" means any and all unique features of a landscape.

"Landscaping" means the process of adding or subtracting vegetation or non-vegetative materials or their support structures (e.g. irrigation systems, walkways, retaining walls) to a landscape.

"Maximize the benefit" means to obtain the greatest feasible benefit.

"Mountainscape" means any low water-use landscape that is compatible with the climate of the Big Bear Valley.

"New developments" means developments that are under construction or will be constructed in the near future, and for which certificates of occupancy have not been granted.

"Percolation" means movement of water, by the forces of gravity, through soils and bedrock to a point of greater depth than its previous location.

"Perennial yield" means the maximum quantity of water available on an annual basis for the foreseeable future. This quantity depends on the amount of water economically, legally, and politically available to the organization(s) managing the ground water basin.

"Rain shut-off sensor" means any mechanism that detects precipitation and transmits the information to an irrigation controller.

"Recharge" means the process of adding water to an aquifer.

"Retrofit" means any change to any existing element.

"Sanitation" means cleanliness or the disposal of unhealthful waste.

"Turf" means a surface layer of earth containing grass with its roots.

"Wasteful" means using water in a quantity in excess of the amount needed to accomplish a given task.

"Water conservation plan" means a plan developed for any property that provides recommendations for conserving water based on how the home or business occupying the property used water in the past.

"Water conservation" means practices or activities which result in the use of water efficiently and in quantities considered less than average.

"Water features" means any landscape feature that utilizes standing or moving water as a main component. Standard examples are ponds, streams, and fountains.

"Water loss" means the loss of water caused by evaporation.

"Water resources" means the retrievable and usable supply of water.

"Water usage" means the act of using water provided by the Department's water system.

"Water-use efficiency" means the use of water in a way that minimizes waste (i.e. use beyond which is needed to accomplish a task).

"Winterize" means turning off water service and draining the on-site pipes or plumbing to prevent damage to the system during the winter months due to freezing.

"Xeriscape" means a landscape that requires relatively little water to install and maintain. Qualifying landscapes include those that range from highly vegetated to completely lacking in vegetation.

Section 15.66.050 Water-Use Policies and Requirements.

A. Customers shall be encouraged to use native and water-conserving plants for landscaping.

B. Customers shall be required to minimize the use of turf at all new and retrofitted commercial and residential landscapes.

C. Water conservation, emphasizing water use efficiency, will be required as set forth herein.

D. The Department shall require and promote development of water conservation plans for all customers whose water use exceeds reasonable guidelines developed by the Department.

E. The Department shall require repair of all leaks, once they are detected.

F. All outdoor irrigation systems shall be shut off and winterized between November 1st and April 1st annually.

G. The Department will establish reasonable water use and irrigation standards for all residential and commercial customers in its service area.

Section 15.66.060 Nonessential water use. Nonessential water use means water use in violation of Big Bear Lake Municipal Code section 17.11.040. The list of prohibited acts contained in section 17.11.040 is not exhaustive and may include other actions not listed therein.

Section 15.66.070 Turf installation.

A. Turf installations shall not exceed 500 square feet in size for each property.

B. All new and retrofitted landscapes with turf must be irrigated using a sprinkler system with an automatic irrigation controller, that incorporates evapotranspiration and rain shut-off features and has the capability to accommodate all time and date irrigation restrictions employed by the Department.

C. Prior to installing turf, the soil must be prepared to a minimum depth of six (6) inches by adding topsoil and soil conditioners to enhance the water retention capability of the soil.

D. The design of the turf area must be developed to allow efficient irrigation and prevent overspray and runoff.

E. A master valve must be installed on all new or retrofitted landscapes containing turf.

Section 15.66.080 Water Feature Installation.

A. Water feature installations shall not exceed an aggregate of 500 square feet of total surface area of customer's property.

B. When a water feature moves water, such a water feature must utilize a recirculating pump.

Section 15.66.090 Landscape Plans and Permits.

A. New Installations. Landscape plans must be submitted for review and permitting by a Department representative whenever the proposed landscape exceeds 1,000 square feet or when any turf is proposed to be installed. The landscape plan review and approval process will have no impact in granting a certificate of occupancy.

B. Retrofitting or Altering Existing Landscape. Landscape plans must be submitted for review and permitting by a Department representative whenever the combination of existing landscape and the proposed additional or retrofitted landscape exceeds 1,000 square feet.

C. Plan Review and Permitting. All landscape plans must be submitted to the Department for review and approval at least ten (10) days prior to the start of installation. A landscaping permit will be issued upon approval of the landscape plan.

Section 15.66.100 New Landscape Regulations.

A. Turf installations shall not exceed 500 square feet in size for each property.

B. Landscape plants must be grouped by similar irrigation requirements, and irrigation systems must be set up to irrigate individual water-use zones in accordance with their individual needs.

C. All slope and soil conditions, that may cause excessive runoff, must be identified and clearly resolved during the planning and installation process.

D. Landscape elements must be appropriately maintained to maximize water-use efficiency.

1. All sprinkler, emitter, pipe and pond leaks must be repaired timely, and all irrigation systems must be tested and inspected before regular use each spring.

2. All irrigation systems must be shut off and winterized between November 1st and April 1st annually.

Section 15.66.110 Regulations for Retrofitting Landscapes.

A. On landscapes that do not contain existing turf, new turf must be installed in accordance with section 15.66.070.

B If total turf area of a landscape exceeds 500 square feet, a property owner or customer is prohibited from expanding his turf area. If total turf area of a landscape is less than 500 square feet, a property owner or customer may expand his turf area provided that the total turf area does not exceed 500 square feet.

C. If a landscape contains more than 700 square feet of turf, turf may be rearranged as long as the net area of turf is reduced by at least twenty-five percent (25%).

D. Existing irrigation systems may be used as long as they can be employed to maximize irrigation efficiency on the retrofitted landscape. If existing irrigation systems cannot maximize irrigation efficiency, a new irrigation system must be installed.

E. Landscape plants must be grouped by similar irrigation requirements, and irrigation systems must be set up to irrigate individual water-use zones in accordance with their individual needs.

F. All slope and soil problems that may cause excessive runoff must be identified and clearly resolved during the planning and retrofitting process.

G. Landscape elements must be appropriately maintained to maximize water-use efficiency.

1. All sprinkler, emitter, pipe and pond leaks must be repaired timely, and all irrigation systems must be tested and inspected before regular use each spring.

2. All irrigation systems must be shut off and winterized between November 1st and April 1st annually.

15.66.120 Regulations for Planning and Installation of Irrigation Systems

A. Automatic irrigation control systems, that have the ability to accommodate all time and date irrigation restrictions employed by the Department, are required on all landscapes greater than 1,000 square feet in size.

B. Sprinklers will only be allowed on turf and other groundcovers. All other landscape plantings must be irrigated with efficient, low water-use devices, such as, drip systems or bubblers.

C. Sprinklers shall not be used on planter strips less than ten (10) feet wide, unless it can be demonstrated to the satisfaction of the Department that irrigation equipment will provide efficient irrigation and prevent overspray.

D. All irrigation controllers must be equipped with rain shut-off sensors.

E. A master valve must be installed on all new or retrofitted landscapes containing turf.

15.66.130 Guidelines for Controlling Erosion

A. All landscape plans for new and retrofitted landscapes must identify potential erosion problems.

B. Preventing erosion.

1. All slopes and areas of bare soil must be evaluated for their erosion potential.

2. All areas that are susceptible to erosion must be addressed with an erosion prevention plan as required by the Department.

3. Areas that contain running water from adjoining properties during rain showers or snow melt must be prepared to minimize erosion caused by this type of runoff utilizing dry stream beds, erosion resistant vegetation, or other methods required by the Department.

15.66.140 Instructions for Submitting Landscape Plans. Landscape plans shall be submitted with the permit application required by this chapter and shall contain the following information:

A. If a new or retrofitted landscape exceeds 3,000 square feet, the property owner or customer shall submit the following to the Department:

1. Appropriate addresses and contact information for the property owner and landscape contractor.

2. The proposed landscape design.

3. The existing landscape design, if the landscape is being retrofitted.

4. Identification of low, medium, and high water-use vegetation zones.

5. Plant lists associated with each water-use vegetation zone.

6. The proposed irrigation system design, including the location, type, size and description of landscaping to be installed (including all trees, shrubs, groundcover and turf /grass areas).

7. The existing irrigation system design, if the landscape is being retrofitted, including the location, type, approximate size, and description of landscaping (including all trees, shrubs, groundcover and turf /grass areas).

8. Identification of areas with slope or soil problems that need special irrigation features to effectively irrigate these areas.

9. A detailed description of solutions to irrigation problems identified in section 15.66.150(a)(8).

10. Identification and description of erosion control features.

11. Proposed irrigation schedules for all landscape features.

12. A list of environmental sensing devices associated with irrigation controllers, such as, evapotranspiration controllers, soil moisture sensors, and rainfall shut-off devices.

13. A detailed description of all water features.

14. An estimate of water use per month (in ccfs) for all landscape features, including water loss associated with water features.

15. A maintenance schedule for all landscape features.

16. A north arrow and scale.

17. Clearly legible and identifiable property lines and their dimensions.

18. The date of submittal of the plans and any revision dates.

19. A written narrative highlighting water-conserving features of the proposed landscape and its adherence to Xeriscape principles.

B. If the new or retrofitted landscape is less than 3,000 square feet and greater than 1,000 square feet, the property owner or customer shall submit the following to the Department:

1. Appropriate addresses and contact information for the property owner or customer and landscape contractor.

2. The proposed landscape design including the location, type, approximate size, and description of landscaping (including all trees, shrubs, groundcover and turf /grass areas).

3. If a landscape is being retrofitted, a written summary of the proposed changes and a list of the water-conserving features of the new landscape is required.

4. An estimate of water use per month (in ccfs) for all landscape features, including water loss associated with water features.

5. All landscape plans shall clearly show xeriscape principles are being implemented.

15.66.150 Failure to Comply. The penalties for failure to comply with any provisions of this chapter shall be as follows:

A. First violation. The Department will contact the customer by certified mail explaining the violation, the need for the regulation that was violated, a list of penalties associated with continued violation, and request voluntary compliance.

B. Second violation. The Department will contact the customer by certified mail explaining the violation, the need for the regulation that was violated, inform the customer of his previous violations, provide a list of penalties associated with continued violation, and add a surcharge to the customer's water bill which is twice the customer's charge for water usage for the billing cycle during which the violation occurred. If the customer does not cure the violation within 10 days of the date of the notification letter from the Department, the Department will deem the failure to cure as a new violation.

C. Third violation. The Department will contact the customer by certified mail explaining the violation, the need for the regulation that was violated, inform the customer of his previous violations, provide a list of penalties associated with continued violation, add a surcharge to the customer's water bill which is triple the customer's charge for water usage for the billing cycle during which the violation occurred, and notify the Board. If the customer does not cure the violation within 10 days of the date of the notification letter from the Department, the Department will deem the failure to cure as a new violation.

D. Fourth violation. The Department will contact the customer by certified mail explaining the violation, the need for the regulation that was violated, inform the customer of his previous violations, provide a list of penalties associated with continued violation, install a flow restrictor in the customer's water service, add

a surcharge to the customer's bill which is quadruple the customer's charge for water usage for the billing cycle during which the violation occurred, together with all associated expenses dealing with the flow restrictor, and notify the Board. If the customer does not cure the violation within 10 days of the date of the notification letter from the Department, the Department will deem the failure to cure as a new violation.

E. Fifth violation. The Department will contact the violator by certified mail explaining the violation, the need for the regulation that was violated, inform the customer of his previous violations, and, upon approval of the Board, discontinue water service to the customer until the customer delivers a notarized written agreement to abide by all water use regulations established by Department and such other requirements as the Board may determine to be appropriate under the circumstances.

15.66.160 Removal of the Flow Restrictor. The water restrictor will be removed, or water service will be restored, whichever the case may be, upon a hearing as provided in Section 15.66.180 where the customer demonstrates to the satisfaction of the General Manager that the cause of the violation has been corrected and all fees and surcharges have been paid.

15.66.170 Appeal Process. A customer shall have the right to a hearing before the General Manager if the Department receives a written request for such a hearing on or before twenty-one (21) days after the date the notice is mailed to the customer.

The written request for a hearing shall include a statement setting forth reasons why the customer believes that a violation of this chapter has not occurred, along with any documentation that may substantiate the customer's position.

The customer's written request for a hearing shall include payment of the surcharge. Said payment shall be held on deposit with the Department. If, following the hearing, it is determined the surcharge will not be imposed, the Department will refund said deposit.

Upon receipt of a request for a hearing, the General Manager shall contact the customer regarding proposed dates for the hearing. The hearing shall be conducted at the Department's offices. The date of the hearing shall be set at a time that is mutually convenient to both parties, but in any event, shall be held no later than fifteen (15) days from the date of customer's request.

The hearing shall be informal and shall not require adherence to any particular procedure. The General Manager shall render a written decision on or before five (5) days following the date of the hearing.

The customer shall only have a right to appeal alleged violations of the procedures of this chapter by the General Manager or his staff to the Board if the Board receives a written request for such an appeal hearing on or before fifteen (15) days after the date of the General Manager's decision. For all other matters or issues, the decision of the General Manager is a final decision of the Department, and the applicant shall have no right of appeal.

The hearing before the Board shall be held at a regular Board meeting within thirty (30) days of the Department receiving the written request for a hearing. The decision of the Board shall be final.

15.66.180 Permit Fees. No fee shall be charged for the filing of an application or landscape plan under this chapter.

15.66.190 Deposit of Penalty Monies. All monies collected by the Department, pursuant to any of the surcharge provisions of this chapter, shall be deposited in the Water Revenue Fund as reimbursement for the Department's costs and expenses of administering and enforcing this chapter and its general Water Conservation Program.

15.66.200 Severability. If any provision of these Regulations is found to be illegal, unconstitutional, or unenforceable for any reason whatsoever, that provision shall be severed from the remaining provisions, which shall remain in full force and effect.

SECTION 2. This Ordinance shall take effect and shall be published in accordance with applicable law.

PASSED, APPROVED AND ADOPTED this 14th day of March, 2005.

AYES:	Conklin, Dally, Harris, Jahn, Mulvihill
NOES:	None
ABSENT:	None
ABSTAIN:	None

March 14, 2005
Date

Darrell Mulvihill
Darrell Mulvihill, Mayor

ATTEST:

Katherine E. Jefferies
Katherine E. Jefferies
City Clerk

REVIEWED AND APPROVED:

Stephen P. Deitsch
Best Best & Krieger LLP
City Attorney

Thomas Harder

Groundwater Consulting

May 1, 2009

Mr. Michael Perry
California Collaborative Solutions
P.O. Box 706
Big Bear City, California 92314

Re: Letter Addressing County of San Bernardino Comments Regarding Water Supply for the Moon Camp Development

Dear Michael,

As per your request, Thomas Harder Groundwater Consulting (THGC) has prepared this letter addressing comments from the County of San Bernardino (County) regarding water supply for the proposed Moon Camp Development near Fawnskin, California. The primary focus of the County's comments is a report by GEOSCIENCE Support Services, Inc. (GEOSCIENCE)[1] that describes the results of recent pumping tests conducted on the Moon Camp Tract's Well FP-2. However, the County's comments also discuss previous estimates of perennial yield for Tributary Subarea A and supplemental water to be supplied from the Moon Camp Tract's recently constructed Well FP-4.

This letter addresses the following specific issues raised by the County:

1. The range of perennial yield (including the low end or "minimum") that has previously been estimated for Subarea A, which is tributary to Well FP-2.
2. Potential impacts of pumping Well FP-2 on Big Bear Lake.
3. Potential impacts associated with the utilization of Well FP-4 as a supplemental water supply source for the development.

[1] GEOSCIENCE. 2008. Results of Rehabilitation and Aquifer Testing, Moon Camp Well FP-2. Prepared for California Collaborative Solutions; Dated August 7, 2008.

Thomas Harder
Groundwater Consulting
601 E. Yorba Linda Blvd., Suite 3A
Placentia, California 92870
(714) 792-3875

Perennial Yield Estimates

The majority of the proposed Moon Camp development is located within Tributary Subarea A of the North Shore Hydrologic Subunit within the Big Bear Lake Watershed. This subarea is the most westerly of the North Shore subareas and is adjacent to the Grout Creek Hydrologic Subunit (see Figure 1).

The perennial yield (i.e. groundwater available for municipal supply) for Subarea A has been estimated in the context of a range of possible natural recharge estimates for the area. GEOSCIENCE, 2003[2] estimated the natural recharge to range from 14 to 44 acre-ft/yr with a midpoint of 29 acre-ft/yr. They reported that the midpoint of the range (i.e. 29 acre-ft/yr) is considered a good estimate of the perennial yield for the subarea, based on available data.

Although recent testing has shown that the pumping capacity of Well FP-2 can easily meet and exceed the demands of the Moon Camp development, the well will be operated within the low end of the natural recharge estimate (14 acre-ft/yr) minus the estimated pumping of the existing homeowners in Subarea A (5 acre-ft/yr). This leaves 9 acre-ft/yr to be pumped from Well FP-2 for the Moon Camp Development. The low end of the range of natural recharge estimates for Subarea A (14 acre-ft/yr) is a conservative estimate of the perennial yield (i.e. available groundwater supply) for the subarea. This amount of recharge is only 2.5 percent of the long-term average annual precipitation for the subarea, which is approximately 28 in/yr based on the San Bernardino County Flood Control District isohyetal map for the area (see GEOSCIENCE, 2003; Figure 4). This amount of recharge is also below the range of accepted recharge estimates for other groundwater basins in southern California, which is generally 3 to 7 percent of precipitation (GEOSCIENCE, 2003). In some areas of southern California, groundwater recharge as a percent of precipitation has been reported to be greater than 10 percent (as an example, see Manghi, et al., 2009)[3]. Thus, until additional data can be collected to refine the perennial yield estimate of Subarea A, producing up to 14 acre-ft/yr of groundwater from this subarea for existing pumpers and the proposed Moon Camp development is a very conservative approach to developing the groundwater resources of the area.

[2] GEOSCIENCE, 2003. Focused Geohydrologic Evaluation of Maximum Perennial Yield for the North Shore and Grout Creek Hydrologic Subunits. Prepared for the City of Big Bear Lake Department of Water and Power. Dated December 2, 2003.

[3] Manghi, F., Mortazavi, B., Crother, C., and Hamdi, M., 2009. Estimating Regional Groundwater Recharge Using a Hydrological Budget Method. Springer Science and Business Media.

The data that has been collected since 2003, including the data from the FP-2 pumping test, is not adequate to refine the perennial yield estimate. One of the best ways to refine the current perennial yield estimate is to monitor groundwater pumping and groundwater level response within Subarea A over a long-term period. Long-term would be defined on the order of decades and would include monitoring and production over multiple "wet" and "dry" hydrologic cycles. Pumping Well FP-2 and other private wells in Subarea A at rates up to 14 acre-ft/yr is a prudent approach for developing the groundwater resources of the area and, in the context of a groundwater monitoring program, verifying the available perennial yield.

Potential Impacts of Pumping Well FP-2 on Big Bear Lake

The potential impact of pumping Well FP-2 on the surface water in Big Bear Lake would be minimal. Well FP-2 produces groundwater from an aquifer system that is deeper than the bottom of Big Bear Lake and is separated from the lake bottom by multiple silt and clay layers. The top of perforations for Well FP-2 occur approximately 60 ft below ground surface (bgs) at an elevation of approximately 6,686 ft above mean sea level (amsl). The high surface water elevation in the lake is 6,743 ft amsl and the average depth of the lake is 30 ft.[4] Thus, the elevation of the bottom of Big Bear Lake is approximately 27 ft above the top of perforations for Well FP-2. The geologic log for Well FP-2 shows multiple silt and clay layers between the land surface and top of perforations (see Attachment A). If the silt and clay layers extend beneath the lake, they would provide some hydraulic separation between the lake water and aquifer system. While it is possible that some vertical leakage could occur from the lake into the aquifer system of FP-2, the majority of groundwater produced by FP-2 would be from the aquifer underlying Subarea A.

Potential Impacts Associated with Pumping Well FP-4

Well FP-4 has recently been constructed in the northwestern corner of the proposed Moon Camp development to provide a supplemental source of water supply. This well is located within Subarea D of the Grout Creek Hydrologic Subunit, a separate drainage catchment from Tributary Subarea A of the North Shore Hydrologic Subunit (see Figure 1). A pumping test conducted upon completion of Well FP-4 indicates it is capable of producing up to 3.5 gallons per minute

[4] Big Bear Municipal Water District Website.

on a sustained basis. At this rate and assuming continuous operation, the well would produce approximately 5.6 acre-ft/yr.

GEOSCIENCE, 2003 reports the groundwater recharge for Subarea D to be between 32 and 99 acre-ft/yr with a midpoint of 66 acre-ft/yr. At present, the only groundwater production in this subarea is from private wells. There are eleven private wells shown on Figure 4 of GEOSCIENCE, 2003. Assuming an average per-household water demand of 250 gallons per day, annual groundwater production from private wells in Subarea D is estimated to be approximately 3 acre-ft/yr. Based on this, the additional 5.6 acre-ft/yr of pumping anticipated from Well FP-4 will not result in combined pumping in excess of the low end of recharge estimates (32 acre-ft/yr) for the Subarea and is not a significant impact to the long-term water supply of Subarea D.

The only other potential impact of pumping Well FP-4 is interference with existing private wells. Pumping test data for Well FP-4 shows that pumping this well at a sustained rate of 3.5 gpm results in approximately 2 ft of drawdown in the nearest private well, which is approximately 250 ft from FP-4. The limited available data for the private well suggests that this well has available saturated thickness to accommodate the additional 2 ft of drawdown and pumping interference from Well FP-4 should not significantly impact the operation of the well.

I appreciate the opportunity to assist in responding to the County's comments regarding the Moon Camp Development. If you have any questions, please call.

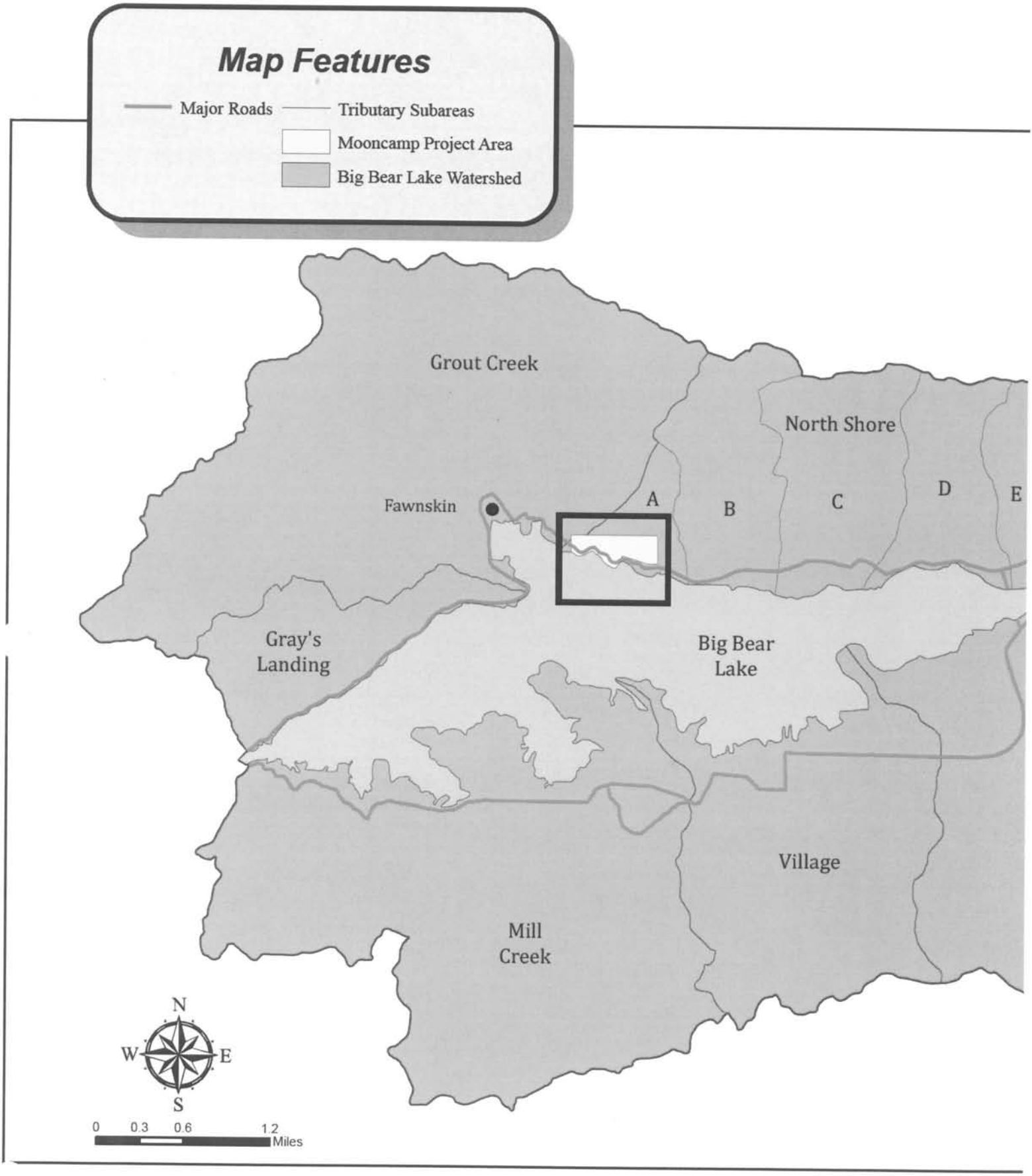
Sincerely,

Thomas Harder

Thomas Harder, P.G., C.HG.
Hydrogeologist

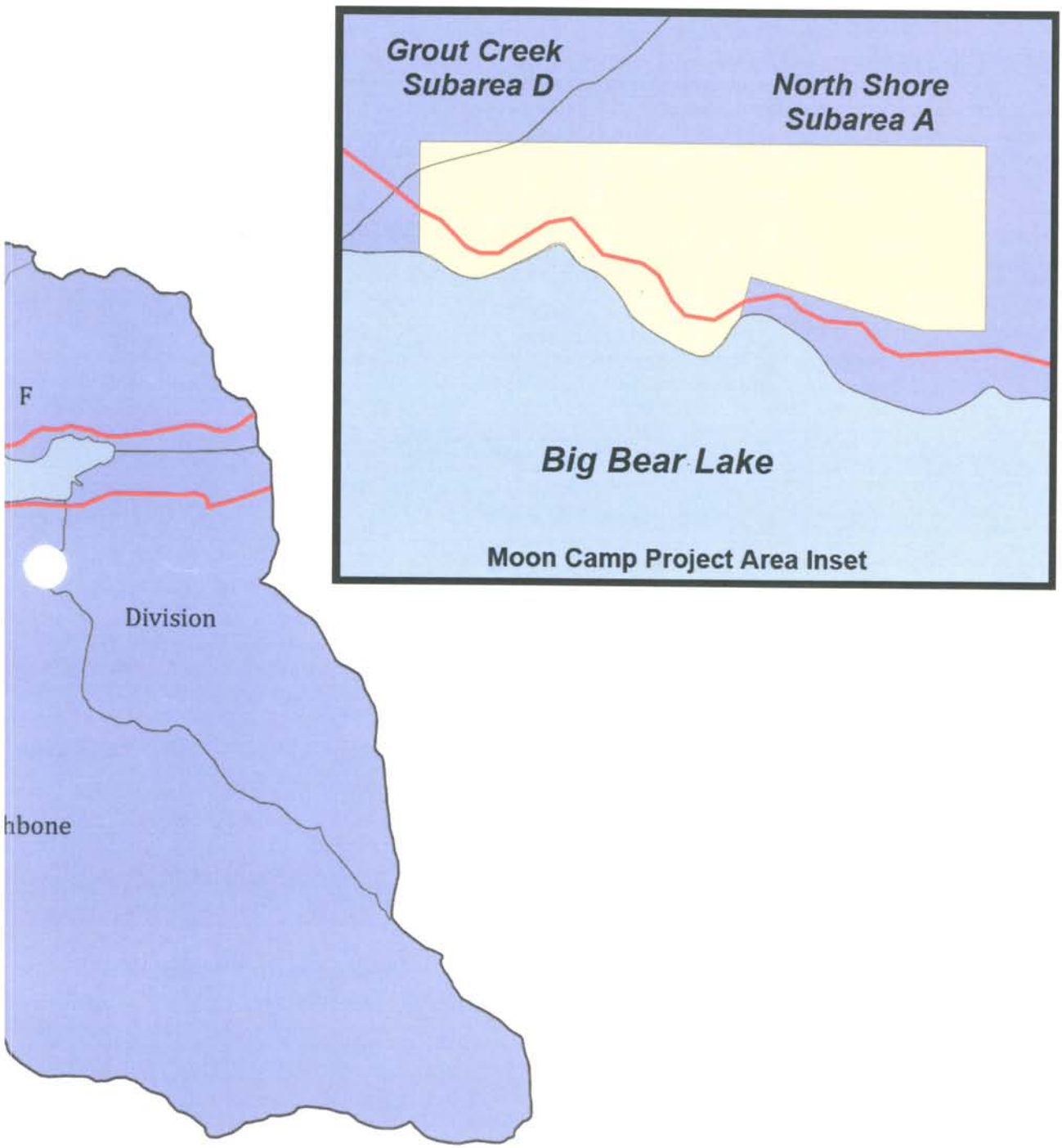
PROFESSIONAL GEOLOGIST
THOMAS EDWIN HARDER
No. 6512
STATE OF CALIFORNIA

CERTIFIED HYDROGEOLOGIST
THOMAS E. HARDER
No. 588
STATE OF CALIFORNIA



NAD 83 UTM Zone 11
Central Meridian: -117

Thomas Harder
Ground Water Consulting



Moon Camp Project Location and Hydrologic Features

Figure 1

Attachment A

Well FP-2 Borehole Log

LITHLOGIC LOG

Well No. FP-2

Depth	Graphic Log		Description of Materials
		SOIL	Brown sandy silt with some gravel, roots
		GRAVEL & SAND	Multicolored, very fine to coarse sand and granule to cobble size gravel
10		SAND	Reddish brown, fine to coarse sand with some clay and fine gravel
20			Clayier
30		SILT	Brown clayey silt with some fine sand
		SAND	Multicolored silty sand with occasional fine to coarse gravel
		CLAY	Brown sandy clay with some silt and medium to coarse sand
40		SAND	Brown clayey sand with some gravel
		CLAY	Brown, medium to coarse sandy clay
50		SAND	Multicolored with a few fine gravels, medium to coarse loose sand
		CLAY	Brown sandy clay with considerable silt
60		SAND	Brown clayey sand with a few fine gravels, medium to coarse sand
		CLAY & SAND	Brown clay with local thin medium to coarse sand layers
70			Siltier

LITHLOGIC LOG

Well No. FP-2

Depth	Graphic Log		Description of Materials
			Clayier
90			
		SAND	Brown clayey sand with some silt, occasional fine gravel, fine to coarse sand
100			
			Clays decrease
			Clay
110			
			Gravel lens
120			
		CLAY	Brown silty clay with some sand
130		SAND	Brown clayey sand with some fine gravel, very fine to medium sand
140		CLAY & SAND	Brown clay and sand interbedded, occasional fine gravel, very fine to coarse sand
			Siltier
150			

LITHLOGIC LOG

Well No. FP-2

Depth	Graphic Log		Description of Materials
		SAND	Brown clayey, very fine to fine sand with some silt and local fine gravel lens
170			
		CLAY	Reddish brown sandy clay with local sand lenses with occasional fine gravels
180			
190			
200			
210			
		SAND	Brown clayey very fine to medium sand, with some silts
220			
230			
		CLAY	Reddish brown sandy clay with occasional fine gravel and very fine to medium sand
240			

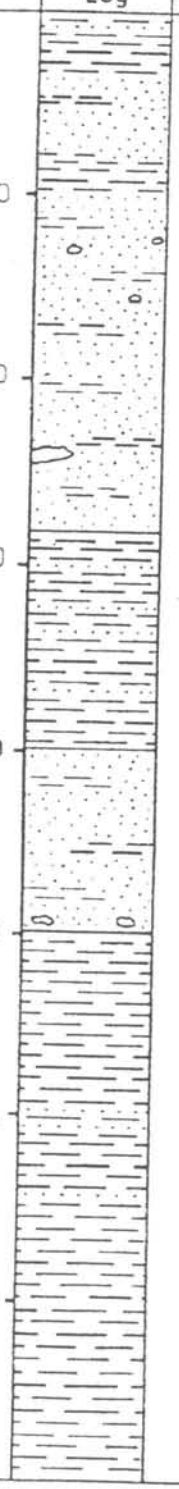
LITHLOGIC LOG

Well No. FP-2

Depth	Graphic Log		Description of Materials
			Interbedded thin sand layers
250			
260		SAND	Brown, clayey, fine to coarse sand with some fine gravel
270			Clayier
280		CLAY	Reddish brown sandy clay with local thin beds of fine sand
290			
300			
310		SAND	Brown clayey medium to coarse sand with a few fine gravels

LITHLOGIC LOG

Well No. FP-2

Depth	Graphic Log		Description of Materials
			Clayier
330			
340			White clays
350		CLAY	Reddish brown sandy clay with some silts and very fine to medium sand
360		SAND	Multicolored clayey very fine to coarse sand
370			Gravelly
		CLAY	Reddish brown, medium to coarse sandy clay
380			
390			

LITHLOGIC LOG

Well No. FP-2

Depth	Graphic Log	Description of Materials
410		

California
Collaborative
Solutions

909 586-5819
P.O. Box 706
Big Bear City, CA 92314
calcolsol@gmail.com

April 24, 2009

Joel Dickson
General Manager
Big Bear Lake DWP
P.O. Box 1929
Big Bear Lake, CA 92315

Re: Moon Camp Tract

Joel,

I am working to complete our Draft EIR for the Moon Camp Project. We anticipate having it ready for the 45 day Public Review Period in late May, early June.

As a part of the Draft EIR, we are showing 2 alternatives for the Water System (see attached Summary).

I am requesting the DWP's approval of Alternative #1 which includes connecting to the Fawnskin Water System as detailed in the DWP's Feasibility Study.

Please call me if you have any questions or need any additional information.

Thank you for your consideration.

Sincerely,

Michael Perry

Michael Perry
California Collaborative Solutions

Moon Camp Water Service

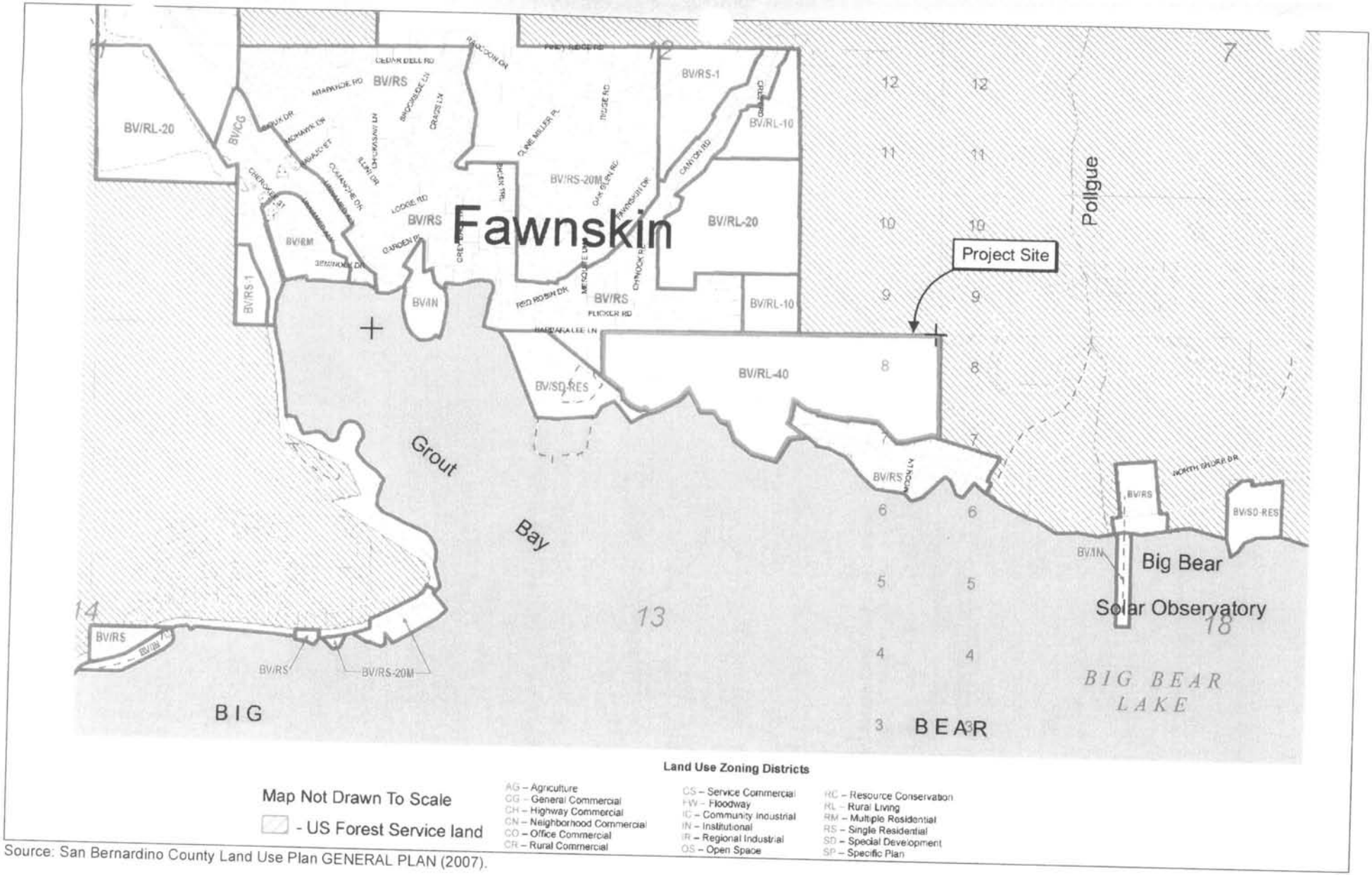
Water Supply:

- 50 each, ½ - 3 acre lots, individual lot sales, custom built homes (previously 92 lots)
- 50 lots require 14 acre-feet per year (Alda Feasibility Study/La Haye-DWP)
- Well FP2 provides 9 acre-feet from the North Shore Sub Area "A" Basin (Geoscience/Harder)
- Well FP4 provides 5 acre-feet from Grout Creek Basin (Geoscience/Harich/Harder)

Water Facilities:

- **Draft EIR Alternative #1** --- Interconnect Moon Camp Tract pipelines / wells with the existing DWP Fawnskin Water Facilities per Alda Feasibility Study. Moon Camp Tract facilities (onsite) owned and operated by CSA 53C (per LAFCo). Offsite facilities (Fawnskin Water System) owned and operated by DWP.
    - Racoon Reservoir provides domestic and fire flow storage (per Alda Feasibility Study)
    - Moon Camp refurbishes Clinemiller Booster (per Alda Feasibility Study)
    - Moon Camp provides 35 KW emergency generator (per Alda Feasibility Study)
    - Moon Camp replaces 2,800 feet of Phase 1, 12" DWP pipeline (per Alda Feasibility Study)
    - Moon Camp constructs 700 feet of 12" DWP pipeline (per Alda Feasibility Study)
    - Moon Camp Wells pump thru 12" line into DWP system – controlled by DWP telemetry
    - CSA 53C sells excess water from Wells FP2 and FP4 to DWP
    - In an emergency, if Wells FP2 and FP4 are unable to supply the needs of the Moon Camp Tract, DWP will sell water to CSA 53C
    - Reimbursement Agreement for Phase 1 replaced pipeline

- **Draft EIR Alternative #2** --- All water facilities are constructed onsite: 3 wells, reservoir, fire booster, pipelines. Owned and operated by CSA 53C (per LAFCo)


Fawnskin
Project Site
Pollgue
Grout
Bay
Big Bear
Solar Observatory
BIG BEAR LAKE
BIG
BEAR
BV/RS
BV/RS-1
BV/RL-10
BV/RL-20
BV/RS-20M
BV/RL-40
BV/SD-RES
BV/IN
BV/CG
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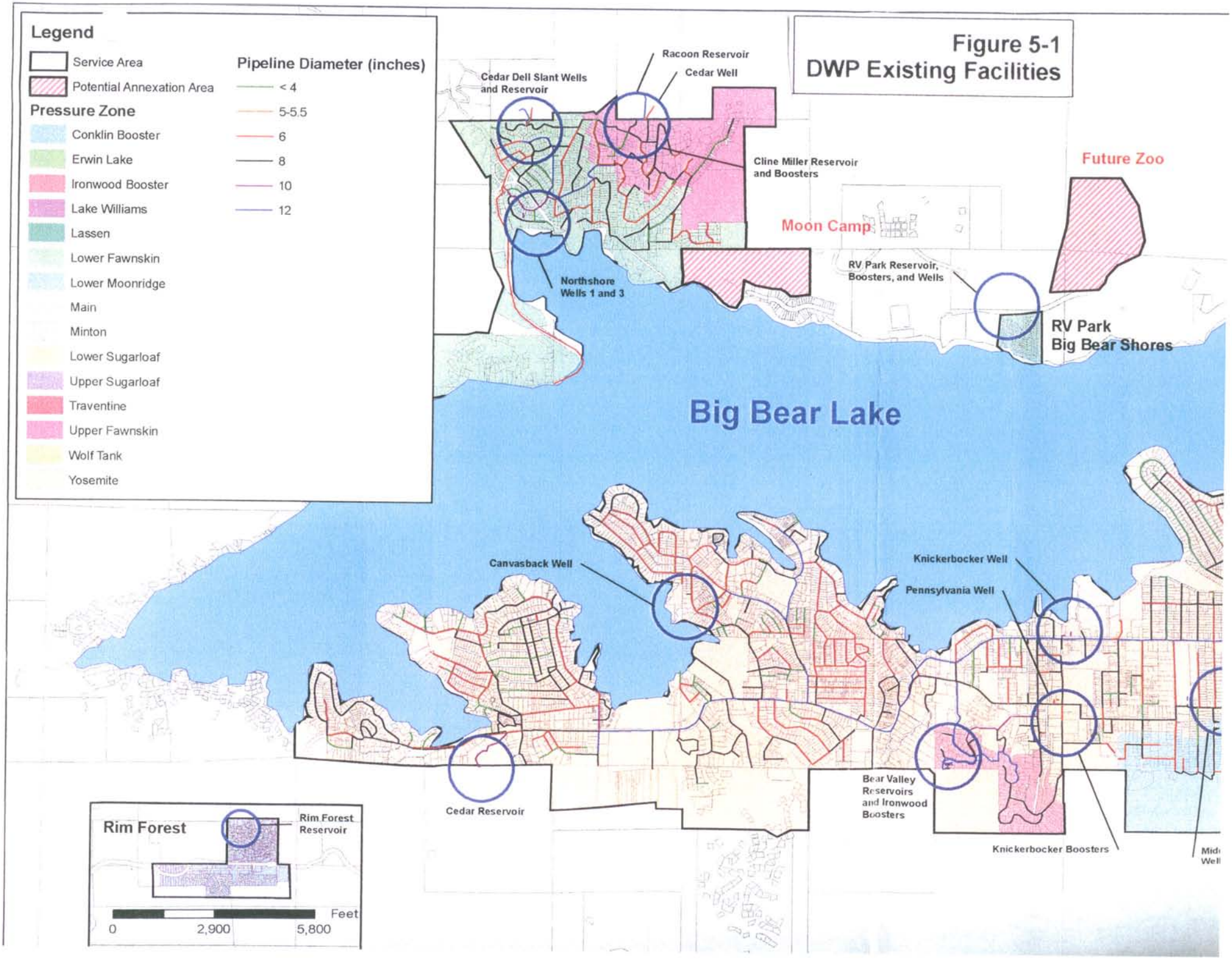
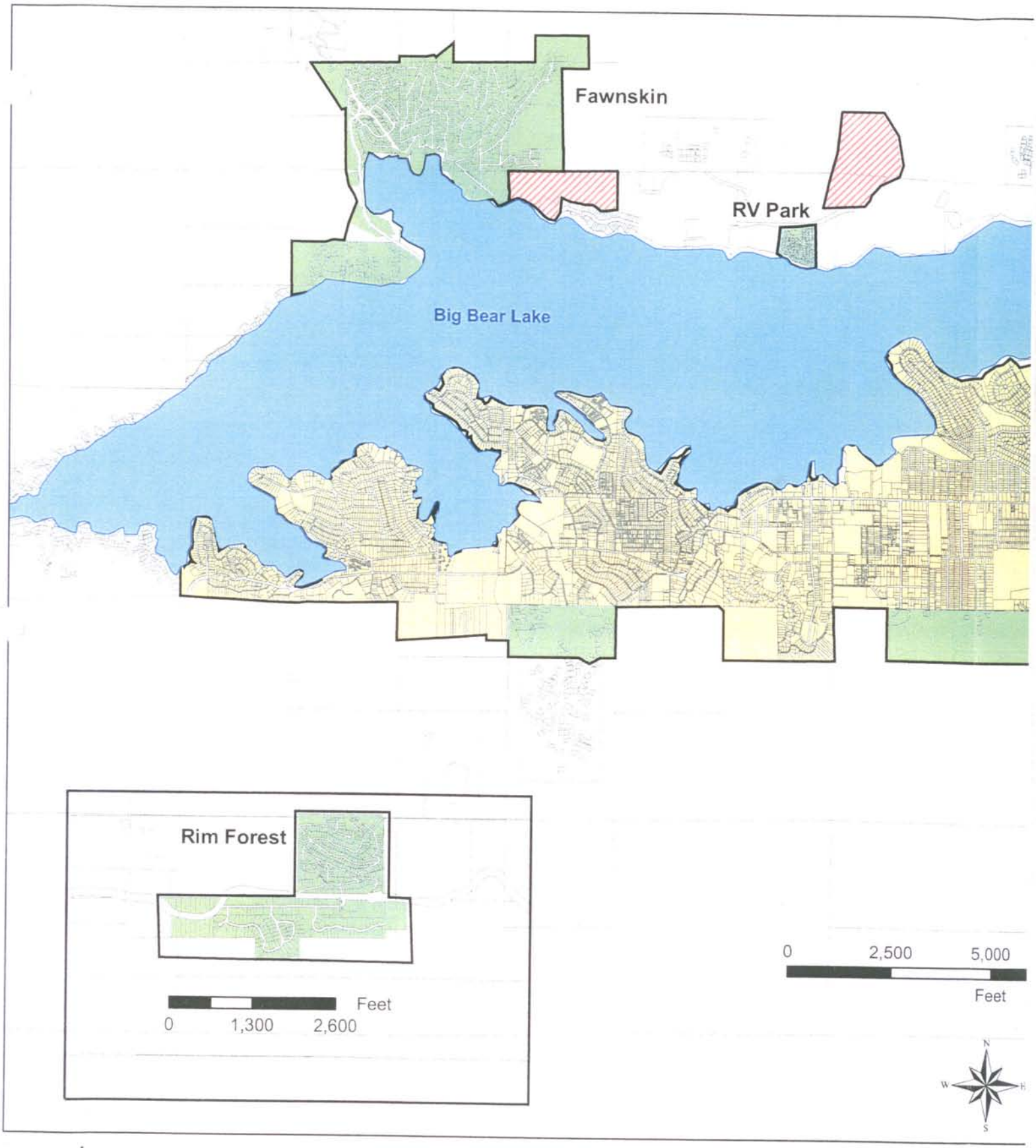


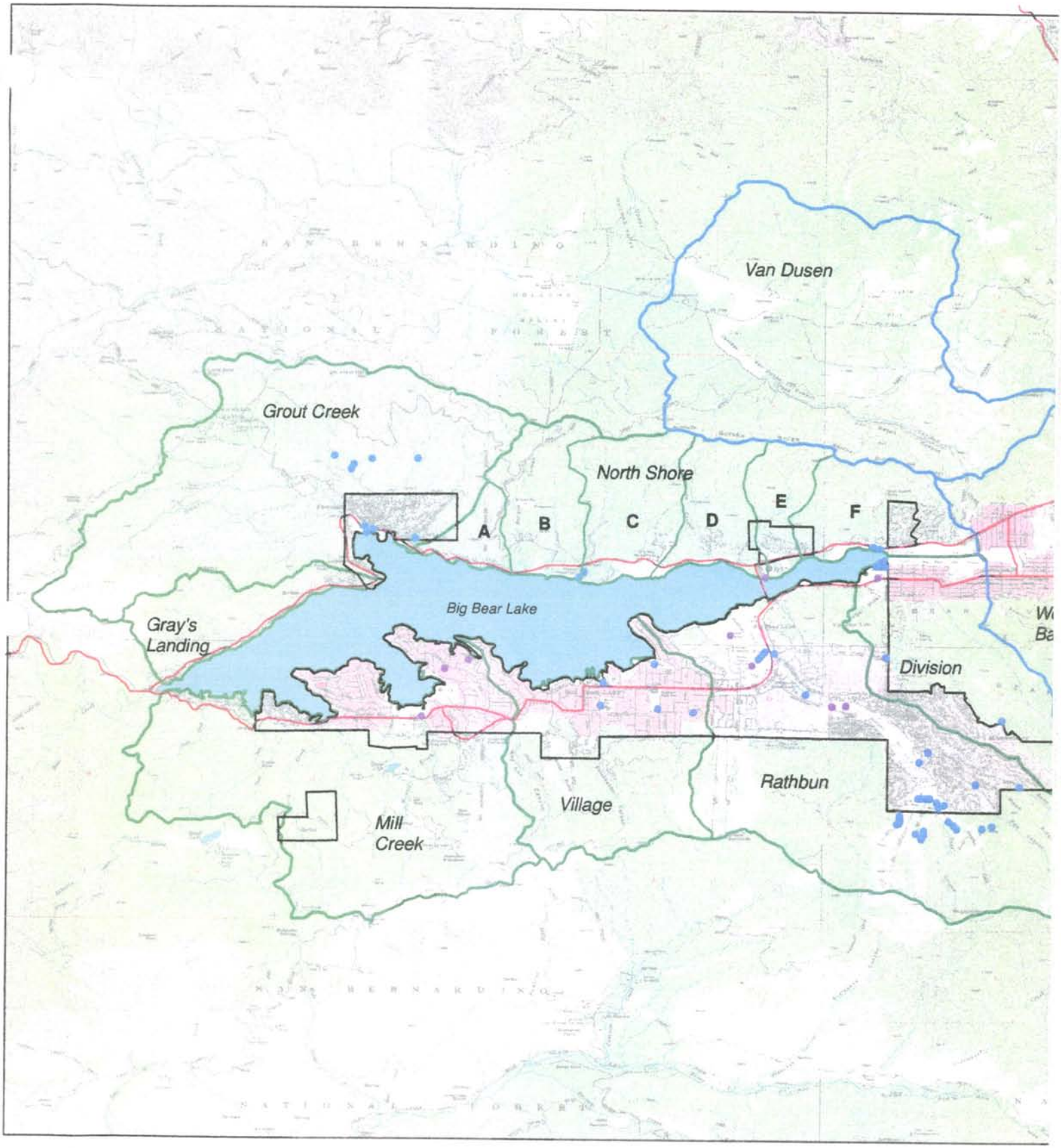
Figure 5-1
DWP Existing Facilities
Legend
Service Area
Potential Annexation Area
Pressure Zone
Conklin Booster
Erwin Lake
Ironwood Booster
Lake Williams
Lassen
Lower Fawnskin
Lower Moonridge
Main
Minton
Lower Sugarloaf
Upper Sugarloaf
Traventine
Upper Fawnskin
Wolf Tank
Yosemite
Pipeline Diameter (inches)
< 4
5-5.5
6
8
10
12
Cedar Dell Slant Wells and Reservoir
Racoon Reservoir
Cedar Well
Cline Miller Reservoir and Boosters
Future Zoo
Moon Camp
RV Park Reservoir, Boosters, and Wells
Northshore Wells 1 and 3
RV Park Big Bear Shores
Big Bear Lake
Canvasback Well
Knickerbocker Well
Pennsylvania Well
Cedar Reservoir
Bear Valley Reservoirs and Ironwood Boosters
Knickerbocker Boosters
Rim Forest
Rim Forest Reservoir
Feet
0
2,900
5,800



egend

- Service Area
- Potential Annexation Areas
- City
- County

Figure 2-1
DWP Service Area



Sep-08

Figure 1

Big Bear DWP Service Area

Tributary Subarea

A

City of Big Bear Lake
Department of Water and Power

Appendix D: Noise Data

D.1 - Noise Modeling Data (DKS, No Date)

Table 1
TRAFFIC NOISE IMPACT
Year 2030 Weekday

FILE: NOISE-BigBearEOStanfield

Location: Big Bear Blvd East of Stanfield Cutoff

Vehicle Type	Traffic Volume 24-hr volume	Equiv 1-hr	Noise Reference Level (15 meters	Noise Level (dB Ldn) Centerline Distance (feet) 100 (30 meters)	200 (61 meters)	400 (122 meters)	800 (244 meters)	1600 (488 meters)	3200 (975 meters)	6400 (1951 meters)
EXISTING (2007)										
Autos	1864	183	63.7	59.1	54.6	50.1	45.6	41.0	36.5	32.0
Med Trucks	19	2	54.1	49.5	45.0	40.5	36.0	31.4	26.9	22.4
Hvy Trucks	19	2	57.4	52.8	48.3	43.8	39.3	34.8	30.3	25.7
TOTAL	1902	186	65.0	60.4	55.9	51.4	46.8	42.3	37.8	33.3
Attenuation from existing walls:										
FUTURE NO PROJECT (2030)										
Autos	2981	292	65.8	61.1	56.6	52.1	47.6	43.1	38.6	34.1
Med Trucks	30	3	56.2	51.5	47.0	42.5	38.0	33.5	29.0	24.5
Hvy Trucks	30	3	59.5	54.9	50.4	45.8	41.3	36.8	32.3	27.8
TOTAL	3042	298	67.1	62.4	57.9	53.4	48.9	44.4	39.9	35.3
Attenuation from existing walls:										
FUTURE WITH PROJECT (2030)										
Autos	2989	293	65.8	61.2	56.6	52.1	47.6	43.1	38.6	34.1
Med Trucks	31	3	56.2	51.6	47.0	42.5	38.0	33.5	29.0	24.5
Hvy Trucks	31	3	59.5	54.9	50.4	45.8	41.3	36.8	32.3	27.8
TOTAL	3050	299	67.1	62.4	57.9	53.4	48.9	44.4	39.9	35.4
Attenuation from existing walls:										
CHANGE FROM EXISTING										
Autos	1125	110	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Med Trucks	11	1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Hvy Trucks	11	1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
TOTAL	1148	112	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
CHANGE FROM FUTURE NO PROJECT										
Autos	8	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Med Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hvy Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	8	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Average speed: 104.6 km/hr= 65.0 mi/hr

Time of day:			Fleet Mi	
	70.0%	Day	98.0%	Autos
	15.0%	Evening	1.0%	Medium Trucks
	15.0%	Night	1.0%	Heavy Trucks
	100.0%		100.0%	

Notes: Based on methods of Federal Highway Administration "Highway Traffic Noise Model", FHWA-RD-77-108, December, 1978.
Traffic data obtained from DKS Associates

Table 1
TRAFFIC NOISE IMPACT
FILE: NOISE-BigBearEOStanfieldSunday Year 2030 Sunday

Location: Big Bear Blvd East of Stanfield Cutoff

Vehicle Type	Traffic Volume 24-hr volume	Equiv 1-hr	Noise Reference Level (15 meters	Noise Level (dB Ldn) Centerline Distance (feet) 100 (30 meters)	200 (61 meters)	400 (122 meters)	800 (244 meters)	1600 (488 meters)	3200 (975 meters)	6400 (1951 meters)
EXISTING (2007)										
Autos	1809	177	63.6	59.0	54.5	49.9	45.4	40.9	36.4	31.9
Med Trucks	18	2	54.0	49.4	44.9	40.3	35.8	31.3	26.8	22.3
Hvy Trucks	18	2	57.3	52.7	48.2	43.7	39.2	34.6	30.1	25.6
TOTAL	1846	181	64.9	60.3	55.7	51.2	46.7	42.2	37.7	33.2
Attenuation from existing walls:										
FUTURE NO PROJECT (2030)										
Autos	2691	264	65.3	60.7	56.2	51.7	47.2	42.6	38.1	33.6
Med Trucks	27	3	55.7	51.1	46.6	42.1	37.6	33.0	28.5	24.0
Hvy Trucks	27	3	59.0	54.4	49.9	45.4	40.9	36.4	31.8	27.3
TOTAL	2746	269	66.6	62.0	57.5	53.0	48.4	43.9	39.4	34.9
Attenuation from existing walls:										
FUTURE WITH PROJECT (2030)										
Autos	2694	264	65.3	60.7	56.2	51.7	47.2	42.6	38.1	33.6
Med Trucks	27	3	55.7	51.1	46.6	42.1	37.6	33.0	28.5	24.0
Hvy Trucks	27	3	59.0	54.4	49.9	45.4	40.9	36.4	31.9	27.3
TOTAL	2749	269	66.6	62.0	57.5	53.0	48.4	43.9	39.4	34.9
Attenuation from existing walls:										
CHANGE FROM EXISTING										
Autos	885	87	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Med Trucks	9	1	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Hvy Trucks	9	1	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
TOTAL	903	88	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
CHANGE FROM FUTURE NO PROJECT										
Autos	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Med Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hvy Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	3	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Average speed: 104.6 km/hr= 65.0 mi/hr

Time of day:			Fleet Mi	
	70.0%	Day	98.0%	Autos
	15.0%	Evening	1.0%	Medium Trucks
	15.0%	Night	1.0%	Heavy Trucks
	100.0%		100.0%	

Notes: Based on methods of Federal Highway Administration "Highway Traffic Noise Model", FHWA-RD-77-108, December, 1978.
Traffic data obtained from DKS Associates

Table 1
TRAFFIC NOISE IMPACT
Year 2030 Weekday

FILE: NOISE-BigBearWOStanfield

Location: Big Bear Blvd West of Stanfield Cutoff

Vehicle Type	Traffic Volume 24-hr volume	Equiv 1-hr	Noise Reference Level (15 meters	Noise Level (dB Ldn) Centerline Distance (feet) 100 (30 meters)	200 (61 meters)	400 (122 meters)	800 (244 meters)	1600 (488 meters)	3200 (975 meters)	6400 (1951 meters)
EXISTING (2007)										
Autos	2521	247	65.0	60.4	55.9	51.4	46.9	42.4	37.8	33.3
Med Trucks	26	3	55.4	50.8	46.3	41.8	37.3	32.8	28.2	23.7
Hvy Trucks	26	3	58.8	54.1	49.6	45.1	40.6	36.1	31.6	27.0
TOTAL	2572	252	66.3	61.7	57.2	52.7	48.2	43.6	39.1	34.6
Attenuation from existing walls:										
FUTURE NO PROJECT (2030)										
Autos	4191	410	67.2	62.6	58.1	53.6	49.1	44.6	40.0	35.5
Med Trucks	43	4	57.6	53.0	48.5	44.0	39.5	35.0	30.5	25.9
Hvy Trucks	43	4	61.0	56.3	51.8	47.3	42.8	38.3	33.8	29.3
TOTAL	4277	419	68.5	63.9	59.4	54.9	50.4	45.9	41.3	36.8
Attenuation from existing walls:										
FUTURE WITH PROJECT (2030)										
Autos	4807	471	67.8	63.2	58.7	54.2	49.7	45.2	40.6	36.1
Med Trucks	49	5	58.2	53.6	49.1	44.6	40.1	35.6	31.0	26.5
Hvy Trucks	49	5	61.6	56.9	52.4	47.9	43.4	38.9	34.4	29.8
TOTAL	4905	480	69.1	64.5	60.0	55.5	51.0	46.4	41.9	37.4
Attenuation from existing walls:										
CHANGE FROM EXISTING										
Autos	2286	224	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Med Trucks	23	2	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Hvy Trucks	23	2	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
TOTAL	2333	228	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
CHANGE FROM FUTURE NO PROJECT										
Autos	615	60	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Med Trucks	6	1	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Hvy Trucks	6	1	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
TOTAL	628	61	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6

Average speed: 104.6 km/hr= 65.0 mi/hr

Time of day:			Fleet Mi	
	70.0%	Day	98.0%	Autos
	15.0%	Evening	1.0%	Medium Trucks
	15.0%	Night	1.0%	Heavy Trucks
	100.0%		100.0%	

Notes: Based on methods of Federal Highway Administration "Highway Traffic Noise Model", FHWA-RD-77-108, December, 1978.
Traffic data obtained from DKS Associates

Table 1
TRAFFIC NOISE IMPACT
FILE: NOISE-BigBearWOStanfieldSunday Year 2030 Sunday

Location: Big Bear Blvd West of Stanfield Cutoff

Vehicle Type	Traffic Volume 24-hr volume	Equiv 1-hr	Noise Reference Level (15 meters	Noise Level (dB Ldn) Centerline Distance (feet) 100 (30 meters)	200 (61 meters)	400 (122 meters)	800 (244 meters)	1600 (488 meters)	3200 (975 meters)	6400 (1951 meters)
EXISTING (2007)										
Autos	2329	228	64.7	60.1	55.6	51.0	46.5	42.0	37.5	33.0
Med Trucks	24	2	55.1	50.5	46.0	41.4	36.9	32.4	27.9	23.4
Hvy Trucks	24	2	58.4	53.8	49.3	44.8	40.3	35.7	31.2	26.7
TOTAL	2377	233	66.0	61.4	56.8	52.3	47.8	43.3	38.8	34.3
Attenuation from existing walls:										
FUTURE NO PROJECT (2030)										
Autos	3408	334	66.3	61.7	57.2	52.7	48.2	43.7	39.1	34.6
Med Trucks	35	3	56.8	52.1	47.6	43.1	38.6	34.1	29.6	25.0
Hvy Trucks	35	3	60.1	55.4	50.9	46.4	41.9	37.4	32.9	28.4
TOTAL	3478	341	67.6	63.0	58.5	54.0	49.5	45.0	40.4	35.9
Attenuation from existing walls:										
FUTURE WITH PROJECT (2030)										
Autos	3426	335	66.4	61.7	57.2	52.7	48.2	43.7	39.2	34.7
Med Trucks	35	3	56.8	52.2	47.6	43.1	38.6	34.1	29.6	25.1
Hvy Trucks	35	3	60.1	55.5	51.0	46.4	41.9	37.4	32.9	28.4
TOTAL	3496	342	67.7	63.0	58.5	54.0	49.5	45.0	40.5	35.9
Attenuation from existing walls:										
CHANGE FROM EXISTING										
Autos	1097	107	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Med Trucks	11	1	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Hvy Trucks	11	1	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
TOTAL	1119	110	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
CHANGE FROM FUTURE NO PROJECT										
Autos	18	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Med Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hvy Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	18	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Average speed: 104.6 km/hr= 65.0 mi/hr

Time of day:			Fleet Mi	
	70.0%	Day	98.0%	Autos
	15.0%	Evening	1.0%	Medium Trucks
	15.0%	Night	1.0%	Heavy Trucks
	100.0%		100.0%	

Notes: Based on methods of Federal Highway Administration "Highway Traffic Noise Model", FHWA-RD-77-108, December, 1978.
Traffic data obtained from DKS Associates

Table 1
TRAFFIC NOISE IMPACT
Year 2030 Weekday

FILE: NOISE-NorthShoreEOStanfield

Location: North Shore Drive East of Stanfield Cutoff

Vehicle Type	Traffic Volume 24-hr volume	Equiv 1-hr	Noise Reference Level (15 meters	Noise Level (dB Ldn) Centerline Distance (feet) 100 (30 meters)	200 (61 meters)	400 (122 meters)	800 (244 meters)	1600 (488 meters)	3200 (975 meters)	6400 (1951 meters)
EXISTING (2007)										
Autos	643	63	59.1	54.5	50.0	45.5	40.9	36.4	31.9	27.4
Med Trucks	7	1	49.5	44.9	40.4	35.9	31.3	26.8	22.3	17.8
Hvy Trucks	7	1	52.8	48.2	43.7	39.2	34.7	30.1	25.6	21.1
TOTAL	656	64	60.4	55.8	51.3	46.7	42.2	37.7	33.2	28.7
Attenuation from existing walls:										
FUTURE NO PROJECT (2030)										
Autos	1410	138	62.5	57.9	53.4	48.9	44.3	39.8	35.3	30.8
Med Trucks	14	1	52.9	48.3	43.8	39.3	34.8	30.2	25.7	21.2
Hvy Trucks	14	1	56.2	51.6	47.1	42.6	38.1	33.6	29.0	24.5
TOTAL	1439	141	63.8	59.2	54.7	50.2	45.6	41.1	36.6	32.1
Attenuation from existing walls:										
FUTURE WITH PROJECT (2030)										
Autos	1418	139	62.5	57.9	53.4	48.9	44.4	39.9	35.3	30.8
Med Trucks	14	1	52.9	48.3	43.8	39.3	34.8	30.3	25.7	21.2
Hvy Trucks	14	1	56.3	51.6	47.1	42.6	38.1	33.6	29.1	24.5
TOTAL	1447	142	63.8	59.2	54.7	50.2	45.7	41.1	36.6	32.1
Attenuation from existing walls:										
CHANGE FROM EXISTING										
Autos	775	76	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Med Trucks	8	1	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Hvy Trucks	8	1	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
TOTAL	791	77	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
CHANGE FROM FUTURE NO PROJECT										
Autos	8	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Med Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hvy Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	8	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Average speed: 104.6 km/hr= 65.0 mi/hr

Time of day:			Fleet Mi	
	70.0%	Day	98.0%	Autos
	15.0%	Evening	1.0%	Medium Trucks
	15.0%	Night	1.0%	Heavy Trucks
	100.0%		100.0%	

Notes: Based on methods of Federal Highway Administration "Highway Traffic Noise Model", FHWA-RD-77-108, December, 1978.
Traffic data obtained from DKS Associates

Table 1
TRAFFIC NOISE IMPACT
FILE: NOISE-NorthShoreEOStanfieldSunday Year 2030 Sunday

Location: North Shore Drive East of Stanfield Cutoff

Vehicle Type	Traffic Volume 24-hr volume	Equiv 1-hr	Noise Reference Level (15 meters	Noise Level (dB Ldn) Centerline Distance (feet) 100 (30 meters)	200 (61 meters)	400 (122 meters)	800 (244 meters)	1600 (488 meters)	3200 (975 meters)	6400 (1951 meters)
EXISTING (2007)										
Autos	601	59	58.8	54.2	49.7	45.2	40.6	36.1	31.6	27.1
Med Trucks	6	1	49.2	44.6	40.1	35.6	31.0	26.5	22.0	17.5
Hvy Trucks	6	1	52.5	47.9	43.4	38.9	34.4	29.8	25.3	20.8
TOTAL	613	60	60.1	55.5	51.0	46.4	41.9	37.4	32.9	28.4
Attenuation from existing walls:										
FUTURE NO PROJECT (2030)										
Autos	1138	111	61.6	57.0	52.4	47.9	43.4	38.9	34.4	29.9
Med Trucks	12	1	52.0	47.4	42.9	38.3	33.8	29.3	24.8	20.3
Hvy Trucks	12	1	55.3	50.7	46.2	41.7	37.1	32.6	28.1	23.6
TOTAL	1161	114	62.9	58.2	53.7	49.2	44.7	40.2	35.7	31.2
Attenuation from existing walls:										
FUTURE WITH PROJECT (2030)										
Autos	1143	112	61.6	57.0	52.5	47.9	43.4	38.9	34.4	29.9
Med Trucks	12	1	52.0	47.4	42.9	38.4	33.8	29.3	24.8	20.3
Hvy Trucks	12	1	55.3	50.7	46.2	41.7	37.2	32.6	28.1	23.6
TOTAL	1166	114	62.9	58.3	53.8	49.2	44.7	40.2	35.7	31.2
Attenuation from existing walls:										
CHANGE FROM EXISTING										
Autos	542	53	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Med Trucks	6	1	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Hvy Trucks	6	1	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
TOTAL	553	54	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
CHANGE FROM FUTURE NO PROJECT										
Autos	5	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Med Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hvy Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	5	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Average speed: 104.6 km/hr= 65.0 mi/hr

Time of day:			Fleet Mi	
	70.0%	Day	98.0%	Autos
	15.0%	Evening	1.0%	Medium Trucks
	15.0%	Night	1.0%	Heavy Trucks
	100.0%		100.0%	

Notes: Based on methods of Federal Highway Administration "Highway Traffic Noise Model", FHWA-RD-77-108, December, 1978.
Traffic data obtained from DKS Associates

Table 1
TRAFFIC NOISE IMPACT
Year 2030 Weekday

FILE: NOISE-NorthShoreWOStanfield

Location: North Shore Drive West of Stanfield Cutoff

Vehicle Type	Traffic Volume 24-hr volume	Equiv 1-hr	Noise Reference Level (15 meters	Noise Level (dB Ldn) Centerline Distance (feet) 100 (30 meters)	200 (61 meters)	400 (122 meters)	800 (244 meters)	1600 (488 meters)	3200 (975 meters)	6400 (1951 meters)
EXISTING (2007)										
Autos	291	28	55.7	51.0	46.5	42.0	37.5	33.0	28.5	23.9
Med Trucks	3	0	46.1	41.4	36.9	32.4	27.9	23.4	18.9	14.4
Hvy Trucks	3	0	49.4	44.8	40.2	35.7	31.2	26.7	22.2	17.7
TOTAL	297	29	56.9	52.3	47.8	43.3	38.8	34.3	29.8	25.2
Attenuation from existing walls:										
FUTURE NO PROJECT (2030)										
Autos	1649	161	63.2	58.6	54.1	49.5	45.0	40.5	36.0	31.5
Med Trucks	17	2	53.6	49.0	44.5	39.9	35.4	30.9	26.4	21.9
Hvy Trucks	17	2	56.9	52.3	47.8	43.3	38.8	34.2	29.7	25.2
TOTAL	1683	165	64.5	59.9	55.3	50.8	46.3	41.8	37.3	32.8
Attenuation from existing walls:										
FUTURE WITH PROJECT (2030)										
Autos	1685	165	63.3	58.7	54.1	49.6	45.1	40.6	36.1	31.6
Med Trucks	17	2	53.7	49.1	44.6	40.0	35.5	31.0	26.5	22.0
Hvy Trucks	17	2	57.0	52.4	47.9	43.4	38.8	34.3	29.8	25.3
TOTAL	1719	168	64.6	60.0	55.4	50.9	46.4	41.9	37.4	32.9
Attenuation from existing walls:										
CHANGE FROM EXISTING										
Autos	1394	136	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
Med Trucks	14	1	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
Hvy Trucks	14	1	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
TOTAL	1422	139	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
CHANGE FROM FUTURE NO PROJECT										
Autos	35	3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Med Trucks	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Hvy Trucks	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TOTAL	36	4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Average speed: 104.6 km/hr= 65.0 mi/hr

Time of day:			Fleet Mi	
	70.0%	Day	98.0%	Autos
	15.0%	Evening	1.0%	Medium Trucks
	15.0%	Night	1.0%	Heavy Trucks
	100.0%		100.0%	

Notes: Based on methods of Federal Highway Administration "Highway Traffic Noise Model", FHWA-RD-77-108, December, 1978.
Traffic data obtained from DKS Associates

Table 1
TRAFFIC NOISE IMPACT
FILE: NOISE-NorthShoreWOStanfieldSunday Year 2030 Sunday

Location: North Shore Drive West of Stanfield Cutoff

Vehicle Type	Traffic Volume 24-hr volume	Equiv 1-hr	Noise Reference Level (15 meters	Noise Level (dB Ldn) Centerline Distance (feet) 100 (30 meters)	200 (61 meters)	400 (122 meters)	800 (244 meters)	1600 (488 meters)	3200 (975 meters)	6400 (1951 meters)
EXISTING (2007)										
Autos	460	45	57.6	53.0	48.5	44.0	39.5	35.0	30.4	25.9
Med Trucks	5	0	48.0	43.4	38.9	34.4	29.9	25.4	20.9	16.3
Hvy Trucks	5	0	51.4	46.7	42.2	37.7	33.2	28.7	24.2	19.7
TOTAL	469	46	58.9	54.3	49.8	45.3	40.8	36.3	31.7	27.2
Attenuation from existing walls:										
FUTURE NO PROJECT (2030)										
Autos	1191	117	61.8	57.2	52.6	48.1	43.6	39.1	34.6	30.1
Med Trucks	12	1	52.2	47.6	43.0	38.5	34.0	29.5	25.0	20.5
Hvy Trucks	12	1	55.5	50.9	46.4	41.9	37.3	32.8	28.3	23.8
TOTAL	1215	119	63.1	58.4	53.9	49.4	44.9	40.4	35.9	31.4
Attenuation from existing walls:										
FUTURE WITH PROJECT (2030)										
Autos	1216	119	61.9	57.3	52.7	48.2	43.7	39.2	34.7	30.2
Med Trucks	12	1	52.3	47.7	43.1	38.6	34.1	29.6	25.1	20.6
Hvy Trucks	12	1	55.6	51.0	46.5	41.9	37.4	32.9	28.4	23.9
TOTAL	1241	122	63.2	58.5	54.0	49.5	45.0	40.5	36.0	31.4
Attenuation from existing walls:										
CHANGE FROM EXISTING										
Autos	757	74	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
Med Trucks	8	1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
Hvy Trucks	8	1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
TOTAL	772	76	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
CHANGE FROM FUTURE NO PROJECT										
Autos	25	2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Med Trucks	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Hvy Trucks	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TOTAL	26	3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Average speed: 104.6 km/hr= 65.0 mi/hr

Time of day:			Fleet Mi	
	70.0%	Day	98.0%	Autos
	15.0%	Evening	1.0%	Medium Trucks
	15.0%	Night	1.0%	Heavy Trucks
	100.0%		100.0%	

Notes: Based on methods of Federal Highway Administration "Highway Traffic Noise Model", FHWA-RD-77-108, December, 1978.
Traffic data obtained from DKS Associates

Table 1
TRAFFIC NOISE IMPACT

FILE: NOISE-StanfieldBTWNorthShoreBigBear Year 2030 Weekday

Location: Stanfield Cutoff Between North Shore Dr and Big Bear Blvd

Vehicle Type	Traffic Volume 24-hr volume	Equiv 1-hr	Noise Reference Level (15 meters	Noise Level (dB Ldn) Centerline Distance (feet) 100 (30 meters)	200 (61 meters)	400 (122 meters)	800 (244 meters)	1600 (488 meters)	3200 (975 meters)	6400 (1951 meters)
EXISTING (2007)										
Autos	1350	132	62.3	57.7	53.2	48.7	44.2	39.6	35.1	30.6
Med Trucks	14	1	52.7	48.1	43.6	39.1	34.6	30.0	25.5	21.0
Hvy Trucks	14	1	56.0	51.4	46.9	42.4	37.9	33.4	28.9	24.3
TOTAL	1378	135	63.6	59.0	54.5	50.0	45.4	40.9	36.4	31.9
Attenuation from existing walls:										
FUTURE NO PROJECT (2030)										
Autos	3067	300	65.9	61.3	56.8	52.2	47.7	43.2	38.7	34.2
Med Trucks	31	3	56.3	51.7	47.2	42.6	38.1	33.6	29.1	24.6
Hvy Trucks	31	3	59.6	55.0	50.5	46.0	41.4	36.9	32.4	27.9
TOTAL	3130	306	67.2	62.6	58.0	53.5	49.0	44.5	40.0	35.5
Attenuation from existing walls:										
FUTURE WITH PROJECT (2030)										
Autos	3123	306	66.0	61.3	56.8	52.3	47.8	43.3	38.8	34.3
Med Trucks	32	3	56.4	51.8	47.2	42.7	38.2	33.7	29.2	24.7
Hvy Trucks	32	3	59.7	55.1	50.6	46.0	41.5	37.0	32.5	28.0
TOTAL	3187	312	67.3	62.6	58.1	53.6	49.1	44.6	40.1	35.5
Attenuation from existing walls:										
CHANGE FROM EXISTING										
Autos	1773	174	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Med Trucks	18	2	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Hvy Trucks	18	2	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
TOTAL	1809	177	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
CHANGE FROM FUTURE NO PROJECT										
Autos	56	5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Med Trucks	1	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Hvy Trucks	1	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TOTAL	57	6	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Average speed: 104.6 km/hr= 65.0 mi/hr

Time of day:			Fleet Mi	
	70.0%	Day	98.0%	Autos
	15.0%	Evening	1.0%	Medium Trucks
	15.0%	Night	1.0%	Heavy Trucks
	100.0%		100.0%	

Notes: Based on methods of Federal Highway Administration "Highway Traffic Noise Model", FHWA-RD-77-108, December, 1978.
Traffic data obtained from DKS Associates

Table 1
TRAFFIC NOISE IMPACT
FILE: NOISE-StnfildBTWNorShorBgBrSun Year 2030 Sunday

Location: Stanfield Cutoff Between North Shore Dr and Big Bear Blvd

Vehicle Type	Traffic Volume 24-hr volume	Equiv 1-hr	Noise Reference Level (15 meters	Noise Level (dB Ldn) Centerline Distance (feet) 100 (30 meters)	200 (61 meters)	400 (122 meters)	800 (244 meters)	1600 (488 meters)	3200 (975 meters)	6400 (1951 meters)
EXISTING (2007)										
Autos	1367	134	62.4	57.8	53.2	48.7	44.2	39.7	35.2	30.7
Med Trucks	14	1	52.8	48.2	43.6	39.1	34.6	30.1	25.6	21.1
Hvy Trucks	14	1	56.1	51.5	47.0	42.5	37.9	33.4	28.9	24.4
TOTAL	1395	137	63.7	59.0	54.5	50.0	45.5	41.0	36.5	32.0
Attenuation from existing walls:										
FUTURE NO PROJECT (2030)										
Autos	2143	210	64.3	59.7	55.2	50.7	46.2	41.6	37.1	32.6
Med Trucks	22	2	54.7	50.1	45.6	41.1	36.6	32.1	27.5	23.0
Hvy Trucks	22	2	58.1	53.4	48.9	44.4	39.9	35.4	30.9	26.3
TOTAL	2187	214	65.6	61.0	56.5	52.0	47.5	42.9	38.4	33.9
Attenuation from existing walls:										
FUTURE WITH PROJECT (2030)										
Autos	2184	214	64.4	59.8	55.3	50.8	46.2	41.7	37.2	32.7
Med Trucks	22	2	54.8	50.2	45.7	41.2	36.7	32.1	27.6	23.1
Hvy Trucks	22	2	58.1	53.5	49.0	44.5	40.0	35.5	30.9	26.4
TOTAL	2229	218	65.7	61.1	56.6	52.1	47.5	43.0	38.5	34.0
Attenuation from existing walls:										
CHANGE FROM EXISTING										
Autos	817	80	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Med Trucks	8	1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Hvy Trucks	8	1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
TOTAL	834	82	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
CHANGE FROM FUTURE NO PROJECT										
Autos	41	4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Med Trucks	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Hvy Trucks	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
TOTAL	42	4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Average speed: 104.6 km/hr= 65.0 mi/hr

Time of day:			Fleet Mi	
	70.0%	Day	98.0%	Autos
	15.0%	Evening	1.0%	Medium Trucks
	15.0%	Night	1.0%	Heavy Trucks
	100.0%		100.0%	

Notes: Based on methods of Federal Highway Administration "Highway Traffic Noise Model", FHWA-RD-77-108, December, 1978.
Traffic data obtained from DKS Associates

Table 1
TRAFFIC NOISE IMPACT
Year 2030 Weekday

FILE: NOISE-StanfieldNONorthShore

Location: Stanfield Cutoff North of North Shore Drive

Vehicle Type	Traffic Volume 24-hr volume	Equiv 1-hr	Noise Reference Level (15 meters	Noise Level (dB Ldn) Centerline Distance (feet) 100 (30 meters)	200 (61 meters)	400 (122 meters)	800 (244 meters)	1600 (488 meters)	3200 (975 meters)	6400 (1951 meters)
EXISTING (2007)										
Autos	30	3	45.8	41.2	36.7	32.2	27.7	23.2	18.6	14.1
Med Trucks	0	0	36.3	31.6	27.1	22.6	18.1	13.6	9.1	4.5
Hvy Trucks	0	0	39.6	34.9	30.4	25.9	21.4	16.9	12.4	7.9
TOTAL	31	3	47.1	42.5	38.0	33.5	29.0	24.5	19.9	15.4
Attenuation from existing walls:										
FUTURE NO PROJECT (2030)										
Autos	58	6	48.6	44.0	39.5	35.0	30.5	26.0	21.4	16.9
Med Trucks	1	0	39.0	34.4	29.9	25.4	20.9	16.4	11.8	7.3
Hvy Trucks	1	0	42.4	37.7	33.2	28.7	24.2	19.7	15.2	10.7
TOTAL	59	6	49.9	45.3	40.8	36.3	31.8	27.2	22.7	18.2
Attenuation from existing walls:										
FUTURE WITH PROJECT (2030)										
Autos	58	6	48.6	44.0	39.5	35.0	30.5	26.0	21.4	16.9
Med Trucks	1	0	39.0	34.4	29.9	25.4	20.9	16.4	11.8	7.3
Hvy Trucks	1	0	42.4	37.7	33.2	28.7	24.2	19.7	15.2	10.7
TOTAL	59	6	49.9	45.3	40.8	36.3	31.8	27.2	22.7	18.2
Attenuation from existing walls:										
CHANGE FROM EXISTING										
Autos	27	3	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Med Trucks	0	0	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Hvy Trucks	0	0	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
TOTAL	28	3	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
CHANGE FROM FUTURE NO PROJECT										
Autos	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Med Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hvy Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Average speed: 104.6 km/hr= 65.0 mi/hr

Time of day:		Fleet Mi	
70.0%	Day	98.0%	Autos
15.0%	Evening	1.0%	Medium Trucks
15.0%	Night	1.0%	Heavy Trucks
100.0%		100.0%	

Notes: Based on methods of Federal Highway Administration "Highway Traffic Noise Model", FHWA-RD-77-108, December, 1978.
Traffic data obtained from DKS Associates

Table 1
TRAFFIC NOISE IMPACT
FILE: NOISE-StanfieldNONorthShoreSunday Year 2030 Sunday

Location: Stanfield Cutoff North of North Shore Drive

Vehicle Type	Traffic Volume 24-hr volume	Equiv 1-hr	Noise Reference Level (15 meters	Noise Level (dB Ldn) Centerline Distance (feet) 100 (30 meters)	200 (61 meters)	400 (122 meters)	800 (244 meters)	1600 (488 meters)	3200 (975 meters)	6400 (1951 meters)
EXISTING (2007)										
Autos	39	4	47.0	42.3	37.8	33.3	28.8	24.3	19.8	15.2
Med Trucks	0	0	37.4	32.7	28.2	23.7	19.2	14.7	10.2	5.6
Hvy Trucks	0	0	40.7	36.1	31.5	27.0	22.5	18.0	13.5	9.0
TOTAL	40	4	48.2	43.6	39.1	34.6	30.1	25.6	21.0	16.5
Attenuation from existing walls:										
FUTURE NO PROJECT (2030)										
Autos	58	6	48.6	44.0	39.5	35.0	30.5	26.0	21.4	16.9
Med Trucks	1	0	39.0	34.4	29.9	25.4	20.9	16.4	11.8	7.3
Hvy Trucks	1	0	42.4	37.7	33.2	28.7	24.2	19.7	15.2	10.7
TOTAL	59	6	49.9	45.3	40.8	36.3	31.8	27.2	22.7	18.2
Attenuation from existing walls:										
FUTURE WITH PROJECT (2030)										
Autos	58	6	48.6	44.0	39.5	35.0	30.5	26.0	21.4	16.9
Med Trucks	1	0	39.0	34.4	29.9	25.4	20.9	16.4	11.8	7.3
Hvy Trucks	1	0	42.4	37.7	33.2	28.7	24.2	19.7	15.2	10.7
TOTAL	59	6	49.9	45.3	40.8	36.3	31.8	27.2	22.7	18.2
Attenuation from existing walls:										
CHANGE FROM EXISTING										
Autos	19	2	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Med Trucks	0	0	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Hvy Trucks	0	0	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
TOTAL	19	2	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
CHANGE FROM FUTURE NO PROJECT										
Autos	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Med Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hvy Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Average speed: 104.6 km/hr= 65.0 mi/hr

Time of day:			Fleet Mi	
	70.0%	Day	98.0%	Autos
	15.0%	Evening	1.0%	Medium Trucks
	15.0%	Night	1.0%	Heavy Trucks
	100.0%		100.0%	

Notes: Based on methods of Federal Highway Administration "Highway Traffic Noise Model", FHWA-RD-77-108, December, 1978.
Traffic data obtained from DKS Associates

Table 1
TRAFFIC NOISE IMPACT
Year 2030 Weekday

FILE: NOISE-StanfieldSOBigBear

Location: Stanfield Cutoff South of Big Bear Blvd

Vehicle Type	Traffic Volume 24-hr volume	Equiv 1-hr	Noise Reference Level (15 meters	Noise Level (dB Ldn) Centerline Distance (feet) 100 (30 meters)	200 (61 meters)	400 (122 meters)	800 (244 meters)	1600 (488 meters)	3200 (975 meters)	6400 (1951 meters)
EXISTING (2007)										
Autos	298	29	55.8	51.1	46.6	42.1	37.6	33.1	28.6	24.0
Med Trucks	3	0	46.2	41.5	37.0	32.5	28.0	23.5	19.0	14.5
Hvy Trucks	3	0	49.5	44.9	40.3	35.8	31.3	26.8	22.3	17.8
TOTAL	304	30	57.0	52.4	47.9	43.4	38.9	34.4	29.9	25.3
Attenuation from existing walls:										
FUTURE NO PROJECT (2030)										
Autos	400	39	57.0	52.4	47.9	43.4	38.9	34.4	29.8	25.3
Med Trucks	4	0	47.4	42.8	38.3	33.8	29.3	24.8	20.2	15.7
Hvy Trucks	4	0	50.8	46.1	41.6	37.1	32.6	28.1	23.6	19.1
TOTAL	408	40	58.3	53.7	49.2	44.7	40.2	35.6	31.1	26.6
Attenuation from existing walls:										
FUTURE WITH PROJECT (2030)										
Autos	400	39	57.0	52.4	47.9	43.4	38.9	34.4	29.8	25.3
Med Trucks	4	0	47.4	42.8	38.3	33.8	29.3	24.8	20.2	15.7
Hvy Trucks	4	0	50.8	46.1	41.6	37.1	32.6	28.1	23.6	19.1
TOTAL	408	40	58.3	53.7	49.2	44.7	40.2	35.6	31.1	26.6
Attenuation from existing walls:										
CHANGE FROM EXISTING										
Autos	102	10	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Med Trucks	1	0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Hvy Trucks	1	0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
TOTAL	104	10	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
CHANGE FROM FUTURE NO PROJECT										
Autos	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Med Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hvy Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Average speed: 104.6 km/hr= 65.0 mi/hr

Time of day:		Fleet Mi	
70.0%	Day	98.0%	Autos
15.0%	Evening	1.0%	Medium Trucks
15.0%	Night	1.0%	Heavy Trucks
100.0%		100.0%	

Notes: Based on methods of Federal Highway Administration "Highway Traffic Noise Model", FHWA-RD-77-108, December, 1978.
Traffic data obtained from DKS Associates

Table 1
TRAFFIC NOISE IMPACT
FILE: NOISE-StanfieldSOBigBearSunday Year 2030 Sunday

Location: Stanfield Cutoff South of Big Bear Blvd

Vehicle Type	Traffic Volume 24-hr volume	Equiv 1-hr	Noise Reference Level (15 meters	Noise Level (dB Ldn) Centerline Distance (feet) 100 (30 meters)	200 (61 meters)	400 (122 meters)	800 (244 meters)	1600 (488 meters)	3200 (975 meters)	6400 (1951 meters)
EXISTING (2007)										
Autos	331	32	56.2	51.6	47.1	42.6	38.1	33.5	29.0	24.5
Med Trucks	3	0	46.6	42.0	37.5	33.0	28.5	23.9	19.4	14.9
Hvy Trucks	3	0	49.9	45.3	40.8	36.3	31.8	27.3	22.7	18.2
TOTAL	338	33	57.5	52.9	48.4	43.9	39.3	34.8	30.3	25.8
Attenuation from existing walls:										
FUTURE NO PROJECT (2030)										
Autos	388	38	56.9	52.3	47.8	43.3	38.7	34.2	29.7	25.2
Med Trucks	4	0	47.3	42.7	38.2	33.7	29.1	24.6	20.1	15.6
Hvy Trucks	4	0	50.6	46.0	41.5	37.0	32.5	28.0	23.4	18.9
TOTAL	396	39	58.2	53.6	49.1	44.5	40.0	35.5	31.0	26.5
Attenuation from existing walls:										
FUTURE WITH PROJECT (2030)										
Autos	388	38	56.9	52.3	47.8	43.3	38.7	34.2	29.7	25.2
Med Trucks	4	0	47.3	42.7	38.2	33.7	29.1	24.6	20.1	15.6
Hvy Trucks	4	0	50.6	46.0	41.5	37.0	32.5	28.0	23.4	18.9
TOTAL	396	39	58.2	53.6	49.1	44.5	40.0	35.5	31.0	26.5
Attenuation from existing walls:										
CHANGE FROM EXISTING										
Autos	57	6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Med Trucks	1	0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Hvy Trucks	1	0	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
TOTAL	58	6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
CHANGE FROM FUTURE NO PROJECT										
Autos	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Med Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hvy Trucks	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Average speed: 104.6 km/hr= 65.0 mi/hr

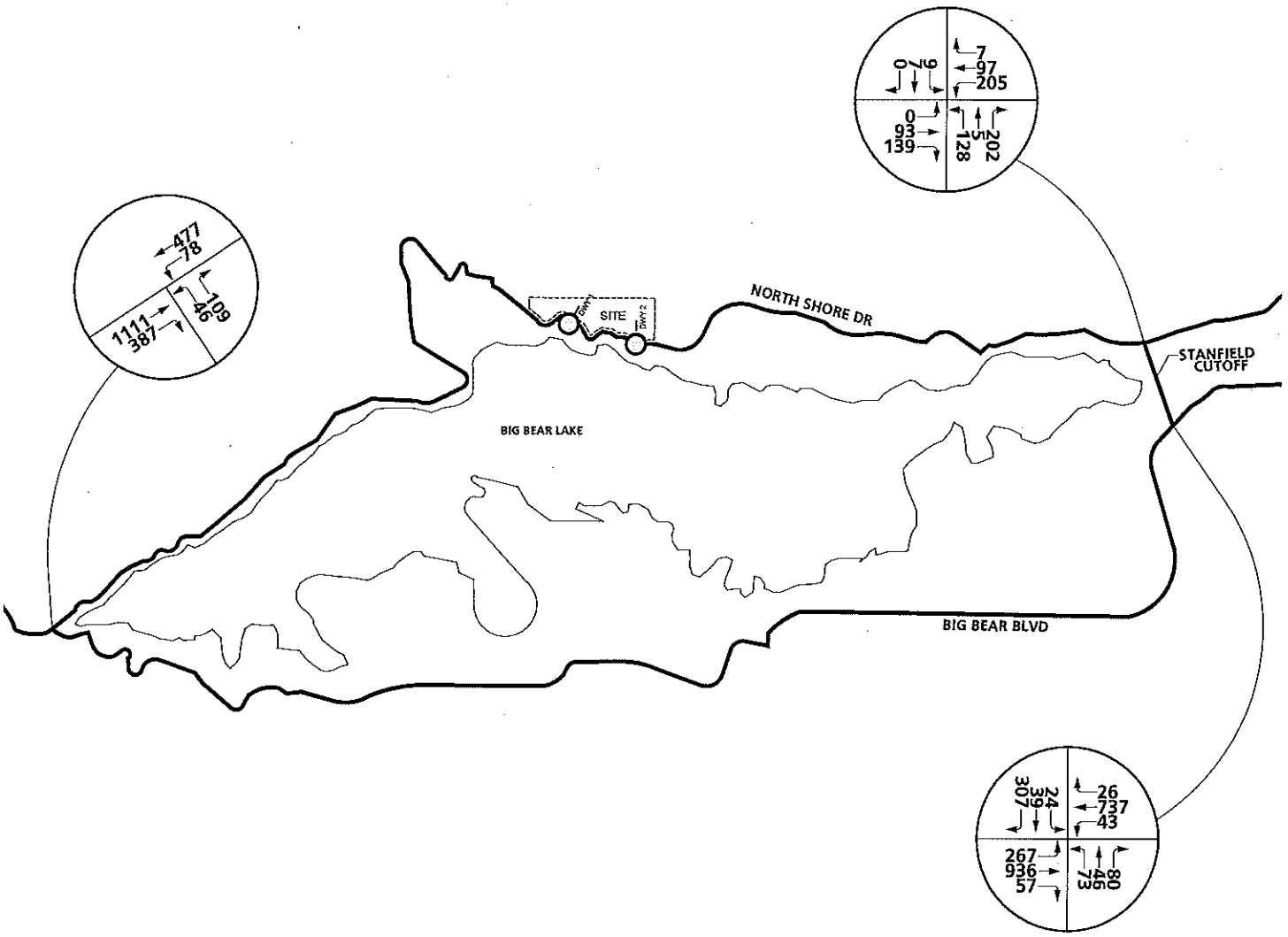
Time of day:			Fleet Mi	
	70.0%	Day	98.0%	Autos
	15.0%	Evening	1.0%	Medium Trucks
	15.0%	Night	1.0%	Heavy Trucks
	100.0%		100.0%	

Notes: Based on methods of Federal Highway Administration "Highway Traffic Noise Model", FHWA-RD-77-108, December, 1978.
Traffic data obtained from DKS Associates

D.2 - Exhibit 3-D, Existing Sunday Mid-Day Peak Hour Intersection Volumes (Urban Crossroads, No Date)

EXHIBIT 3-D

EXISTING SUNDAY MID-DAY PEAK HOUR INTERSECTION VOLUMES



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URBAN CROSSROADS

Appendix E:
Traffic Impact Analysis

E.1 - Traffic Study
(Urban Crossroads, April 2007)

URBAN
CROSSROADS

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MOON CAMP
TRAFFIC IMPACT ANALYSIS
COUNTY OF SAN BERNARDINO, CALIFORNIA

April 24, 2007

JN:04409-02
SS :RA :JCS

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MOON CAMP
TRAFFIC IMPACT ANALYSIS
COUNTY OF SAN BERNARDINO, CALIFORNIA

1.0 INTRODUCTION

This report summarizes the traffic impact analysis conducted to assess the potential impacts of the proposed Moon Camp residential development on the roadway system in the study area. The proposed development is generally located along North Shore Drive in the County of San Bernardino. The Moon Camp residential project is proposed to include 50 new single-family detached dwelling units and three lots for open space and common area on approximately 62.43 acres. The general location of the project site is presented on Exhibit 1-A.

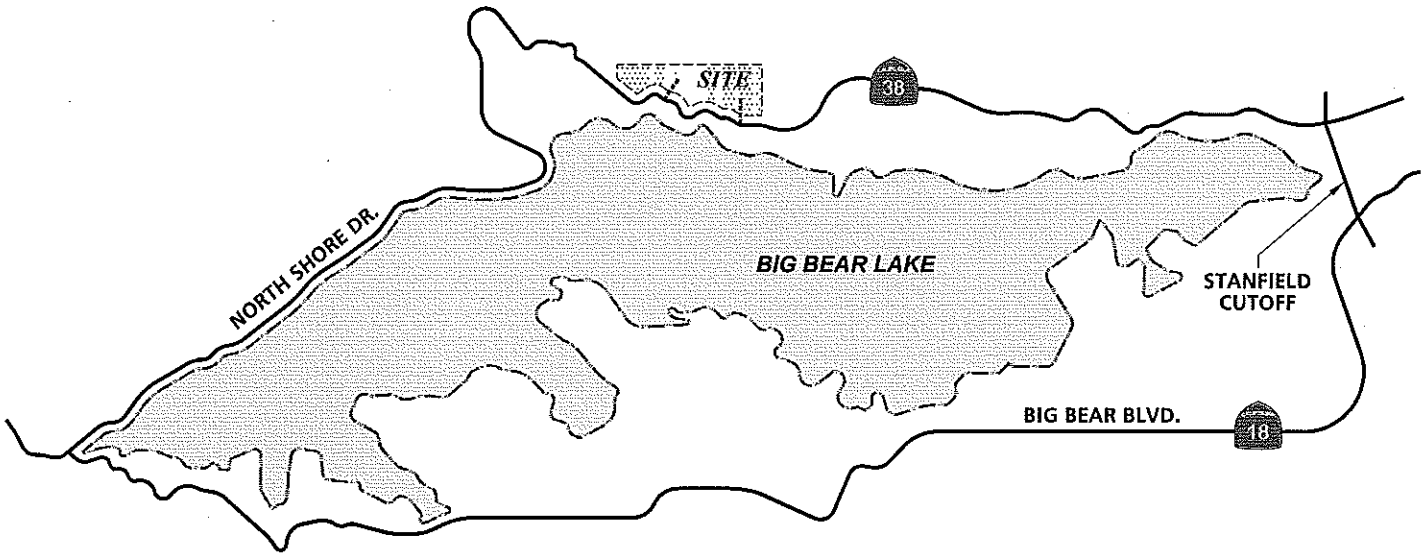
In conformance with the requirements of the San Bernardino County Congestion Management Program (CMP), the proposed project does not require a CMP traffic study. The CMP requires no analysis for projects generating less than 250 peak hour trips. The project generates approximately 51 and 51 trips during the AM and PM peak hours, respectively; which is less than the required threshold for a CMP traffic study. However, per discussion with County staff, the traffic study should follow CMP guidelines and a long-range traffic analysis is required.

The introduction to this report presents an overview of the project and provides a brief description of the study area. The analysis methodologies used to evaluate the impacts of the project are described and the definitions of roadway system deficiencies and significant project impacts are presented in the context of the County of San Bernardino and CEQA requirements.

Subsequent sections of the report will describe the project in detail and provide a complete description of existing and projected traffic conditions within the study area.

EXHIBIT 1-A

LOCATION MAP



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MOON CAMP TIA, San Bernardino County, California - 04409:01 (REVISED)

URBAN CROSSROADS

1.1 Project Overview

The proposed Moon Camp residential development is generally located north of North Shore Drive south of Flicker Road and east of Canyon Road in San Bernardino County. The Moon Camp residential project is proposed to include 50 new single-family detached dwelling units and three open space lots and common area. Exhibit 1-B illustrates the site plan.

There are two (2) primary full access points to the project site located off North Shore Drive.

Additional detailed discussion of the roadway network features of the project and its traffic generation characteristics will be provided in subsequent sections of this report.

1.2 Study Area

The overall study area evaluated in this study is presented on Exhibit 1-A. Based on discussion with County transportation staff, the study area includes the following existing study intersections:

Stanfield Cutoff (NS) at:

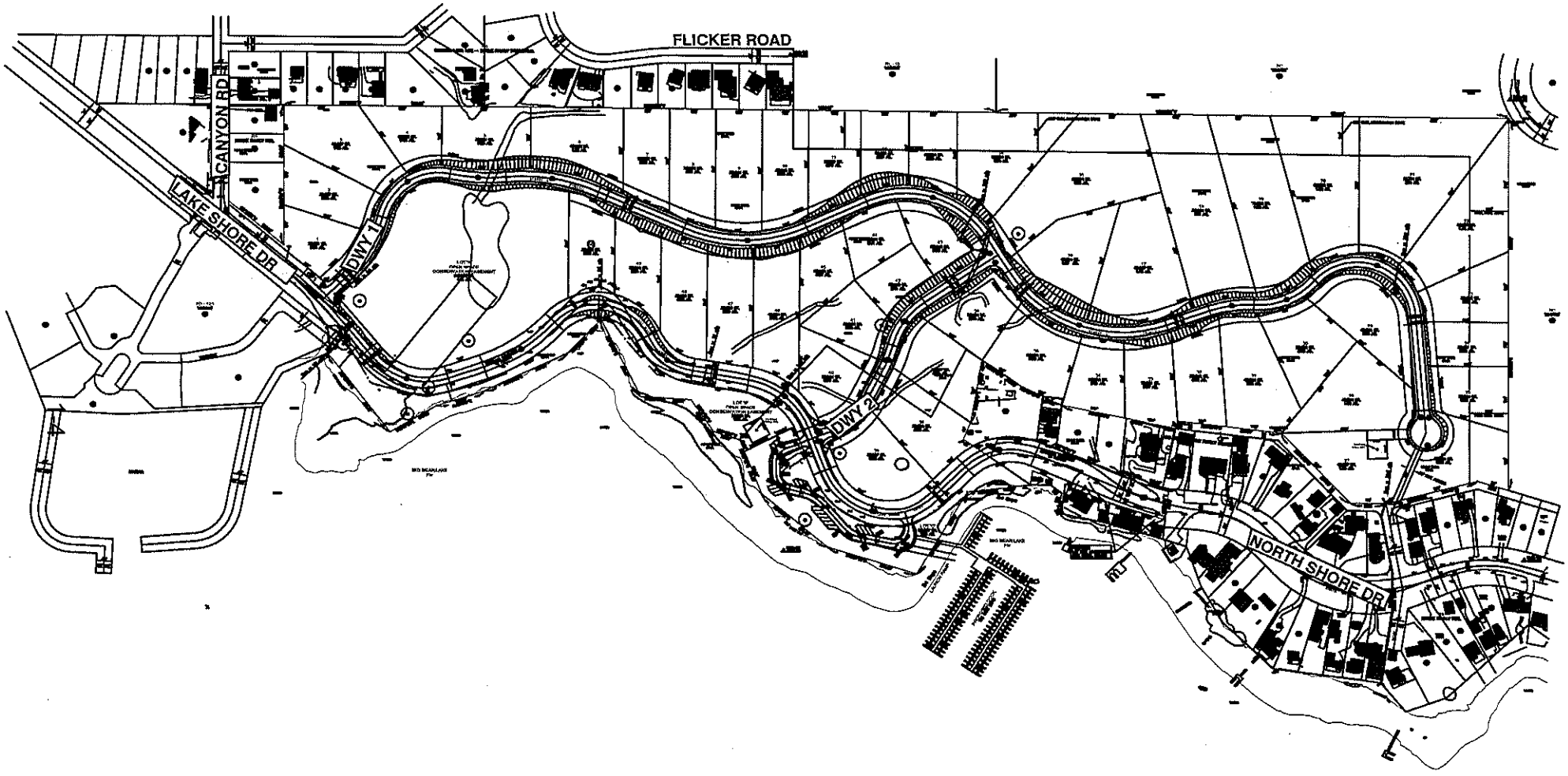
- North Shore Drive (SR-38) (EW)
- Big Bear Boulevard (SR-18) (EW)

North Shore Drive (SR-38) (NS) at:

- Big Bear Boulevard (SR-18) (EW)

EXHIBIT 1-B

SITE PLAN



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URBAN CROSSROADS

1.3 Analysis Methodologies

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are consistent with the San Bernardino County Congestion Management Program. The following analysis years are considered in this report:

- Existing Condition – 2007
- Interim Year – 2010
- Long Range – 2030

The overall methodologies used to develop future traffic volume forecasts, and the explicit traffic operations analysis methodologies are summarized herein. The primary section of interest to the non-technically oriented reviewer is Section 1.4.2 (Definition of Significant Impact).

1.3.1 Overall Analysis Methodology

As described previously, traffic conditions are evaluated in this report for existing conditions, 2010 Interim Year Without Project conditions, 2010 Interim Year With Project conditions, and Long Range General Plan Buildout (2030) conditions.

Actual traffic count data was obtained from manual intersection counts (conducted in March 2007, see Appendix "A") to quantify existing traffic conditions. Per discussion with County staff, the peak season of the study area occurs during the summer months, thus a 16% growth is applied to manual intersection counts to represent existing peak hour intersection volumes.

Project traffic volumes for all future conditions were estimated using the manual approach. Trip generation has been estimated based on data collected by the Institute of Transportation Engineers (ITE). The project trip distribution was derived from a select zone run of the San Bernardino Mountain Model.

Interim Year conditions have been estimated based on areawide growth (other projects that are approved, pending, or under construction) and the addition of the project related peak hour volumes. An area-wide growth of 2% per year is applied to adjusted existing volumes (with 16% growth).

The Interim Year 2010 without project traffic volumes are estimated based on the 2007 existing traffic volumes (with 16% adjustment) plus the 2007 to 2010 background growth volumes (2%) plus the known cumulative development volumes.

Project traffic volumes for all future conditions were estimated using the manual approach described in the CMP guidelines. The trip generation calculation is based on the most recent Institute of Transportation Engineers Trip Generation Rates, 7th Edition. The project trip distribution was developed from a select zone run of the San Bernardino Mountain Model and was reviewed by the County of San Bernardino staff. The project only traffic forecasts have been generated by applying the trip generation, distribution and traffic assignment calculations.

Long Range General Plan Buildout (2030) conditions have been estimated based on the San Bernardino Mountain Model and the addition of both the project related peak hour volumes and the known cumulative development peak hour volumes per discussions with County staff.

1.3.2 Traffic Operations Analysis

The current technical guide to the evaluation of traffic operations is the 2000 Highway Capacity Manual (HCM) (Transportation Research Board Special Report 209). The HCM defines level of service as a qualitative measure which describes operational conditions within a traffic stream, generally in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. The criteria used to evaluate LOS (Level of Service) conditions vary based on the type of roadway and whether the traffic flow is considered interrupted or uninterrupted. The definitions of level of service for uninterrupted flow (flow unrestrained by the existence of traffic control devices) are:

- LOS "A" represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream.

- LOS "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.

- LOS "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.

- LOS "D" represents high-density but stable flow. Speed and freedom to maneuver are severely restricted, and the driver experiences a generally poor level of comfort and convenience.

- LOS "E" represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Small increases in flow will cause breakdowns in traffic movement.

- LOS "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.

Uninterrupted flow is generally found only on limited access (freeway) facilities in urban areas. The definitions of level of service for interrupted traffic flow (flow restrained by the existence of traffic signals and other traffic control devices) differ slightly depending on the type of traffic control.

The level of service is typically dependent on the quality of traffic flow at the intersections along a roadway. The HCM methodology expresses the level of service at an intersection in terms of delay time for the various intersection approaches. The HCM uses different procedures depending on the type of intersection control. The levels of service determined in this study are calculated using the HCM methodology.

For signalized intersections, average total delay per vehicle for the overall intersection is used to determine level of service. Levels of service at signalized study intersections have been evaluated using an HCM intersection analysis program.

The study area intersections which are stop sign controlled with stop-control on the minor street only have been analyzed using the two-way stop

controlled unsignalized intersection analysis methodology of the HCM. For these intersections, the calculation of level of service is dependent on the occurrence of gaps occurring in the traffic flow of the main street. Using data collected describing the intersection configuration and traffic volumes at these locations to calculate average intersection delay; the level of service has been calculated. The level of service criteria for this type of intersection analysis is based on total delay per vehicle for the worst minor street movement(s).

The levels of service are defined in terms of average delay for the intersection analysis methodology as follows:

LEVEL OF SERVICE	AVERAGE TOTAL DELAY PER VEHICLE (SECONDS)	
	SIGNALIZED	UNSIGNALIZED
A	0 to 10.00	0 to 10.00
B	10.1 to 20.00	10.01 to 15.00
C	20.1 to 35.00	15.01 to 25.00
D	35.1 to 55.00	25.01 to 35.00
E	55.1 to 80.00	35.01 to 50.00
F	Over 80.0 or V/C ≥ 1.00	50.01 and up

Per the CMP guidelines, signalized intersections are considered deficient (LOS "F") if the overall intersection critical volume to capacity (V/C) ratio equals or exceeds 1.0, even if the level of service defined by the delay value is below the defined LOS standard. The V/C ratio is defined as the critical volumes divided by the intersection capacity. A V/C ratio greater than 1.0 implies an infinite queue.

The LOS analysis for signalized intersections has been performed using optimized signal timing. This analysis has included an assumed lost time of two seconds per phase in accordance with San Bernardino CMP recommended default values. Signal timing optimization has considered pedestrian safety and signal coordination requirements. Appropriate time for pedestrian crossing have also been considered in the signalized intersection analysis. The following formula has been used to calculate the pedestrian minimum times for all HCM runs:

[(Curb to Curb distance) / (4 feet/second)] + 5 seconds

The resulting minimum green times are shown in the appendices for each analyzed scenario. Saturation flow rates of 1,800 vehicles per hour of green (vphg) for through and right-turn lanes and 1,700 vphg for single left-turn lanes, 1,600 vphg per lane for dual left-turn lanes, and 1,500 vphg per lane for triple left-turn lanes have been assumed for all capacity analysis under 2007 Existing and 2010 Interim Year conditions. Under 2030 Horizon Year conditions, saturation flow rates of 1,900 vphg for through and right-turn lanes and 1,800 vphg for single left-turn lanes, 1,700 vphg per lane for dual left-turn lanes, and 1,600 vphg per lane for triple left-turn lanes have been assumed. These are the default values recommended by the CMP guidelines.

The 2030 peak hour factor has been adjusted upwards to 0.95. This is specifically allowed by the San Bernardino CMP guidelines to account for the effects of congestion on peak spreading. Peak spreading refers to the tendency of traffic to spread more evenly across time as congestion increases.

1.4 Definition of Deficiency and Significant Impact

The following definitions of deficiencies and significant impacts have been developed in accordance with the County of San Bernardino requirements.

1.4.1 Definition of Deficiency

County of San Bernardino guidelines indicate that peak hour intersection operations of LOS "C" or better are considered acceptable. Therefore, any intersection operating at LOS "D" or worse is considered deficient. Per CMP direction, state controlled facilities (state highways, freeway ramp intersection, etc.) are subject to local jurisdiction (California Department of Transportation) traffic operations requirements, with no greater than 45 seconds average stopped delay per vehicle allowed during peak hour operations (middle of LOS "D")

The identification of a CMP deficiency requires further analysis in satisfaction of CMP and County requirements, including:

- Evaluation of the mitigation measures required to restore traffic operations to an acceptable level of service with respect to CMP and local jurisdiction LOS standards.
- Calculation of the project share of new traffic on the impacted CMP facility during peak hours of traffic.
- Estimation of the cost required to implement the improvements required to restore traffic operations to an acceptable level of service as described above.

This study incorporates each of these aspects for all locations where a CMP deficiency is identified.

1.4.2 Definition of Significant Impact

The identification of significant impacts is a requirement of CEQA, and is not directly addressed in the CMP document. The County of San Bernardino General Plan and Circulation Element have been adopted in accordance with CEQA requirements, and any roadway improvements within the County of San Bernardino which are consistent with these documents are not considered a significant impact, so long as the project contributes its "fair share" funding for improvements.

A traffic impact is considered significant and immitigable if the project both: i) contributes measurable traffic to and ii) substantially and adversely changes the level of service at any off-site location projected to experience deficient operations under foreseeable cumulative conditions, where feasible improvements consistent with the County of San Bernardino General Plan cannot be constructed.

2.0 PROJECT DESCRIPTION

This section describes the project land uses and traffic characteristics for each of the future conditions analyzed.

2.1 Project Description

The proposed Moon Camp residential development is located along North Shore Drive in the County of San Bernardino. The Moon Camp residential project is proposed to include 50 new single-family detached dwelling units and one existing single-family detached dwelling unit. Exhibit 1-B (previously presented) illustrates the site plan.

There are two (2) primary full access points to the project site located off North Shore Drive.

2.2 Project Traffic

The traffic related to the project has been calculated in accordance with the following accepted procedural steps:

- Trip Generation
- Trip Distribution
- Traffic Assignment

These steps are described in detail below.

2.2.1 Project Trip Generation

The trip generation calculation is based on the most recent Institute of Transportation Engineers Trip Generation Rates, 7th Edition. Table 2-1 indicates the proposed trip generation rates. As indicated in Table 2-2, the

TABLE 2-1

TRIP GENERATION RATES[1]

LAND USE	ITE CODE	QUANTITY	UNITS[2]	FRIDAY PM PEAK HOUR			SUNDAY MID-DAY PEAK HOUR			DAILY
				IN	OUT	TOTAL	IN	OUT	TOTAL	
PROJECT										
Single Family Residential	210	50	DU	0.64	0.37	1.01	0.64	0.37	1.01	9.57
CUMULATIVE PROJECTS										
Hotel	310	Varies	ROOMS	0.31	0.28	0.59	0.31	0.28	0.59	8.17
Townhomes/Condominium	230	78	DU	0.35	0.17	0.52	0.35	0.17	0.52	5.86
Fast Food Restaurant With Drive-Thru	934	2.5	TSF	18.01	16.63	34.64	18.01	16.63	34.64	496.12
Shopping Center	820	10	TSF	6.57	7.12	13.70	6.57	7.12	13.70	152.03
Shopping Center	820	22.517	TSF	4.99	5.40	10.39	4.99	5.40	10.39	114.43
Automobile Care Center	942	4.375	TSF	1.69	1.69	3.38	1.69	1.69	3.38	20.00
Mini-Warehouse	151	3	AC	1.99	1.84	3.83	1.99	1.84	3.83	38.87
Office	710	6.3	TSF	0.17	0.83	1.00	0.17	0.83	1.00	11.01
Church	560	20	TSF	0.34	0.32	0.66	0.34	0.32	0.66	9.11

[1] Source: ITE (Institute of Transportation Engineers) Trip Generation Manual, 7th Edition, 2003.

[2] DU = Dwelling Units

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TABLE 2-2

PROJECT TRIP GENERATION SUMMARY

LAND USE	QUANTITY	UNITS[1]	FRIDAY PM PEAK HOUR			SUNDAY MID-DAY PEAK HOUR			DAILY
			IN	OUT	TOTAL	IN	OUT	TOTAL	
Single Family Residential	50	DU	32	19	51	32	19	51	479

[1] DU = Dwelling Units

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proposed Moon Camp residential development is projected to generate 479 trip-ends per day with 51 vehicles per hour during the weekday AM peak hour and 51 vehicles per hour during the weekday PM peak hour. It is our understanding that the weekday PM peak hour generates more trips than the Sunday Midday peak hour. Based on discussions with County of San Bernardino staff, weekday PM peak hour trip generation has been used in both Friday PM peak hour analysis and Sunday Mid-day peak hour analysis to represent a conservative worst case condition.

2.2.2 Project Trip Distribution and Assignment

The project trip distribution and assignment process represents the directional orientation of traffic to and from the project site. Trip distribution is heavily influenced by the geographical location of the site, the location of surrounding uses, and the proximity to the regional freeway system.

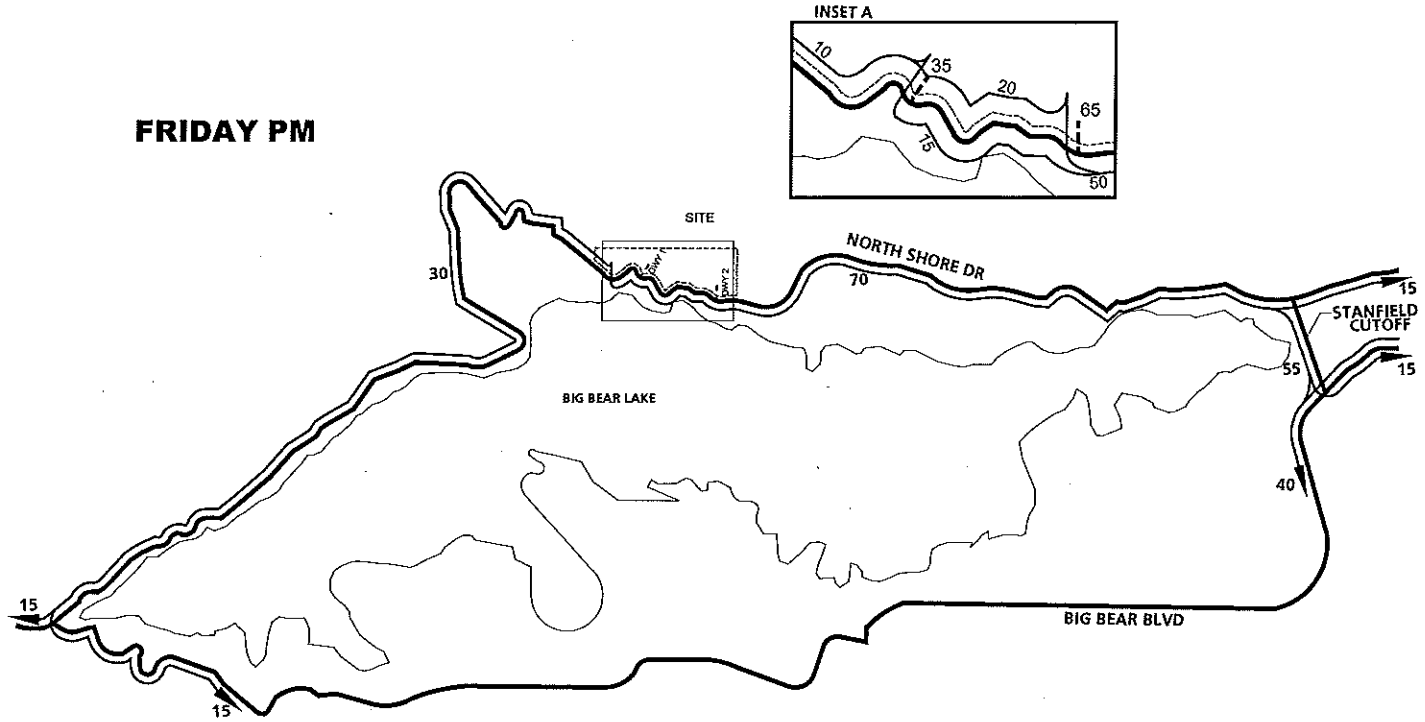
Project trip distribution has been derived from a select zone run of the San Bernardino Mountain Model. The trip distribution pattern for both Friday PM peak and Sunday Mid-day peak is based on the Friday PM distribution per discussions with County staff. Exhibit 2-A illustrates the project trip distribution.

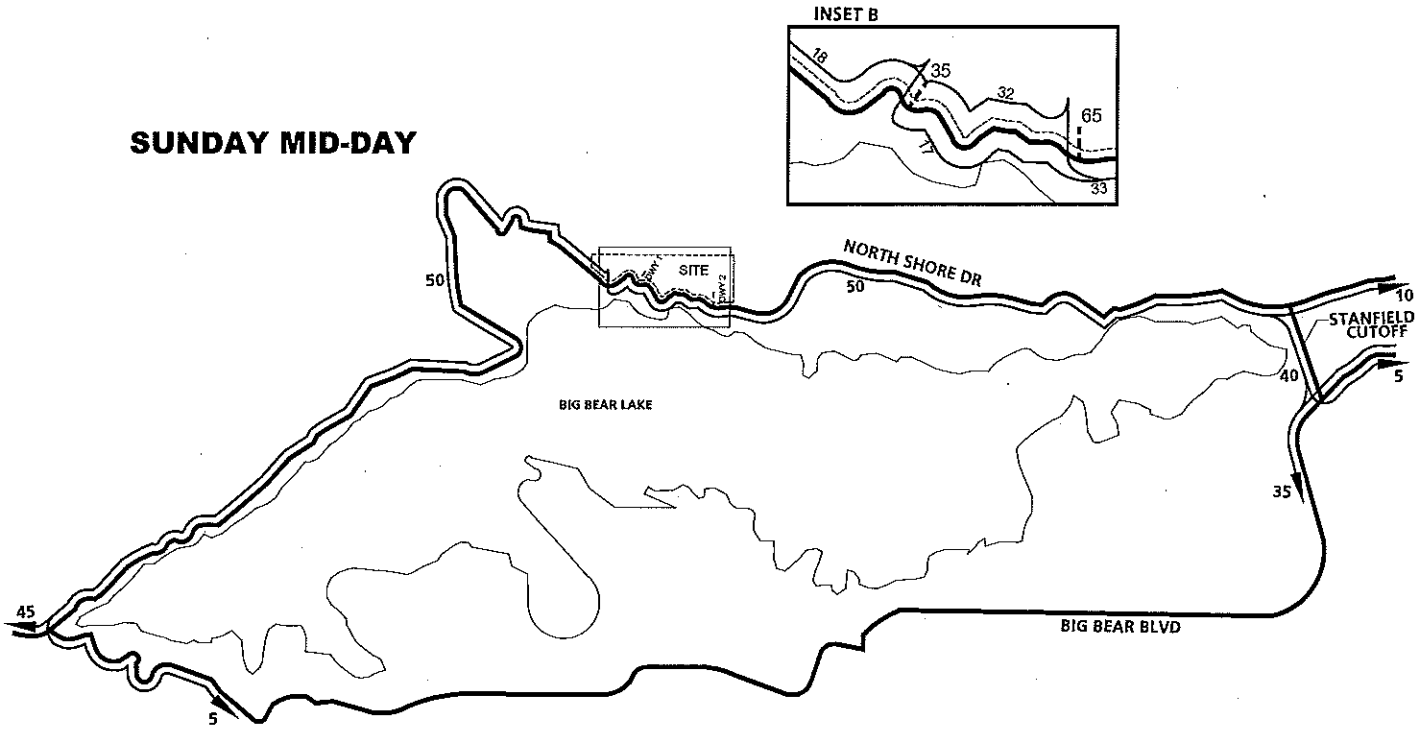
2.2.3 Project Only Traffic Volume Forecasts

The project only traffic forecasts have been generated by applying the trip generation, distribution and traffic assignment calculations. The project ADT volumes are presented on Exhibit 2-B. The project only Friday PM peak hour and Sunday Mid-day peak hour intersection volumes are depicted on Exhibit 2-C.

EXHIBIT 2-A

PROJECT TRIP DISTRIBUTION





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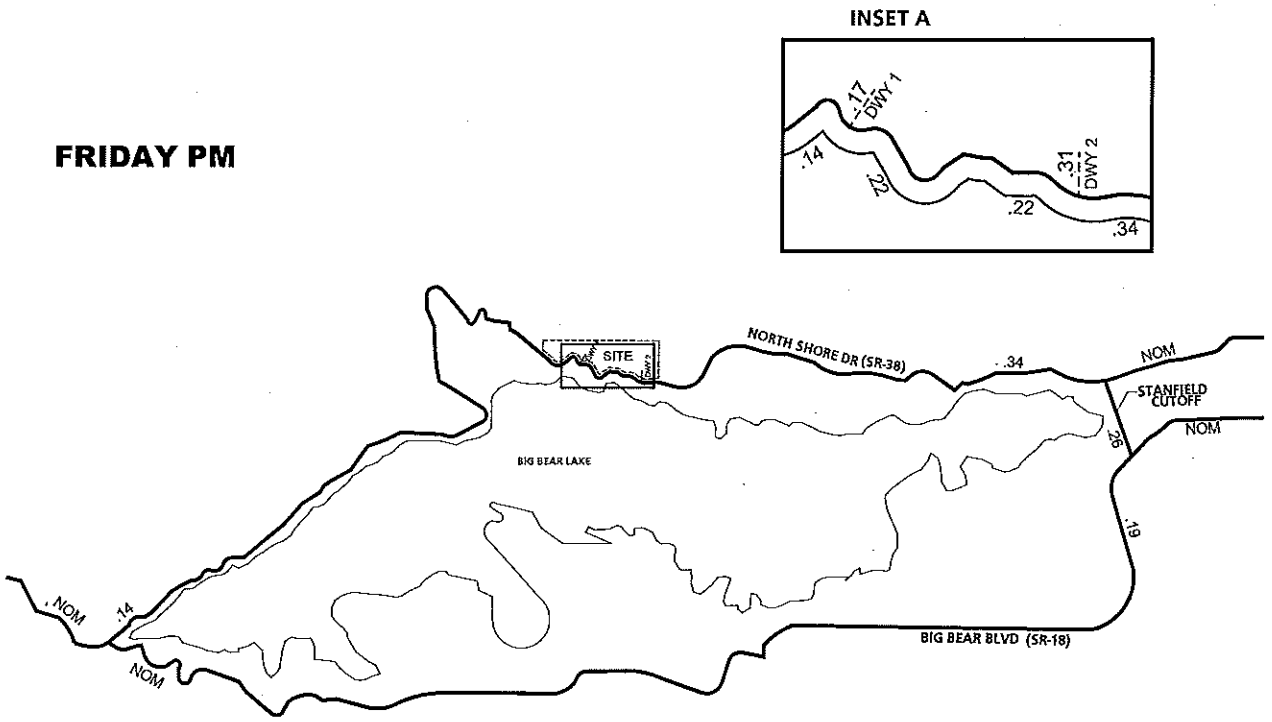
LEGEND:

10 = PERCENT TO/FROM PROJECT

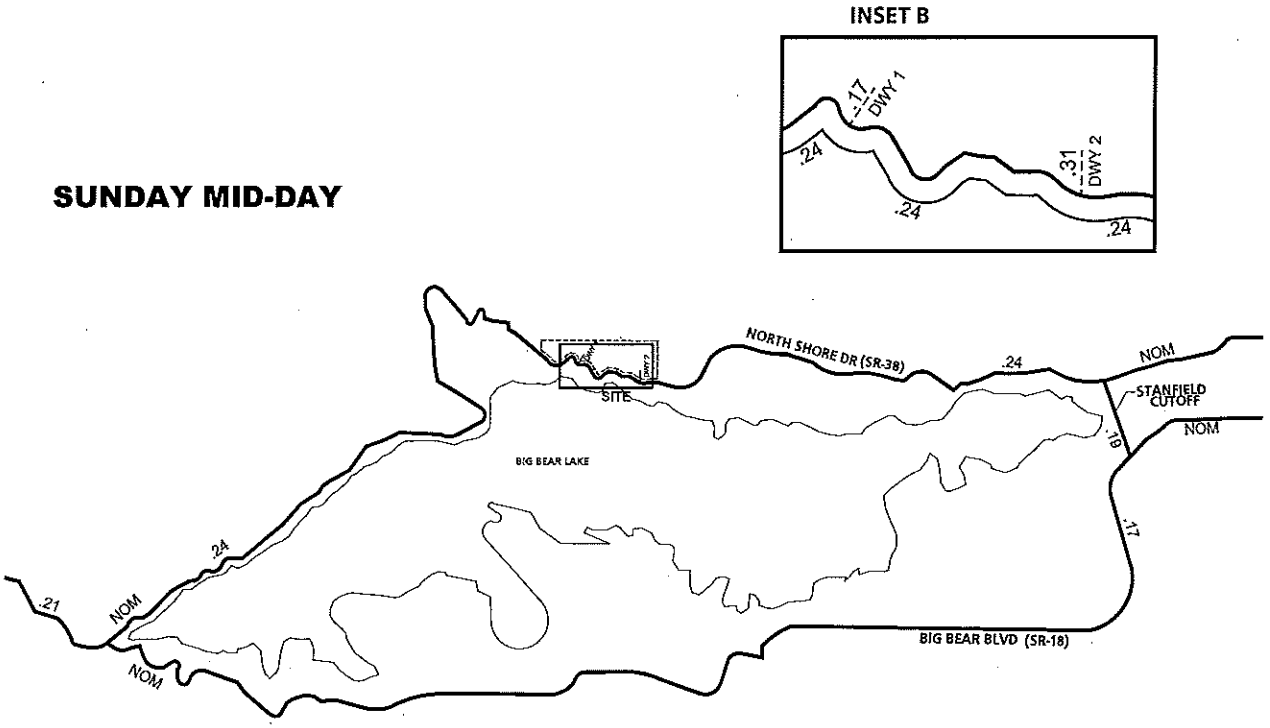
EXHIBIT 2-B

PROJECT AVERAGE DAILY TRAFFIC

FRIDAY PM



SUNDAY MID-DAY



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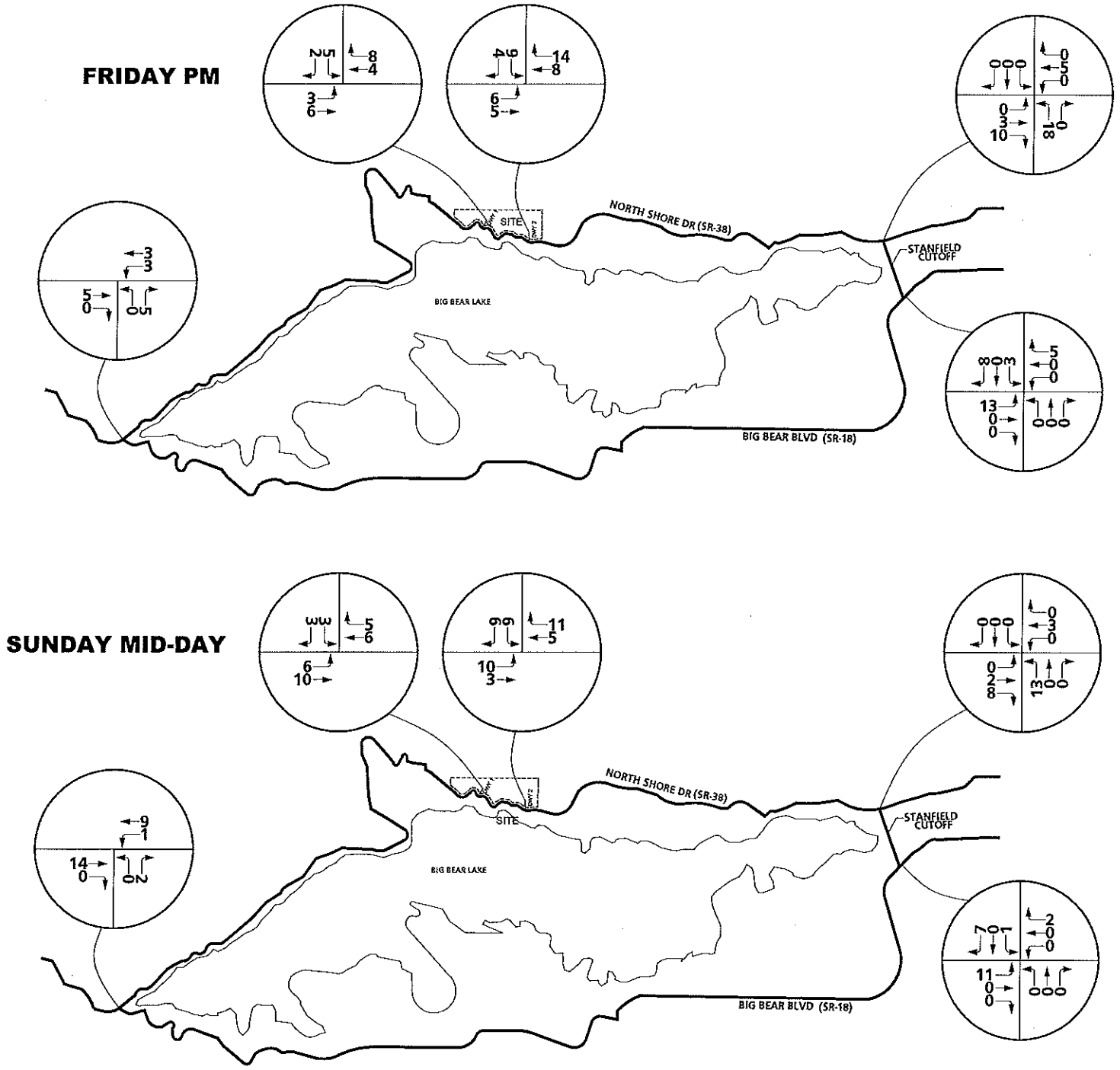
LEGEND:

10.0 = VEHICLES PER DAY (1000'S)
NOM = NOMINAL, LESS THAN 50 VEHICLES PER DAY

URBAN CROSSROADS

EXHIBIT 2-C

PROJECT FRIDAY PM PEAK HOUR / SUNDAY MIDDAY PEAK HOUR INTERSECTION VOLUMES



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3.0 EXISTING CONDITIONS

This section of the report summarizes existing roadway and traffic conditions in the study area. All analysis locations which exist today have been analyzed. The number of through travel lanes for existing roadways and intersection controls are presented, along with existing traffic count data collected for this study. This data was used to analyze existing traffic operations in the study area. Existing plans for roadway improvements are also described in this section.

3.1 Existing Roadway System and Daily Traffic Volumes

The number of through travel lanes for existing roadways and existing intersection controls within the study area are presented on Exhibit 3-A.

Exhibits 3-B and 3-C depict the current average daily traffic (ADT) volumes in the study area on Friday and Sunday, respectively. Existing ADT volumes are estimated based upon the latest traffic data collected by Urban Crossroads, Inc. (see Appendix "A"). Peak hour data has been used to estimate the average daily traffic volumes on each leg using the following formula:

Peak Hour (Approach Volume + Exit Volume) x 12 = Leg Volume.

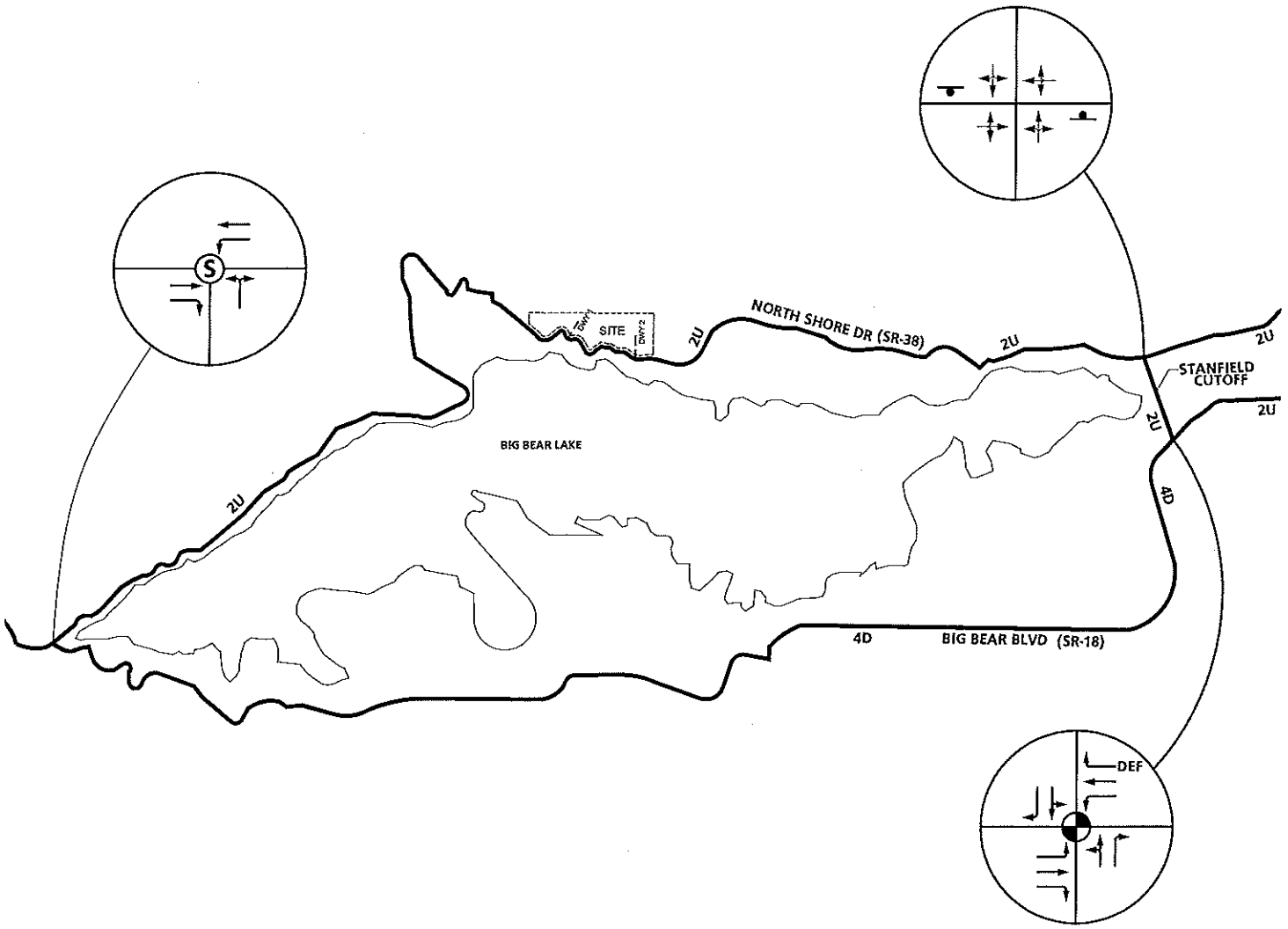
Regional access to the site is provided by North Shore Drive (SR-38)

3.2 Existing Peak Hour Traffic Volumes

Actual traffic count data was obtained from manual intersection counts (March 2007, see Appendix "A") to quantify existing traffic conditions. The Friday PM peak hour traffic volumes were determined by counting the two hour period between 4:00 PM- 6:00 PM in the evening. The Sunday Mid-day peak hour traffic volumes were identified by counting the two hour period from 12:00 PM – 2:00 PM. Per discussions with County staff, since the peak season of the study area occurs during the summer months, a 16% growth is applied to the manual intersection counts to represent existing peak hour intersection volumes.

EXHIBIT 3-A

EXISTING NUMBER OF THROUGH LANES AND INTERSECTION CONTROLS



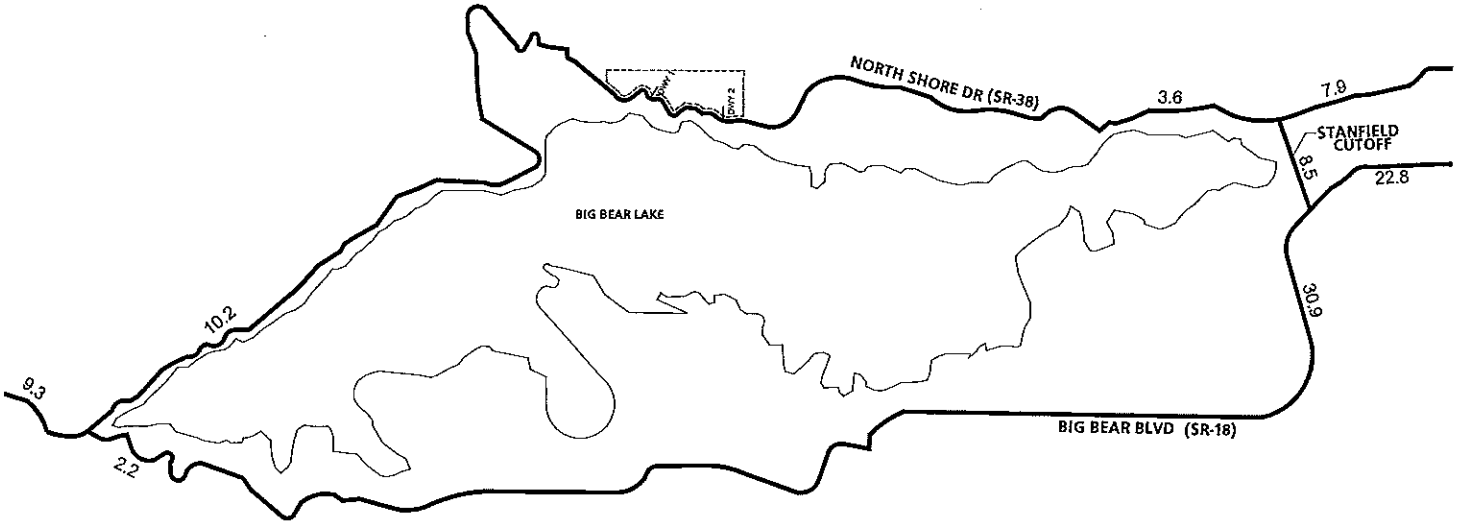
LEGEND:

- = TRAFFIC SIGNAL
- = ALL WAY STOP
- = STOP SIGN
- 4 = NUMBER OF LANES
- D = DIVIDED
- U = UNDIVIDED
- DEF = DEFACTO RIGHT TURN LANE

N

EXHIBIT 3-B

EXISTING FRIDAY AVERAGE DAILY TRAFFIC (ADT)



LEGEND:

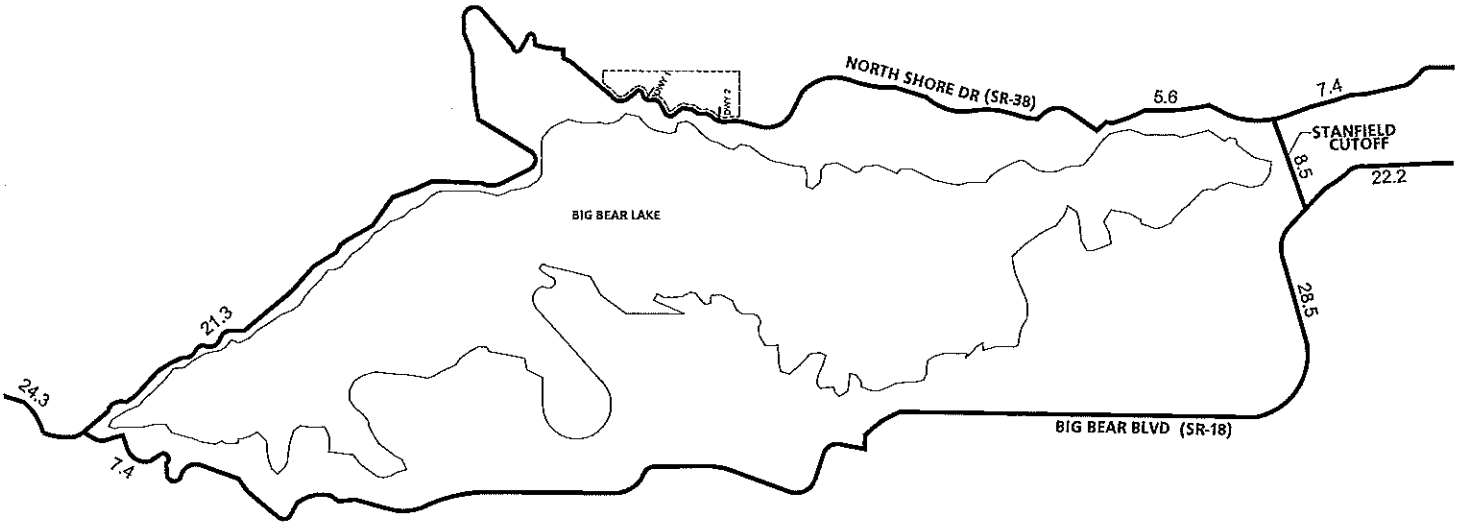
10.0 = VEHICLES PER DAY (1000'S)

N

URBAN CROSSROADS

EXHIBIT 3-C

EXISTING SUNDAY AVERAGE DAILY TRAFFIC (ADT)



LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

N

URBAN CROSSROADS

Existing intersection level of service calculations are based upon the adjusted manual Friday PM and Sunday Mid-day peak hour turning movement counts, as shown on Exhibits 3-D and 3-E.

3.3 Existing Traffic Operations

Existing peak hour traffic operations have been evaluated for both the Friday PM and Sunday Mid-day peak hours of traffic throughout the study area. The results of this analysis are summarized in Table 3-1, along with the existing intersection geometrics and control devices at each analysis location. As indicated in Table 3-1, the following study area intersections are currently operating at an unacceptable level of service during both Friday PM and Sunday Mid-day peak hours:

Big Bear Blvd (SR-18) (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- Big Bear Blvd (SR-18) (EW)

The operations analysis worksheets for existing conditions are included in Appendix "B".

Traffic signal warrant analysis (included in Appendix "C") has been conducted for existing conditions and traffic signals are currently warranted at the following study area intersections:

Big Bear Blvd (SR-18) (NS) at:

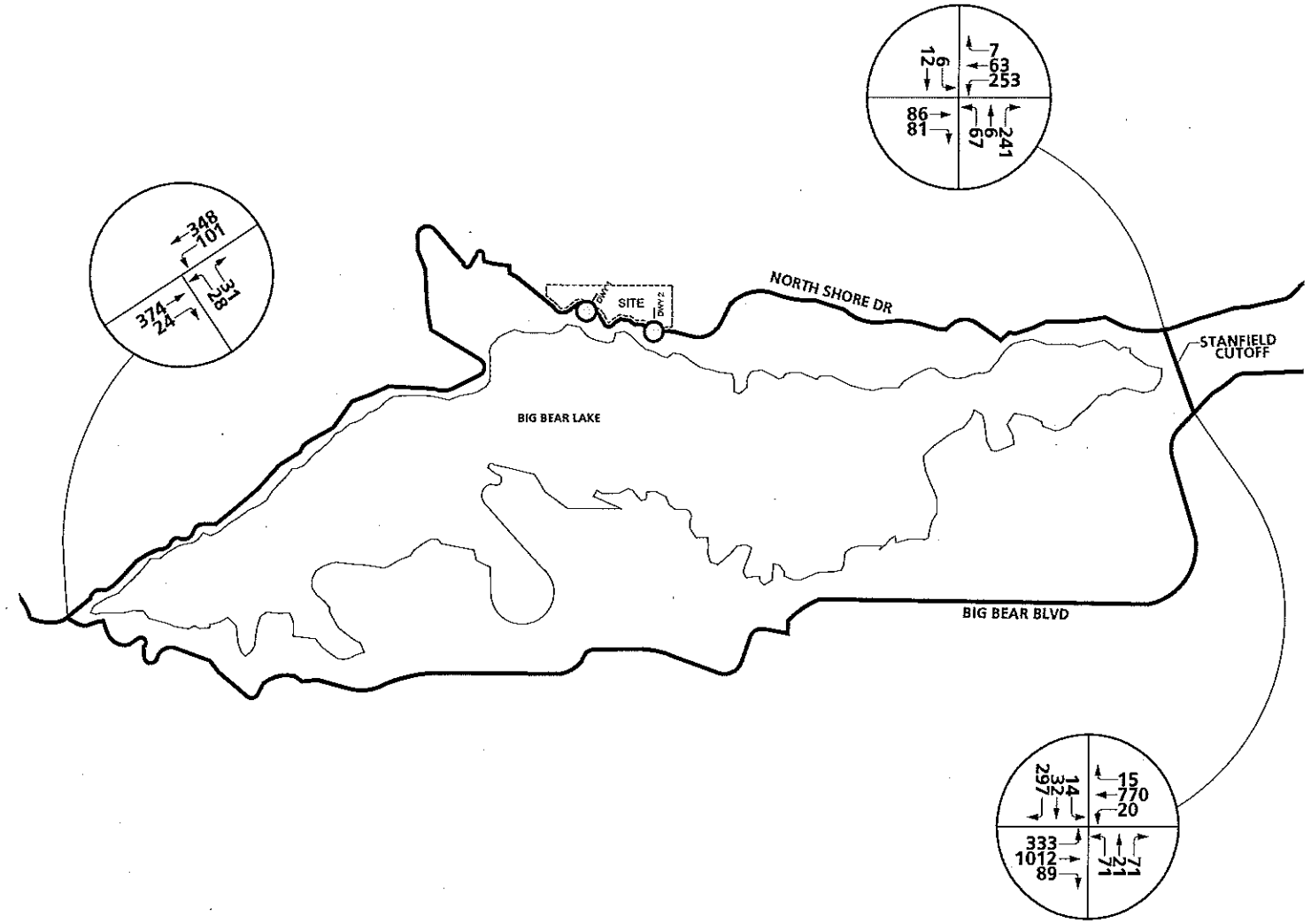
- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- North Shore Drive (SR-38) (EW)

EXHIBIT 3-D

EXISTING FRIDAY PM PEAK HOUR INTERSECTION VOLUMES



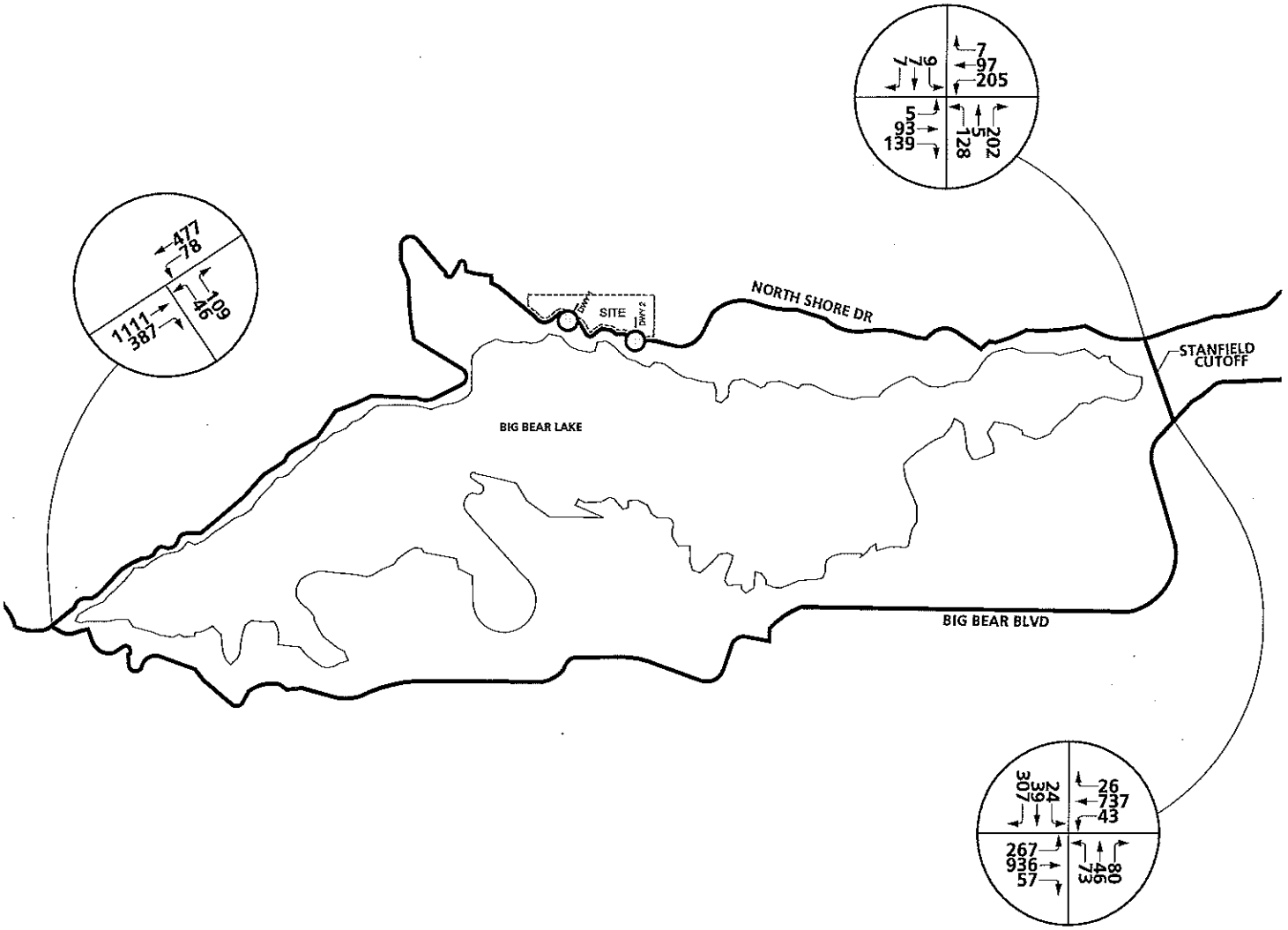
N

MOON CAMP TIA, San Bernardino County, California - 04409 : 04B 3-6 BHL.DWG

URBAN CROSSROADS

EXHIBIT 3-E

EXISTING SUNDAY MID-DAY PEAK HOUR INTERSECTION VOLUMES



N

URBAN CROSSROADS

TABLE 3-1

INTERSECTION ANALYSIS FOR EXISTING CONDITIONS

INTERSECTION	TRAFFIC CONTROL[3]	INTERSECTION APPROACH LANES[1]												DELAY[2] (SECS.)		LEVEL OF SERVICE	
		NORTH-BOUND			SOUTH-BOUND			EAST-BOUND			WEST-BOUND						
		L	T	R	L	T	R	L	T	R	L	T	R	Fri. PM	Sun. MD	Fri. PM	Sun. MD
North Shore Dr. (SR-38) (NS) at:																	
• Big Bear Blvd. (SR-18) (EW)	CSS	0	1	0	0	0	0	0	1	1	1	1	0	22.5	--[4]	C	F
Stanfield Cutoff (NS) at:																	
• North Shore Dr. (SR-38) (EW)	CSS	0	1	0	0	1	0	0	1	0	0	1	0	25.5	34.5	D	D
• Big Bear Blvd. (SR-18) (EW)	TS	0	1	1	0	1	1	1	1	1	1	1	1	--[4]	81.1	F	F

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right;

[2] Delay and level of service calculated using the following analysis software: Traffix, Version 7.8 R3 (2006). Per the 2000 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with traffic traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for worst individual movement (or movements sharing a single lane) are shown.

[3] TS = Traffic Signal
CSS = Cross Street Stop

[4] -- = Delay High, Intersection Unstable, Level of Service "F".

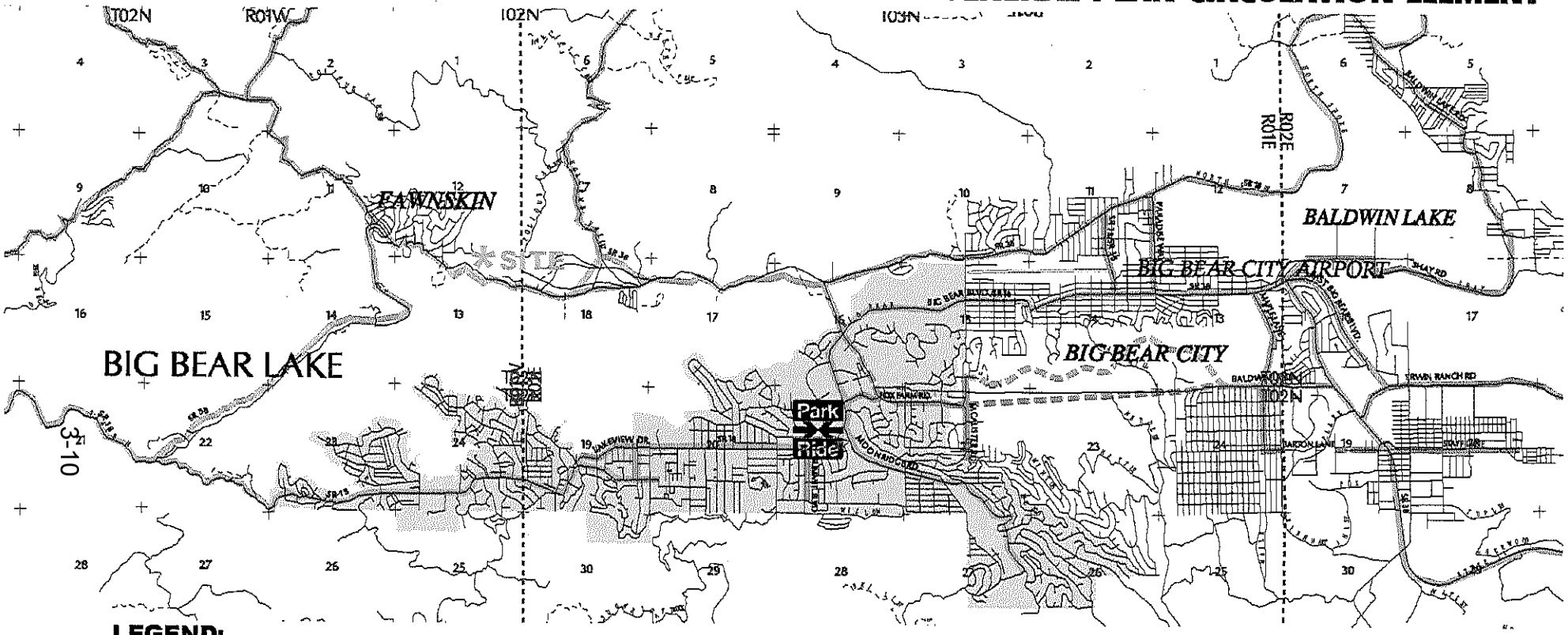
S:\Carlsbad_Jobs_04400\04409\excel\[04409-05.xls]T 3-1

3.4 Planned Transportation Improvements and Relationships to General Plan

The long-range transportation system within the study area is expected to undergo significant improvement as a result of work to be performed by Caltrans, the County of San Bernardino, and City of Big Bear Lake. The County of San Bernardino General Plan Circulation Element and General Plan roadway cross-sections are shown on Exhibits 3-F and 3-G, respectively. The City of Big Bear Lake General Plan Circulation Element and General Plan roadway cross-sections are shown on Exhibits 3-H and 3-I, respectively.

EXHIBIT 3-F

SAN BERNARDINO COUNTY GENERAL PLAN CIRCULATION ELEMENT



LEGEND:

Circulation and Transportation

EXISTING PROPOSED

- Freeway
- Major Divided Highway
- Major Arterial Highway
- Major Highway
- Secondary Highway
- Controlled/Limited Access Collector
- Mountain Major Highway
- Secondary Highway
- Controlled/Limited Access Collector
- Mountain Major Highway
- Mountain Secondary Highway
- State Highway (Special Standards or Conditions)
- Railroads
- Park Ride — Ridesharing Facilities

N

Airport Runways

Runway location

Map data compiled on 7 and 1/2 and 1 rangle maps by J. J. VanHouton and A

Positional accuracy of map data is a 750 feet

Jurisdictional Control

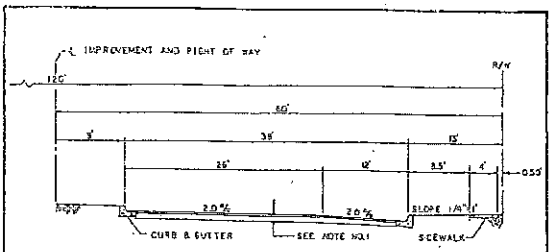
Private Unincorporated Lands

- Bureau of Land Management
- National Parks and Monuments, National Forests and Wildlife Refuges
- Military Reservations (Includes U.S. Army, Navy, Air Force, and Army, Corps of Engineers)
- State, County, and Municipal Lands
- Indian Lands and Reservations
- Unclassed Water Body
- Incorporated Cities

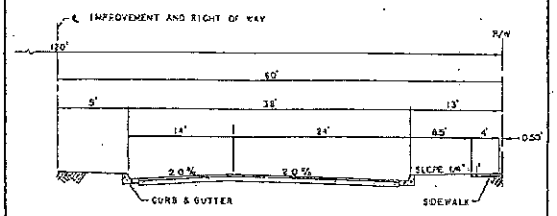
URBAN CROSSROADS

EXHIBIT 3-G

SAN BERNARDINO COUNTY GENERAL PLAN ROADWAY CROSS-SECTIONS (PAGE 1 OF 2)



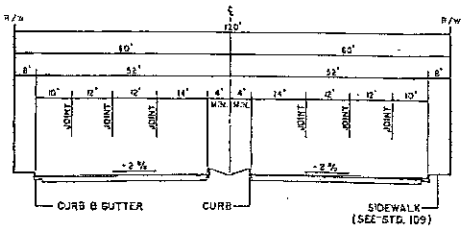
TYPICAL HALF SECTION



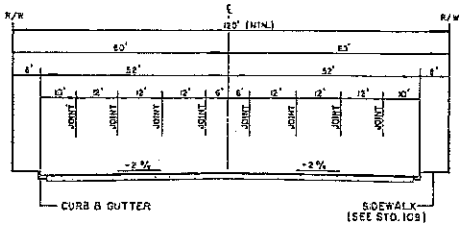
TYPICAL HALF SECTION

NOTES:
1. STRUCTURAL SECTION OF ROADWAY SHALL BE DETERMINED FROM SOILS TESTS AND SO INDICATED ON CONSTRUCTION PLANS.
2. CONSTRUCTION OUTSIDE R/W LINE SHALL REQUIRE SLOPE EASEMENTS.

SAN BERNARDINO COUNTY ROAD DEPARTMENT		
DATE Nov. 6-69 REV. 1-1-72	KEN A. MILLER Director of Transportation	MAJOR DIVIDED HIGHWAY	100



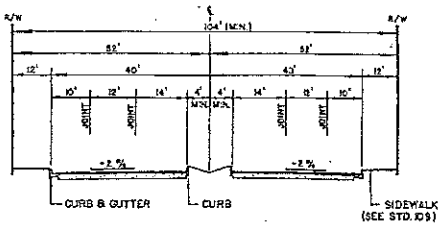
TYPICAL SECTION
WITH RAISED MEDIAN



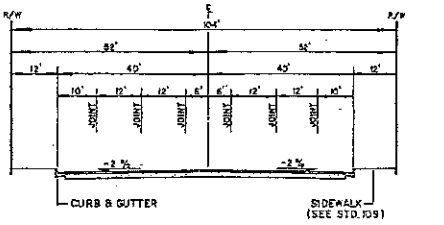
TYPICAL SECTION
WITH CONTINUOUS LEFT TURN LANE

NOTES:
1. STRUCTURAL SECTION OF ROADWAY SHALL BE DETERMINED FROM SOILS TESTS AND SO INDICATED ON CONSTRUCTION PLANS.
2. DRAINAGE FACILITIES SHALL BE PROVIDED TO DEWATER RAISED MEDIAN AREAS.
3. 10' SHOULDER AREAS MAY BE DESIGNATED AS A BIKE LANE AND EMERGENCY PARKING ONLY.

SAN BERNARDINO COUNTY TRANSPORTATION DEPARTMENT		
DATE FEB 12 '71	JOHN R. SHONE DIRECTOR OF TRANSPORTATION	MAJOR ARTERIAL	100 A



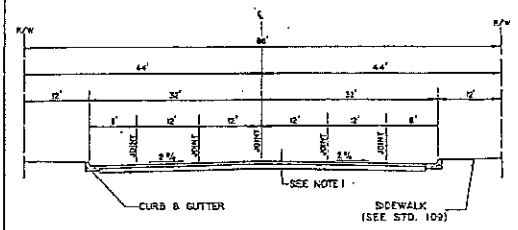
TYPICAL SECTION
WITH RAISED MEDIAN



TYPICAL SECTION
WITH CONTINUOUS LEFT TURN LANE

NOTES:
1. STRUCTURAL SECTION OF ROADWAY SHALL BE DETERMINED FROM SOILS TESTS AND SO INDICATED ON CONSTRUCTION PLANS.
2. DRAINAGE FACILITIES SHALL BE PROVIDED TO DEWATER RAISED MEDIAN AREAS.
3. 10' SHOULDER AREAS MAY BE DESIGNATED AS A BIKE LANE AND EMERGENCY PARKING ONLY.

SAN BERNARDINO COUNTY TRANSPORTATION DEPARTMENT		
DATE FEB 12 '71	JOHN R. SHONE DIRECTOR OF TRANSPORTATION	MAJOR HIGHWAY	101



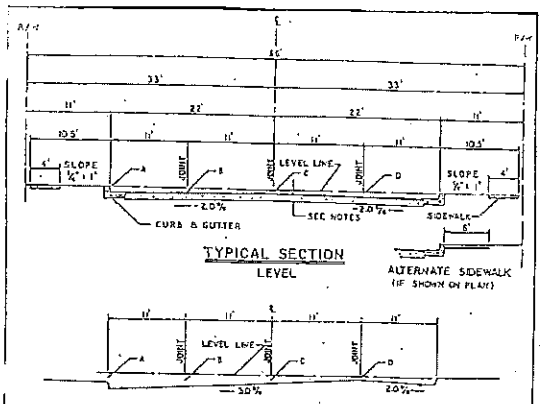
TYPICAL SECTION

NOTES:
1. STRUCTURAL SECTION OF ROADWAY SHALL BE DETERMINED FROM SOILS TESTS AND SO INDICATED ON CONSTRUCTION PLANS.
2. 8' SHOULDER AREAS MAY BE DESIGNATED AS A BIKE LANE AND EMERGENCY PARKING ONLY.

SAN BERNARDINO COUNTY TRANSPORTATION DEPARTMENT		
DATE DEC 4 '71 REV. 12-8-71	JOHN R. SHONE DIRECTOR OF TRANSPORTATION	SECONDARY HIGHWAY	102

EXHIBIT 3-G

SAN BERNARDINO COUNTY GENERAL PLAN ROADWAY CROSS-SECTIONS (PAGE 2 OF 2)



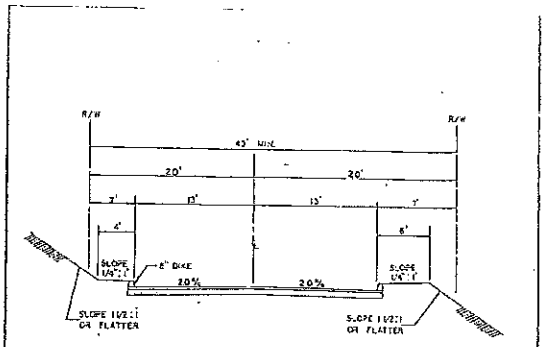
TYPICAL SECTION
TILT

		A	B	C	D
8" CURB	LEVEL	0.00'	0.36'	0.14'	0.36'
	TILT	0.75'	1.02'	0.69'	0.35'
6" CURB	LEVEL	0.02'	0.19'	(0.03')	0.19'
	TILT	0.76'	0.85'	0.52'	0.19'

( ) INDICATES ABOVE LEVEL LINE

NOTE.
1. STRUCTURAL SECTION OF ROADWAY SHALL BE DETERMINED FROM SOILS TESTS AND SO INDICATED ON CONSTRUCTION PLANS.
2. MINIMUM DESIGN PAVING THICKNESS SHALL BE 0.25' ASPHALT CONCRETE.
3. CONSTRUCTION OUTSIDE R/W WILL REQUIRE SLOPE EASEMENTS.

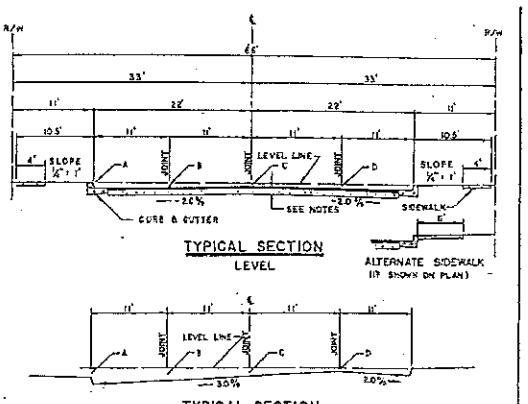
SAN BERNARDINO COUNTY TRANS. DEPT.		
KEN A. MILLER Director of Transportation	CONTROLLED LIMITED ACCESS COLLECTOR	103 A



TYPICAL SECTION
MOUNTAIN AREAS

NOTES:
1. STRUCTURAL SECTION OF ROADWAY SHALL BE DETERMINED FROM SOILS TESTS AND SO INDICATED ON CONSTRUCTION PLANS.
2. CONSTRUCTION OUTSIDE R/W LINE SHALL REQUIRE SLOPE EASEMENTS.
3. SLOPE REQUIREMENT MAY BE VARIED BY SUBMISSION OF SOILS REPORT.

SAN BERNARDINO COUNTY ROAD DEPARTMENT		
KEN A. MILLER Director of Transportation	MOUNTAIN LOCAL PAVED ROAD	114b



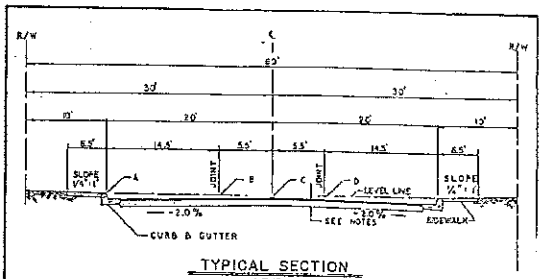
TYPICAL SECTION
TILT

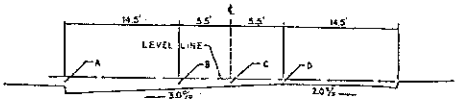
		A	B	C	D
8" CURB	LEVEL	0.00'	0.36'	0.14'	0.36'
	TILT	0.75'	1.02'	0.69'	0.36'
6" CURB	LEVEL	0.00'	0.19'	(0.03')	0.19'
	TILT	0.76'	0.85'	0.52'	0.19'

( ) INDICATES ABOVE LEVEL LINE

NOTE
1. STRUCTURAL SECTION OF ROADWAY SHALL BE DETERMINED FROM SOILS TESTS AND SO INDICATED ON CONSTRUCTION PLANS.
2. MINIMUM DESIGN PAVING THICKNESS SHALL BE 0.25' ASPHALT CONCRETE.
3. CONSTRUCTION OUTSIDE R/W WILL REQUIRE SLOPE EASEMENTS.

SAN BERNARDINO COUNTY ROAD DEPARTMENT		
John R. Shoja COUNTY HIGHWAY ENGINEER	COLLECTOR STREET	103





TYPICAL SECTION
TILT

		A	B	C	D
8" CURB	LEVEL	0.00'	0.28'	0.18'	0.29'
	TILT	0.46'	0.62'	0.46'	0.29'
6" CURB	LEVEL	0.00	0.12'	0.01'	0.12'
	TILT	0.46'	0.45'	0.29'	0.12'

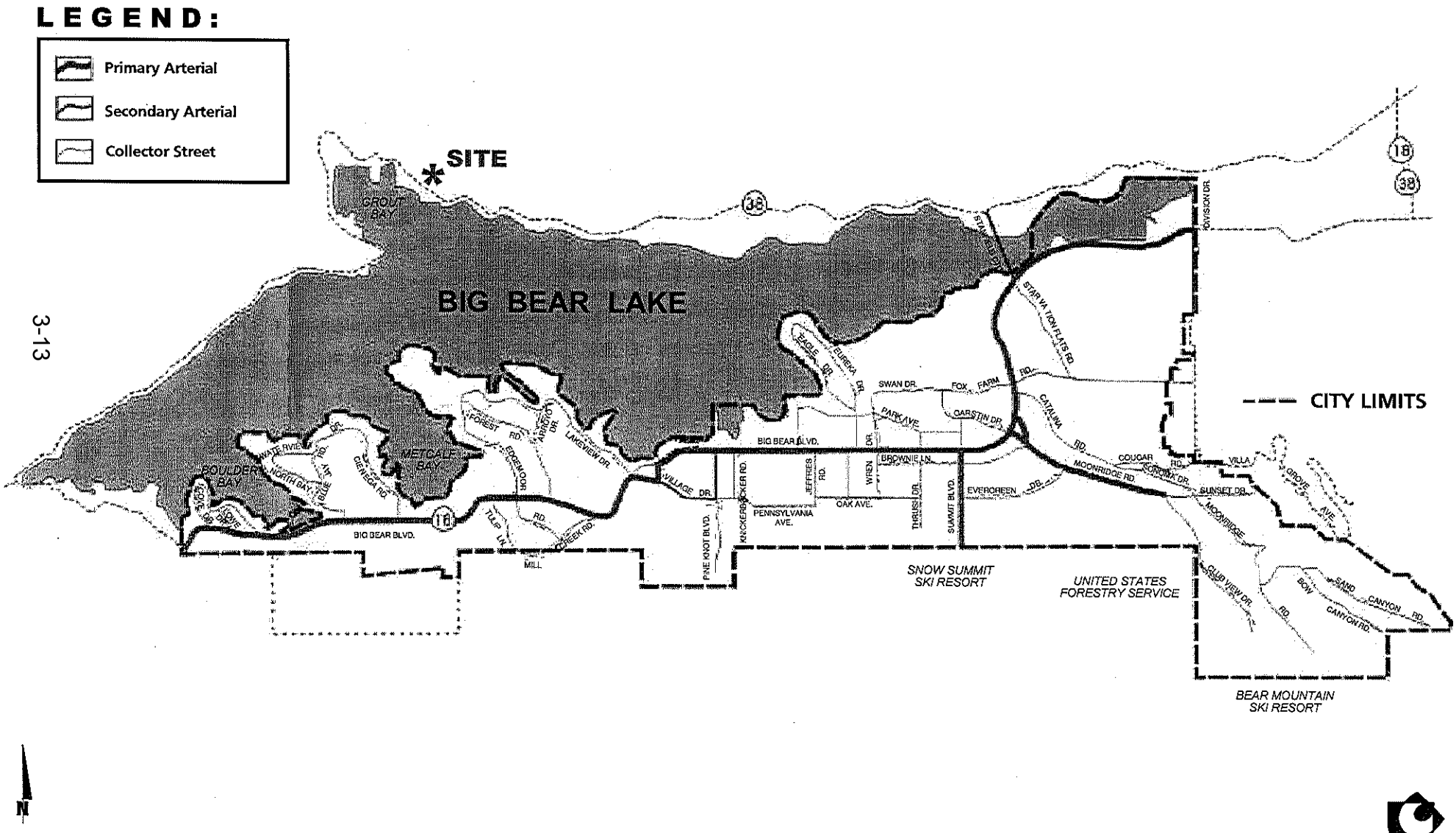
NOTE
1. STRUCTURAL SECTION OF ROADWAY SHALL BE DETERMINED FROM SOILS TESTS AND SO INDICATED ON CONSTRUCTION PLANS.
2. MINIMUM DESIGN PAVING THICKNESS SHALL BE 0.25' ASPHALT CONCRETE.
3. CONSTRUCTION OUTSIDE R/W WILL REQUIRE SLOPE EASEMENTS
4. WHEN PREPARING SUBGRADE FOR PAVING, CENTERLINE CROWN ON THE "LEVEL SECTION" SHALL BE RELOCATED EITHER LEFT OR RIGHT 0.50' TO MATCH CROWN BREAK IN PAVING MACHINE.

SAN BERNARDINO COUNTY TRANS. DEPT.		
KEN A. MILLER Director of Transportation	LOCAL STREET	104 A

URBAN CROSSROADS

EXHIBIT 3-H

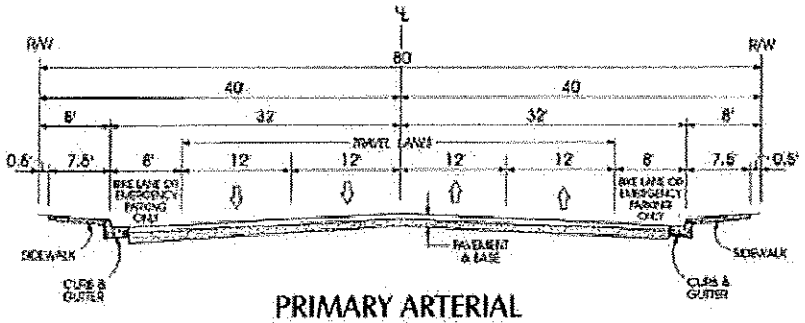
CITY OF BIG BEAR LAKE
GENERAL PLAN CIRCULATION ELEMENT



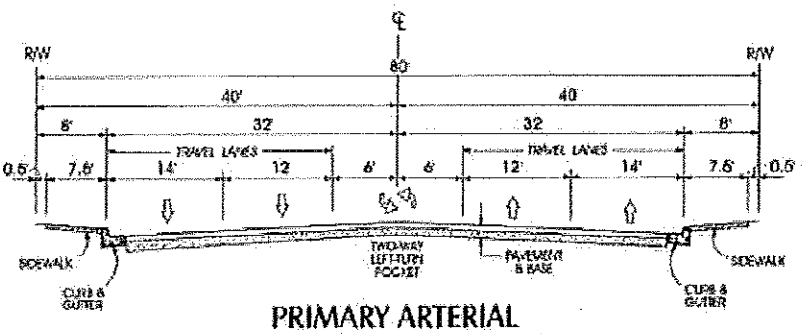
URBAN CROSSROADS

EXHIBIT 3-I

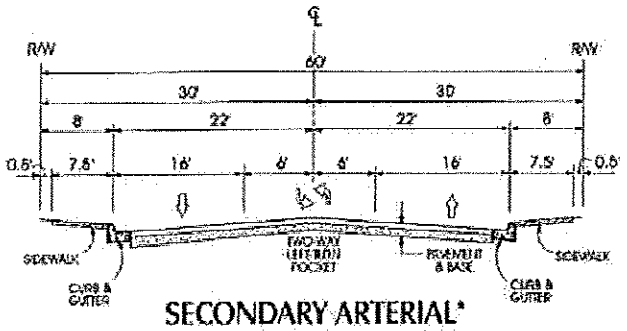
CITY OF BIG BEAR LAKE GENERAL PLAN ROADWAY CROSS-SECTIONS (PAGE 1 OF 2)



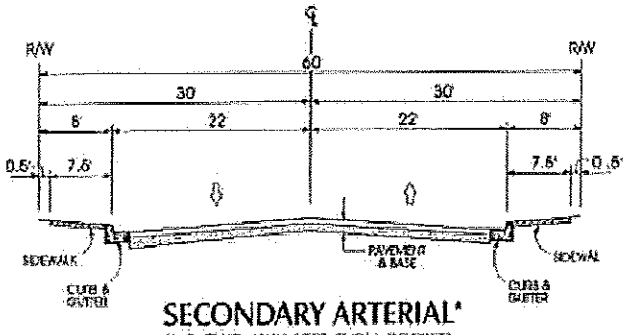
PRIMARY ARTERIAL
(WITH BIKE LANES OR EMERGENCY PARKING)
TYPICAL SECTION



PRIMARY ARTERIAL
(WITH TWO-WAY LEFT-TURN POCKET)
TYPICAL SECTION



SECONDARY ARTERIAL*
(WITH TWO-WAY LEFT-TURN POCKET)
TYPICAL SECTION

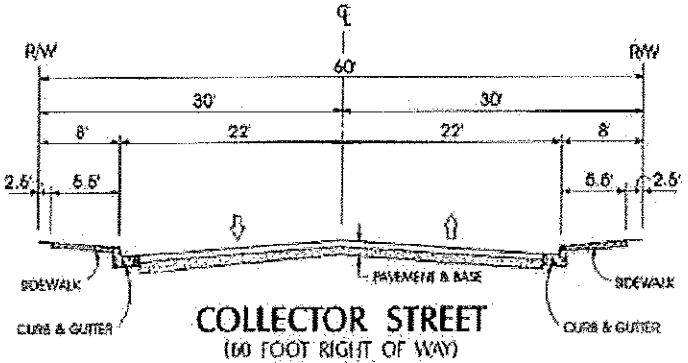


SECONDARY ARTERIAL*
(NO TWO-WAY LEFT-TURN POCKET)
TYPICAL SECTION

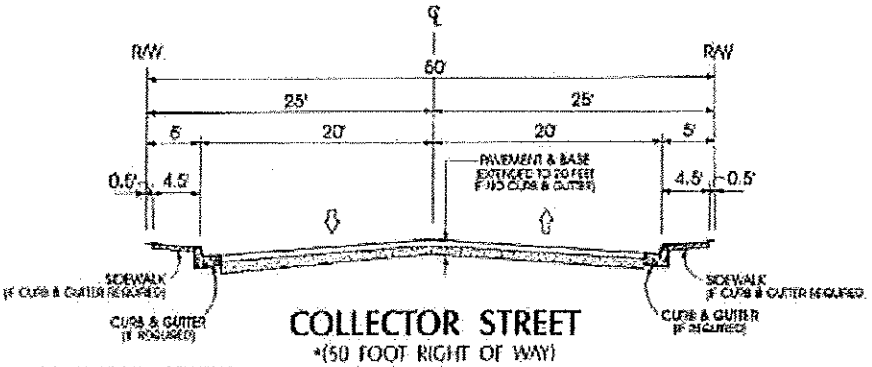
*THESE CROSS SECTIONS MAY BE MODIFIED BASED UPON ADOPTED SPECIFIC PLANS OR EXISTING CONDITIONS

EXHIBIT 3-I

CITY OF BIG BEAR LAKE GENERAL PLAN ROADWAY CROSS-SECTIONS (PAGE 2 OF 2)

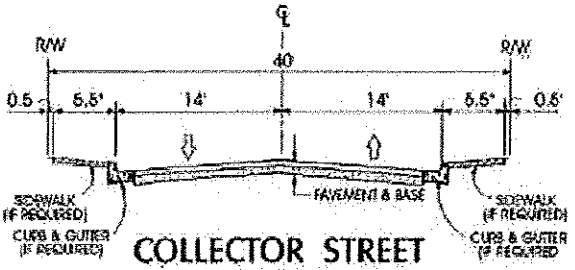


COLLECTOR STREET
(60 FOOT RIGHT OF WAY)
TYPICAL SECTION

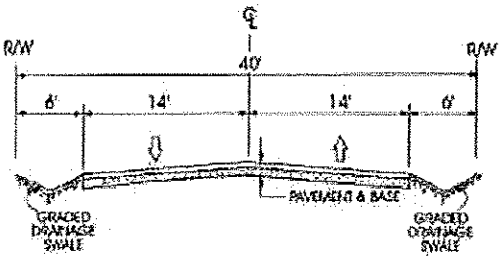


COLLECTOR STREET
*(50 FOOT RIGHT OF WAY)
TYPICAL SECTION

*ACCEPTABLE ONLY IF EXISTING DEVELOPMENT PRECLUDES A 60 FOOT RIGHT OF WAY.



COLLECTOR STREET
*(40 FOOT RIGHT OF WAY)
TYPICAL SECTION



COLLECTOR STREET
with no curb and gutter
*(40 FOOT RIGHT OF WAY)
TYPICAL SECTION

*ACCEPTABLE ONLY IF EXISTING DEVELOPMENT PRECLUDES A 60 FOOT RIGHT OF WAY.

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4.0 FUTURE DAILY TRAFFIC CONDITIONS

This chapter of the report describes the development of the future year traffic volume forecasts and presents the resulting daily traffic volumes which will be used for traffic operations analysis. Future traffic conditions without the project are presented first, followed by the future with project traffic volumes. Traffic signal warrant analysis for future conditions has also been presented in this chapter.

4.1 Future With and Without Project Traffic Conditions

Per discussion with County staff, the areawide growth has been interpolated from adjusted existing volumes (with 16% growth) to General Plan Buildout (2030) volumes. The areawide growth varies for each movement at each intersection (see Appendix "D"). The interpolated area-wide growth rate has been added to peak hour traffic volumes on surrounding roadways, in addition to traffic generated by the project and other development.

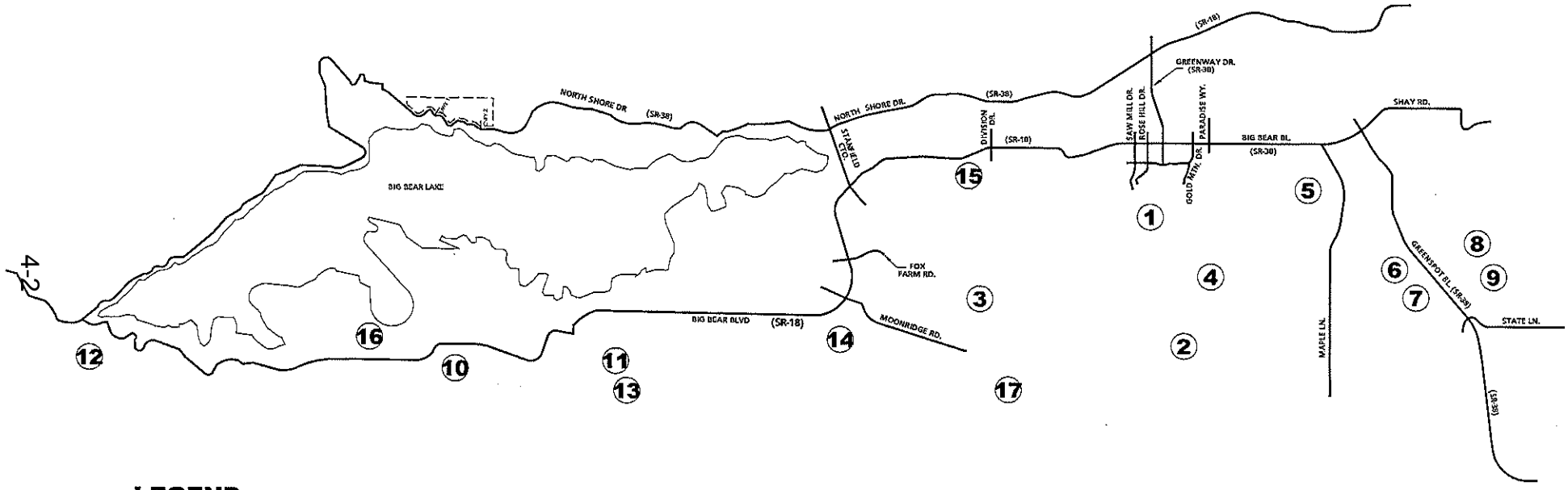
Long Range General Plan Buildout (2030) conditions have been estimated based on a select zone run of the San Bernardino Mountain Model, in addition to traffic generated by the project and the known cumulative development.

The County of San Bernardino was contacted in order to determine if there were any projects planned within the study area that would have an impact on future traffic volumes at the study intersections. Based on information given by the County of San Bernardino and City of Big Bear staff, a total of 17 cumulative projects were identified to affect the study intersections. The location of each of these other developments is shown on Exhibit 4-A.

As indicated in Table 4-1, other developments are projected to generate 15,111 trip-ends per day with 1,455 vehicles per hour during the AM peak hour and 1,455 vehicles per hour during the PM peak hour. Appendix "D" contains the

EXHIBIT 4-A

OTHER DEVELOPMENT LOCATION MAP



LEGEND:

1. = TT 16771
2. = TT 16934
3. = TT 17217 & TPM 17022
4. = TT 16036
5. = TT 14916
6. = TT 16980
7. = TT 17764
8. = TT 16749
9. = TT 17201
10. = HILTON GARDEN INN
11. = MIXED USE DEVELOPMENT
12. = RESIDENTIAL LOTS
13. = CONDOMINIUMS
14. = 41820 BIG BEAR BLVD
15. = WORLD HARVEST FAITH CENTER
16. = BOAT PARTS RETAIL & SERVICE
17. = STORAGE YARD

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MOON CAMP TIA, San Bernardino County, California - 04409: OD LOC MAP

URBAN CROSSROADS

TABLE 4-1
FRIDAY PM PEAK HOUR/SUNDAY MIDDAY PEAK HOUR

OTHER DEVELOPMENT TRIP GENERATION

ID #	PROJECT NAME	LAND USE[1]	QUANTITY	UNITS[2]	PEAK HOUR						DAILY
					FRIDAY PM			SUNDAY MIDDAY			
					IN	OUT	TOTAL	IN	OUT	TOTAL	
	SAN BERNARDINO COUNTY										
1	TT 16771 [3]	SFR	242	DU	155	90	245	155	90	245	2,316
2	TT 16934 [4]	SFR	228	DU	146	84	230	146	84	230	2,182
3	TT 17217 & TT 17022 [4]	SFR	53	DU	34	20	54	34	20	54	507
4	TT 16036	SFR	116	DU	74	43	117	74	43	117	1,110
5	TT 14916	SFR	51	DU	33	19	52	33	19	52	488
6	TT 16980	SFR	15	DU	10	6	16	10	6	16	144
7	TT 1776H	SFR	10	DU	6	4	10	6	4	10	96
8	TT 16749	SFR	86	DU	55	32	87	55	32	87	823
9	TT 17201	SFR	66	DU	42	24	66	42	24	66	632
	TOTAL (COUNTY OF SAN BERNARDINO)				555	322	877	555	322	877	8,298
	CITY OF BIG BEAR										
10	Hilton Garden Inn	Hotel	91	ROOMS	28	25	53	28	25	53	743
11	Mixed Use Development	Retail	22.5	TSF	112	122	234	112	122	234	2,575
		Less Pass-By (15%)			-17	-18	-35	-17	-18	-35	-386
		Subtotal Commercial			95	104	199	95	104	199	2,189
		Office	6.3	TSF	1	5	6	1	5	6	69
		SFR	10	DU	6	4	10	6	4	10	96
	Sub-Total				102	113	215	102	113	215	2,354
12	Residential Lots	SFR	8	DU	5	3	8	5	3	8	77
13	Condominiums	MFDU	78	DU	27	13	40	27	13	40	457
14	41820 Big Bear Blvd.	Hotel	55	ROOMS	17	15	32	17	15	32	449
		Retail	10	TSF	66	71	137	66	71	137	1,520
		Fast-Food	2.5	TSF	45	42	87	45	42	87	1,240
		Less Pass-By (15%)			-17	-17	-34	-17	-17	-34	-414
		Subtotal Commercial			94	96	190	94	96	190	2,346
	Sub-Total				111	111	222	111	111	222	2,795
15	World Harvest Faith Center	Church	20	TSF	7	6	13	7	6	13	182
16	Boat Parts Retail & Service	Auto Care Center	4.375	TSF	7	7	14	7	7	14	88
17	Storage Yard	Mini Warehouse	3	AC	6	6	12	6	6	12	117
	TOTAL (CITY OF BIG BEAR)				294	284	578	294	284	578	6,813
	TOTAL				**849**	**606**	**1,455**	**849**	**606**	**1,455**	**15,111**

[1] SFR = Single Family Residential
[2] DU = Dwelling Unit
TSF= Thousand Square Feet
AC = Acres

[3] Source: TT 16771 Traffic Impact Analysis, County of San Bernardino, Urban Crossroads, Inc. July 2006

[4] Source: TT 17217 and TT 17022 Traffic Impact Analysis, County of San Bernardino, Urban Crossroads, Inc. July 2006

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directional distribution and assignment of the other development traffic. Based on the identified trip distribution for the other development on arterial highways throughout the study area, other development average daily traffic (ADT) and Friday PM/Sunday Mid-day peak hour intersection turning movement volumes (based on PM peak hour trip generation) are shown on Exhibits 4-B and 4-C, respectively.

Project traffic volumes on study area roadway segments are determined by generating project trips and manually routing the traffic through the roadway network. The routing patterns follow the trip distributions which were previously presented in Section 2. Trips are assigned to each individual roadway link and intersection occurring along a specific route.

The accumulation of traffic assigned to each roadway link represents the project traffic volume for that link. Project only ADT volumes were previously presented in Section 2.

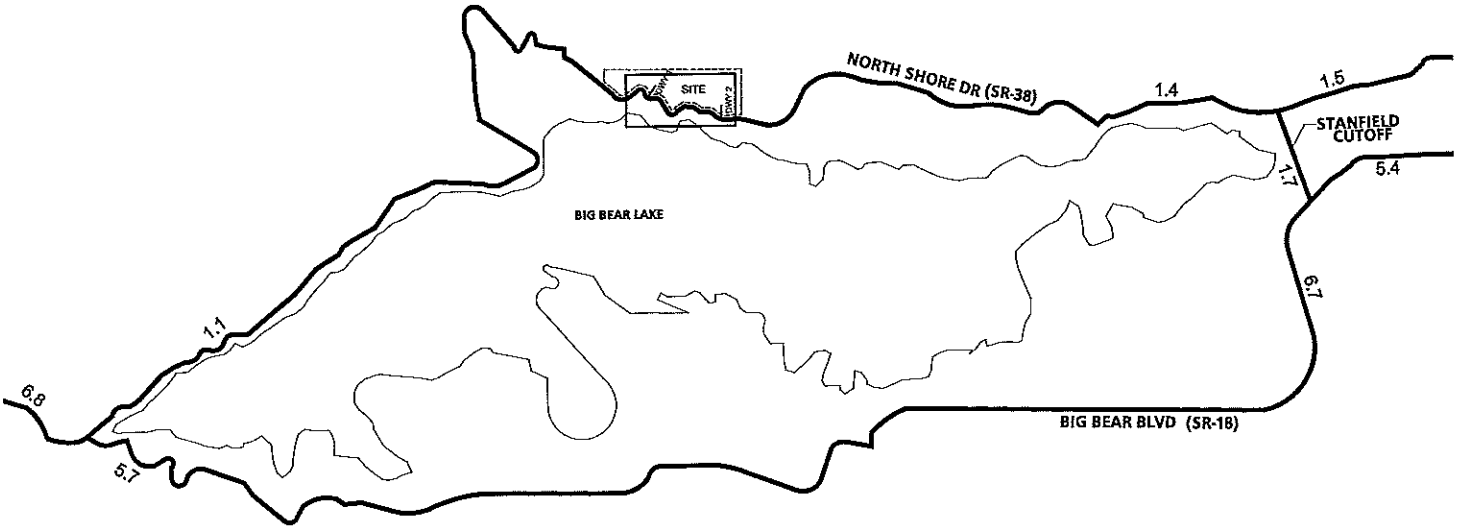
4.1.1 2010 Without Project Daily Traffic Volumes

The ADT's for 2010 Without Project traffic conditions have been determined by adding the 2007 existing traffic volumes (with 16% adjustment) plus the 2% background growth volumes per year (6% for three years) plus the known cumulative development volumes. 2010 Friday ADT and Sunday ADT volumes for without project traffic conditions are shown on Exhibit 4-D and 4-E, respectively.

For 2010 Without Project traffic conditions, no new traffic signals are projected to be warranted (see Appendix "C"), compared to Existing Conditions.

EXHIBIT 4-B

OTHER DEVELOPMENT AVERAGE DAILY TRAFFIC



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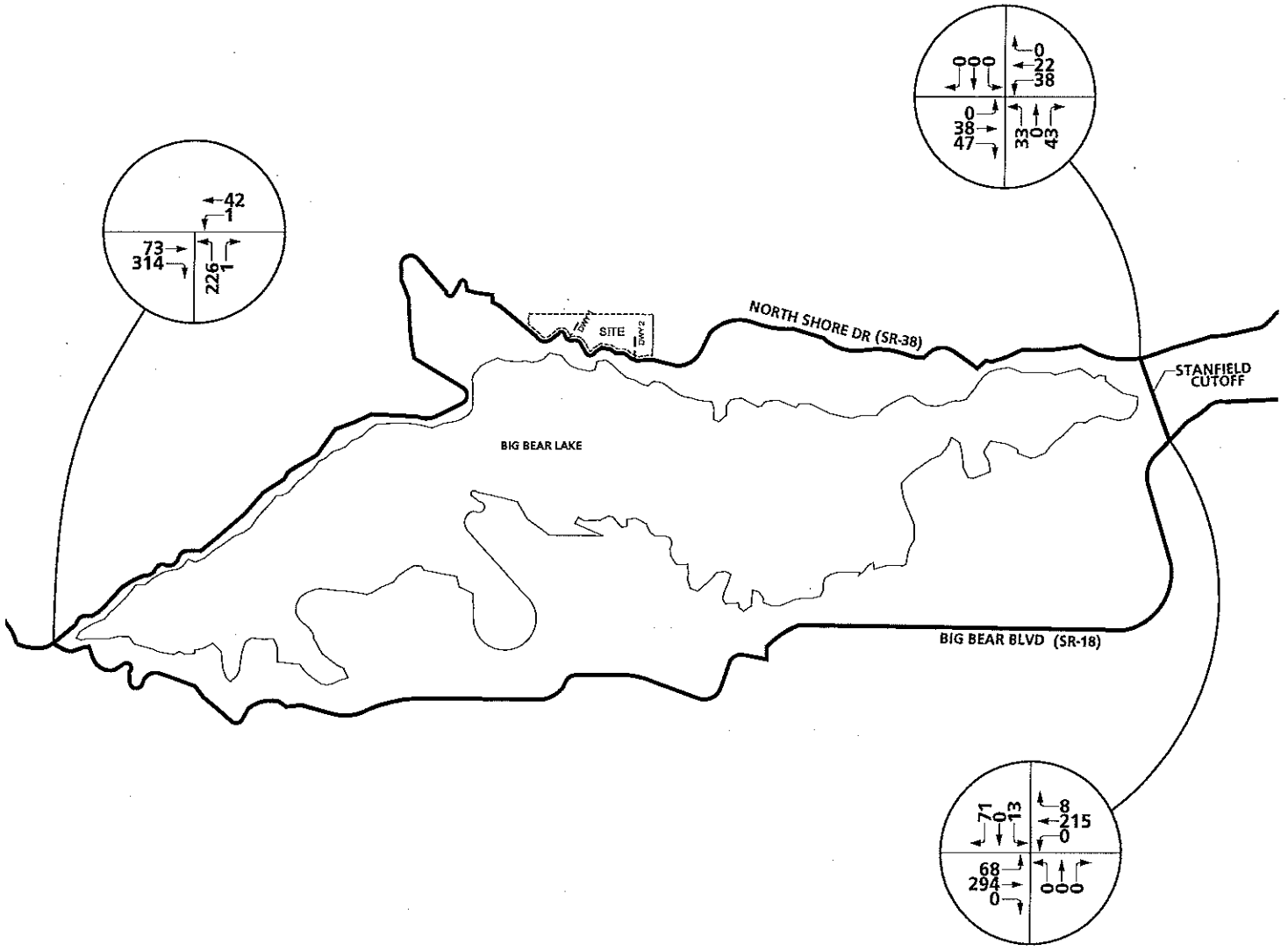
URBAN CROSSROADS

EXHIBIT 4-C

OTHER DEVELOPMENT FRIDAY PM PEAK HOUR/ SUNDAY MIDDAY PEAK HOUR INSTERSECTION VOLUMES



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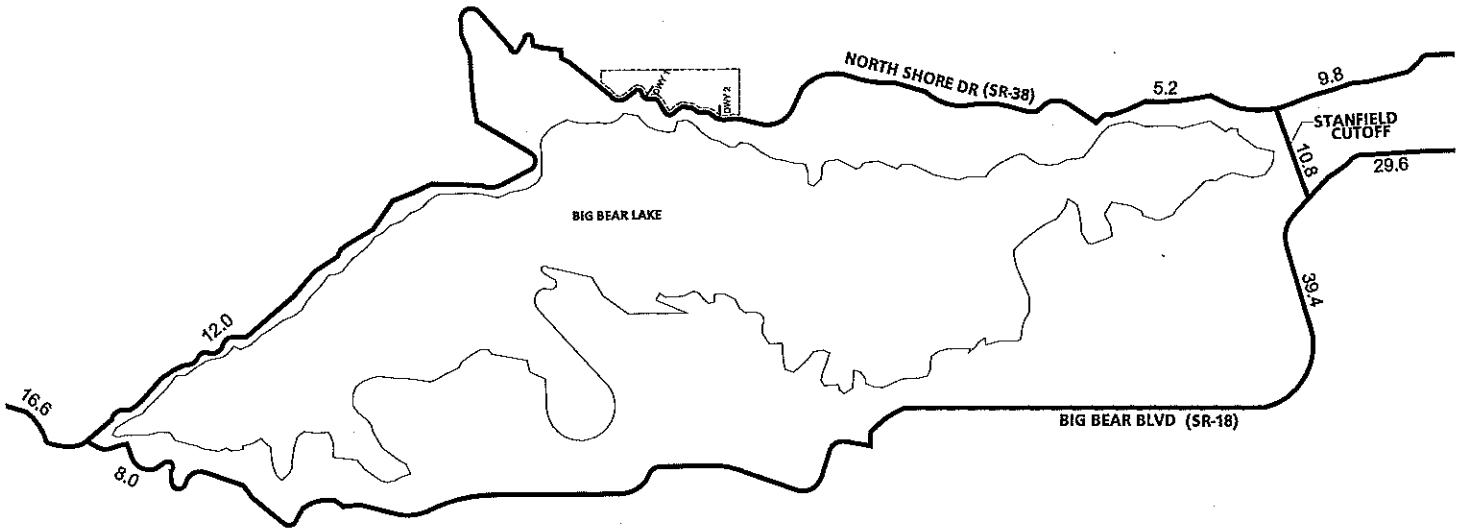
URBAN CROSSROADS

EXHIBIT 4-D

2010 WITHOUT PROJECT FRIDAY AVERAGE DAILY TRAFFIC



LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

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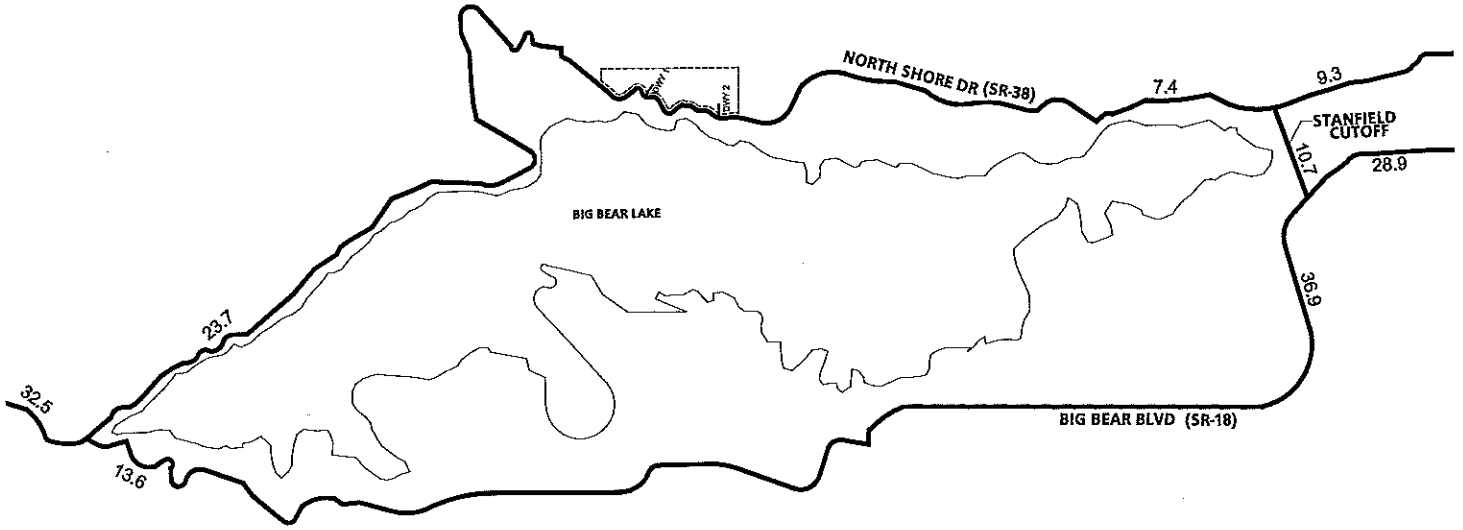
URBAN CROSSROADS

EXHIBIT 4-E

2010 WITHOUT PROJECT SUNDAY AVERAGE DAILY TRAFFIC



LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

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URBAN CROSSROADS

4.1.2 2010 With Project Daily Traffic Volumes

The ADT's for the 2010 With Project have been determined by adding the project only traffic volumes to the 2010 Without Project traffic volumes. 2010 Friday and Sunday ADT volumes with the project traffic are shown on Exhibit 4-F and 4-G, respectively.

For 2010 With Project traffic conditions, no new traffic signals are projected to be warranted (see Appendix "C"), as compared to 2010 Without Project conditions.

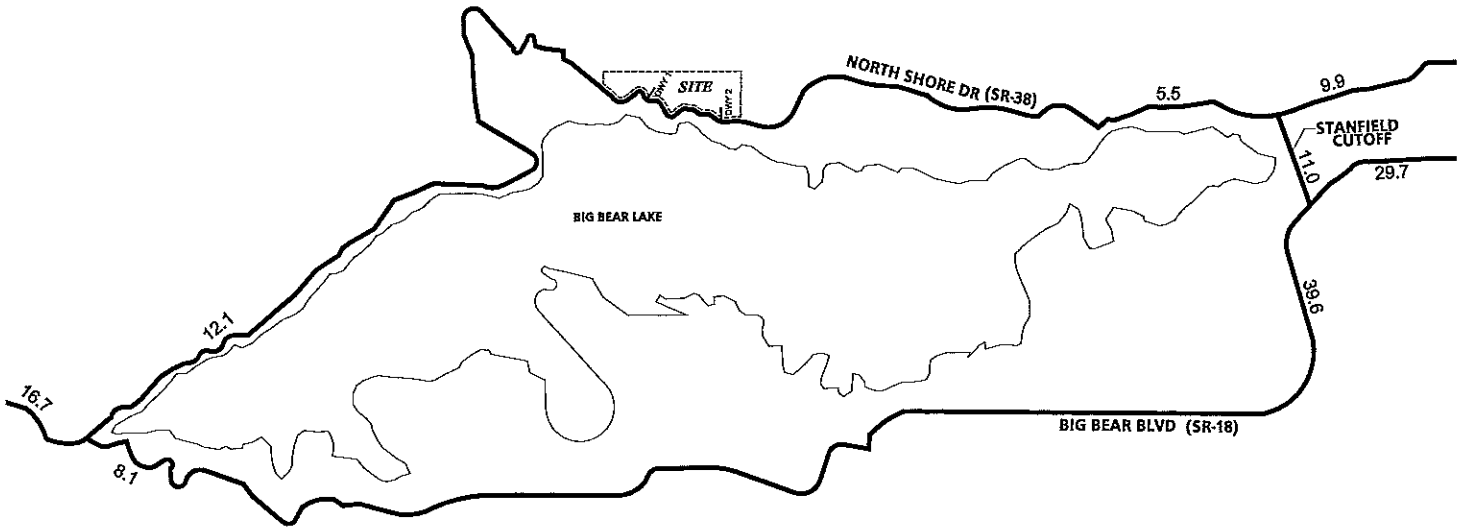
4.1.3 General Plan Buildout (2030) Daily Traffic Volumes

The ADT's for General Plan Buildout (2030) conditions have been determined by adding the project only and other cumulative development traffic volumes to the 2030 ADT volumes derived from the San Bernardino Mountain Model. General Plan Buildout Without Project (2030) Winter Friday and Sunday ADT volumes are shown on Exhibits 4-H and 4-I, respectively. Based on the San Bernardino Mountain Model for General Plan Buildout (2030), the peak season is shown to be winter. Therefore, the winter ADT results were used for post-processing peak hour turning volumes and level of service analysis to achieve a conservative analysis. General Plan Buildout With Project (2030) Winter Friday and Sunday ADT volumes are shown on Exhibits 4-J and 4-K, respectively.

For General Plan Buildout With Project (2030) traffic conditions, no new traffic signals are projected to be warranted (see Appendix "C") at study area analysis intersections.

EXHIBIT 4-F

2010 WITH PROJECT FRIDAY AVERAGE DAILY AVERAGE TRAFFIC



LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

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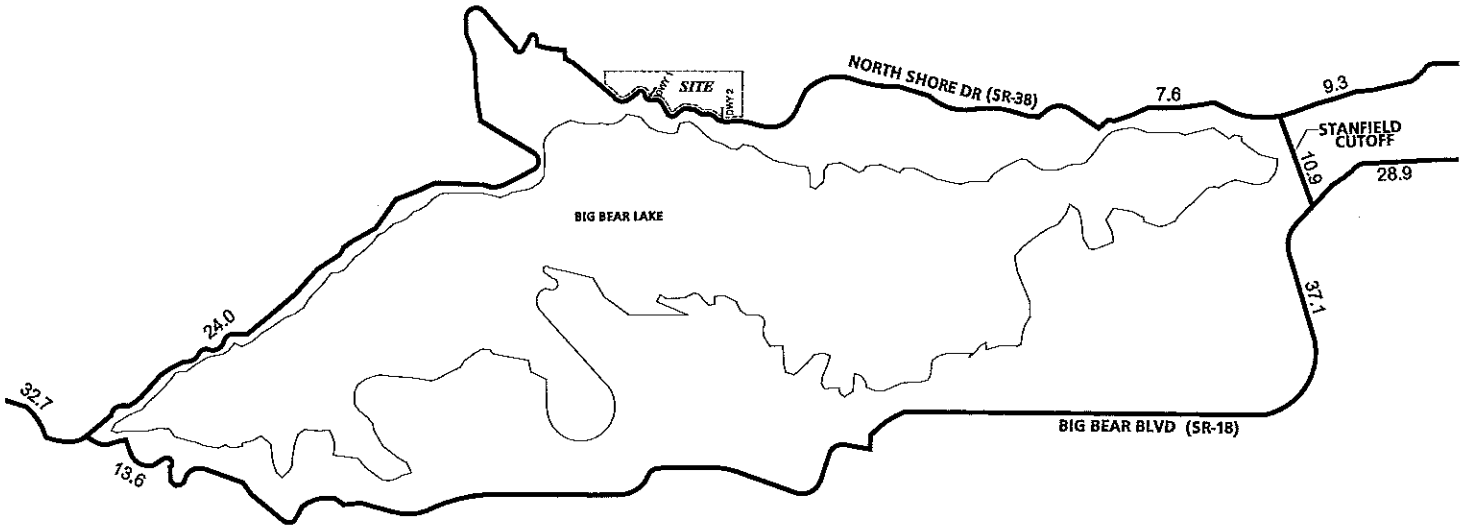
URBAN CROSSROADS

EXHIBIT 4-G

2010 WITH PROJECT SUNDAY AVERAGE DAILY TRAFFIC



LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

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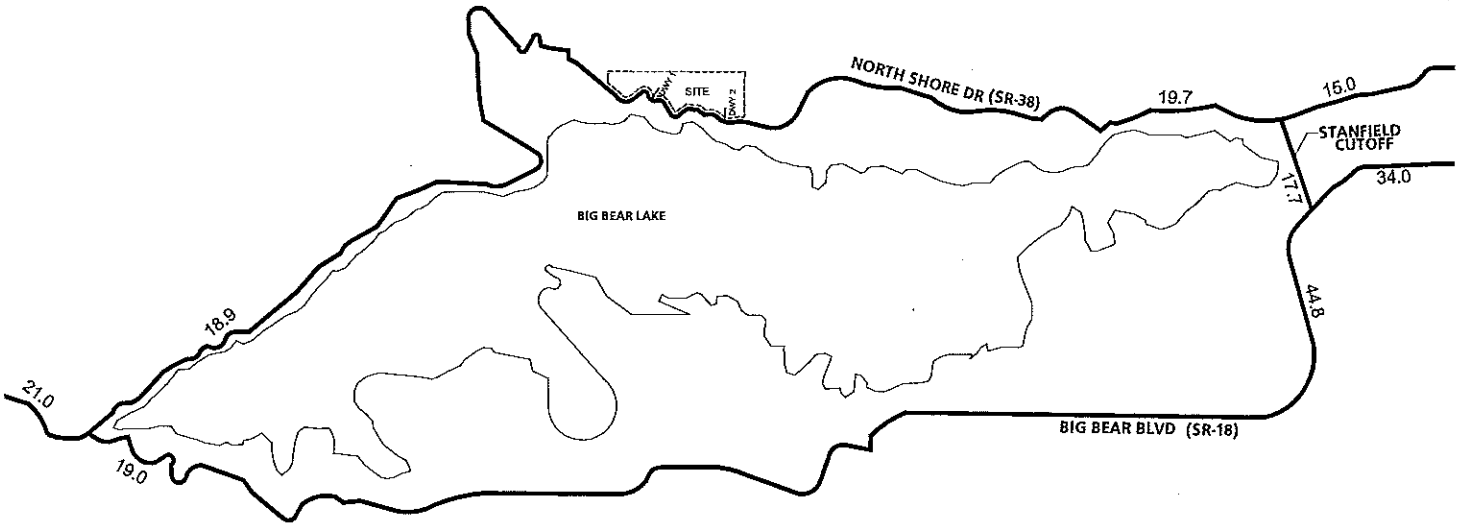
URBAN CROSSROADS

EXHIBIT 4-H

GENERAL PLAN BUILDOUT (2030) WINTER FRIDAY AVERAGE DAILY TRAFFIC



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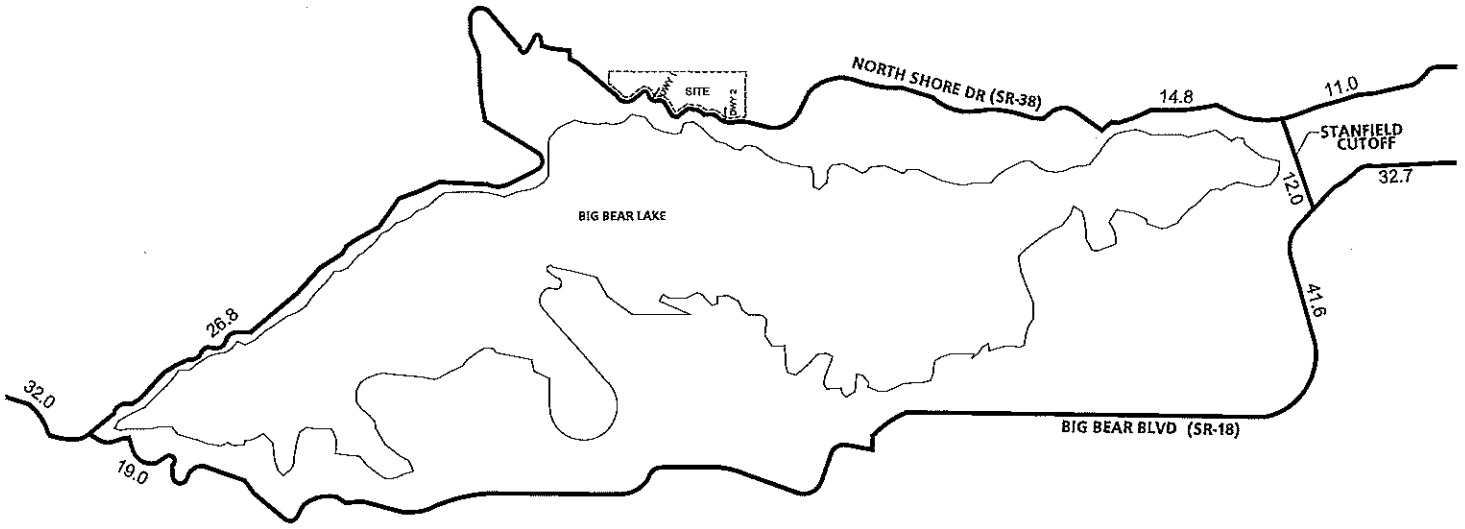
URBAN CROSSROADS

EXHIBIT 4-I

GENERAL PLAN BUILDOUT (2030) WINTER SUNDAY AVERAGE DAILY TRAFFIC (ADT)



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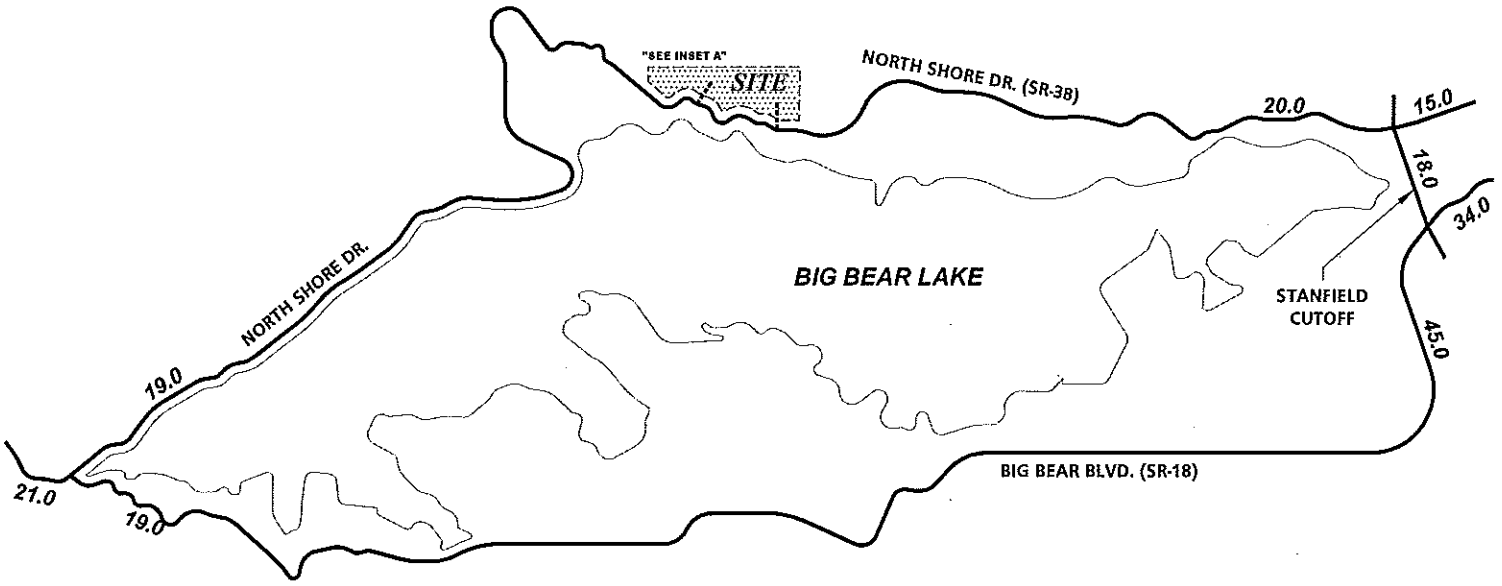
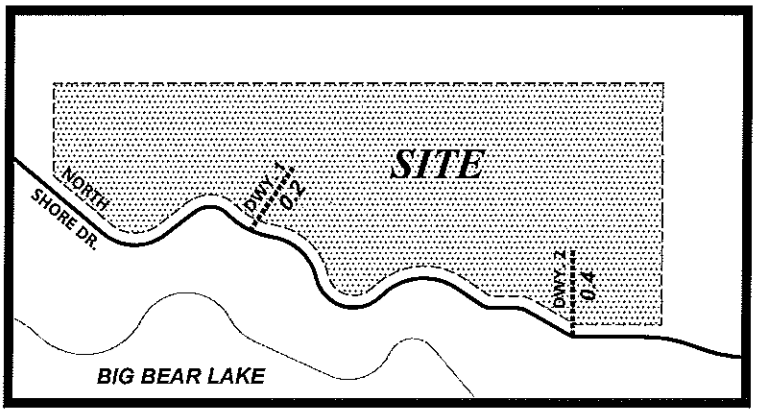
URBAN CROSSROADS

EXHIBIT 4-J

GENERAL PLAN BUILDOUT WITH PROJECT (2030) WINTER FRIDAY AVERAGE DAILY TRAFFIC



INSET A



LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

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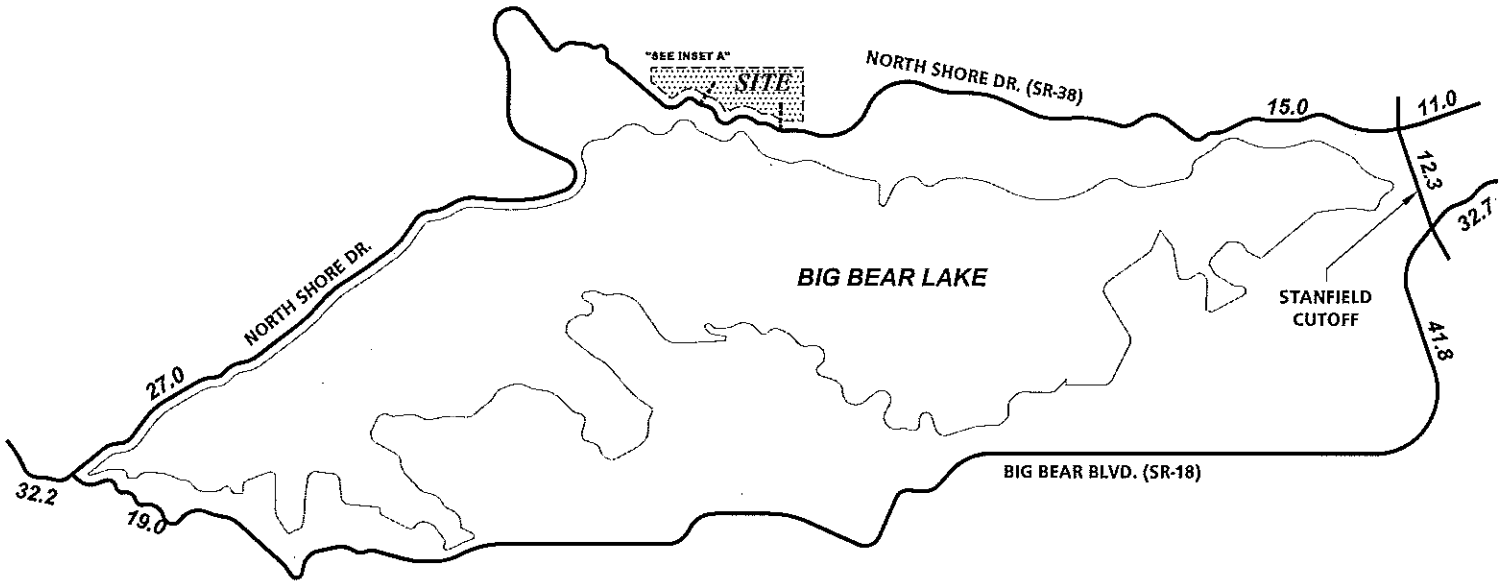
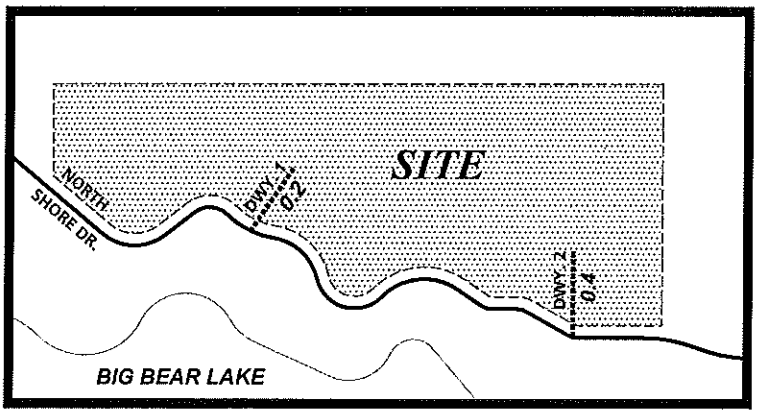
EXHIBIT 4-K

GENERAL PLAN BUILDOUT WITH PROJECT (2030) WINTER SUNDAY AVERAGE DAILY TRAFFIC



INSET A



LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

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5.0 FUTURE TRAFFIC OPERATIONS ANALYSIS

This section of the report presents the operations analysis for the traffic volume forecasts for future traffic conditions without the project and for future traffic conditions with the project. The analysis procedures conform to the requirements of the County of San Bernardino CMP. The operations analysis for each analysis year is presented in a separate subsection.

5.1 Future Interim Year Traffic Operations

5.1.1 2010 Without Project Conditions

The intersection operations analysis for 2010 Without Project traffic conditions are summarized in Table 5-1, based on the geometrics analysis at the study area intersections, without and with improvements. 2010 Without Project Friday PM and Sunday Mid-day peak hour intersection turning movement volumes are shown on Exhibits 5-A and 5-B, respectively. As shown in Table 5-1, the following study area intersections are currently operating at an unacceptable level of service during both Friday PM and Sunday Mid-day peak hours:

Big Bear Blvd (SR-18) (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- Big Bear Blvd (SR-18) (EW)

The operations analysis worksheets for 2010 Without Project conditions are included in Appendix "E".

TABLE 5-1

INTERSECTION ANALYSIS FOR 2010 WITHOUT PROJECT CONDITIONS

INTERSECTION	TRAFFIC CONTROL[3]	INTERSECTION APPROACH LANES[1]												DELAY[2] (SECS.)		LEVEL OF SERVICE	
		NORTH-BOUND			SOUTH-BOUND			EAST-BOUND			WEST-BOUND						
		L	T	R	L	T	R	L	T	R	L	T	R	Fri. PM	Sun. MD	Fri. PM	Sun. MD
North Shore Dr. (SR-38) (NS) at:																	
• Big Bear Blvd. (SR-18) (EW)																	
- Without Improvements	CSS	0	1	0	0	0	0	0	1	1	1	1	0	--[4]	--[4]	F	F
- With Improvements	**TS**	**1**	0	1	0	0	0	0	**2**	1	1	1	0	14.0	21.2	B	C
Stanfield Cutoff (NS) at:																	
• North Shore Dr. (SR-38) (EW)																	
- Without Improvements	CSS	0	1	0	0	1	0	0	1	0	0	1	0	--[4]	--[4]	F	F
- With Improvements	**TS**	**1**	1	0	**1**	1	0	**1**	1	0	**1**	1	0	31.9	30.7	C	C
• Big Bear Blvd. (SR-18) (EW)																	
- Without Improvements	TS	0	1	1	0	1	1	1	1	1	1	1	1	--[4]	--[4]	F	F
- With Improvements	TS	**1**	1	0	**1**	1	0	1	**2**	0	1	**2**	0	31.4	26.8	C	C

1 When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; **1** = Improvement

2 Delay and level of service calculated using the following analysis software: Traffix, Version 7.8 R3 (2006). Per the 2000 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with traffic traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for worst individual movement (or movements sharing a single lane) are shown.

3 TS = Traffic Signal
CSS = Cross Street Stop
AWS = All Way Stop

4 -- = Delay High, Intersection Unstable, Level of Service "F".

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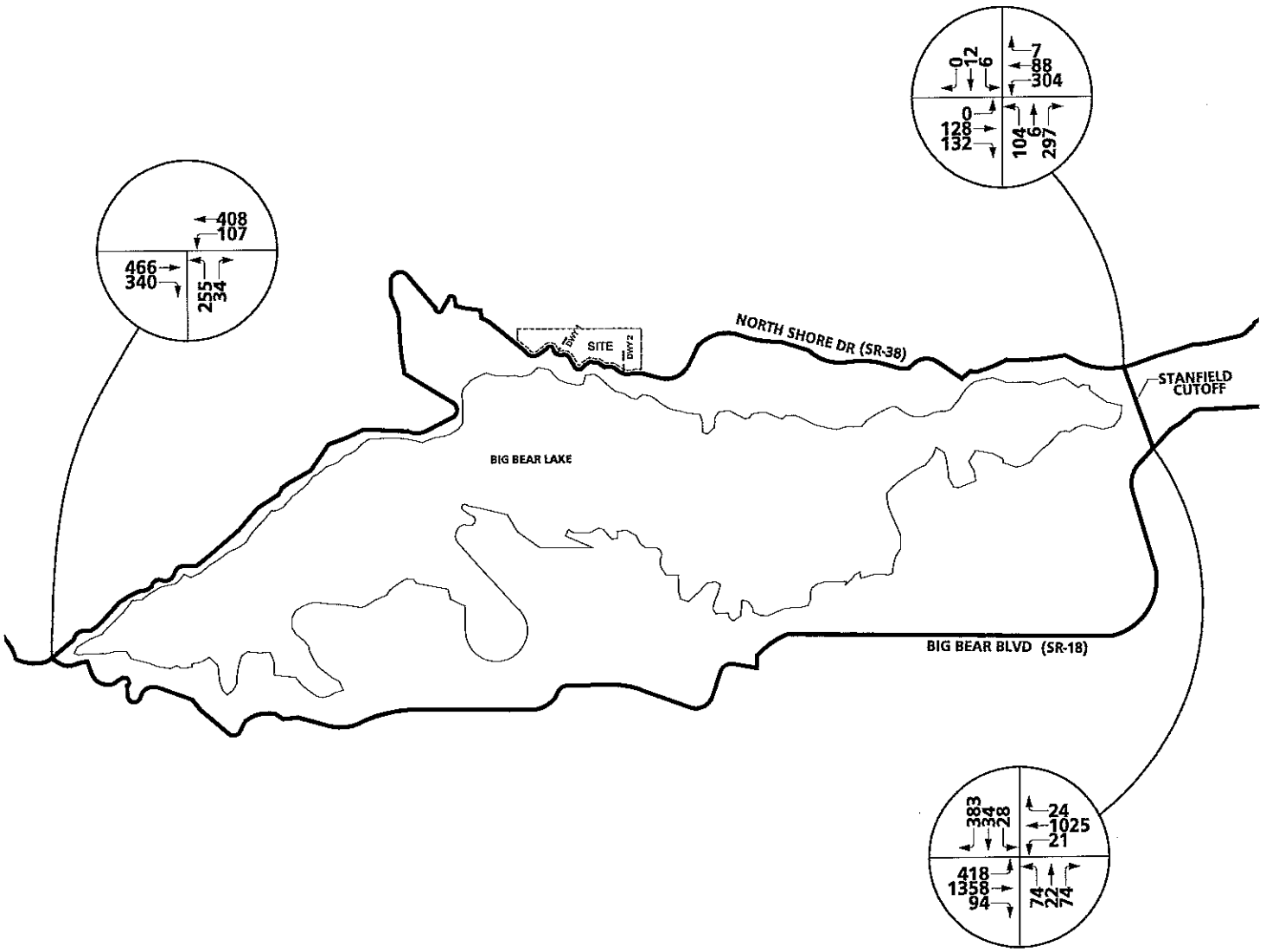
EXHIBIT 5-A

2010 WITHOUT PROJECT FRIDAY PM PEAK HOUR INTERSECTION VOLUMES



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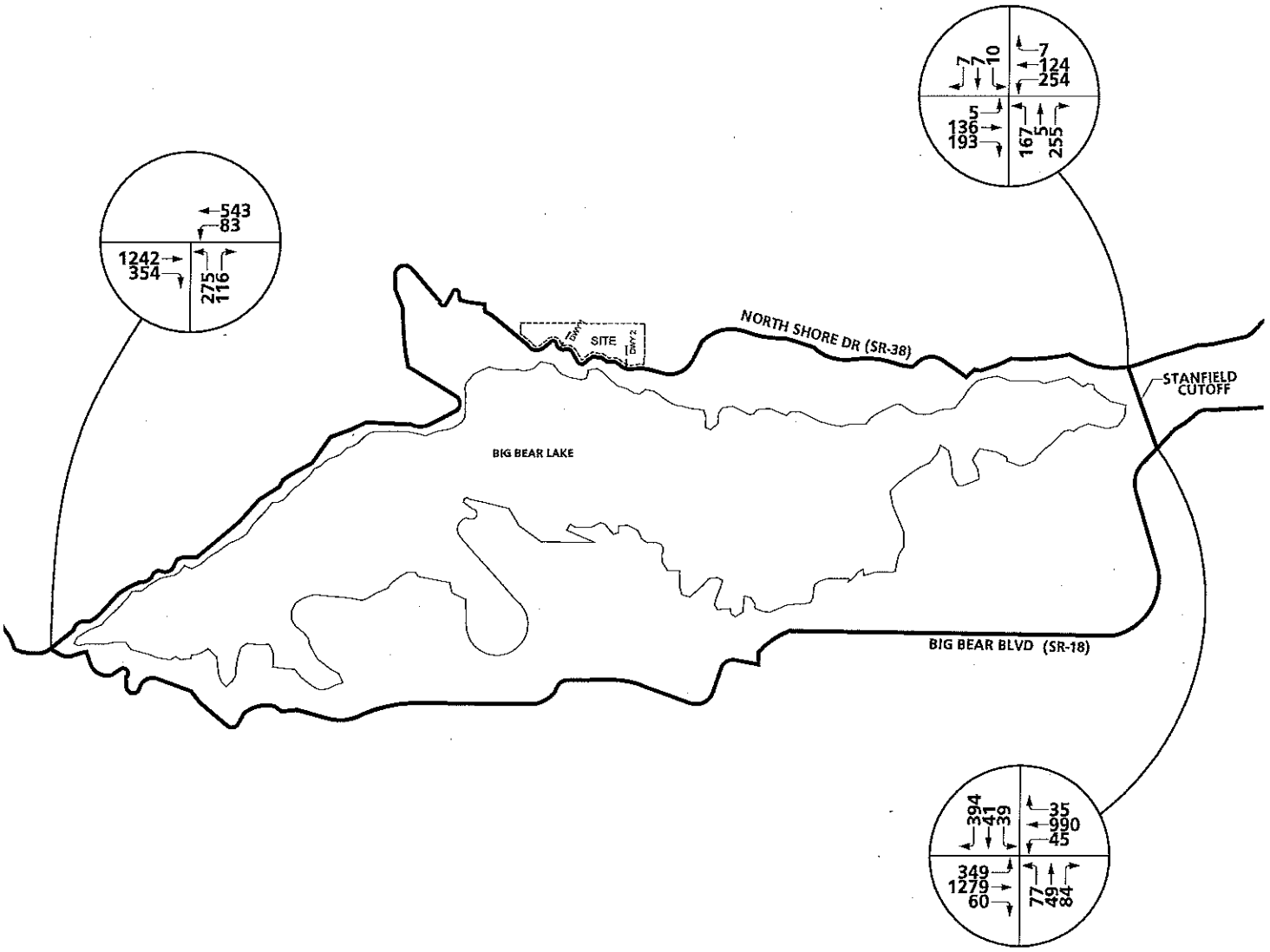
URBAN CROSSROADS

EXHIBIT 5-B

2010 WITHOUT PROJECT SUNDAY MID-DAY PEAK HOUR INTERSECTION VOLUMES



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URBAN CROSSROADS

5.1.2 2010 With Project Conditions

The intersection operations analysis for 2010 With Project traffic conditions are summarized in Table 5-2, based on the geometrics analysis at the study area intersections, without and with improvements. 2010 With Project Friday PM and Sunday Mid-day peak hour intersection turning movement volumes are shown on Exhibits 5-C and 5-D, respectively. As shown in Table 5-2, the following study area intersections are currently operating at an unacceptable level of service during both Friday PM and Sunday Mid-day peak hours:

Big Bear Blvd (SR-18) (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- Big Bear Blvd (SR-18) (EW)

The operations analysis worksheets for 2010 With Project conditions are included in Appendix "F".

5.2 General Plan Buildout With Project (2030) Traffic Operations

The intersection operations analysis for General Plan Buildout With Project (2030) traffic conditions are summarized in Table 5-3, based on the geometrics analysis at the study area intersections, without and with improvements. General Plan Buildout With Project (2030) Friday PM and Sunday Mid-day peak hour intersection turning movement volumes are shown on Exhibits 5-E and 5-F, respectively. The General Plan Buildout post-processed volumes worksheets are provided in Appendix "G". As shown in Table 5-3, the following study area intersections are currently operating at an unacceptable level of service during both Friday PM and Sunday Mid-day peak hours:

TABLE 5-2

INTERSECTION ANALYSIS FOR 2010 WITH PROJECT CONDITIONS

INTERSECTION	TRAFFIC CONTROL[3]	INTERSECTION APPROACH LANES[1]												DELAY[2] (SECS.)		LEVEL OF SERVICE	
		NORTH-BOUND			SOUTH-BOUND			EAST-BOUND			WEST-BOUND						
		L	T	R	L	T	R	L	T	R	L	T	R	Fri. PM	Sun. MD	Fri. PM	Sun. MD
North Shore Dr. (SR-38) (NS) at:																	
• Big Bear Blvd. (SR-18) (EW)																	
- Without Improvements	CSS	0	1	0	0	0	0	0	1	1	1	1	0	--[4]	--[4]	F	F
- With Improvements	**TS**	**1**	0	1	0	0	0	0	**2**	1	1	1	0	14.0	22.1	B	C
Stanfield Cutoff (NS) at:																	
• North Shore Dr. (SR-38) (EW)																	
- Without Improvements	CSS	0	1	0	0	1	0	0	1	0	0	1	0	--[4]	--[4]	F	F
- With Improvements	**TS**	**1**	1	0	**1**	1	0	**1**	1	0	**1**	1	0	32.4	31.5	C	C
• Big Bear Blvd. (SR-18) (EW)																	
- Without Improvements	TS	0	1	1	0	1	1	1	1	1	1	1	1	--[4]	--[4]	F	F
- With Improvements	TS	**1**	1	0	**1**	1	0	1	**2**	0	1	**2**	0	32.5	27.6	C	C
Driveway # 1 (NS) at:																	
• North Shore Dr. (SR-38) (EW)	CSS	0	0	0	0	**1**	0	0	1	0	0	1	0	11.1	12.0	B	B
Driveway # 2 (NS) at:																	
• North Shore Dr. (SR-38) (EW)	CSS	0	0	0	0	**1**	0	0	1	0	0	1	0	11.2	12.1	B	B

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1 When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; **1** = Improvement

2 Delay and level of service calculated using the following analysis software: Traffix, Version 7.8 R3 (2006). Per the 2000 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with traffic traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for worst individual movement (or movements sharing a single lane) are shown.

3 TS = Traffic Signal
CSS = Cross Street Stop
AWS = All Way Stop

4 -- = Delay High, Intersection Unstable, Level of Service "F".

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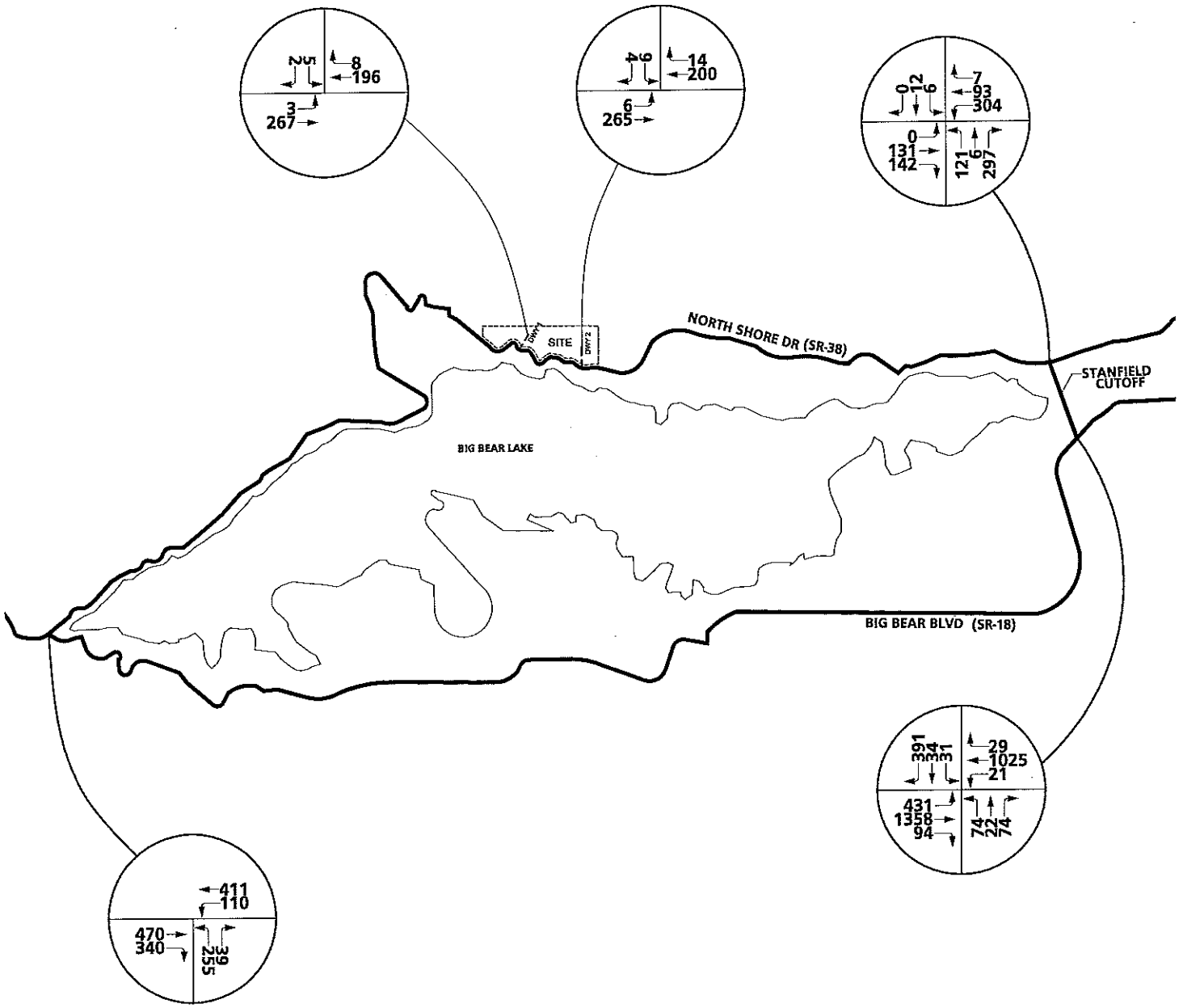
EXHIBIT 5-C

2010 WITH PROJECT FRIDAY PM PEAK INTERSECTION VOLUMES



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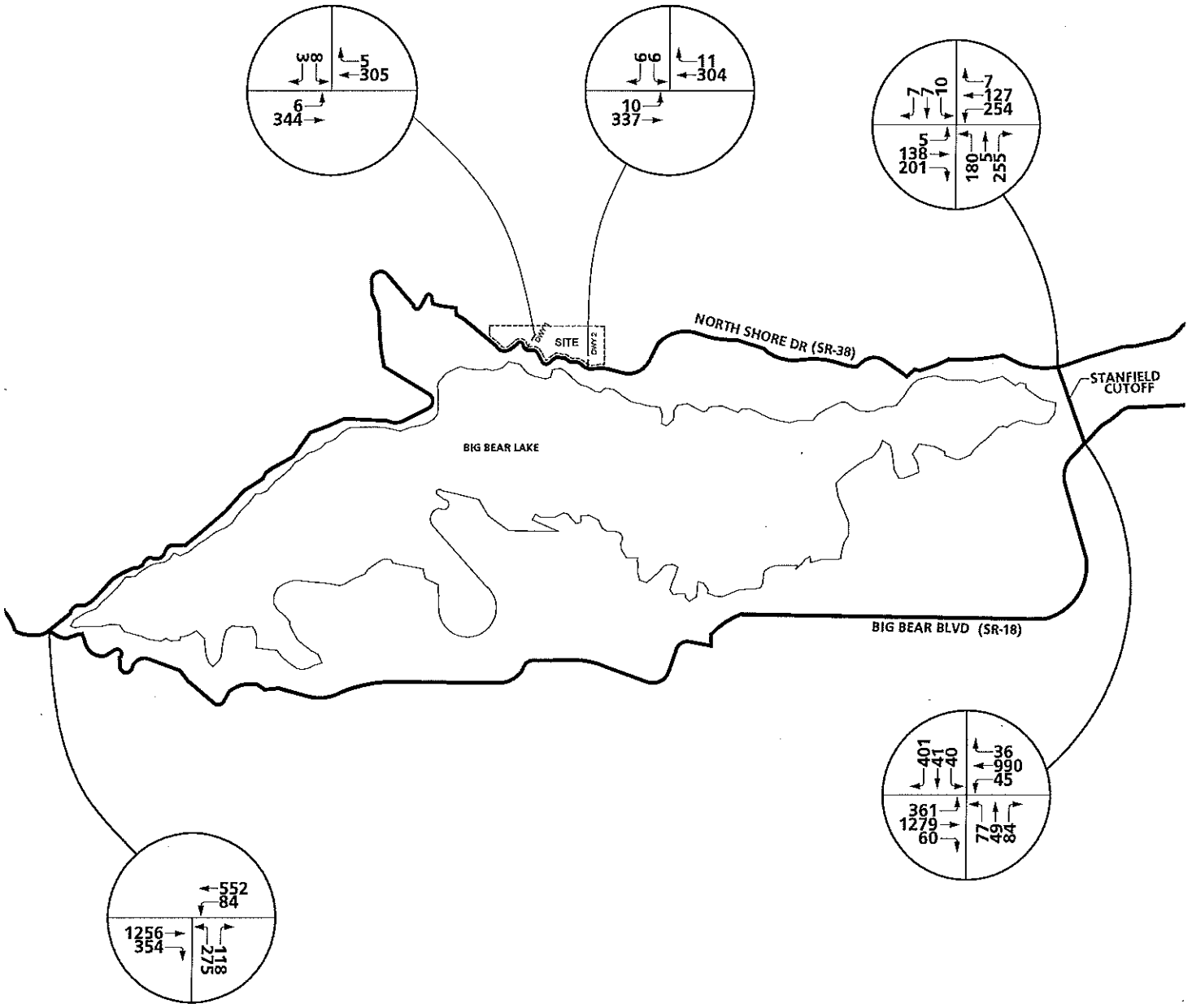
URBAN CROSSROADS

EXHIBIT 5-D

2010 WITH PROJECT SUNDAY MIDDAY PEAK INTERSECTION VOLUMES



URBAN CROSSROADS

TABLE 5-3

INTERSECTION ANALYSIS FOR GENERAL PLAN BUILDOUT (2030) CONDITIONS

INTERSECTION	TRAFFIC CONTROL[3]	INTERSECTION APPROACH LANES[1]												DELAY[2] (SECS.)		LEVEL OF SERVICE	
		NORTH-BOUND			SOUTH-BOUND			EAST-BOUND			WEST-BOUND						
		L	T	R	L	T	R	L	T	R	L	T	R	Fri. PM	Sun. MD	Fri. PM	Sun. MD
North Shore Dr. (SR-38) (NS) at:																	
• Big Bear Blvd. (SR-18) (EW)																	
- Without Improvements	CSS	0	1	0	0	0	0	0	1	1	1	1	0	--[4]	--[4]	F	F
- With Improvements	TS	1	0	1	0	0	0	0	2	1>	1	1	0	20.4	18.6	C	B
Stanfield Cutoff (NS) at:																	
• North Shore Dr. (SR-38) (EW)																	
- Without Improvements	CSS	0	1	0	0	1	0	0	1	0	0	1	0	--[4]	--[4]	F	F
- With Improvements	TS	2	1	0	1	1	0	1	1	1>	1	1	0	34.2	26.0	C	C
• Big Bear Blvd. (SR-18) (EW)																	
- Without Improvements	TS	0	1	1	0	1	1	1	1	1	1	1	1	--[4]	--[4]	F	F
- With Improvements	TS	1	1	0	1	1	1>	1	2	0	1	2	1	31.7	21.5	C	C
Driveway # 1 (NS) at:																	
• North Shore Dr. (SR-38) (EW)																	
- Without Improvements	CSS	0	0	0	0	1	0	0	1	0	0	1	0	49.5	24.2	E	C
- With Improvements	CSS	0	0	0	0	1	0	1	2	0	0	1	0	23.1	15.7	C	C
Driveway # 2 (NS) at:																	
• North Shore Dr. (SR-38) (EW)																	
- Without Improvements	CSS	0	0	0	0	1	0	0	1	0	0	1	0	41.9	18.8	E	C
- With Improvements	CSS	0	0	0	0	1	0	1	2	0	0	1	0	23.6	15.7	C	C

---

1 When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; 1 = Improvement; > = Right Turn Overlap Phase

2 Delay and level of service calculated using the following analysis software: Traffix, Version 7.7 R5 (2005). Per the 2000 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with traffic traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for worst individual movement (or movements sharing a single lane) are shown.

3 TS = Traffic Signal
CSS = Cross Street Stop
AWS = All Way Stop

4 -- = Delay High, Intersection Unstable, Level of Service "F".

5 Volume to Capacity ratio is greater than 1.00 = Level of Service "F".

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EXHIBIT 5-E

GENERAL PLAN BUILDOUT WITH PROJECT FRIDAY PM PEAK HOUR INTERSECTION VOLUMES

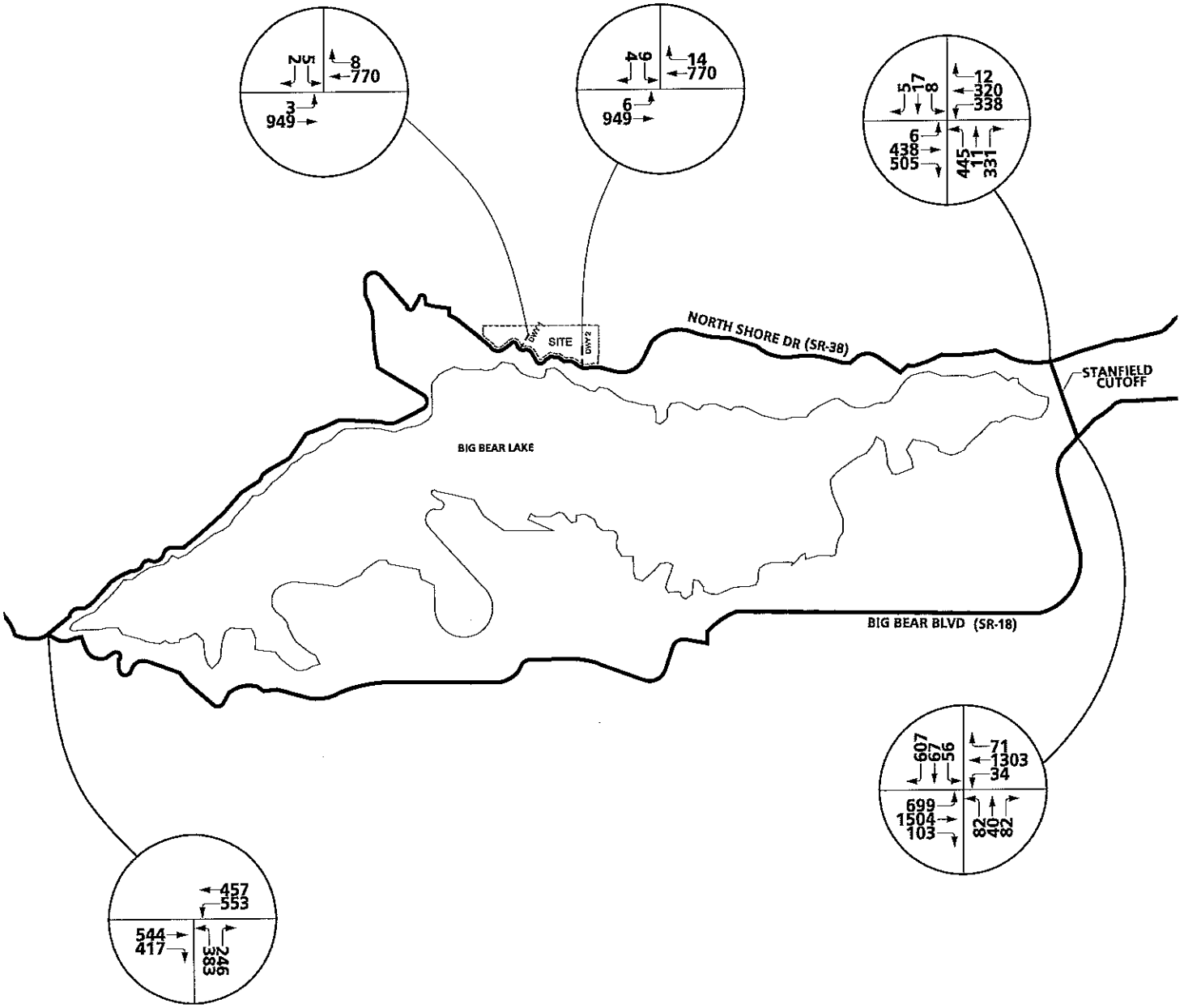

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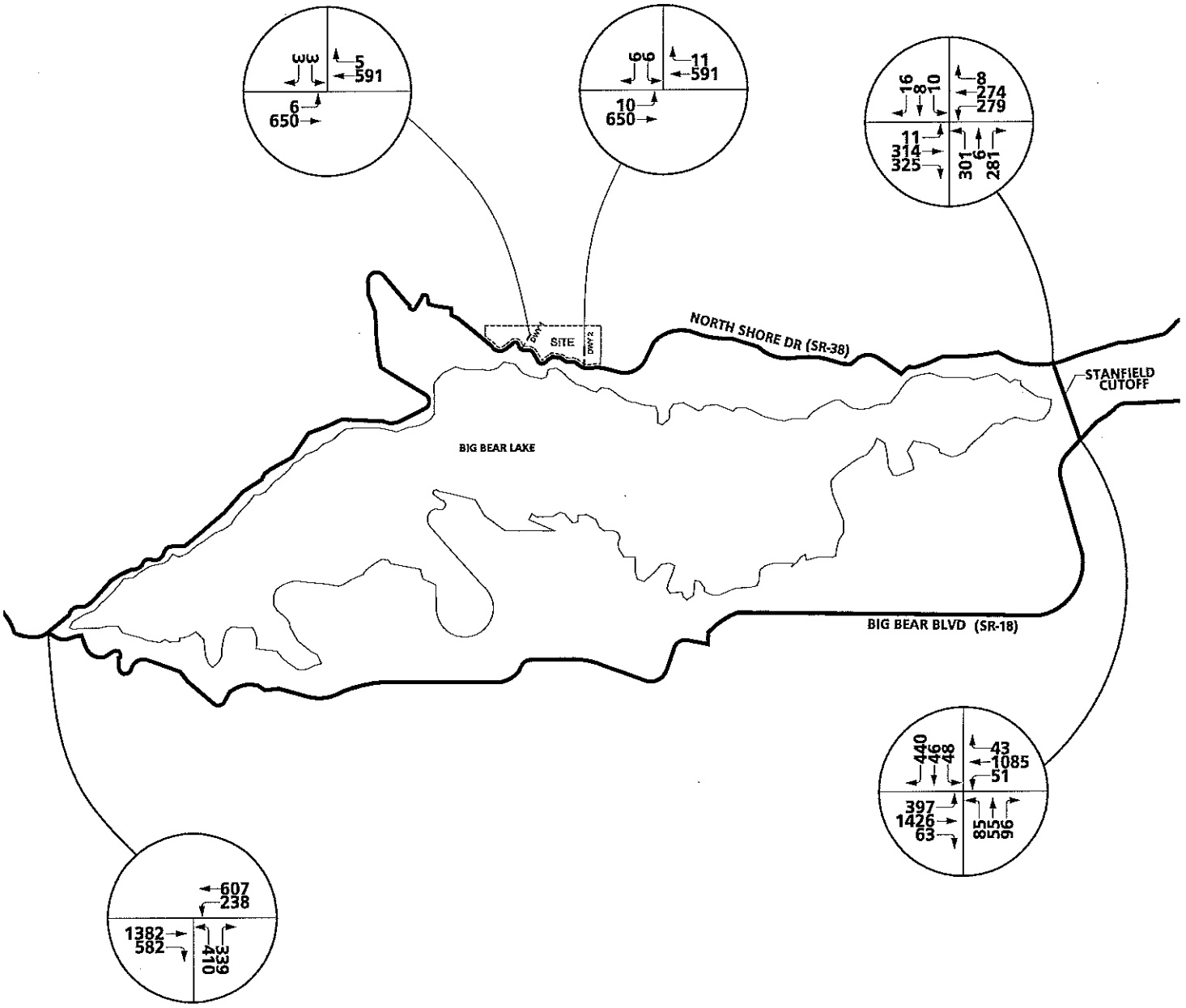
EXHIBIT 5-F

GENERAL PLAN BUILDOUT WITH PROJECT SUNDAY MIDDAY PEAK HOUR INTERSECTION VOLUMES



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URBAN CROSSROADS

Big Bear Blvd (SR-18) (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- Big Bear Blvd (SR-18) (EW)

Driveway #1 (NS) at:

- North Shore Drive (SR-38) (EW)

Driveway #2 (NS) at:

- North Shore Drive (SR-38) (EW)

The operations analysis worksheets for General Plan Buildout With Project (2030) traffic conditions are included in Appendix "H".

6.0 SUMMARY AND RECOMMENDATIONS

This chapter summarizes the findings of this traffic impact analysis, and provides a series of recommendations related to project implementation.

6.1 Summary

The traffic issues related to the proposed land use and development have been evaluated in the context of the California Environmental Quality Act (CEQA) and the San Bernardino County Congestion Management Program (CMP). In conformance with the requirements of the San Bernardino County Congestion Management Program (CMP), the proposed project does not require a CMP traffic study. The CMP requires no analysis for projects that generate less than 250 peak hour trips. The project generates approximately 51 and 51 trips during the AM and PM peak hours, respectively; which is less than the required threshold for a CMP traffic study. However, a long-range traffic analysis has been required by County staff.

Project traffic volumes for all future conditions were estimated using a manual approach. The trip generation calculation is based on the most recent Institute of Transportation Engineers Trip Generation Rates, 7th Edition. The project trip distributions are derived from a select zone run of the San Bernardino Mountain Model.

Long Range General Plan Buildout (2030) conditions have been estimated based on the San Bernardino Mountain Model and the addition of both the project related peak hour volumes and the known cumulative development peak hour volumes per discussions with County staff.

6.1.1 The Project

The Moon Camp residential project is proposed to include 50 new single-family detached dwelling units and three lots for open space and common area on approximately 62.43 acres. Exhibit 1-B illustrates the project site plan.

The traffic related to the project has been calculated in accordance with the following accepted procedural steps:

- Trip Generation
- Trip Distribution
- Traffic Assignment

Table 2-2 (previously presented) summarizes the projected trip generation for the proposed development. As indicated in Table 2-2, the proposed Moon Camp residential development is projected to generate 479 trip-ends per day with 51 vehicles per hour during the weekday PM peak hour.

6.1.2 Existing Study Area Conditions

Regional access to the site is provided via North Shore Boulevard.

6.1.3 Future Conditions

An Interim Year (2010) analysis and long-range General Plan Buildout (2030) analysis are included in this report. Interim Year (2010) traffic operations analysis has been completed for the Friday PM and Sunday Mid-day peak hours and are shown in Tables 5-1 and 5-2 (previously presented). Friday PM peak hour and Sunday Mid-day peak hour traffic operations analysis are summarized in Tables 5-3 (previously presented)

for General Plan Buildout With Project (2030) conditions. All study intersections are projected to experience Level of Service "C" or better operations during the peak hours for all scenario analyzed.

6.2 Recommendations

The recommendations in this section address all necessary on-site improvements and off-site transportation improvements.

6.2.1 On-Site Improvements

On-site improvements and improvements adjacent to the site will be required in conjunction with the proposed development to ensure adequate circulation within the project itself. Exhibit 6-A illustrates the recommended improvement measures to address on-site circulation requirements of the proposed site, which include the following:

- Sight distance at the project access roadway should be reviewed with respect to Caltrans / County of San Bernardino sight distance standards at the time of final grading landscape and street improvement plans.

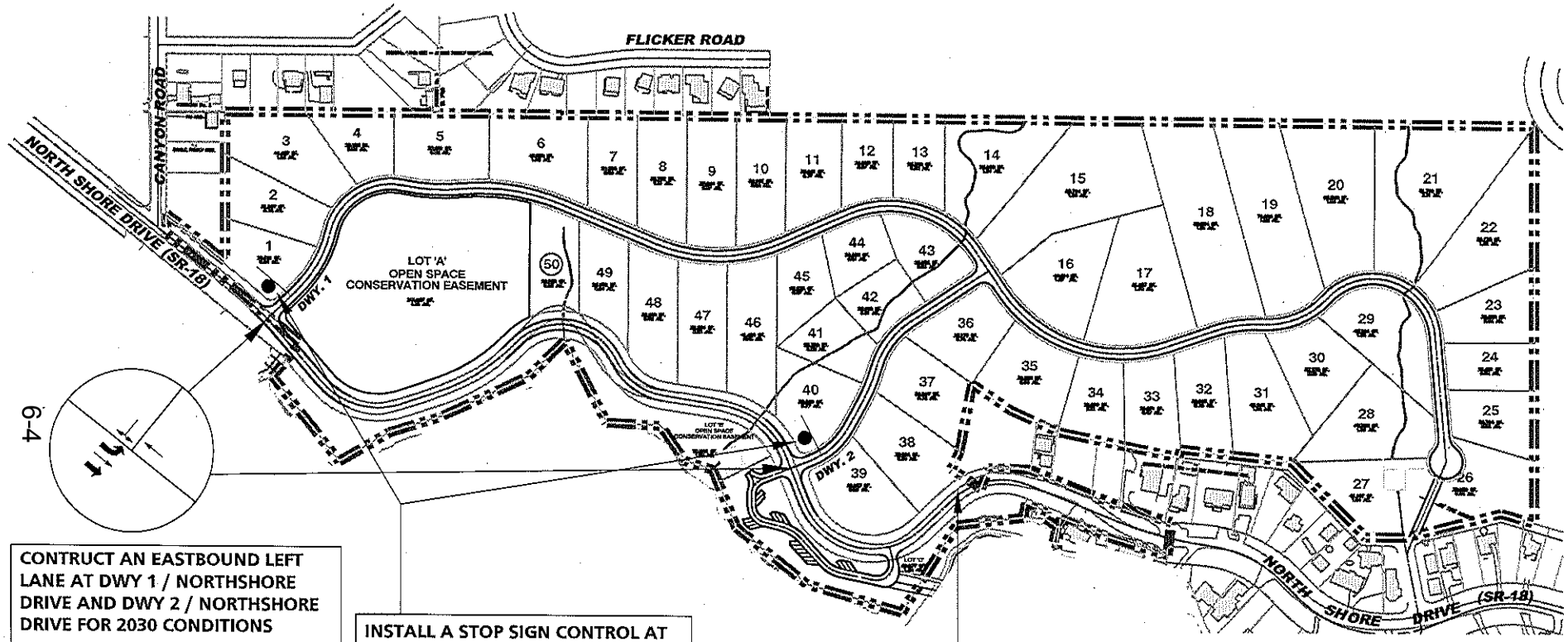
- Traffic signing / striping should be implemented in conjunction with detailed construction plans for the project site.

- Construct North Shore Drive at its ultimate half-section width as a Mountain Major highway from Canyon Drive to the Easterly project boundary.

- Install a stop sign control at Driveway #1 and Driveway #2

EXHIBIT 6-A

CIRCULATION RECOMMENDATIONS



CONTRUCT AN EASTBOUND LEFT LANE AT DWY 1 / NORTHSHORE DRIVE AND DWY 2 / NORTHSHORE DRIVE FOR 2030 CONDITIONS

INSTALL A STOP SIGN CONTROL AT THE DRIVEWAY 1 AND DRIVEWAY 2.

CONTRUCT A SECOND EASTBOUND THROUGH LANE AT DWY 1 / NORTHSHORE DRIVE AND DWY 2 / NORTHSHORE DRIVE FOR 2030 CONDITIONS

TRAFFIC SIGNING AND STRIPING SHOULD BE IMPLEMENTED IN CONJUNCTION WITH DETAILED CONSTRUCTION PLANS FOR THE PROJECT SITE.

SIGHT DISTANCE AT EACH PROJECT ACCESS ROADWAY SHOULD BE REVIEWED WITH RESPECT TO STANDARD CALTRANS AND COUNTY OF SAN BERNARDINO SIGHT DISTANCE STANDARDS AT THE TIME OF FINAL GRADING, LANDSCAPE AND STREET IMPROVEMENT PLANS.

CONSTRUCT NORTH SHORE DRIVE AT ITS ULTIMATE HALF-SECTION AS A MOUNTAIN MAJOR HIGHWAY FROM CANYON ROAD TO THE EASTERLY PROJECT BOUNDARY.

LEGEND:

● = STOP SIGN

➡ = RECOMMENDED IMPROVEMENT

N

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- Construct an Eastbound Left Turn Lane at Driveway 1 / North Shore Drive and Driveway 2/ North Shore Drive for 2030 Buildout Conditions

- Construct a 2nd Eastbound Through Lane at Driveway 1 / North Shore Drive and Driveway 2/ North Shore Drive for 2030 Buildout Conditions

6.2.2 Off-Site Improvements

The necessary off-site improvement recommendations were described in previous sections of this report. Exhibit 6-B illustrates the recommended improvements for 2010 Without Project and With Project traffic conditions. There are no additional recommended improvements for 2010 With Project traffic conditions compared to 2010 Without Project traffic conditions. Exhibit 6-C illustrates the recommended improvements for General Plan Buildout (2030) traffic conditions compared to the improvements shown on Exhibit 6-B.

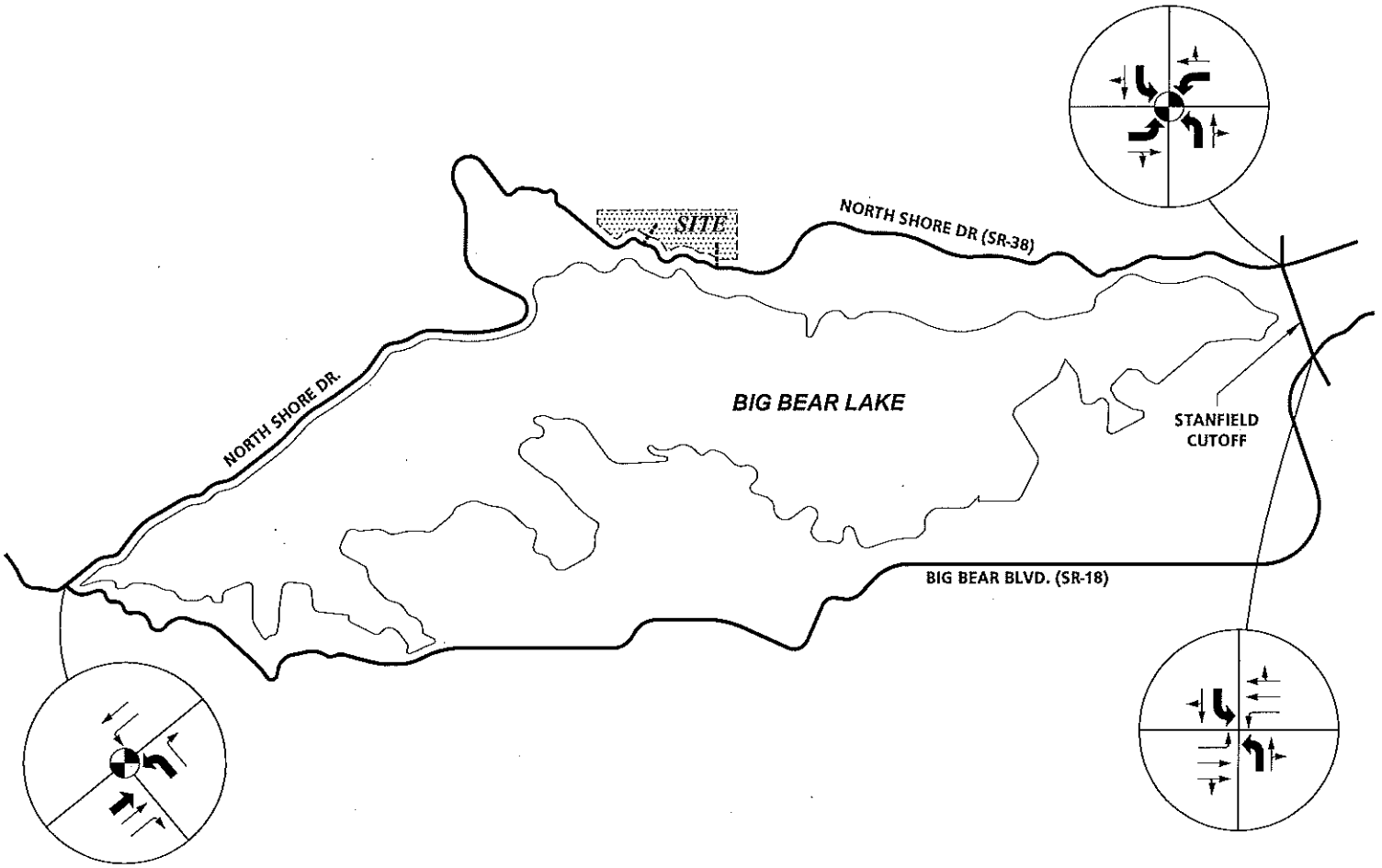
6.2.3 Project Fair Share Analysis

This section of the report summarizes the improvements and associated costs required to meet San Bernardino Congestion Management Program (CMP) level of service requirements for long range traffic condition, per discussion with County staff.

Table 6-1 indicates the needed long range 2030 improvements and resulting costs for the study area intersections. The cost data is provided in Appendix "G" of the San Bernardino Congestion Management Program, 2003 update (see Appendix "I"). Estimated cost (per SANBAG CMP table)

EXHIBIT 6-B

RECOMMENDED IMPROVEMENTS FOR 2010 WITHOUT AND WITH PROJECT CONDITIONS



LEGEND:

= TRAFFIC SIGNAL

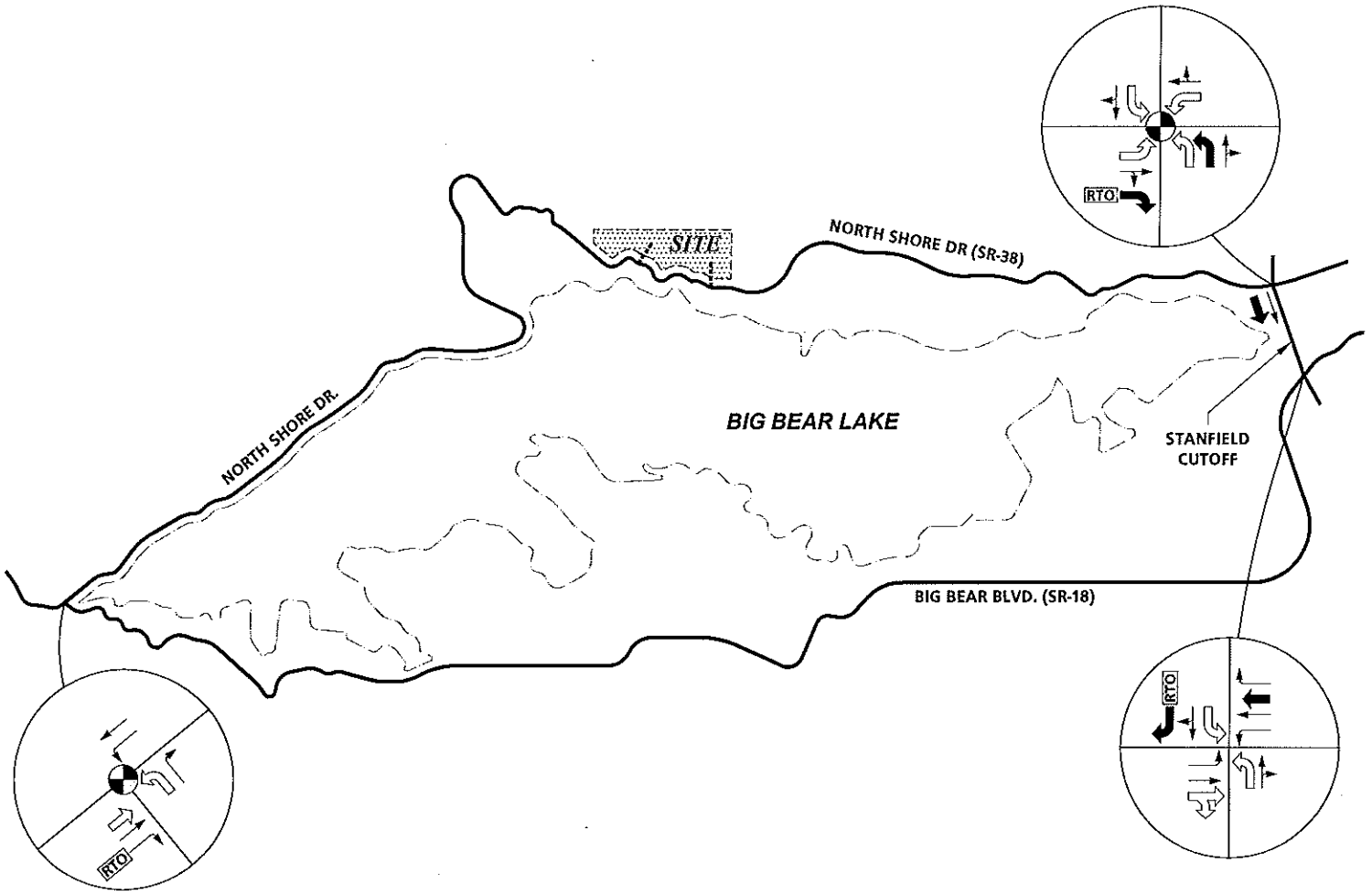
= EXISTING LANE

= CURRENT PHASE IMPROVEMENTS

N

EXHIBIT 6-C

ADDITIONAL RECOMMENDED IMPROVEMENTS FOR GENERAL PLAN BUILDOUT (2030) CONDITIONS



LEGEND:

- = TRAFFIC SIGNAL
- = EXISTING LANE
- = CURRENT PHASE IMPROVEMENTS
- = PREVIOUS PHASE IMPROVEMENTS
- RTO = RIGHT TURN OVERLAP PHASING IMPROVEMENTS

N

TABLE 6-1

ROADWAY IMPROVEMENTS COST

INTERSECTION	2030 IMPROVEMENTS	COST
North Shore Dr. (SR-38) (NS) at:	Install Traffic Signal	$250,000
• Big Bear Blvd. (SR-18) (EW)	Construct NB Left Turn Lane	$50,000
	Construct EB Through Lane	$289,720
	Add Right Turn Overlap Phasing	$25,000
		$614,720
Standfield Cutoff (NS) at:		
• North Shore Dr. (EW)		
	Install Traffic Signal	$250,000
	Construct 2 NB left turn lanes	$100,000
	Construct SB left turn lane	$50,000
	Construct EB left turn lane	$50,000
	Construct EB right turn lane	$50,000
	Add Right Turn Overlap Phasing	$25,000
	Construct WB left turn lane	$50,000
		$575,000
Stanfield Cutoff (NS) at:		
• Big Bear Blvd. (EW)		
	Construct NB left turn lane	$50,000
	Construct SB left turn lane	$50,000
	Add Right Turn Overlap Phasing	$25,000
	Construct EB through lane	$289,720
	Construct WB through lane	$289,720
		$704,440
TOTAL - COST OF CONSTRUCTION		**$1,894,160**

Source: Appendix "G" of the San Bernardino Congestion Management Program, 2003 update.

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for a through lane is $289,720 (600 feet long for upstream and 600 feet long including taper for downstream). As indicated in Table 6-1, the total cost of needed intersection improvements is $1,894,160.

The project fair share contribution towards the required improvements has also been calculated. Table 6-2 includes the project's cost contribution based on the project's percent of new traffic. As indicated in Table 6-2, the highest Friday PM or Sunday Mid-day fair share cost is approximately $129,193.

6.2.4 Transportation System Management Actions

a. Off-Site

As development in the area occurs, transit agencies should consider expanding service within the area.

b. On-Site

The on-site design should accommodate private and/or public bus access design and parking as necessary.

TABLE 6-2

PROJECT FAIR SHARE

SEGMENT	COST	PEAK HOUR	EXISTING TRAFFIC	2030 WITH PROJECT TRAFFIC	PROJECT TRAFFIC	TOTAL NEW TRAFFIC	PROJECT % OF NEW TRAFFIC	(A) FRIDAY PM PROJECT COST SHARE	(B) SUNDAY MID. PROJECT COST SHARE	HIGHEST FRIDAY PM OR SUNDAY MID. COST SHARE
North Shore Dr. (SR-38) (NS) at: • Big Bear Blvd. (EW)	$614,720	Friday PM Sunday Midday	906 2208	1625 2639	15 26	719 431	2.09% 6.03%	$12,824	$37,083	$37,083
Standfield Cutoff (NS) at: • North Shore Dr. (EW)	$575,000	Friday PM Sunday Midday	822 904	1,119 1,196	35 26	297 292	11.78% 8.90%	$67,761	$51,199	$67,761
Stanfield Cutoff (NS) at: • Big Bear Blvd. (EW)	$704,440	Friday PM Sunday Midday	2,745 2,625	3,584 3,463	29 21	839 838	3.46% 2.51%	$24,349	$17,653	$24,349
GRAND TOTAL - COST SHARE FOR IMPROVEMENTS								**$104,934**	**$105,935**	**$129,193**

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E.2 - Revised Traffic Study (Urban Crossroads, June 2007)

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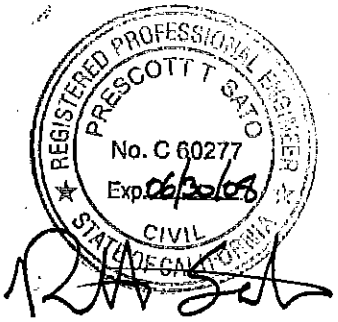

Prepared for:

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MOON CAMP
TRAFFIC IMPACT ANALYSIS
COUNTY OF SAN BERNARDINO, CALIFORNIA

June 29, 2007 (REVISED)
April 24, 2007

JN:04409-02
SS:RA:JCS :dl

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MOON CAMP
TRAFFIC IMPACT ANALYSIS
COUNTY OF SAN BERNARDINO, CALIFORNIA

1.0 INTRODUCTION

This report summarizes the traffic impact analysis conducted to assess the potential impacts of the proposed Moon Camp residential development on the roadway system in the study area. The proposed development is generally located along North Shore Drive in the County of San Bernardino. The Moon Camp residential project is proposed to include 50 new single-family detached dwelling units and three lots for open space and common area on approximately 62.43 acres. The general location of the project site is presented on Exhibit 1-A.

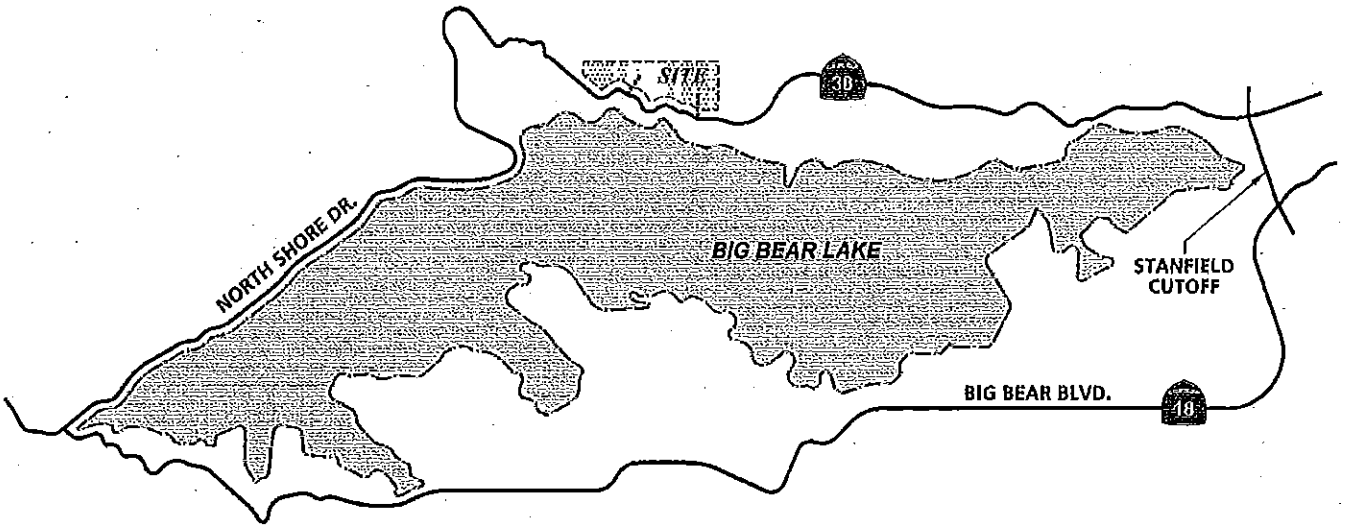
In conformance with the requirements of the San Bernardino County Congestion Management Program (CMP), the proposed project does not require a CMP traffic study. The CMP requires no analysis for projects generating less than 250 peak hour trips. The project generates approximately 51 and 51 trips during the AM and PM peak hours, respectively; which is less than the required threshold for a CMP traffic study. However, per discussion with County staff, the traffic study should follow CMP guidelines and a long-range traffic analysis is required.

The introduction to this report presents an overview of the project and provides a brief description of the study area. The analysis methodologies used to evaluate the impacts of the project are described and the definitions of roadway system deficiencies and significant project impacts are presented in the context of the County of San Bernardino and CEQA requirements.

Subsequent sections of the report will describe the project in detail and provide a complete description of existing and projected traffic conditions within the study area.

EXHIBIT 1-A

LOCATION MAP



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1.1 Project Overview

The proposed Moon Camp residential development is generally located north of North Shore Drive south of Flicker Road and east of Canyon Road in San Bernardino County. The Moon Camp residential project is proposed to include 50 new single-family detached dwelling units and three open space lots and common area. Exhibit 1-B illustrates the site plan.

There are two (2) primary full access points to the project site located off North Shore Drive.

Additional detailed discussion of the roadway network features of the project and its traffic generation characteristics will be provided in subsequent sections of this report.

1.2 Study Area

The overall study area evaluated in this study is presented on Exhibit 1-A. Based on discussion with County transportation staff, the study area includes the following existing study intersections:

Stanfield Cutoff (NS) at:

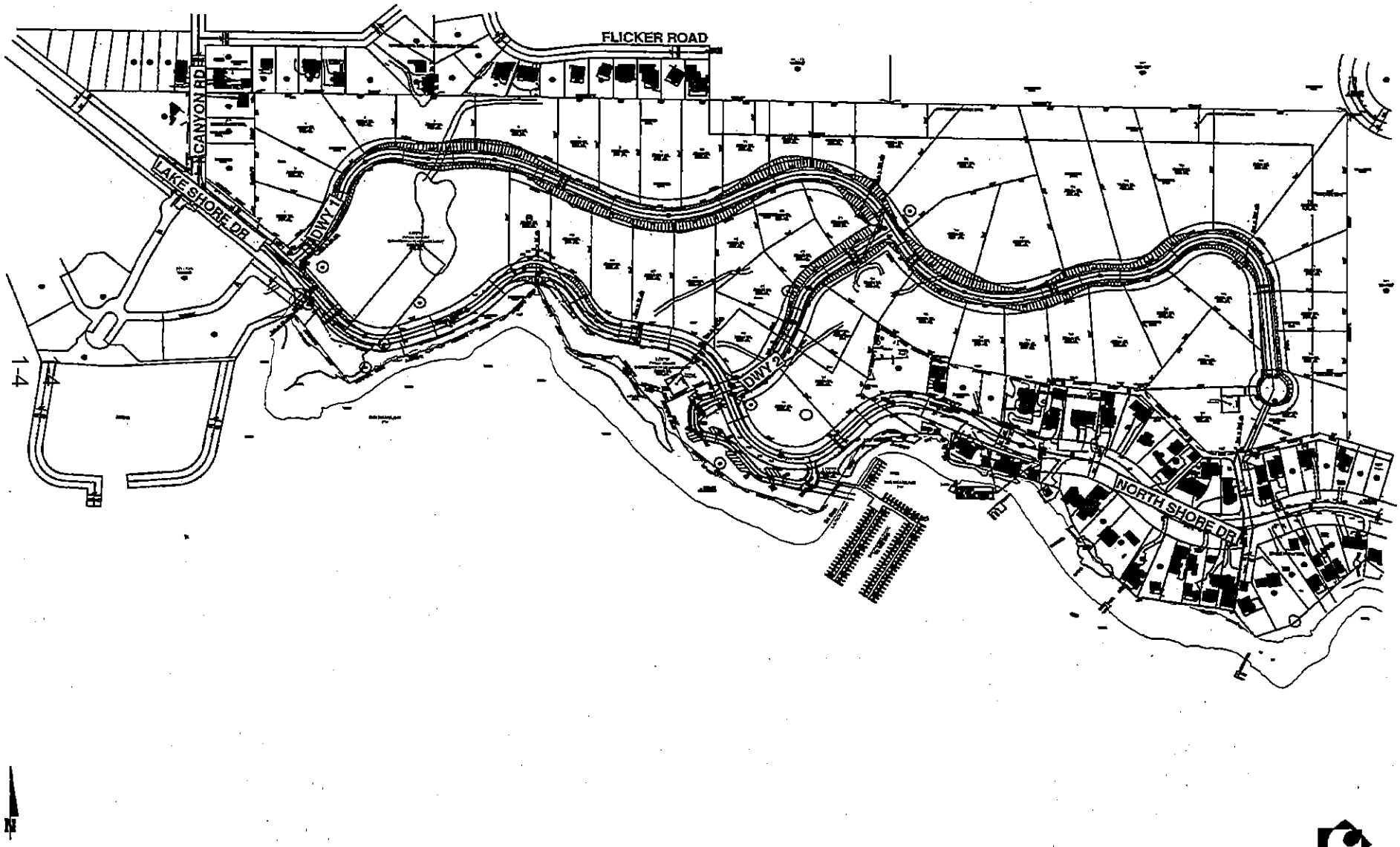
- North Shore Drive (SR-38) (EW)
- Big Bear Boulevard (SR-18) (EW)

North Shore Drive (SR-38) (NS) at:

- Big Bear Boulevard (SR-18) (EW)

EXHIBIT 1-B

SITE PLAN



URBAN

1.3 Analysis Methodologies

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are consistent with the San Bernardino County Congestion Management Program. The following analysis years are considered in this report:

- Existing Condition – 2007
- Interim Year – 2010
- Long Range – 2030

The overall methodologies used to develop future traffic volume forecasts, and the explicit traffic operations analysis methodologies are summarized herein. The primary section of interest to the non-technically oriented reviewer is Section 1.4.2 (Definition of Significant Impact).

1.3.1 Overall Analysis Methodology

As described previously, traffic conditions are evaluated in this report for existing conditions, 2010 Interim Year Without Project conditions, 2010 Interim Year With Project conditions, and Long Range General Plan Buildout (2030) conditions.

Actual traffic count data was obtained from manual intersection counts (conducted in March 2007, see Appendix "A") to quantify existing traffic conditions. Per discussion with County staff, the peak season of the study area occurs during the summer months, thus a 16% growth is applied to manual intersection counts to represent existing peak hour intersection volumes.

Project traffic volumes for all future conditions were estimated using the manual approach. Trip generation has been estimated based on data collected by the Institute of Transportation Engineers (ITE). The project trip distribution was derived from a select zone run of the San Bernardino Mountain Model.

Interim Year conditions have been estimated based on areawide growth (other projects that are approved, pending, or under construction) and the addition of the project related peak hour volumes. An area-wide growth of 2% per year is applied to adjusted existing volumes (with 16% growth).

The Interim Year 2010 without project traffic volumes are estimated based on the 2007 existing traffic volumes (with 16% adjustment) plus the 2007 to 2010 background growth volumes (2%) plus the known cumulative development volumes.

Project traffic volumes for all future conditions were estimated using the manual approach described in the CMP guidelines. The trip generation calculation is based on the most recent Institute of Transportation Engineers Trip Generation Rates, 7th Edition. The project trip distribution was developed from a select zone run of the San Bernardino Mountain Model and was reviewed by the County of San Bernardino staff. The project only traffic forecasts have been generated by applying the trip generation, distribution and traffic assignment calculations.

Long Range General Plan Buildout (2030) conditions have been estimated based on the San Bernardino Mountain Model and the addition of both the project related peak hour volumes and the known cumulative development peak hour volumes per discussions with County staff.

1.3.2 Traffic Operations Analysis

The current technical guide to the evaluation of traffic operations is the 2000 Highway Capacity Manual (HCM) (Transportation Research Board Special Report 209). The HCM defines level of service as a qualitative measure which describes operational conditions within a traffic stream, generally in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. The criteria used to evaluate LOS (Level of Service) conditions vary based on the type of roadway and whether the traffic flow is considered interrupted or uninterrupted. The definitions of level of service for uninterrupted flow (flow unrestrained by the existence of traffic control devices) are:

- LOS "A" represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream.

- LOS "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.

- LOS "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.

- LOS "D" represents high-density but stable flow. Speed and freedom to maneuver are severely restricted, and the driver experiences a generally poor level of comfort and convenience.

- LOS "E" represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Small increases in flow will cause breakdowns in traffic movement.

- LOS "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.

Uninterrupted flow is generally found only on limited access (freeway) facilities in urban areas. The definitions of level of service for interrupted traffic flow (flow restrained by the existence of traffic signals and other traffic control devices) differ slightly depending on the type of traffic control.

The level of service is typically dependent on the quality of traffic flow at the intersections along a roadway. The HCM methodology expresses the level of service at an intersection in terms of delay time for the various intersection approaches. The HCM uses different procedures depending on the type of intersection control. The levels of service determined in this study are calculated using the HCM methodology.

For signalized intersections, average total delay per vehicle for the overall intersection is used to determine level of service. Levels of service at signalized study intersections have been evaluated using an HCM intersection analysis program.

The study area intersections which are stop sign controlled with stop-control on the minor street only have been analyzed using the two-way stop

controlled unsignalized intersection analysis methodology of the HCM. For these intersections, the calculation of level of service is dependent on the occurrence of gaps occurring in the traffic flow of the main street. Using data collected describing the intersection configuration and traffic volumes at these locations to calculate average intersection delay; the level of service has been calculated. The level of service criteria for this type of intersection analysis is based on total delay per vehicle for the worst minor street movement(s).

The levels of service are defined in terms of average delay for the intersection analysis methodology as follows:

LEVEL OF SERVICE	AVERAGE TOTAL DELAY PER VEHICLE (SECONDS)	
	SIGNALIZED	UNSIGNALIZED
A	0 to 10.00	0 to 10.00
B	10.1 to 20.00	10.01 to 15.00
C	20.1 to 35.00	15.01 to 25.00
D	35.1 to 55.00	25.01 to 35.00
E	55.1 to 80.00	35.01 to 50.00
F	Over 80.0 or V/C ≥ 1.00	50.01 and up

Per the CMP guidelines, signalized intersections are considered deficient (LOS "F") if the overall intersection critical volume to capacity (V/C) ratio equals or exceeds 1.0, even if the level of service defined by the delay value is below the defined LOS standard. The V/C ratio is defined as the critical volumes divided by the intersection capacity. A V/C ratio greater than 1.0 implies an infinite queue.

The LOS analysis for signalized intersections has been performed using optimized signal timing. This analysis has included an assumed lost time of two seconds per phase in accordance with San Bernardino CMP recommended default values. Signal timing optimization has considered pedestrian safety and signal coordination requirements. Appropriate time for pedestrian crossing have also been considered in the signalized intersection analysis. The following formula has been used to calculate the pedestrian minimum times for all HCM runs:

[(Curb to Curb distance) / (4 feet/second)] + 5 seconds

The resulting minimum green times are shown in the appendices for each analyzed scenario. Saturation flow rates of 1,800 vehicles per hour of green (vphg) for through and right-turn lanes and 1,700 vphg for single left-turn lanes, 1,600 vphg per lane for dual left-turn lanes, and 1,500 vphg per lane for triple left-turn lanes have been assumed for all capacity analysis under 2007 Existing and 2010 Interim Year conditions. Under 2030 Horizon Year conditions, saturation flow rates of 1,900 vphg for through and right-turn lanes and 1,800 vphg for single left-turn lanes, 1,700 vphg per lane for dual left-turn lanes, and 1,600 vphg per lane for triple left-turn lanes have been assumed. These are the default values recommended by the CMP guidelines.

The 2030 peak hour factor has been adjusted upwards to 0.95. This is specifically allowed by the San Bernardino CMP guidelines to account for the effects of congestion on peak spreading. Peak spreading refers to the tendency of traffic to spread more evenly across time as congestion increases.

1.4 Definition of Deficiency and Significant Impact

The following definitions of deficiencies and significant impacts have been developed in accordance with the County of San Bernardino requirements.

1.4.1 Definition of Deficiency

County of San Bernardino guidelines indicate that peak hour intersection operations of LOS "C" or better are considered acceptable. Therefore, any intersection operating at LOS "D" or worse is considered deficient. Per CMP direction, state controlled facilities (state highways, freeway ramp intersection, etc.) are subject to local jurisdiction (California Department of Transportation) traffic operations requirements, with no greater than 45 seconds average stopped delay per vehicle allowed during peak hour operations (middle of LOS "D")

The identification of a CMP deficiency requires further analysis in satisfaction of CMP and County requirements, including:

- Evaluation of the mitigation measures required to restore traffic operations to an acceptable level of service with respect to CMP and local jurisdiction LOS standards.
- Calculation of the project share of new traffic on the impacted CMP facility during peak hours of traffic.
- Estimation of the cost required to implement the improvements required to restore traffic operations to an acceptable level of service as described above.

This study incorporates each of these aspects for all locations where a CMP deficiency is identified.

1.4.2 Definition of Significant Impact

The identification of significant impacts is a requirement of CEQA, and is not directly addressed in the CMP document. The County of San Bernardino General Plan and Circulation Element have been adopted in accordance with CEQA requirements, and any roadway improvements within the County of San Bernardino which are consistent with these documents are not considered a significant impact, so long as the project contributes its "fair share" funding for improvements.

A traffic impact is considered significant and immitigable if the project both: i) contributes measurable traffic to and ii) substantially and adversely changes the level of service at any off-site location projected to experience deficient operations under foreseeable cumulative conditions, where feasible improvements consistent with the County of San Bernardino General Plan cannot be constructed.

2.0 PROJECT DESCRIPTION

This section describes the project land uses and traffic characteristics for each of the future conditions analyzed.

2.1 Project Description

The proposed Moon Camp residential development is located along North Shore Drive in the County of San Bernardino. The Moon Camp residential project is proposed to include 50 new single-family detached dwelling units and one existing single-family detached dwelling unit. Exhibit 1-B (previously presented) illustrates the site plan.

There are two (2) primary full access points to the project site located off North Shore Drive.

2.2 Project Traffic

The traffic related to the project has been calculated in accordance with the following accepted procedural steps:

- Trip Generation
- Trip Distribution
- Traffic Assignment

These steps are described in detail below.

2.2.1 Project Trip Generation

The trip generation calculation is based on the most recent Institute of Transportation Engineers Trip Generation Rates, 7th Edition. Table 2-1 indicates the proposed trip generation rates. As indicated in Table 2-2, the

TABLE 2-1

TRIP GENERATION RATES[1]

LAND USE	ITE CODE	QUANTITY	UNITS[2]	FRIDAY PM PEAK HOUR			SUNDAY MID-DAY PEAK HOUR			DAILY
				IN	OUT	TOTAL	IN	OUT	TOTAL	
PROJECT										
Single Family Residential	210	50	DU	0.64	0.37	1.01	0.64	0.37	1.01	9.57
CUMULATIVE PROJECTS										
Hotel	310	Varies	ROOMS	0.31	0.28	0.59	0.31	0.28	0.59	8.17
Townhomes/Condominium	230	78	DU	0.35	0.17	0.52	0.35	0.17	0.52	5.86
Fast Food Restaurant With Drive-Thru	934	2.5	TSF	18.01	16.63	34.64	18.01	16.63	34.64	496.12
Shopping Center	820	10	TSF	6.57	7.12	13.70	6.57	7.12	13.70	152.03
Shopping Center	820	22.517	TSF	4.99	5.40	10.39	4.99	5.40	10.39	114.43
Automobile Care Center	942	4.375	TSF	1.69	1.69	3.38	1.69	1.69	3.38	20.00
Mini-Warehouse	151	3	AC	1.99	1.84	3.83	1.99	1.84	3.83	38.87
Office	710	6.3	TSF	0.17	0.83	1.00	0.17	0.83	1.00	11.01
Church	560	20	TSF	0.34	0.32	0.66	0.34	0.32	0.66	9.11

[1] Source: ITE (Institute of Transportation Engineers) Trip Generation Manual, 7th Edition, 2003.

[2] DU = Dwelling Units

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TABLE 2-2

PROJECT TRIP GENERATION SUMMARY

LAND USE	QUANTITY	UNITS[1]	FRIDAY PM PEAK HOUR			SUNDAY MID-DAY PEAK HOUR			DAILY
			IN	OUT	TOTAL	IN	OUT	TOTAL	
Single Family Residential	50	DU	32	19	51	32	19	51	479

[1] DU = Dwelling Units

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proposed Moon Camp residential development is projected to generate 479 trip-ends per day with 51 vehicles per hour during the weekday AM peak hour and 51 vehicles per hour during the weekday PM peak hour. It is our understanding that the weekday PM peak hour generates more trips than the Sunday Midday peak hour. Based on discussions with County of San Bernardino staff, weekday PM peak hour trip generation has been used in both Friday PM peak hour analysis and Sunday Mid-day peak hour analysis to represent a conservative worst case condition.

2.2.2 Project Trip Distribution and Assignment

The project trip distribution and assignment process represents the directional orientation of traffic to and from the project site. Trip distribution is heavily influenced by the geographical location of the site, the location of surrounding uses, and the proximity to the regional freeway system.

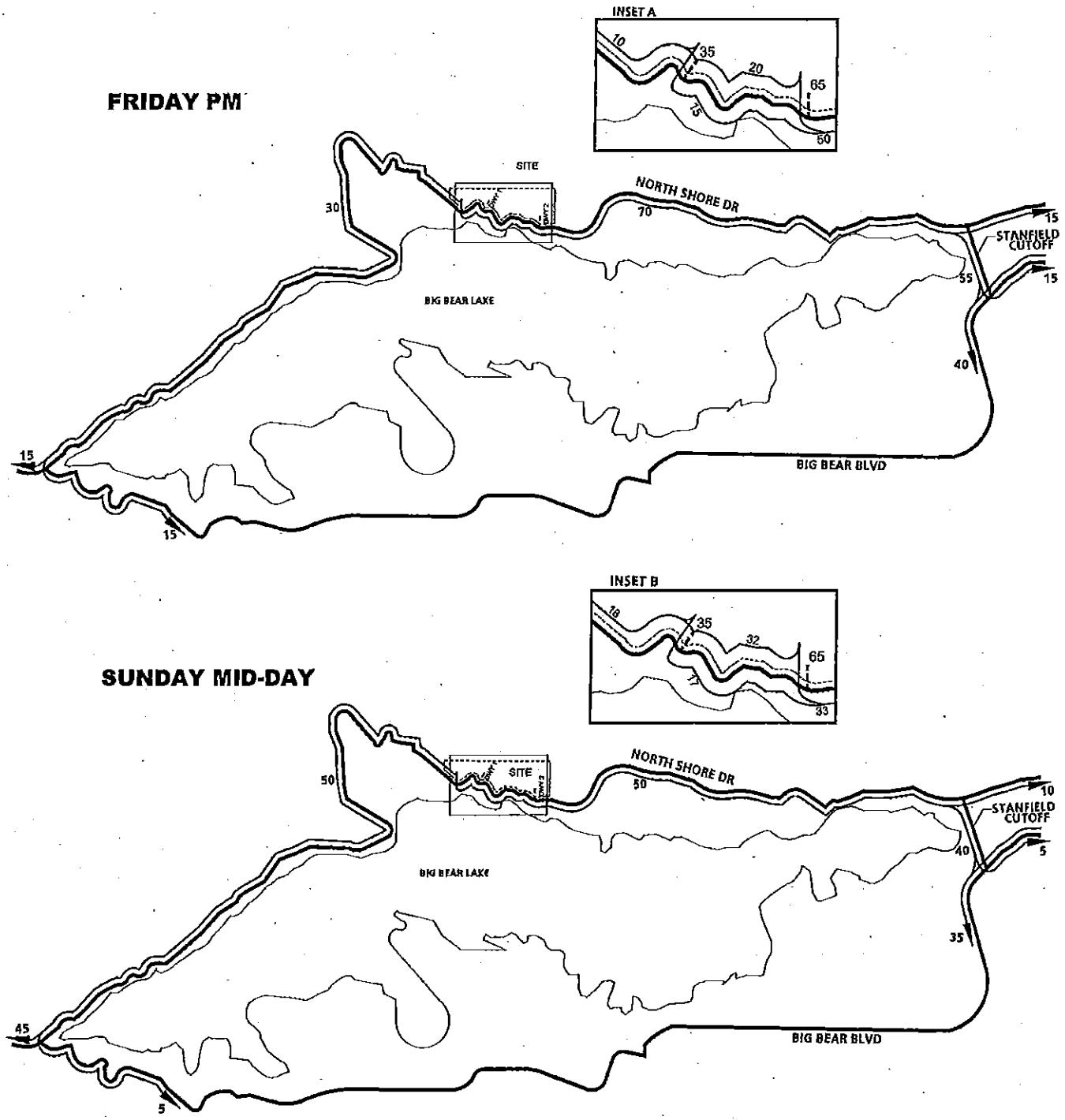
Project trip distribution has been derived from a select zone run of the San Bernardino Mountain Model. The trip distribution pattern for both Friday PM peak and Sunday Mid-day peak is based on the Friday PM distribution per discussions with County staff. Exhibit 2-A illustrates the project trip distribution.

2.2.3 Project Only Traffic Volume Forecasts

The project only traffic forecasts have been generated by applying the trip generation, distribution and traffic assignment calculations. The project ADT volumes are presented on Exhibit 2-B. The project only Friday PM peak hour and Sunday Mid-day peak hour intersection volumes are depicted on Exhibit 2-C.

EXHIBIT 2-A

PROJECT TRIP DISTRIBUTION



MOON CAMP TIA, San Bernardino County, California - 04409: 06B PTD FRIDAY-SUNDAY

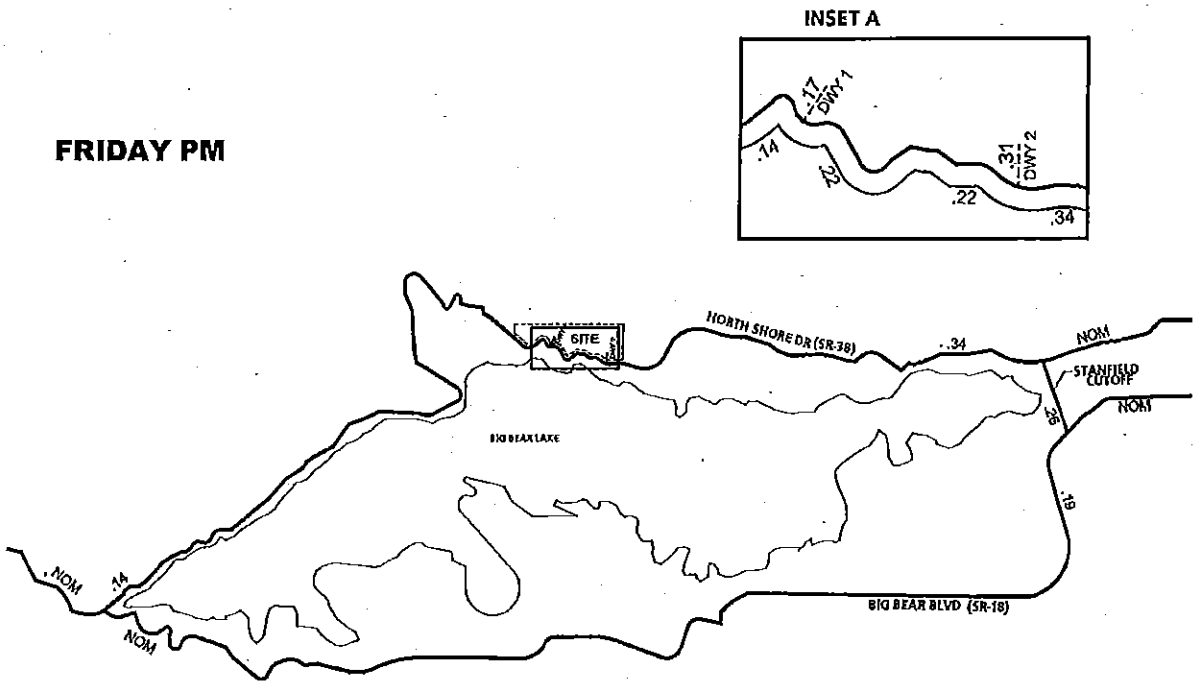
URBAN CROSSROADS

2-5

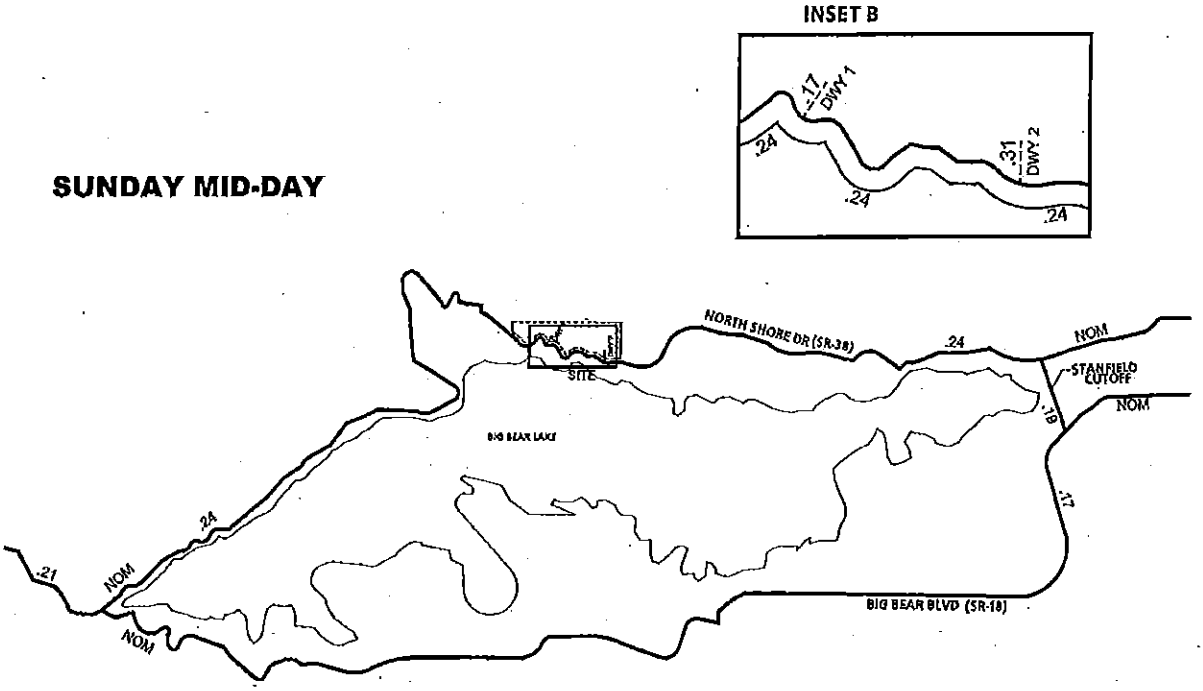
EXHIBIT 2-B

PROJECT AVERAGE DAILY TRAFFIC

FRIDAY PM



SUNDAY MID-DAY

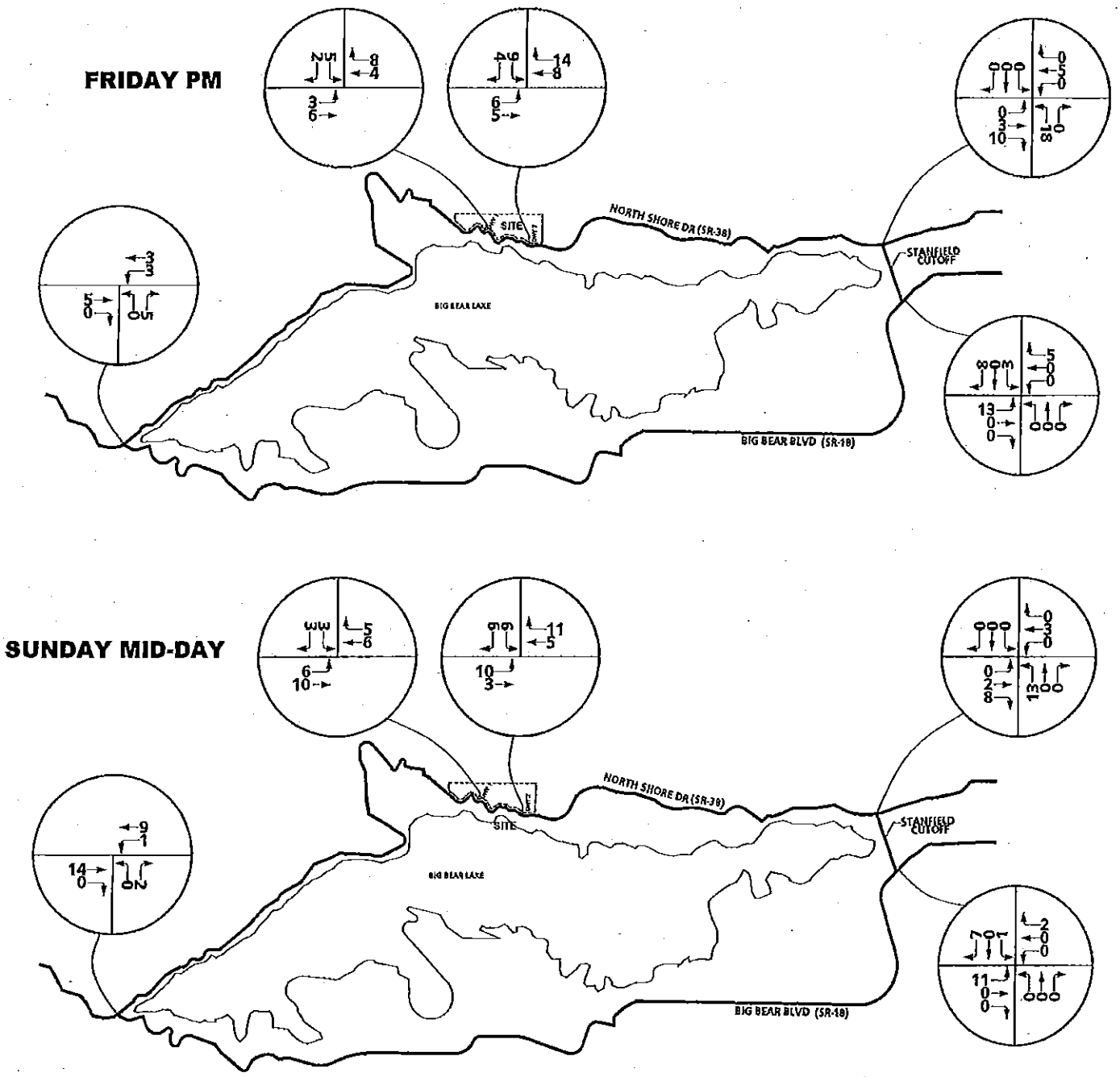


LEGEND:

10.0 = VEHICLES PER DAY (1000'S)
NOM = NOMINAL, LESS THAN 50 VEHICLES PER DAY

EXHIBIT 2-C

PROJECT FRIDAY PM PEAK HOUR / SUNDAY MIDDAY PEAK HOUR INTERSECTION VOLUMES



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3.0 EXISTING CONDITIONS

This section of the report summarizes existing roadway and traffic conditions in the study area. All analysis locations which exist today have been analyzed. The number of through travel lanes for existing roadways and intersection controls are presented, along with existing traffic count data collected for this study. This data was used to analyze existing traffic operations in the study area. Existing plans for roadway improvements are also described in this section.

3.1 Existing Roadway System and Daily Traffic Volumes

The number of through travel lanes for existing roadways and existing intersection controls within the study area are presented on Exhibit 3-A.

Exhibits 3-B and 3-C depict the current average daily traffic (ADT) volumes in the study area on Friday and Sunday, respectively. Existing ADT volumes are estimated based upon the latest traffic data collected by Urban Crossroads, Inc. (see Appendix "A"). Peak hour data has been used to estimate the average daily traffic volumes on each leg using the following formula:

Peak Hour (Approach Volume + Exit Volume) x 12 = Leg Volume.

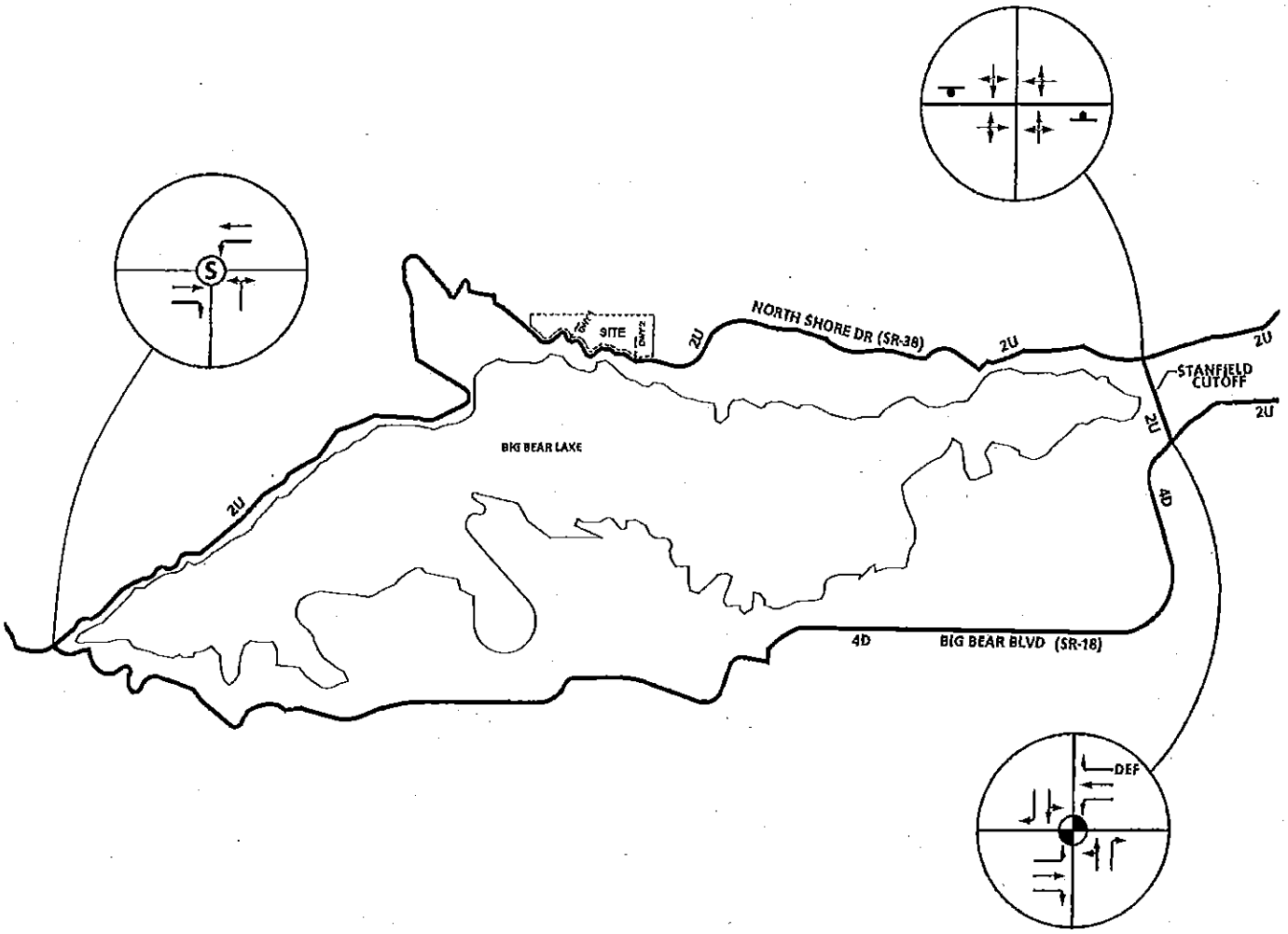
Regional access to the site is provided by North Shore Drive (SR-38)

3.2 Existing Peak Hour Traffic Volumes

Actual traffic count data was obtained from manual intersection counts (March 2007, see Appendix "A") to quantify existing traffic conditions. The Friday PM peak hour traffic volumes were determined by counting the two hour period between 4:00 PM- 6:00 PM in the evening. The Sunday Mid-day peak hour traffic volumes were identified by counting the two hour period from 12:00 PM – 2:00 PM. Per discussions with County staff, since the peak season of the study area occurs during the summer months, a 16% growth is applied to the manual intersection counts to represent existing peak hour intersection volumes.

EXHIBIT 3-A

EXISTING NUMBER OF THROUGH LANES AND INTERSECTION CONTROLS



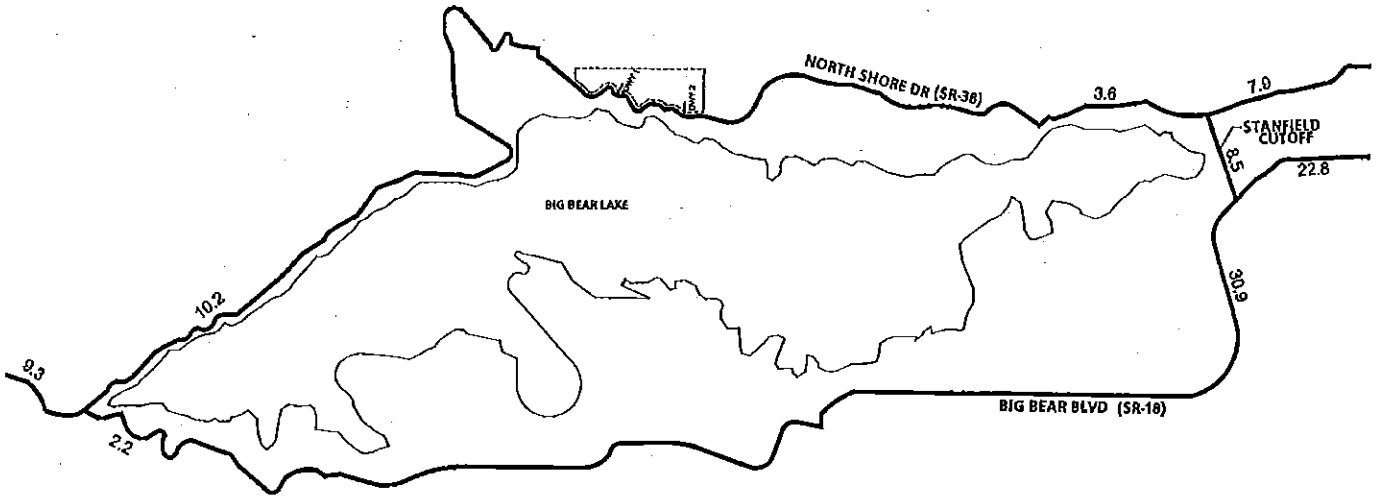
LEGEND:

- = TRAFFIC SIGNAL
- = ALL WAY STOP
- = STOP SIGN
- 4 = NUMBER OF LANES
- D = DIVIDED
- U = UNDIVIDED
- DEF = DEFACTO RIGHT TURN LANE

N

EXHIBIT 3-B

EXISTING FRIDAY AVERAGE DAILY TRAFFIC (ADT)



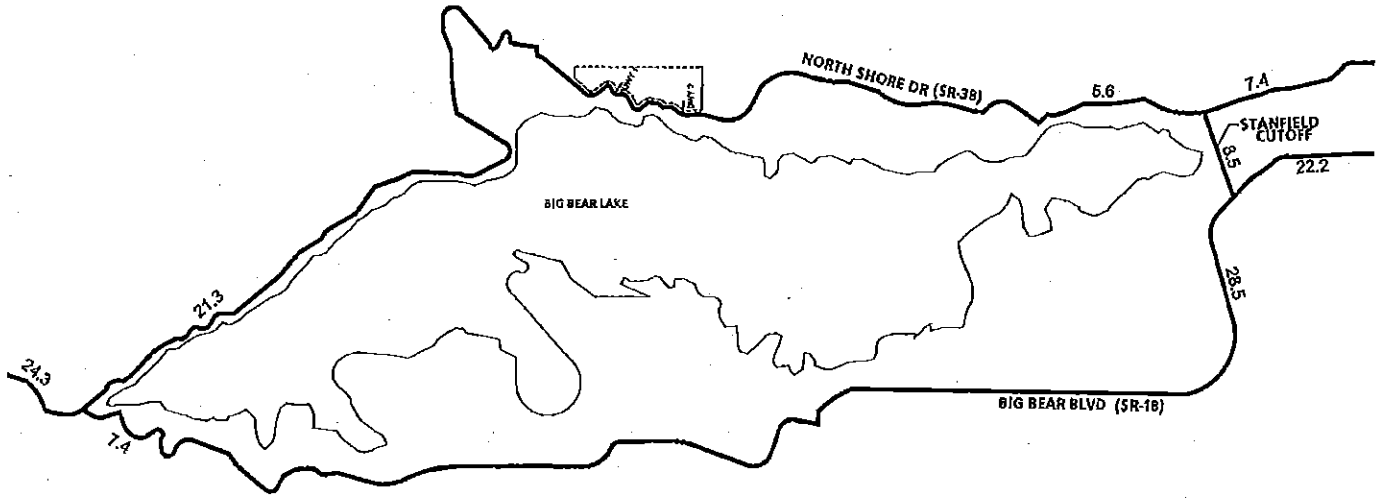
LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

N

EXHIBIT 3-C

EXISTING SUNDAY AVERAGE DAILY TRAFFIC (ADT)



LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

N

MOON CAMP TIA, San Bernardino County, California - 04409: 12A

URBAN CROSSROADS

Existing intersection level of service calculations are based upon the adjusted manual Friday PM and Sunday Mid-day peak hour turning movement counts, as shown on Exhibits 3-D and 3-E.

3.3 Existing Traffic Operations

Existing peak hour traffic operations have been evaluated for both the Friday PM and Sunday Mid-day peak hours of traffic throughout the study area. The results of this analysis are summarized in Table 3-1, along with the existing intersection geometrics and control devices at each analysis location. As indicated in Table 3-1, the following study area intersections are currently operating at an unacceptable level of service during both Friday PM and Sunday Mid-day peak hours:

Big Bear Blvd (SR-18) (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- Big Bear Blvd (SR-18) (EW)

The operations analysis worksheets for existing conditions are included in Appendix "B".

Traffic signal warrant analysis (included in Appendix "C") has been conducted for existing conditions and traffic signals are currently warranted at the following study area intersections:

Big Bear Blvd (SR-18) (NS) at:

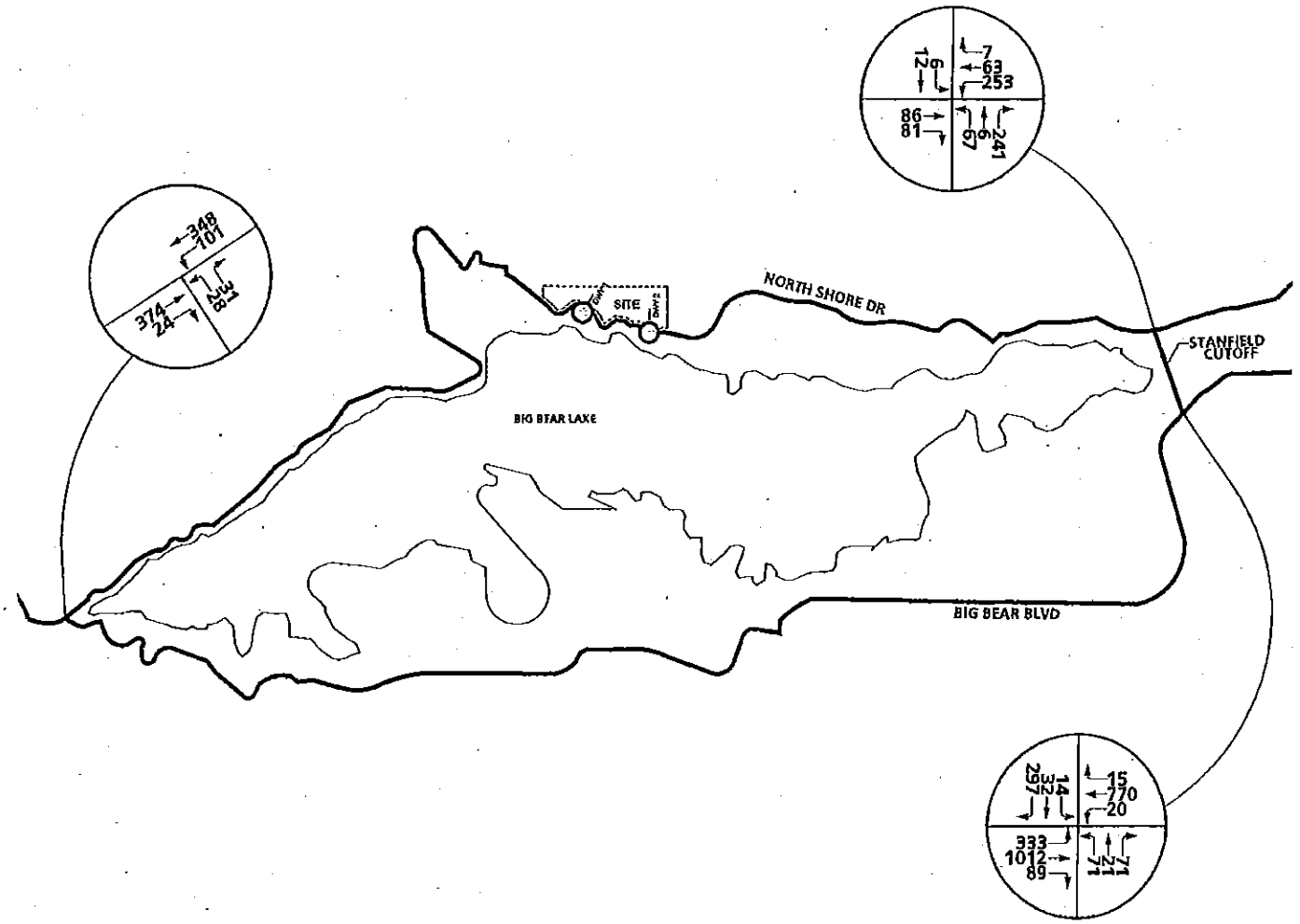
- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- North Shore Drive (SR-38) (EW)

EXHIBIT 3-D

EXISTING FRIDAY PM PEAK HOUR INTERSECTION VOLUMES



N

MOON CAMP TIA, San Bernardino County, California - 04409 : 04B 3-6.DWG

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EXHIBIT 3-E

EXISTING SUNDAY MID-DAY PEAK HOUR INTERSECTION VOLUMES

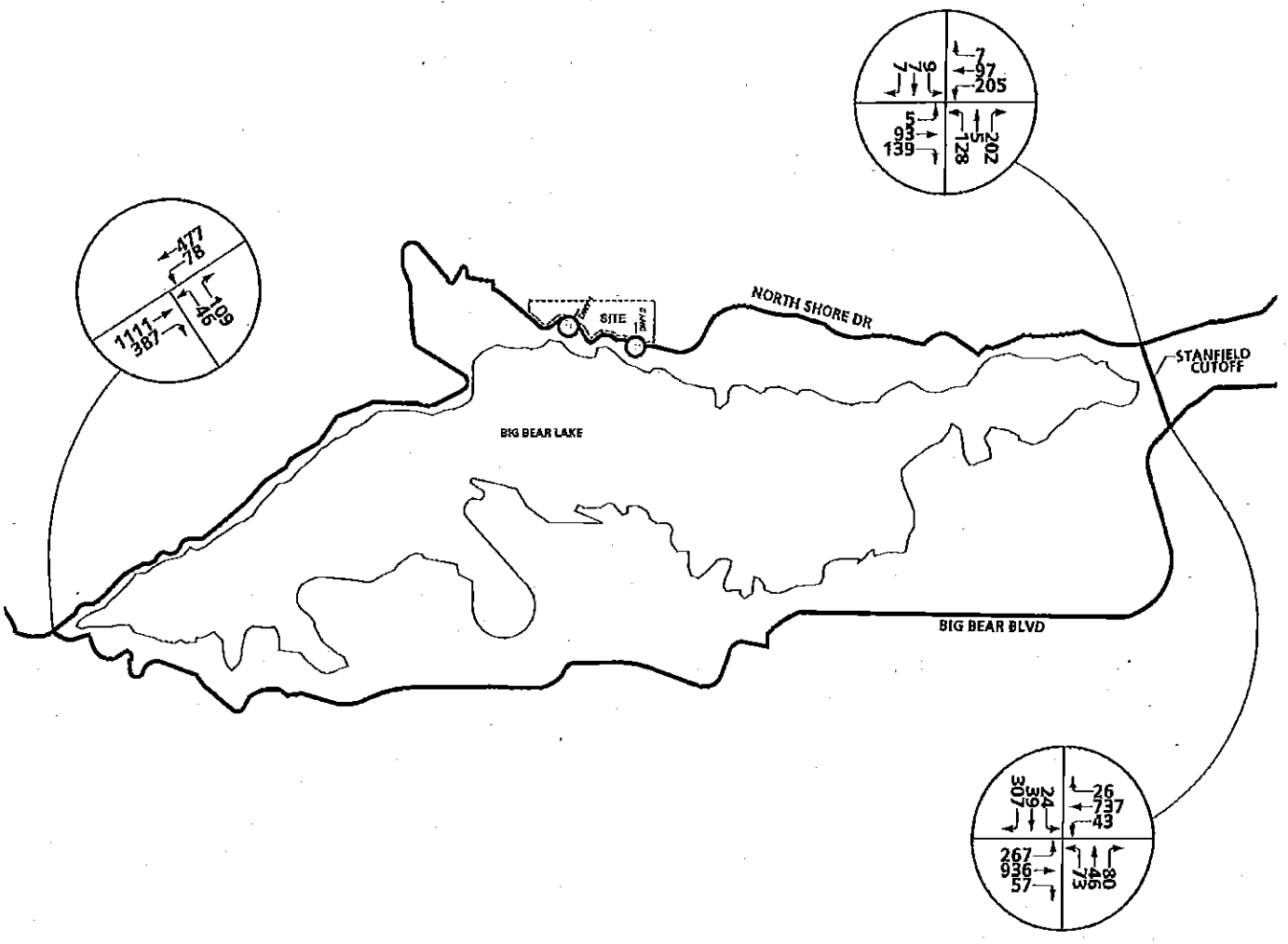

TABLE 3-1

INTERSECTION ANALYSIS FOR EXISTING CONDITIONS

INTERSECTION	TRAFFIC CONTROL[3]	INTERSECTION APPROACH LANES[1]												DELAY[2] (SECS.)		LEVEL OF SERVICE	
		NORTH-BOUND			SOUTH-BOUND			EAST-BOUND			WEST-BOUND						
		L	T	R	L	T	R	L	T	R	L	T	R	Fri. PM	Sun. MD	Fri. PM	Sun. MD
North Shore Dr. (SR-38) (NS) at:																	
• Big Bear Blvd. (SR-18) (EW)	CSS	0	1	0	0	0	0	0	1	1	1	1	0	22.5	--[4]	C	F
Stanfield Cutoff (NS) at:																	
• North Shore Dr. (SR-38) (EW)	CSS	0	1	0	0	1	0	0	1	0	0	1	0	25.5	34.5	D	D
• Big Bear Blvd. (SR-18) (EW)	TS	0	1	1	0	1	1	1	1	1	1	1	1	--[4]	81.1	F	F

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right;

[2] Delay and level of service calculated using the following analysis software: Traffix, Version 7.8 R3 (2006). Per the 2000 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with traffic traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for worst individual movement (or movements sharing a single lane) are shown.

[3] TS = Traffic Signal
CSS = Cross Street Stop

[4] -- = Delay High, Intersection Unstable, Level of Service "F".

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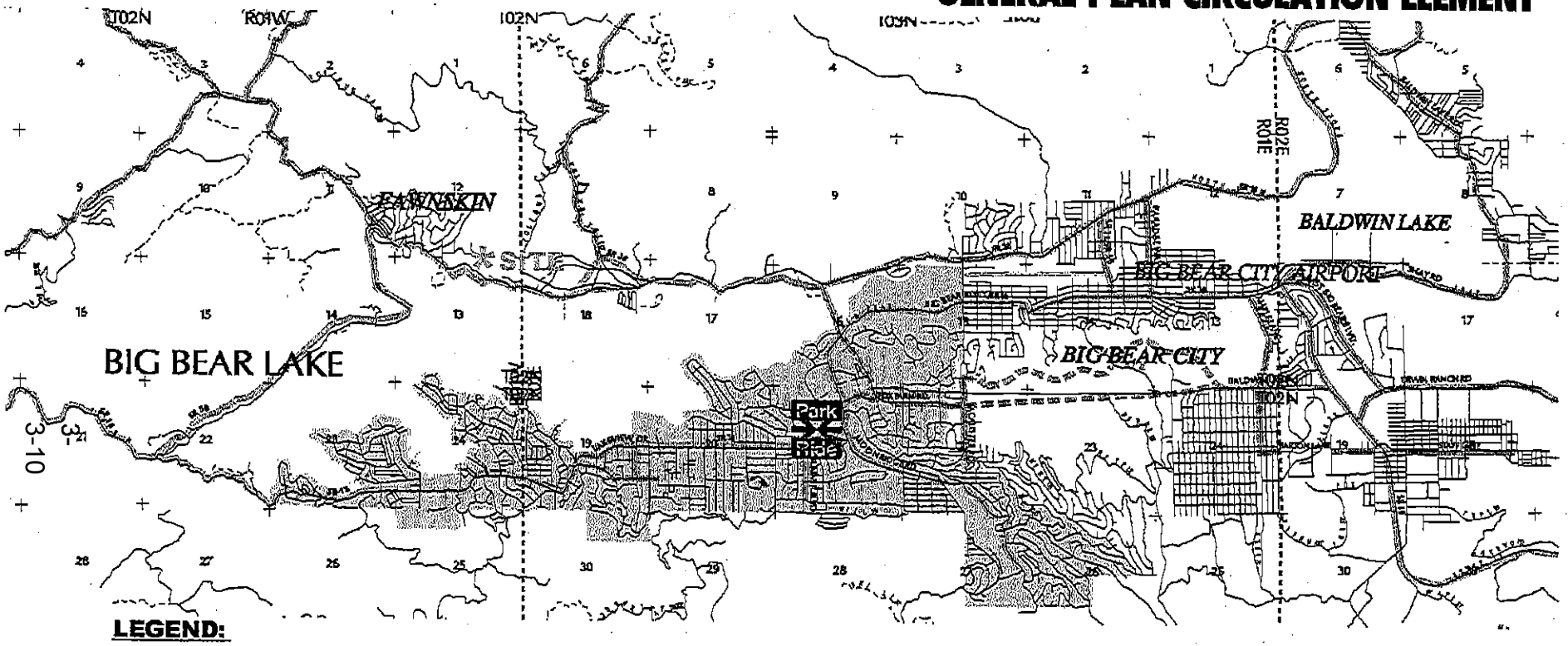
3.4 Planned Transportation Improvements and Relationships to General Plan

The long-range transportation system within the study area is expected to undergo significant improvement as a result of work to be performed by Caltrans, the County of San Bernardino, and City of Big Bear Lake. The County of San Bernardino General Plan Circulation Element and General Plan roadway cross-sections are shown on Exhibits 3-F and 3-G, respectively. The City of Big Bear Lake General Plan Circulation Element and General Plan roadway cross-sections are shown on Exhibits 3-H and 3-I, respectively.

EXHIBIT 3-F

SAN BERNARDINO COUNTY GENERAL PLAN CIRCULATION ELEMENT



LEGEND:

Circulation and Transportation

EXISTING PROPOSED

- Freeway
- Major Divided Highway
- Major Arterial Highway
- Major Highway
- Secondary Highway
- Controlled/Limited Access Collector
- Mountain Major Highway
- Secondary Highway
- Controlled/Limited Access Collector
- Mountain Major Highway
- Mountain Secondary Highway
- State Highway (Special Standards or Conditions)
- Railroads
- Park & Ride — Ridesharing Facilities

Airport Runways

- Runway location

Map data compiled on 7 and 1/2 and 1 angle maps by J. J. VanHouton and A

Positional accuracy of map data is a 750 feet

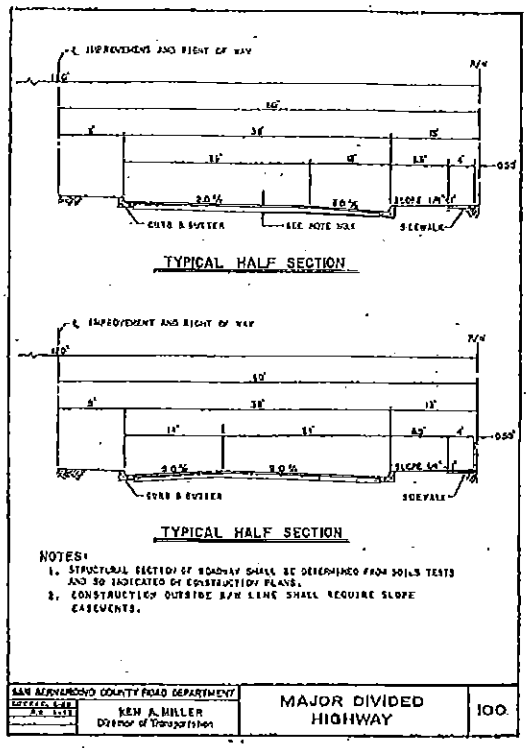
Jurisdictional Control

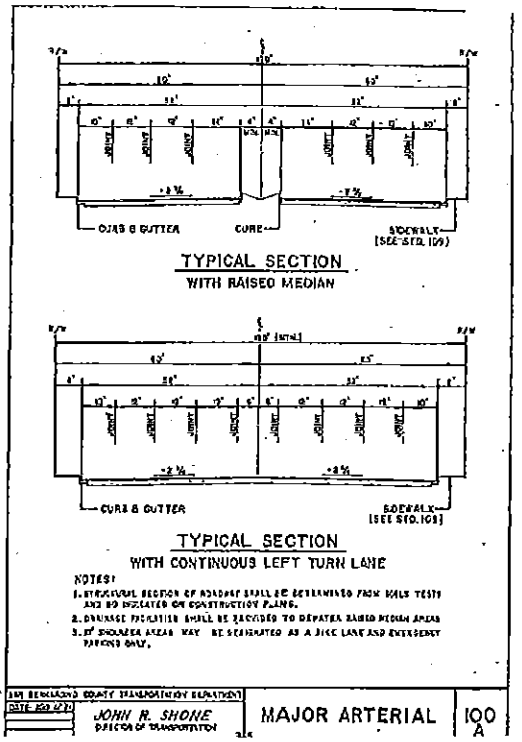
- Private Unincorporated Lands
- Bureau of Land Management
- National Parks and Monuments, National Forests and Wildlife Refuges
- Military Reservations (includes U.S. Army, Navy, Air Force, and Army, Corps of Engineers)
- State, County, and Municipal Lands
- Indian Lands and Reservations
- Unclassed Water Body
- Incorporated Cities

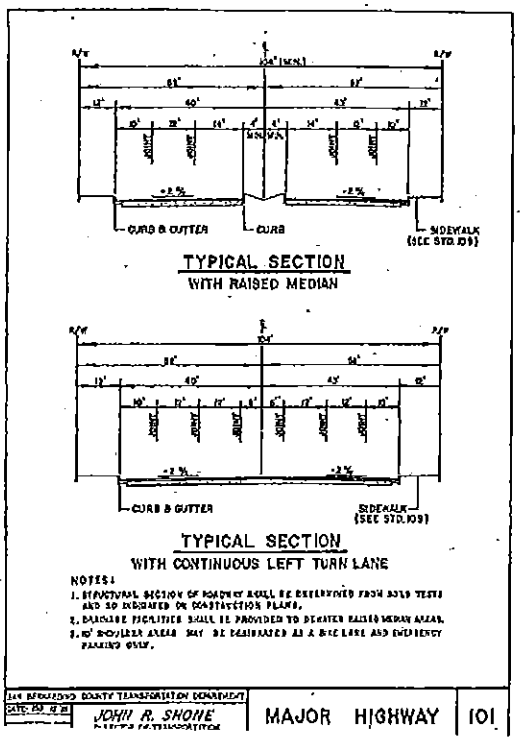
URBAN

EXHIBIT 3-G

SAN BERNARDINO COUNTY GENERAL PLAN ROADWAY CROSS-SECTIONS (PAGE 1 OF 2)







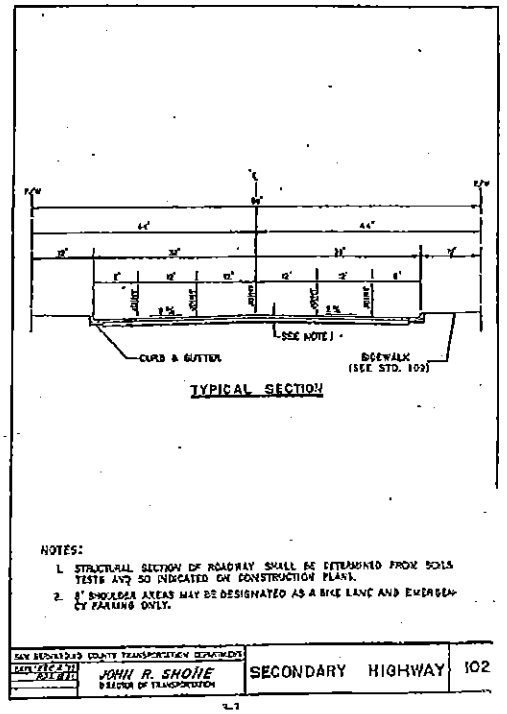
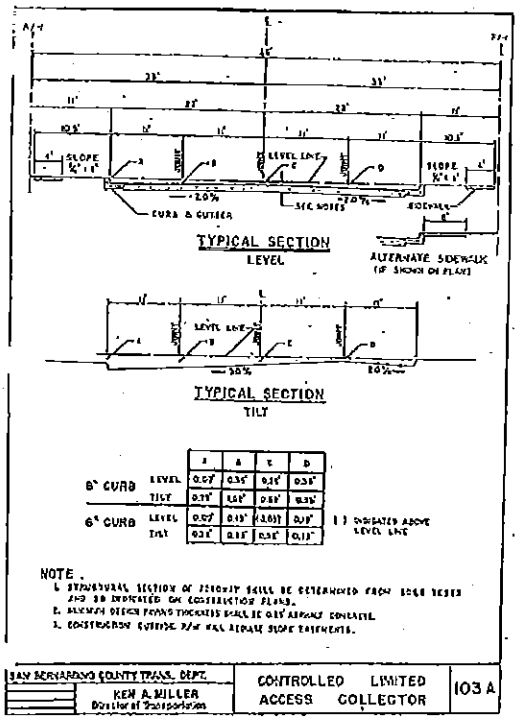
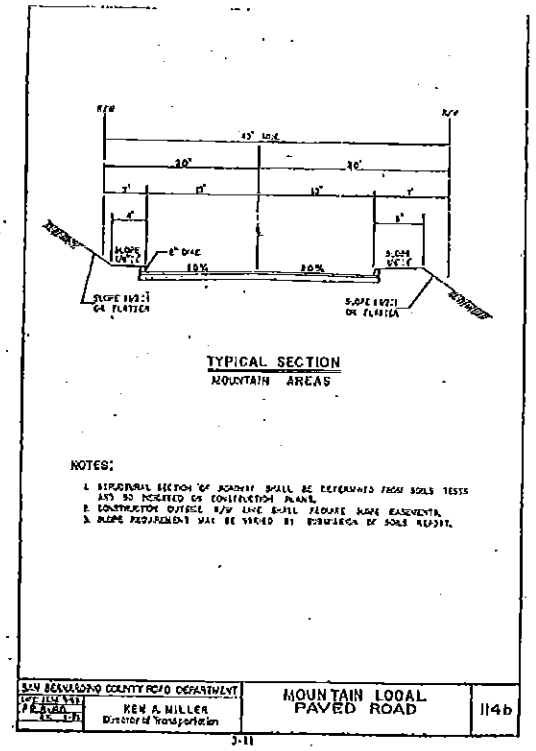
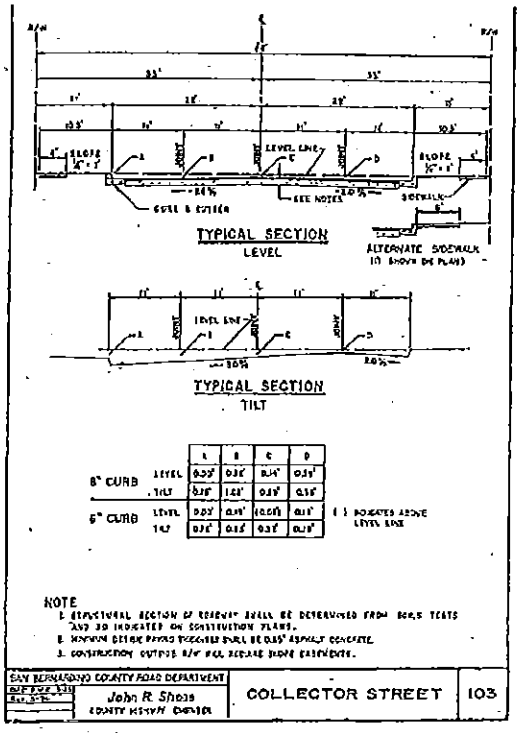


EXHIBIT 3-G

SAN BERNARDINO COUNTY GENERAL PLAN ROADWAY CROSS-SECTIONS (PAGE 2 OF 2)







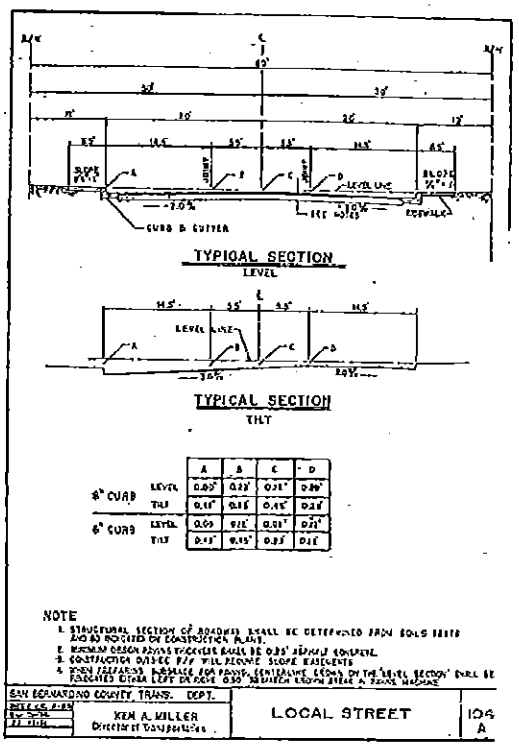
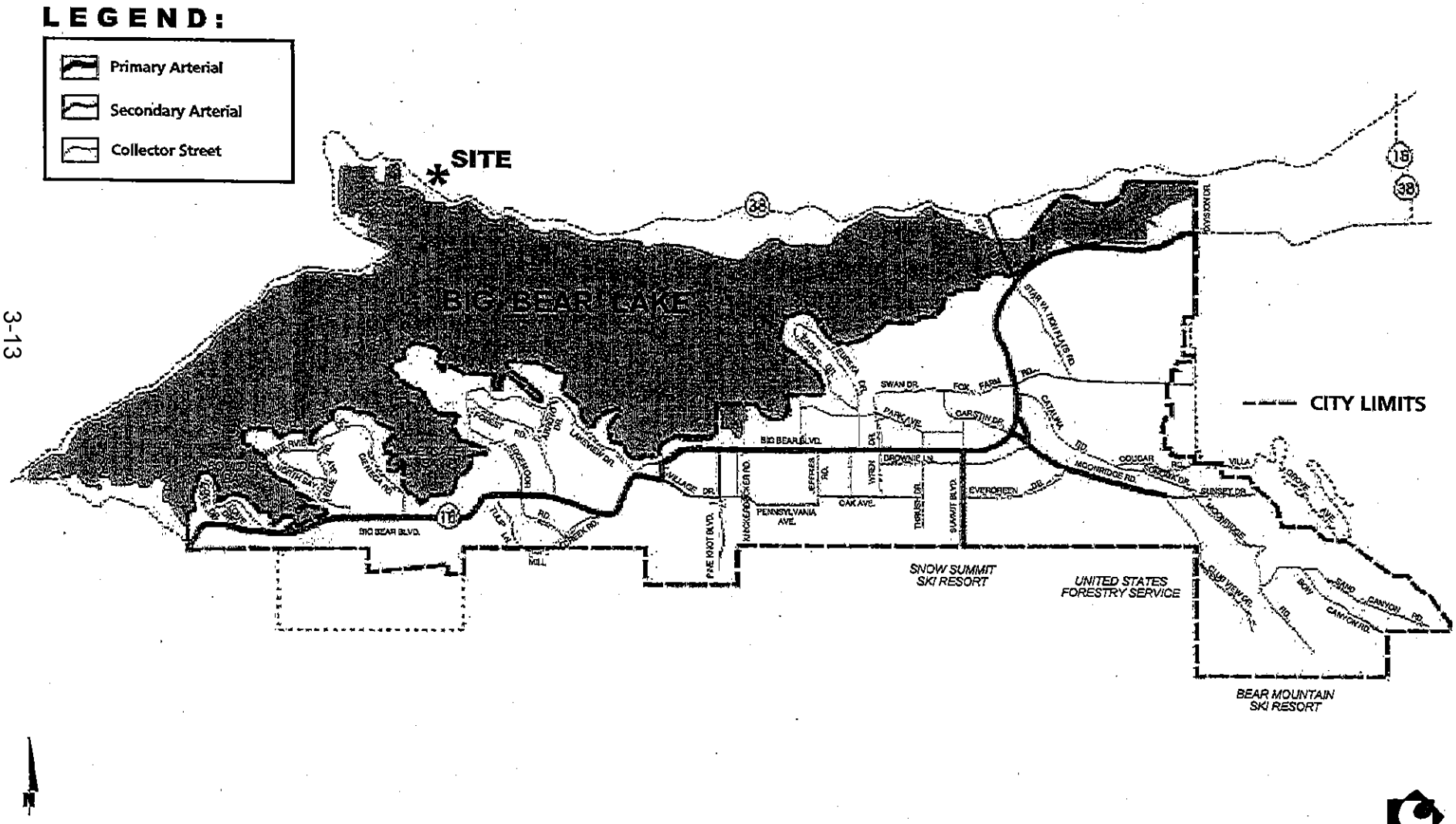


EXHIBIT 3-H

CITY OF BIG BEAR LAKE
GENERAL PLAN CIRCULATION ELEMENT

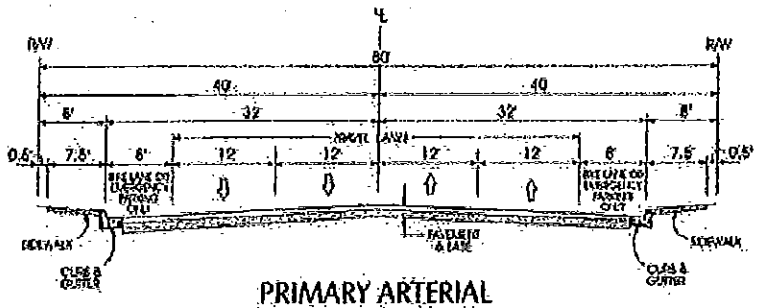


MOON CAMP TIA, San Bernardino County, California - 04409: Big Bear GPCE

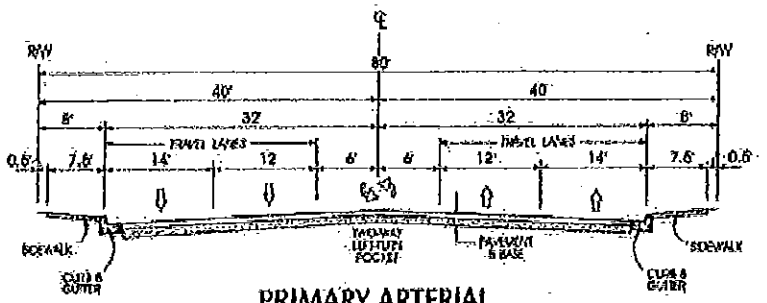
URBAN

EXHIBIT 3-I

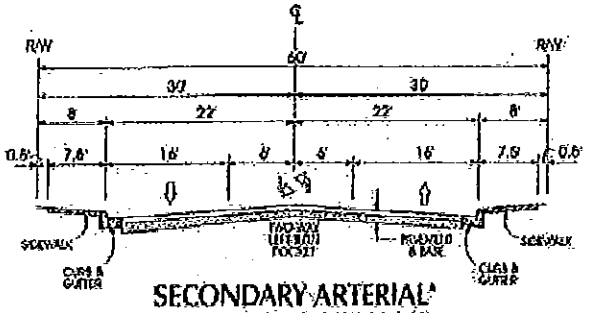
CITY OF BIG BEAR LAKE GENERAL PLAN ROADWAY CROSS-SECTIONS (PAGE 1 OF 2)



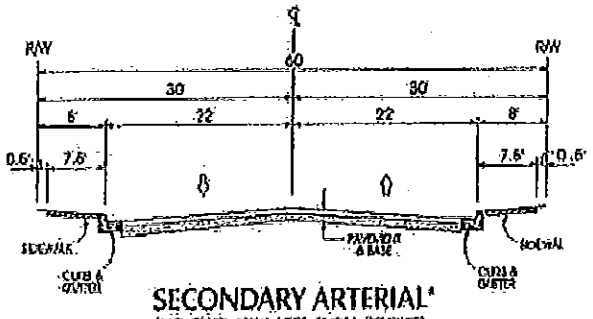
PRIMARY ARTERIAL
(WITH BIKE LANES OR EMERGENCY PARKING)
TYPICAL SECTION



PRIMARY ARTERIAL
(WITH TWO-WAY LEFT-TURN POCKET)
TYPICAL SECTION



SECONDARY ARTERIAL*
(WITH TWO-WAY LEFT-TURN POCKET)
TYPICAL SECTION

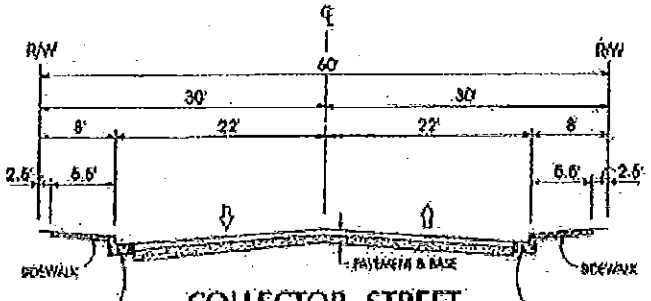


SECONDARY ARTERIAL*
(NO TWO-WAY LEFT-TURN POCKET)
TYPICAL SECTION

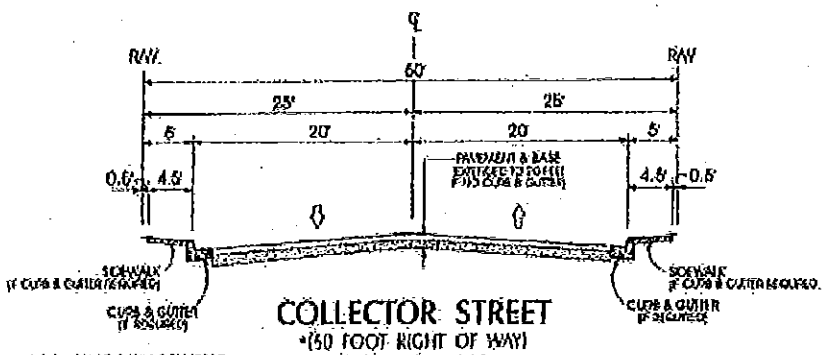
*THESE CROSS SECTIONS MAY BE MODIFIED BASED UPON ADOPTED SPECIFIC PLANS OR EXISTING CONDITIONS

EXHIBIT 3-I

CITY OF BIG BEAR LAKE GENERAL PLAN ROADWAY CROSS-SECTIONS (PAGE 2 OF 2)

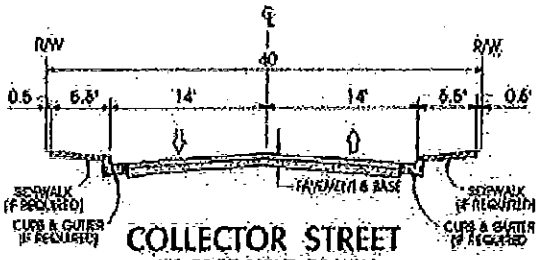


COLLECTOR STREET
(60 FOOT RIGHT OF WAY)
TYPICAL SECTION

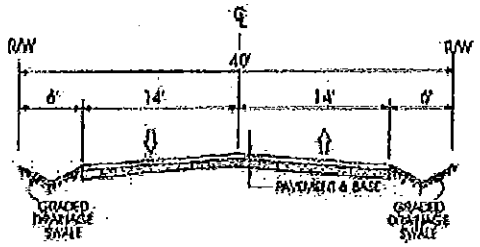


COLLECTOR STREET
*(60 FOOT RIGHT OF WAY)
TYPICAL SECTION

*ACCEPTABLE ONLY IF EXISTING DEVELOPMENT PRECLUDES A 60 FOOT RIGHT OF WAY.



COLLECTOR STREET
*(40 FOOT RIGHT OF WAY)
TYPICAL SECTION



COLLECTOR STREET
with no curb and gutter
*(40 FOOT RIGHT OF WAY)
TYPICAL SECTION

*ACCEPTABLE ONLY IF EXISTING DEVELOPMENT PRECLUDES A 60 FOOT RIGHT OF WAY.

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4.0 FUTURE DAILY TRAFFIC CONDITIONS

This chapter of the report describes the development of the future year traffic volume forecasts and presents the resulting daily traffic volumes which will be used for traffic operations analysis. Future traffic conditions without the project are presented first, followed by the future with project traffic volumes. Traffic signal warrant analysis for future conditions has also been presented in this chapter.

4.1 Future With and Without Project Traffic Conditions

Per discussion with County staff, the areawide growth has been interpolated from adjusted existing volumes (with 16% growth) to General Plan Buildout (2030) volumes. The areawide growth varies for each movement at each intersection (see Appendix "D"). The interpolated area-wide growth rate has been added to peak hour traffic volumes on surrounding roadways, in addition to traffic generated by the project and other development.

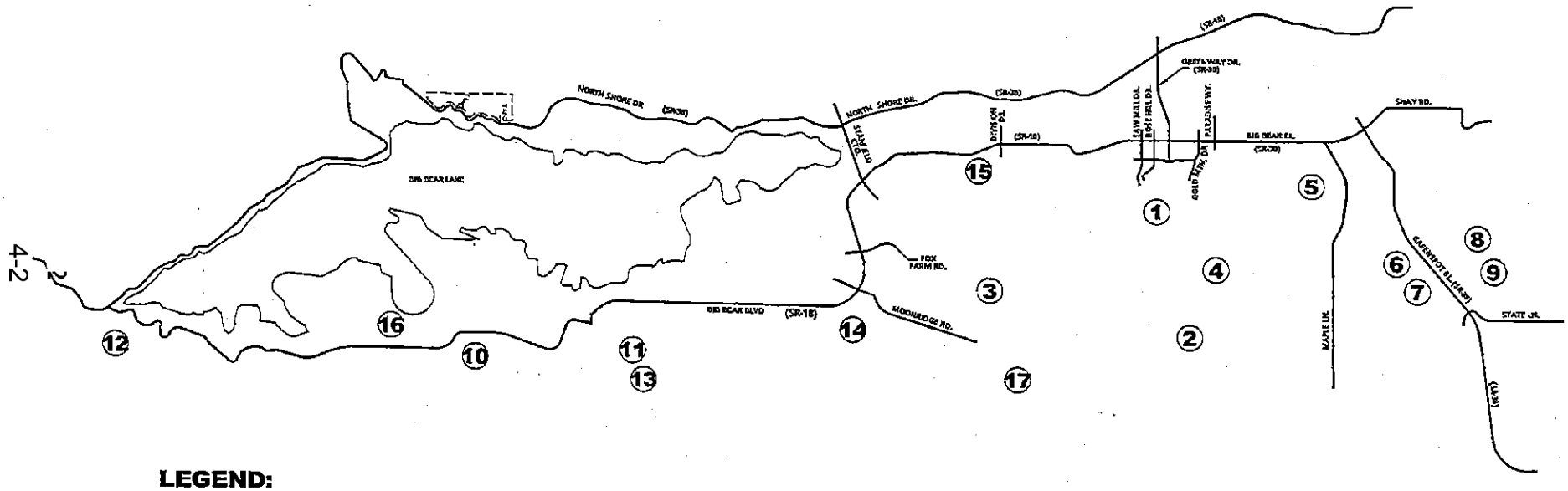
Long Range General Plan Buildout (2030) conditions have been estimated based on a select zone run of the San Bernardino Mountain Model, in addition to traffic generated by the project and the known cumulative development.

The County of San Bernardino was contacted in order to determine if there were any projects planned within the study area that would have an impact on future traffic volumes at the study intersections. Based on information given by the County of San Bernardino and City of Big Bear staff, a total of 17 cumulative projects were identified to affect the study intersections. The location of each of these other developments is shown on Exhibit 4-A.

As indicated in Table 4-1, other developments are projected to generate 15,111 trip-ends per day with 1,455 vehicles per hour during the AM peak hour and 1,455 vehicles per hour during the PM peak hour. Appendix "D" contains the

EXHIBIT 4-A

OTHER DEVELOPMENT LOCATION MAP



LEGEND:

1. = TT 16771
2. = TT 16934
3. = TT 17217 & TPM 17022
4. = TT 16036
5. = TT 14916
6. = TT 16980
7. = TT 17764
8. = TT 16749
9. = TT 17201
10. = HILTON GARDEN INN
11. = MIXED USE DEVELOPMENT
12. = RESIDENTIAL LOTS
13. = CONDOMINIUMS
14. = 41820 BIG BEAR BLVD
15. = WORLD HARVEST FAITH CENTER
16. = BOAT PARTS RETAIL & SERVICE
17. = STORAGE YARD

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MOON CAMP TIA, San Bernardino County, California - 04409: OD LOC MAP

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TABLE 4-1
FRIDAY PM PEAK HOUR/SUNDAY MIDDAY PEAK HOUR

OTHER DEVELOPMENT TRIP GENERATION

ID #	PROJECT NAME	LAND USE[1]	QUANTITY	UNITS[2]	PEAK HOUR						DAILY
					FRIDAY PM			SUNDAY MIDDAY			
					IN	OUT	TOTAL	IN	OUT	TOTAL	
	SAN BERNARDINO COUNTY										
1	TT 16771[3]	SFR	242	DU	155	90	245	155	90	245	2,316
2	TT 16934[4]	SFR	228	DU	146	84	230	146	84	230	2,182
3	TT 17217 & TT 17022[4]	SFR	53	DU	34	20	54	34	20	54	507
4	TT 16036	SFR	116	DU	74	43	117	74	43	117	1,110
5	TT 14916	SFR	51	DU	33	19	52	33	19	52	488
6	TT 16980	SFR	15	DU	10	6	16	10	6	16	144
7	TT 1776H	SFR	10	DU	6	4	10	6	4	10	96
8	TT 16749	SFR	86	DU	55	32	87	55	32	87	823
9	TT 17201	SFR	66	DU	42	24	66	42	24	66	632
	TOTAL (COUNTY OF SAN BERNARDINO)				555	322	877	555	322	877	8,298
	CITY OF BIG BEAR										
10	Hilton Garden Inn	Hotel	91	ROOMS	28	25	53	28	25	53	743
11	Mixed Use Development	Retail	22.5	TSF	112	122	234	112	122	234	2,575
		Less Pass-By (15%)			-17	-18	-35	-17	-18	-35	-386
		Subtotal Commercial			95	104	199	95	104	199	2,189
		Office	6.3	TSF	1	5	6	1	5	6	69
		SFR	10	DU	6	4	10	6	4	10	96
	Sub-Total				102	113	215	102	113	215	2,354
12	Residential Lots	SFR	8	DU	5	3	8	5	3	8	77
13	Condominiums	MFDU	78	DU	27	13	40	27	13	40	457
14	41820 Big Bear Blvd.	Hotel	55	ROOMS	17	15	32	17	15	32	449
		Retail	10	TSF	66	71	137	66	71	137	1,520
		Fast-Food	2.5	TSF	45	42	87	45	42	87	1,240
		Less Pass-By (15%)			-17	-17	-34	-17	-17	-34	-414
		Subtotal Commercial			94	96	190	94	96	190	2,346
	Sub-Total				111	111	222	111	111	222	2,795
15	World Harvest Faith Center	Church	20	TSF	7	6	13	7	6	13	182
16	Boat Parts Retail & Service	Auto Care Center	4.375	TSF	7	7	14	7	7	14	88
17	Storage Yard	Mini Warehouse	3	AC	6	6	12	6	6	12	117
	TOTAL (CITY OF BIG BEAR)				294	284	578	294	284	578	6,813
	TOTAL				**849**	**606**	**1,455**	**849**	**606**	**1,455**	**15,111**

[1] SFR = Single Family Residential
[2] DU = Dwelling Unit
TSF= Thousand Square Feet
AC = Acres

[3] Source: TT 16771 Traffic Impact Analysis, County of San Bernardino, Urban Crossroads, Inc. July 2006

[4] Source: TT 17217 and TT 17022 Traffic Impact Analysis, County of San Bernardino, Urban Crossroads, Inc. July 2006

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directional distribution and assignment of the other development traffic. Based on the identified trip distribution for the other development on arterial highways throughout the study area, other development average daily traffic (ADT) and Friday PM/Sunday Mid-day peak hour intersection turning movement volumes (based on PM peak hour trip generation) are shown on Exhibits 4-B and 4-C, respectively.

Project traffic volumes on study area roadway segments are determined by generating project trips and manually routing the traffic through the roadway network. The routing patterns follow the trip distributions which were previously presented in Section 2. Trips are assigned to each individual roadway link and intersection occurring along a specific route.

The accumulation of traffic assigned to each roadway link represents the project traffic volume for that link. Project only ADT volumes were previously presented in Section 2.

4.1.1 2010 Without Project Daily Traffic Volumes

The ADT's for 2010 Without Project traffic conditions have been determined by adding the 2007 existing traffic volumes (with 16% adjustment) plus the 2% background growth volumes per year (6% for three years) plus the known cumulative development volumes. 2010 Friday ADT and Sunday ADT volumes for without project traffic conditions are shown on Exhibit 4-D and 4-E, respectively.

For 2010 Without Project traffic conditions, no new traffic signals are projected to be warranted (see Appendix "C"), compared to Existing Conditions.

EXHIBIT 4-B

OTHER DEVELOPMENT AVERAGE DAILY TRAFFIC

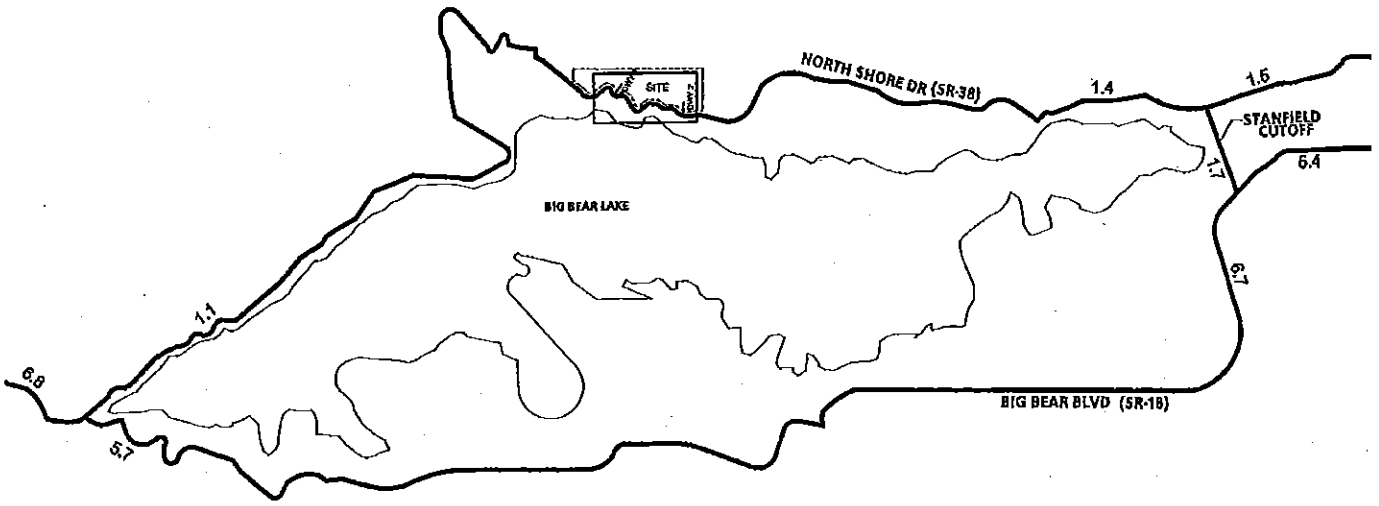

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EXHIBIT 4-C

OTHER DEVELOPMENT FRIDAY PM PEAK HOUR/ SUNDAY MIDDAY PEAK HOUR INSTERSECTION VOLUMES

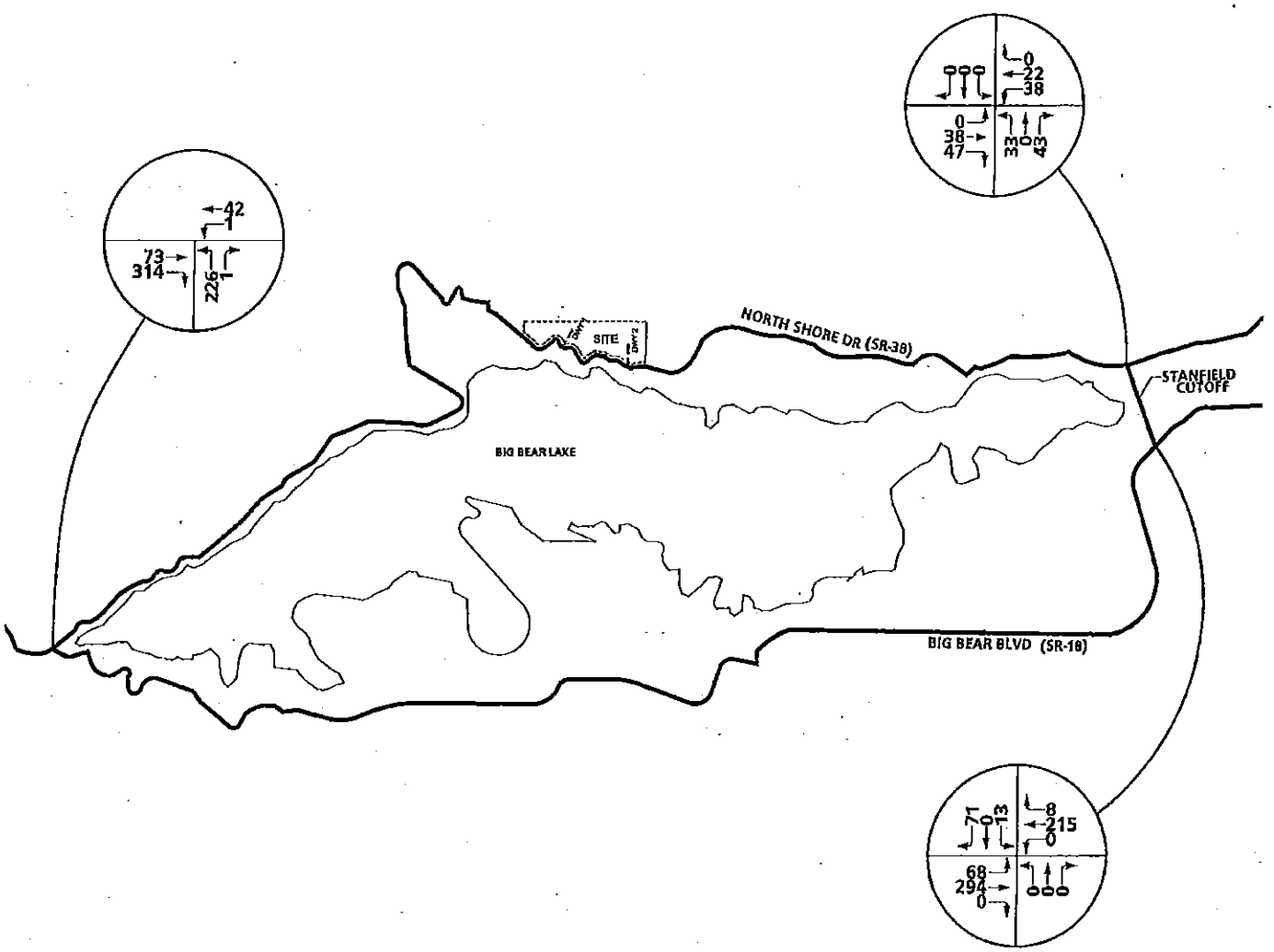

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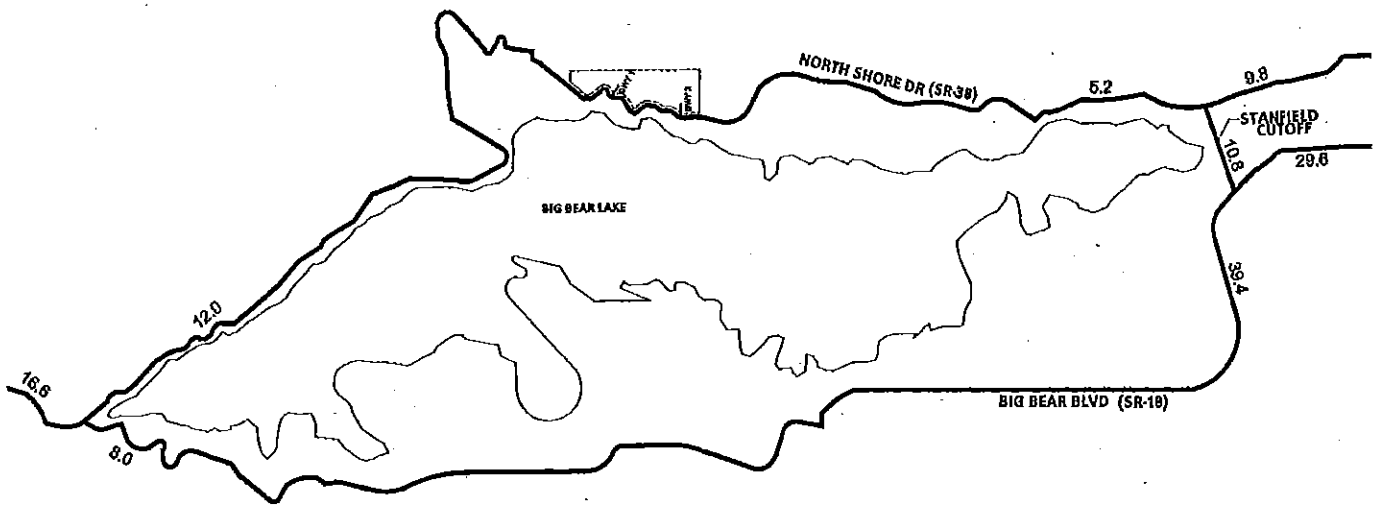
EXHIBIT 4-D

2010 WITHOUT PROJECT FRIDAY AVERAGE DAILY TRAFFIC



LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

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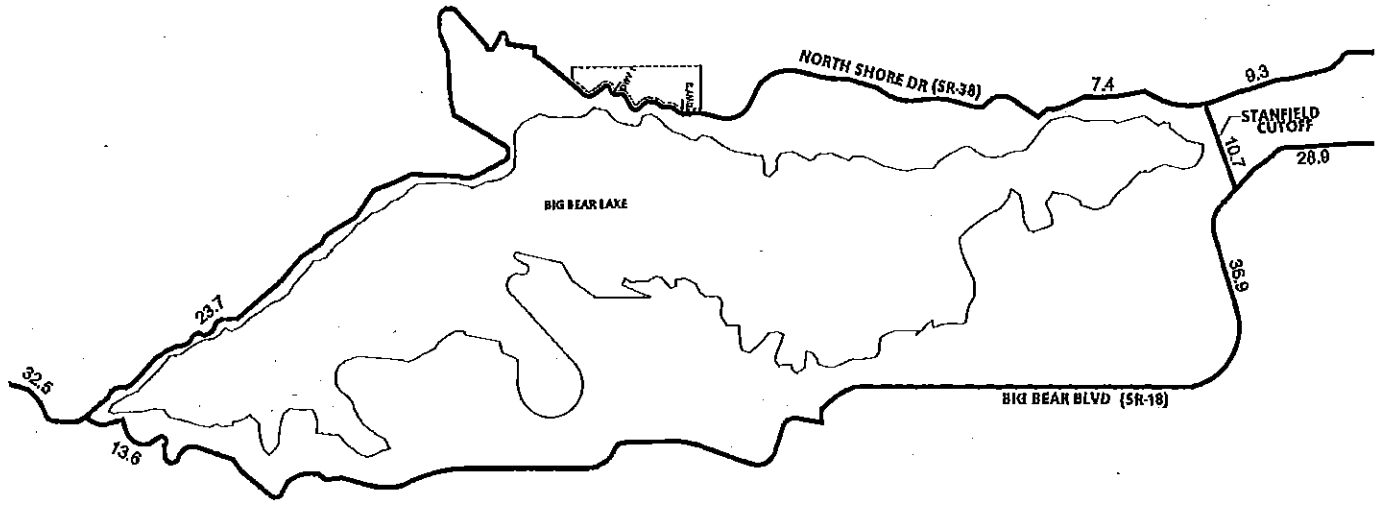
MOON CAMP TIA, San Bernardino County, California - 04409: 19

EXHIBIT 4-E

2010 WITHOUT PROJECT SUNDAY AVERAGE DAILY TRAFFIC



LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

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URBAN CROSSROADS

4.1.2 2010 With Project Daily Traffic Volumes

The ADT's for the 2010 With Project have been determined by adding the project only traffic volumes to the 2010 Without Project traffic volumes. 2010 Friday and Sunday ADT volumes with the project traffic are shown on Exhibit 4-F and 4-G, respectively.

For 2010 With Project traffic conditions, no new traffic signals are projected to be warranted (see Appendix "C"), as compared to 2010 Without Project conditions.

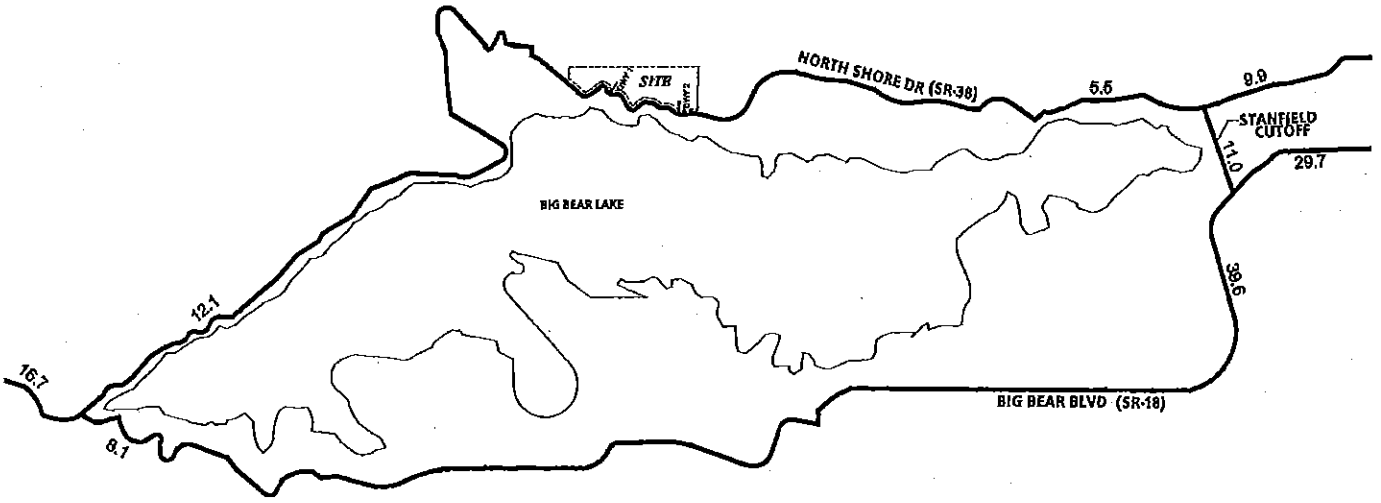
4.1.3 General Plan Buildout (2030) Daily Traffic Volumes

The ADT's for General Plan Buildout (2030) conditions have been determined by adding the project only and other cumulative development traffic volumes to the 2030 ADT volumes derived from the San Bernardino Mountain Model. General Plan Buildout Without Project (2030) Winter Friday and Sunday ADT volumes are shown on Exhibits 4-H and 4-I, respectively. Based on the San Bernardino Mountain Model for General Plan Buildout (2030), the peak season is shown to be winter. Therefore, the winter ADT results were used for post-processing peak hour turning volumes and level of service analysis to achieve a conservative analysis. General Plan Buildout With Project (2030) Winter Friday and Sunday ADT volumes are shown on Exhibits 4-J and 4-K, respectively.

For General Plan Buildout With Project (2030) traffic conditions, no new traffic signals are projected to be warranted (see Appendix "C") at study area analysis intersections.

EXHIBIT 4-F

2010 WITH PROJECT FRIDAY AVERAGE DAILY AVERAGE TRAFFIC



LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

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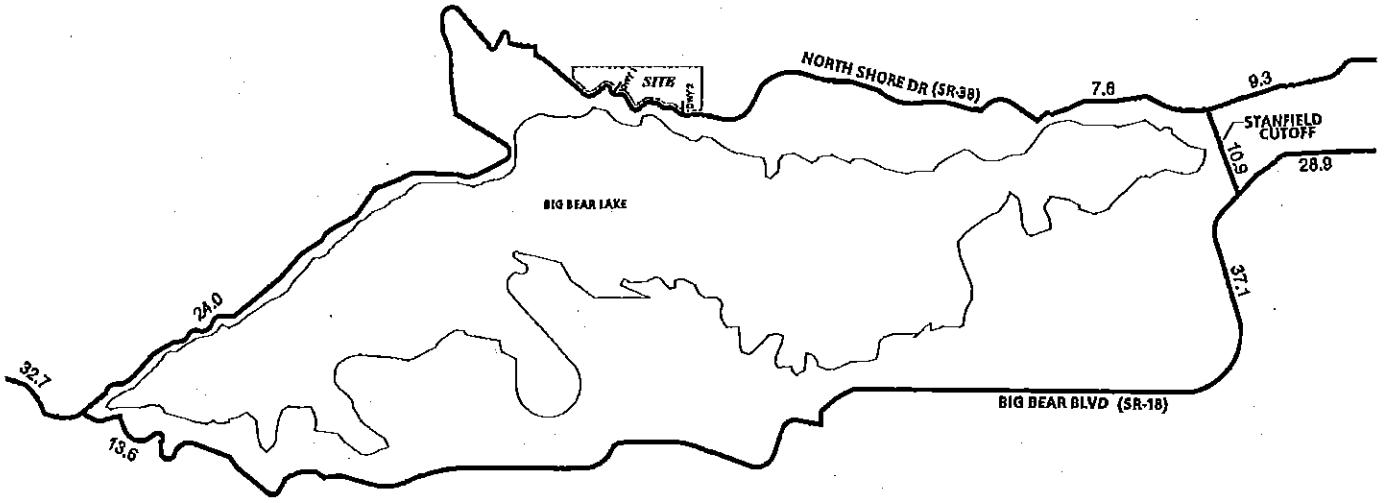
EXHIBIT 4-G

2010 WITH PROJECT SUNDAY AVERAGE DAILY TRAFFIC



LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

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EXHIBIT 4-H

GENERAL PLAN BUILDOUT (2030) WINTER FRIDAY AVERAGE DAILY TRAFFIC

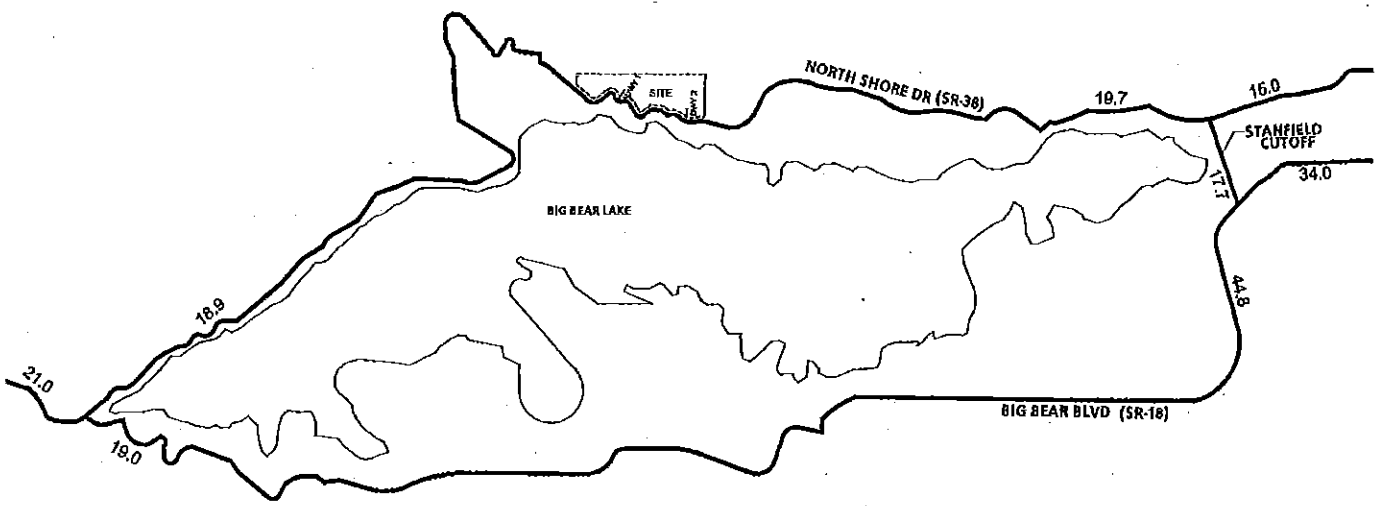

EXHIBIT 4-I

GENERAL PLAN BUILDOUT (2030) WINTER SUNDAY AVERAGE DAILY TRAFFIC (ADT)

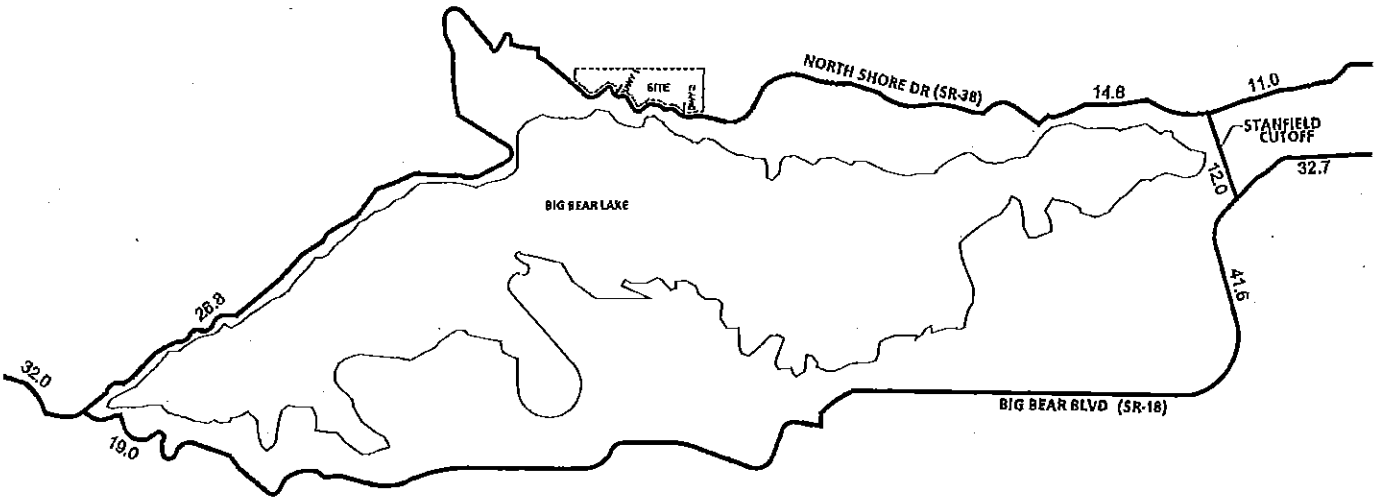

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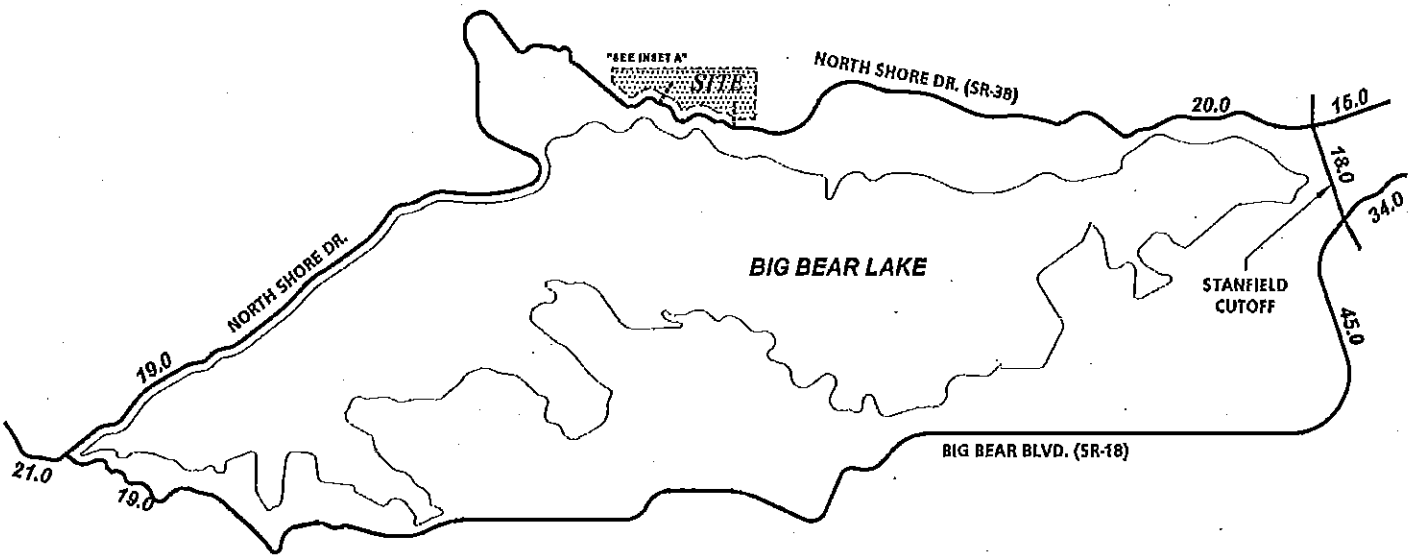
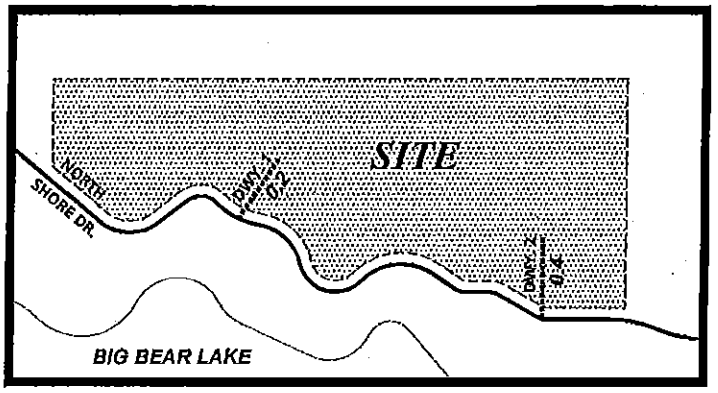
EXHIBIT 4-J

GENERAL PLAN BUILDOUT WITH PROJECT (2030) WINTER FRIDAY AVERAGE DAILY TRAFFIC



INSET A



LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

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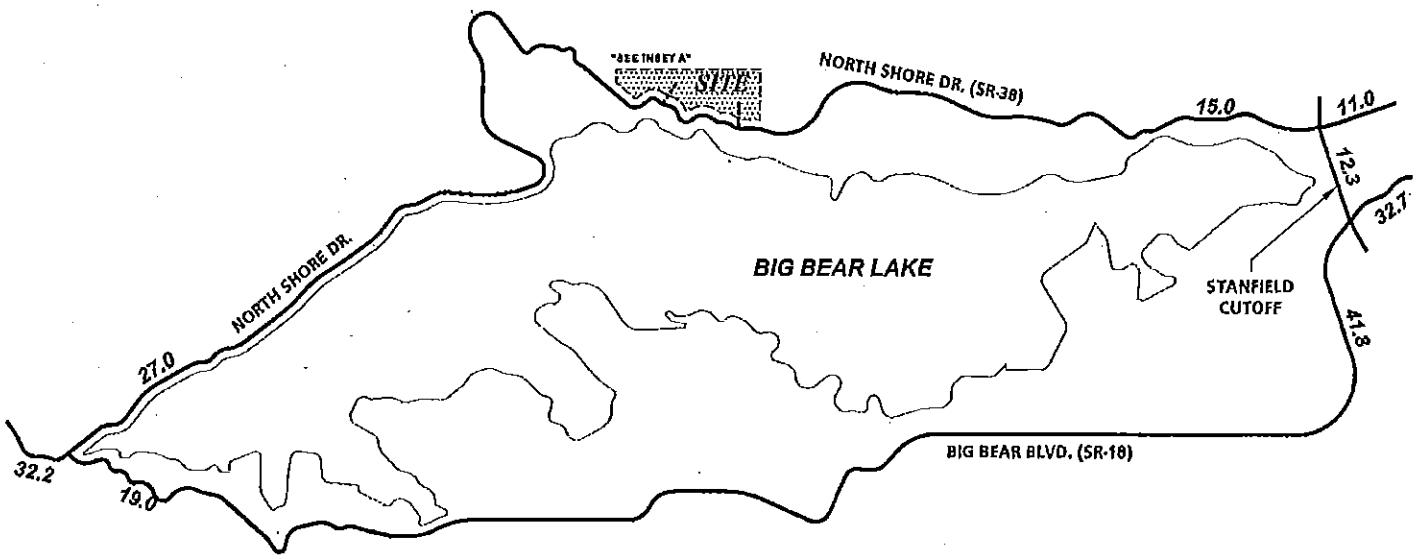
MOON CAMP TIA, San Bernardino County, California - 04409: 29A (REVISED)

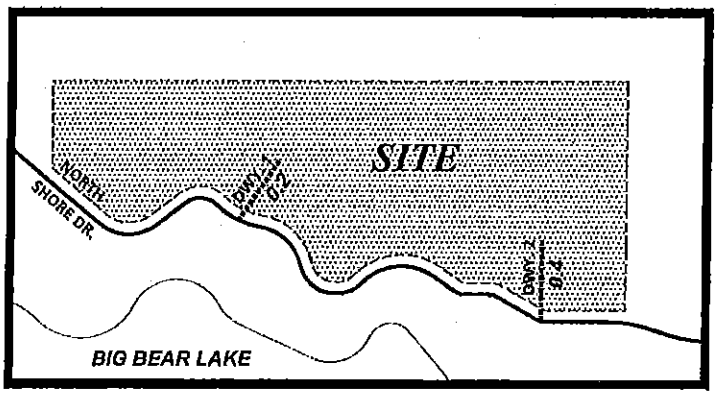
URBAN CROSSROADS

EXHIBIT 4-K

GENERAL PLAN BUILDOUT WITH PROJECT (2030) WINTER SUNDAY AVERAGE DAILY TRAFFIC



INSET A



LEGEND:

10.0 = VEHICLES PER DAY (1000'S)

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5.0 FUTURE TRAFFIC OPERATIONS ANALYSIS

This section of the report presents the operations analysis for the traffic volume forecasts for future traffic conditions without the project and for future traffic conditions with the project. The analysis procedures conform to the requirements of the County of San Bernardino CMP. The operations analysis for each analysis year is presented in a separate subsection.

5.1 Future Interim Year Traffic Operations

5.1.1 2010 Without Project Conditions

The intersection operations analysis for 2010 Without Project traffic conditions are summarized in Table 5-1, based on the geometrics analysis at the study area intersections, without and with improvements. 2010 Without Project Friday PM and Sunday Mid-day peak hour intersection turning movement volumes are shown on Exhibits 5-A and 5-B, respectively. As shown in Table 5-1, the following study area intersections are currently operating at an unacceptable level of service during both Friday PM and Sunday Mid-day peak hours:

Big Bear Blvd (SR-18) (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- Big Bear Blvd (SR-18) (EW)

The operations analysis worksheets for 2010 Without Project conditions are included in Appendix "E".

TABLE 5-1

INTERSECTION ANALYSIS FOR 2010 WITHOUT PROJECT CONDITIONS

INTERSECTION	TRAFFIC CONTROL[3]	INTERSECTION APPROACH LANES[1]												DELAY[2] (SECS.)		LEVEL OF SERVICE	
		NORTH-BOUND			SOUTH-BOUND			EAST-BOUND			WEST-BOUND						
		L	T	R	L	T	R	L	T	R	L	T	R	Fri. PM	Sun. MD	Fri. PM	Sun. MD
North Shore Dr. (SR-38) (NS) at:																	
• Big Bear Blvd. (SR-18) (EW)																	
- Without Improvements	CSS	0	1	0	0	0	0	0	1	1	1	1	0	--[4]	--[4]	F	F
- With Improvements	TS	1	0	1	0	0	0	0	2	1	1	1	0	14.0	21.2	B	C
Stanfield Cutoff (NS) at:																	
• North Shore Dr. (SR-38) (EW)																	
- Without Improvements	CSS	0	1	0	0	1	0	0	1	0	0	1	0	--[4]	--[4]	F	F
- With Improvements	TS	1	1	0	1	1	0	1	1	0	1	1	0	31.9	30.7	C	C
• Big Bear Blvd. (SR-18) (EW)																	
- Without Improvements	TS	0	1	1	0	1	1	1	1	1	1	1	1	--[4]	--[4]	F	F
- With Improvements	TS	1	1	0	1	1	0	1	2	0	1	2	0	31.4	20.6	C	C

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; 1 = Improvement

[2] Delay and level of service calculated using the following analysis software: Traffix, Version 7.8 R3 (2006). Per the 2000 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with traffic traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for worst individual movement (or movements sharing a single lane) are shown.

[3] TS = Traffic Signal
CSS = Cross Street Stop
AWS = All Way Stop

[4] -- = Delay High, Intersection Unstable, Level of Service "F".

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EXHIBIT 5-A

2010 WITHOUT PROJECT FRIDAY PM PEAK HOUR INTERSECTION VOLUMES

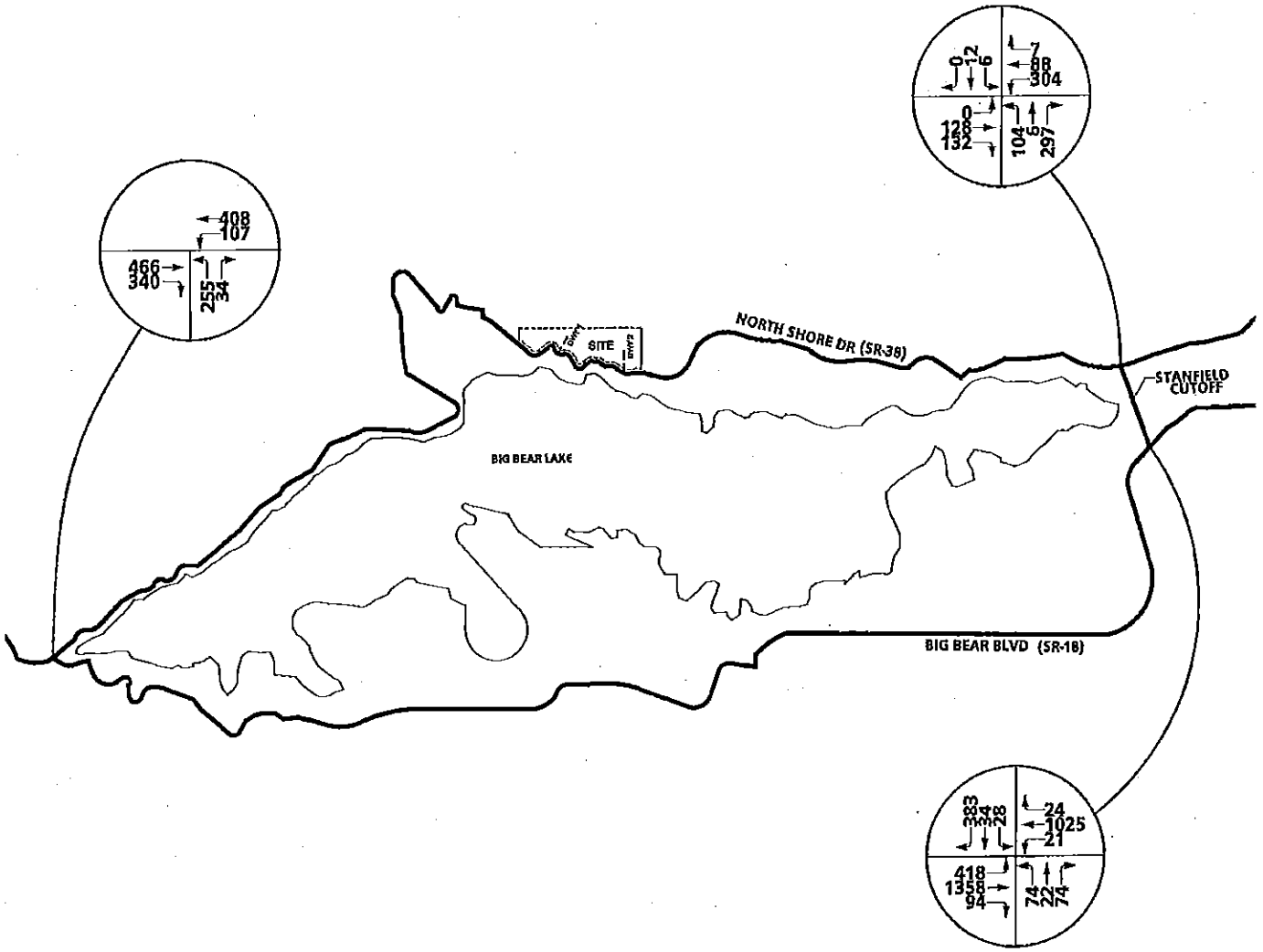

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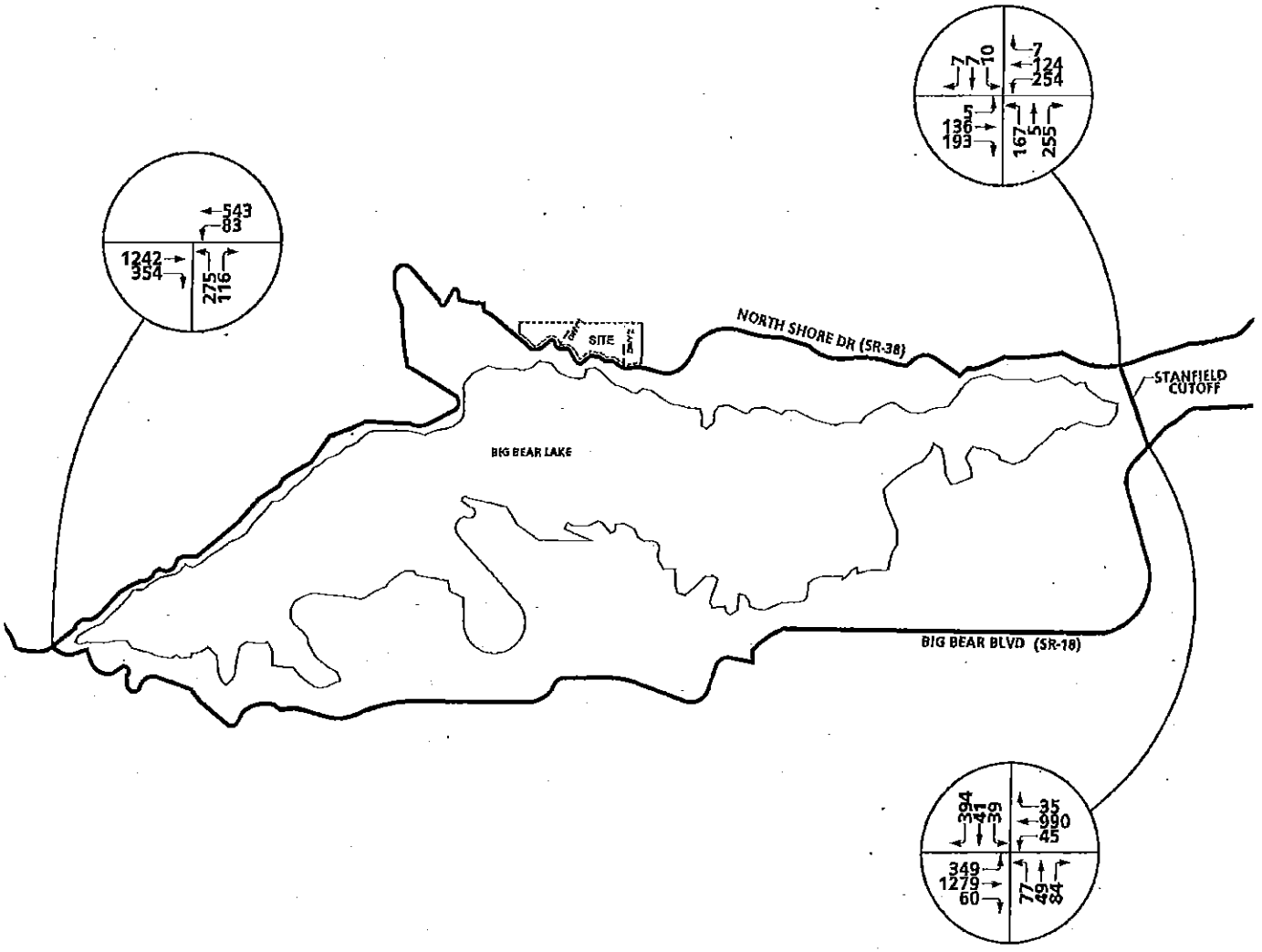
EXHIBIT 5-B

2010 WITHOUT PROJECT SUNDAY MID-DAY PEAK HOUR INTERSECTION VOLUMES



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5.1.2 2010 With Project Conditions

The intersection operations analysis for 2010 With Project traffic conditions are summarized in Table 5-2, based on the geometrics analysis at the study area intersections, without and with improvements. 2010 With Project Friday PM and Sunday Mid-day peak hour intersection turning movement volumes are shown on Exhibits 5-C and 5-D, respectively. As shown in Table 5-2, the following study area intersections are currently operating at an unacceptable level of service during both Friday PM and Sunday Mid-day peak hours:

Big Bear Blvd (SR-18) (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- Big Bear Blvd (SR-18) (EW)

The operations analysis worksheets for 2010 With Project conditions are included in Appendix "F".

5.2 General Plan Buildout With Project (2030) Traffic Operations

The intersection operations analysis for General Plan Buildout With Project (2030) traffic conditions are summarized in Table 5-3, based on the geometrics analysis at the study area intersections, without and with improvements. General Plan Buildout With Project (2030) Friday PM and Sunday Mid-day peak hour intersection turning movement volumes are shown on Exhibits 5-E and 5-F, respectively. The General Plan Buildout post-processed volumes worksheets are provided in Appendix "G". As shown in Table 5-3, the following study area intersections are currently operating at an unacceptable level of service during both Friday PM and Sunday Mid-day peak hours:

TABLE 5-2

INTERSECTION ANALYSIS FOR 2010 WITH PROJECT CONDITIONS

INTERSECTION	TRAFFIC CONTROL[3]	INTERSECTION APPROACH LANES[1]												DELAY[2] (SECS.)		LEVEL OF SERVICE	
		NORTH-BOUND			SOUTH-BOUND			EAST-BOUND			WEST-BOUND						
		L	T	R	L	T	R	L	T	R	L	T	R	Fri. PM	Sun. MD	Fri. PM	Sun. MD
North Shore Dr. (SR-38) (NS) at:																	
• Big Bear Blvd. (SR-18) (EW)																	
- Without Improvements	CSS	0	1	0	0	0	0	0	1	1	1	1	0	--[4]	--[4]	F	F
- With Improvements	TS	1	0	1	0	0	0	0	2	1	1	1	0	14.0	22.1	B	C
Stanfield Cutoff (NS) at:																	
• North Shore Dr. (SR-38) (EW)																	
- Without Improvements	CSS	0	1	0	0	1	0	0	1	0	0	1	0	--[4]	--[4]	F	F
- With Improvements	TS	1	1	0	1	1	0	1	1	0	1	1	0	32.4	31.5	C	C
• Big Bear Blvd. (SR-18) (EW)																	
- Without Improvements	TS	0	1	1	0	1	1	1	1	1	1	1	1	--[4]	--[4]	F	F
- With Improvements	TS	1	1	0	1	1	0	1	2	0	1	2	0	32.5	27.6	C	C
Driveway # 1 (NS) at:																	
• North Shore Dr. (SR-38) (EW)	CSS	0	0	0	0	1	0	0	1	0	0	1	0	11.1	12.0	B	B
Drivoway # 2 (NS) at:																	
• North Shore Dr. (SR-38) (EW)	CSS	0	0	0	0	1	0	0	1	0	0	1	0	11.2	12.1	B	B

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1 When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; 1 = Improvement

2 Delay and level of service calculated using the following analysis software: Trafix, Version 7.8 R3 (2006). Per the 2000 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with traffic traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for worst individual movement (or movements sharing a single lane) are shown.

3 TS = Traffic Signal
CSS = Cross Street Stop
AWS = All Way Stop

4 -- = Delay High, Intersection Unstable, Level of Service "F".

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EXHIBIT 5-C

2010 WITH PROJECT FRIDAY PM PEAK INTERSECTION VOLUMES

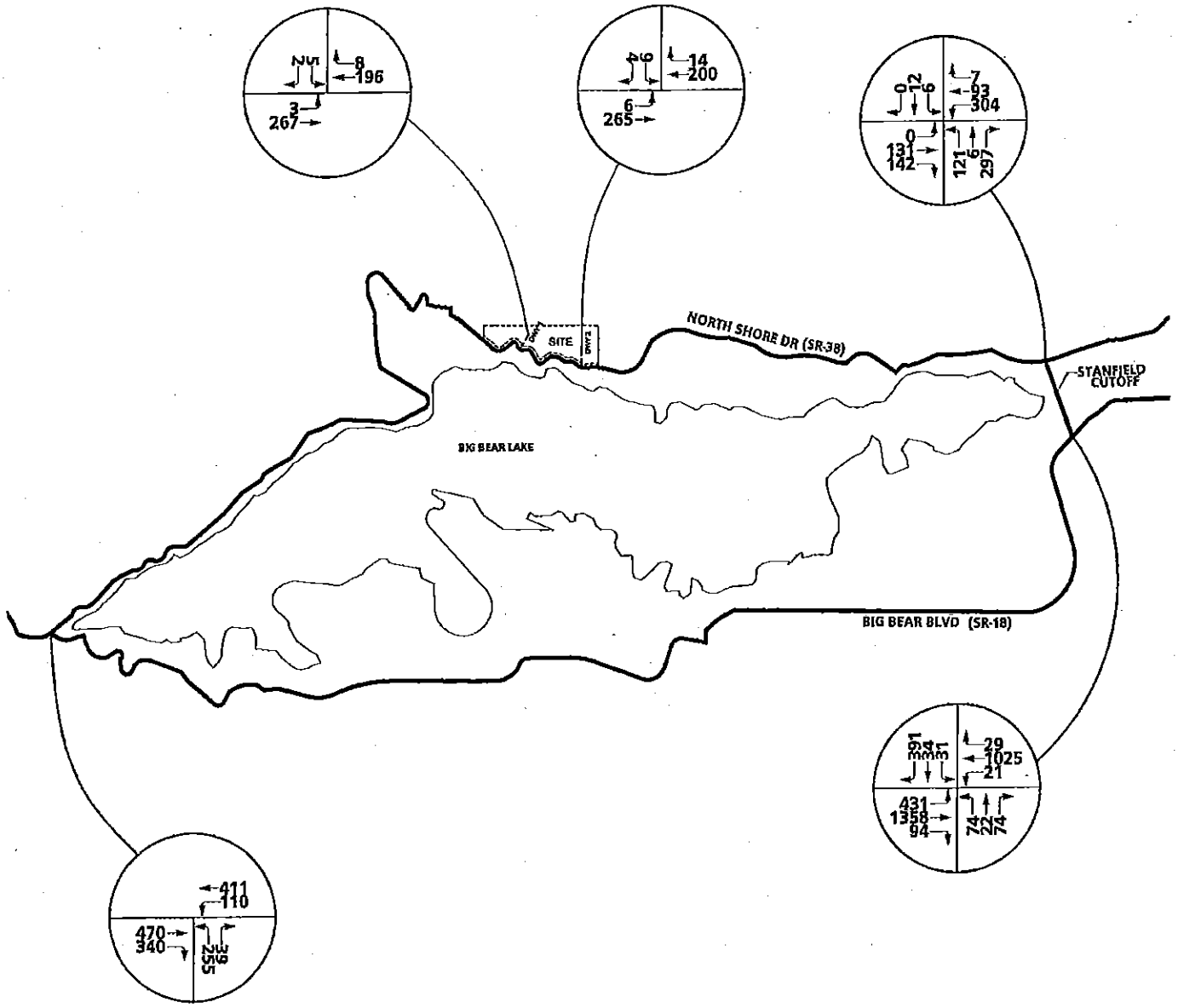
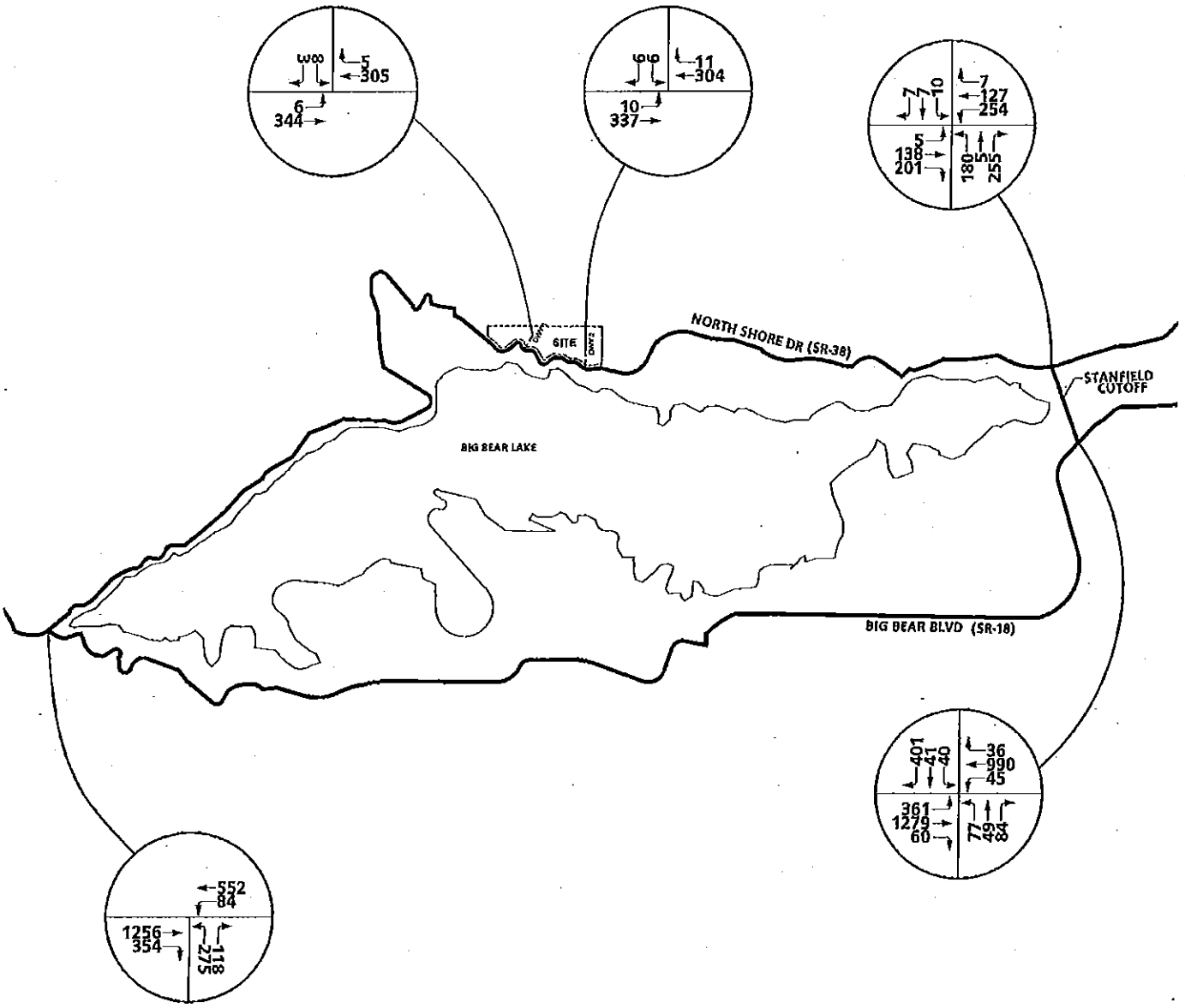


EXHIBIT 5-D

2010 WITH PROJECT SUNDAY MIDDAY PEAK INTERSECTION VOLUMES



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MOON CAMP TIA, San Bernardino County, California - 04409: 24A

URBAN CROSSROADS

TABLE 5-3

INTERSECTION ANALYSIS FOR GENERAL PLAN BUILDOUT (2030) CONDITIONS

INTERSECTION	TRAFFIC CONTROL[3]	INTERSECTION APPROACH LANES[1] NORTH-BOUND L	NORTH-BOUND T	NORTH-BOUND R	SOUTH-BOUND L	SOUTH-BOUND T	SOUTH-BOUND R	EAST-BOUND L	EAST-BOUND T	EAST-BOUND R	WEST-BOUND L	WEST-BOUND T	WEST-BOUND R	DELAY[2] (SECS.) Fri. PM	DELAY[2] (SECS.) Sun. MD	LEVEL OF SERVICE Fri. PM	LEVEL OF SERVICE Sun. MD
North Shore Dr. (SR-38) (NS) at:																	
• Big Bear Blvd. (SR-18) (EW)																	
- Without Improvements	CSS	0	1	0	0	0	0	0	1	1	1	1	0	--[4]	--[4]	F	F
- With Improvements	TS	1	0	1	0	0	0	0	2	1>	1	1	0	20.4	18.6	C	B
Stanfield Cutoff (NS) at:																	
• North Shore Dr. (SR-38) (EW)																	
- Without Improvements	CSS	0	1	0	0	1	0	0	1	0	0	1	0	--[4]	--[4]	F	F
- With Improvements	TS	2	1	0	1	1	0	1	1	1>	1	1	0	34.2	26.0	C	C
• Big Bear Blvd. (SR-18) (EW)																	
- Without Improvements	TS	0	1	1	0	1	1	1	1	1	1	1	1	--[4]	--[4]	F	F
- With Improvements	TS	1	1	0	1	1	1>	1	2	0	1	2	1	31.7	21.5	C	C
Driveway # 1 (NS) at:																	
• North Shore Dr. (SR-38) (EW)																	
- Without Improvements	CSS	0	0	0	0	1	0	0	1	0	0	1	0	49.6	24.2	E	C
- With Improvements	CSS	0	0	0	0	1	0	1	2	0	0	1	0	23.1	15.7	C	C
Driveway # 2 (NS) at:																	
• North Shore Dr. (SR-38) (EW)																	
- Without Improvements	CSS	0	0	0	0	1	0	0	1	0	0	1	0	41.9	18.8	E	C
- With Improvements	CSS	0	0	0	0	1	0	1	2	0	0	1	0	23.6	15.7	C	C

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes.

L = Left; T = Through; R = Right; 1 = Improvement; > = Right Turn Overlap Phase

[2] Delay and level of service calculated using the following analysis software: Traffix, Version 7.7 R5 (2005). Per the 2000 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with traffic traffic signal or all way stop control. For intersections with cross street stop control, the delay and level of service for worst individual movement (or movements sharing a single lane) are shown.

[3] TS = Traffic Signal
CSS = Cross Street Stop
AWS = All Way Stop

[4] -- = Delay High, Intersection Unstable, Level of Service "F".

[5] Volume to Capacity ratio is greater than 1.00 = Level of Service "F".

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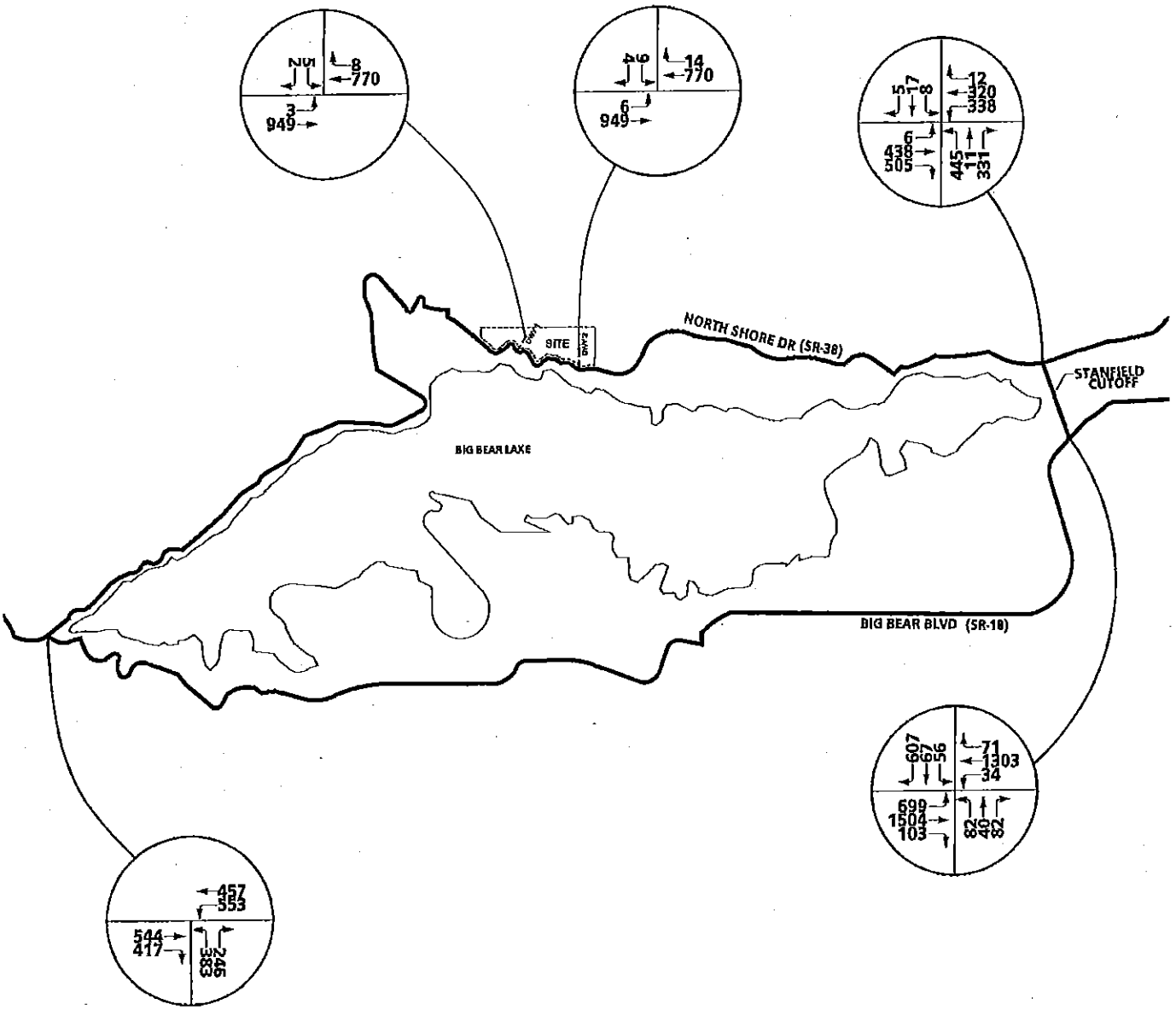
EXHIBIT 5-E

GENERAL PLAN BUILDOUT WITH PROJECT FRIDAY PM PEAK HOUR INTERSECTION VOLUMES



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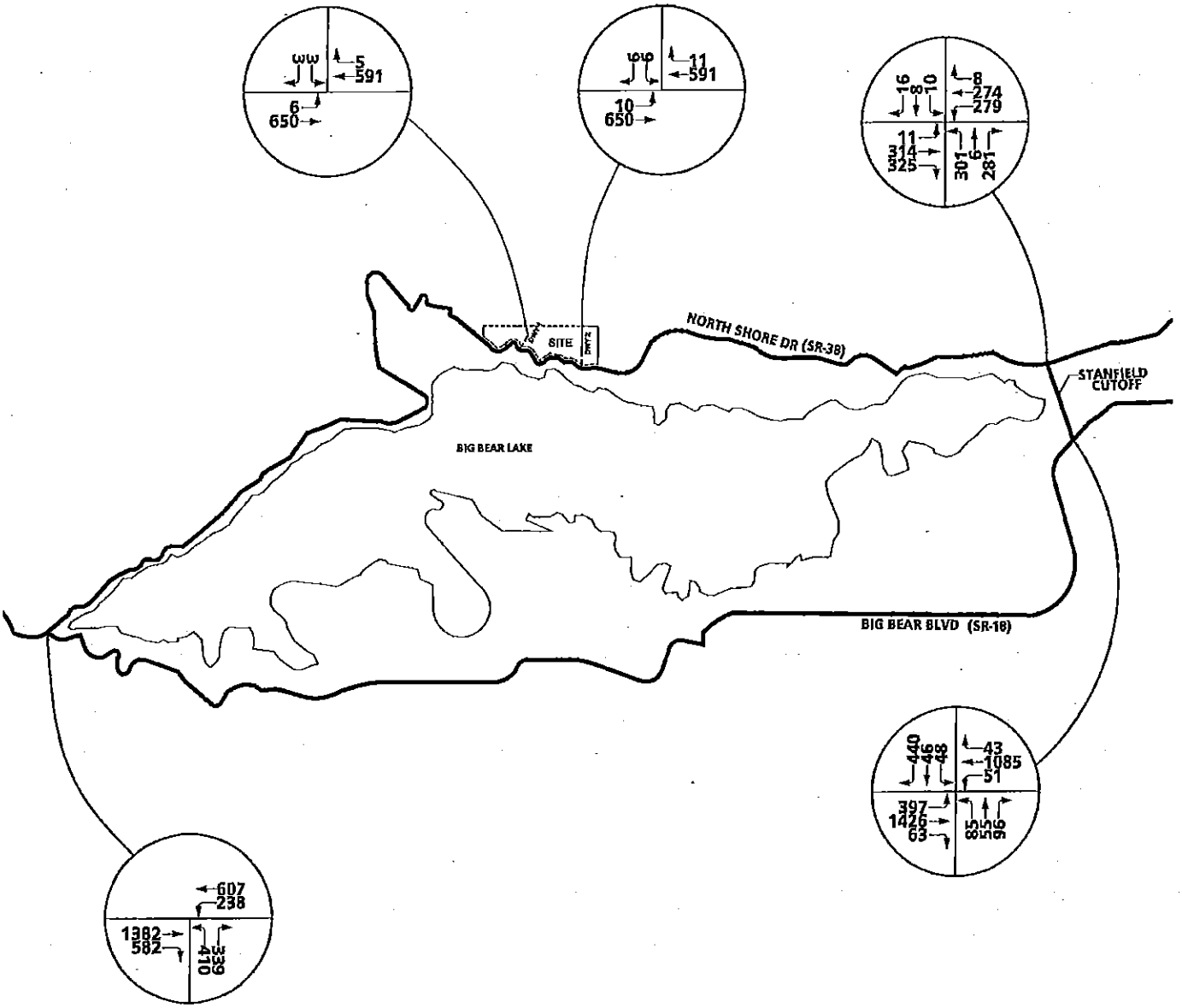
URBAN CROSSROADS

EXHIBIT 5-F

GENERAL PLAN BUILDOUT WITH PROJECT SUNDAY MIDDAY PEAK HOUR INTERSECTION VOLUMES



Big Bear Blvd (SR-18) (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- North Shore Drive (SR-38) (EW)

Stanfield Cut Off (NS) at:

- Big Bear Blvd (SR-18) (EW)

Driveway #1 (NS) at:

- North Shore Drive (SR-38) (EW)

Driveway #2 (NS) at:

- North Shore Drive (SR-38) (EW)

The operations analysis worksheets for General Plan Buildout With Project (2030) traffic conditions are included in Appendix "H".

6.0 SUMMARY AND RECOMMENDATIONS

This chapter summarizes the findings of this traffic impact analysis, and provides a series of recommendations related to project implementation.

6.1 Summary

The traffic issues related to the proposed land use and development have been evaluated in the context of the California Environmental Quality Act (CEQA) and the San Bernardino County Congestion Management Program (CMP). In conformance with the requirements of the San Bernardino County Congestion Management Program (CMP), the proposed project does not require a CMP traffic study. The CMP requires no analysis for projects that generate less than 250 peak hour trips. The project generates approximately 51 and 51 trips during the AM and PM peak hours, respectively; which is less than the required threshold for a CMP traffic study. However, a long-range traffic analysis has been required by County staff.

Project traffic volumes for all future conditions were estimated using a manual approach. The trip generation calculation is based on the most recent Institute of Transportation Engineers Trip Generation Rates, 7th Edition. The project trip distributions are derived from a select zone run of the San Bernardino Mountain Model.

Long Range General Plan Buildout (2030) conditions have been estimated based on the San Bernardino Mountain Model and the addition of both the project related peak hour volumes and the known cumulative development peak hour volumes per discussions with County staff.

6.1.1 The Project

The Moon Camp residential project is proposed to include 50 new single-family detached dwelling units and three lots for open space and common area on approximately 62.43 acres. Exhibit 1-B illustrates the project site plan.

The traffic related to the project has been calculated in accordance with the following accepted procedural steps:

- Trip Generation
- Trip Distribution
- Traffic Assignment

Table 2-2 (previously presented) summarizes the projected trip generation for the proposed development. As indicated in Table 2-2, the proposed Moon Camp residential development is projected to generate 479 trip-ends per day with 51 vehicles per hour during the weekday PM peak hour.

6.1.2 Existing Study Area Conditions

Regional access to the site is provided via North Shore Boulevard.

6.1.3 Future Conditions

An Interim Year (2010) analysis and long-range General Plan Buildout (2030) analysis are included in this report. Interim Year (2010) traffic operations analysis has been completed for the Friday PM and Sunday Mid-day peak hours and are shown in Tables 5-1 and 5-2 (previously presented). Friday PM peak hour and Sunday Mid-day peak hour traffic operations analysis are summarized in Tables 5-3 (previously presented)

for General Plan Buildout With Project (2030) conditions. All study intersections are projected to experience Level of Service "C" or better operations during the peak hours for all scenario analyzed.

6.2 Recommendations

The recommendations in this section address all necessary on-site improvements and off-site transportation improvements.

6.2.1 On-Site Improvements

On-site improvements and improvements adjacent to the site will be required in conjunction with the proposed development to ensure adequate circulation within the project itself. Exhibit 6-A illustrates the recommended improvement measures to address on-site circulation requirements of the proposed site, which include the following:

- Sight distance at the project access roadway should be reviewed with respect to Caltrans / County of San Bernardino sight distance standards at the time of final grading landscape and street improvement plans.

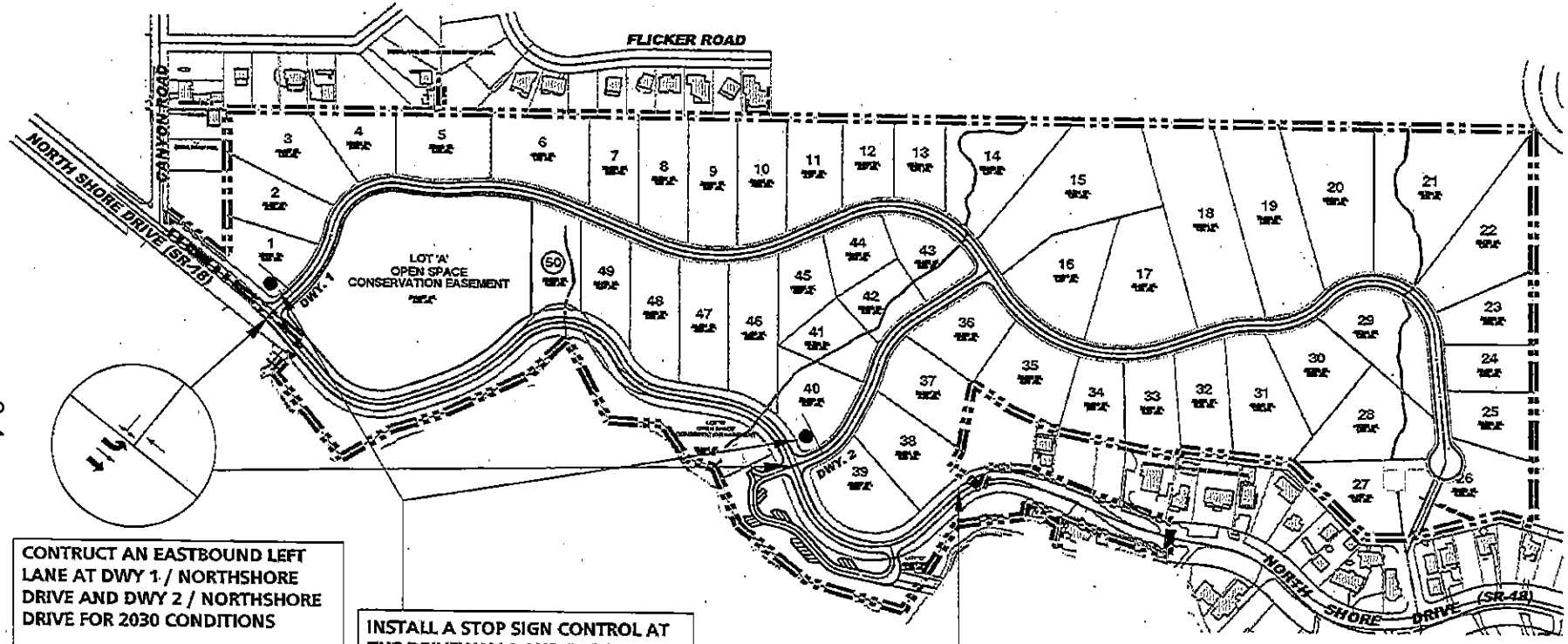
- Traffic signing / striping should be implemented in conjunction with detailed construction plans for the project site.

- Construct North Shore Drive at its ultimate half-section width as a Mountain Major highway from Canyon Drive to the Easterly project boundary.

- Install a stop sign control at Driveway #1 and Driveway #2

EXHIBIT 6-A

CIRCULATION RECOMMENDATIONS



CONTRUCT AN EASTBOUND LEFT LANE AT DWY 1 / NORTHSHORE DRIVE AND DWY 2 / NORTHSHORE DRIVE FOR 2030 CONDITIONS

INSTALL A STOP SIGN CONTROL AT THE DRIVEWAY 1 AND DRIVEWAY 2.

CONTRUCT A SECOND EASTBOUND THROUGH LANE AT DWY 1 / NORTHSHORE DRIVE AND DWY 2 / NORTHSHORE DRIVE FOR 2030 CONDITIONS

TRAFFIC SIGNING AND STRIPING SHOULD BE IMPLEMENTED IN CONJUNCTION WITH DETAILED CONSTRUCTION PLANS FOR THE PROJECT SITE.

SIGHT DISTANCE AT EACH PROJECT ACCESS ROADWAY SHOULD BE REVIEWED WITH RESPECT TO STANDARD CALTRANS AND COUNTY OF SAN BERNARDINO SIGHT DISTANCE STANDARDS AT THE TIME OF FINAL GRADING, LANDSCAPE AND STREET IMPROVEMENT PLANS.

CONSTRUCT NORTH SHORE DRIVE AT ITS ULTIMATE HALF-SECTION AS A MOUNTAIN MAJOR HIGHWAY FROM CANYON ROAD TO THE EASTERLY PROJECT BOUNDARY.

LEGEND:

● = STOP SIGN

➡ = RECOMMENDED IMPROVEMENT

N

URBAN

- Construct an Eastbound Left Turn Lane at Driveway 1 / North Shore Drive and Driveway 2/ North Shore Drive for 2030 Buildout Conditions

- Construct a 2nd Eastbound Through Lane at Driveway 1 / North Shore Drive and Driveway 2/ North Shore Drive for 2030 Buildout Conditions

6.2.2 Off-Site Improvements

The necessary off-site improvement recommendations were described in previous sections of this report. Exhibit 6-B illustrates the recommended improvements for 2010 Without Project and With Project traffic conditions. There are no additional recommended improvements for 2010 With Project traffic conditions compared to 2010 Without Project traffic conditions. Exhibit 6-C illustrates the recommended improvements for General Plan Buildout (2030) traffic conditions compared to the improvements shown on Exhibit 6-B.

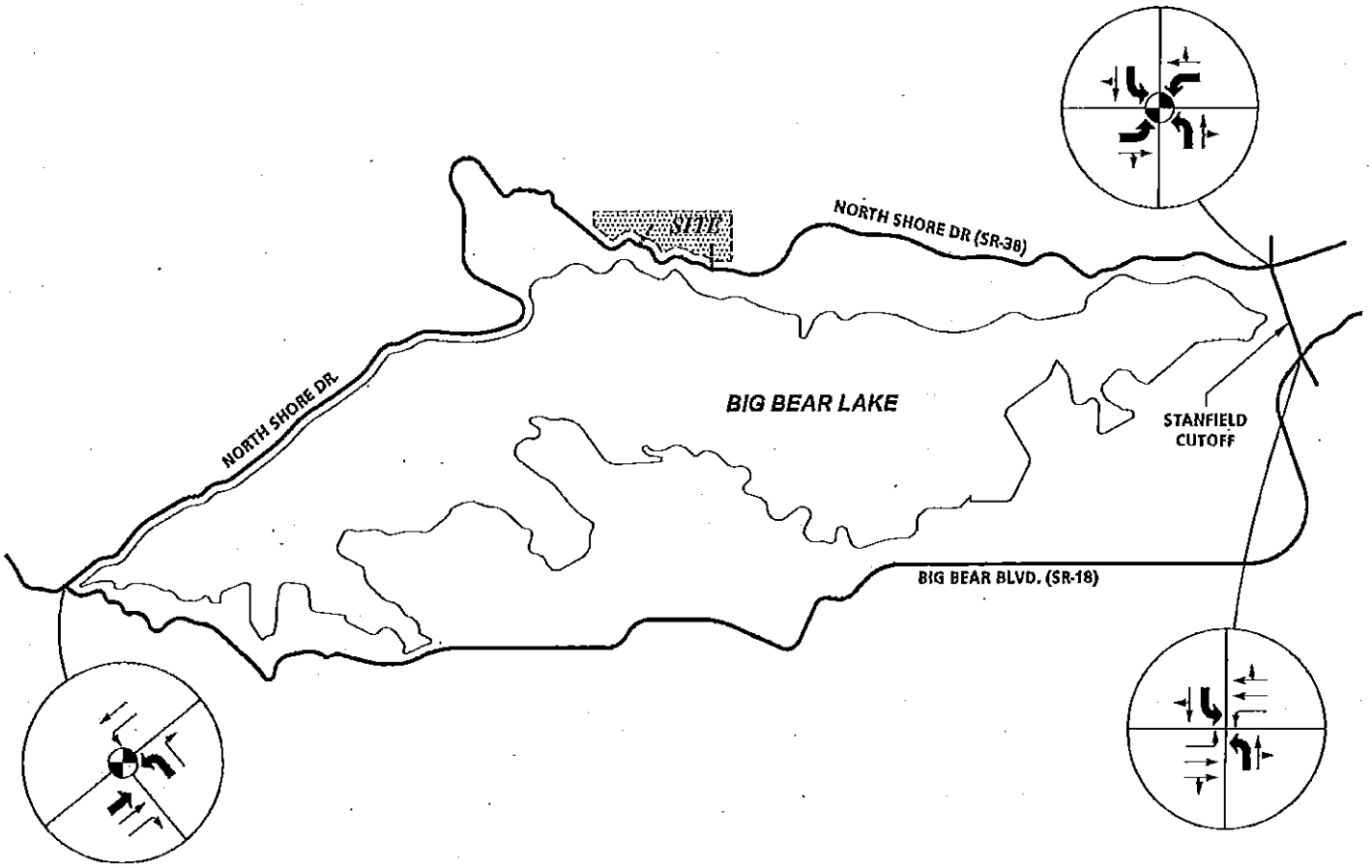
6.2.3 Project Fair Share Analysis

This section of the report summarizes the improvements and associated costs required to meet San Bernardino Congestion Management Program (CMP) level of service requirements for long range traffic condition, per discussion with County staff.

Table 6-1 indicates the needed long range 2030 improvements and resulting costs for the study area intersections. The cost data is provided in Appendix "G" of the San Bernardino Congestion Management Program, 2003 update (see Appendix "I"). Estimated cost (per SANBAG CMP table)

EXHIBIT 6-B

RECOMMENDED IMPROVEMENTS FOR 2010 WITHOUT AND WITH PROJECT CONDITIONS



LEGEND:

= TRAFFIC SIGNAL

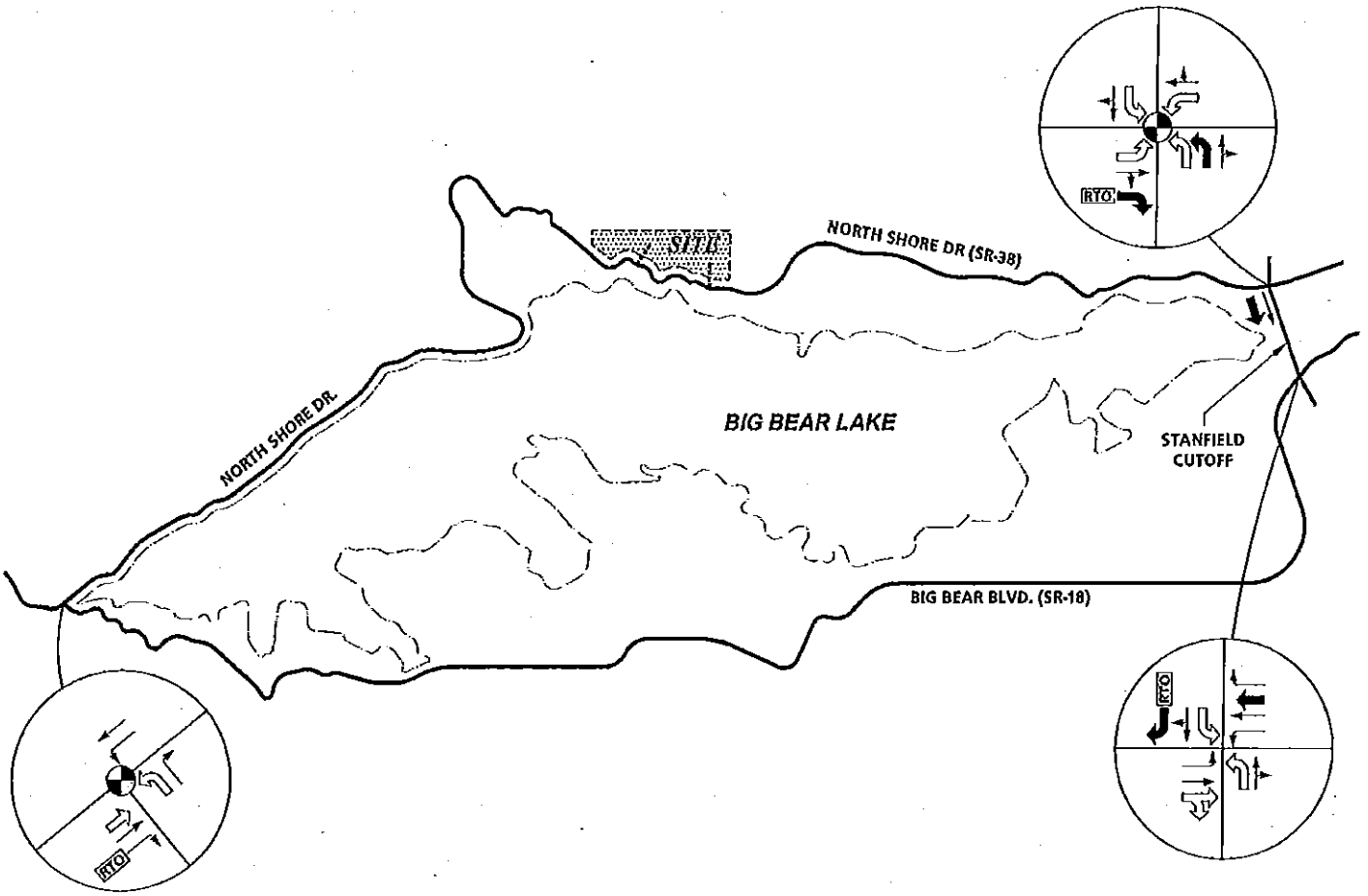
= EXISTING LANE

= CURRENT PHASE IMPROVEMENTS

N

EXHIBIT 6-C

ADDITIONAL RECOMMENDED IMPROVEMENTS FOR GENERAL PLAN BUILDOUT (2030) CONDITIONS



LEGEND:

- = TRAFFIC SIGNAL
- = EXISTING LANE
- = CURRENT PHASE IMPROVEMENTS
- = PREVIOUS PHASE IMPROVEMENTS
- RTO = RIGHT TURN OVERLAP PHASING IMPROVEMENTS

N

TABLE 6-1

ROADWAY IMPROVEMENTS COST

INTERSECTION	2030 IMPROVEMENTS	COST
North Shore Dr. (SR-38) (NS) at: • Big Bear Blvd. (SR-18) (EW)	Install Traffic Signal Construct NB Left Turn Lane Construct EB Through Lane Add Right Turn Overlap Phasing	$400,000 $50,000 $289,720 $25,000
		$764,720
Standfield Cutoff (NS) at: • North Shore Dr. (EW)	Install Traffic Signal Construct 2 NB left turn lanes Construct SB left turn lane Construct EB left turn lane Construct EB right turn lane Add Right Turn Overlap Phasing Construct WB left turn lane	$400,000 $100,000 $50,000 $50,000 $50,000 $25,000 $50,000
		$725,000
Stanfield Cutoff (NS) at: • Big Bear Blvd. (EW)	Construct NB left turn lane Construct SB left turn lane Construct SB right turn lane Add Right Turn Overlap Phasing Construct EB through lane Construct WB through lane Signal Modification	$50,000 $50,000 $50,000 $25,000 $289,720 $289,720 $40,000
		$794,440
TOTAL - COST OF CONSTRUCTION		**$2,284,160**

Source: Appendix "G" of the San Bernardino Congestion Management Program, 2003 update.

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for a through lane is $289,720 (600 feet long for upstream and 600 feet long including taper for downstream). As indicated in Table 6-1, the total cost of needed intersection improvements is $2,284,160.

The project fair share contribution towards the required improvements has also been calculated. Table 6-2 includes the project's cost contribution based on the project's percent of new traffic. As indicated in Table 6-2, the highest Friday PM or Sunday Mid-day fair share cost is approximately $48,921.

6.2.4 Transportation System Management Actions

a. Off-Site

As development in the area occurs, transit agencies should consider expanding service within the area.

b. On-Site

The on-site design should accommodate private and/or public bus access design and parking as necessary.

TABLE 6-2

PROJECT FAIR SHARE

SEGMENT	COST	PEAK HOUR	EXISTING TRAFFIC	2030 WITH PROJECT TRAFFIC	PROJECT TRAFFIC	TOTAL NEW TRAFFIC	PROJECT % OF NEW TRAFFIC	(A) FRIDAY PM PROJECT COST SHARE	(B) SUNDAY MID. PROJECT COST SHARE	HIGHEST FRIDAY PM OR SUNDAY MID. COST SHARE
North Shore Dr. (SR-38) (NS) at: • Big Bear Blvd. (EW)	$764,720	Friday PM	906	2,600	16	1,694	0.94%	$7,223	$14,728	$14,728
		Sunday Midday	2208	3,558	26	1,350	1.93%			
Standfield Cutoff (NS) at: • North Shore Dr. (EW)	$725,000	Friday PM	822	2,436	36	1,614	2.23%	$16,171	$20,291	$20,291
		Sunday Midday	904	1,833	26	929	2.80%			
Stanfield Cutoff (NS) at: • Big Bear Blvd. (EW)	$794,440	Friday PM	2,745	4,648	29	1,903	1.52%	$12,107	$13,903	$13,903
		Sunday Midday	2,635	3,835	21	1,200	1.75%			
GRAND TOTAL - COST SHARE FOR IMPROVEMENTS								**$35,500**	**$48,921**	**$48,921**

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APPENDIX A

TRAFFIC COUNT DATA

PASSENGER CAR EQUIVALENCY PEAK HOUR COUNT SUMMARY

INTERSECTION 1
Big Bear Ave(NS) / North Shore (SR-38)(EW)

FRIDAY PM PEAK HOUR

SOUTHBOUND

Total	0	0	0
4-Axle	0	0	0
3-Axle	0	0	0
Buses/RV's	0	0	0
Autos	0	0	0

Eastbound

Total	4-Axle	3-Axle	Buses/ RV's	Autos
0	0	0	0	0
322	0	4	14	304
21	0	0	0	21

Westbound

Autos	Buses/ RV's	3-Axle	4-Axle	Total
0	0	0	0	0
295	5	0	0	300
87	0	0	0	87

NORTHBOUND

Autos	19	0	25
Buses/RV's	3	0	2
3-Axle	2	0	0
4-Axle	0	0	0
Total	24	0	27

URBAN CROSSROADS

INTERSECTION 1
Big Bear Ave(NS) / North Shore (SR-38)(EW)

SUNDAY MID-DAY PEAK HOUR

SOUTHBOUND

Total	0	0	0
4-Axle	0	0	0
3-Axle	0	0	0
Buses/RV's	0	0	0
Autos	0	0	0

Eastbound

Total	4-Axle	3-Axle	Buses/ RV's	Autos
0	0	0	0	0
958	0	2	9	947
33	0	0	0	33

Westbound

Autos	Buses/ RV's	3-Axle	4-Axle	Total
0	0	0	0	0
411	0	0	0	411
65	2	0	0	67

NORTHBOUND

Autos	40	0	92
Buses/RV's	0	0	2
3-Axle	0	0	0
4-Axle	0	0	0
Total	40	0	94

URBAN CROSSROADS

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Dr

File Name : Not Named 1
Site Code : 1
Start Date : 3/2/2007
Page No : 1

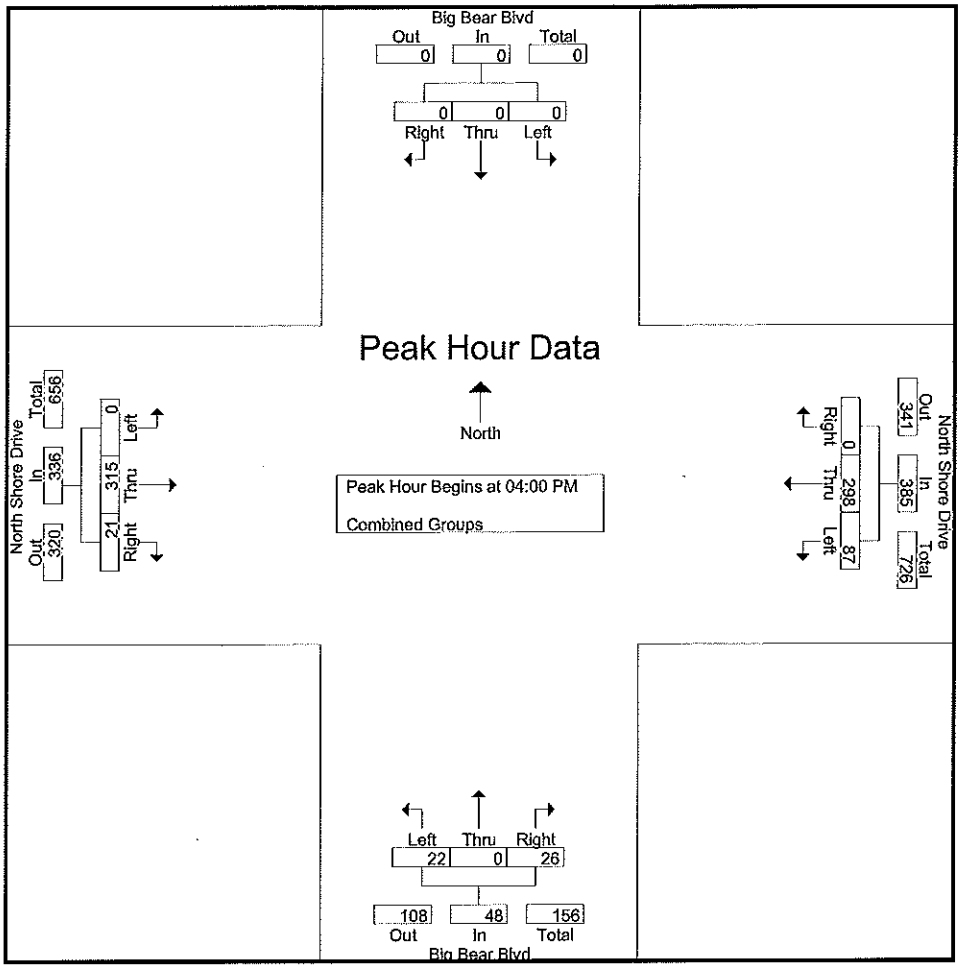
Groups Printed- Combined Groups

	Big Bear Blvd Southbound				North Shore Drive Westbound				Big Bear Blvd Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	0	17	87	0	104	3	0	9	12	0	80	5	85	201
04:15 PM	0	0	0	0	20	92	0	112	9	0	6	15	0	96	7	103	230
04:30 PM	0	0	0	0	20	66	0	86	6	0	6	12	0	88	7	95	193
04:45 PM	0	0	0	0	30	53	0	83	4	0	5	9	0	51	2	53	145
Total	0	0	0	0	87	298	0	385	22	0	26	48	0	315	21	336	769
05:00 PM	0	0	0	0	30	70	0	100	5	0	4	9	0	71	5	76	185
05:15 PM	0	0	0	0	17	74	0	91	2	0	5	7	0	79	6	85	183
05:30 PM	0	0	0	0	20	53	0	73	2	0	3	5	0	77	6	83	161
05:45 PM	0	0	0	0	8	43	0	51	1	0	2	3	0	45	0	45	99
Total	0	0	0	0	75	240	0	315	10	0	14	24	0	272	17	289	628
Grand Total	0	0	0	0	162	538	0	700	32	0	40	72	0	587	38	625	1397
Apprch %	0	0	0		23.1	76.9	0		44.4	0	55.6		0	93.9	6.1		
Total %	0	0	0	0	11.6	38.5	0	50.1	2.3	0	2.9	5.2	0	42	2.7	44.7	

	Big Bear Blvd Southbound				North Shore Drive Westbound				Big Bear Blvd Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	17	87	0	104	3	0	**9**	12	0	80	5	85	201
04:15 PM	0	0	0	0	20	**92**	0	**112**	**9**	0	6	**15**	0	**96**	**7**	**103**	**230**
04:30 PM	0	0	0	0	20	66	0	86	6	0	6	12	0	88	7	95	193
04:45 PM	0	0	0	0	**30**	53	0	83	4	0	5	9	0	51	2	53	145
Total Volume	0	0	0	0	87	298	0	385	22	0	26	48	0	315	21	336	769
% App. Total	0	0	0		22.6	77.4	0		45.8	0	54.2		0	93.8	6.2		
PHF	.000	.000	.000	.000	.725	.810	.000	.859	.611	.000	.722	.800	.000	.820	.750	.816	.836

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Dr

File Name : Not Named 1
Site Code : 1
Start Date : 3/2/2007
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:00 PM				04:00 PM			
+0 mins.	0	0	0	0	17	87	0	104	3	0	9	12	0	80	5	85
+15 mins.	0	0	0	0	20	**92**	0	**112**	**9**	0	6	**15**	0	**96**	**7**	**103**
+30 mins.	0	0	0	0	20	66	0	86	6	0	6	12	0	88	7	95
+45 mins.	0	0	0	0	**30**	53	0	83	4	0	5	9	0	51	2	53
Total Volume	0	0	0	0	87	298	0	385	22	0	26	48	0	315	21	336
% App. Total	0	0	0		22.6	77.4	0		45.8	0	54.2		0	93.8	6.2	
PHF	.000	.000	.000	.000	.725	.810	.000	.859	.611	.000	.722	.800	.000	.820	.750	.816

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Dr

File Name : NShoreDr(SR-18) Friday
Site Code : 1
Start Date : 3/2/2007
Page No : 1

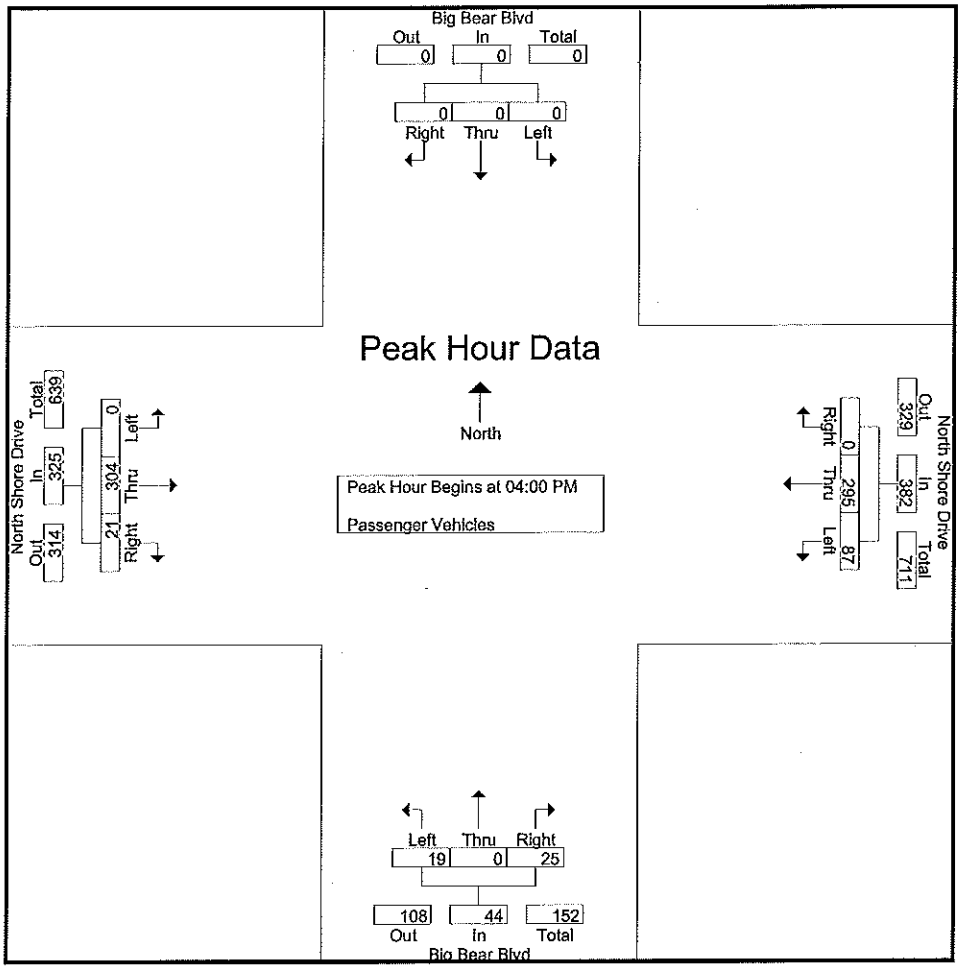
Groups Printed- Passenger Vehicles

	Big Bear Blvd Southbound				North Shore Drive Westbound				Big Bear Blvd Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	0	17	86	0	103	3	0	9	12	0	79	5	84	199
04:15 PM	0	0	0	0	20	91	0	111	7	0	5	12	0	90	7	97	220
04:30 PM	0	0	0	0	20	65	0	85	5	0	6	11	0	86	7	93	189
04:45 PM	0	0	0	0	30	53	0	83	4	0	5	9	0	49	2	51	143
Total	0	0	0	0	87	295	0	382	19	0	25	44	0	304	21	325	751
05:00 PM	0	0	0	0	30	69	0	99	3	0	4	7	0	69	5	74	180
05:15 PM	0	0	0	0	17	74	0	91	2	0	3	5	0	78	6	84	180
05:30 PM	0	0	0	0	20	53	0	73	2	0	3	5	0	75	6	81	159
05:45 PM	0	0	0	0	8	43	0	51	1	0	2	3	0	43	0	43	97
Total	0	0	0	0	75	239	0	314	8	0	12	20	0	265	17	282	616
Grand Total	0	0	0	0	162	534	0	696	27	0	37	64	0	569	38	607	1367
Apprch %	0	0	0		23.3	76.7	0		42.2	0	57.8		0	93.7	6.3		
Total %	0	0	0	0	11.9	39.1	0	50.9	2	0	2.7	4.7	0	41.6	2.8	44.4	

	Big Bear Blvd Southbound				North Shore Drive Westbound				Big Bear Blvd Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	17	86	0	103	3	0	**9**	**12**	0	79	5	84	199
04:15 PM	0	0	0	0	20	**91**	0	**111**	**7**	0	5	12	0	**90**	**7**	**97**	**220**
04:30 PM	0	0	0	0	20	65	0	85	5	0	6	11	0	86	7	93	189
04:45 PM	0	0	0	0	**30**	53	0	83	4	0	5	9	0	49	2	51	143
Total Volume	0	0	0	0	87	295	0	382	19	0	25	44	0	304	21	325	751
% App. Total	0	0	0		22.8	77.2	0		43.2	0	56.8		0	93.5	6.5		
PHF	.000	.000	.000	.000	.725	.810	.000	.860	.679	.000	.694	.917	.000	.844	.750	.838	.853

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Dr

File Name : NShoreDr(SR-18) Friday
Site Code : 1
Start Date : 3/2/2007
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:00 PM				04:00 PM			
+0 mins.	0	0	0	0	17	86	0	103	3	0	**9**	**12**	0	79	5	84
+15 mins.	0	0	0	0	20	**91**	0	**111**	**7**	0	5	12	0	**90**	**7**	**97**
+30 mins.	0	0	0	0	20	65	0	85	5	0	6	11	0	86	7	93
+45 mins.	0	0	0	0	**30**	53	0	83	4	0	5	9	0	49	2	51
Total Volume	0	0	0	0	87	295	0	382	19	0	25	44	0	304	21	325
% App. Total	0	0	0		22.8	77.2	0		43.2	0	56.8		0	93.5	6.5	
PHF	.000	.000	.000	.000	.725	.810	.000	.860	.679	.000	.694	.917	.000	.844	.750	.838

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Dr

Traffic Data Consultants

File Name : NShoreDr(SR-18) Friday
Site Code : 1
Start Date : 3/2/2007
Page No : 1

Groups Printed- Large 2 Axle

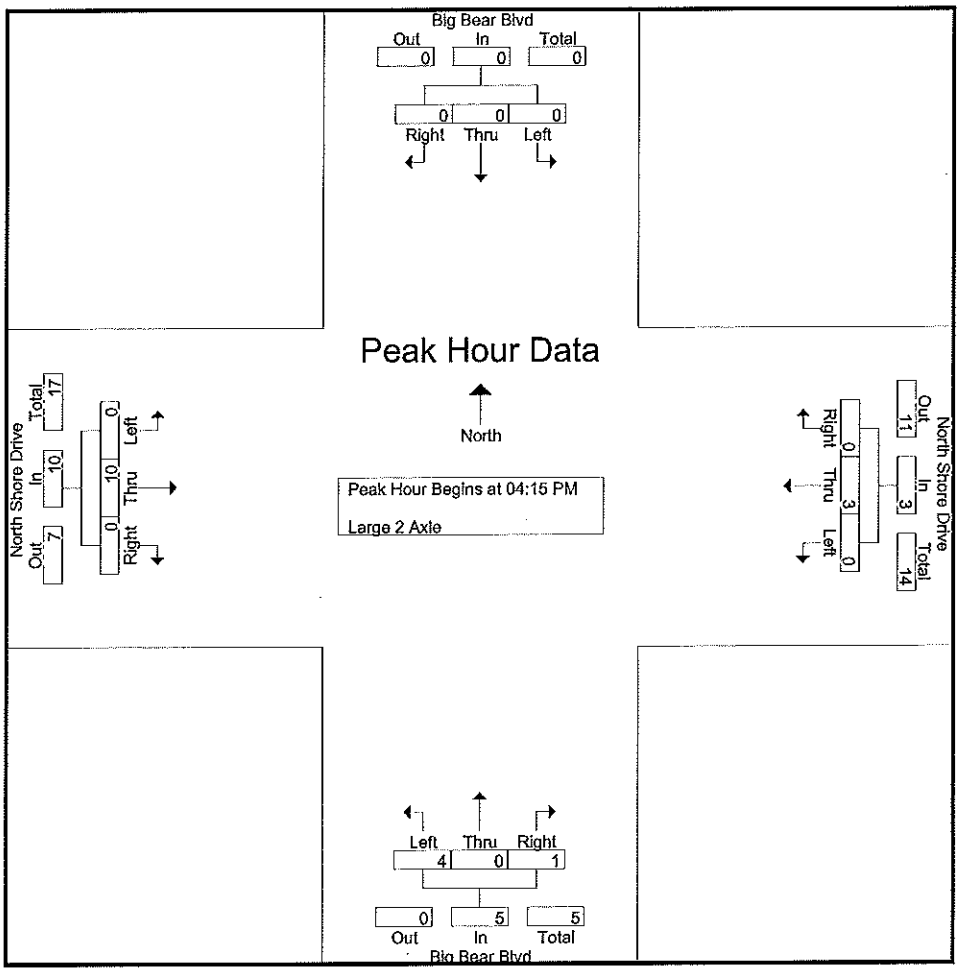
	Big Bear Blvd Southbound				North Shore Drive Westbound				Big Bear Blvd Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	2
04:15 PM	0	0	0	0	0	1	0	1	2	0	1	3	0	6	0	6	10
04:30 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	2
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total	0	0	0	0	0	3	0	3	2	0	1	3	0	9	0	9	15
05:00 PM	0	0	0	0	0	1	0	1	2	0	0	2	0	2	0	2	5
05:15 PM	0	0	0	0	0	0	0	0	0	0	2	2	0	1	0	1	3
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
Total	0	0	0	0	0	1	0	1	2	0	2	4	0	7	0	7	12
Grand Total	0	0	0	0	0	4	0	4	4	0	3	7	0	16	0	16	27
Apprch %	0	0	0		0	100	0		57.1	0	42.9		0	100	0		
Total %	0	0	0	0	0	14.8	0	14.8	14.8	0	11.1	25.9	0	59.3	0	59.3	

	Big Bear Blvd Southbound				North Shore Drive Westbound				Big Bear Blvd Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	0	0	0	0	0	1	0	1	2	0	1	3	0	6	0	6	10
04:30 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	2
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
05:00 PM	0	0	0	0	0	1	0	1	2	0	0	2	0	2	0	2	5
Total Volume	0	0	0	0	0	3	0	3	4	0	1	5	0	10	0	10	18
% App. Total	0	0	0		0	100	0		80	0	20		0	100	0		
PHF	.000	.000	.000	.000	.000	.750	.000	.750	.500	.000	.250	.417	.000	.417	.000	.417	.450

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Dr

Traffic Data Consultants

File Name : NShoreDr(SR-18) Friday
Site Code : 1
Start Date : 3/2/2007
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:15 PM				04:15 PM			
+0 mins.	0	0	0	0	0	1	0	1	2	0	1	3	0	6	0	6
+15 mins.	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1
+30 mins.	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1
+45 mins.	0	0	0	0	0	0	0	0	2	0	0	2	0	2	0	2
Total Volume	0	0	0	0	0	3	0	3	4	0	1	5	0	10	0	10
% App. Total	0	0	0		0	100	0		80	0	20		0	100	0	
PHF	.000	.000	.000	.000	.000	.750	.000	.750	.500	.000	.250	.417	.000	.417	.000	.417

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Dr

Traffic Data Consultants

File Name : NShoreDr(SR-18) Friday
Site Code : 1
Start Date : 3/2/2007
Page No : 1

Groups Printed- 3 Axle

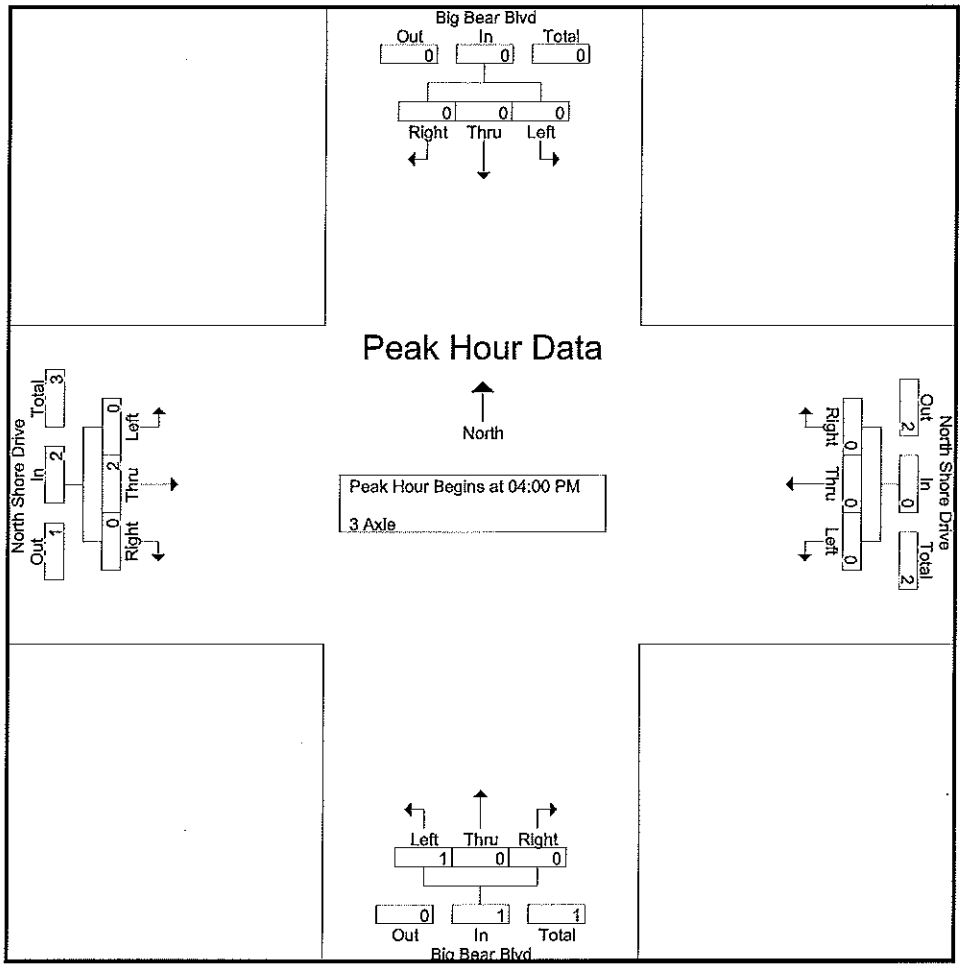
	Big Bear Blvd Southbound				North Shore Drive Westbound				Big Bear Blvd Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1	2
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total	0	0	0	0	0	0	0	0	1	0	0	1	0	2	0	2	3
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	1	0	0	1	0	2	0	2	3
Apprch %	0	0	0		0	0	0		100	0	0		0	100	0		
Total %	0	0	0	0	0	0	0	0	33.3	0	0	33.3	0	66.7	0	66.7	

	Big Bear Blvd Southbound				North Shore Drive Westbound				Big Bear Blvd Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1	2
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total Volume	0	0	0	0	0	0	0	0	1	0	0	1	0	2	0	2	3
% App. Total	0	0	0		0	0	0		100	0	0		0	100	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.000	.500	.000	.500	.375

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Dr

Traffic Data Consultants

File Name : NShoreDr(SR-18) Friday
Site Code : 1
Start Date : 3/2/2007
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:00 PM				04:00 PM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Total Volume	0	0	0	0	0	0	0	0	1	0	0	1	0	2	0	2
% App. Total	0	0	0		0	0	0		100	0	0		0	100	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.250	.000	.000	.250	.000	.500	.000	.500

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Drive

File Name : NShoreDr&BigBearBlvd Comb Sun
Site Code : 1
Start Date : 3/4/2007
Page No : 1

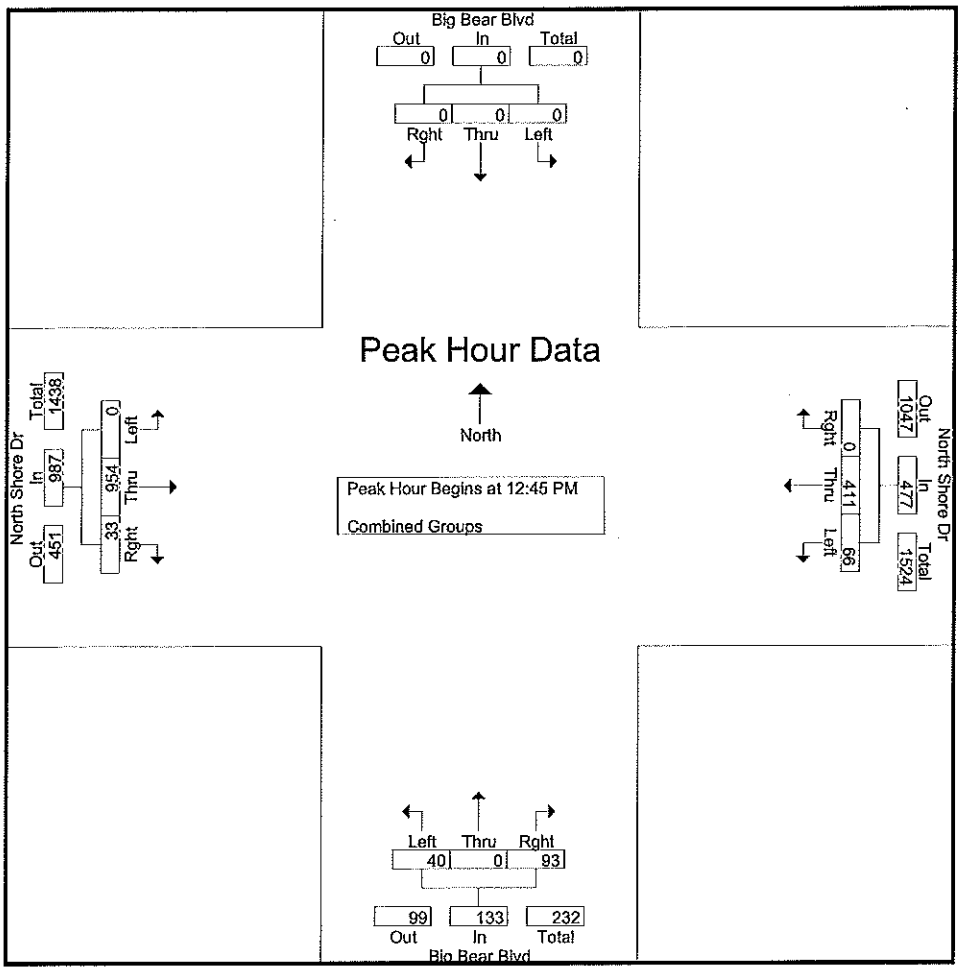
Groups Printed- Combined Groups

	Big Bear Blvd Southbound				North Shore Dr Westbound				Big Bear Blvd Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
12:00 PM	0	0	0	0	21	115	0	136	11	0	25	36	0	174	11	185	357
12:15 PM	0	0	0	0	18	101	0	119	8	0	21	29	0	183	6	189	337
12:30 PM	0	0	0	0	18	104	0	122	4	0	24	28	0	183	12	195	345
12:45 PM	0	0	0	0	10	103	0	113	7	0	27	34	0	228	8	236	383
Total	0	0	0	0	67	423	0	490	30	0	97	127	0	768	37	805	1422
01:00 PM	0	0	0	0	11	104	0	115	14	0	27	41	0	237	8	245	401
01:15 PM	0	0	0	0	26	126	0	152	6	0	19	25	0	251	10	261	438
01:30 PM	0	0	0	0	19	78	0	97	13	0	20	33	0	238	7	245	375
01:45 PM	0	0	0	0	18	71	0	89	8	0	22	30	0	213	13	226	345
Total	0	0	0	0	74	379	0	453	41	0	88	129	0	939	38	977	1559
Grand Total	0	0	0	0	141	802	0	943	71	0	185	256	0	1707	75	1782	2981
Apprch %	0	0	0		15	85	0		27.7	0	72.3		0	95.8	4.2		
Total %	0	0	0	0	4.7	26.9	0	31.6	2.4	0	6.2	8.6	0	57.3	2.5	59.8	

	Big Bear Blvd Southbound				North Shore Dr Westbound				Big Bear Blvd Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:45 PM																	
12:45 PM	0	0	0	0	10	103	0	113	7	0	**27**	34	0	228	8	236	383
01:00 PM	0	0	0	0	11	104	0	115	**14**	0	27	**41**	0	237	8	245	401
01:15 PM	0	0	0	0	**26**	**126**	0	**152**	6	0	19	25	0	**251**	**10**	**261**	**438**
01:30 PM	0	0	0	0	19	78	0	97	13	0	20	33	0	238	7	245	375
Total Volume	0	0	0	0	66	411	0	477	40	0	93	133	0	954	33	987	1597
% App. Total	0	0	0		13.8	86.2	0		30.1	0	69.9		0	96.7	3.3		
PHF	.000	.000	.000	.000	.635	.815	.000	.785	.714	.000	.861	.811	.000	.950	.825	.945	.912

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Drive

File Name : NShoreDr&BigBearBlvd Comb Sun
Site Code : 1
Start Date : 3/4/2007
Page No : 2



Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	12:00 PM				12:30 PM				12:45 PM				12:45 PM			
+0 mins.	0	0	0	0	18	104	0	122	7	0	**27**	34	0	228	8	236
+15 mins.	0	0	0	0	10	103	0	113	**14**	0	27	**41**	0	237	8	245
+30 mins.	0	0	0	0	11	104	0	115	6	0	19	25	0	**251**	**10**	**261**
+45 mins.	0	0	0	0	**26**	**126**	0	**152**	13	0	20	33	0	238	7	245
Total Volume	0	0	0	0	65	437	0	502	40	0	93	133	0	954	33	987
% App. Total	0	0	0		12.9	87.1	0		30.1	0	69.9		0	96.7	3.3	
PHF	.000	.000	.000	.000	.625	.867	.000	.826	.714	.000	.861	.811	.000	.950	.825	.945

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Drive

File Name : NShoreDr(SR-18) Sunday
Site Code : 1
Start Date : 3/4/2007
Page No : 1

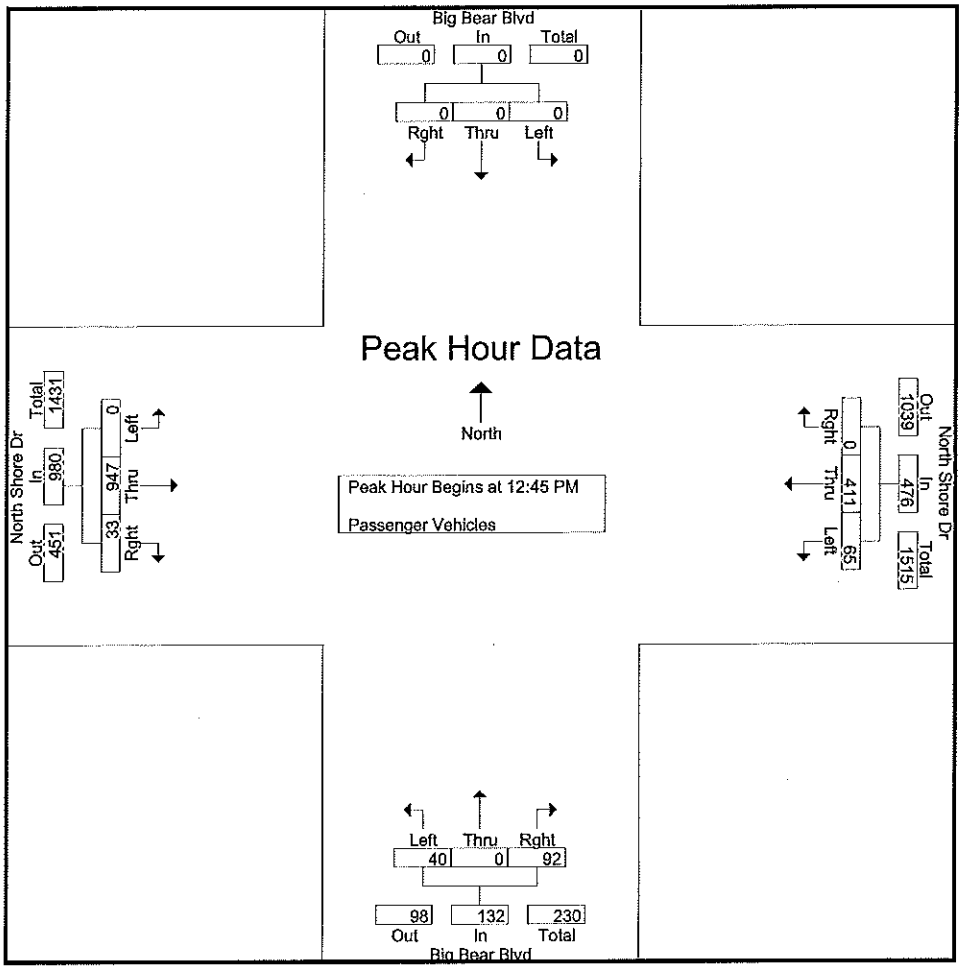
Groups Printed- Passenger Vehicles

	Big Bear Blvd Southbound				North Shore Dr Westbound				Big Bear Blvd Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
12:00 PM	0	0	0	0	21	115	0	136	11	0	25	36	0	172	11	183	355
12:15 PM	0	0	0	0	18	97	0	115	8	0	21	29	0	183	5	188	332
12:30 PM	0	0	0	0	18	104	0	122	4	0	24	28	0	183	12	195	345
12:45 PM	0	0	0	0	10	103	0	113	7	0	27	34	0	226	8	234	381
Total	0	0	0	0	67	419	0	486	30	0	97	127	0	764	36	800	1413
01:00 PM	0	0	0	0	11	104	0	115	14	0	26	40	0	236	8	244	399
01:15 PM	0	0	0	0	26	126	0	152	6	0	19	25	0	248	10	258	435
01:30 PM	0	0	0	0	18	78	0	96	13	0	20	33	0	237	7	244	373
01:45 PM	0	0	0	0	17	70	0	87	7	0	21	28	0	211	13	224	339
Total	0	0	0	0	72	378	0	450	40	0	86	126	0	932	38	970	1546
Grand Total	0	0	0	0	139	797	0	936	70	0	183	253	0	1696	74	1770	2959
Apprch %	0	0	0		14.9	85.1	0		27.7	0	72.3		0	95.8	4.2		
Total %	0	0	0	0	4.7	26.9	0	31.6	2.4	0	6.2	8.6	0	57.3	2.5	59.8	

	Big Bear Blvd Southbound				North Shore Dr Westbound				Big Bear Blvd Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:45 PM																	
12:45 PM	0	0	0	0	10	103	0	113	7	0	**27**	34	0	226	8	234	381
01:00 PM	0	0	0	0	**11**	104	0	115	**14**	0	26	**40**	0	236	8	244	399
01:15 PM	0	0	0	0	**26**	**126**	0	**152**	6	0	19	25	0	**248**	**10**	**258**	**435**
01:30 PM	0	0	0	0	18	78	0	96	13	0	20	33	0	237	7	244	373
Total Volume	0	0	0	0	65	411	0	476	40	0	92	132	0	947	33	980	1588
% App. Total	0	0	0		13.7	86.3	0		30.3	0	69.7		0	96.6	3.4		
PHF	.000	.000	.000	.000	.625	.815	.000	.783	.714	.000	.852	.825	.000	.955	.825	.950	.913

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Drive

File Name : NShoreDr(SR-18) Sunday
Site Code : 1
Start Date : 3/4/2007
Page No : 2



Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:00 PM				12:30 PM				12:45 PM				12:45 PM			
+0 mins.	0	0	0	0	18	104	0	122	7	0	**27**	34	0	226	8	234
+15 mins.	0	0	0	0	10	103	0	113	**14**	0	26	**40**	0	236	8	244
+30 mins.	0	0	0	0	11	104	0	115	6	0	19	25	0	**248**	**10**	**258**
+45 mins.	0	0	0	0	**26**	**126**	0	**152**	13	0	20	33	0	237	7	244
Total Volume	0	0	0	0	65	437	0	502	40	0	92	132	0	947	33	980
% App. Total	0	0	0		12.9	87.1	0		30.3	0	69.7		0	96.6	3.4	
PHF	.000	.000	.000	.000	.625	.867	.000	.826	.714	.000	.852	.825	.000	.955	.825	.950

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Drive

File Name : NShoreDr(SR-18) Sunday
Site Code : 1
Start Date : 3/4/2007
Page No : 1

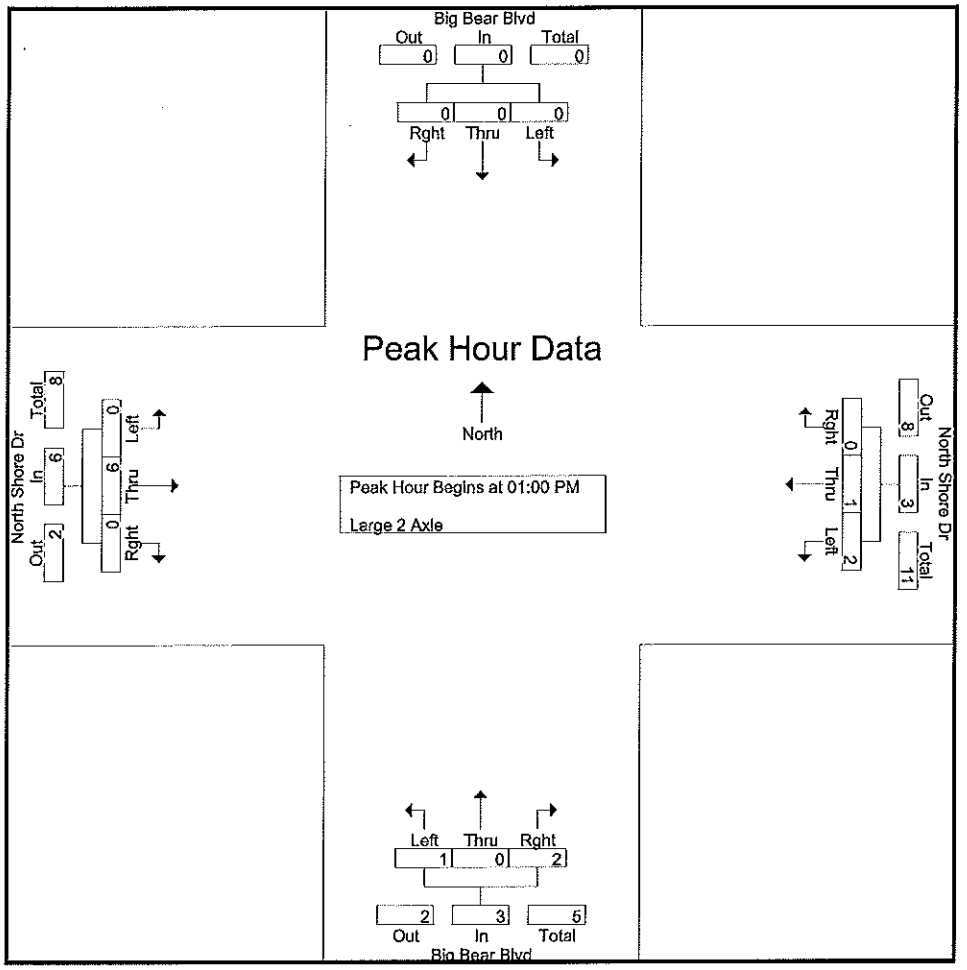
Groups Printed- Large 2 Axle

	Big Bear Blvd Southbound				North Shore Dr Westbound				Big Bear Blvd Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
12:15 PM	0	0	0	0	0	3	0	3	0	0	0	0	0	0	1	1	4
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
Total	0	0	0	0	0	3	0	3	0	0	0	0	0	4	1	5	8
01:00 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
01:30 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	1	2
01:45 PM	0	0	0	0	1	1	0	2	1	0	1	2	0	2	0	2	6
Total	0	0	0	0	2	1	0	3	1	0	2	3	0	6	0	6	12
Grand Total	0	0	0	0	2	4	0	6	1	0	2	3	0	10	1	11	20
Apprch %	0	0	0		33.3	66.7	0		33.3	0	66.7		0	90.9	9.1		
Total %	0	0	0	0	10	20	0	30	5	0	10	15	0	50	5	55	

	Big Bear Blvd Southbound				North Shore Dr Westbound				Big Bear Blvd Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 01:00 PM																	
01:00 PM	0	0	0	0	0	0	0	0	0	0	**1**	1	0	0	0	0	**1**
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	**3**	0	**3**	3
01:30 PM	0	0	0	0	**1**	0	0	1	0	0	0	0	0	1	0	1	2
01:45 PM	0	0	0	0	1	**1**	0	**2**	**1**	0	1	**2**	0	2	0	2	**6**
Total Volume	0	0	0	0	2	1	0	3	1	0	2	3	0	6	0	6	12
% App. Total	0	0	0		66.7	33.3	0		33.3	0	66.7		0	100	0		
PHF	.000	.000	.000	.000	.500	.250	.000	.375	.250	.000	.500	.375	.000	.500	.000	.500	.500

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Drive

File Name : NShoreDr(SR-18) Sunday
Site Code : 1
Start Date : 3/4/2007
Page No : 2



Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:00 PM				12:00 PM				01:00 PM				12:45 PM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	**1**	1	0	2	0	2
+15 mins.	0	0	0	0	0	**3**	0	**3**	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	**3**	0	**3**
+45 mins.	0	0	0	0	0	0	0	0	**1**	0	1	**2**	0	1	0	1
Total Volume	0	0	0	0	0	3	0	3	1	0	2	3	0	6	0	6
% App. Total	0	0	0		0	100	0		33.3	0	66.7		0	100	0	
PHF	.000	.000	.000	.000	.000	.250	.000	.250	.250	.000	.500	.375	.000	.500	.000	.500

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Drive

File Name : NShoreDr(SR-18) Sunday
Site Code : 1
Start Date : 3/4/2007
Page No : 1

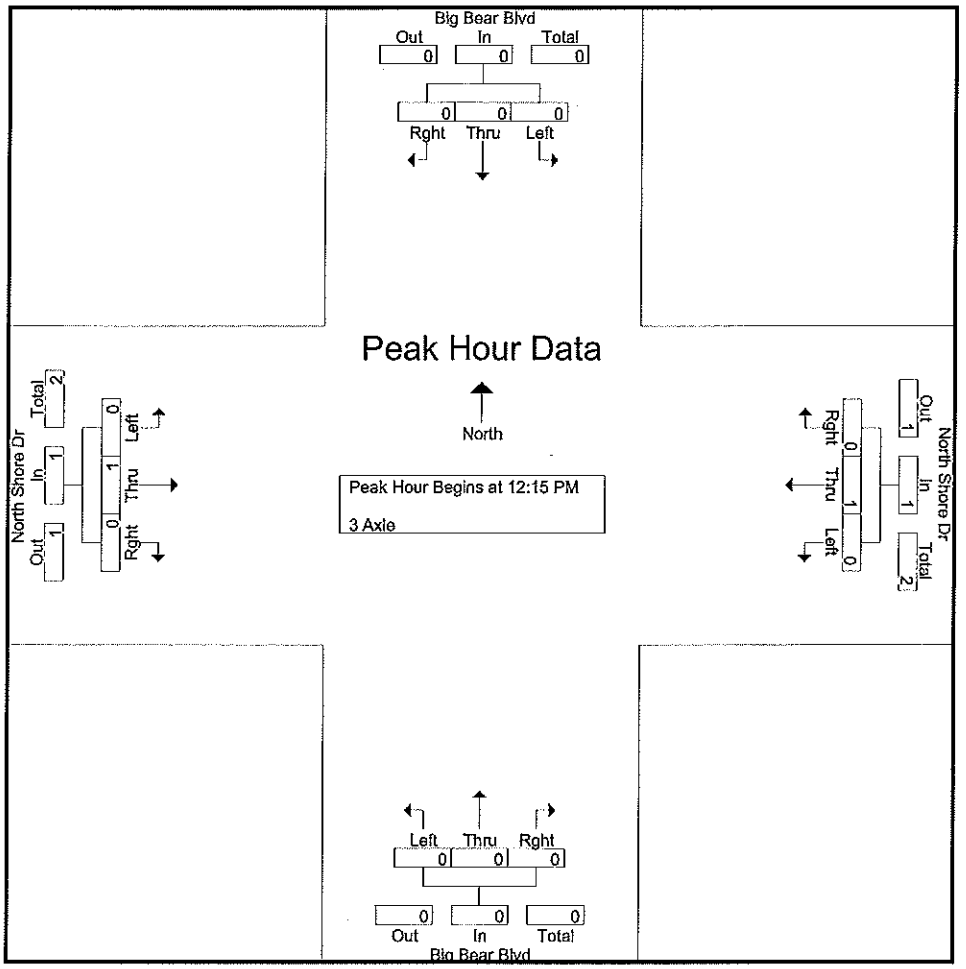
Groups Printed- 3 Axle

	Big Bear Blvd Southbound				North Shore Dr Westbound				Big Bear Blvd Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Grand Total	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	2
Apprch %	0	0	0		0	100	0		0	0	0		0	100	0		
Total %	0	0	0	0	0	50	0	50	0	0	0	0	0	50	0	50	

	Big Bear Blvd Southbound				North Shore Dr Westbound				Big Bear Blvd Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:15 PM																	
12:15 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total Volume	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	2
% App. Total	0	0	0		0	100	0		0	0	0		0	100	0		
PHF	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.000	.000	.000	.250	.000	.250	.500

City of: Big Bear
N/S: Big Bear Blvd
E/W: North Shore Drive

File Name : NShoreDr(SR-18) Sunday
Site Code : 1
Start Date : 3/4/2007
Page No : 2



Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	12:00 PM				12:00 PM				12:00 PM				12:15 PM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Total Volume	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1
% App. Total	0	0	0		0	100	0		0	0	0		0	100	0	
PHF	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.000	.000	.000	.250	.000	.250

PASSENGER CAR EQUIVALENCY PEAK HOUR COUNT SUMMARY

INTERSECTION 2
Stanfield Cut Off(NS) / North Shore (SR-38)(EW)

FRIDAY PM PEAK HOUR

SOUTHBOUND

Total	0	10	5
4-Axle	0	0	0
3-Axle	0	0	0
Buses/RV's	0	0	0
Autos	0	10	5

Eastbound

Total	4-Axle	3-Axle	Buses/ RV's	Autos
0	0	0	0	0
74	0	2	5	67
70	0	0	0	70

Westbound

Autos	Buses/ RV's	3-Axle	4-Axle	Total
6	0	0	0	6
49	5	0	0	54
210	6	2	0	218

NORTHBOUND

Autos	55	5	199
Buses/RV's	3	0	9
3-Axle	0	0	0
4-Axle	0	0	0
Total	58	5	208

URBAN CROSSROADS

INTERSECTION 2
Stanfield Cut Off(NS) / North Shore (SR-38)(EW)

SUNDAY MID-DAY PEAK HOUR

SOUTHBOUND

Total	6	6	8
4-Axle	0	0	0
3-Axle	0	0	0
Buses/RV's	0	0	0
Autos	6	6	8

Eastbound

Total	4-Axle	3-Axle	Buses/ RV's	Autos
4	0	0	0	4
80	0	0	0	80
120	0	0	2	118

Westbound

Autos	Buses/ RV's	3-Axle	4-Axle	Total
6	0	0	0	6
79	5	0	0	84
177	0	0	0	177

NORTHBOUND

Autos	107	4	174
Buses/RV's	3	0	0
3-Axle	0	0	0
4-Axle	0	0	0
Total	110	4	174

URBAN CROSSROADS

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Dr

Traffic Data Consultants

File Name : Stanfield&NShoreDr Combined Fri
Site Code : 2
Start Date : 3/2/2007
Page No : 1

Groups Printed- Combined Groups

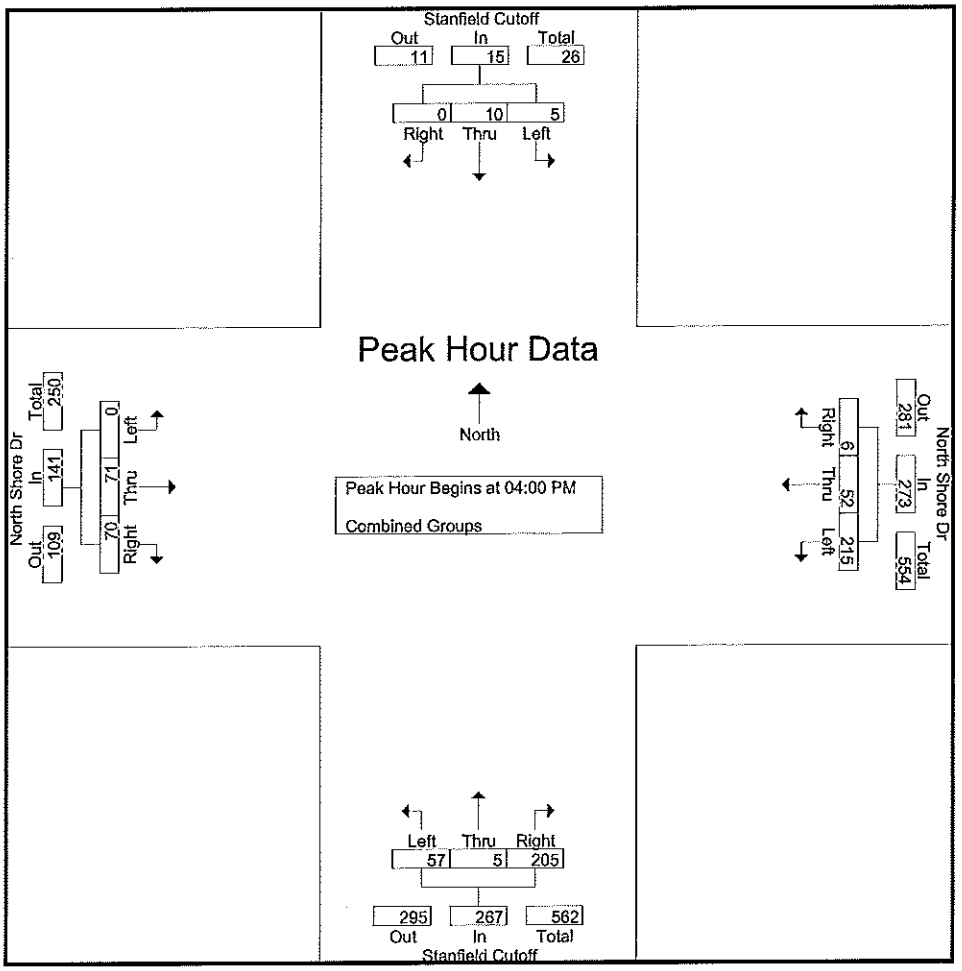
	Stanfield Cutoff Southbound				North Shore Dr Westbound				Stanfield Cutoff Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	1	4	0	5	64	15	2	81	18	1	48	67	0	19	22	41	194
04:15 PM	0	6	0	6	46	10	0	56	11	2	53	66	0	21	20	41	169
04:30 PM	1	0	0	1	57	15	2	74	12	1	54	67	0	11	17	28	170
04:45 PM	3	0	0	3	48	12	2	62	16	1	50	67	0	20	11	31	163
Total	5	10	0	15	215	52	6	273	57	5	205	267	0	71	70	141	696
05:00 PM	1	3	0	4	44	9	2	55	15	4	62	81	0	12	12	24	164
05:15 PM	2	2	0	4	41	8	1	50	14	2	38	54	0	20	15	35	143
05:30 PM	0	2	1	3	40	10	0	50	12	2	48	62	0	11	10	21	136
05:45 PM	3	1	0	4	32	6	1	39	13	0	42	55	0	25	21	46	144
Total	6	8	1	15	157	33	4	194	54	8	190	252	0	68	58	126	587
Grand Total	11	18	1	30	372	85	10	467	111	13	395	519	0	139	128	267	1283
Apprch %	36.7	60	3.3		79.7	18.2	2.1		21.4	2.5	76.1		0	52.1	47.9		
Total %	0.9	1.4	0.1	2.3	29	6.6	0.8	36.4	8.7	1	30.8	40.5	0	10.8	10	20.8	

	Stanfield Cutoff Southbound				North Shore Dr Westbound				Stanfield Cutoff Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	1	4	0	5	**64**	**15**	**2**	**81**	**18**	1	48	**67**	0	19	**22**	**41**	**194**
04:15 PM	0	**6**	0	**6**	46	10	0	56	11	**2**	53	66	0	**21**	20	41	169
04:30 PM	1	0	0	1	57	15	2	74	12	1	**54**	67	0	11	17	28	170
04:45 PM	**3**	0	0	3	48	12	2	62	16	1	50	67	0	20	11	31	163
Total Volume	5	10	0	15	215	52	6	273	57	5	205	267	0	71	70	141	696
% App. Total	33.3	66.7	0		78.8	19	2.2		21.3	1.9	76.8		0	50.4	49.6		
PHF	.417	.417	.000	.625	.840	.867	.750	.843	.792	.625	.949	.996	.000	.845	.795	.860	.897

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Dr

Traffic Data Consultants

File Name : Stanfield&NShoreDr Combined Fri
Site Code : 2
Start Date : 3/2/2007
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:15 PM				04:00 PM			
+0 mins.	1	4	0	5	**64**	**15**	**2**	**81**	11	2	53	66	0	19	**22**	**41**
+15 mins.	0	**6**	0	**6**	46	10	0	56	12	1	54	67	0	**21**	20	41
+30 mins.	1	0	0	1	57	15	2	74	**16**	1	50	67	0	11	17	28
+45 mins.	**3**	0	0	3	48	12	2	62	15	**4**	**62**	**81**	0	20	11	31
Total Volume	5	10	0	15	215	52	6	273	54	8	219	281	0	71	70	141
% App. Total	33.3	66.7	0		78.8	19	2.2		19.2	2.8	77.9		0	50.4	49.6	
PHF	.417	.417	.000	.625	.840	.867	.750	.843	.844	.500	.883	.867	.000	.845	.795	.860

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Dr

Traffic Data Consultants

File Name : Stanfield@NSHoreDr
Site Code : 2
Start Date : 3/2/2007
Page No : 1

Groups Printed- Passenger Vehicles

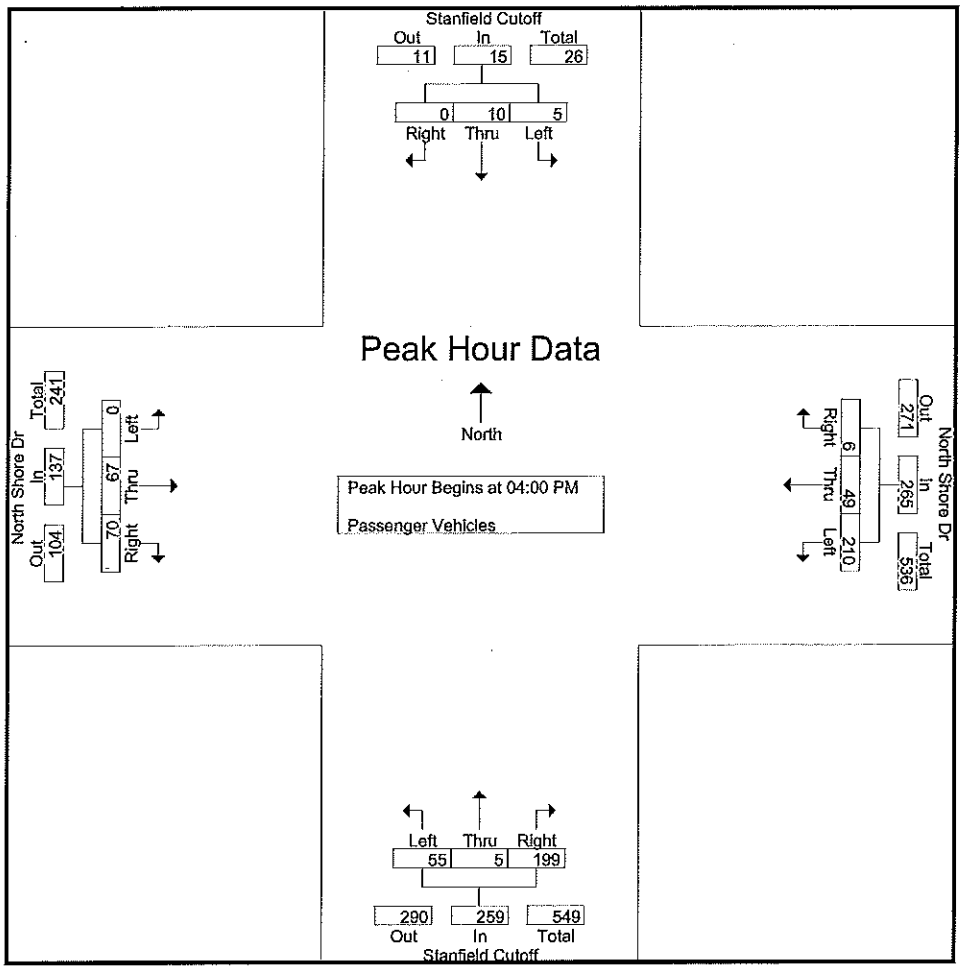
	Stanfield Cutoff Southbound				North Shore Dr Westbound				Stanfield Cutoff Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	1	4	0	5	61	14	2	77	16	1	48	65	0	18	22	40	187
04:15 PM	0	6	0	6	46	10	0	56	11	2	52	65	0	21	20	41	168
04:30 PM	1	0	0	1	56	14	2	72	12	1	52	65	0	9	17	26	164
04:45 PM	3	0	0	3	47	11	2	60	16	1	47	64	0	19	11	30	157
Total	5	10	0	15	210	49	6	265	55	5	199	259	0	67	70	137	676
05:00 PM	1	3	0	4	44	8	2	54	13	4	61	78	0	11	12	23	159
05:15 PM	2	2	0	4	39	8	1	48	14	2	38	54	0	17	14	31	137
05:30 PM	0	2	1	3	38	10	0	48	12	2	48	62	0	11	10	21	134
05:45 PM	2	1	0	3	30	6	1	37	13	0	42	55	0	24	20	44	139
Total	5	8	1	14	151	32	4	187	52	8	189	249	0	63	56	119	569
Grand Total	10	18	1	29	361	81	10	452	107	13	388	508	0	130	126	256	1245
Apprch %	34.5	62.1	3.4		79.9	17.9	2.2		21.1	2.6	76.4		0	50.8	49.2		
Total %	0.8	1.4	0.1	2.3	29	6.5	0.8	36.3	8.6	1	31.2	40.8	0	10.4	10.1	20.6	

	Stanfield Cutoff Southbound				North Shore Dr Westbound				Stanfield Cutoff Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	1	4	0	5	61	14	2	77	16	1	48	65	0	18	22	40	187
04:15 PM	0	6	0	6	46	10	0	56	11	2	52	65	0	21	20	41	168
04:30 PM	1	0	0	1	56	14	2	72	12	1	52	65	0	9	17	26	164
04:45 PM	3	0	0	3	47	11	2	60	16	1	47	64	0	19	11	30	157
Total Volume	5	10	0	15	210	49	6	265	55	5	199	259	0	67	70	137	676
% App. Total	33.3	66.7	0		79.2	18.5	2.3		21.2	1.9	76.8		0	48.9	51.1		
PHF	.417	.417	.000	.625	.861	.875	.750	.860	.859	.625	.957	.996	.000	.798	.795	.835	.904

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Dr

Traffic Data Consultants

File Name : Stanfield@NSHoreDr
Site Code : 2
Start Date : 3/2/2007
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:15 PM				04:00 PM			
+0 mins.	1	4	0	5	**61**	**14**	**2**	**77**	11	2	52	65	0	18	**22**	40
+15 mins.	0	**6**	0	**6**	46	10	0	56	12	1	52	65	0	**21**	20	**41**
+30 mins.	1	0	0	1	56	14	2	72	**16**	1	47	64	0	9	17	26
+45 mins.	**3**	0	0	3	47	11	2	60	13	**4**	**61**	**78**	0	19	11	30
Total Volume	5	10	0	15	210	49	6	265	52	8	212	272	0	67	70	137
% App. Total	33.3	66.7	0		79.2	18.5	2.3		19.1	2.9	77.9		0	48.9	51.1	
PHF	.417	.417	.000	.625	.861	.875	.750	.860	.813	.500	.869	.872	.000	.798	.795	.835

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Dr

Traffic Data Consultants

File Name : Stanfield@NSHoreDr
Site Code : 2
Start Date : 3/2/2007
Page No : 1

Groups Printed- Large 2 Axle

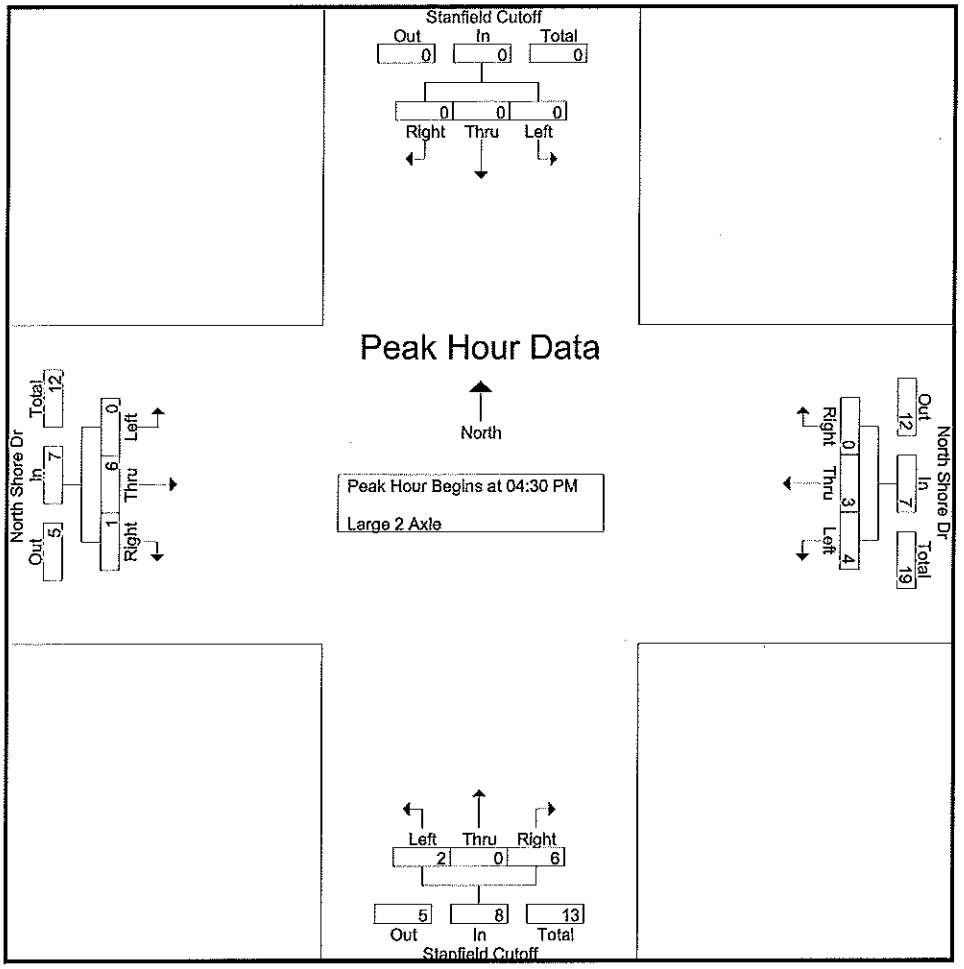
	Stanfield Cutoff Southbound				North Shore Dr Westbound				Stanfield Cutoff Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	0	2	1	0	3	2	0	0	2	0	1	0	1	6
04:15 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
04:30 PM	0	0	0	0	1	1	0	2	0	0	2	2	0	1	0	1	5
04:45 PM	0	0	0	0	1	1	0	2	0	0	3	3	0	1	0	1	6
Total	0	0	0	0	4	3	0	7	2	0	6	8	0	3	0	3	18
05:00 PM	0	0	0	0	0	1	0	1	2	0	1	3	0	1	0	1	5
05:15 PM	0	0	0	0	2	0	0	2	0	0	0	0	0	3	1	4	6
05:30 PM	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	2
05:45 PM	1	0	0	1	2	0	0	2	0	0	0	0	0	1	1	2	5
Total	1	0	0	1	6	1	0	7	2	0	1	3	0	5	2	7	18
Grand Total	1	0	0	1	10	4	0	14	4	0	7	11	0	8	2	10	36
Apprch %	100	0	0		71.4	28.6	0		36.4	0	63.6		0	80	20		
Total %	2.8	0	0	2.8	27.8	11.1	0	38.9	11.1	0	19.4	30.6	0	22.2	5.6	27.8	

	Stanfield Cutoff Southbound				North Shore Dr Westbound				Stanfield Cutoff Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	0	0	0	1	1	0	2	0	0	2	2	0	1	0	1	5
04:45 PM	0	0	0	0	1	1	0	2	0	0	3	3	0	1	0	1	6
05:00 PM	0	0	0	0	0	1	0	1	2	0	1	3	0	1	0	1	5
05:15 PM	0	0	0	0	2	0	0	2	0	0	0	0	0	3	1	4	6
Total Volume	0	0	0	0	4	3	0	7	2	0	6	8	0	6	1	7	22
% App. Total	0	0	0		57.1	42.9	0		25	0	75		0	85.7	14.3		
PHF	.000	.000	.000	.000	.500	.750	.000	.875	.250	.000	.500	.667	.000	.500	.250	.438	.917

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Dr

Traffic Data Consultants

File Name : Stanfield@NSHoreDr
Site Code : 2
Start Date : 3/2/2007
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	05:00 PM				04:00 PM				04:15 PM				04:30 PM			
+0 mins.	0	0	0	0	**2**	**1**	0	**3**	0	0	1	1	0	1	0	1
+15 mins.	0	0	0	0	0	0	0	0	0	0	2	2	0	1	0	1
+30 mins.	0	0	0	0	1	1	0	2	0	0	**3**	**3**	0	1	0	1
+45 mins.	**1**	0	0	**1**	1	1	0	2	**2**	0	1	3	0	**3**	**1**	**4**
Total Volume	1	0	0	1	4	3	0	7	2	0	7	9	0	6	1	7
% App. Total	100	0	0		57.1	42.9	0		22.2	0	77.8		0	85.7	14.3	
PHF	.250	.000	.000	.250	.500	.750	.000	.583	.250	.000	.583	.750	.000	.500	.250	.438

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Dr

Traffic Data Consultants

File Name : Stanfield@NSHoreDr
Site Code : 2
Start Date : 3/2/2007
Page No : 1

Groups Printed- 3 Axle

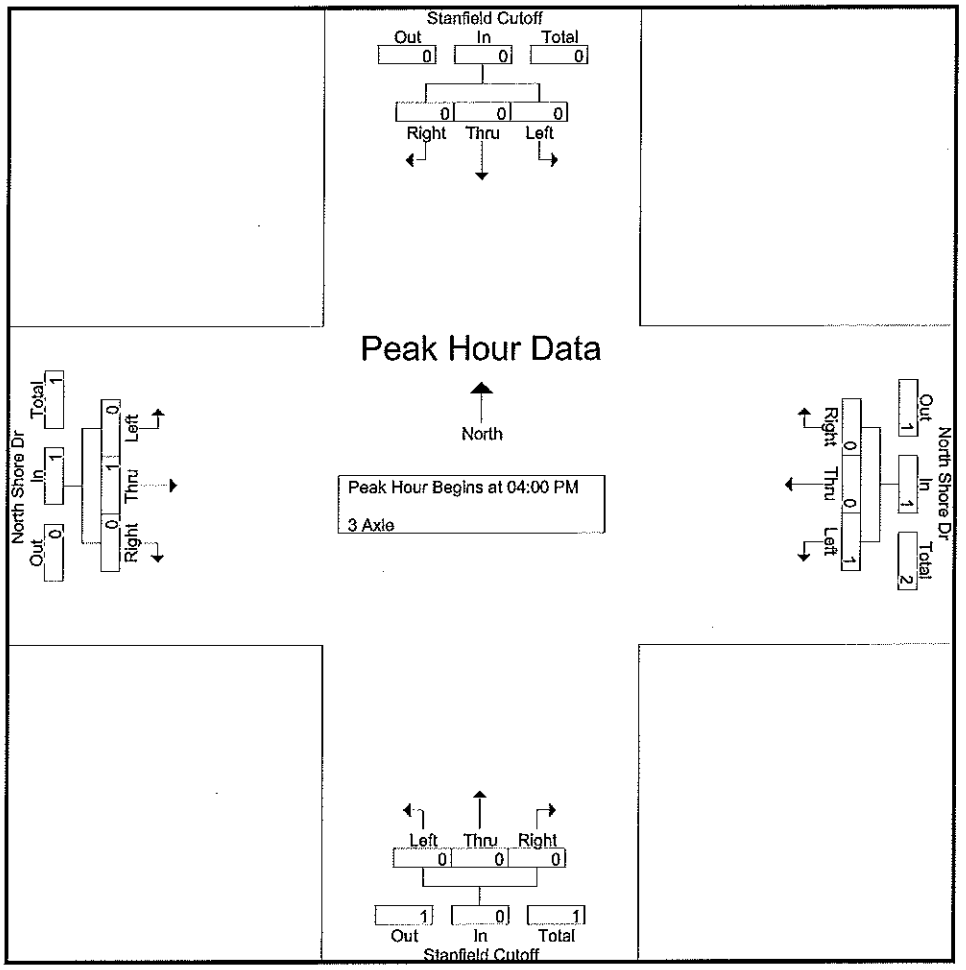
	Stanfield Cutoff Southbound				North Shore Dr Westbound				Stanfield Cutoff Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	1	2
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	1	2
Apprch %	0	0	0		100	0	0		0	0	0		0	100	0		
Total %	0	0	0	0	50	0	0	50	0	0	0	0	0	50	0	50	

	Stanfield Cutoff Southbound				North Shore Dr Westbound				Stanfield Cutoff Northbound				North Shore Dr Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	1	2
% App. Total	0	0	0		100	0	0		0	0	0		0	100	0		
PHF	.000	.000	.000	.000	.250	.000	.000	.250	.000	.000	.000	.000	.000	.250	.000	.250	.500

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Dr

Traffic Data Consultants

File Name : Stanfield@NSHoreDr
Site Code : 2
Start Date : 3/2/2007
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:00 PM				04:00 PM			
+0 mins.	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	1
% App. Total	0	0	0		100	0	0		0	0	0		0	100	0	
PHF	.000	.000	.000	.000	.250	.000	.000	.250	.000	.000	.000	.000	.000	.250	.000	.250

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Drive

File Name : Stanfield&NShoreDr Combined Sun
Site Code : 2
Start Date : 3/4/2007
Page No : 1

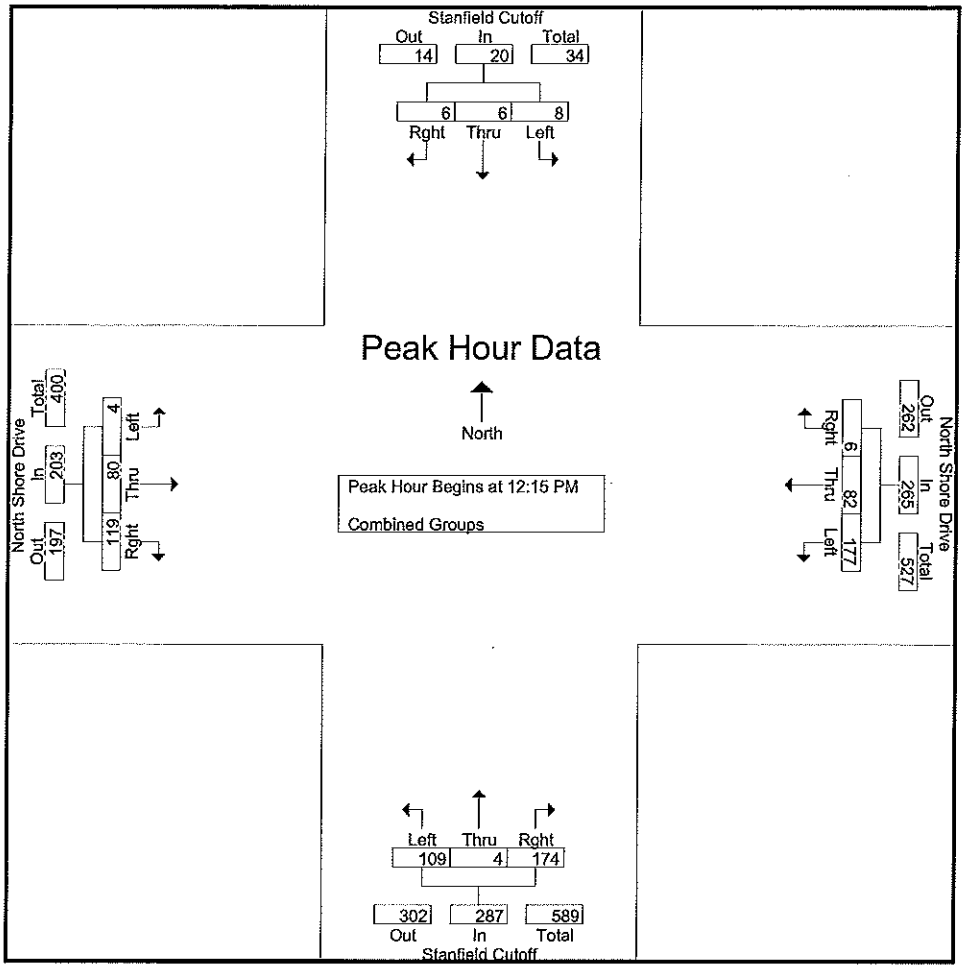
Groups Printed- Combined Groups

	Stanfield Cutoff Southbound				North Shore Drive Westbound				Stanfield Cutoff Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
12:00 PM	2	1	1	4	39	15	4	58	32	1	39	72	0	16	24	40	174
12:15 PM	2	3	3	8	50	25	1	76	23	0	36	59	1	17	25	43	186
12:30 PM	2	1	2	5	47	21	2	70	36	0	41	77	2	21	35	58	210
12:45 PM	2	1	1	4	33	25	2	60	23	2	56	81	0	16	25	41	186
Total	8	6	7	21	169	86	9	264	114	3	172	289	3	70	109	182	756
01:00 PM	2	1	0	3	47	11	1	59	27	2	41	70	1	26	34	61	193
01:15 PM	4	0	1	5	48	14	3	65	22	0	54	76	0	21	19	40	186
01:30 PM	1	3	0	4	34	20	2	56	30	1	62	93	0	14	27	41	194
01:45 PM	0	1	0	1	26	16	3	45	25	1	31	57	0	28	25	53	156
Total	7	5	1	13	155	61	9	225	104	4	188	296	1	89	105	195	729
Grand Total	15	11	8	34	324	147	18	489	218	7	360	585	4	159	214	377	1485
Apprch %	44.1	32.4	23.5		66.3	30.1	3.7		37.3	1.2	61.5		1.1	42.2	56.8		
Total %	1	0.7	0.5	2.3	21.8	9.9	1.2	32.9	14.7	0.5	24.2	39.4	0.3	10.7	14.4	25.4	

	Stanfield Cutoff Southbound				North Shore Drive Westbound				Stanfield Cutoff Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:15 PM																	
12:15 PM	**2**	**3**	**3**	**8**	**50**	**25**	1	**76**	23	0	36	59	1	17	25	43	186
12:30 PM	2	1	2	5	47	21	**2**	70	**36**	0	41	77	**2**	21	**35**	58	**210**
12:45 PM	2	1	1	4	33	25	2	60	23	**2**	**56**	**81**	0	16	25	41	186
01:00 PM	2	1	0	3	47	11	1	59	27	2	41	70	1	**26**	34	**61**	193
Total Volume	8	6	6	20	177	82	6	265	109	4	174	287	4	80	119	203	775
% App. Total	40	30	30		66.8	30.9	2.3		38	1.4	60.6		2	39.4	58.6		
PHF	1.000	.500	.500	.625	.885	.820	.750	.872	.757	.500	.777	.886	.500	.769	.850	.832	.923

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Drive

File Name : Stanfield&NShoreDr Combined Sun
Site Code : 2
Start Date : 3/4/2007
Page No : 2



Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:00 PM				12:15 PM				12:45 PM				12:15 PM			
+0 mins.	**2**	1	1	4	**50**	**25**	1	**76**	23	**2**	56	81	1	17	25	43
+15 mins.	2	**3**	**3**	**8**	47	21	**2**	70	27	2	41	70	**2**	21	**35**	58
+30 mins.	2	1	2	5	33	25	2	60	22	0	54	76	0	16	25	41
+45 mins.	2	1	1	4	47	11	1	59	**30**	1	**62**	**93**	1	**26**	34	**61**
Total Volume	8	6	7	21	177	82	6	265	102	5	213	320	4	80	119	203
% App. Total	38.1	28.6	33.3		66.8	30.9	2.3		31.9	1.6	66.6		2	39.4	58.6	
PHF	1.000	.500	.583	.656	.885	.820	.750	.872	.850	.625	.859	.860	.500	.769	.850	.832

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Drive

File Name : Stanfield@NShoreDr Sunday
Site Code : 2
Start Date : 3/4/2007
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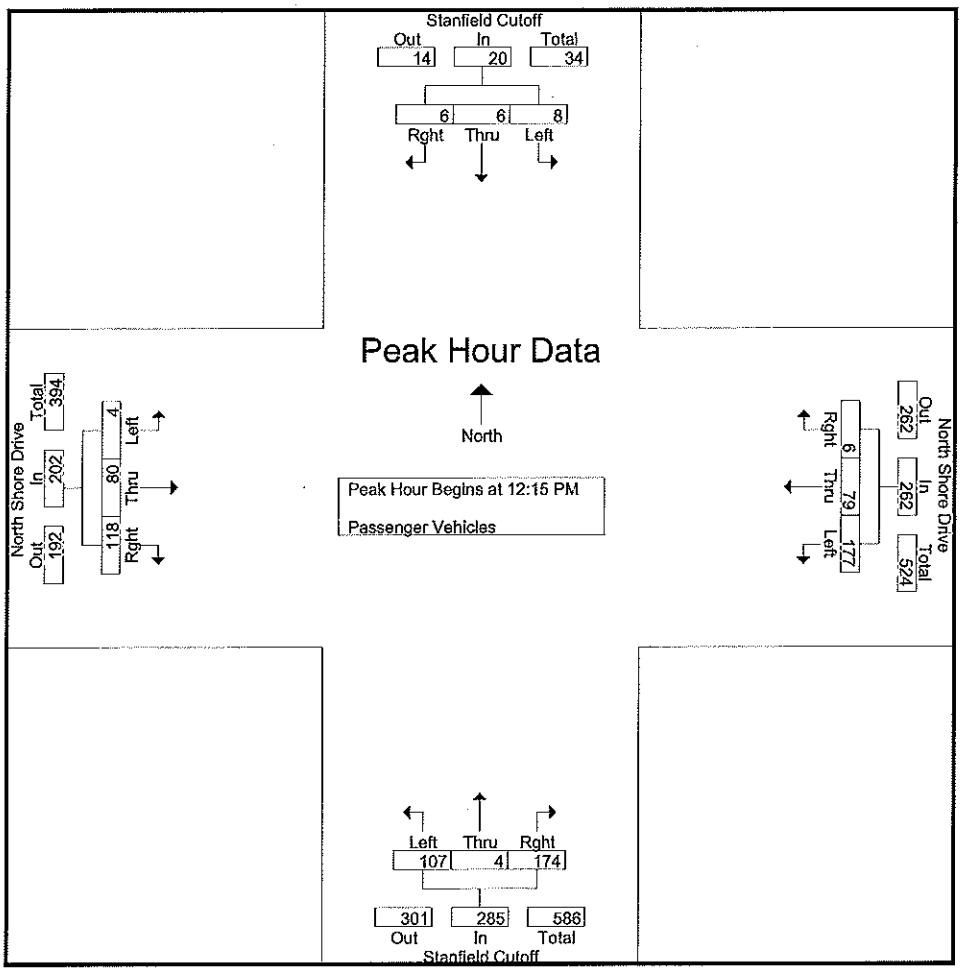
Groups Printed- Passenger Vehicles

	Stanfield Cutoff Southbound				North Shore Drive Westbound				Stanfield Cutoff Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
12:00 PM	2	1	1	4	39	15	4	58	32	1	39	72	0	16	24	40	174
12:15 PM	2	3	3	8	50	23	1	74	23	0	36	59	1	17	25	43	184
12:30 PM	2	1	2	5	47	21	2	70	36	0	41	77	2	21	35	58	210
12:45 PM	2	1	1	4	33	25	2	60	22	2	56	80	0	16	25	41	185
Total	8	6	7	21	169	84	9	262	113	3	172	288	3	70	109	182	753
01:00 PM	2	1	0	3	47	10	1	58	26	2	41	69	1	26	33	60	190
01:15 PM	4	0	1	5	48	14	3	65	22	0	53	75	0	19	19	38	183
01:30 PM	1	3	0	4	34	20	2	56	29	1	62	92	0	14	27	41	193
01:45 PM	0	1	0	1	25	16	3	44	25	1	30	56	0	27	23	50	151
Total	7	5	1	13	154	60	9	223	102	4	186	292	1	86	102	189	717
Grand Total	15	11	8	34	323	144	18	485	215	7	358	580	4	156	211	371	1470
Apprch %	44.1	32.4	23.5		66.6	29.7	3.7		37.1	1.2	61.7		1.1	42	56.9		
Total %	1	0.7	0.5	2.3	22	9.8	1.2	33	14.6	0.5	24.4	39.5	0.3	10.6	14.4	25.2	

	Stanfield Cutoff Southbound				North Shore Drive Westbound				Stanfield Cutoff Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:15 PM																	
12:15 PM	**2**	**3**	**3**	**8**	**50**	23	**1**	**74**	23	0	36	59	1	17	25	43	184
12:30 PM	2	1	2	5	47	21	**2**	70	**36**	0	41	77	**2**	21	**35**	58	**210**
12:45 PM	2	1	1	4	33	**25**	2	60	22	**2**	**56**	**80**	0	16	25	41	185
01:00 PM	2	1	0	3	47	10	1	58	26	2	41	69	1	**26**	33	**60**	190
Total Volume	8	6	6	20	177	79	6	262	107	4	174	285	4	80	118	202	769
% App. Total	40	30	30		67.6	30.2	2.3		37.5	1.4	61.1		2	39.6	58.4		
PHF	1.000	.500	.500	.625	.885	.790	.750	.885	.743	.500	.777	.891	.500	.769	.843	.842	.915

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Drive

File Name : Stanfield@NShoreDr Sunday
Site Code : 2
Start Date : 3/4/2007
Page No : 2



Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:00 PM				12:00 PM				12:45 PM				12:15 PM			
+0 mins.	**2**	1	1	4	39	15	**4**	58	22	**2**	56	80	1	17	25	43
+15 mins.	2	**3**	**3**	**8**	**50**	23	1	**74**	26	2	41	69	**2**	21	**35**	58
+30 mins.	2	1	2	5	47	21	2	70	22	0	53	75	0	16	25	41
+45 mins.	2	1	**1**	4	33	**25**	2	60	**29**	1	**62**	**92**	1	**26**	33	**60**
Total Volume	8	6	7	21	169	84	9	262	99	5	212	316	4	80	118	202
% App. Total	38.1	28.6	33.3		64.5	32.1	3.4		31.3	1.6	67.1		2	39.6	58.4	
PHF	1.000	.500	.583	.656	.845	.840	.563	.885	.853	.625	.855	.859	.500	.769	.843	.842

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Drive

Traffic Data Consultants

File Name : Stanfield@NShoreDr Sunday
Site Code : 2
Start Date : 3/4/2007
Page No : 1

Groups Printed- Large 2 Axle

	Stanfield Cutoff Southbound				North Shore Drive Westbound				Stanfield Cutoff Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	2
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
Total	0	0	0	0	0	2	0	2	1	0	0	1	0	0	0	0	3
01:00 PM	0	0	0	0	0	1	0	1	1	0	0	1	0	0	1	1	3
01:15 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	2	3
01:30 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
01:45 PM	0	0	0	0	1	0	0	1	0	0	1	1	0	1	2	3	5
Total	0	0	0	0	1	1	0	2	2	0	2	4	0	3	3	6	12
Grand Total	0	0	0	0	1	3	0	4	3	0	2	5	0	3	3	6	15
Apprch %	0	0	0		25	75	0		60	0	40		0	50	50		
Total %	0	0	0	0	6.7	20	0	26.7	20	0	13.3	33.3	0	20	20	40	

	Stanfield Cutoff Southbound				North Shore Drive Westbound				Stanfield Cutoff Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 01:00 PM																	
01:00 PM	0	0	0	0	0	**1**	0	**1**	**1**	0	0	**1**	0	0	1	1	3
01:15 PM	0	0	0	0	0	0	0	0	0	0	**1**	1	0	**2**	0	2	3
01:30 PM	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
01:45 PM	0	0	0	0	**1**	0	0	1	0	0	1	1	0	1	**2**	**3**	**5**
Total Volume	0	0	0	0	1	1	0	2	2	0	2	4	0	3	3	6	12
% App. Total	0	0	0		50	50	0		50	0	50		0	50	50		
PHF	.000	.000	.000	.000	.250	.250	.000	.500	.500	.000	.500	1.000	.000	.375	.375	.500	.600

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Drive

Traffic Data Consultants

File Name : Stanfield@NShoreDr Sunday
Site Code : 2
Start Date : 3/4/2007
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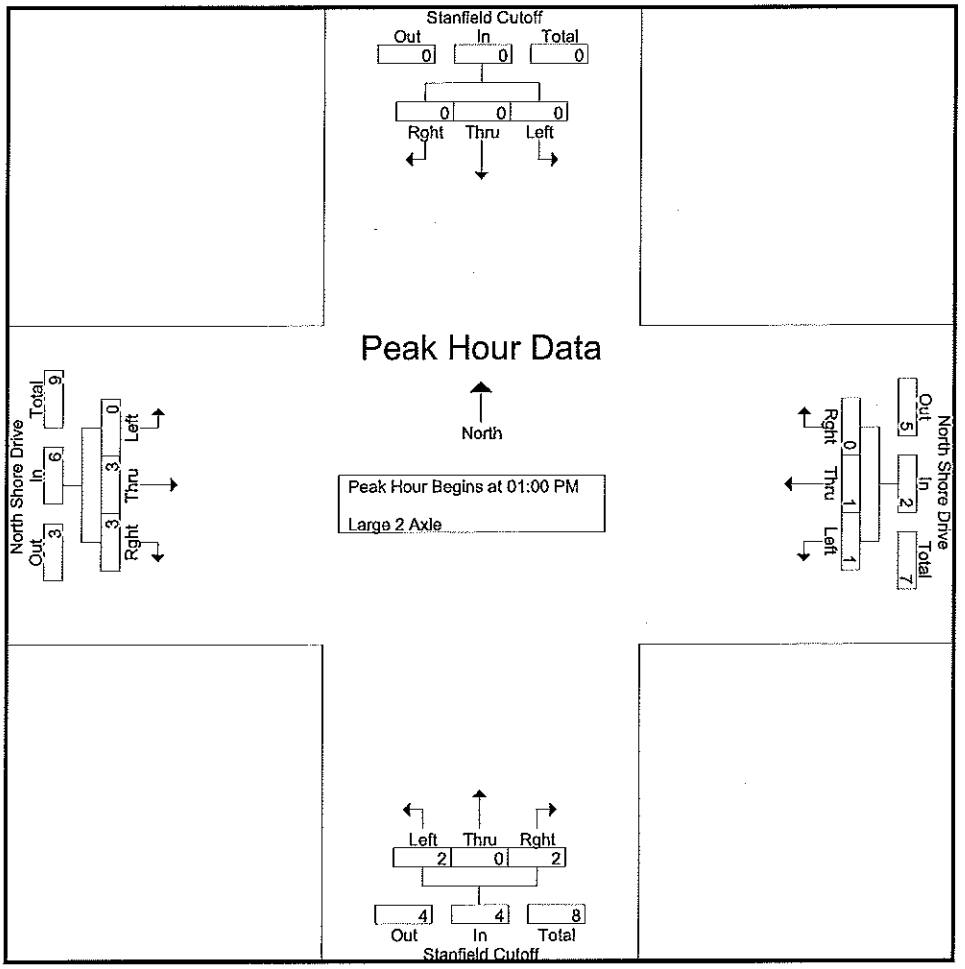

Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:00 PM				12:15 PM				12:45 PM				01:00 PM			
+0 mins.	0	0	0	0	0	**2**	0	**2**	**1**	0	0	**1**	0	0	1	1
+15 mins.	0	0	0	0	0	0	0	0	1	0	0	1	0	**2**	0	2
+30 mins.	0	0	0	0	0	0	0	0	0	0	**1**	1	0	0	0	0
+45 mins.	0	0	0	0	0	1	0	1	1	0	0	1	0	1	**2**	**3**
Total Volume	0	0	0	0	0	3	0	3	3	0	1	4	0	3	3	6
% App. Total	0	0	0		0	100	0		75	0	25		0	50	50	
PHF	.000	.000	.000	.000	.000	.375	.000	.375	.750	.000	.250	1.000	.000	.375	.375	.500

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Drive

Traffic Data Consultants

File Name : Stanfield@NShoreDr Sunday
Site Code : 2
Start Date : 3/4/2007
Page No : 1

Groups Printed- 3 Axle

	Stanfield Cutoff Southbound				North Shore Drive Westbound				Stanfield Cutoff Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0		0	0	0		0	0	0		0	0	0		
Total %																	

	Stanfield Cutoff Southbound				North Shore Drive Westbound				Stanfield Cutoff Northbound				North Shore Drive Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

City of: Big Bear
N/S: Stanfield Cutoff
E/W: North Shore Drive

Traffic Data Consultants

File Name : Stanfield@NShoreDr Sunday
Site Code : 2
Start Date : 3/4/2007
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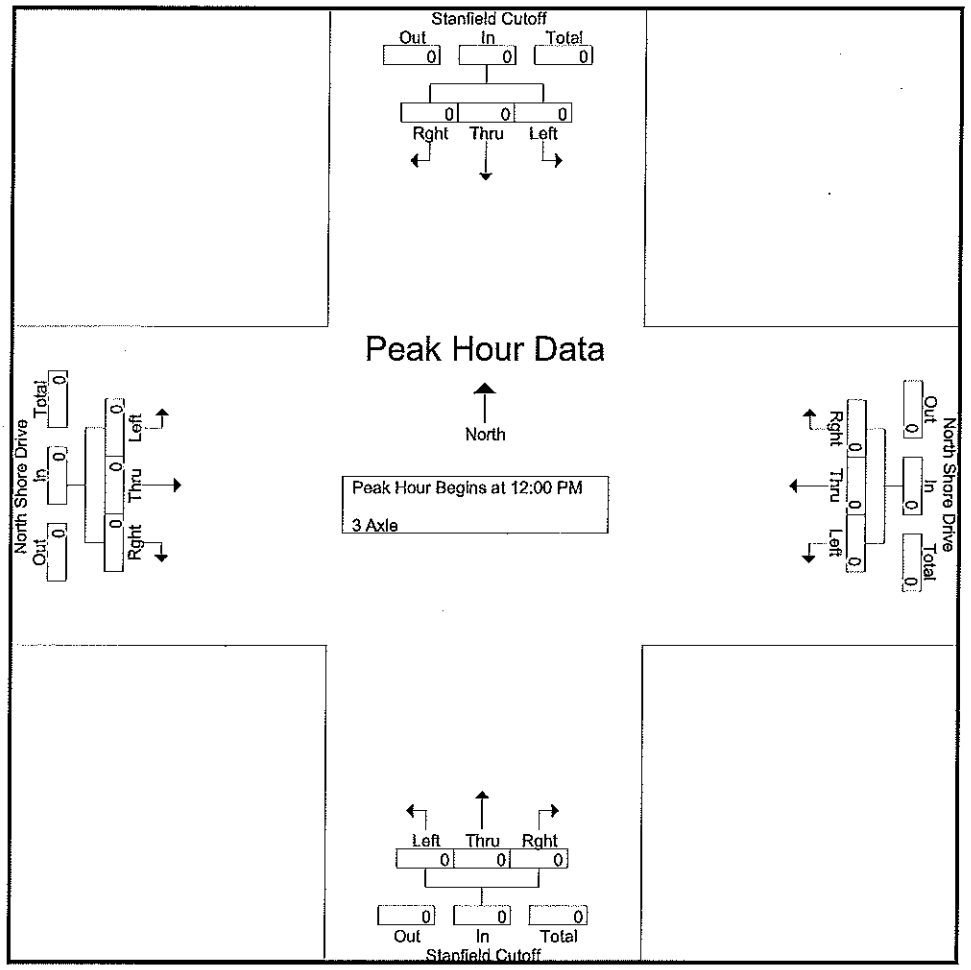


Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	12:00 PM				12:00 PM				12:00 PM				12:00 PM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

PASSENGER CAR EQUIVALENCY PEAK HOUR COUNT SUMMARY

INTERSECTION 3
Stanfield Cut Off(NS) / Big Bear Bl.(EW)

FRIDAY PM PEAK HOUR

SOUTHBOUND

Total	256	28	12
4-Axle	0	0	0
3-Axle	0	0	0
Buses/RV's	5	0	0
Autos	251	28	12

Eastbound

Total	4-Axle	3-Axle	Buses/ RV's	Autos
287	0	0	11	276
872	0	0	21	851
77	0	0	3	74

Westbound

Autos	Buses/ RV's	3-Axle	4-Axle	Total
13	0	0	0	13
638	24	2	0	664
17	0	0	0	17

NORTHBOUND

Autos	61	18	59
Buses/RV's	0	0	2
3-Axle	0	0	0
4-Axle	0	0	0
Total	61	18	61

URBAN CROSSROADS

INTERSECTION 3
Stanfield Cut Off(NS) / Big Bear Bl.(EW)

SUNDAY MID-DAY PEAK HOUR

SOUTHBOUND

Total	265	34	21
4-Axle	0	0	0
3-Axle	0	0	0
Buses/RV's	3	0	0
Autos	262	34	21

Eastbound

Total	4-Axle	3-Axle	Buses/ RV's	Autos
230	0	0	2	228
807	0	0	11	796
49	0	0	0	49

Westbound

Autos	Buses/ RV's	3-Axle	4-Axle	Total
22	0	0	0	22
629	6	0	0	635
35	2	0	0	37

NORTHBOUND

Autos	63	37	69
Buses/RV's	0	3	0
3-Axle	0	0	0
4-Axle	0	0	0
Total	63	40	69

URBAN CROSSROADS

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

Traffic Data Consultants

File Name : Stanfield&BigBear Combined Fri
Site Code : 3
Start Date : 3/2/2007
Page No : 1

Groups Printed- Combined Groups

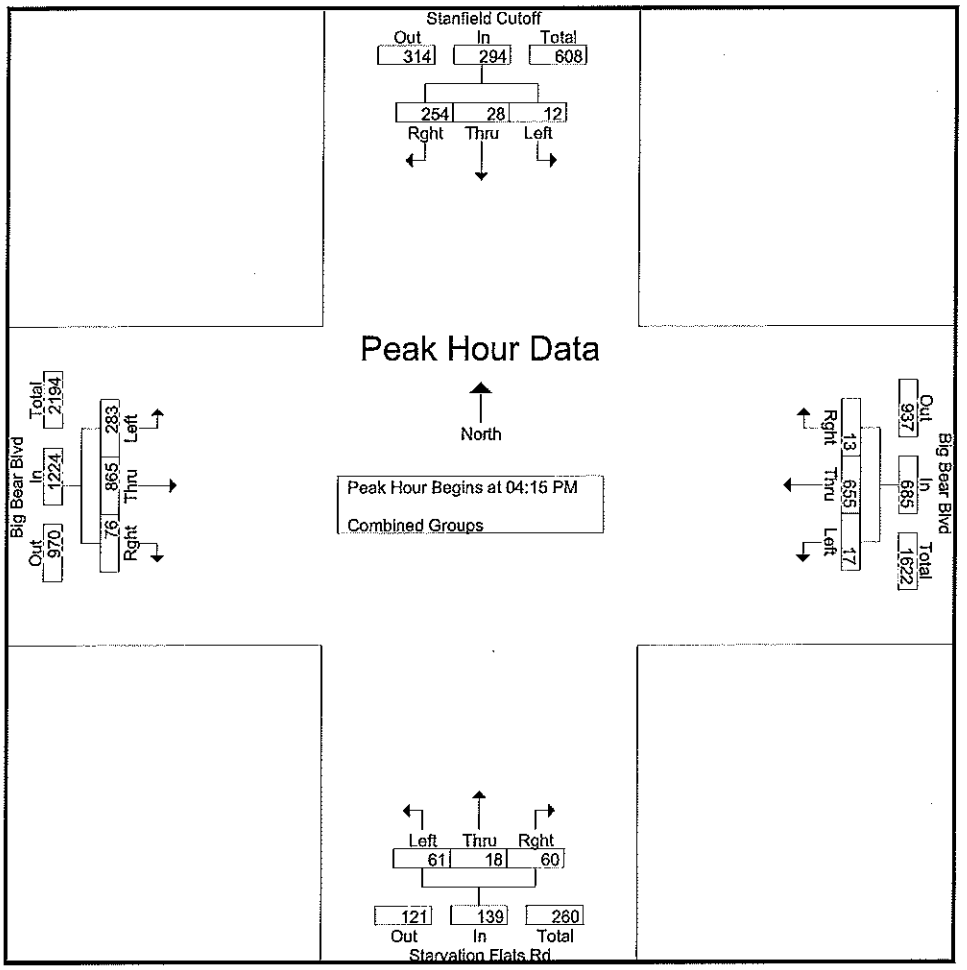
	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
04:00 PM	3	3	62	68	5	165	6	176	15	3	14	32	67	194	12	273	549
04:15 PM	2	11	65	78	6	154	5	165	12	4	19	35	75	203	16	294	572
04:30 PM	6	7	77	90	4	170	2	176	19	5	18	42	66	211	20	297	605
04:45 PM	1	4	58	63	2	164	1	167	14	5	12	31	73	223	17	313	574
Total	12	25	262	299	17	653	14	684	60	17	63	140	281	831	65	1177	2300
05:00 PM	3	6	54	63	5	167	5	177	16	4	11	31	69	228	23	320	591
05:15 PM	1	4	58	63	8	156	1	165	16	6	13	35	44	240	7	291	554
05:30 PM	3	5	46	54	7	143	1	151	10	5	8	23	49	237	12	298	526
05:45 PM	3	10	55	68	23	127	1	151	13	3	10	26	45	196	9	250	495
Total	10	25	213	248	43	593	8	644	55	18	42	115	207	901	51	1159	2166
Grand Total	22	50	475	547	60	1246	22	1328	115	35	105	255	488	1732	116	2336	4466
Apprch %	4	9.1	86.8		4.5	93.8	1.7		45.1	13.7	41.2		20.9	74.1	5		
Total %	0.5	1.1	10.6	12.2	1.3	27.9	0.5	29.7	2.6	0.8	2.4	5.7	10.9	38.8	2.6	52.3	

	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	2	**11**	65	78	**6**	154	**5**	165	12	4	**19**	35	**75**	203	16	294	572
04:30 PM	**6**	7	**77**	**90**	4	**170**	2	176	**19**	**5**	18	**42**	66	211	20	297	**605**
04:45 PM	1	4	58	63	2	164	1	167	14	5	12	31	73	223	17	313	574
05:00 PM	3	6	54	63	5	167	5	**177**	16	4	11	31	69	**228**	**23**	**320**	591
Total Volume	12	28	254	294	17	655	13	685	61	18	60	139	283	865	76	1224	2342
% App. Total	4.1	9.5	86.4		2.5	95.6	1.9		43.9	12.9	43.2		23.1	70.7	6.2		
PHF	.500	.636	.825	.817	.708	.963	.650	.968	.803	.900	.789	.827	.943	.948	.826	.956	.968

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

Traffic Data Consultants

File Name : Stanfield&BigBear Combined Fri
Site Code : 3
Start Date : 3/2/2007
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:15 PM				04:00 PM				04:15 PM			
+0 mins.	3	3	62	68	**6**	154	**5**	165	15	3	14	32	**75**	203	16	294
+15 mins.	2	**11**	65	78	4	**170**	2	176	12	4	**19**	35	66	211	20	297
+30 mins.	**6**	7	**77**	**90**	2	164	1	167	**19**	**5**	18	**42**	73	223	17	313
+45 mins.	1	4	58	63	5	167	5	**177**	14	5	12	31	69	**228**	**23**	**320**
Total Volume	12	25	262	299	17	655	13	685	60	17	63	140	283	865	76	1224
% App. Total	4	8.4	87.6		2.5	95.6	1.9		42.9	12.1	45		23.1	70.7	6.2	
PHF	.500	.568	.851	.831	.708	.963	.650	.968	.789	.850	.829	.833	.943	.948	.826	.956

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

Traffic Data Consultants

File Name : Stanfield@BigBearBlvd Friday
Site Code : 3
Start Date : 3/2/2007
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Groups Printed- Passenger Vehicles

	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
04:00 PM	3	3	59	65	5	159	6	170	15	3	14	32	67	194	12	273	540
04:15 PM	2	11	64	77	6	149	5	160	12	4	19	35	74	200	16	290	562
04:30 PM	6	7	76	89	4	166	2	172	19	5	18	42	64	208	19	291	594
04:45 PM	1	4	57	62	2	160	1	163	14	5	12	31	71	218	17	306	562
Total	12	25	256	293	17	634	14	665	60	17	63	140	276	820	64	1160	2258
05:00 PM	3	6	54	63	5	163	5	173	16	4	10	30	67	225	22	314	580
05:15 PM	1	4	55	60	8	150	1	159	16	6	12	34	43	236	7	286	539
05:30 PM	3	4	45	52	7	141	1	149	10	5	7	22	49	234	12	295	518
05:45 PM	3	10	52	65	23	125	1	149	13	3	9	25	45	188	9	242	481
Total	10	24	206	240	43	579	8	630	55	18	38	111	204	883	50	1137	2118
Grand Total	22	49	462	533	60	1213	22	1295	115	35	101	251	480	1703	114	2297	4376
Apprch %	4.1	9.2	86.7		4.6	93.7	1.7		45.8	13.9	40.2		20.9	74.1	5		
Total %	0.5	1.1	10.6	12.2	1.4	27.7	0.5	29.6	2.6	0.8	2.3	5.7	11	38.9	2.6	52.5	

	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	2	**11**	64	77	**6**	149	**5**	160	12	4	**19**	35	**74**	200	16	290	562
04:30 PM	**6**	7	**76**	**89**	4	**166**	2	172	**19**	**5**	18	**42**	64	208	19	291	**594**
04:45 PM	1	4	57	62	2	160	1	163	14	5	12	31	71	218	17	306	562
05:00 PM	3	6	54	63	5	163	5	**173**	16	4	10	30	67	**225**	**22**	**314**	580
Total Volume	12	28	251	291	17	638	13	668	61	18	59	138	276	851	74	1201	2298
% App. Total	4.1	9.6	86.3		2.5	95.5	1.9		44.2	13	42.8		23	70.9	6.2		
PHF	.500	.636	.826	.817	.708	.961	.650	.965	.803	.900	.776	.821	.932	.946	.841	.956	.967

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

Traffic Data Consultants

File Name : Stanfield@BigBearBlvd Friday
Site Code : 3
Start Date : 3/2/2007
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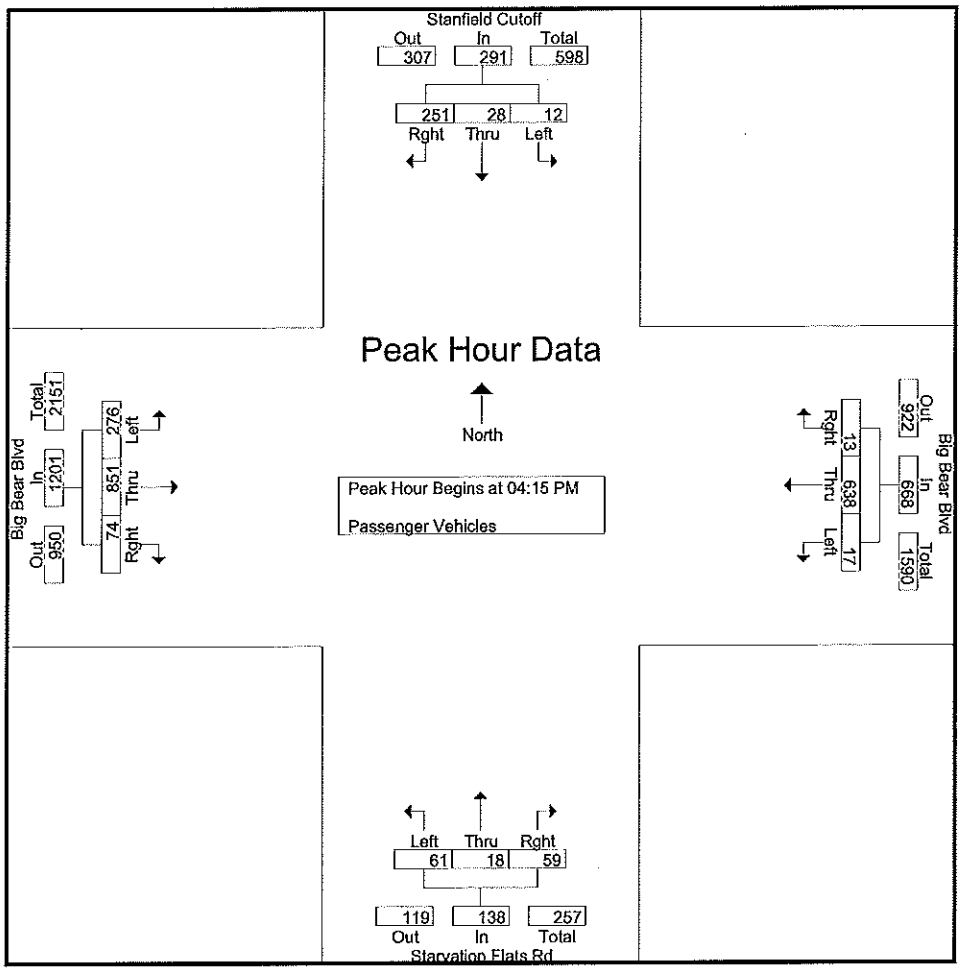

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:15 PM				04:00 PM				04:15 PM			
+0 mins.	3	3	59	65	**6**	149	**5**	160	15	3	14	32	**74**	200	16	290
+15 mins.	2	**11**	64	77	4	**166**	2	172	12	4	**19**	35	64	208	19	291
+30 mins.	**6**	7	**76**	**89**	2	160	1	163	**19**	**5**	18	**42**	71	218	17	306
+45 mins.	1	4	57	62	5	163	5	**173**	14	5	12	31	67	**225**	**22**	**314**
Total Volume	12	25	256	293	17	638	13	668	60	17	63	140	276	851	74	1201
% App. Total	4.1	8.5	87.4		2.5	95.5	1.9		42.9	12.1	45		23	70.9	6.2	
PHF	.500	.568	.842	.823	.708	.961	.650	.965	.789	.850	.829	.833	.932	.946	.841	.956

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

Traffic Data Consultants

File Name : Stanfield@BigBearBlvd Friday
Site Code : 3
Start Date : 3/2/2007
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Groups Printed- Large 2 Axle

	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
04:00 PM	0	0	2	2	0	5	0	5	0	0	0	0	0	0	0	0	7
04:15 PM	0	0	1	1	0	5	0	5	0	0	0	0	1	3	0	4	10
04:30 PM	0	0	1	1	0	4	0	4	0	0	0	0	2	3	1	6	11
04:45 PM	0	0	1	1	0	4	0	4	0	0	0	0	2	5	0	7	12
Total	0	0	5	5	0	18	0	18	0	0	0	0	5	11	1	17	40
05:00 PM	0	0	0	0	0	3	0	3	0	0	1	1	2	3	1	6	10
05:15 PM	0	0	3	3	0	6	0	6	0	0	1	1	1	4	0	5	15
05:30 PM	0	1	1	2	0	2	0	2	0	0	1	1	0	3	0	3	8
05:45 PM	0	0	3	3	0	2	0	2	0	0	0	0	0	8	0	8	13
Total	0	1	7	8	0	13	0	13	0	0	3	3	3	18	1	22	46
Grand Total	0	1	12	13	0	31	0	31	0	0	3	3	8	29	2	39	86
Apprch %	0	7.7	92.3		0	100	0		0	0	100		20.5	74.4	5.1		
Total %	0	1.2	14	15.1	0	36	0	36	0	0	3.5	3.5	9.3	33.7	2.3	45.3	

	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	0	0	1	1	0	4	0	4	0	0	0	0	2	3	1	6	11
04:45 PM	0	0	1	1	0	4	0	4	0	0	0	0	2	5	0	7	12
05:00 PM	0	0	0	0	0	3	0	3	0	0	1	1	2	3	1	6	10
05:15 PM	0	0	3	3	0	6	0	6	0	0	1	1	1	4	0	5	15
Total Volume	0	0	5	5	0	17	0	17	0	0	2	2	7	15	2	24	48
% App. Total	0	0	100		0	100	0		0	0	100		29.2	62.5	8.3		
PHF	.000	.000	.417	.417	.000	.708	.000	.708	.000	.000	.500	.500	.875	.750	.500	.857	.800

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

Traffic Data Consultants

File Name : Stanfield@BigBearBlvd Friday
Site Code : 3
Start Date : 3/2/2007
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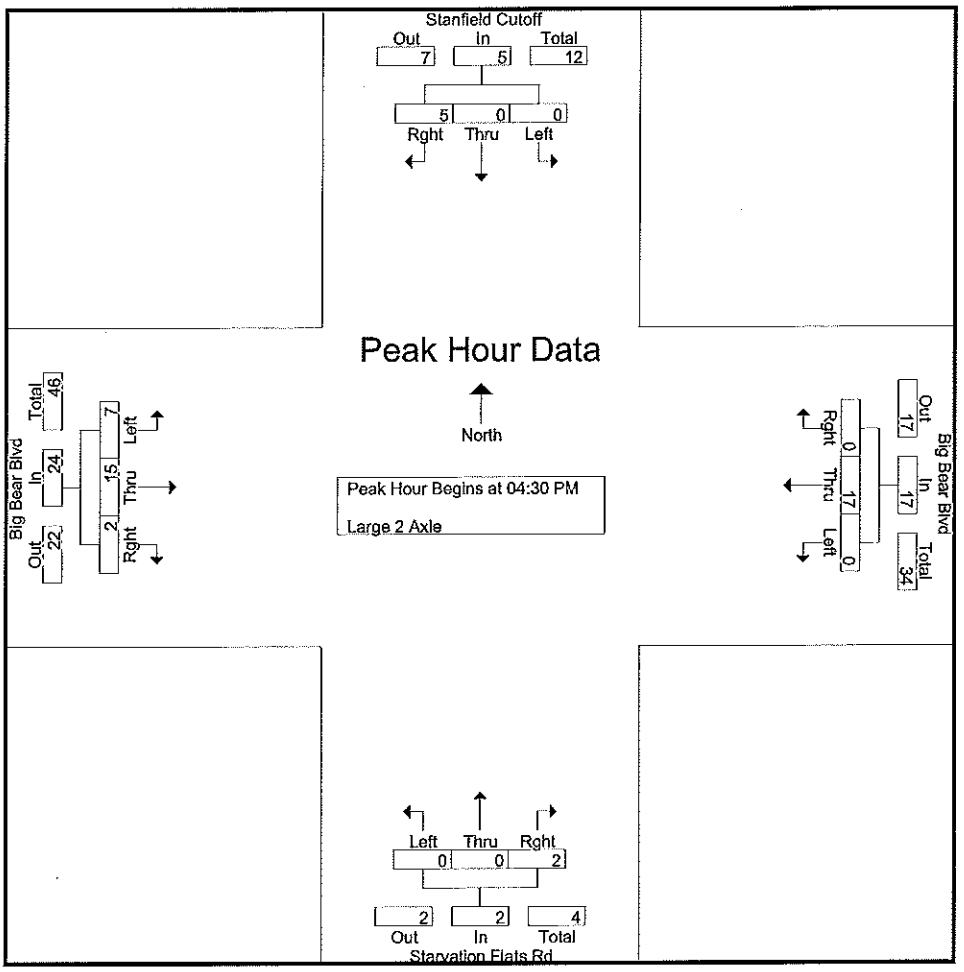

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	05:00 PM				04:00 PM				04:45 PM				04:30 PM			
+0 mins.	0	0	0	0	0	**5**	0	**5**	0	0	0	0	**2**	3	**1**	6
+15 mins.	0	0	**3**	**3**	0	5	0	5	0	0	**1**	**1**	2	**5**	0	**7**
+30 mins.	0	**1**	1	2	0	4	0	4	0	0	1	1	2	3	1	6
+45 mins.	0	0	3	3	0	4	0	4	0	0	1	1	1	4	0	5
Total Volume	0	1	7	8	0	18	0	18	0	0	3	3	7	15	2	24
% App. Total	0	12.5	87.5		0	100	0		0	0	100		29.2	62.5	8.3	
PHF	.000	.250	.583	.667	.000	.900	.000	.900	.000	.000	.750	.750	.875	.750	.500	.857

Traffic Data Consultants

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

File Name : Stanfield@BigBearBlvd Friday
Site Code : 3
Start Date : 3/2/2007
Page No : 1

Groups Printed- 3 Axle

	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
04:00 PM	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	2
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	2
05:00 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1
Total	0	0	0	0	0	1	0	1	0	0	1	1	0	0	0	0	2
Grand Total	0	0	1	1	0	2	0	2	0	0	1	1	0	0	0	0	4
Apprch %	0	0	100		0	100	0		0	0	100		0	0	0		
Total %	0	0	25	25	0	50	0	50	0	0	25	25	0	0	0	0	

	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	2
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	2
% App. Total	0	0	100		0	100	0		0	0	0		0	0	0		
PHF	.000	.000	.250	.250	.000	.250	.000	.250	.000	.000	.000	.000	.000	.000	.000	.000	.250

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

Traffic Data Consultants

File Name : Stanfield@BigBearBlvd Friday
Site Code : 3
Start Date : 3/2/2007
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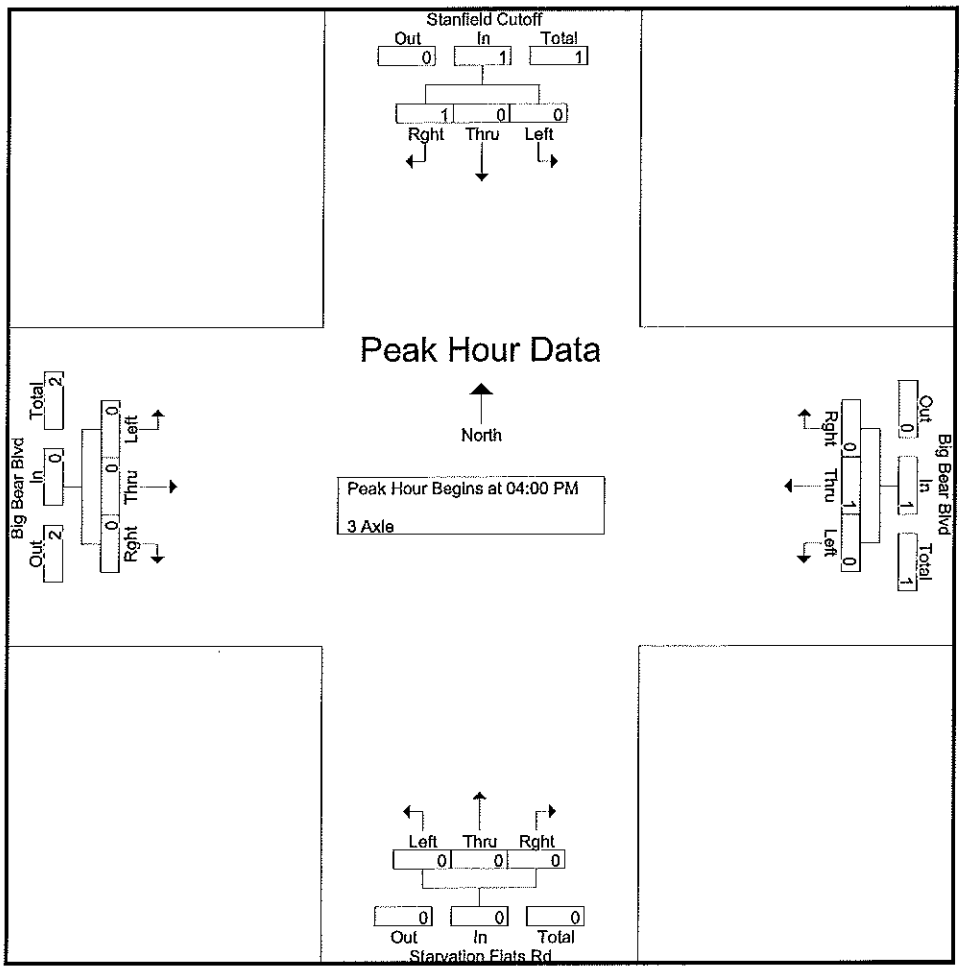

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				05:00 PM				04:00 PM			
+0 mins.	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Total Volume	0	0	1	1	0	1	0	1	0	0	1	1	0	0	0	0
% App. Total	0	0	100		0	100	0		0	0	100		0	0	0	
PHF	.000	.000	.250	.250	.000	.250	.000	.250	.000	.000	.250	.250	.000	.000	.000	.000

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

Traffic Data Consultants

File Name : Stanfield&BigBearBlvd Comb Sun
Site Code : 3
Start Date : 3/4/2007
Page No : 1

Groups Printed- Combined Groups

	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
12:00 PM	1	4	53	58	17	156	7	180	17	9	7	33	51	184	12	247	518
12:15 PM	3	15	99	117	2	149	6	157	9	4	9	22	22	104	8	134	430
12:30 PM	7	10	81	98	11	166	4	181	11	8	18	37	59	178	11	248	564
12:45 PM	4	11	58	73	7	173	6	186	23	16	21	60	59	198	12	269	588
Total	15	40	291	346	37	644	23	704	60	37	55	152	191	664	43	898	2100
01:00 PM	6	10	67	83	6	144	9	159	17	6	14	37	52	194	15	261	540
01:15 PM	4	3	58	65	12	150	3	165	12	9	16	37	59	233	11	303	570
01:30 PM	5	8	47	60	13	133	10	156	15	3	12	30	81	183	4	268	514
01:45 PM	5	11	43	59	12	140	6	158	18	9	16	43	67	197	6	270	530
Total	20	32	215	267	43	567	28	638	62	27	58	147	259	807	36	1102	2154
Grand Total	35	72	506	613	80	1211	51	1342	122	64	113	299	450	1471	79	2000	4254
Apprch %	5.7	11.7	82.5		6	90.2	3.8		40.8	21.4	37.8		22.5	73.6	4		
Total %	0.8	1.7	11.9	14.4	1.9	28.5	1.2	31.5	2.9	1.5	2.7	7	10.6	34.6	1.9	47	

	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:30 PM																	
12:30 PM	**7**	10	**81**	**98**	11	166	4	181	**11**	8	18	37	**59**	178	11	248	564
12:45 PM	4	**11**	58	73	7	**173**	6	**186**	**23**	**16**	**21**	**60**	59	198	12	269	**588**
01:00 PM	6	10	67	83	6	144	**9**	159	17	6	14	37	52	194	**15**	261	540
01:15 PM	4	3	58	65	**12**	150	3	165	12	9	16	37	59	**233**	11	**303**	570
Total Volume	21	34	264	319	36	633	22	691	63	39	69	171	229	803	49	1081	2262
% App. Total	6.6	10.7	82.8		5.2	91.6	3.2		36.8	22.8	40.4		21.2	74.3	4.5		
PHF	.750	.773	.815	.814	.750	.915	.611	.929	.685	.609	.821	.713	.970	.862	.817	.892	.962

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

Traffic Data Consultants

File Name : Stanfield&BigBearBlvd Comb Sun
Site Code : 3
Start Date : 3/4/2007
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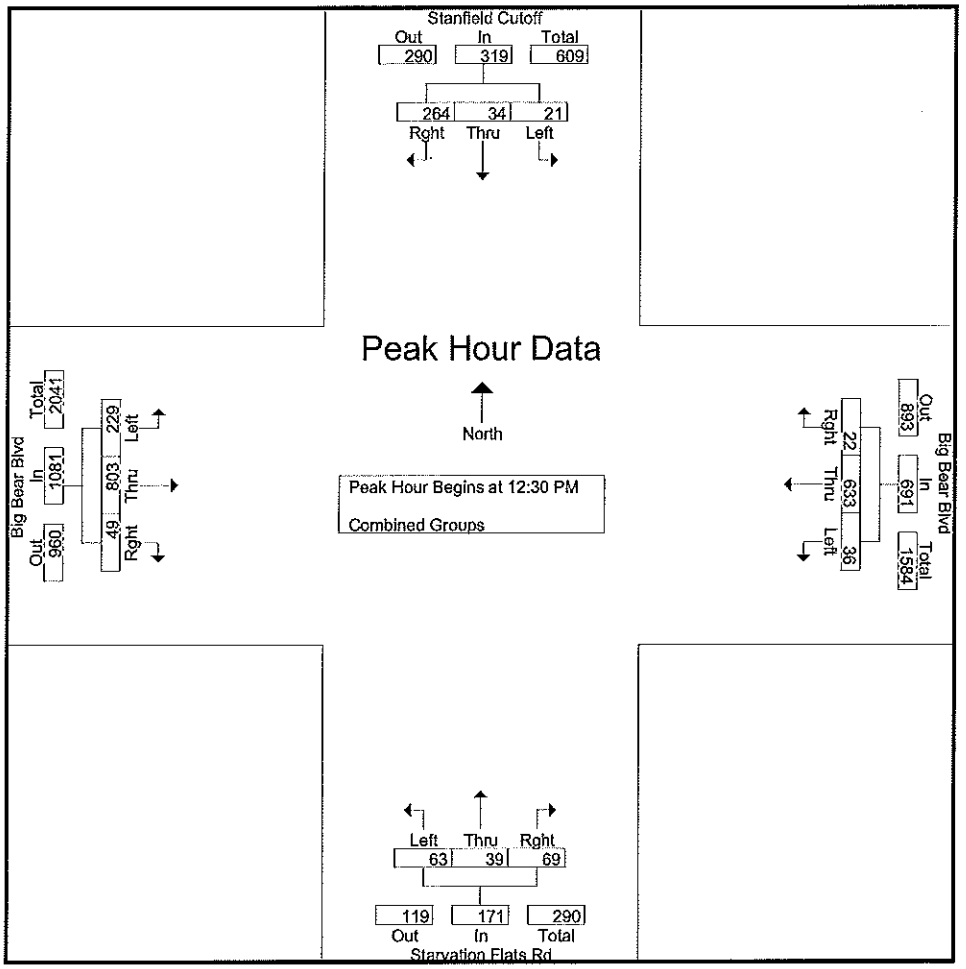

Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:15 PM				12:00 PM				12:30 PM				01:00 PM			
+0 mins.	3	**15**	**99**	**117**	**17**	156	**7**	180	11	8	18	37	52	194	**15**	261
+15 mins.	**7**	10	81	98	2	149	6	157	**23**	**16**	**21**	**60**	59	**233**	11	**303**
+30 mins.	4	11	58	73	11	166	4	181	17	6	14	37	**81**	183	4	268
+45 mins.	6	10	67	83	7	**173**	6	**186**	12	9	16	37	67	197	6	270
Total Volume	20	46	305	371	37	644	23	704	63	39	69	171	259	807	36	1102
% App. Total	5.4	12.4	82.2		5.3	91.5	3.3		36.8	22.8	40.4		23.5	73.2	3.3	
PHF	.714	.767	.770	.793	.544	.931	.821	.946	.685	.609	.821	.713	.799	.866	.600	.909

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

Traffic Data Consultants

File Name : Stanfield@BigBearBlvd Sunday
Site Code : 3
Start Date : 3/4/2007
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Groups Printed- Passenger Vehicles

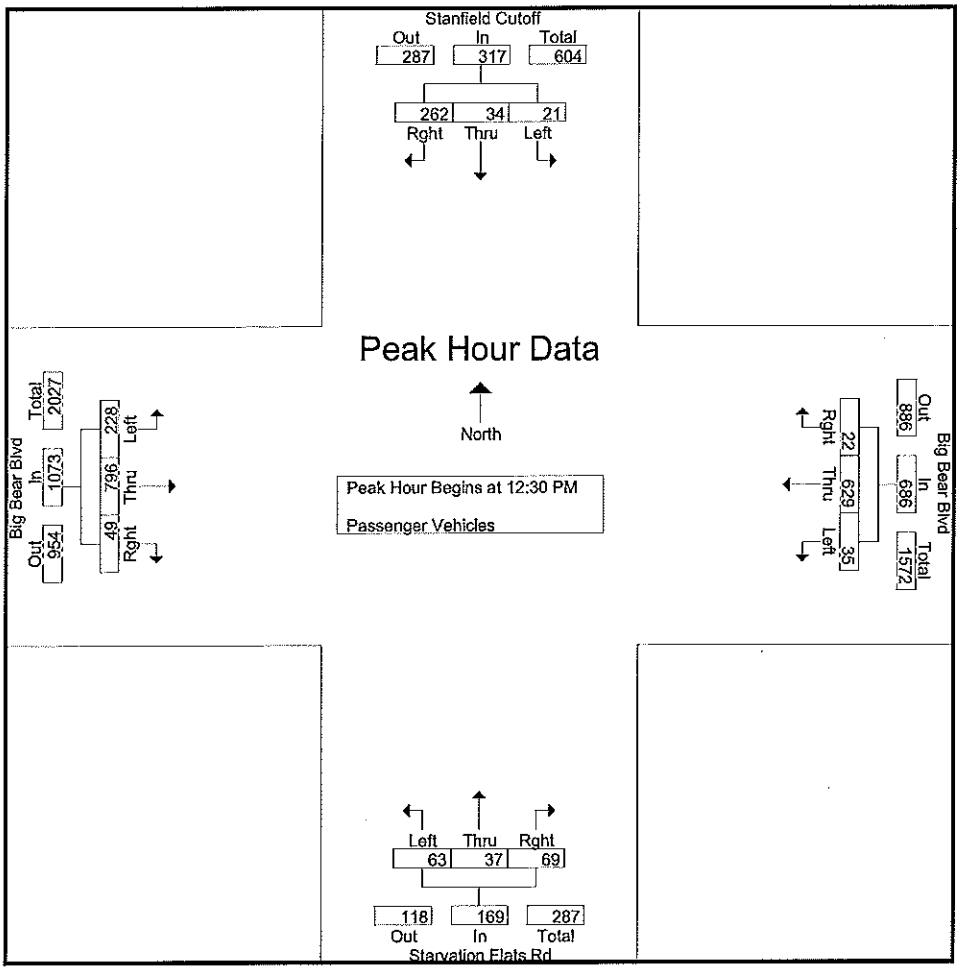
	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
12:00 PM	1	4	53	58	17	156	7	180	17	9	7	33	51	182	12	245	516
12:15 PM	3	15	99	117	2	149	6	157	9	4	9	22	22	102	8	132	428
12:30 PM	7	10	81	98	11	166	4	181	11	8	18	37	59	175	11	245	561
12:45 PM	4	11	57	72	6	171	6	183	23	16	21	60	58	198	12	268	583
Total	15	40	290	345	36	642	23	701	60	37	55	152	190	657	43	890	2088
01:00 PM	6	10	66	82	6	144	9	159	17	5	14	36	52	191	15	258	535
01:15 PM	4	3	58	65	12	148	3	163	12	8	16	36	59	232	11	302	566
01:30 PM	5	8	47	60	13	132	10	155	15	3	12	30	80	183	4	267	512
01:45 PM	5	10	42	57	12	139	6	157	18	9	16	43	67	197	6	270	527
Total	20	31	213	264	43	563	28	634	62	25	58	145	258	803	36	1097	2140
Grand Total	35	71	503	609	79	1205	51	1335	122	62	113	297	448	1460	79	1987	4228
Apprch %	5.7	11.7	82.6		5.9	90.3	3.8		41.1	20.9	38		22.5	73.5	4		
Total %	0.8	1.7	11.9	14.4	1.9	28.5	1.2	31.6	2.9	1.5	2.7	7	10.6	34.5	1.9	47	

	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:30 PM																	
12:30 PM	**7**	10	**81**	**98**	11	166	4	181	11	8	18	37	**59**	175	11	245	561
12:45 PM	4	**11**	57	72	6	**171**	6	**183**	**23**	**16**	**21**	**60**	58	198	12	268	**583**
01:00 PM	6	10	66	82	6	144	**9**	159	17	5	14	36	52	191	**15**	258	535
01:15 PM	4	3	58	65	**12**	148	3	163	12	8	16	36	59	**232**	11	**302**	566
Total Volume	21	34	262	317	35	629	22	686	63	37	69	169	228	796	49	1073	2245
% App. Total	6.6	10.7	82.6		5.1	91.7	3.2		37.3	21.9	40.8		21.2	74.2	4.6		
PHF	.750	.773	.809	.809	.729	.920	.611	.937	.685	.578	.821	.704	.966	.858	.817	.888	.963

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

Traffic Data Consultants

File Name : Stanfield@BigBearBlvd Sunday
Site Code : 3
Start Date : 3/4/2007
Page No : 2



Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:15 PM				12:00 PM				12:30 PM				01:00 PM			
+0 mins.	3	**15**	**99**	**117**	**17**	156	**7**	180	11	8	18	37	52	191	**15**	258
+15 mins.	**7**	10	81	98	2	149	6	157	**23**	**16**	**21**	**60**	59	**232**	11	**302**
+30 mins.	4	11	57	72	11	166	4	181	17	5	14	36	**80**	183	4	267
+45 mins.	6	10	66	82	6	**171**	6	**183**	12	8	16	36	67	197	6	270
Total Volume	20	46	303	369	36	642	23	701	63	37	69	169	258	803	36	1097
% App. Total	5.4	12.5	82.1		5.1	91.6	3.3		37.3	21.9	40.8		23.5	73.2	3.3	
PHF	.714	.767	.765	.788	.529	.939	.821	.958	.685	.578	.821	.704	.806	.865	.600	.908

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

Traffic Data Consultants

File Name : Stanfield@BigBearBlvd Sunday
Site Code : 3
Start Date : 3/4/2007
Page No : 1

Groups Printed- Large 2 Axle

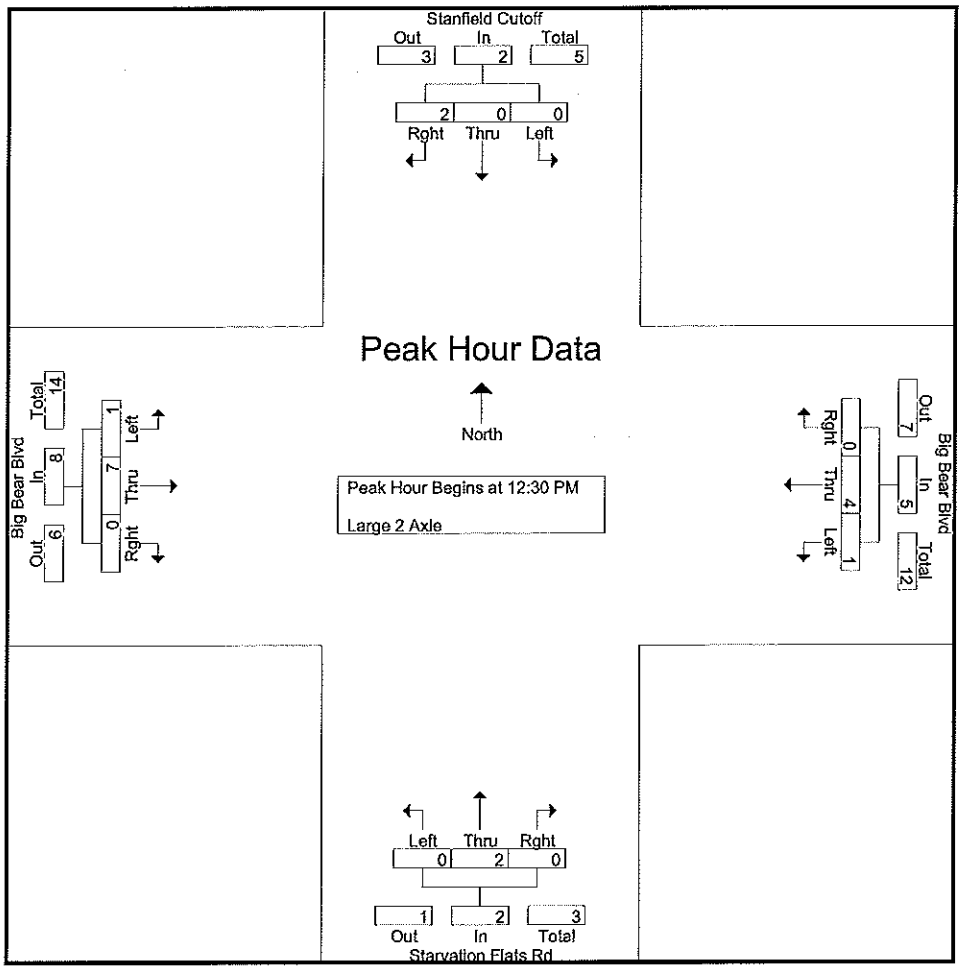
	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
12:45 PM	0	0	1	1	1	2	0	3	0	0	0	0	1	0	0	1	5
Total	0	0	1	1	1	2	0	3	0	0	0	0	1	7	0	8	12
01:00 PM	0	0	1	1	0	0	0	0	0	1	0	1	0	3	0	3	5
01:15 PM	0	0	0	0	0	2	0	2	0	1	0	1	0	1	0	1	4
01:30 PM	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	1	2
01:45 PM	0	1	1	2	0	1	0	1	0	0	0	0	0	0	0	0	3
Total	0	1	2	3	0	4	0	4	0	2	0	2	1	4	0	5	14
Grand Total	0	1	3	4	1	6	0	7	0	2	0	2	2	11	0	13	26
Apprch %	0	25	75		14.3	85.7	0		0	100	0		15.4	84.6	0		
Total %	0	3.8	11.5	15.4	3.8	23.1	0	26.9	0	7.7	0	7.7	7.7	42.3	0	50	

	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:30 PM																	
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	3
12:45 PM	0	0	1	1	1	2	0	3	0	0	0	0	1	0	0	1	5
01:00 PM	0	0	1	1	0	0	0	0	0	1	0	1	0	3	0	3	5
01:15 PM	0	0	0	0	0	2	0	2	0	1	0	1	0	1	0	1	4
Total Volume	0	0	2	2	1	4	0	5	0	2	0	2	1	7	0	8	17
% App. Total	0	0	100		20	80	0		0	100	0		12.5	87.5	0		
PHF	.000	.000	.500	.500	.250	.500	.000	.417	.000	.500	.000	.500	.250	.583	.000	.667	.850

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

Traffic Data Consultants

File Name : Stanfield@BigBearBlvd Sunday
Site Code : 3
Start Date : 3/4/2007
Page No : 2



Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	01:00 PM				12:45 PM				12:30 PM				12:15 PM			
+0 mins.	0	0	**1**	1	**1**	**2**	0	**3**	0	0	0	0	0	2	0	2
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	**3**	0	**3**
+30 mins.	0	0	0	0	0	2	0	2	0	**1**	0	**1**	**1**	0	0	1
+45 mins.	0	**1**	1	**2**	0	1	0	1	0	1	0	1	0	3	0	3
Total Volume	0	1	2	3	1	5	0	6	0	2	0	2	1	8	0	9
% App. Total	0	33.3	66.7		16.7	83.3	0		0	100	0		11.1	88.9	0	
PHF	.000	.250	.500	.375	.250	.625	.000	.500	.000	.500	.000	.500	.250	.667	.000	.750

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

Traffic Data Consultants

File Name : Stanfield@BigBearBlvd Sunday
Site Code : 3
Start Date : 3/4/2007
Page No : 1

Groups Printed- 3 Axle

	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0		0	0	0		0	0	0		0	0	0		
Total %																	

	Stanfield Cutoff Southbound				Big Bear Blvd Westbound				Starvation Flats Rd Northbound				Big Bear Blvd Eastbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

City of: Big Bear
N/S: Stanfield Cutoff
E/W: Big Bear Blvd

Traffic Data Consultants

File Name : Stanfield@BigBearBlvd Sunday
Site Code : 3
Start Date : 3/4/2007
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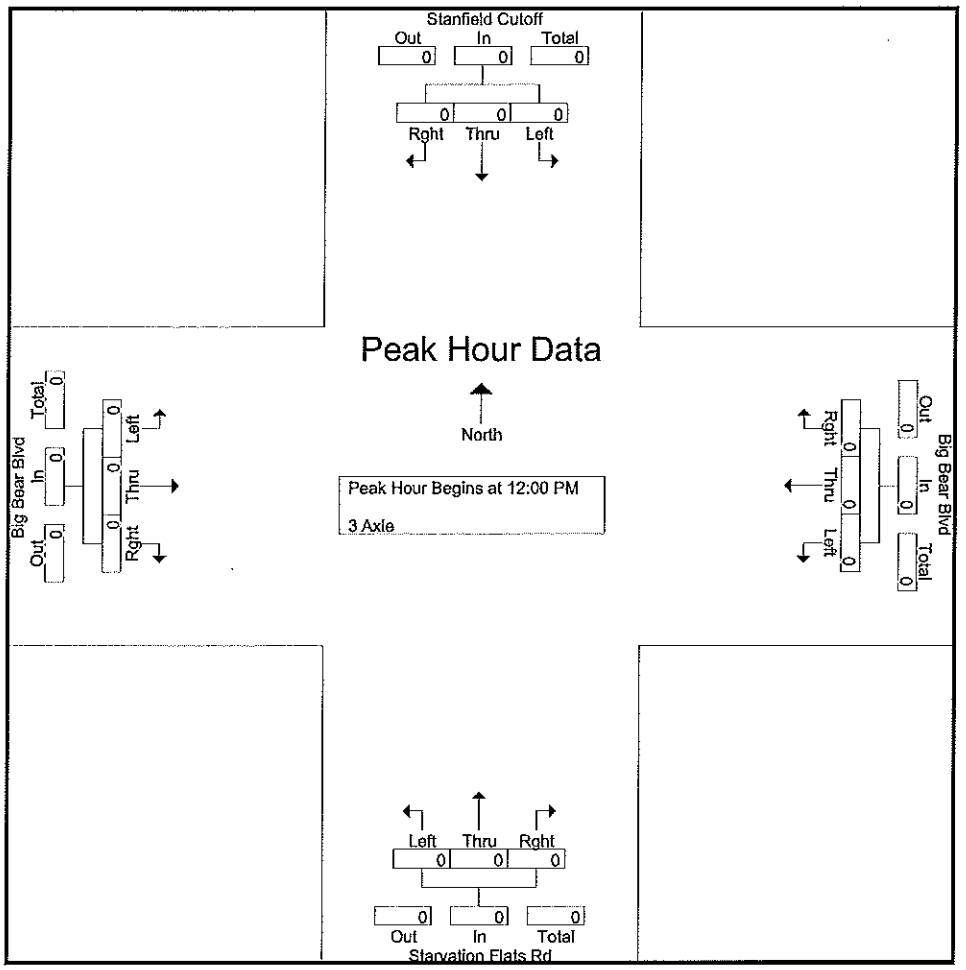

Peak Hour Analysis From 12:00 PM to 01:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	12:00 PM				12:00 PM				12:00 PM				12:00 PM			
+0 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+15 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+30 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+45 mins.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0	
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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APPENDIX B

EXISTING CONDITIONS INTERSECTION ANALYSIS

MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 0409)
Existing Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #101 Big Bear Blvd (NS)/ North Shore (SR-38) (EW)

Average Delay (sec/veh): 15.4 Worst Case Level Of Service: C[16.5]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 1! 0 0			0 0 0 0 0			0 0 1 0 1			1 0 1 0 0		
Volume Module:												
Base Vol:	24	0	27	0	0	0	0	322	21	87	300	0
Growth Adj:	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
Initial Bse:	28	0	31	0	0	0	0	374	24	101	348	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
PHF Volume:	33	0	37	0	0	0	0	447	29	121	416	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	33	0	37	0	0	0	0	447	29	121	416	0
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	6.5	6.2	7.1	6.5	xxxxx
FollowUpTim:	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	4.0	3.3	3.5	4.0	xxxxx
Capacity Module:												
Cnflict Vol:	0	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	104	0	309	85	xxxxx
Potent Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	790	900	648	809	xxxxx
Move Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	760	900	325	778	xxxxx
Volume/Cap:	0.04	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	0.59	0.03	0.37	0.53	xxxx
Level Of Service Module:												
2Way95thQ:	0.1	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	3.9	0.1	1.7	3.2	xxxxx
Control Del:	9.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	16.3	9.1	22.5	14.8	xxxxx
LOS by Move:	A	*	*	*	*	*	*	C	A	C	B	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			15.8			16.5		
ApproachLOS:	*			*			C			C		

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 0409)
Existing Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

****
Intersection #102 Stanfield Cut Off (NS) / North Shore Dr. (EW)
****
Average Delay (sec/veh): 11.4 Worst Case Level Of Service: D[25.5]
****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0	1! 0	0	0 1	0 0	0	0 0	0 1	0	0 0	1! 0	0
Volume Module:												
Base Vol:	58	5	208	5	10	0	0	74	70	218	54	6
Growth Adj:	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
Initial Bse:	67	6	241	6	12	0	0	86	81	253	63	7
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	75	6	269	6	13	0	0	96	91	282	70	8
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	75	6	269	6	13	0	0	96	91	282	70	8
Critical Gap Module:												
Critical Gp:	7.1	6.5	6.2	7.1	6.5	xxxxx	xxxxx	xxxx	xxxxx	4.1	xxxx	xxxxx
FollowUpTim:	3.5	4.0	3.3	3.5	4.0	xxxxx	xxxxx	xxxx	xxxxx	2.2	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	785	782	141	916	824	xxxxx	xxxx	xxxx	xxxxx	186	xxxx	xxxxx
Potent Cap.:	313	328	912	255	310	xxxxx	xxxx	xxxx	xxxxx	1400	xxxx	xxxxx
Move Cap.:	245	250	912	144	236	xxxxx	xxxx	xxxx	xxxxx	1400	xxxx	xxxxx
Volume/Cap:	0.31	0.03	0.29	0.04	0.05	xxxx	xxxx	xxxx	xxxx	0.20	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.8	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	8.2	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	*	*	*	A	*	*
Movement:	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT
Shared Cap.:	xxxx	559	xxxxx	195	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	4.3	xxxxx	0.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	21.6	xxxxx	25.5	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	C	*	D	*	*	*	*	*	*	*	*
ApproachDel:		21.6			25.5			xxxxxx			xxxxxx	
ApproachLOS:		C			D			*			*	

****
Note: Queue reported is the number of cars per lane.
****

Traffix 7.8.0115 (c) 2007 Dowling Assoc. Licensed to URBAN CROSSROADS, IRVINE

MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 0409)
Existing Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #103 Stanfield Cut Off (NS) / Big Bear Blvd. (SR-18) (EW)

Cycle (sec):	130	Critical Vol./Cap.(X):	0.719
Loss Time (sec):	8 (Y+R=2.0 sec)	Average Delay (sec/veh):	106.5
Optimal Cycle:	84	Level Of Service:	F

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Split Phase			Split Phase			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	24	24	24	24	24	24	10	18	18	10	18	18
Lanes:	0 1	0 0	1	0 1	0 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	61	18	61	12	28	256	287	872	77	17	664	13
Growth Adj:	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
Initial Bse:	71	21	71	14	32	297	333	1012	89	20	770	15
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
PHF Volume:	73	22	73	14	34	307	344	1045	92	20	796	16
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	73	22	73	14	34	307	344	1045	92	20	796	16
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	73	22	73	14	34	307	344	1045	92	20	796	16
Saturation Flow Module:												
Sat/Lane:	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Adjustment:	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00
Lanes:	0.78	0.22	1.00	0.31	0.69	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1329	392	1800	531	1238	1800	1700	1800	1800	1700	1800	1800
Capacity Analysis Module:												
Vol/Sat:	0.05	0.05	0.04	0.03	0.03	0.17	0.20	0.58	0.05	0.01	0.44	0.01
Crit Moves:		****			****			****		****		
Green/Cycle:	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.49	0.49	0.08	0.39	0.39
Volume/Cap:	0.30	0.30	0.22	0.15	0.15	0.92	1.13	1.18	0.10	0.16	1.13	0.02
Delay/Veh:	48.1	48.1	46.6	45.4	45.4	85.3	145.5	118	14.0	58.6	112	22.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	48.1	48.1	46.6	45.4	45.4	85.3	145.5	118	14.0	58.6	112	22.1
LOS by Move:	D	D	D	D	D	F	F	F	B	E	F	C
HCM2kAvgQ:	3	3	2	2	2	16	23	63	1	1	46	0

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 0409)
Existing Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #101 Big Bear Blvd (NS)/ North Shore (SR-38) (EW)

Average Delay (sec/veh): OVERFLOW Worst Case Level Of Service: F[xxxxx]

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Rights:	Include					Include					Include					Include				
Lanes:	0	0	1!	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0
Volume Module:																				
Base Vol:	40		0		94	0		0		0	0		958		33	67		411		0
Growth Adj:	1.16	1.16		1.16		1.16	1.16		1.16		1.16	1.16		1.16		1.16	1.16		1.16	
Initial Bse:	46		0		109	0		0		0	0		1111		38	78		477		0
User Adj:	1.00	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00	
PHF Adj:	0.91	0.91		0.91		0.91	0.91		0.91		0.91	0.91		0.91		0.91	0.91		0.91	
PHF Volume:	51		0		120	0		0		0	0		1219		42	85		523		0
Reduct Vol:	0		0		0	0		0		0	0		0		0	0		0		0
FinalVolume:	51		0		120	0		0		0	0		1219		42	85		523		0
Critical Gap Module:																				
Critical Gp:	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx		6.5		6.2	7.1		6.5	xxxxx					
FollowUpTim:	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx		4.0		3.3	3.5		4.0	xxxxx					
Capacity Module:																				
Cnflict Vol:	0	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx		221		0	771		162	xxxxx					
Potent Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx		681		900	320		734	xxxxx					
Move Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx		641		900	0		692	xxxxx					
Volume/Cap:	0.06	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx		1.90		0.05	xxxx		0.76	xxxx					
Level Of Service Module:																				
2Way95thQ:	0.2	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx		78.0		0.1	xxxx		7.0	xxxxx					
Control Del:	9.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx		427		9.2	xxxxx		24.5	xxxxx					
LOS by Move:	A	*	*	*	*	*	*		F		A	*		C	*					
Movement:	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx		xxxx	xxxx	xxxxx							
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx		xxxxx	xxxx	xxxxx							
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx		xxxxx	xxxx	xxxxx							
Shared LOS:	*	*	*	*	*	*	*	*	*		*	*	*							
ApproachDel:	xxxxxx			xxxxxx			413.4				xxxxxx									
ApproachLOS:	*			*			F				F									

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 0409)
Existing Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #102 Stanfield Cut Off (NS) / North Shore Dr. (EW)

Average Delay (sec/veh): 15.2 Worst Case Level Of Service: D[34.5]

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Rights:	Include					Include					Include					Include				
Lanes:	0	0	1!	0	0	0	0	1!	0	0	0	0	1!	0	0	0	0	1!	0	0
Volume Module:																				
Base Vol:	110		4		174	8		6		6	4		80		120	177		84		6
Growth Adj:	1.16	1.16		1.16		1.16	1.16		1.16		1.16	1.16		1.16		1.16	1.16		1.16	
Initial Bse:	128		5		202	9		7		7	5		93		139	205		97		7
User Adj:	1.00	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00		1.00	1.00		1.00	
PHF Adj:	0.92	0.92		0.92		0.92	0.92		0.92		0.92	0.92		0.92		0.92	0.92		0.92	
PHF Volume:	138		5		219	10		8		8	5		101		151	222		106		8
Reduct Vol:	0		0		0	0		0		0	0		0		0	0		0		0
FinalVolume:	138		5		219	10		8		8	5		101		151	222		106		8
Critical Gap Module:																				
Critical Gp:	7.1	6.5		6.2		7.1	6.5		6.2		4.1	xxxx		xxxxx		4.1	xxxx		xxxxx	
FollowUpTim:	3.5	4.0		3.3		3.5	4.0		3.3		2.2	xxxx		xxxxx		2.2	xxxx		xxxxx	
Capacity Module:																				
Cnflict Vol:	748	744		176		852	816		109		113	xxxx		xxxxx		251	xxxx		xxxxx	
Potent Cap.:	331	345		872		282	314		950		1489	xxxx		xxxxx		1326	xxxx		xxxxx	
Move Cap.:	273	278		872		177	253		950		1489	xxxx		xxxxx		1326	xxxx		xxxxx	
Volume/Cap:	0.51	0.02		0.25		0.06	0.03		0.01		0.00	xxxx		xxxx		0.17	xxxx		xxxx	
Level Of Service Module:																				
2Way95thQ:	xxxx	xxxx		xxxxx		xxxx	xxxx		xxxxx		0.0	xxxx		xxxxx		0.6	xxxx		xxxxx	
Control Del:	xxxxx	xxxx		xxxxx		xxxxx	xxxx		xxxxx		7.4	xxxx		xxxxx		8.3	xxxx		xxxxx	
LOS by Move:	*	*		*		*	*		*		A	*		*		A	*		*	
Movement:	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT
Shared Cap.:	xxxx	467		xxxxx		xxxx	266		xxxxx		xxxx	xxxx		xxxxx		xxxx	xxxx		xxxxx	
SharedQueue:	xxxxx	6.8		xxxxx		xxxxx	0.3		xxxxx		xxxxx	xxxx		xxxxx		xxxxx	xxxx		xxxxx	
Shrd ConDel:	xxxxx	34.5		xxxxx		xxxxx	19.9		xxxxx		xxxxx	xxxx		xxxxx		xxxxx	xxxx		xxxxx	
Shared LOS:	*	D		*		*	C		*		*	*		*		*	*		*	
ApproachDel:		34.5					19.9					xxxxxx					xxxxxx			
ApproachLOS:		D					C					*					*			

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 0409)
Existing Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #103 Stanfield Cut Off (NS) / Big Bear Blvd. (SR-18) (EW)

Cycle (sec):	130	Critical Vol./Cap.(X):	0.720
Loss Time (sec):	8 (Y+R=2.0 sec)	Average Delay (sec/veh):	81.1
Optimal Cycle:	84	Level Of Service:	F

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Split Phase			Split Phase			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	24	24	24	24	24	24	10	18	18	10	18	18
Lanes:	0 1	0 0	1	0 1	0 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	63	40	69	21	34	265	230	807	49	37	635	22
Growth Adj:	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
Initial Bse:	73	46	80	24	39	307	267	936	57	43	737	26
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
PHF Volume:	76	48	83	25	41	320	277	973	59	45	766	27
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	76	48	83	25	41	320	277	973	59	45	766	27
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	76	48	83	25	41	320	277	973	59	45	766	27
Saturation Flow Module:												
Sat/Lane:	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Adjustment:	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00
Lanes:	0.63	0.37	1.00	0.40	0.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1063	675	1800	672	1088	1800	1700	1800	1800	1700	1800	1800
Capacity Analysis Module:												
Vol/Sat:	0.07	0.07	0.05	0.04	0.04	0.18	0.16	0.54	0.03	0.03	0.43	0.01
Crit Moves:		****		****				****		****		
Green/Cycle:	0.18	0.18	0.18	0.18	0.18	0.18	0.16	0.49	0.49	0.08	0.41	0.41
Volume/Cap:	0.39	0.39	0.25	0.20	0.20	0.96	1.03	1.10	0.07	0.34	1.03	0.04
Delay/Veh:	50.0	50.0	47.1	46.3	46.3	93.1	118.8	86.4	13.6	63.8	75.9	20.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	50.0	50.0	47.1	46.3	46.3	93.1	118.8	86.4	13.6	63.8	75.9	20.2
LOS by Move:	D	D	D	D	D	F	F	F	B	E	E	C
HCM2kAvgQ:	4	4	3	2	2	17	17	53	1	2	39	0

Note: Queue reported is the number of cars per lane.

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APPENDIX C

TRAFFIC SIGNAL WARRANTS

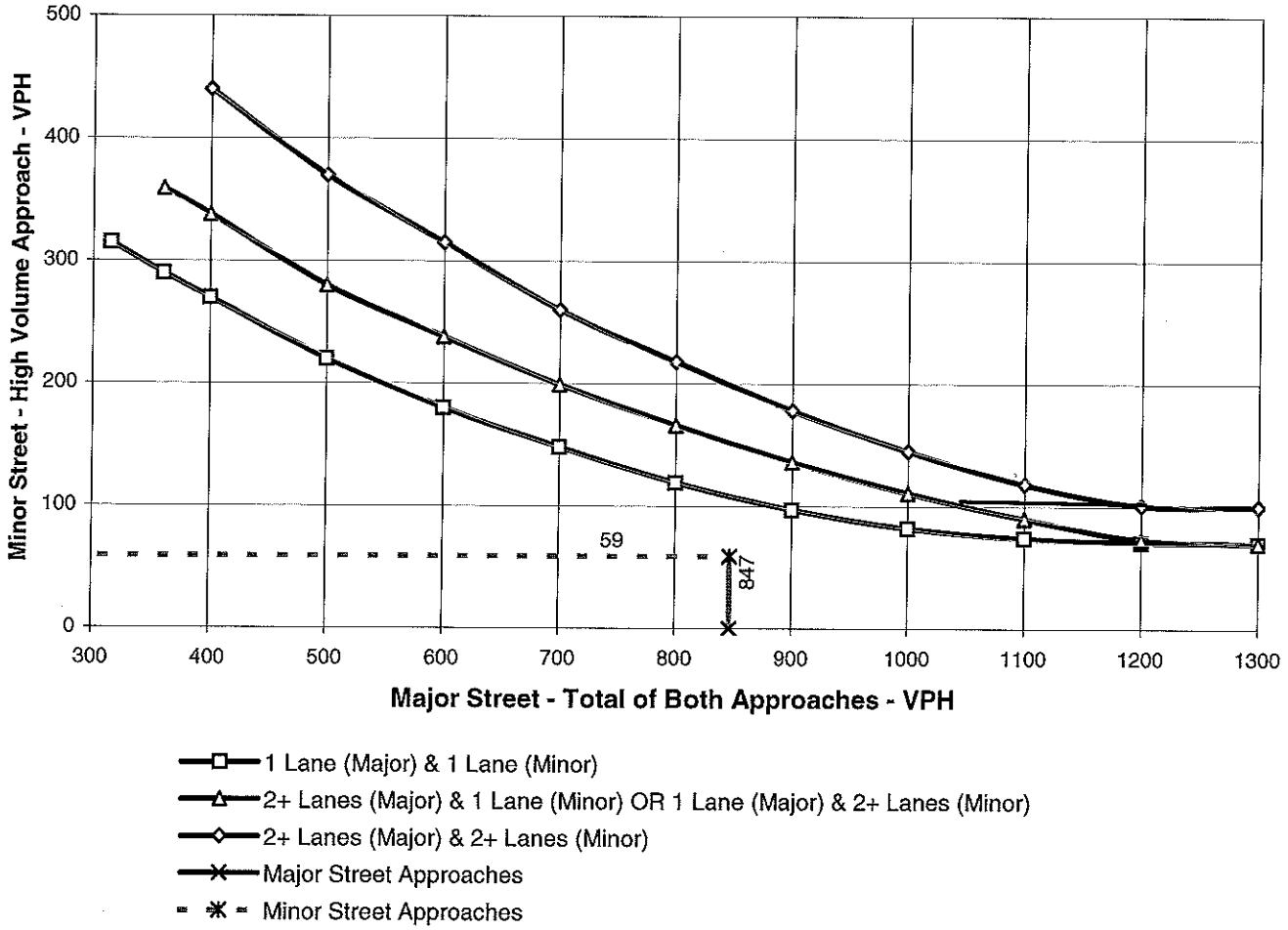
PEAK HOUR VOLUME WARRANT
(Rural Areas)

FRIDAY PM PEAK HOUR CONDITIONS (EXISTING CONDITIONS)

Major Street Name = **NORTH SHORE (EW)** Total of Both Approaches (VPH) = **847**
Number of Approach Lanes Major Street = **1**

Minor Street Name = **BIGBEAR (NS)** High Volume Approach (VPH) = **59**
Number of Approach Lanes Minor Street = **1**

SIGNAL WARRANT NOT SATISFIED



** NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

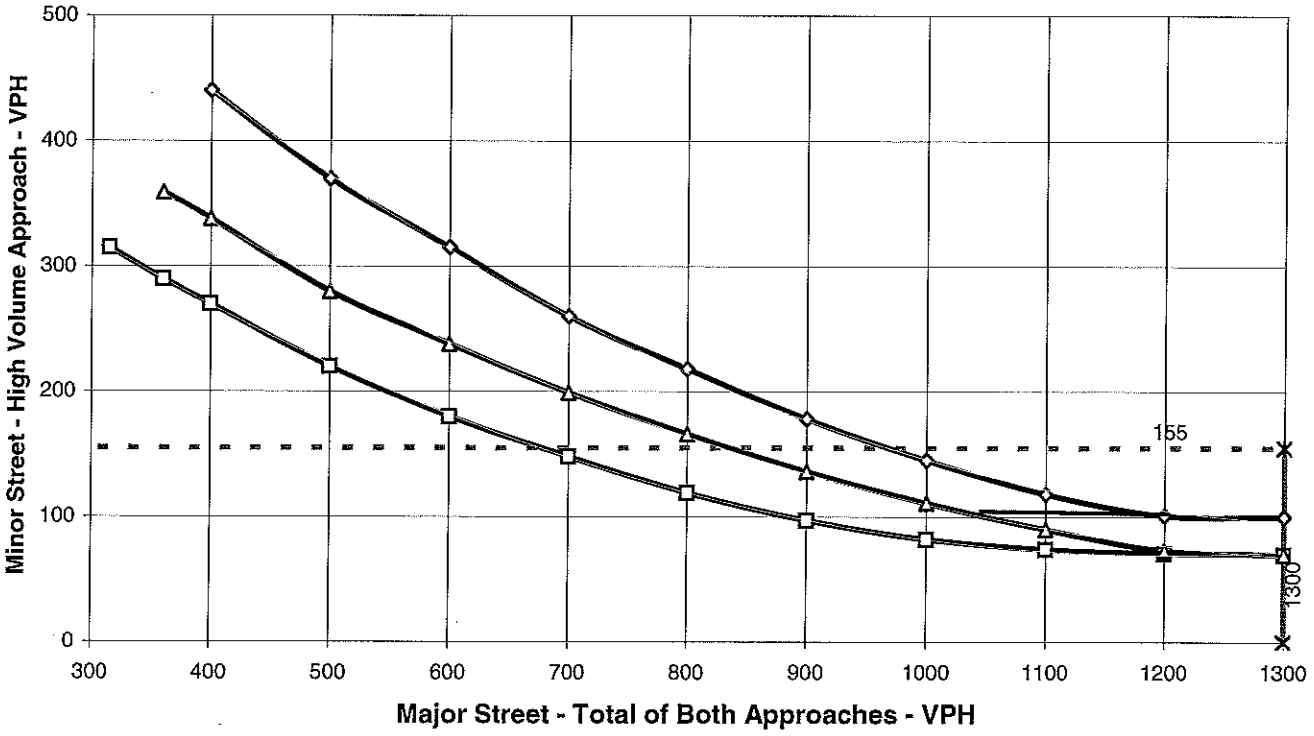
PEAK HOUR VOLUME WARRANT
(Rural Areas)

SUNDAY MIDDAY PEAK HOUR CONDITIONS (EXISTING CONDITIONS)

Major Street Name = **NORTH SHORE (EW)** Total of Both Approaches (VPH) = **1704**
Number of Approach Lanes Major Street = **1**

Minor Street Name = **BIGBEAR (NS)** High Volume Approach (VPH) = **155**
Number of Approach Lanes Minor Street = **1**

WARRANTED FOR A SIGNAL



1 Lane (Major) & 1 Lane (Minor)
2+ Lanes (Major) & 1 Lane (Minor) OR 1 Lane (Major) & 2+ Lanes (Minor)
2+ Lanes (Major) & 2+ Lanes (Minor)
Major Street Approaches
Minor Street Approaches

** NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

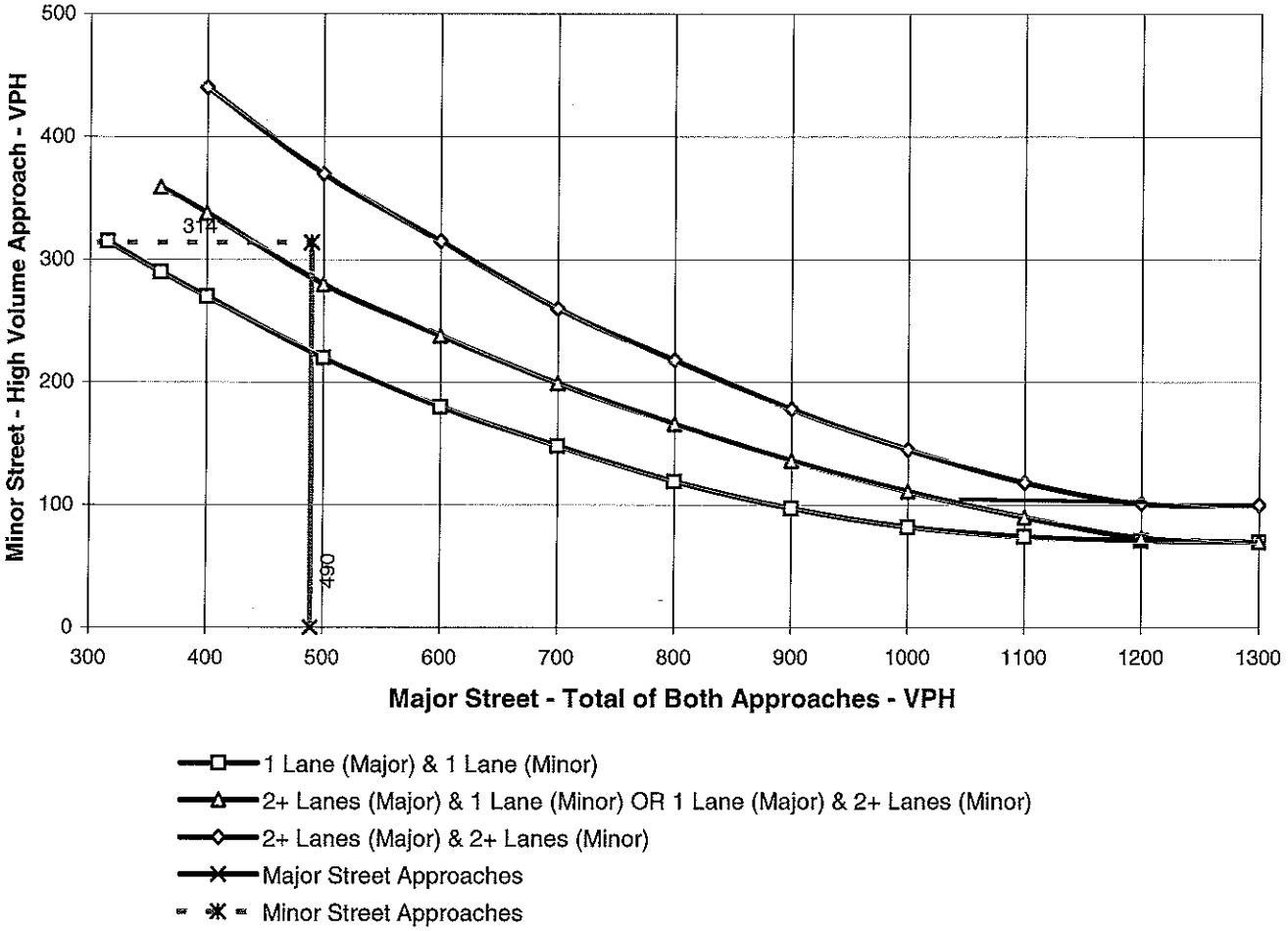
PEAK HOUR VOLUME WARRANT
(Rural Areas)

FRIDAY PM PEAK HOUR CONDITIONS (EXISTING CONDITIONS)

Major Street Name = **NORTH SHORE (EW)** Total of Both Approaches (VPH) = **490**
Number of Approach Lanes Major Street = **1**

Minor Street Name = **STANFIELD CUT OFF (NS)** High Volume Approach (VPH) = **314**
Number of Approach Lanes Minor Street = **1**

WARRANTED FOR A SIGNAL



** NOTE:
100 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACH WITH TWO OR MORE LANES AND 75 VPH APPLIES AS THE LOWER THRESHOLD VOLUME FOR A MINOR STREET APPROACHING WITH ONE LANE.

TRAFFIC SIGNAL WARRANTS

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

Major St: DWY 1 Minor St: North Shore Year = GP FRI

Volume = 20,000 Lanes= 1 Volume = 200 Lanes= 1 (one-way)

URBAN RURAL XX	Minimum Requirements EADT	
1. Minimum Vehicular Satisfied Not Satisfied XX	Vehicles per day on major street (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 20,000 / Minor Street 200	Urban / Rural	Urban / Rural
1 / 1	8,000 / 5,600 *	2,400 / 1,680
2 + / 1	9,600 / 6,720	2,400 / 1,680
2 + / 2 +	9,600 / 6,720	3,200 / 2,240
1 / 2 +	8,000 / 5,600	3,200 / 2,240
2. Interruption of Continuous traffic Satisfied Not Satisfied XX	Vehicles per day on major street (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 20,000 / Minor Street 200	Urban / Rural	Urban / Rural
1 / 1	12,000 / 8,400 *	1,200 / 850
2 + / 1	14,400 / 10,080	1,200 / 850
2 + / 2 +	14,000 / 10,080	1,600 / 1,120
1 / 2 +	12,000 / 8,400	1,600 / 1,120
3. Combination Satisfied Not Satisfied XX No one warrant satisfied but following warrants fulfilled 80% or more.. 12% 24% 1 2	2 Warrants	2 Warrants

NOTES: 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.

TRAFFIC SIGNAL WARRANTS

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

Major St: DWY 2 Minor St: North Shore Year = GP FRI

Volume = 20,000 Lanes= 1 Volume = 400 Lanes= 1 (one-way)

URBAN RURAL XX	Minimum Requirements EADT	
1. Minimum Vehicular Satisfied Not Satisfied XX	Vehicles per day on major street (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 20,000 / 1 400	8,000 / 5,600 *	2,400 / 1,680
2 + / 1	9,600 / 6,720	2,400 / 1,680
2 + / 2 +	9,600 / 6,720	3,200 / 2,240
1 / 2 +	8,000 / 5,600	3,200 / 2,240
2. Interruption of Continuous traffic Satisfied Not Satisfied XX	Vehicles per day on major street (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 20,000 / 1 400	12,000 / 8,400 *	1,200 / 850
2 + / 1	14,400 / 10,080	1,200 / 850
2 + / 2 +	14,000 / 10,080	1,600 / 1,120
1 / 2 +	12,000 / 8,400	1,600 / 1,120
3. Combination Satisfied Not Satisfied XX No one warrant satisfied but following warrants fulfilled 80% or more.. 24% 47% 1 2	2 Warrants	2 Warrants

NOTES: 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.

TRAFFIC SIGNAL WARRANTS

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

Major St: DWY 1 Minor St: North Shore Year = GP Buildo

Volume = 15,000 Lanes= 1 Volume = 200 Lanes= 1 (one-way)

URBAN RURAL XX	Minimum Requirements EADT	
1. Minimum Vehicular Satisfied Not Satisfied XX	Vehicles per day on major street (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 15,000 / 1 200	8,000 / 5,600 *	2,400 / 1,680
2 + / 1	9,600 / 6,720	2,400 / 1,680
2 + / 2 +	9,600 / 6,720	3,200 / 2,240
1 / 2 +	8,000 / 5,600	3,200 / 2,240
2. Interruption of Continuous traffic Satisfied Not Satisfied XX	Vehicles per day on major street (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 15,000 / 1 200	12,000 / 8,400 *	1,200 / 850
2 + / 1	14,400 / 10,080	1,200 / 850
2 + / 2 +	14,000 / 10,080	1,600 / 1,120
1 / 2 +	12,000 / 8,400	1,600 / 1,120
3. Combination Satisfied Not Satisfied XX No one warrant satisfied but following warrants fulfilled 80% or more.. 12% 24% 1 2	2 Warrants	2 Warrants

NOTES: 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.

TRAFFIC SIGNAL WARRANTS

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

Major St: DWY 2 Minor St: North Shore Year = GP Buildo

Volume = 15,000 Lanes= 1 Volume = 400 Lanes= 1 (one-way)

URBAN RURAL XX	Minimum Requirements EADT	
1. Minimum Vehicular Satisfied Not Satisfied XX	Vehicles per day on major street (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 15,000 Minor Street 400	Urban Rural	Urban Rural
1 1 2 + 1 2 + 2 + 1 2 +	8,000 5,600 * 9,600 6,720 9,600 6,720 8,000 5,600	2,400 1,680 2,400 1,680 3,200 2,240 3,200 2,240
2. Interruption of Continuous traffic Satisfied Not Satisfied XX	Vehicles per day on major street (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 15,000 Minor Street 400	Urban Rural	Urban Rural
1 1 2 + 1 2 + 2 + 1 2 +	12,000 8,400 * 14,400 10,080 14,000 10,080 12,000 8,400	1,200 850 1,200 850 1,600 1,120 1,600 1,120
3. Combination Satisfied Not Satisfied XX No one warrant satisfied but following warrants fulfilled 80% or more.. 24% 47% 1 2	2 Warrants	2 Warrants

NOTES: 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.

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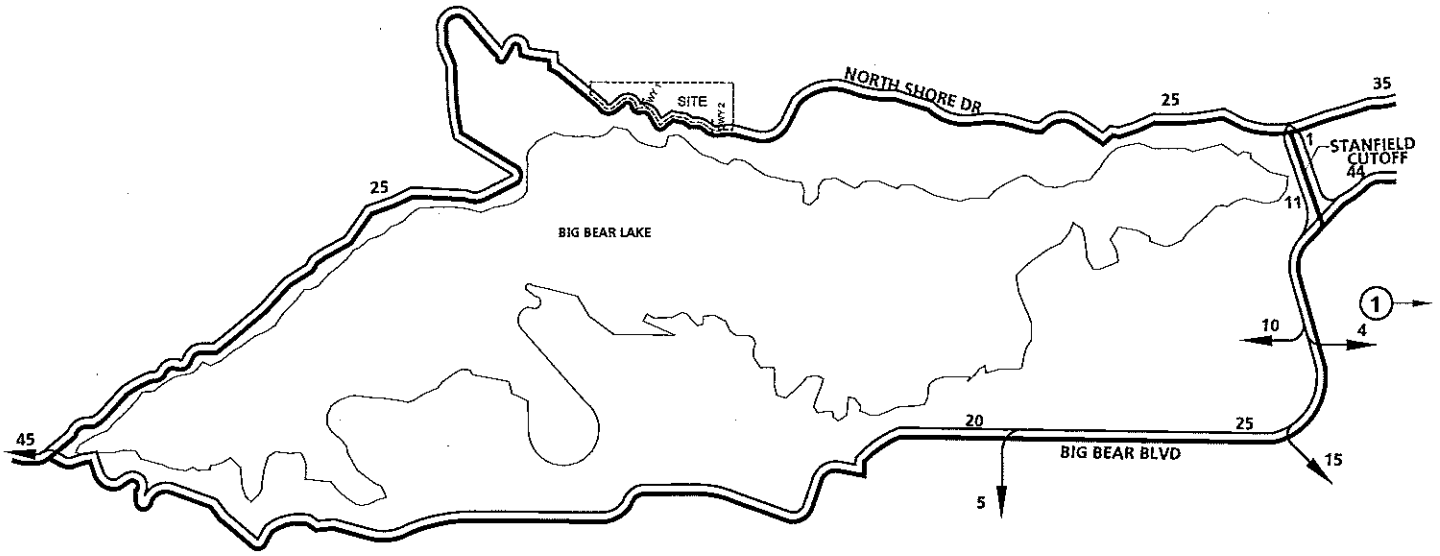
APPENDIX D

OTHER DEVELOPMENT TRIP DISTRIBUTION

EXHIBIT D-1

TT 16771
TRIP DISTRIBUTION



SOURCE: BASED ON TT16771 TIA,
SAN BERNARDINO COUNTY
(URBAN CROSSROADS, INC.), JULY 2006

LEGEND:

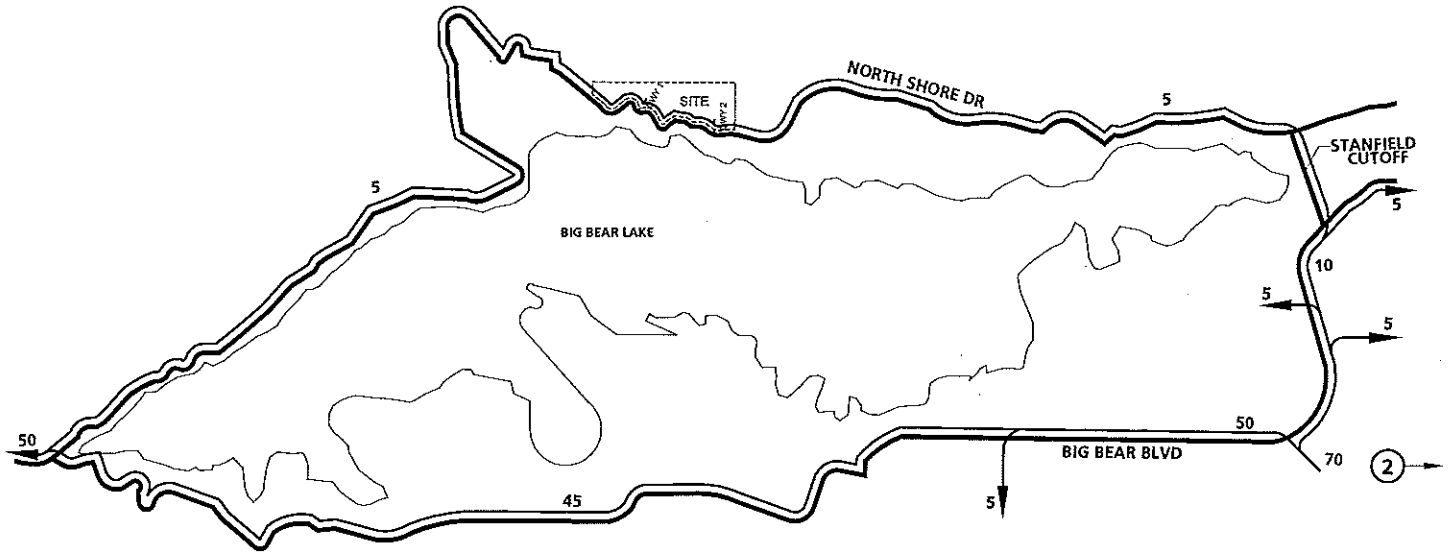
(1) = TT 16771

N

URBAN CROSSROADS

EXHIBIT D-2

TT 16934
TRIP DISTRIBUTION



SOURCE: BASED TT 17217 & TT 17022 TIA
SAN BERNARDINO COUNTY
(URBAN CROSSROADS, INC.), JULY 2006

LEGEND:

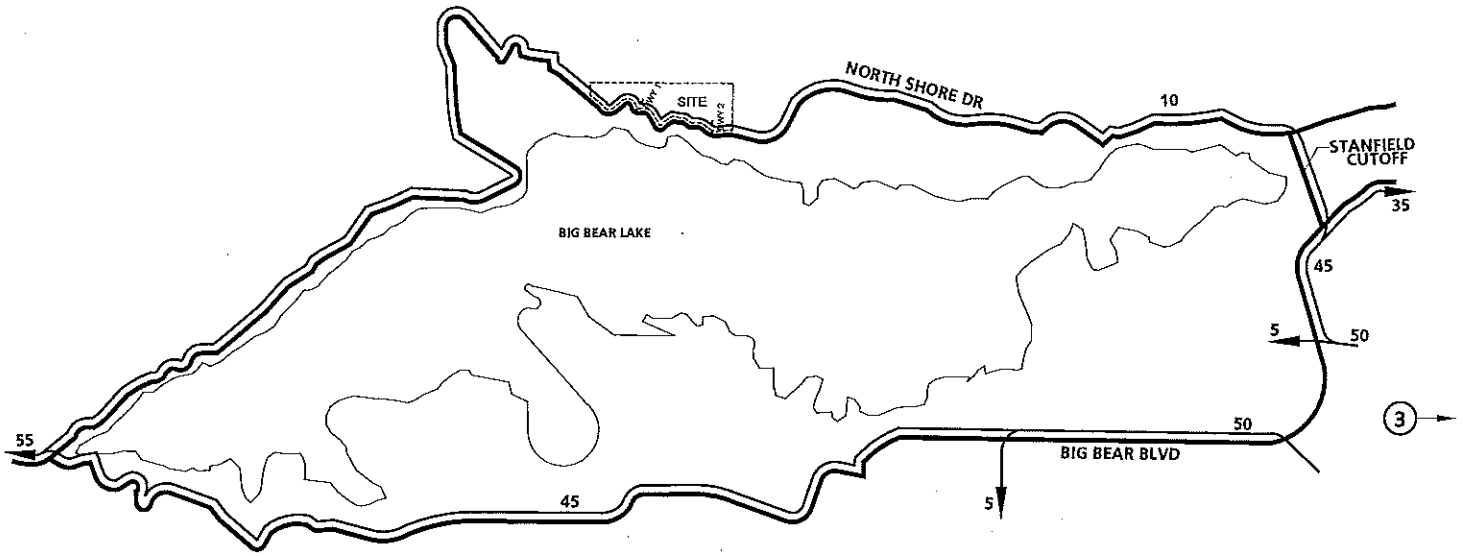
(2) = TT 16934

N

URBAN CROSSROADS

EXHIBIT D-3

TT 17217 & 17022 TRIP DISTRIBUTION



SOURCE: BASED TT 17217 & TT 17022 TIA
SAN BERNARDINO COUNTY
(URBAN CROSSROADS, INC.), JULY 2006

LEGEND:

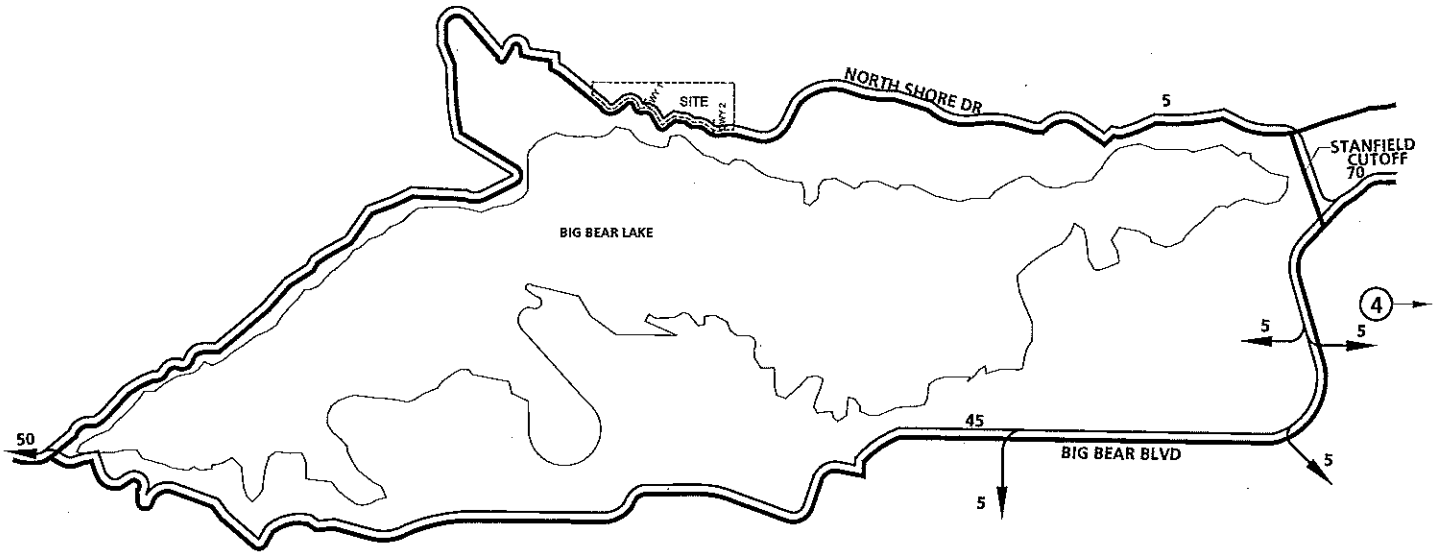
(3) = TT 17217 & 17022

N

URBAN CROSSROADS

EXHIBIT D-4

TT 16036
TRIP DISTRIBUTION



LEGEND:

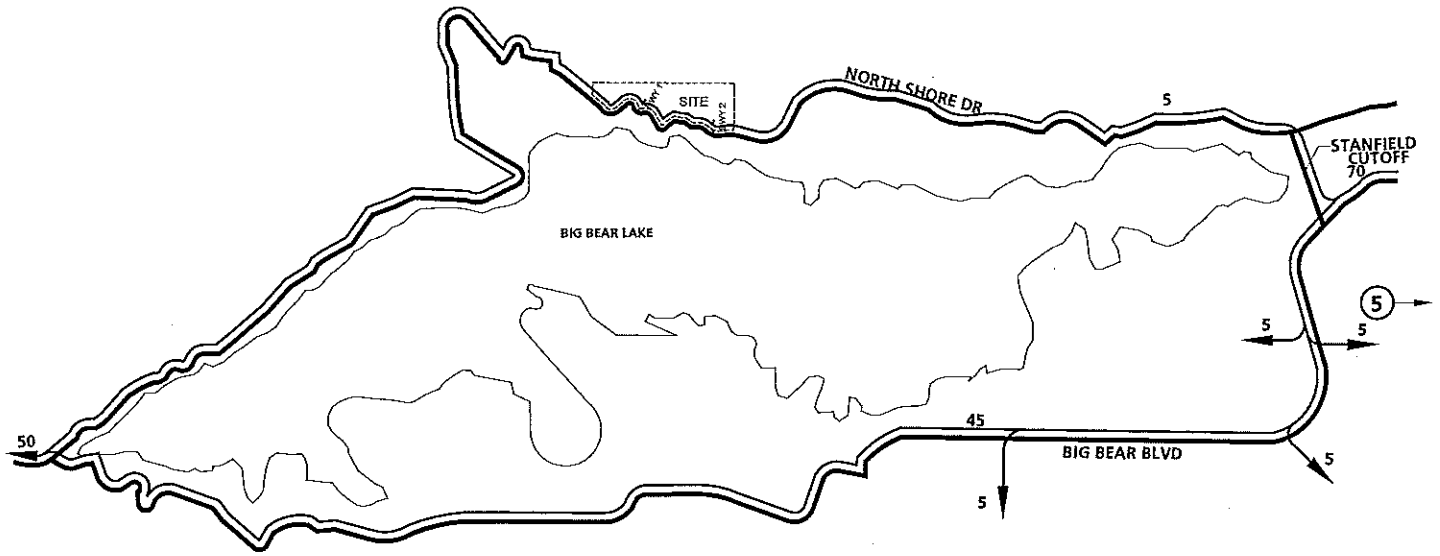
(4) = TT 16036

N

URBAN CROSSROADS

EXHIBIT D-5

TT 14916
TRIP DISTRIBUTION



LEGEND:

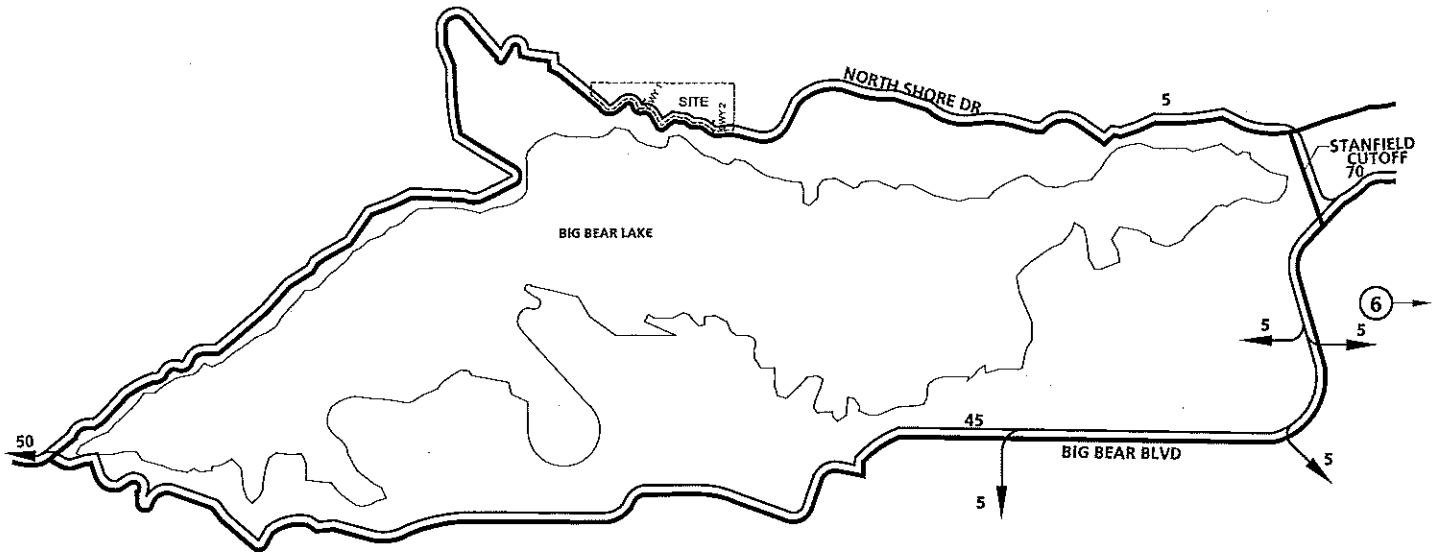
(5) = TT 14916

N

URBAN CROSSROADS

EXHIBIT D-6

TT 16980
TRIP DISTRIBUTION



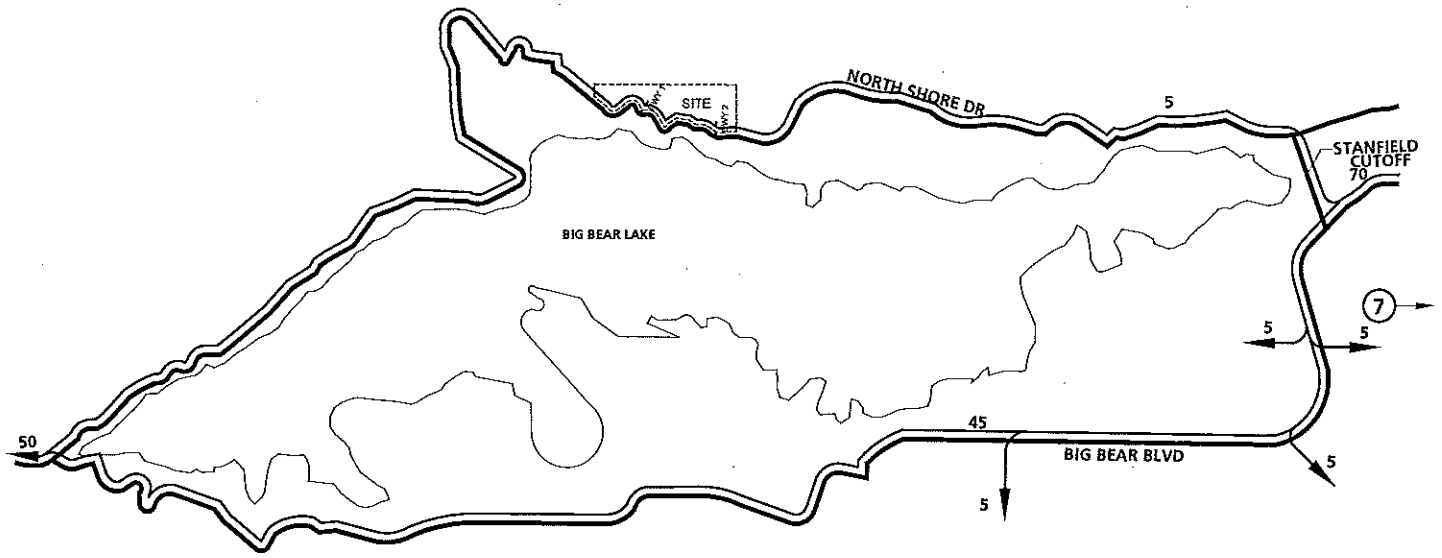
LEGEND:

(6) = TT 16980

N

EXHIBIT D-7

TT 1776H
TRIP DISTRIBUTION



LEGEND:

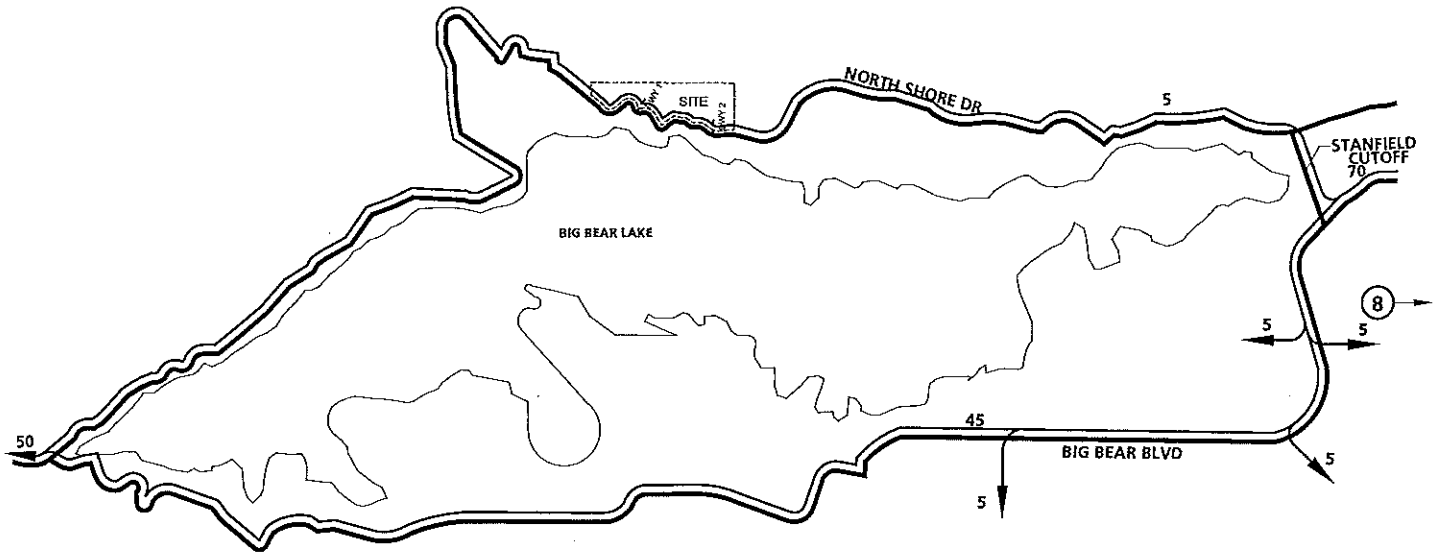
(7) = TT 1776H

N

URBAN CROSSROADS

EXHIBIT D-8

TT 16749
TRIP DISTRIBUTION



LEGEND:

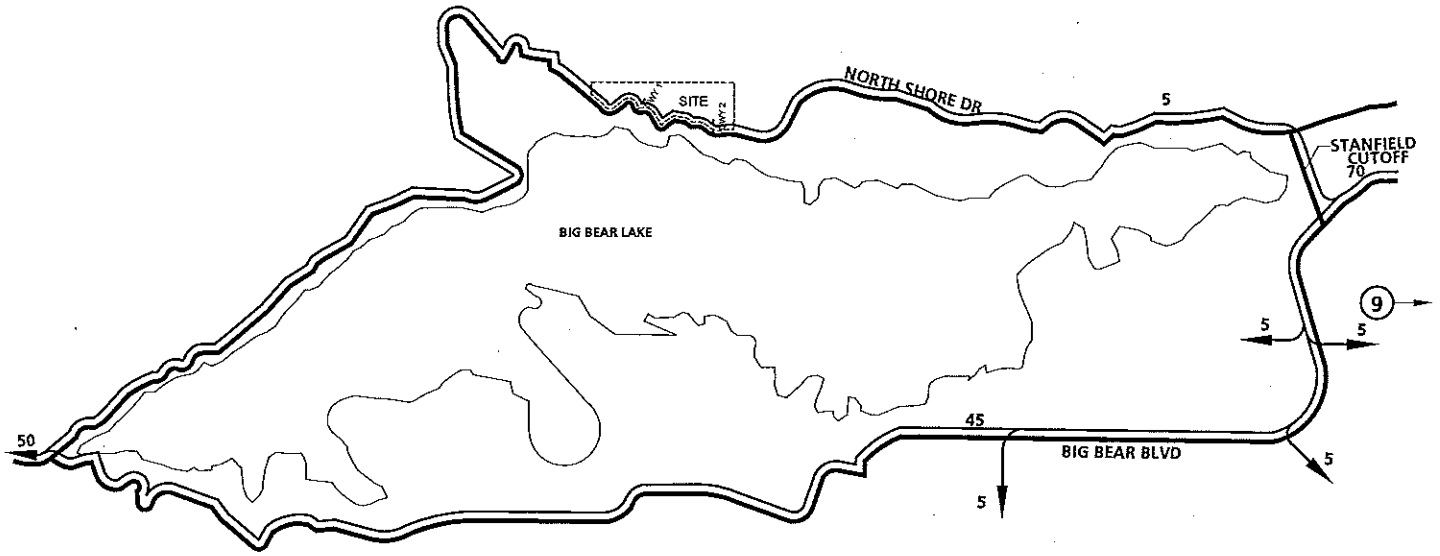
(8) = TT 16749

N

URBAN CROSSROADS

EXHIBIT D-9

TT 17201
TRIP DISTRIBUTION



LEGEND:

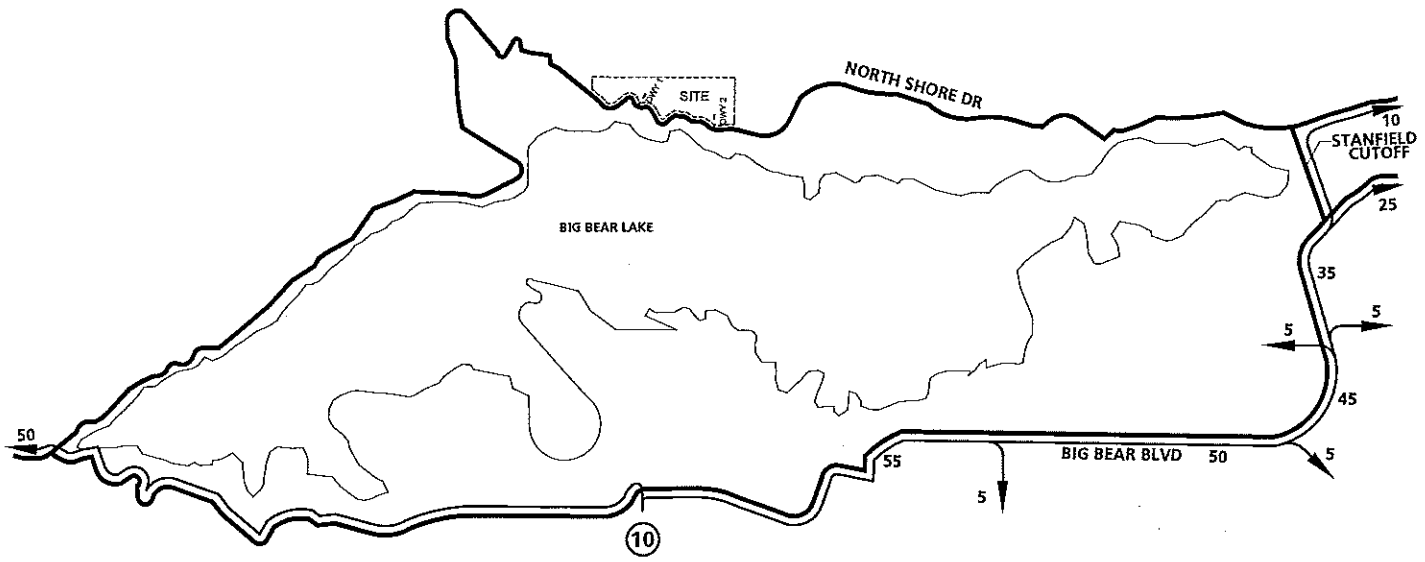
(9) = TT 17201

N

URBAN CROSSROADS

EXHIBIT D-10

HILTON GARDEN INN TRIP DISTRIBUTION



LEGEND:

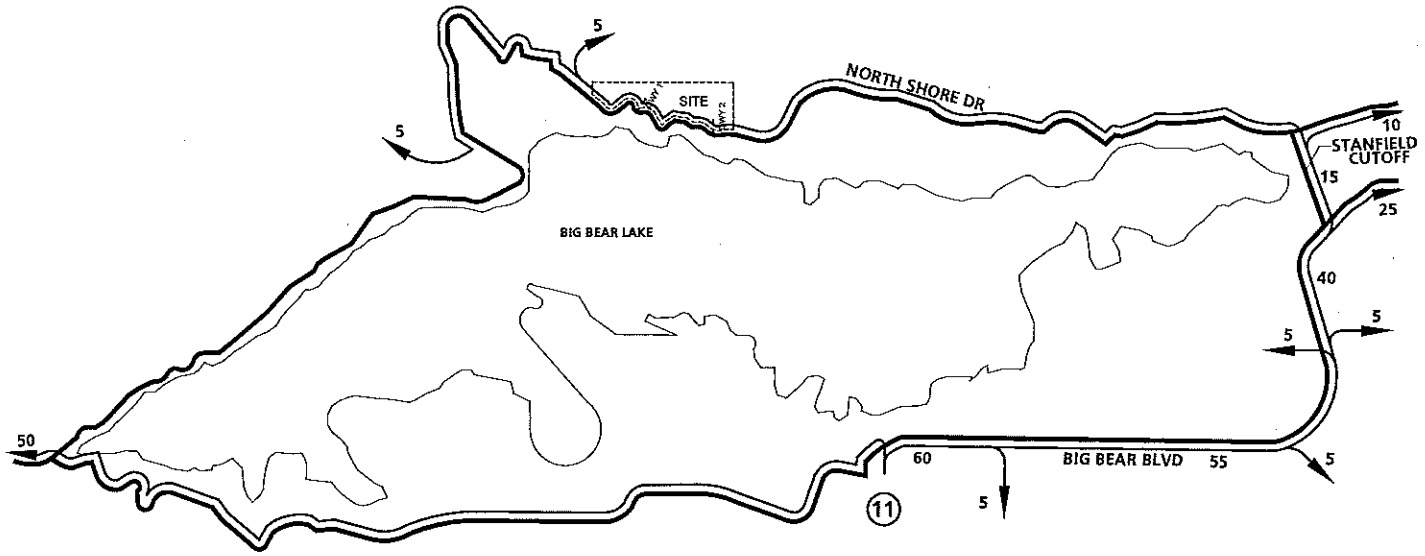
(10) = HILTON GARDEN INN

N

URBAN CROSSROADS

EXHIBIT D-11

MIXED-USE DEVELOPMENT TRIP DISTRIBUTION



LEGEND:

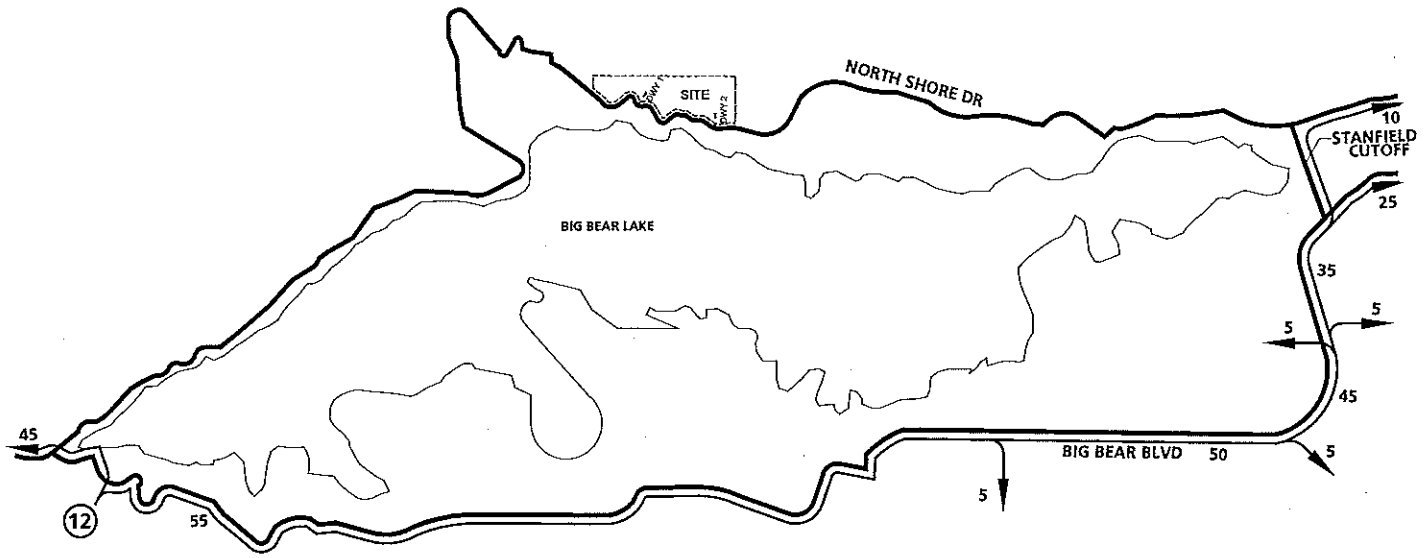
(11) = MIXED-USED DEVELOPMENT

N

URBAN CROSSROADS

EXHIBIT D-12

RESIDENTIAL LOTS TRIP DISTRIBUTION



LEGEND:

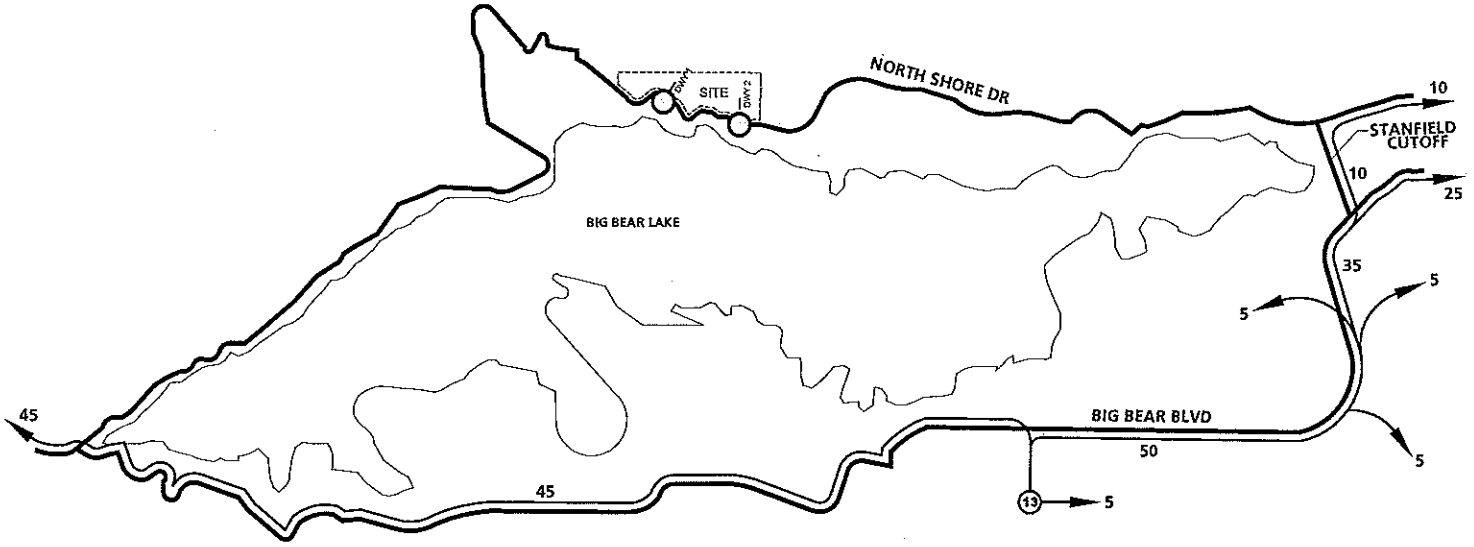
(12) = RESIDENTIAL LOTS

N

URBAN CROSSROADS

EXHIBIT D-13

CONDOMINIUMS



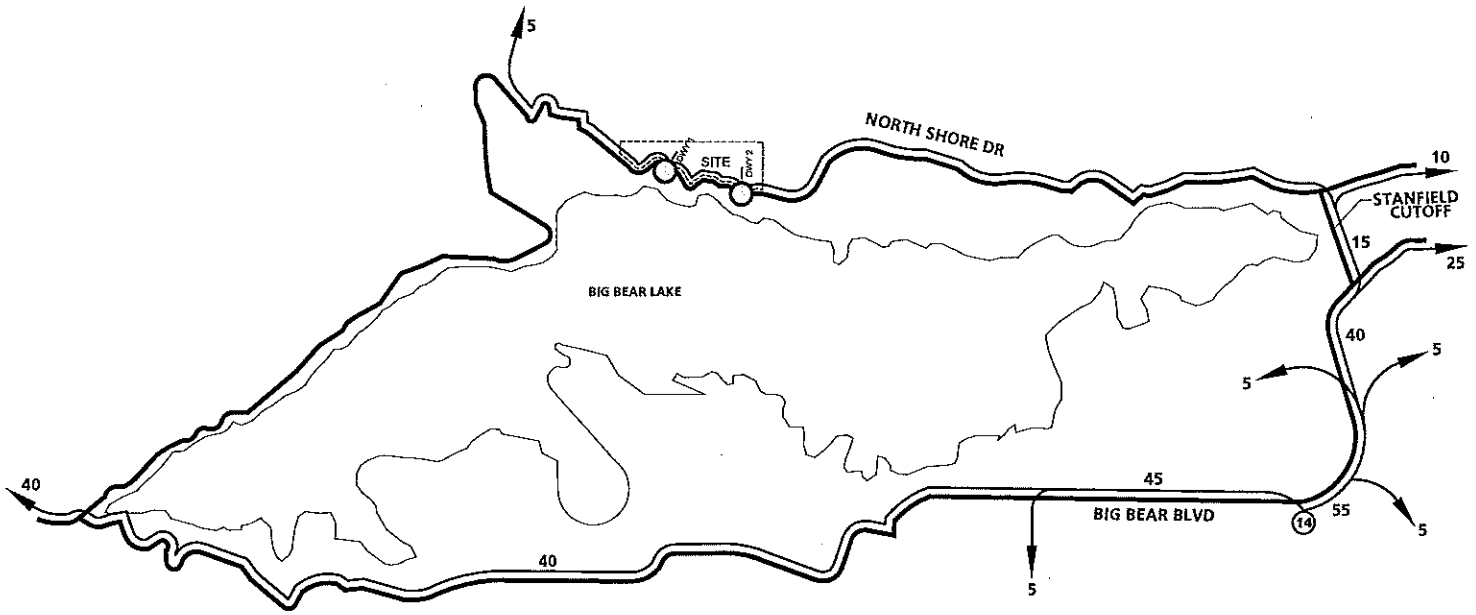
LEGEND:

(13) = CONDOMINIUMS

N

EXHIBIT D-14

41820 BIG BEAR BLVD.



LEGEND:

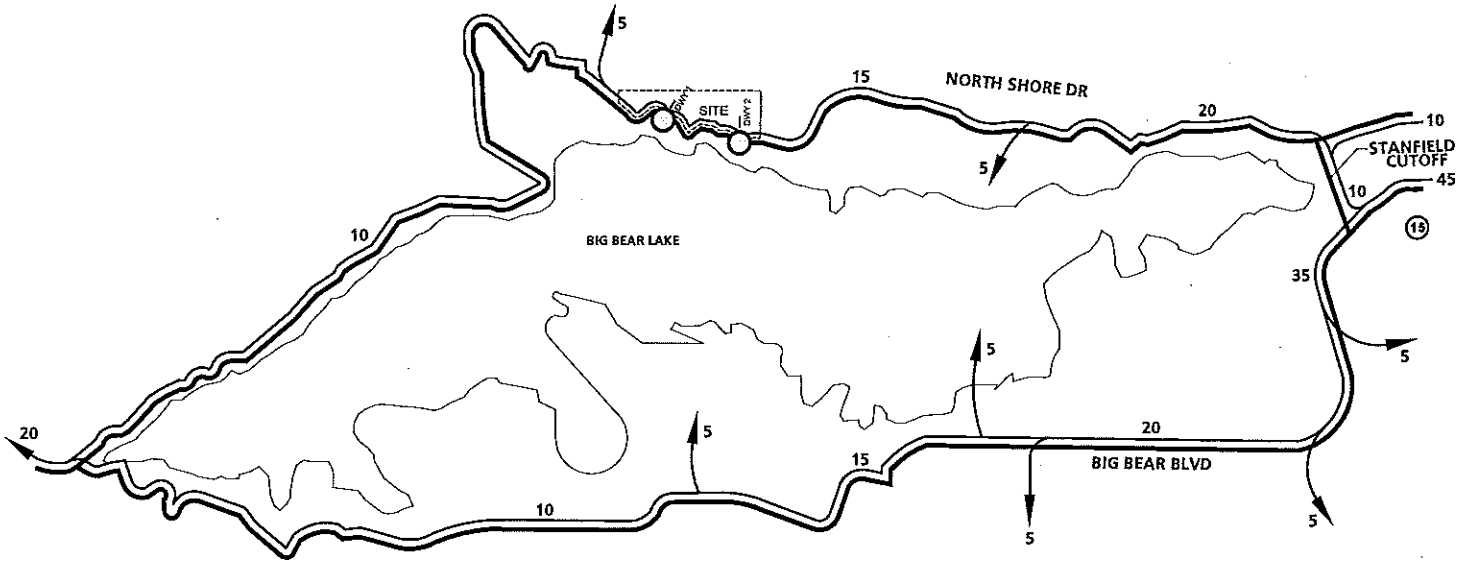
(14) = 41820 BIG BEAR BLVD.

N

URBAN CROSSROADS

EXHIBIT D-15

WORLD HARVEST FAITH CENTER



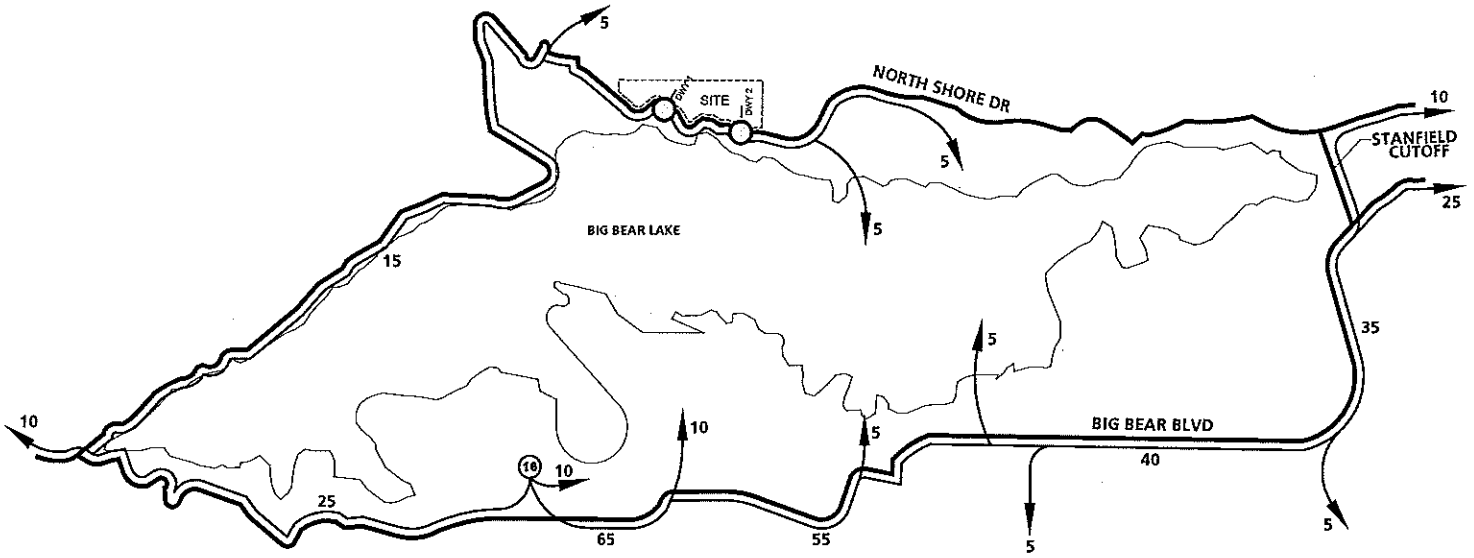
LEGEND:

(15) = WORLD HARVEST FAITH CENTER

N

EXHIBIT D-16

BOAT PARTS RETAIL & SERVICE



LEGEND:

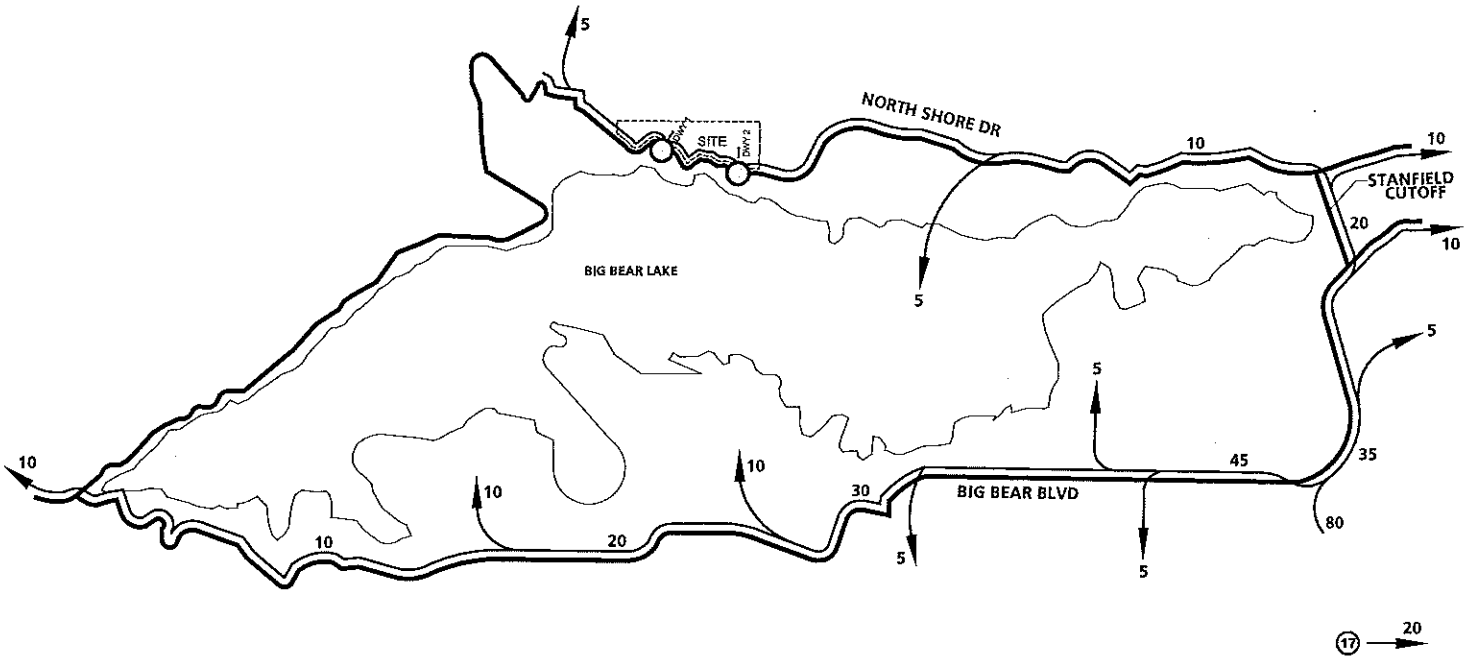
(16) = BOAT PARTS RETAIL & SERVICE

N

URBAN CROSSROADS

EXHIBIT D-17

STORAGE YARD



LEGEND:

(17) = STORAGE YARD

N

MOON CAMP TIA, San Bernardino County, California - 04409 : 04A D17A.DWG

URBAN CROSSROADS

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APPENDIX E

2010 CONDITIONS INTERSECTION ANALYSIS WITHOUT PROJECT

MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 Without Project Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

****
Intersection #101 Big Bear Blvd (NS)/ North Shore (SR-38) (EW)
****
Average Delay (sec/veh): OVERFLOW Worst Case Level Of Service: F[xxxxx]
****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Channel			Include		
Lanes:	0 0 1! 0 0			0 0 0 0 0			0 0 1 0 1			1 0 1 0 0		
Volume Module:												
Base Vol:	24	0	27	0	0	0	0	322	21	87	300	0
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	29	0	33	0	0	0	0	393	26	106	366	0
Added Vol:	226	0	1	0	0	0	0	73	314	1	42	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	255	0	34	0	0	0	0	466	340	107	408	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
PHF Volume:	305	0	41	0	0	0	0	557	406	128	488	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	305	0	41	0	0	0	0	557	406	128	488	0
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	6.5	6.2	7.1	6.5	xxxxx
FollowUpTim:	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	4.0	3.3	3.5	4.0	xxxxx
Capacity Module:												
Cnflict Vol:	0	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	651	0	910	631	xxxxx
Potent Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	390	900	258	401	xxxxx
Move Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	231	900	0	237	xxxxx
Volume/Cap:	0.34	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	2.42	0.45	xxxx	2.06	xxxx
Level Of Service Module:												
2Way95thQ:	1.5	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	45.4	2.4	xxxx	36.4	xxxxx
Control Del:	11.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	683	12.2	xxxxx	525	xxxxx
LOS by Move:	B	*	*	*	*	*	*	F	B	*	F	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			400.2			xxxxxx		
ApproachLOS:	*			*			F			F		

****
Note: Queue reported is the number of cars per lane.
****

Traffix 7.8.0115 (c) 2007 Dowling Assoc. Licensed to URBAN CROSSROADS, IRVINE

MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2011 Without Project Conditions With Improvements
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #101 Big Bear Blvd (NS)/ North Shore (SR-38) (EW)

Cycle (sec):	60	Critical Vol./Cap.(X):	0.534
Loss Time (sec):	6 (Y+R=4.0 sec)	Average Delay (sec/veh):	14.0
Optimal Cycle:	47	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Split Phase			Split Phase			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	17	0	17	0	0	0	0	12	12	12	12	0
Lanes:	1 0 0 0 1			0 0 0 0 0			0 0 2 0 1			1 0 1 0 0		
Volume Module:												
Base Vol:	24	0	27	0	0	0	0	322	21	87	300	0
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	29	0	33	0	0	0	0	393	26	106	366	0
Added Vol:	226	0	1	0	0	0	0	73	314	1	42	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	255	0	34	0	0	0	0	466	340	107	408	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
PHF Volume:	305	0	41	0	0	0	0	557	406	128	488	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	305	0	41	0	0	0	0	557	406	128	488	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05	1.00	1.00	1.00	1.00
FinalVolume:	305	0	41	0	0	0	0	585	406	128	488	0
Saturation Flow Module:												
Sat/Lane:	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Adjustment:	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	2.00	1.00	1.00	1.00	0.00
Final Sat.:	1700	0	1800	0	0	0	0	3600	1800	1700	1800	0
Capacity Analysis Module:												
Vol/Sat:	0.18	0.00	0.02	0.00	0.00	0.00	0.00	0.16	0.23	0.08	0.27	0.00
Crit Moves:	****								****	****		
Green/Cycle:	0.31	0.00	0.31	0.00	0.00	0.00	0.00	0.39	0.39	0.20	0.59	0.00
Volume/Cap:	0.58	0.00	0.07	0.00	0.00	0.00	0.00	0.42	0.58	0.38	0.46	0.00
Delay/Veh:	21.6	0.0	14.5	0.0	0.0	0.0	0.0	13.0	16.5	23.9	5.6	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	21.6	0.0	14.5	0.0	0.0	0.0	0.0	13.0	16.5	23.9	5.6	0.0
LOS by Move:	C	A	B	A	A	A	A	B	B	C	A	A
HCM2kAvgQ:	5	0	0	0	0	0	0	4	6	2	4	0

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 Without Project Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #102 Stanfield Cut Off (NS) / North Shore Dr. (EW)

Average Delay (sec/veh): 54.9 Worst Case Level Of Service: F[137.9]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0	1! 0	0	0 1	0 0	0	0 0	0 1	0	0 0	1! 0	0
Volume Module:												
Base Vol:	58	5	208	5	10	0	0	74	70	218	54	6
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	71	6	254	6	12	0	0	90	85	266	66	7
Added Vol:	33	0	43	0	0	0	0	38	47	38	22	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	104	6	297	6	12	0	0	128	132	304	88	7
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	116	7	331	7	14	0	0	143	148	339	98	8
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	116	7	331	7	14	0	0	143	148	339	98	8
Critical Gap Module:												
Critical Gp:	7.1	6.5	6.2	7.1	6.5	xxxxx	xxxxx	xxxx	xxxxx	4.1	xxxx	xxxxx
FollowUpTim:	3.5	4.0	3.3	3.5	4.0	xxxxx	xxxxx	xxxx	xxxxx	2.2	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	1003	1001	217	1165	1070	xxxxx	xxxx	xxxx	xxxxx	291	xxxx	xxxxx
Potent Cap.:	223	245	828	173	223	xxxxx	xxxx	xxxx	xxxxx	1283	xxxx	xxxxx
Move Cap.:	156	165	828	75	150	xxxxx	xxxx	xxxx	xxxxx	1283	xxxx	xxxxx
Volume/Cap:	0.74	0.04	0.40	0.09	0.09	xxxx	xxxx	xxxx	xxxx	0.26	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	1.1	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	8.8	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	*	*	*	A	*	*
Movement:	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT
Shared Cap.:	xxxx	383	xxxxx	113	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	18.2	xxxxx	0.6	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	138	xxxxx	43.8	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	F	*	E	*	*	*	*	*	*	*	*
ApproachDel:	137.9			43.8			xxxxxx			xxxxxx		
ApproachLOS:	F			E			*			*		

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2011 Without Project Conditions With Improvements
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

Intersection #102 Stanfield Cut Off (NS) / North Shore Dr. (EW)

****

Cycle (sec):	60	Critical Vol./Cap.(X):	0.637
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	31.9
Optimal Cycle:	54	Level Of Service:	C

****

Approach:	North Bound						South Bound						East Bound						West Bound					
Movement:	L	-	T	-	R		L	-	T	-	R		L	-	T	-	R		L	-	T	-	R	
Control:	Protected						Protected						Protected						Protected					
Rights:	Include						Include						Include						Include					
Min. Green:	10		13		13		10		13		13		10		13		13		10		13		13	
Lanes:	1	0	0	1	0		1	0	0	1	0		1	0	0	1	0		1	0	0	1	0	
Volume Module:																								
Base Vol:	58		5		208		5		10		0		0		74		70		218		54		6	
Growth Adj:	1.22	1.22			1.22		1.22	1.22			1.22		1.22	1.22			1.22		1.22	1.22			1.22	
Initial Bse:	71		6		254		6		12		0		0		90		85		266		66		7	
Added Vol:	33		0		43		0		0		0		0		38		47		38		22		0	
PasserByVol:	0		0		0		0		0		0		0		0		0		0		0		0	
Initial Fut:	104		6		297		6		12		0		0		128		132		304		88		7	
User Adj:	1.00	1.00			1.00		1.00	1.00			1.00		1.00	1.00			1.00		1.00	1.00			1.00	
PHF Adj:	0.90	0.90			0.90		0.90	0.90			0.90		0.90	0.90			0.90		0.90	0.90			0.90	
PHF Volume:	116		7		331		7		14		0		0		143		148		339		98		8	
Reduct Vol:	0		0		0		0		0		0		0		0		0		0		0		0	
Reduced Vol:	116		7		331		7		14		0		0		143		148		339		98		8	
PCE Adj:	1.00	1.00			1.00		1.00	1.00			1.00		1.00	1.00			1.00		1.00	1.00			1.00	
MLF Adj:	1.00	1.00			1.00		1.00	1.00			1.00		1.00	1.00			1.00		1.00	1.00			1.00	
FinalVolume:	116		7		331		7		14		0		0		143		148		339		98		8	
Saturation Flow Module:																								
Sat/Lane:	1800	1800			1800		1800	1800			1800		1800	1800			1800		1800	1800			1800	
Adjustment:	0.94	1.00			1.00		0.94	1.00			1.00		0.94	1.00			1.00		0.94	1.00			1.00	
Lanes:	1.00	0.02			0.98		1.00	1.00			0.00		1.00	0.49			0.51		1.00	0.92			0.08	
Final Sat.:	1700		36		1764		1700	1800			0		1700		886		914		1700	1662			138	
Capacity Analysis Module:																								
Vol/Sat:	0.07	0.19			0.19		0.00	0.01			0.00		0.00	0.16			0.16		0.20	0.06			0.06	
Crit Moves:		****					****							****					****					
Green/Cycle:	0.17	0.23			0.23		0.17	0.23			0.00		0.00	0.22			0.22		0.25	0.47			0.47	
Volume/Cap:	0.39	0.80			0.80		0.02	0.03			0.00		0.00	0.75			0.75		0.80	0.13			0.13	
Delay/Veh:	25.8	36.4			36.4		21.1	18.2			0.0		0.0	34.2			34.2		35.8	7.7			7.7	
User DelAdj:	1.00	1.00			1.00		1.00	1.00			1.00		1.00	1.00			1.00		1.00	1.00			1.00	
AdjDel/Veh:	25.8	36.4			36.4		21.1	18.2			0.0		0.0	34.2			34.2		35.8	7.7			7.7	
LOS by Move:	C		D		D		C		B		A		A		C		C		D		A		A	
HCM2kAvgQ:	2		8		8		0		0		0		0		7		7		9		1		1	

****

Note: Queue reported is the number of cars per lane.

****

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 Without Project Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

Intersection #103 Stanfield Cut Off (NS) / Big Bear Blvd. (SR-18) (EW)

****

Cycle (sec):	130	Critical Vol./Cap.(X):	1.140
Loss Time (sec):	8 (Y+R=2.0 sec)	Average Delay (sec/veh):	242.2
Optimal Cycle:	180	Level Of Service:	F

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Split Phase			Split Phase			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	24	24	24	24	24	24	10	18	18	10	18	18
Lanes:	0 1	0 0	1	0 1	0 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	61	18	61	12	28	256	287	872	77	17	664	13
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	74	22	74	15	34	312	350	1064	94	21	810	16
Added Vol:	0	0	0	13	0	71	68	294	0	0	215	8
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	74	22	74	28	34	383	418	1358	94	21	1025	24
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
PHF Volume:	77	23	77	29	35	396	432	1403	97	21	1059	25
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	77	23	77	29	35	396	432	1403	97	21	1059	25
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	77	23	77	29	35	396	432	1403	97	21	1059	25
Saturation Flow Module:												
Sat/Lane:	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Adjustment:	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00
Lanes:	0.78	0.22	1.00	0.46	0.54	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1329	392	1800	784	969	1800	1700	1800	1800	1700	1800	1800
Capacity Analysis Module:												
Vol/Sat:	0.06	0.06	0.04	0.04	0.04	0.22	0.25	0.78	0.05	0.01	0.59	0.01
Crit Moves:	****					****		****		****		
Green/Cycle:	0.18	0.18	0.18	0.18	0.18	0.18	0.17	0.49	0.49	0.08	0.40	0.40
Volume/Cap:	0.31	0.31	0.23	0.20	0.20	1.19	1.48	1.58	0.11	0.16	1.48	0.03
Delay/Veh:	48.4	48.4	46.8	46.2	46.2	165.1	287.4	293	14.0	58.8	259	21.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	48.4	48.4	46.8	46.2	46.2	165.1	287.4	293	14.0	58.8	259	21.5
LOS by Move:	D	D	D	D	D	F	F	F	B	E	F	C
HCM2kAvgQ:	4	4	3	2	2	26	38	118	1	1	84	0

****

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2011 Without Project Conditions With Improvements
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #103 Stanfield Cut Off (NS) / Big Bear Blvd. (SR-18) (EW)

Cycle (sec):	80	Critical Vol./Cap.(X):	0.875
Loss Time (sec):	6 (Y+R=2.0 sec)	Average Delay (sec/veh):	31.4
Optimal Cycle:	76	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	24	24	24	24	24	24	10	18	18	10	18	18
Lanes:	1 0	0 1	0	1 0	0 1	0	1 0	1 1	0	1 0	1 1	0
Volume Module:												
Base Vol:	61	18	61	12	28	256	287	872	77	17	664	13
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	74	22	74	15	34	312	350	1064	94	21	810	16
Added Vol:	0	0	0	13	0	71	68	294	0	0	215	8
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	74	22	74	28	34	383	418	1358	94	21	1025	24
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
PHF Volume:	77	23	77	29	35	396	432	1403	97	21	1059	25
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	77	23	77	29	35	396	432	1403	97	21	1059	25
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05	1.05	1.00	1.05	1.05
FinalVolume:	77	23	77	29	35	396	432	1473	102	21	1112	26
Saturation Flow Module:												
Sat/Lane:	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Adjustment:	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00
Lanes:	1.00	0.23	0.77	1.00	0.08	0.92	1.00	1.87	0.13	1.00	1.95	0.05
Final Sat.:	1700	410	1390	1700	147	1653	1700	3367	233	1700	3518	82
Capacity Analysis Module:												
Vol/Sat:	0.05	0.06	0.06	0.02	0.24	0.24	0.25	0.44	0.44	0.01	0.32	0.32
Crit Moves:					****		****				****	
Green/Cycle:	0.30	0.30	0.30	0.30	0.30	0.30	0.28	0.49	0.49	0.14	0.35	0.35
Volume/Cap:	0.15	0.18	0.18	0.06	0.80	0.80	0.91	0.90	0.90	0.09	0.91	0.91
Delay/Veh:	20.9	21.2	21.2	19.9	37.1	37.1	52.3	22.7	22.7	30.8	35.2	35.2
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	20.9	21.2	21.2	19.9	37.1	37.1	52.3	22.7	22.7	30.8	35.2	35.2
LOS by Move:	C	C	C	B	D	D	D	C	C	C	D	D
HCM2kAvgQ:	1	2	2	0	12	12	15	21	21	1	17	17

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 Without Project Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #101 Big Bear Blvd (NS)/ North Shore (SR-38) (EW)

Average Delay (sec/veh): OVERFLOW Worst Case Level Of Service: F[xxxxx]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Channel			Include		
Lanes:	0 0 1! 0 0			0 0 0 0 0			0 0 1 0 1			1 0 1 0 0		
Volume Module:												
Base Vol:	40	0	94	0	0	0	0	958	33	67	411	0
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	49	0	115	0	0	0	0	1169	40	82	501	0
Added Vol:	226	0	1	0	0	0	0	73	314	1	42	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	275	0	116	0	0	0	0	1242	354	83	543	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
PHF Volume:	301	0	127	0	0	0	0	1362	388	91	596	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	301	0	127	0	0	0	0	1362	388	91	596	0
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	6.5	6.2	7.1	6.5	xxxxx
FollowUpTim:	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	4.0	3.3	3.5	4.0	xxxxx
Capacity Module:												
Cnflict Vol:	0	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	729	0	1347	666	xxxxx
Potent Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	352	900	130	383	xxxxx
Move Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	210	900	0	229	xxxxx
Volume/Cap:	0.33	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	6.47	0.43	xxxx	2.60	xxxx
Level Of Service Module:												
2Way95thQ:	1.5	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	147	2.2	xxxx	50.3	xxxxx
Control Del:	11.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	2504	12.0	xxxxx	767	xxxxx
LOS by Move:	B	*	*	*	*	*	*	F	B	*	F	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			1951.2			xxxxxx		
ApproachLOS:	*			*			F			F		

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 Without Project Conditions With Improvements
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

Intersection #101 Big Bear Blvd (NS)/ North Shore (SR-38) (EW)

****

Cycle (sec):	60	Critical Vol./Cap.(X):	0.697
Loss Time (sec):	6 (Y+R=4.0 sec)	Average Delay (sec/veh):	21.2
Optimal Cycle:	47	Level Of Service:	C

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Split Phase			Split Phase			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	17	0	17	0	0	0	0	12	12	12	12	0
Lanes:	1 0 0 0 1			0 0 0 0 0			0 0 2 0 1			1 0 1 0 0		
Volume Module:												
Base Vol:	40	0	94	0	0	0	0	958	33	67	411	0
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	49	0	115	0	0	0	0	1169	40	82	501	0
Added Vol:	226	0	1	0	0	0	0	73	314	1	42	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	275	0	116	0	0	0	0	1242	354	83	543	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
PHF Volume:	301	0	127	0	0	0	0	1362	388	91	596	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	301	0	127	0	0	0	0	1362	388	91	596	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05	1.00	1.00	1.00	1.00
FinalVolume:	301	0	127	0	0	0	0	1430	388	91	596	0
Saturation Flow Module:												
Sat/Lane:	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Adjustment:	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	2.00	1.00	1.00	1.00	0.00
Final Sat.:	1700	0	1800	0	0	0	0	3600	1800	1700	1800	0
Capacity Analysis Module:												
Vol/Sat:	0.18	0.00	0.07	0.00	0.00	0.00	0.00	0.40	0.22	0.05	0.33	0.00
Crit Moves:	****							****		****		
Green/Cycle:	0.28	0.00	0.28	0.00	0.00	0.00	0.00	0.42	0.42	0.20	0.62	0.00
Volume/Cap:	0.63	0.00	0.25	0.00	0.00	0.00	0.00	0.95	0.52	0.27	0.54	0.00
Delay/Veh:	24.7	0.0	17.7	0.0	0.0	0.0	0.0	29.3	14.0	22.2	5.4	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	24.7	0.0	17.7	0.0	0.0	0.0	0.0	29.3	14.0	22.2	5.4	0.0
LOS by Move:	C	A	B	A	A	A	A	C	B	C	A	A
HCM2kAvgQ:	6	0	2	0	0	0	0	19	5	2	4	0

****

Note: Queue reported is the number of cars per lane.

****

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 Without Project Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

****
Intersection #102 Stanfield Cut Off (NS) / North Shore Dr. (EW)
****
Average Delay (sec/veh): 82.7 Worst Case Level Of Service: F[219.6]
****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 1! 0 0			0 0 1! 0 0			0 0 1! 0 0			0 0 1! 0 0		
Volume Module:												
Base Vol:	110	4	174	8	6	6	4	80	120	177	84	6
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	134	5	212	10	7	7	5	98	146	216	102	7
Added Vol:	33	0	43	0	0	0	0	38	47	38	22	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	167	5	255	10	7	7	5	136	193	254	124	7
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PHF Volume:	181	5	277	11	8	8	5	147	210	275	135	8
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	181	5	277	11	8	8	5	147	210	275	135	8
Critical Gap Module:												
Critical Gp:	7.1	6.5	6.2	7.1	6.5	6.2	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx
FollowUpTim:	3.5	4.0	3.3	3.5	4.0	3.3	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	959	955	252	1092	1056	139	143	xxxx	xxxxx	356	xxxx	xxxxx
Potent Cap.:	239	260	792	194	227	915	1452	xxxx	xxxxx	1213	xxxx	xxxxx
Move Cap.:	181	190	792	98	166	915	1452	xxxx	xxxxx	1213	xxxx	xxxxx
Volume/Cap:	1.00	0.03	0.35	0.11	0.05	0.01	0.00	xxxx	xxxx	0.23	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	0.9	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	7.5	xxxx	xxxxx	8.8	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	A	*	*	A	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	335	xxxxx	xxxx	160	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	23.4	xxxxx	xxxxx	0.6	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	220	xxxxx	xxxxx	31.8	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	F	*	*	D	*	*	*	*	*	*	*
ApproachDel:	219.6			31.8			xxxxxx			xxxxxx		
ApproachLOS:	F			D			*			*		

****
Note: Queue reported is the number of cars per lane.
****

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 Without Project Conditions With Improvements
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

Intersection #102 Stanfield Cut Off (NS) / North Shore Dr. (EW)

****

Cycle (sec):	60	Critical Vol./Cap.(X):	0.603
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	30.7
Optimal Cycle:	54	Level Of Service:	C

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	13	13	10	13	13	10	13	13	10	13	13
Lanes:	1 0	0 1	0	1 0	0 1	0	1 0	0 1	0	1 0	0 1	0
Volume Module:												
Base Vol:	110	4	174	8	6	6	4	80	120	177	84	6
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	134	5	212	10	7	7	5	98	146	216	102	7
Added Vol:	33	0	43	0	0	0	0	38	47	38	22	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	167	5	255	10	7	7	5	136	193	254	124	7
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PHF Volume:	181	5	277	11	8	8	5	147	210	275	135	8
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	181	5	277	11	8	8	5	147	210	275	135	8
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	181	5	277	11	8	8	5	147	210	275	135	8
Saturation Flow Module:												
Sat/Lane:	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Adjustment:	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00
Lanes:	1.00	0.02	0.98	1.00	0.50	0.50	1.00	0.41	0.59	1.00	0.94	0.06
Final Sat.:	1700	34	1766	1700	900	900	1700	742	1058	1700	1700	100
Capacity Analysis Module:												
Vol/Sat:	0.11	0.16	0.16	0.01	0.01	0.01	0.00	0.20	0.20	0.16	0.08	0.08
Crit Moves:		****		****				****		****		
Green/Cycle:	0.17	0.22	0.22	0.17	0.22	0.22	0.21	0.27	0.27	0.22	0.27	0.27
Volume/Cap:	0.64	0.72	0.72	0.04	0.04	0.04	0.01	0.74	0.74	0.74	0.29	0.29
Delay/Veh:	33.9	32.9	32.9	21.2	18.8	18.8	18.9	30.2	30.2	34.7	18.7	18.7
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	33.9	32.9	32.9	21.2	18.8	18.8	18.9	30.2	30.2	34.7	18.7	18.7
LOS by Move:	C	C	C	C	B	B	B	C	C	C	B	B
HCM2kAvgQ:	4	6	6	0	0	0	0	8	8	7	2	2

****

Note: Queue reported is the number of cars per lane.

****

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 Without Project Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

Intersection #103 Stanfield Cut Off (NS) / Big Bear Blvd. (SR-18) (EW)

****

Cycle (sec): 130 Critical Vol./Cap.(X): 1.139
Loss Time (sec): 8 (Y+R=2.0 sec) Average Delay (sec/veh): 207.6
Optimal Cycle: 180 Level Of Service: F

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Control:	Split Phase			Split Phase			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	24	24	24	24	24	24	10	18	18	10	18	18
Lanes:	0 1	0 0 1		0 1	0 0 1		1 0	1 0 1		1 0	1 0 1	
Volume Module:												
Base Vol:	63	40	69	21	34	265	230	807	49	37	635	22
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	77	49	84	26	41	323	281	985	60	45	775	27
Added Vol:	0	0	0	13	0	71	68	294	0	0	215	8
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	77	49	84	39	41	394	349	1279	60	45	990	35
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
PHF Volume:	80	51	88	40	43	410	362	1329	62	47	1029	36
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	80	51	88	40	43	410	362	1329	62	47	1029	36
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	80	51	88	40	43	410	362	1329	62	47	1029	36
Saturation Flow Module:												
Sat/Lane:	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Adjustment:	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00
Lanes:	0.63	0.37	1.00	0.50	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1063	675	1800	844	906	1800	1700	1800	1800	1700	1800	1800
Capacity Analysis Module:												
Vol/Sat:	0.08	0.08	0.05	0.05	0.05	0.23	0.21	0.74	0.03	0.03	0.57	0.02
Crit Moves:		****				****		****		****		
Green/Cycle:	0.18	0.18	0.18	0.18	0.18	0.18	0.15	0.49	0.49	0.08	0.41	0.41
Volume/Cap:	0.41	0.41	0.26	0.26	0.26	1.23	1.38	1.50	0.07	0.36	1.38	0.05
Delay/Veh:	50.5	50.5	47.3	47.3	47.3	181.4	247.4	257	13.7	64.5	212	20.1
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	50.5	50.5	47.3	47.3	47.3	181.4	247.4	257	13.7	64.5	212	20.1
LOS by Move:	D	D	D	D	D	F	F	F	B	E	F	C
HCM2kAvgQ:	5	5	3	3	3	28	30	106	1	2	76	1

****

Note: Queue reported is the number of cars per lane.

****

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 Without Project Conditions With Improvements
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****
Intersection #103 Stanfield Cut Off (NS) / Big Bear Blvd. (SR-18) (EW)
****

Cycle (sec):	80	Critical Vol./Cap.(X):	0.741
Loss Time (sec):	6 (Y+R=2.0 sec)	Average Delay (sec/veh):	26.8
Optimal Cycle:	58	Level Of Service:	C

****

Approach:	North Bound						South Bound						East Bound						West Bound					
Movement:	L	-	T	-	R		L	-	T	-	R		L	-	T	-	R		L	-	T	-	R	
Control:	Permitted						Permitted						Protected						Protected					
Rights:	Include						Include						Include						Include					
Min. Green:	24		24		24		24		24		24		10		18		18		10		18		18	
Lanes:	1	0	0	1	0		1	0	0	1	0		1	0	1	1	0		1	0	1	1	0	
Volume Module:																								
Base Vol:	63		40		69		21		34		265		230		807		49		37		635		22	
Growth Adj:	1.22		1.22		1.22		1.22		1.22		1.22		1.22		1.22		1.22		1.22		1.22		1.22	
Initial Bse:	77		49		84		26		41		323		281		985		60		45		775		27	
Added Vol:	0		0		0		13		0		71		68		294		0		0		215		8	
PasserByVol:	0		0		0		0		0		0		0		0		0		0		0		0	
Initial Fut:	77		49		84		39		41		394		349		1279		60		45		990		35	
User Adj:	1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
PHF Adj:	0.96		0.96		0.96		0.96		0.96		0.96		0.96		0.96		0.96		0.96		0.96		0.96	
PHF Volume:	80		51		88		40		43		410		362		1329		62		47		1029		36	
Reduct Vol:	0		0		0		0		0		0		0		0		0		0		0		0	
Reduced Vol:	80		51		88		40		43		410		362		1329		62		47		1029		36	
PCE Adj:	1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
MLF Adj:	1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.05		1.05		1.00		1.05		1.05	
FinalVolume:	80		51		88		40		43		410		362		1395		65		47		1080		38	
Saturation Flow Module:																								
Sat/Lane:	1800		1800		1800		1800		1800		1800		1800		1800		1800		1800		1800		1800	
Adjustment:	0.94		1.00		1.00		0.94		1.00		1.00		0.94		1.00		1.00		0.94		1.00		1.00	
Lanes:	1.00		0.37		0.63		1.00		0.10		0.90		1.00		1.91		0.09		1.00		1.93		0.07	
Final Sat.:	1700		661		1139		1700		171		1629		1700		3439		161		1700		3478		122	
Capacity Analysis Module:																								
Vol/Sat:	0.05		0.08		0.08		0.02		0.25		0.25		0.21		0.41		0.41		0.03		0.31		0.31	
Crit Moves:									****						****				****					
Green/Cycle:	0.31		0.31		0.31		0.31		0.31		0.31		0.25		0.49		0.49		0.13		0.37		0.37	
Volume/Cap:	0.15		0.25		0.25		0.08		0.82		0.82		0.85		0.82		0.82		0.22		0.85		0.85	
Delay/Veh:	20.4		21.5		21.5		19.6		38.2		38.2		46.8		17.8		17.8		33.9		28.4		28.4	
User DelAdj:	1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00		1.00	
AdjDel/Veh:	20.4		21.5		21.5		19.6		38.2		38.2		46.8		17.8		17.8		33.9		28.4		28.4	
LOS by Move:	C		C		C		B		D		D		D		B		B		C		C		C	
HCM2kAvgQ:	1		2		2		1		13		13		12		16		16		1		15		15	

****
Note: Queue reported is the number of cars per lane.
****

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APPENDIX F

2010 CONDITIONS INTERSECTION ANALYSIS WITH PROJECT

MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #101 Big Bear Blvd (NS)/ North Shore (SR-38) (EW)

Average Delay (sec/veh): OVERFLOW Worst Case Level Of Service: F[xxxxx]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Channel			Include		
Lanes:	0 0 1!	0	0	0 0	0	0	0 0	1	0 1	1 0	1	0 0
Volume Module:												
Base Vol:	24	0	27	0	0	0	0	322	21	87	300	0
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	29	0	33	0	0	0	0	393	26	106	366	0
Added Vol:	226	0	6	0	0	0	0	77	314	4	45	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	255	0	39	0	0	0	0	470	340	110	411	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
PHF Volume:	305	0	47	0	0	0	0	562	406	132	492	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	305	0	47	0	0	0	0	562	406	132	492	0
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	6.5	6.2	7.1	6.5	xxxxx
FollowUpTim:	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	4.0	3.3	3.5	4.0	xxxxx
Capacity Module:												
Cnflict Vol:	0	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	657	0	915	634	xxxxx
Potent Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	387	900	256	399	xxxxx
Move Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	229	900	0	236	xxxxx
Volume/Cap:	0.34	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	2.46	0.45	xxxx	2.08	xxxx
Level Of Service Module:												
2Way95thQ:	1.5	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	46.2	2.4	xxxx	36.9	xxxxx
Control Del:	11.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	701	12.2	xxxxx	535	xxxxx
LOS by Move:	B	*	*	*	*	*	*	F	B	*	F	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			412.0			xxxxxx		
ApproachLOS:	*			*			F			F		

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions With Improvements
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

Intersection #101 Big Bear Blvd (NS)/ North Shore (SR-38) (EW)

****

Cycle (sec): 60 Critical Vol./Cap.(X): 0.536
Loss Time (sec): 6 (Y+R=4.0 sec) Average Delay (sec/veh): 14.0
Optimal Cycle: 47 Level Of Service: B

****

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	-	T	- R	L	-	T	- R	L	-	T	- R	L	-	T	- R
Control:	Split Phase				Split Phase				Protected				Protected			
Rights:	Include				Include				Include				Include			
Min. Green:	17		0	17	0		0	0	0		12	12	12		12	0
Lanes:	1	0	0	0 1	0	0	0	0 0	0	0	2	0 1	1	0	1	0 0
Volume Module:																
Base Vol:	24		0	27	0		0	0	0		322	21	87		300	0
Growth Adj:	1.22	1.22		1.22	1.22	1.22		1.22	1.22	1.22		1.22	1.22	1.22		1.22
Initial Bse:	29		0	33	0		0	0	0		393	26	106		366	0
Added Vol:	226		0	6	0		0	0	0		77	314	4		45	0
PasserByVol:	0		0	0	0		0	0	0		0	0	0		0	0
Initial Fut:	255		0	39	0		0	0	0		470	340	110		411	0
User Adj:	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
PHF Adj:	0.84	0.84		0.84	0.84	0.84		0.84	0.84	0.84		0.84	0.84	0.84		0.84
PHF Volume:	305		0	47	0		0	0	0		562	406	132		492	0
Reduct Vol:	0		0	0	0		0	0	0		0	0	0		0	0
Reduced Vol:	305		0	47	0		0	0	0		562	406	132		492	0
PCE Adj:	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00
MLF Adj:	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.05		1.00	1.00	1.00		1.00
FinalVolume:	305		0	47	0		0	0	0		590	406	132		492	0
Saturation Flow Module:																
Sat/Lane:	1800	1800		1800	1800	1800		1800	1800	1800		1800	1800	1800		1800
Adjustment:	0.94	1.00		1.00	0.94	1.00		1.00	0.94	1.00		1.00	0.94	1.00		1.00
Lanes:	1.00	0.00		1.00	0.00	0.00		0.00	0.00	2.00		1.00	1.00	1.00		0.00
Final Sat.:	1700		0	1800	0		0	0	0		3600	1800	1700		1800	0
Capacity Analysis Module:																
Vol/Sat:	0.18	0.00		0.03	0.00	0.00		0.00	0.00		0.16	0.23	0.08		0.27	0.00
Crit Moves:	****											****	****			
Green/Cycle:	0.31	0.00		0.31	0.00	0.00		0.00	0.00		0.39	0.39	0.20		0.59	0.00
Volume/Cap:	0.58	0.00		0.08	0.00	0.00		0.00	0.00		0.42	0.58	0.39		0.46	0.00
Delay/Veh:	21.6	0.0		14.6	0.0	0.0		0.0	0.0		13.0	16.5	24.1		5.6	0.0
User DelAdj:	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	1.00
AdjDel/Veh:	21.6	0.0		14.6	0.0	0.0		0.0	0.0		13.0	16.5	24.1		5.6	0.0
LOS by Move:	C	A		B	A	A		A	A		B	B	C		A	A
HCM2kAvgQ:	5	0		1	0	0		0	0		4	6	3		4	0

****

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

****
Intersection #102 Stanfield Cut Off (NS) / North Shore Dr. (EW)
****
Average Delay (sec/veh): 78.9 Worst Case Level Of Service: F[200.1]
****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0	1! 0	0	0 1	0 0	0	0 0	0 1	0	0 0	1! 0	0
Volume Module:												
Base Vol:	58	5	208	5	10	0	0	74	70	218	54	6
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	71	6	254	6	12	0	0	90	85	266	66	7
Added Vol:	50	0	43	0	0	0	0	41	57	38	27	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	121	6	297	6	12	0	0	131	142	304	93	7
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	135	7	331	7	14	0	0	146	159	339	104	8
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	135	7	331	7	14	0	0	146	159	339	104	8
Critical Gap Module:												
Critical Gp:	7.1	6.5	6.2	7.1	6.5	xxxxx	xxxxx	xxxx	xxxxx	4.1	xxxx	xxxxx
FollowUpTim:	3.5	4.0	3.3	3.5	4.0	xxxxx	xxxxx	xxxx	xxxxx	2.2	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	1018	1015	226	1180	1090	xxxxx	xxxx	xxxx	xxxxx	305	xxxx	xxxxx
Potent Cap.:	218	240	819	169	217	xxxxx	xxxx	xxxx	xxxxx	1267	xxxx	xxxxx
Move Cap.:	151	161	819	73	145	xxxxx	xxxx	xxxx	xxxxx	1267	xxxx	xxxxx
Volume/Cap:	0.89	0.04	0.40	0.09	0.09	xxxx	xxxx	xxxx	xxxx	0.27	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	1.1	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	8.9	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	*	*	*	A	*	*
Movement:	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT
Shared Cap.:	xxxx	353	xxxxx	109	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	22.7	xxxxx	0.7	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	200	xxxxx	45.5	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	F	*	E	*	*	*	*	*	*	*	*
ApproachDel:		200.1			45.5			xxxxxx			xxxxxx	
ApproachLOS:		F			E			*			*	

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Note: Queue reported is the number of cars per lane.
****

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions With Improvements
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

Intersection #102 Stanfield Cut Off (NS) / North Shore Dr. (EW)

****

Cycle (sec):	60	Critical Vol./Cap.(X):	0.647
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	32.4
Optimal Cycle:	54	Level Of Service:	C

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T	- R		L - T	- R		L - T	- R		L - T	- R	
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	13	13	10	13	13	10	13	13	10	13	13
Lanes:	1 0	0 1	0	1 0	0 1	0	1 0	0 1	0	1 0	0 1	0
Volume Module:												
Base Vol:	58	5	208	5	10	0	0	74	70	218	54	6
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	71	6	254	6	12	0	0	90	85	266	66	7
Added Vol:	50	0	43	0	0	0	0	41	57	38	27	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	121	6	297	6	12	0	0	131	142	304	93	7
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PHF Volume:	135	7	331	7	14	0	0	146	159	339	104	8
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	135	7	331	7	14	0	0	146	159	339	104	8
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	135	7	331	7	14	0	0	146	159	339	104	8
Saturation Flow Module:												
Sat/Lane:	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Adjustment:	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00
Lanes:	1.00	0.02	0.98	1.00	1.00	0.00	1.00	0.48	0.52	1.00	0.93	0.07
Final Sat.:	1700	36	1764	1700	1800	0	1700	863	937	1700	1669	131
Capacity Analysis Module:												
Vol/Sat:	0.08	0.19	0.19	0.00	0.01	0.00	0.00	0.17	0.17	0.20	0.06	0.06
Crit Moves:		****		****				****		****		
Green/Cycle:	0.17	0.23	0.23	0.17	0.23	0.00	0.00	0.22	0.22	0.25	0.47	0.47
Volume/Cap:	0.45	0.80	0.80	0.02	0.03	0.00	0.00	0.78	0.78	0.80	0.13	0.13
Delay/Veh:	27.2	36.4	36.4	21.1	18.2	0.0	0.0	36.6	36.6	35.8	7.8	7.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	27.2	36.4	36.4	21.1	18.2	0.0	0.0	36.6	36.6	35.8	7.8	7.8
LOS by Move:	C	D	D	C	B	A	A	D	D	D	A	A
HCM2kAvgQ:	3	8	8	0	0	0	0	8	8	9	1	1

****

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #103 Stanfield Cut Off (NS) / Big Bear Blvd. (SR-18) (EW)

Cycle (sec):	130	Critical Vol./Cap.(X):	1.145
Loss Time (sec):	8 (Y+R=2.0 sec)	Average Delay (sec/veh):	245.3
Optimal Cycle:	180	Level Of Service:	F

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Control:	Split Phase			Split Phase			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	24	24	24	24	24	24	10	18	18	10	18	18
Lanes:	0 1	0 0	1	0 1	0 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	61	18	61	12	28	256	287	872	77	17	664	13
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	74	22	74	15	34	312	350	1064	94	21	810	16
Added Vol:	0	0	0	16	0	79	81	294	0	0	215	13
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	74	22	74	31	34	391	431	1358	94	21	1025	29
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
PHF Volume:	77	23	77	32	35	404	445	1403	97	21	1059	30
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	77	23	77	32	35	404	445	1403	97	21	1059	30
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	77	23	77	32	35	404	445	1403	97	21	1059	30
Saturation Flow Module:												
Sat/Lane:	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Adjustment:	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00
Lanes:	0.78	0.22	1.00	0.49	0.51	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1329	392	1800	828	923	1800	1700	1800	1800	1700	1800	1800
Capacity Analysis Module:												
Vol/Sat:	0.06	0.06	0.04	0.04	0.04	0.22	0.26	0.78	0.05	0.01	0.59	0.02
Crit Moves:	****					****		****		****		
Green/Cycle:	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.49	0.49	0.08	0.39	0.39
Volume/Cap:	0.31	0.31	0.23	0.21	0.21	1.22	1.49	1.58	0.11	0.16	1.49	0.04
Delay/Veh:	48.4	48.4	46.8	46.4	46.4	174.8	292.8	293	14.0	58.8	265	22.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	48.4	48.4	46.8	46.4	46.4	174.8	292.8	293	14.0	58.8	265	22.0
LOS by Move:	D	D	D	D	D	F	F	F	B	E	F	C
HCM2kAvgQ:	4	4	3	2	2	28	39	118	1	1	85	1

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions With Improvements
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #103 Stanfield Cut Off (NS) / Big Bear Blvd. (SR-18) (EW)

Cycle (sec):	80	Critical Vol./Cap.(X):	0.891
Loss Time (sec):	6 (Y+R=2.0 sec)	Average Delay (sec/veh):	32.5
Optimal Cycle:	82	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	24	24	24	24	24	24	10	18	18	10	18	18
Lanes:	1 0	0 1	0	1 0	0 1	0	1 0	1 1	0	1 0	1 1	0
Volume Module:												
Base Vol:	61	18	61	12	28	256	287	872	77	17	664	13
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	74	22	74	15	34	312	350	1064	94	21	810	16
Added Vol:	0	0	0	16	0	79	81	294	0	0	215	13
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	74	22	74	31	34	391	431	1358	94	21	1025	29
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
PHF Volume:	77	23	77	32	35	404	445	1403	97	21	1059	30
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	77	23	77	32	35	404	445	1403	97	21	1059	30
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05	1.05	1.00	1.05	1.05
FinalVolume:	77	23	77	32	35	404	445	1473	102	21	1112	31
Saturation Flow Module:												
Sat/Lane:	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Adjustment:	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00
Lanes:	1.00	0.23	0.77	1.00	0.08	0.92	1.00	1.87	0.13	1.00	1.95	0.05
Final Sat.:	1700	410	1390	1700	145	1655	1700	3367	233	1700	3501	99
Capacity Analysis Module:												
Vol/Sat:	0.05	0.06	0.06	0.02	0.24	0.24	0.26	0.44	0.44	0.01	0.32	0.32
Crit Moves:					****		****				****	
Green/Cycle:	0.30	0.30	0.30	0.30	0.30	0.30	0.28	0.49	0.49	0.14	0.34	0.34
Volume/Cap:	0.15	0.18	0.18	0.06	0.81	0.81	0.93	0.90	0.90	0.09	0.93	0.93
Delay/Veh:	20.9	21.2	21.2	19.9	38.2	38.2	54.3	22.7	22.7	30.8	37.3	37.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	20.9	21.2	21.2	19.9	38.2	38.2	54.3	22.7	22.7	30.8	37.3	37.3
LOS by Move:	C	C	C	B	D	D	D	C	C	C	D	D
HCM2kAvgQ:	1	2	2	1	12	12	16	21	21	1	18	18

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #104 Site Driveway #1 (NS)/ North Shore (SR-38) (EW)

Average Delay (sec/veh): 0.2 Worst Case Level Of Service: B[11.1]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 0	0 0		0 0	1! 0	0	0 1	0 0	0	0 0	0 1	0
Volume Module:												
Base Vol:	0	0	0	0	0	0	0	144	0	0	112	0
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	0	0	0	0	0	0	0	176	0	0	137	0
Added Vol:	0	0	0	5	0	2	3	91	0	0	59	8
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	5	0	2	3	267	0	0	196	8
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	0	0	0	5	0	2	3	281	0	0	206	8
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	0	0	5	0	2	3	281	0	0	206	8
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	6.4	6.5	6.2	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	3.5	4.0	3.3	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	497	497	210	214	xxxx	xxxxx	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	536	477	835	1368	xxxx	xxxxx	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	535	476	835	1368	xxxx	xxxxx	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	0.01	0.00	0.00	0.00	xxxx	xxxx	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	7.6	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	A	*	*	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	596	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	0.0	xxxxx	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	11.1	xxxxx	7.6	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	B	*	A	*	*	*	*	*
ApproachDel:	xxxxxx			11.1			xxxxxx			xxxxxx		
ApproachLOS:	*			B			*			*		

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

****

Intersection #105 Site Driveway #2 (NS)/ North Shore (SR-38) (EW)

****

Average Delay (sec/veh): 0.4 Worst Case Level Of Service: B[11.2]

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0	0 0	0	0 0	1! 0	0	0 1	0 0	0	0 0	0 1	0
Volume Module:												
Base Vol:	0	0	0	0	0	0	0	144	0	0	112	0
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	0	0	0	0	0	0	0	176	0	0	137	0
Added Vol:	0	0	0	9	0	4	6	89	0	0	63	14
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	9	0	4	6	265	0	0	200	14
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	0	0	0	9	0	4	6	279	0	0	210	15
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	0	0	9	0	4	6	279	0	0	210	15
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	6.4	6.5	6.2	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	3.5	4.0	3.3	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	509	509	218	225	xxxx	xxxxx	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	528	470	827	1356	xxxx	xxxxx	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	526	468	827	1356	xxxx	xxxxx	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	0.02	0.00	0.01	0.00	xxxx	xxxx	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	7.7	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	A	*	*	*	*	*
Movement:	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	592	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	0.1	xxxxx	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	11.2	xxxxx	7.7	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	B	*	A	*	*	*	*	*
ApproachDel:	xxxxxx			11.2			xxxxxx			xxxxxx		
ApproachLOS:	*			B			*			*		

****

Note: Queue reported is the number of cars per lane.

****

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #101 Big Bear Blvd (NS)/ North Shore (SR-38) (EW)

Average Delay (sec/veh): OVERFLOW Worst Case Level Of Service: F[xxxxx]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Channel			Include		
Lanes:	0 0 1! 0 0			0 0 0 0 0			0 0 1 0 1			1 0 1 0 0		
Volume Module:												
Base Vol:	40	0	94	0	0	0	0	958	33	67	411	0
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	49	0	115	0	0	0	0	1169	40	82	501	0
Added Vol:	226	0	3	0	0	0	0	87	314	2	51	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	275	0	118	0	0	0	0	1256	354	84	552	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
PHF Volume:	301	0	129	0	0	0	0	1377	388	92	606	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	301	0	129	0	0	0	0	1377	388	92	606	0
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	6.5	6.2	7.1	6.5	xxxxx
FollowUpTim:	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	4.0	3.3	3.5	4.0	xxxxx
Capacity Module:												
Cnflict Vol:	0	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	732	0	1356	667	xxxxx
Potent Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	351	900	128	382	xxxxx
Move Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	210	900	0	228	xxxxx
Volume/Cap:	0.33	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	6.56	0.43	xxxx	2.65	xxxx
Level Of Service Module:												
2Way95thQ:	1.5	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	149	2.2	xxxx	51.6	xxxxx
Control Del:	11.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	2546	12.0	xxxxx	788	xxxxx
LOS by Move:	B	*	*	*	*	*	*	F	B	*	F	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			1988.3			xxxxxx		
ApproachLOS:	*			*			F			F		

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions With Improvements
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

Intersection #101 Big Bear Blvd (NS)/ North Shore (SR-38) (EW)

****

Cycle (sec):	60	Critical Vol./Cap.(X):	0.703
Loss Time (sec):	6 (Y+R=4.0 sec)	Average Delay (sec/veh):	22.1
Optimal Cycle:	47	Level Of Service:	C

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Split Phase			Split Phase			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	17	0	17	0	0	0	0	12	12	12	12	0
Lanes:	1 0 0 0 1			0 0 0 0 0			0 0 2 0 1			1 0 1 0 0		
Volume Module:												
Base Vol:	40	0	94	0	0	0	0	958	33	67	411	0
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	49	0	115	0	0	0	0	1169	40	82	501	0
Added Vol:	226	0	3	0	0	0	0	87	314	2	51	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	275	0	118	0	0	0	0	1256	354	84	552	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
PHF Volume:	301	0	129	0	0	0	0	1377	388	92	606	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	301	0	129	0	0	0	0	1377	388	92	606	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05	1.00	1.00	1.00	1.00
FinalVolume:	301	0	129	0	0	0	0	1446	388	92	606	0
Saturation Flow Module:												
Sat/Lane:	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Adjustment:	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	2.00	1.00	1.00	1.00	0.00
Final Sat.:	1700	0	1800	0	0	0	0	3600	1800	1700	1800	0
Capacity Analysis Module:												
Vol/Sat:	0.18	0.00	0.07	0.00	0.00	0.00	0.00	0.40	0.22	0.05	0.34	0.00
Crit Moves:	****							****		****		
Green/Cycle:	0.28	0.00	0.28	0.00	0.00	0.00	0.00	0.42	0.42	0.20	0.62	0.00
Volume/Cap:	0.63	0.00	0.25	0.00	0.00	0.00	0.00	0.96	0.52	0.27	0.55	0.00
Delay/Veh:	24.7	0.0	17.8	0.0	0.0	0.0	0.0	31.0	14.0	22.2	5.5	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	24.7	0.0	17.8	0.0	0.0	0.0	0.0	31.0	14.0	22.2	5.5	0.0
LOS by Move:	C	A	B	A	A	A	A	C	B	C	A	A
HCM2kAvgQ:	6	0	2	0	0	0	0	19	5	2	4	0

****

Note: Queue reported is the number of cars per lane.

****

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

****
Intersection #102 Stanfield Cut Off (NS) / North Shore Dr. (EW)
****
Average Delay (sec/veh): 99.4 Worst Case Level Of Service: F[263.2]
****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 1! 0 0			0 0 1! 0 0			0 0 1! 0 0			0 0 1! 0 0		
Volume Module:												
Base Vol:	110	4	174	8	6	6	4	80	120	177	84	6
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	134	5	212	10	7	7	5	98	146	216	102	7
Added Vol:	46	0	43	0	0	0	0	40	55	38	25	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	180	5	255	10	7	7	5	138	201	254	127	7
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PHF Volume:	195	5	277	11	8	8	5	149	218	275	138	8
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	195	5	277	11	8	8	5	149	218	275	138	8
Critical Gap Module:												
Critical Gp:	7.1	6.5	6.2	7.1	6.5	6.2	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx
FollowUpTim:	3.5	4.0	3.3	3.5	4.0	3.3	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	969	965	258	1102	1070	142	146	xxxx	xxxxx	367	xxxx	xxxxx
Potent Cap.:	235	257	785	191	223	911	1448	xxxx	xxxxx	1202	xxxx	xxxxx
Move Cap.:	177	187	785	96	162	911	1448	xxxx	xxxxx	1202	xxxx	xxxxx
Volume/Cap:	1.10	0.03	0.35	0.11	0.05	0.01	0.00	xxxx	xxxx	0.23	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	0.9	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	7.5	xxxx	xxxxx	8.9	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	A	*	*	A	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	322	xxxxx	xxxx	157	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	26.2	xxxxx	xxxxx	0.6	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	263	xxxxx	xxxxx	32.5	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	F	*	*	D	*	*	*	*	*	*	*
ApproachDel:	263.2			32.5			xxxxxx			xxxxxx		
ApproachLOS:	F			D			*			*		

****
Note: Queue reported is the number of cars per lane.
****

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions With Improvements
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

****

Intersection #102 Stanfield Cut Off (NS) / North Shore Dr. (EW)

****

Cycle (sec):	60	Critical Vol./Cap.(X):	0.610
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	31.5
Optimal Cycle:	54	Level Of Service:	C

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	10	13	13	10	13	13	10	13	13	10	13	13
Lanes:	1 0 0	1 0		1 0 0	1 0		1 0 0	1 0		1 0 0	1 0	
Volume Module:												
Base Vol:	110	4	174	8	6	6	4	80	120	177	84	6
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	134	5	212	10	7	7	5	98	146	216	102	7
Added Vol:	46	0	43	0	0	0	0	40	55	38	25	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	180	5	255	10	7	7	5	138	201	254	127	7
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
PHF Volume:	195	5	277	11	8	8	5	149	218	275	138	8
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	195	5	277	11	8	8	5	149	218	275	138	8
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	195	5	277	11	8	8	5	149	218	275	138	8
Saturation Flow Module:												
Sat/Lane:	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Adjustment:	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00
Lanes:	1.00	0.02	0.98	1.00	0.50	0.50	1.00	0.41	0.59	1.00	0.95	0.05
Final Sat.:	1700	34	1766	1700	900	900	1700	731	1069	1700	1702	98
Capacity Analysis Module:												
Vol/Sat:	0.11	0.16	0.16	0.01	0.01	0.01	0.00	0.20	0.20	0.16	0.08	0.08
Crit Moves:		****		****				****		****		
Green/Cycle:	0.17	0.22	0.22	0.17	0.22	0.22	0.21	0.27	0.27	0.21	0.27	0.27
Volume/Cap:	0.69	0.72	0.72	0.04	0.04	0.04	0.01	0.76	0.76	0.76	0.30	0.30
Delay/Veh:	36.4	32.9	32.9	21.2	18.8	18.8	18.9	30.7	30.7	35.8	18.8	18.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	36.4	32.9	32.9	21.2	18.8	18.8	18.9	30.7	30.7	35.8	18.8	18.8
LOS by Move:	D	C	C	C	B	B	B	C	C	D	B	B
HCM2kAvgQ:	5	6	6	0	0	0	0	8	8	7	2	2

****

Note: Queue reported is the number of cars per lane.

****

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #103 Stanfield Cut Off (NS) / Big Bear Blvd. (SR-18) (EW)

Cycle (sec):	130	Critical Vol./Cap.(X):	1.143
Loss Time (sec):	8 (Y+R=2.0 sec)	Average Delay (sec/veh):	210.8
Optimal Cycle:	180	Level Of Service:	F

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Split Phase			Split Phase			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	24	24	24	24	24	24	10	18	18	10	18	18
Lanes:	0 1	0 0	1	0 1	0 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	63	40	69	21	34	265	230	807	49	37	635	22
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	77	49	84	26	41	323	281	985	60	45	775	27
Added Vol:	0	0	0	14	0	78	80	294	0	0	215	9
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	77	49	84	40	41	401	361	1279	60	45	990	36
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
PHF Volume:	80	51	88	41	43	417	375	1329	62	47	1029	37
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	80	51	88	41	43	417	375	1329	62	47	1029	37
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	80	51	88	41	43	417	375	1329	62	47	1029	37
Saturation Flow Module:												
Sat/Lane:	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Adjustment:	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00
Lanes:	0.63	0.37	1.00	0.50	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1063	675	1800	855	895	1800	1700	1800	1800	1700	1800	1800
Capacity Analysis Module:												
Vol/Sat:	0.08	0.08	0.05	0.05	0.05	0.23	0.22	0.74	0.03	0.03	0.57	0.02
Crit Moves:		****				****		****		****		
Green/Cycle:	0.18	0.18	0.18	0.18	0.18	0.18	0.16	0.49	0.49	0.08	0.41	0.41
Volume/Cap:	0.41	0.41	0.26	0.26	0.26	1.26	1.39	1.50	0.07	0.36	1.39	0.05
Delay/Veh:	50.5	50.5	47.3	47.4	47.4	190.2	252.1	257	13.7	64.5	218	20.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	50.5	50.5	47.3	47.4	47.4	190.2	252.1	257	13.7	64.5	218	20.5
LOS by Move:	D	D	D	D	D	F	F	F	B	E	F	C
HCM2kAvgQ:	5	5	3	3	3	29	31	106	1	2	77	1

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions With Improvements
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #103 Stanfield Cut Off (NS) / Big Bear Blvd. (SR-18) (EW)

Cycle (sec):	80	Critical Vol./Cap.(X):	0.745
Loss Time (sec):	6 (Y+R=2.0 sec)	Average Delay (sec/veh):	27.6
Optimal Cycle:	58	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	24	24	24	24	24	24	10	18	18	10	18	18
Lanes:	1 0	0 1	0	1 0	0 1	0	1 0	1 1	0	1 0	1 1	0
Volume Module:												
Base Vol:	63	40	69	21	34	265	230	807	49	37	635	22
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22
Initial Bse:	77	49	84	26	41	323	281	985	60	45	775	27
Added Vol:	0	0	0	14	0	78	80	294	0	0	215	9
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	77	49	84	40	41	401	361	1279	60	45	990	36
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
PHF Volume:	80	51	88	41	43	417	375	1329	62	47	1029	37
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	80	51	88	41	43	417	375	1329	62	47	1029	37
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.05	1.05	1.00	1.05	1.05
FinalVolume:	80	51	88	41	43	417	375	1395	65	47	1080	39
Saturation Flow Module:												
Sat/Lane:	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Adjustment:	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00	0.94	1.00	1.00
Lanes:	1.00	0.37	0.63	1.00	0.09	0.91	1.00	1.91	0.09	1.00	1.93	0.07
Final Sat.:	1700	661	1139	1700	169	1631	1700	3439	161	1700	3474	126
Capacity Analysis Module:												
Vol/Sat:	0.05	0.08	0.08	0.02	0.26	0.26	0.22	0.41	0.41	0.03	0.31	0.31
Crit Moves:					****			****		****		
Green/Cycle:	0.31	0.31	0.31	0.31	0.31	0.31	0.26	0.49	0.49	0.13	0.36	0.36
Volume/Cap:	0.15	0.25	0.25	0.08	0.83	0.83	0.86	0.83	0.83	0.22	0.86	0.86
Delay/Veh:	20.2	21.3	21.3	19.4	38.3	38.3	48.2	18.2	18.2	33.9	30.0	30.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	20.2	21.3	21.3	19.4	38.3	38.3	48.2	18.2	18.2	33.9	30.0	30.0
LOS by Move:	C	C	C	B	D	D	D	B	B	C	C	C
HCM2kAvgQ:	1	2	2	1	13	13	12	16	16	1	16	16

Note: Queue reported is the number of cars per lane.

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

****
Intersection #104 Site Driveway #1 (NS)/ North Shore (SR-38) (EW)
****
Average Delay (sec/veh): 0.2 Worst Case Level Of Service: B[12.0]
****

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Rights:	Include					Include					Include					Include				
Lanes:	0	0	0	0	0	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Volume Module:																				
Base Vol:	0	0	0	0	0	0	0				0	204	0			0	200	0		
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22				1.22	1.22	1.22			1.22	1.22	1.22		
Initial Bse:	0	0	0	0	0	0	0				0	249	0			0	244	0		
Added Vol:	0	0	0	3	0	3	6				6	95	0			0	61	5		
PasserByVol:	0	0	0	0	0	0	0				0	0	0			0	0	0		
Initial Fut:	0	0	0	3	0	3	6				6	344	0			0	305	5		
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00			1.00	1.00	1.00		
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95				0.95	0.95	0.95			0.95	0.95	0.95		
PHF Volume:	0	0	0	3	0	3	6				6	362	0			0	321	5		
Reduct Vol:	0	0	0	0	0	0	0				0	0	0			0	0	0		
FinalVolume:	0	0	0	3	0	3	6				6	362	0			0	321	5		
Critical Gap Module:																				
Critical Gp:	xxxxx	xxxx	xxxxx	6.4	6.5	6.2	4.1				xxxx	xxxxx	xxxxx			xxxx	xxxxx			
FollowUpTim:	xxxxx	xxxx	xxxxx	3.5	4.0	3.3	2.2				xxxx	xxxxx	xxxxx			xxxx	xxxxx			
Capacity Module:																				
Cnflict Vol:	xxxx	xxxx	xxxxx	698	698	324	326				xxxx	xxxxx	xxxx			xxxx	xxxxx			
Potent Cap.:	xxxx	xxxx	xxxxx	409	367	722	1245				xxxx	xxxxx	xxxx			xxxx	xxxxx			
Move Cap.:	xxxx	xxxx	xxxxx	408	365	722	1245				xxxx	xxxxx	xxxx			xxxx	xxxxx			
Volume/Cap:	xxxx	xxxx	xxxx	0.01	0.00	0.00	0.01				xxxx	xxxx	xxxx			xxxx	xxxx			
Level Of Service Module:																				
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.0				xxxx	xxxxx	xxxx			xxxx	xxxxx			
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	7.9				xxxx	xxxxx	xxxxx			xxxx	xxxxx			
LOS by Move:	*	*	*	*	*	*	A				*	*	*			*	*			
Movement:	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	521	xxxxx	xxxx				xxxx	xxxxx	xxxx			xxxx	xxxxx			
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	0.0	xxxxx	0.0				xxxx	xxxxx	xxxxx			xxxx	xxxxx			
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	12.0	xxxxx	7.9				xxxx	xxxxx	xxxxx			xxxx	xxxxx			
Shared LOS:	*	*	*	*	B	*	A				*	*	*			*	*			
ApproachDel:	xxxxxx				12.0		xxxxxx						xxxxxx							
ApproachLOS:	*				B						*					*				

****
Note: Queue reported is the number of cars per lane.
****

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MOON CAMP (TT 16136) TRAFFIC IMPACT ANALYSIS (JN 04409)
2010 With Project Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #105 Site Driveway #2 (NS)/ North Shore (SR-38) (EW)

Average Delay (sec/veh): 0.3 Worst Case Level Of Service: B[12.1]

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Stop Sign					Stop Sign					Uncontrolled					Uncontrolled				
Rights:	Include					Include					Include					Include				
Lanes:	0	0	0	0	0	0	0	1!	0	0	0	1	0	0	0	0	0	0	1	0
Volume Module:																				
Base Vol:	0	0	0	0	0	0	0	0	0	0	0	204	0	0	0	0	200	0		
Growth Adj:	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22	1.22		
Initial Bse:	0	0	0	0	0	0	0	0	0	0	0	249	0	0	0	0	244	0		
Added Vol:	0	0	0	6	0	6	10	88	0	0	0	60	11							
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0	0							
Initial Fut:	0	0	0	6	0	6	10	337	0	0	0	304	11							
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00							
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95							
PHF Volume:	0	0	0	6	0	6	11	355	0	0	320	12								
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0								
FinalVolume:	0	0	0	6	0	6	11	355	0	0	320	12								
Critical Gap Module:																				
Critical Gp:	xxxxx	xxxx	xxxxx	6.4	6.5	6.2	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx								
FollowUpTim:	xxxxx	xxxx	xxxxx	3.5	4.0	3.3	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx								
Capacity Module:																				
Cnflict Vol:	xxxx	xxxx	xxxxx	701	701	326	332	xxxx	xxxxx	xxxx	xxxx	xxxxx								
Potent Cap.:	xxxx	xxxx	xxxxx	408	365	720	1239	xxxx	xxxxx	xxxx	xxxx	xxxxx								
Move Cap.:	xxxx	xxxx	xxxxx	405	362	720	1239	xxxx	xxxxx	xxxx	xxxx	xxxxx								
Volume/Cap:	xxxx	xxxx	xxxx	0.02	0.00	0.01	0.01	xxxx	xxxx	xxxx	xxxx	xxxx								
Level Of Service Module:																				
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx								
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	7.9	xxxx	xxxxx	xxxxx	xxxx	xxxxx								
LOS by Move:	*	*	*	*	*	*	A	*	*	*	*	*								
Movement:	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	518	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx								
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	0.1	xxxxx	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx								
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	12.1	xxxxx	7.9	xxxx	xxxxx	xxxxx	xxxx	xxxxx								
Shared LOS:	*	*	*	*	B	*	A	*	*	*	*	*								
ApproachDel:	xxxxxx			12.1			xxxxxx			xxxxxx										
ApproachLOS:	*			B			*			*										

Note: Queue reported is the number of cars per lane.

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APPENDIX G

POST PROCESSING SHEETS

Project:	MOONCAMP	Job #:	4409
Scenario:	Year 2030 with Project (Sunday MD)	Analyst:	JS
		Date:	4/1/07

LOCATION: Big Bear (NS) / North Shore Drive (SR-38) (EW)
FORECAST YEAR: 2030

INDIVIDUAL TURN VOLUME GROWTH REVIEW

		SUNDAY MD PEAK HOUR INPUT DATA				PM PEAK HOUR INPUT DATA			
APPROACH	TURNING MOVEMENT	IY 2010 VOLUME	GP BUILDOUT VOLUME	DIFF-ERENCE	% CHANGE	EXISTING COUNT	FUTURE VOLUME	DIFF-ERENCE	% CHANGE
NORTH BOUND	Left	275	410	135	49%	0	0	0	#DIV/0!
	Through	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	Right	118	339	221	187%	0	0	0	#DIV/0!
	NB Total	393	749	356	91%	0	0	0	#DIV/0!
SOUTH BOUND	Left	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	Through	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	Right	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	SB Total	0	0	0	#DIV/0!	0	0	0	#DIV/0!
EAST BOUND	Left	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	Through	1,256	1,382	126	10%	0	0	0	#DIV/0!
	Right	354	582	228	64%	0	0	0	#DIV/0!
	EB Total	1,610	1,964	354	22%	0	0	0	#DIV/0!
WEST BOUND	Left	84	238	154	183%	0	0	0	#DIV/0!
	Through	552	607	55	10%	0	0	0	#DIV/0!
	Right	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	WB Total	636	845	209	33%	0	0	0	#DIV/0!
TOTAL ENTERING VOLUME		2,639	3,558	919	35%	0	0	0	#DIV/0!

FORECAST PEAK HOUR TO ADT COMPARISON

		VOLUMES		PERCENT OF ADT		
		SUN MD	PM	SUN MD	PM	ADT
North Leg	Inbound	0	0			
North Leg	Outbound	0	0			
North Leg	**TOTAL**	**0**	**0**	**#DIV/0!**	**#DIV/0!**	**-**
South Leg	Inbound	749	0			
South Leg	Outbound	820	0			
South Leg	**TOTAL**	**1,569**	**0**	**8%**	**0%**	**19,000**
East Leg	Inbound	845	0			
East Leg	Outbound	1,721	0			
East Leg	**TOTAL**	**2,566**	**0**	**10%**	**0%**	**27,000**
West Leg	Inbound	1,964	0			
West Leg	Outbound	1,017	0			
West Leg	**TOTAL**	**2,981**	**0**	**9%**	**0%**	**32,200**
OVERALL TOTAL		***7,116***	**-**	**9%**	***0%***	***78,200***

S:\Carlsbad_Jobs_04400\04409\POSTPROCESSING\SUNDAY\[Big Bear_North Shore.xls]Output (3)

Project:	MOONCAMP	Job #:	4409
Scenario:	Year 2030 with Project (Sunday MD)	Analyst:	JS
		Date:	4/1/07

LOCATION: Stanfield Cutoff (NS) / North Shore Drive (SR-38) (EW)
FORECAST YEAR: 2030

INDIVIDUAL TURN VOLUME GROWTH REVIEW

		SUNDAY MD PEAK HOUR INPUT DATA				PM PEAK HOUR INPUT DATA			
APPROACH	TURNING MOVEMENT	IY 2010 VOLUME	GP BUILDOUT VOLUME	DIFF-ERENCE	% CHANGE	EXISTING COUNT	FUTURE VOLUME	DIFF-ERENCE	% CHANGE
NORTH BOUND	Left	180	301	121	67%	0	0	0	#DIV/0!
	Through	5	6	1	20%	0	0	0	#DIV/0!
	Right	255	281	26	10%	0	0	0	#DIV/0!
	NB Total	440	588	148	34%	0	0	0	#DIV/0!
SOUTH BOUND	Left	10	10	0	0%	0	0	0	#DIV/0!
	Through	7	8	1	14%	0	0	0	#DIV/0!
	Right	7	16	9	129%	0	0	0	#DIV/0!
	SB Total	24	34	10	42%	0	0	0	#DIV/0!
EAST BOUND	Left	5	11	6	120%	0	0	0	#DIV/0!
	Through	138	314	176	128%	0	0	0	#DIV/0!
	Right	201	325	124	62%	0	0	0	#DIV/0!
	EB Total	344	650	306	89%	0	0	0	#DIV/0!
WEST BOUND	Left	254	279	25	10%	0	0	0	#DIV/0!
	Through	127	274	147	116%	0	0	0	#DIV/0!
	Right	7	8	1	14%	0	0	0	#DIV/0!
	WB Total	388	561	173	45%	0	0	0	#DIV/0!
TOTAL ENTERING VOLUME		1,196	1,833	637	53%	0	0	0	#DIV/0!

FORECAST PEAK HOUR TO ADT COMPARISON

		VOLUMES		PERCENT OF ADT		
		SUN MD	PM	SUN MD	PM	ADT
North Leg	Inbound	34	0			
North Leg	Outbound	25	0			
North Leg	**TOTAL**	**59**	**0**	**8%**	**0%**	**700**
South Leg	Inbound	588	0			
South Leg	Outbound	612	0			
South Leg	**TOTAL**	**1,200**	**0**	**10%**	**0%**	**12,000**
East Leg	Inbound	561	0			
East Leg	Outbound	605	0			
East Leg	**TOTAL**	**1,166**	**0**	**11%**	**0%**	**11,000**
West Leg	Inbound	650	0			
West Leg	Outbound	591	0			
West Leg	**TOTAL**	**1,241**	**0**	**8%**	**0%**	**15,000**
OVERALL TOTAL		***3,666***	-	**9%**	**0%**	***38,700***

S:\Carlsbad_Jobs_04400\04409\POSTPROCESSING\SUNDAY\[Stanfield_North Shore.xls]Output (3)

Project:	MOON CAMP	Job #:	4409
Scenario:	Year 2030 with Project (Sunday MD)	Analyst:	JS
		Date:	4/1/07

LOCATION: Stanfield Cutoff (NS) / Big Bear Boulevard (EW)
FORECAST YEAR: 2030

INDIVIDUAL TURN VOLUME GROWTH REVIEW

		SUNDAY MD PEAK HOUR INPUT DATA				PM PEAK HOUR INPUT DATA			
APPROACH	TURNING MOVEMENT	IY 2010 VOLUME	GP BUILDOUT VOLUME	DIFF-ERENCE	% CHANGE	EXISTING COUNT	FUTURE VOLUME	DIFF-ERENCE	% CHANGE
NORTH BOUND	Left	77	85	8	10%	0	0	0	#DIV/0!
	Through	49	55	6	12%	0	0	0	#DIV/0!
	Right	84	96	12	14%	0	0	0	#DIV/0!
	NB Total	210	236	26	12%	0	0	0	#DIV/0!
SOUTH BOUND	Left	40	48	8	20%	0	0	0	#DIV/0!
	Through	41	46	5	12%	0	0	0	#DIV/0!
	Right	401	440	39	10%	0	0	0	#DIV/0!
	SB Total	482	534	52	11%	0	0	0	#DIV/0!
EAST BOUND	Left	361	397	36	10%	0	0	0	#DIV/0!
	Through	1,279	1,426	147	11%	0	0	0	#DIV/0!
	Right	60	63	3	5%	0	0	0	#DIV/0!
	EB Total	1,700	1,886	186	11%	0	0	0	#DIV/0!
WEST BOUND	Left	45	51	6	13%	0	0	0	#DIV/0!
	Through	990	1,085	95	10%	0	0	0	#DIV/0!
	Right	36	43	7	19%	0	0	0	#DIV/0!
	WB Total	1,071	1,179	108	10%	0	0	0	#DIV/0!
TOTAL ENTERING VOLUME		3,463	3,835	372	11%	0	0	0	#DIV/0!

FORECAST PEAK HOUR TO ADT COMPARISON

		VOLUMES		PERCENT OF ADT		
		SUN MD	PM	SUN MD	PM	ADT
North Leg	Inbound	534	0			
North Leg	Outbound	495	0			
North Leg	**TOTAL**	**1,029**	**0**	**8%**	**0%**	**12,300**
South Leg	Inbound	236	0			
South Leg	Outbound	160	0			
South Leg	**TOTAL**	**396**	**0**	**8%**	**0%**	**4,800**
East Leg	Inbound	1,179	0			
East Leg	Outbound	1,570	0			
East Leg	**TOTAL**	**2,749**	**0**	**8%**	**0%**	**32,700**
West Leg	Inbound	1,886	0			
West Leg	Outbound	1,610	0			
West Leg	**TOTAL**	**3,496**	**0**	**8%**	**0%**	**41,800**
OVERALL TOTAL		***7,670***	-	**8%**	***0%***	***91,600***

S:\Carlsbad_Jobs_04400\04409\POSTPROCESSING\SUNDAY\[Stanfield_Big Bear.xls]Output (3)

Project:	MOONCAMP	Job #:	4409
Scenario:	Year 2030 with Project (Friday PM)	Analyst:	JS
		Date:	4/1/07

LOCATION: Northshore (NS) / Big Bear Boulevard (EW)
FORECAST YEAR: 2030

INDIVIDUAL TURN VOLUME GROWTH REVIEW

		FRI PM PEAK HOUR INPUT DATA				PM PEAK HOUR INPUT DATA			
APPROACH	TURNING MOVEMENT	IY 2010 VOLUME	GP BUILDOUT VOLUME	DIFF-ERENCE	% CHANGE	EXISTING COUNT	FUTURE VOLUME	DIFF-ERENCE	% CHANGE
NORTH BOUND	Left	269	383	114	42%	0	0	0	#DIV/0!
	Through	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	Right	39	246	207	531%	0	0	0	#DIV/0!
	NB Total	308	629	321	104%	0	0	0	#DIV/0!
SOUTH BOUND	Left	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	Through	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	Right	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	SB Total	0	0	0	#DIV/0!	0	0	0	#DIV/0!
EAST BOUND	Left	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	Through	470	544	74	16%	0	0	0	#DIV/0!
	Right	353	417	64	18%	0	0	0	#DIV/0!
	EB Total	823	961	138	17%	0	0	0	#DIV/0!
WEST BOUND	Left	110	553	443	403%	0	0	0	#DIV/0!
	Through	411	457	46	11%	0	0	0	#DIV/0!
	Right	0	0	0	#DIV/0!	0	0	0	#DIV/0!
	WB Total	521	1,010	489	94%	0	0	0	#DIV/0!
TOTAL ENTERING VOLUME		1,652	2,600	948	57%	0	0	0	#DIV/0!

FORECAST PEAK HOUR TO ADT COMPARISON

		VOLUMES		PERCENT OF ADT		
		FRI PM	PM	FRI PM	PM	ADT
North Leg	Inbound	0	0			
North Leg	Outbound	0	0			
North Leg	**TOTAL**	**0**	**0**	**#DIV/0!**	**#DIV/0!**	**-**
South Leg	Inbound	629	0			
South Leg	Outbound	970	0			
South Leg	**TOTAL**	**1,599**	**0**	**8%**	**0%**	**19,000**
East Leg	Inbound	1,010	0			
East Leg	Outbound	790	0			
East Leg	**TOTAL**	**1,800**	**0**	**9%**	**0%**	**19,000**
West Leg	Inbound	961	0			
West Leg	Outbound	840	0			
West Leg	**TOTAL**	**1,801**	**0**	**9%**	**0%**	**21,000**
OVERALL TOTAL		***5,200***	***-***	**9%**	***0%***	***59,000***

S:\Carlsbad_Jobs_04400\04409\POSTPROCESSING\FRIDAY\[NorthShore_Big Bear.xls]Output (3)

Project:	MOONCAMP	Job #:	4409
Scenario:	Year 2030 with Project (Friday PM)	Analyst:	JS
		Date:	7/5/06

LOCATION: Stanfield Cutoff (NS) / North Shore Drive (SR-38) (EW)
FORECAST YEAR: 2030

INDIVIDUAL TURN VOLUME GROWTH REVIEW

		FRI PM PEAK HOUR INPUT DATA				PM PEAK HOUR INPUT DATA			
APPROACH	TURNING MOVEMENT	IY 2010 VOLUME	GP BUILDOUT VOLUME	DIFF-ERENCE	% CHANGE	EXISTING COUNT	FUTURE VOLUME	DIFF-ERENCE	% CHANGE
NORTH BOUND	Left	123	445	322	262%	0	0	0	#DIV/0!
	Through	6	11	5	83%	0	0	0	#DIV/0!
	Right	301	331	30	10%	0	0	0	#DIV/0!
	NB Total	430	787	357	83%	0	0	0	#DIV/0!
SOUTH BOUND	Left	6	8	2	33%	0	0	0	#DIV/0!
	Through	12	17	5	42%	0	0	0	#DIV/0!
	Right	1	5	4	400%	0	0	0	#DIV/0!
	SB Total	19	30	11	58%	0	0	0	#DIV/0!
EAST BOUND	Left	1	6	5	500%	0	0	0	#DIV/0!
	Through	131	438	307	234%	0	0	0	#DIV/0!
	Right	144	505	361	251%	0	0	0	#DIV/0!
	EB Total	276	949	673	244%	0	0	0	#DIV/0!
WEST BOUND	Left	307	338	31	10%	0	0	0	#DIV/0!
	Through	93	320	227	244%	0	0	0	#DIV/0!
	Right	7	12	5	71%	0	0	0	#DIV/0!
	WB Total	407	670	263	65%	0	0	0	#DIV/0!
TOTAL ENTERING VOLUME		1,132	2,436	1304	115%	0	0	0	#DIV/0!

FORECAST PEAK HOUR TO ADT COMPARISON

		VOLUMES		PERCENT OF ADT		
		FRI PM	PM	FRI PM	PM	ADT
North Leg	Inbound	30	0			
North Leg	Outbound	29	0			
North Leg	**TOTAL**	**59**	**0**	**11%**	**0%**	**550**
South Leg	Inbound	787	0			
South Leg	Outbound	860	0			
South Leg	**TOTAL**	**1,647**	**0**	**9%**	**0%**	**18,000**
East Leg	Inbound	670	0			
East Leg	Outbound	777	0			
East Leg	**TOTAL**	**1,447**	**0**	**10%**	**0%**	**15,000**
West Leg	Inbound	949	0			
West Leg	Outbound	770	0			
West Leg	**TOTAL**	**1,719**	**0**	**9%**	**0%**	**20,000**
OVERALL TOTAL		***4,872***	**-**	**9%**	***0%***	***53,550***

S:\Carlsbad_Jobs_04400\04409\POSTPROCESSING\FRIDAY\[Stanfield_North Shore.xls]Output (3)

Project:	MOONCAMP	Job #:	4409
Scenario:	Year 2030 with Project (Friday PM)	Analyst:	JS
		Date:	4/12/07

LOCATION: Stanfield Cutoff (NS) / Big Bear Boulevard (EW)
FORECAST YEAR: 2030

INDIVIDUAL TURN VOLUME GROWTH REVIEW

		FRI PM PEAK HOUR INPUT DATA				PM PEAK HOUR INPUT DATA			
APPROACH	TURNING MOVEMENT	IY 2010 VOLUME	GP BUILDOUT VOLUME	DIFF-ERENCE	% CHANGE	EXISTING COUNT	FUTURE VOLUME	DIFF-ERENCE	% CHANGE
NORTH BOUND	Left	74	82	8	11%	0	0	0	#DIV/0!
	Through	22	40	18	82%	0	0	0	#DIV/0!
	Right	74	82	8	11%	0	0	0	#DIV/0!
	NB Total	170	204	34	20%	0	0	0	#DIV/0!
SOUTH BOUND	Left	31	56	25	81%	0	0	0	#DIV/0!
	Through	34	67	33	97%	0	0	0	#DIV/0!
	Right	396	607	211	53%	0	0	0	#DIV/0!
	SB Total	461	730	269	58%	0	0	0	#DIV/0!
EAST BOUND	Left	436	699	263	60%	0	0	0	#DIV/0!
	Through	1,367	1,504	137	10%	0	0	0	#DIV/0!
	Right	94	103	9	10%	0	0	0	#DIV/0!
	EB Total	1,897	2,306	409	22%	0	0	0	#DIV/0!
WEST BOUND	Left	21	34	13	62%	0	0	0	#DIV/0!
	Through	1,033	1,303	270	26%	0	0	0	#DIV/0!
	Right	29	71	42	145%	0	0	0	#DIV/0!
	WB Total	1,083	1,408	325	30%	0	0	0	#DIV/0!
TOTAL ENTERING VOLUME		3,611	4,648	1037	29%	0	0	0	#DIV/0!

FORECAST PEAK HOUR TO ADT COMPARISON

		VOLUMES		PERCENT OF ADT		
		FRI PM	PM	FRI PM	PM	ADT
North Leg	Inbound	730	0			
North Leg	Outbound	810	0			
North Leg	**TOTAL**	**1,540**	**0**	**9%**	**0%**	**18,100**
South Leg	Inbound	204	0			
South Leg	Outbound	204	0			
South Leg	**TOTAL**	**408**	**0**	**10%**	**0%**	**4,200**
East Leg	Inbound	1,408	0			
East Leg	Outbound	1,642	0			
East Leg	**TOTAL**	**3,050**	**0**	**9%**	**0%**	**34,000**
West Leg	Inbound	2,306	0			
West Leg	Outbound	1,992	0			
West Leg	**TOTAL**	**4,298**	**0**	**10%**	**0%**	**45,000**
OVERALL TOTAL		***9,296***	-	**9%**	***0%***	***101,300***

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APPENDIX H

GENERAL PLAN BUILDOUT WITH PROJECT (2030) CONDITIONS
INTERSECTION ANALYSIS

MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #101 Big Bear Blvd (NS)/ North Shore (SR-38) (EW)

Average Delay (sec/veh): OVERFLOW Worst Case Level Of Service: F[xxxxx]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 1!	0	0	0 0	0	0	0 0	1	0 1	1 0	1	0 0
Volume Module:												
Base Vol:	383	0	246	0	0	0	0	544	417	553	457	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	383	0	246	0	0	0	0	544	417	553	457	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	403	0	259	0	0	0	0	573	439	582	481	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	403	0	259	0	0	0	0	573	439	582	481	0
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	6.5	6.2	7.1	6.5	xxxxx
FollowUpTim:	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	4.0	3.3	3.5	4.0	xxxxx
Capacity Module:												
Cnflict Vol:	0	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	1065	0	1222	936	xxxxx
Potent Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	224	900	158	267	xxxxx
Move Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	95	900	0	113	xxxxx
Volume/Cap:	0.45	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	6.04	0.49	xxxx	4.26	xxxx
Level Of Service Module:												
2Way95thQ:	2.3	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	63.1	2.7	xxxx	49.6	xxxxx
Control Del:	12.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	2355	12.7	xxxxx	1544	xxxxx
LOS by Move:	B	*	*	*	*	*	*	F	B	*	F	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			1338.5			xxxxxx		
ApproachLOS:	*			*			F			F		

Note: Queue reported is the number of cars per lane.

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions With Improvements
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #101 Big Bear Blvd (NS)/ North Shore (SR-38) (EW)

Cycle (sec): 65 Critical Vol./Cap.(X): 0.769
Loss Time (sec): 6 (Y+R=4.0 sec) Average Delay (sec/veh): 20.4
Optimal Cycle: 48 Level Of Service: C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Split Phase			Split Phase			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	17	0	17	0	0	0	0	12	12	12	12	0
Lanes:	1 0	0 0	1	0 0	0 0	0	0 0	2 0	1	1 0	1 0	0
Volume Module:												
Base Vol:	383	0	246	0	0	0	0	544	417	553	457	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	383	0	246	0	0	0	0	544	417	553	457	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	403	0	259	0	0	0	0	573	439	582	481	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	403	0	259	0	0	0	0	573	439	582	481	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	403	0	259	0	0	0	0	573	439	582	481	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	2.00	1.00	1.00	1.00	0.00
Final Sat.:	1800	0	1900	0	0	0	0	3800	1900	1800	1900	0
Capacity Analysis Module:												
Vol/Sat:	0.22	0.00	0.14	0.00	0.00	0.00	0.00	0.15	0.23	0.32	0.25	0.00
Crit Moves:	****							****		****		
Green/Cycle:	0.29	0.00	0.29	0.00	0.00	0.00	0.00	0.20	0.49	0.42	0.62	0.00
Volume/Cap:	0.77	0.00	0.47	0.00	0.00	0.00	0.00	0.77	0.47	0.77	0.41	0.00
Delay/Veh:	31.3	0.0	21.6	0.0	0.0	0.0	0.0	32.2	10.5	21.5	4.5	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	31.3	0.0	21.6	0.0	0.0	0.0	0.0	32.2	10.5	21.5	4.5	0.0
LOS by Move:	C	A	C	A	A	A	A	C	B	C	A	A
HCM2kAvgQ:	10	0	4	0	0	0	0	7	5	12	3	0

Note: Queue reported is the number of cars per lane.

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #102 Stanfield Cut Off (NS) / North Shore Dr. (EW)

Average Delay (sec/veh): 7869.9 Worst Case Level Of Service: F[24333.0]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0	1! 0	0	0 0	1! 0	0	0 1	0 1	0	0 0	1! 0	0
Volume Module:												
Base Vol:	445	11	331	8	17	5	6	438	505	338	320	12
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	445	11	331	8	17	5	6	438	505	338	320	12
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	468	12	348	8	18	5	6	461	532	356	337	13
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	468	12	348	8	18	5	6	461	532	356	337	13
Critical Gap Module:												
Critical Gp:	7.1	6.5	6.2	7.1	6.5	6.2	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx
FollowUpTim:	3.5	4.0	3.3	3.5	4.0	3.3	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	1806	1801	496	1304	2060	343	349	xxxx	xxxxx	993	xxxx	xxxxx
Potent Cap.:	62	81	578	139	56	704	1221	xxxx	xxxxx	705	xxxx	xxxxx
Move Cap.:	9	30	578	20	20	704	1221	xxxx	xxxxx	705	xxxx	xxxxx
Volume/Cap:	53.02	0.39	0.60	0.42	0.87	0.01	0.01	xxxx	xxxx	0.50	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	2.9	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	8.0	xxxx	xxxxx	15.2	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	A	*	*	C	*	*
Movement:	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT
Shared Cap.:	xxxx	15	xxxxx	xxxx	24	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	105	xxxxx	xxxxx	3.9	xxxxx	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	527	xxxxx	8.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	F	*	*	F	*	A	*	*	*	*	*
ApproachDel:	xxxxxx			526.9			xxxxxx			xxxxxx		
ApproachLOS:	F			F			*			*		

Note: Queue reported is the number of cars per lane.

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions With Improvements
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #102 Stanfield Cut Off (NS) / North Shore Dr. (EW)

Cycle (sec):	65	Critical Vol./Cap.(X):	0.724
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	34.2
Optimal Cycle:	52	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	10	12	12	10	12	12	10	12	12	10	12	12
Lanes:	2 0	0 1	0	1 0	0 1	0	1 0	1 0	1	1 0	0 1	0
Volume Module:												
Base Vol:	445	11	331	8	17	5	6	438	505	338	320	12
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	445	11	331	8	17	5	6	438	505	338	320	12
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	468	12	348	8	18	5	6	461	532	356	337	13
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	468	12	348	8	18	5	6	461	532	356	337	13
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	468	12	348	8	18	5	6	461	532	356	337	13
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.89	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	2.00	0.03	0.97	1.00	0.77	0.23	1.00	1.00	1.00	1.00	0.96	0.04
Final Sat.:	3378	61	1839	1800	1468	432	1800	1900	1900	1800	1831	69
Capacity Analysis Module:												
Vol/Sat:	0.14	0.19	0.19	0.00	0.01	0.01	0.00	0.24	0.28	0.20	0.18	0.18
Crit Moves:		****		****				****		****		
Green/Cycle:	0.17	0.22	0.22	0.15	0.20	0.20	0.23	0.28	0.45	0.23	0.28	0.28
Volume/Cap:	0.82	0.87	0.87	0.03	0.06	0.06	0.02	0.87	0.63	0.87	0.67	0.67
Delay/Veh:	38.6	46.0	46.0	23.6	21.2	21.2	19.4	39.9	15.0	45.9	27.5	27.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	38.6	46.0	46.0	23.6	21.2	21.2	19.4	39.9	15.0	45.9	27.5	27.5
LOS by Move:	D	D	D	C	C	C	B	D	B	D	C	C
HCM2kAvgQ:	8	10	10	0	0	0	0	12	8	11	7	7

Note: Queue reported is the number of cars per lane.

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

****

Intersection #103 Stanfield Cut Off (NS) / Big Bear Blvd. (SR-18) (EW)

****

Cycle (sec):	180	Critical Vol./Cap.(X):	1.579
Loss Time (sec):	8 (Y+R=2.0 sec)	Average Delay (sec/veh):	303.8
Optimal Cycle:	180	Level Of Service:	F

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Split Phase			Split Phase			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	24	24	24	24	24	24	10	18	18	10	18	18
Lanes:	0 1	0 0	1	0 1	0 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	82	40	82	56	67	607	699	1504	103	34	1303	71
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	82	40	82	56	67	607	699	1504	103	34	1303	71
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
PHF Volume:	85	41	85	58	69	627	722	1554	106	35	1346	73
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	85	41	85	58	69	627	722	1554	106	35	1346	73
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	85	41	85	58	69	627	722	1554	106	35	1346	73
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	0.68	0.32	1.00	0.47	0.53	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1231	601	1900	844	1009	1900	1800	1900	1900	1800	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.07	0.07	0.04	0.07	0.07	0.33	0.40	0.82	0.06	0.02	0.71	0.04
Crit Moves:	****					****	****				****	
Green/Cycle:	0.13	0.13	0.13	0.19	0.19	0.19	0.23	0.58	0.58	0.06	0.40	0.40
Volume/Cap:	0.52	0.52	0.33	0.36	0.36	1.75	1.75	1.41	0.10	0.35	1.75	0.10
Delay/Veh:	80.2	80.2	74.3	66.5	66.5	422.3	417.2	216	10.8	91.3	391	29.8
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	80.2	80.2	74.3	66.5	66.5	422.3	417.2	216	10.8	91.3	391	29.8
LOS by Move:	F	F	E	E	E	F	F	F	B	F	F	C
HCM2kAvgQ:	7	7	4	6	6	67	81	138	1	2	142	2

****

Note: Queue reported is the number of cars per lane.

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions With Improvements
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #103 Stanfield Cut Off (NS) / Big Bear Blvd. (SR-18) (EW)

Cycle (sec):	120	Critical Vol./Cap.(X):	0.865
Loss Time (sec):	6 (Y+R=2.0 sec)	Average Delay (sec/veh):	31.7
Optimal Cycle:	81	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Ovl			Include			Include		
Min. Green:	10	20	20	10	20	20	14	14	14	14	14	14
Lanes:	1 0	0 1	0	1 0	1 0	1	1 0	1 1	0	1 0	2 0	1
Volume Module:												
Base Vol:	82	40	82	56	67	607	699	1504	103	34	1303	71
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	82	40	82	56	67	607	699	1504	103	34	1303	71
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
PHF Volume:	85	41	85	58	69	627	722	1554	106	35	1346	73
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	85	41	85	58	69	627	722	1554	106	35	1346	73
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	85	41	85	58	69	627	722	1554	106	35	1346	73
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	1.00	0.33	0.67	1.00	1.00	1.00	1.00	1.87	0.13	1.00	2.00	1.00
Final Sat.:	1800	623	1277	1800	1900	1900	1800	3556	244	1800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.05	0.07	0.07	0.03	0.04	0.33	0.40	0.44	0.44	0.02	0.35	0.04
Crit Moves:		****					****				****	
Green/Cycle:	0.17	0.17	0.17	0.17	0.17	0.58	0.42	0.62	0.62	0.17	0.37	0.37
Volume/Cap:	0.28	0.40	0.40	0.19	0.22	0.57	0.96	0.71	0.71	0.12	0.96	0.11
Delay/Veh:	46.1	48.3	48.3	44.5	44.8	11.7	55.2	10.0	10.0	43.5	51.4	23.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	46.1	48.3	48.3	44.5	44.8	11.7	55.2	10.0	10.0	43.5	51.4	23.5
LOS by Move:	D	D	D	D	D	B	E	B	B	D	D	C
HCM2kAvgQ:	3	4	4	2	2	10	32	14	14	1	29	1

Note: Queue reported is the number of cars per lane.

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #104 Site Driveway #1 (NS)/ North Shore (SR-38) (EW)

Average Delay (sec/veh): 0.2 Worst Case Level Of Service: E[39.5]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 0 0 0			1 0 0 0 1			0 1 0 0 0			0 0 0 1 0		
Volume Module:												
Base Vol:	0	0	0	5	0	2	3	949	0	0	770	8
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	0	0	5	0	2	3	949	0	0	770	8
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	0	0	0	5	0	2	3	999	0	0	811	8
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	0	0	5	0	2	3	999	0	0	811	8
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	6.4	xxxx	6.2	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	3.5	xxxx	3.3	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	1820	xxxx	815	819	xxxx	xxxxx	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	86	xxxx	381	818	xxxx	xxxxx	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	86	xxxx	381	818	xxxx	xxxxx	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	0.06	xxxx	0.01	0.00	xxxx	xxxx	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	0.2	xxxx	0.0	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	49.5	xxxx	14.5	9.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	E	*	B	A	*	*	*	*	*
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	9.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	A	*	*	*	*	*
ApproachDel:	xxxxxx			39.5			xxxxxx			xxxxxx		
ApproachLOS:	*			E			*			*		

Note: Queue reported is the number of cars per lane.

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions With Improvements
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #104 Site Driveway #1 (NS)/ North Shore (SR-38) (EW)

Average Delay (sec/veh): 0.1 Worst Case Level Of Service: C[23.1]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 0 0 0			0 0 1! 0 0			1 0 2 0 0			0 0 0 1 0		
Volume Module:												
Base Vol:	0	0	0	5	0	2	3	949	0	0	770	8
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	0	0	5	0	2	3	949	0	0	770	8
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	5	0	2	3	949	0	0	770	8
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	0	0	0	5	0	2	3	999	0	0	811	8
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	0	0	5	0	2	3	999	0	0	811	8
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	6.4	6.5	6.2	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	3.5	4.0	3.3	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	1321	1820	815	819	xxxx	xxxxx	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	175	78	381	818	xxxx	xxxxx	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	174	78	381	818	xxxx	xxxxx	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	0.03	0.00	0.01	0.00	xxxx	xxxx	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	9.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	A	*	*	*	*	*
Movement:	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	206	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	0.1	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	23.1	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	C	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			23.1			xxxxxx			xxxxxx		
ApproachLOS:	*			C			*			*		

Note: Queue reported is the number of cars per lane.

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #105 Site Driveway #2 (NS)/ North Shore (SR-38) (EW)

Average Delay (sec/veh): 0.3 Worst Case Level Of Service: E[41.9]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 0 0 0			0 0 1! 0 0			0 1 0 0 0			0 0 0 1 0		
Volume Module:												
Base Vol:	0	0	0	9	0	4	6	949	0	0	770	14
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	0	0	9	0	4	6	949	0	0	770	14
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	0	0	0	9	0	4	6	999	0	0	811	15
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	0	0	9	0	4	6	999	0	0	811	15
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	6.4	6.5	6.2	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	3.5	4.0	3.3	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	1829	1829	818	825	xxxx	xxxxx	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	85	77	379	814	xxxx	xxxxx	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	85	77	379	814	xxxx	xxxxx	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	0.11	0.00	0.01	0.01	xxxx	xxxx	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	9.5	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	A	*	*	*	*	*
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	111	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	0.4	xxxxx	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	41.9	xxxxx	9.5	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	E	*	A	*	*	*	*	*
ApproachDel:	xxxxxx			41.9			xxxxxx			xxxxxx		
ApproachLOS:	*			E			*			*		

Note: Queue reported is the number of cars per lane.

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions With Improvements
FRIDAY PM PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

Intersection #105 Site Driveway #2 (NS)/ North Shore (SR-38) (EW)

Average Delay (sec/veh): 0.2 Worst Case Level Of Service: C[23.6]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0	0 0	0	0 0	1! 0	0	1 0	2 0	0	0 0	0 1	0
Volume Module:												
Base Vol:	0	0	0	9	0	4	6	949	0	0	770	5
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	0	0	9	0	4	6	949	0	0	770	5
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	9	0	4	6	949	0	0	770	5
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	0	0	0	9	0	4	6	999	0	0	811	5
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	0	0	9	0	4	6	999	0	0	811	5
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	6.4	6.5	6.2	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	3.5	4.0	3.3	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	1325	1825	813	816	xxxx	xxxxx	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	173	78	381	821	xxxx	xxxxx	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	172	77	381	821	xxxx	xxxxx	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	0.05	0.00	0.01	0.01	xxxx	xxxx	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	9.4	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	A	*	*	*	*	*
Movement:	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	207	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	0.2	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	23.6	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	C	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			23.6			xxxxxx			xxxxxx		
ApproachLOS:	*			C			*			*		

Note: Queue reported is the number of cars per lane.

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #101 Big Bear Blvd (NS)/ North Shore (SR-38) (EW)

Average Delay (sec/veh): OVERFLOW Worst Case Level Of Service: F[xxxxx]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 1! 0 0			0 0 0 0 0			0 0 1 0 1			1 0 1 0 0		
Volume Module:												
Base Vol:	410	0	339	0	0	0	0	1382	582	238	607	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	410	0	339	0	0	0	0	1382	582	238	607	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	432	0	357	0	0	0	0	1455	613	251	639	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	432	0	357	0	0	0	0	1455	613	251	639	0
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	6.5	6.2	7.1	6.5	xxxxx
FollowUpTim:	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	4.0	3.3	3.5	4.0	xxxxx
Capacity Module:												
Cnflict Vol:	0	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	1220	0	1769	1042	xxxxx
Potent Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	182	900	66	232	xxxxx
Move Cap.:	900	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	67	900	0	86	xxxxx
Volume/Cap:	0.48	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	21.69	0.68	xxxx	7.47	xxxx
Level Of Service Module:												
2Way95thQ:	2.6	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	177	5.5	xxxx	72.5	xxxxx
Control Del:	12.6	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	9426	17.1	xxxxx	3007	xxxxx
LOS by Move:	B	*	*	*	*	*	*	F	C	*	F	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			6637.8			xxxxxx		
ApproachLOS:	*			*			F			F		

Note: Queue reported is the number of cars per lane.

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions With Improvements
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

****

Intersection #101 Big Bear Blvd (NS)/ North Shore (SR-38) (EW)

****

Cycle (sec):	65	Critical Vol./Cap.(X):	0.839
Loss Time (sec):	6 (Y+R=4.0 sec)	Average Delay (sec/veh):	18.6
Optimal Cycle:	60	Level Of Service:	B

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Split Phase			Split Phase			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	17	0	17	0	0	0	0	12	12	12	12	0
Lanes:	1 0 0 0		1	0 0 0 0		0	0 0 2 0		1	1 0 1 0		0
Volume Module:												
Base Vol:	410	0	339	0	0	0	0	1382	582	238	607	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	410	0	339	0	0	0	0	1382	582	238	607	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	432	0	357	0	0	0	0	1455	613	251	639	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	432	0	357	0	0	0	0	1455	613	251	639	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	432	0	357	0	0	0	0	1455	613	251	639	0
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	2.00	1.00	1.00	1.00	0.00
Final Sat.:	1800	0	1900	0	0	0	0	3800	1900	1800	1900	0
Capacity Analysis Module:												
Vol/Sat:	0.24	0.00	0.19	0.00	0.00	0.00	0.00	0.38	0.32	0.14	0.34	0.00
Crit Moves:	****							****		****		
Green/Cycle:	0.28	0.00	0.28	0.00	0.00	0.00	0.00	0.44	0.72	0.18	0.63	0.00
Volume/Cap:	0.86	0.00	0.67	0.00	0.00	0.00	0.00	0.86	0.45	0.75	0.53	0.00
Delay/Veh:	39.7	0.0	27.6	0.0	0.0	0.0	0.0	19.7	1.6	39.8	5.1	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	39.7	0.0	27.6	0.0	0.0	0.0	0.0	19.7	1.6	39.8	5.1	0.0
LOS by Move:	D	A	C	A	A	A	A	B	A	D	A	A
HCM2kAvgQ:	12	0	7	0	0	0	0	16	1	7	5	0

****

Note: Queue reported is the number of cars per lane.

****

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

****
Intersection #102 Stanfield Cut Off (NS) / North Shore Dr. (EW)
****
Average Delay (sec/veh): 583.9 Worst Case Level Of Service: F[1812.4]
****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0	1! 0	0	0 0	1! 0	0	0 1	0 1	0	0 0	1! 0	0
Volume Module:												
Base Vol:	301	6	281	10	8	16	11	314	325	279	274	8
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	301	6	281	10	8	16	11	314	325	279	274	8
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	317	6	296	11	8	17	12	331	342	294	288	8
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	317	6	296	11	8	17	12	331	342	294	288	8
Critical Gap Module:												
Critical Gp:	7.1	6.5	6.2	7.1	6.5	6.2	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx
FollowUpTim:	3.5	4.0	3.3	3.5	4.0	3.3	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	1417	1409	336	1072	1576	293	297	xxxx	xxxxx	673	xxxx	xxxxx
Potent Cap.:	116	140	710	200	111	751	1276	xxxx	xxxxx	928	xxxx	xxxxx
Move Cap.:	72	86	710	77	68	751	1276	xxxx	xxxxx	928	xxxx	xxxxx
Volume/Cap:	4.39	0.07	0.42	0.14	0.12	0.02	0.01	xxxx	xxxx	0.32	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	1.4	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	7.8	xxxx	xxxxx	10.7	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	A	*	*	B	*	*
Movement:	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT
Shared Cap.:	xxxx	127	xxxxx	xxxx	127	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	65.1	xxxxx	xxxxx	1.1	xxxxx	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	1812	xxxxx	xxxxx	44.1	xxxxx	7.8	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	F	*	*	E	*	A	*	*	*	*	*
ApproachDel:	1812.4			44.1			xxxxxx			xxxxxx		
ApproachLOS:	F			E			*			*		

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Note: Queue reported is the number of cars per lane.
****

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions With Improvements
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

****

Intersection #102 Stanfield Cut Off (NS) / North Shore Dr. (EW)

****

Cycle (sec):	65	Critical Vol./Cap.(X):	0.572
Loss Time (sec):	8 (Y+R=4.0 sec)	Average Delay (sec/veh):	26.0
Optimal Cycle:	52	Level Of Service:	C

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Protected			Protected			Protected			Protected		
Rights:	Include			Include			Ovl			Include		
Min. Green:	10	12	12	10	12	12	10	12	12	10	12	12
Lanes:	2 0	0 1	0	1 0	0 1	0	1 0	1 0	1	1 0	0 1	0
Volume Module:												
Base Vol:	301	6	281	10	8	16	11	314	325	279	274	8
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	301	6	281	10	8	16	11	314	325	279	274	8
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	317	6	296	11	8	17	12	331	342	294	288	8
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	317	6	296	11	8	17	12	331	342	294	288	8
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	317	6	296	11	8	17	12	331	342	294	288	8
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.89	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	2.00	0.02	0.98	1.00	0.33	0.67	1.00	1.00	1.00	1.00	0.97	0.03
Final Sat.:	3378	40	1860	1800	633	1267	1800	1900	1900	1800	1846	54
Capacity Analysis Module:												
Vol/Sat:	0.09	0.16	0.16	0.01	0.01	0.01	0.01	0.17	0.18	0.16	0.16	0.16
Crit Moves:		****		****				****		****		
Green/Cycle:	0.18	0.23	0.23	0.15	0.21	0.21	0.22	0.25	0.43	0.24	0.27	0.27
Volume/Cap:	0.54	0.69	0.69	0.04	0.06	0.06	0.03	0.69	0.42	0.69	0.58	0.58
Delay/Veh:	27.8	31.2	31.2	23.7	20.8	20.8	19.9	29.7	12.7	31.2	25.5	25.5
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	27.8	31.2	31.2	23.7	20.8	20.8	19.9	29.7	12.7	31.2	25.5	25.5
LOS by Move:	C	C	C	C	C	C	B	C	B	C	C	C
HCM2kAvgQ:	4	7	7	0	0	0	0	7	4	7	6	6

****

Note: Queue reported is the number of cars per lane.

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #103 Stanfield Cut Off (NS) / Big Bear Blvd. (SR-18) (EW)

Cycle (sec):	180	Critical Vol./Cap.(X):	1.182
Loss Time (sec):	8 (Y+R=2.0 sec)	Average Delay (sec/veh):	175.0
Optimal Cycle:	180	Level Of Service:	F

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Split Phase			Split Phase			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	24	24	24	24	24	24	10	18	18	10	18	18
Lanes:	0 1	0 0	1	0 1	0 0	1	1 0	1 0	1	1 0	1 0	1
Volume Module:												
Base Vol:	85	55	96	48	46	440	397	1426	63	51	1085	43
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	85	55	96	48	46	440	397	1426	63	51	1085	43
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
PHF Volume:	88	57	100	50	48	457	413	1482	65	53	1128	45
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	88	57	100	50	48	457	413	1482	65	53	1128	45
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	88	57	100	50	48	457	413	1482	65	53	1128	45
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	0.62	0.38	1.00	0.52	0.48	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Sat.:	1116	722	1900	943	904	1900	1800	1900	1900	1800	1900	1900
Capacity Analysis Module:												
Vol/Sat:	0.08	0.08	0.05	0.05	0.05	0.24	0.23	0.78	0.03	0.03	0.59	0.02
Crit Moves:		****				****		****		****		
Green/Cycle:	0.13	0.13	0.13	0.18	0.18	0.18	0.18	0.59	0.59	0.06	0.46	0.46
Volume/Cap:	0.59	0.59	0.39	0.29	0.29	1.33	1.28	1.33	0.06	0.53	1.28	0.05
Delay/Veh:	83.6	83.6	75.9	66.0	66.0	241.7	222.9	178	9.8	101.4	176	21.9
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	83.6	83.6	75.9	66.0	66.0	241.7	222.9	178	9.8	101.4	176	21.9
LOS by Move:	F	F	E	E	E	F	F	F	A	F	F	C
HCM2kAvgQ:	8	8	5	5	5	40	37	124	1	4	91	1

Note: Queue reported is the number of cars per lane.

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions With Improvements
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Operations Method (Base Volume Alternative)

Intersection #103 Stanfield Cut Off (NS) / Big Bear Blvd. (SR-18) (EW)

Cycle (sec):	120	Critical Vol./Cap.(X):	0.641
Loss Time (sec):	6 (Y+R=2.0 sec)	Average Delay (sec/veh):	21.5
Optimal Cycle:	54	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Ovl			Include			Include		
Min. Green:	10	20	20	10	20	20	14	14	14	14	14	14
Lanes:	1 0	0 1	0	1 0	1 0	1	1 0	1 1	0	1 0	2 0	1
Volume Module:												
Base Vol:	85	55	96	48	46	440	397	1426	63	51	1085	43
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	85	55	96	48	46	440	397	1426	63	51	1085	43
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
PHF Volume:	88	57	100	50	48	457	413	1482	65	53	1128	45
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	88	57	100	50	48	457	413	1482	65	53	1128	45
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	88	57	100	50	48	457	413	1482	65	53	1128	45
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	1.00	0.36	0.64	1.00	1.00	1.00	1.00	1.92	0.08	1.00	2.00	1.00
Final Sat.:	1800	692	1208	1800	1900	1900	1800	3639	161	1800	3800	1900
Capacity Analysis Module:												
Vol/Sat:	0.05	0.08	0.08	0.03	0.03	0.24	0.23	0.41	0.41	0.03	0.30	0.02
Crit Moves:		****					****				****	
Green/Cycle:	0.17	0.17	0.17	0.17	0.17	0.51	0.34	0.61	0.61	0.17	0.44	0.44
Volume/Cap:	0.29	0.50	0.50	0.17	0.15	0.47	0.67	0.67	0.67	0.17	0.67	0.05
Delay/Veh:	46.3	50.9	50.9	44.0	43.8	16.1	37.9	10.1	10.1	43.3	24.7	16.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	46.3	50.9	50.9	44.0	43.8	16.1	37.9	10.1	10.1	43.3	24.7	16.3
LOS by Move:	D	D	D	D	D	B	D	B	B	D	C	B
HCM2kAvgQ:	3	6	6	2	1	8	13	13	13	2	15	1

Note: Queue reported is the number of cars per lane.

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

****
Intersection #104 Site Driveway #1 (NS)/ North Shore (SR-38) (EW)
****
Average Delay (sec/veh): 0.1 Worst Case Level Of Service: C[18.2]
****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 0 0 0			1 0 0 0 1			0 1 0 0 0			0 0 0 1 0		
Volume Module:												
Base Vol:	0	0	0	3	0	3	6	650	0	0	591	5
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	0	0	3	0	3	6	650	0	0	591	5
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	0	0	0	3	0	3	6	650	0	0	591	5
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	0	0	3	0	3	6	650	0	0	591	5
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	6.4	xxxx	6.2	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	3.5	xxxx	3.3	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	1256	xxxx	594	596	xxxx	xxxxx	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	191	xxxx	509	990	xxxx	xxxxx	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	190	xxxx	509	990	xxxx	xxxxx	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	0.02	xxxx	0.01	0.01	xxxx	xxxx	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	0.0	xxxx	0.0	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	24.2	xxxx	12.1	8.7	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	C	*	B	A	*	*	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	8.7	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	*	*	A	*	*	*	*	*
ApproachDel:	xxxxxx			18.2			xxxxxx			xxxxxx		
ApproachLOS:	*			C			*			*		

****
Note: Queue reported is the number of cars per lane.
****

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions With Improvements
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

****

Intersection #104 Site Driveway #1 (NS)/ North Shore (SR-38) (EW)

****

Average Delay (sec/veh): 0.2 Worst Case Level Of Service: C[15.7]

****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 0 0 0			0 0 1! 0 0			1 0 2 0 0			0 0 0 1 0		
Volume Module:												
Base Vol:	0	0	0	6	0	6	10	650	0	0	591	11
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	0	0	6	0	6	10	650	0	0	591	11
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	6	0	6	10	650	0	0	591	11
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	0	0	0	6	0	6	11	684	0	0	622	12
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	0	0	6	0	6	11	684	0	0	622	12
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	6.4	6.5	6.2	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	3.5	4.0	3.3	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	991	1333	628	634	xxxx	xxxxx	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	275	155	487	959	xxxx	xxxxx	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	273	154	487	959	xxxx	xxxxx	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	0.02	0.00	0.01	0.01	xxxx	xxxx	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	8.8	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	A	*	*	*	*	*
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	350	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	0.1	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	15.7	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	C	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			15.7			xxxxxx			xxxxxx		
ApproachLOS:	*			C			*			*		

****

Note: Queue reported is the number of cars per lane.

****

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

```
*******************************************************************************
Intersection #105 Site Driveway #2 (NS)/ North Shore (SR-38) (EW)
*******************************************************************************
Average Delay (sec/veh):      0.2       Worst Case Level Of Service: C[ 18.8]
*******************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Stop Sign        Stop Sign       Uncontrolled     Uncontrolled
Rights:           Include          Include          Include          Include
Lanes:        0  0  0  0  0    0  0  1! 0  0    0  1  0  0  0    0  0  0  1  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0    0    0     6    0    6    10  650    0     0  591   11
Growth Adj:  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
Initial Bse:    0    0    0     6    0    6    10  650    0     0  591   11
User Adj:    1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Adj:     1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00  1.00 1.00 1.00
PHF Volume:     0    0    0     6    0    6    10  650    0     0  591   11
Reduct Vol:     0    0    0     0    0    0     0    0    0     0    0    0
FinalVolume:    0    0    0     6    0    6    10  650    0     0  591   11
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx   6.4  6.5   6.2   4.1 xxxx xxxxx xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx   3.5  4.0   3.3   2.2 xxxx xxxxx xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  1267 1267   597   602 xxxx xxxxx  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx   188  170   507   985 xxxx xxxxx  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx   187  169   507   985 xxxx xxxxx  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  0.03 0.00  0.01  0.01 xxxx  xxxx  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   0.0 xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   8.7 xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:   *    *    *     *    *    *     A    *    *     *    *    *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx  273 xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx  0.1 xxxxx   0.0 xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx 18.8 xxxxx   8.7 xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:    *    *    *     *    C    *     A    *    *     *    *    *
ApproachDel:    xxxxxx            18.8           xxxxxx           xxxxxx
ApproachLOS:       *               C               *               *
*******************************************************************************
Note: Queue reported is the number of cars per lane.
*******************************************************************************
```

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MOONCAMP TRAFFIC IMPACT ANALYSIS (JN 04409)
General Plan Buildout Conditions With Improvements
SUNDAY MID-DAY PEAK HOUR

Level Of Service Computation Report
2000 HCM Unsignalized Method (Future Volume Alternative)

****
Intersection #105 Site Driveway #2 (NS)/ North Shore (SR-38) (EW)
****
Average Delay (sec/veh): 0.2 Worst Case Level Of Service: C[15.7]
****

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Control:	Stop Sign			Stop Sign			Uncontrolled			Uncontrolled		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 0 0 0			0 0 1! 0 0			1 0 2 0 0			0 0 0 1 0		
Volume Module:												
Base Vol:	0	0	0	6	0	6	10	650	0	0	591	11
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	0	0	6	0	6	10	650	0	0	591	11
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	0	0	0	6	0	6	10	650	0	0	591	11
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
PHF Volume:	0	0	0	6	0	6	11	684	0	0	622	12
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	0	0	0	6	0	6	11	684	0	0	622	12
Critical Gap Module:												
Critical Gp:	xxxxx	xxxx	xxxxx	6.4	6.5	6.2	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx
FollowUpTim:	xxxxx	xxxx	xxxxx	3.5	4.0	3.3	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Capacity Module:												
Cnflict Vol:	xxxx	xxxx	xxxxx	991	1333	628	634	xxxx	xxxxx	xxxx	xxxx	xxxxx
Potent Cap.:	xxxx	xxxx	xxxxx	275	155	487	959	xxxx	xxxxx	xxxx	xxxx	xxxxx
Move Cap.:	xxxx	xxxx	xxxxx	273	154	487	959	xxxx	xxxxx	xxxx	xxxx	xxxxx
Volume/Cap:	xxxx	xxxx	xxxx	0.02	0.00	0.01	0.01	xxxx	xxxx	xxxx	xxxx	xxxx
Level Of Service Module:												
2Way95thQ:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	xxxx	xxxx	xxxxx
Control Del:	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx	8.8	xxxx	xxxxx	xxxxx	xxxx	xxxxx
LOS by Move:	*	*	*	*	*	*	A	*	*	*	*	*
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	350	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	xxxxx	0.1	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	xxxxx	15.7	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	*	C	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			15.7			xxxxxx			xxxxxx		
ApproachLOS:	*			C			*			*		

****
Note: Queue reported is the number of cars per lane.
****

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APPENDIX I

COST ESTIMATE FOR ROADWAY IMPROVEMENTS

Local Interchange Improvements CONT...		
2.	Reconstruct Existing Interchange	
	Realign and widen existing ramps (to 2 lanes)	$750,000/Each Ramp
	Construct Loop on – ramps (Does not include realigning existing ramp)	$700,000/Each Ramp
	Upgrade existing Diamond IC to Partial – Cloverleaf	$6,000,000
3.	Improve Existing Interchange	
	Widen ramps (From one to two lanes)	$350,000/Each Ramp
	Widen existing OC structure	$110/Sq. Ft.
	Signalize ramp Intersection	$90,000/Location
	Upgrade existing signal at ramp terminal	$75,000/Intersection
	Upgrade existing signal at ramp terminal (Add lights only)	$25,000/Each
4.	Ramp Metering System	$60,000/Each location
Intersection Improvements		
1.	Signalization of local intersection (with some roadwork)	$250,000
2.	Upgrade existing intersection signalization	$75,000
3.	Upgrade existing Traffic Controller/Assembles	$40,000/Each
4.	Install new signal	$90,000/location
5.	Add signal heads	$25,000/Intersection
6.	Construct left – turn lane (240' long)	$50,000/Each Location
7.	Street widening (12' wide) (Pavement only)	$180,000/Mile
8.	Curb and gutter (Type A2-8)	$15/LF

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Appendix F:
Applicable Fire Code Requirements

CHAPTER 82.13 FIRE SAFETY (FS) OVERLAY

Sections:

82.13.010 Purpose
82.13.020 Location Requirements
82.13.030 Fire Safety Areas
82.13.040 Application Requirements
82.13.050 General Development Standards
82.13.060 FS1, FS2, and FS3 Development Standards
82.13.070 FS1 Additional Development Standards
82.13.080 Soil Erosion and Sediment Control Plans/Permits
82.13.090 Alternate Hazard Protection Measures

82.13.010 Purpose

The Fire Safety (FS) Overlay established by Sections 82.01.020 (Land Use Plan and Land Use Zoning Districts) and 82.01.030 (Overlays) is created to provide greater public safety in areas prone to wildland brush fires, by establishing additional development standards for these areas.

Adopted 4011 (2007)

82.13.020 Location Requirements

The FS Overlay shall be designated in high fire hazard areas as mapped on the General Plan Hazards Maps with the locations derived from the California Department of Forestry, U.S. Forest Service, and the County Fire Department.

Adopted 4011 (2007)

82.13.030 Fire Safety Areas

The FS Overlay is divided into three fire safety areas to correspond to distinct geographic areas and the associated wildland fire hazard. The requirements applicable to each fire safety area are found in Section 82.13.050 (General Development Standards), Section 82.13.060 (FS1, FS2, and FS3 Development Standards), and 82.13.070 (FS1 Additional Development Standards).

(a) Fire Safety Area 1 (FS1). Fire Safety Area 1 (FS1) includes areas within the mountains and valley foothills. It includes all the land generally within the San Bernardino National Forest boundary and is characterized by areas with moderate and steep terrain and moderate to heavy fuel loading contributing to high fire hazard conditions.

(b) Fire Safety Area 2 (FS2). Fire Safety Area 2 (FS2) includes those lands just to the north and east of the mountain FS1 area in the mountain-desert interface. These areas have gentle to moderate sloping terrain and contain light to moderate fuel loading. These areas

are periodically subject to high wind conditions that have the potential of dramatically spreading wildland fires.

(c) Fire Safety Area 3 (FS3). Fire Safety Area 3 (FS3) includes lands just to the south of the mountain FS1 area. These lands are primarily within the wildland-urban interface of the Valley Region and consist of varying terrain from relatively flat to steeply sloping hillside areas. Present and future development within FS3 is exposed to the impacts of wildland fires and other natural hazards primarily due to its proximity to FS1. These areas are subject to Santa Ana wind conditions that have the potential of dramatically spreading wildland fires during extreme fire behavior conditions.

Adopted 4011 (2007)

82.13.040 Application Requirements

(a) Notice of application or permit. A notice of each land use application and/or development permit that would lead to the construction of one or more structures or the subdivision of land within the FS Overlay shall be filed with the responsible Fire Authority by the Department.

(b) Review authorities. Each proposed land use application that would lead to the construction or expansion of a structure or the subdivision of land shall be submitted to the responsible fire authority and the appropriate Natural Resource Conservation Service Office for review and recommendation. Any recommendations received shall be indicated in any staff report and/or presentation for the proposed development and shall be incorporated into project conditions of approval where possible.

(c) Pre-application conference. Every development project application submitted to the Department shall be reviewed by Department staff through a pre-application conference with the project proponent before the acceptance of the application for filing.

(d) Density bonus. A residential density bonus, if any, shall only be allowed through the approval of a Planned Development Permit in compliance with Chapter 85.10 (Planned Development Permits).

(e) Subdivisions. When 25 percent or more of a subdivision project site involving five or more lots is located on natural slopes greater than 30 percent, the subdivision application shall be submitted concurrently with a Planned Development application to evaluate appropriate project design in consideration of topographic limitations of the site. This provision shall not apply if all of the areas on the site with natural ungraded slopes over 30 percent are permanently restricted from structural development.

(f) Application requirements. Each land use and other project application shall include the following information and materials, in addition to what is required by Section 85.03.060 (Application Forms and Information Packets).

(1) Slope analysis. Each project application shall include a slope analysis. The slope analysis shall include the following information:

(A) A topographic map of the proposed project area and all adjoining properties within 150 feet at a scale of not less than one-inch to 200 feet. The contour interval shall not be more than two feet except that the contour interval may be five feet if the general natural ungraded slope is more than 10 percent. Contour lines shall be obtained by aerial or field survey, done under the supervision of a licensed Land Surveyor or Registered Engineer.

(B) The natural, ungraded, slope categories to be computed are zero percent to less than 15 percent, 15 percent to less than 30 percent, and 30 percent or greater. The minimum area (polygon) used for slope calculation shall be 5,000 square feet.

(C) The area, in acres, shall be tabulated for each category.

(2) Preliminary grading plan. Each project application shall include a preliminary grading plan, except that preliminary grading plan requirements may be waived by the Director if it is determined through the required preapplication conference that this requirement is unnecessary due to site specific soils, topographic or other physical conditions, or due to the specific design of the project. The preliminary grading plan shall include the following information.

(A) A topographic map of the proposed project area and all adjoining properties within 150 feet at a scale of not less than one inch to 200 feet. The contour interval shall not be more than two feet except that the contour interval may be five feet if the natural ungraded slope is more than 10 percent. Contour lines shall be obtained by aerial or field survey, done under the supervision of a licensed Land Surveyor or Registered Engineer.

(B) Contours of the finished graded slope shown at intervals similar to that on the topographic base map.

(C) Street grades, slope ratios, flow lines, pad elevations, maximum elevation of top and minimum elevation of toe of finished slopes over five feet in vertical height, the maximum heights of those slopes and approximate total cubic yards of cut and fill shown on the preliminary grading plan.

(D) Compliance with the current edition of the California Building Code, as adopted by the County, is required.

(E) In the event no grading is proposed, a statement to that effect shall be placed on the required topographic map described in Subsection (f)1.a, above, and the map shall delineate the boundary of an adequately sized building pad, driveway and septic system (if proposed) for each proposed parcel.

(3) Fuel modification plan. Each project application shall include a fuel modification plan describing the fuel modification area required in Subsection 82.15.060.(b) 6, below. The plan may be submitted as a preliminary and final plan. A preliminary and/or final plan shall be submitted concurrently with the development application to the Department for review in conjunction with the project design review. Final plans shall be reviewed and approved by the responsible Fire Authority in conjunction with the County Fire Marshall. The fuel modification plan shall address the standards in Subsection 82.15.060.(b) 6, below, and the following factors:

(A) The natural ungraded slope of the land within the project and in the areas adjacent to the project;

(B) Fuel loading;

(C) Access to the project and access directly to the fuel modified area;

(D) The on-site availability of water that can be used for fire fighting purposes;

(E) The continual maintenance of the fuel modified areas;

(F) The soil erosion and sediment control measures to alleviate permanent scarring and accelerated erosion; and

(G) A list of recommended landscape plant materials that are fire resistant.

Adopted 4011 (2007)

82.13.050 General Development Standards

Each proposed development shall comply with all applicable requirements of this Chapter, as follows.

(a) All phases. The requirements of this Chapter shall apply to all phases of a development project.

(b) Fire Authority standards. All proposed development shall comply with all other applicable standards required by the responsible Fire Authority.

(c) Applicability of land use zoning district standards and overlay standards. The development standards established by a land use zoning district and any applicable overlay shall apply, except as modified by this Chapter.

(d) Additions, alterations, enlargements, or reconstructions. Any addition, alteration, enlargement or reconstruction of a structure shall comply with the provisions of this Chapter. When an addition, alteration, enlargement or reconstruction of a structure equals or exceeds 50 percent of the existing structure, or 25 percent of the roof for roofing requirements only, the provisions of Section 82.13.060(c) (FS1, FS2, and FS3 Development Standards - Building separation standards), Section 82.13.060(d) (FS1, FS2, and FS3 Development Standards - Building construction requirements), and Section 82.13.070 (FS1 Additional Development Standards) regarding construction requirements shall apply to the entire structure and/or the whole roof as applicable. The structures and/or roofs shall be entirely retrofitted to comply with the requirements of this Chapter.

Adopted 4011 (2007)

82.13.060 FS1, FS2, and FS3 Development Standards

Development proposed in the FS1, FS2, or FS3 Overlays shall comply with all applicable requirements of this Section. Development proposed in the FS1 Overlay shall also comply with the requirements of Section 82.13.070 (FS1 Additional Development Standards).

(a) Residential density. In order to reduce fire hazards, prevent erosion, and to preserve the existing vegetation and visual quality, the density of development for any Tentative Parcel Map or Tentative Tract Map in sloping hillside areas shall be in compliance with the following criteria:

(1) One to four dwelling units per gross acre on slopes of zero to less than fifteen percent (0-<15%);

(2) Two dwelling units per gross acre on slopes of 15 to less than 30 percent (15-<30%);

(3) One dwelling unit per three gross acres on slopes of greater than 30 percent gradient;

(4) In the Rancho Cucamonga Sphere of Influence, zero density is allowed for any portion of a proposed Tentative Parcel Map or Tentative Tract Map on slopes of greater than 30 percent gradient.

(b) Site development requirements.

(1) Site and emergency access. Each development project and each development project phase, except for a development project located exclusively on a cul-de-sac, shall have a minimum of two points of vehicular ingress and egress, designed to County road standards, with a minimum width of 26 feet of all-weather surface as defined in the Uniform Fire Code, from existing and surrounding streets. The Department may authorize one point of vehicular access to be an emergency access route with an all-weather surface if the Department first makes each of the following findings:

(A) Two points of nonemergency access are physically infeasible;

(B) Provisions have been made to reasonably ensure that the emergency access will be maintained; and

(C) Based on the review and consideration of the Fire Authority's recommendation, the emergency access route will provide adequate vehicular ingress and egress during emergencies.

(2) Private driveways or access roadways. Private driveways or access roadways for residential units shall not exceed 150 feet in length, unless approved by the Fire Authority in compliance with Section 10.207 of the Uniform Fire Code.

(3) Fences.

(A) Where wood or vinyl fencing is used, there shall be a minimum five-foot separation between the wood or vinyl fencing and the wall of the nearest structure except on those properties where previous construction occurred in compliance with a previous code. Fencing within the five-foot separation area shall be of noncombustible material or modified one-hour fire-resistance-rated construction.

(B) Fences or walls required adjacent to fuel modification areas or wildland areas as conditions of approval for a development project shall be constructed of noncombustible materials as defined in the California Building Code. All other fences, including those on the interior of a development project, are not subject to this requirement, except as required in subparagraph a, above.

(4) Water supply. Each development project shall provide six-inch or larger circulating (loop) water mains as required by the Uniform Fire Code, proper hydrant location and spacing, and have sufficient water storage capacity to provide the minimum fire flow duration requirements [gallons per minute (GPM) for a minimum number of hours or portions thereof] as specified by the minimum system standards established by the Fire Authority. Circulating (loop) mains are not required for cul-de-sacs and are not required for subdivisions that exclusively take all access from cul-de-sacs. In areas not served by water purveyors, on-site fire flow and water storage requirements shall be as specified by the Uniform Fire Code.

(5) Access to water supplies. There shall be vehicular access, at least 12 feet in width, to within at least 10 feet of each static water source, including ponds, lakes, swimming pools, reservoirs and water storage tanks. Access shall be either to a plumbed outlet with two-and-one-half-inch National Hose Thread Fitting, or directly to the source. This requirement shall be waived if the Fire Authority determines that the water source is sufficiently below the elevation of existing or proposed roads or driveways to make drafting of water from the source through a plumbed outlet

infeasible, and that direct vehicular access to the water source would require an impractical extension of a road or driveway.

(6) Fuel modification areas.

(A) A permanent fuel modification area shall be required around a development project or portions thereof that are adjacent or exposed to hazardous fire areas for the purpose of fire protection. In no case shall this area be less than 100 feet in width as measured from the development perimeter. Where feasible, the area shall be designated as common open space rather than private open space. The recommended width of the fuel modification area shall be determined based on a fuel modification plan filed in compliance with Subsection 82.13.040.(f)3 (Application Requirements Fuel modification plans), above.

(B) When a development project is phased, individual phases may be required to provide temporary fuel modification areas, where the development perimeter of a phase is contiguous to a subsequent phase of a project, which in its undeveloped state is a hazardous fire area. The need for a temporary fuel modification area shall be determined by the responsible Fire Authority in conjunction with the County Fire Marshall and shall be based upon the same considerations described in Subparagraph a, above, for permanent fuel modification areas and the factors addressed in the required fuel modification plan.

(7) Setback requirements. Each proposed structure shall comply with the following setback requirements as applicable, in addition to the setbacks required by the applicable primary land use zoning district, and the building separation requirements in Subsection C. (Building separation), below.

(A) Firewood or flammable materials storage. Each area used for the storage of firewood, or other flammable materials, shall either be located at least 30 feet away from all structures, or wholly enclosed within a structure.

(B) Fuel tanks. Fuel tanks (e.g., liquefied petroleum tanks) shall be located at least 10 feet away from any structure and shall be in compliance with the standards in the Uniform Fire Code, Section 83.02.080 (Allowed Projections into Setbacks), and Section 83.01.060 (Fire Hazards). The tanks shall be secured to the ground.

(C) National Forest boundary. Each structure on a lot that was created after April 12, 2007 and abuts a boundary of the San Bernardino National Forest shall be set back at least 100 feet from the boundary.

(D) Sloping site setbacks or fuel modification. Each structure proposed in an area with slopes exceeding 30 percent and 30 feet in height shall comply with the following requirements:

(I) Where a structure is proposed or within 200 feet of a slope that is greater than 30 percent before grading and where the slope is at least 30 feet in height, the vegetation on the slopes shall be treated in a manner so that it becomes a fuel modified area. The fuel-modified area shall be maintained for either the entire slope, or 100 feet, or to the property line, whichever distance is less for existing parcels or the distance prescribed by a fuel modification plan for new development.

(II) Where grading is utilized that does not conform to the natural slope and the graded area is adjacent to natural ungraded slopes that are greater than 30 percent in gradient and greater than 30 feet in height, each structure shall be set back at least 30 feet from the edges of the graded area adjacent to the natural ungraded slopes.

(8) Street name signs. All public or private streets within or bordering a development project shall have noncombustible and reflective street name signs designed to County standards and visible at all street intersections.

(9) Fire hydrant identification. Each fire hydrant shall be identified by a method specified by the Fire Authority.

(10) Erosion and sediment control. Each development project, building permit, grading and any other significant land disturbing activity shall include the installation of erosion control measures in compliance with this Development Code.

(c) Building separation standards. The intent of the following exterior wall separation standards is to reduce the exposure and risk from adjacent structural fires and to reduce the potential spread of fire from structure to structure.

(1) Building separation standards in FS1 and FS2 areas. In FS1 and FS2 areas, the following shall apply:

(A) Each building on a parcel shall have exterior wall separations of at least 30 feet.

(B) Residential structures shall have interior side yard setbacks of 20 percent of the lot width, provided that these interior side yards shall not be less than five feet and need not exceed 15 feet. In no case shall exterior wall separations be less than 10 feet for all buildings, including those on adjoining parcels. Eaves shall be permitted to project into the required setback no more than two feet. No other projections shall be allowed in the required setbacks unless a variance is obtained.

(C) When the exterior walls of residential and accessory buildings or portions thereof are within 15 feet of interior side or rear lot lines, or the exterior wall separation is less than 30 feet, the outside of each exterior wall or portion

thereof shall be constructed with the modified one-hour construction. Modified one-hour construction shall be defined by the Building Official. Where building separations are less than 10 feet, additional mitigation measures may be required by the responsible Fire Authority;

(D) In compliance with Section 82.13.090 (Alternate Hazard Protection Measures), and dependent upon site specific conditions, the following measures or combinations of measures may be substituted for the exterior wall separation requirements for all structures in FS1 and FS2 areas:

(I) The expansion of fuel modified areas around the perimeter of the development project beyond that required by this Section or other requirement of the County Code.

(II) A substantial transfer of density from steeper slopes, including areas with slopes less than 30 percent if they exist on-site, to less steep areas within the development project.

(III) Clustering of structures away from the development perimeter and away from fire hazard areas.

(IV) Other alternate measures (e.g., sprinklers, etc.) if approved by the Department in compliance with Section 82.13.090 (Alternate Hazard Protection Measures).

(2) Building separation standards in FS3 areas. In FS3 areas, exterior walls shall be constructed of noncombustible materials or shall provide the equivalent one-hour fire-resistance-rated construction on the exterior side. Interior side yards shall not be less than five feet in width. Within the Mountain Region, building separation and side yard setbacks shall be as described in Paragraph 1, above.

(d) Building construction requirements.

(1) Eaves.

(A) In FS 1 and FS2 areas, eaves shall be boxed in perpendicular to the adjoining wall and shall be one-hour protected.

(B) In FS3 areas, eaves shall be enclosed with a minimum seven-eighth inch stucco or equivalent protection.

(2) Exterior doors. All exterior doors made of wood or wood portions shall be solid core wood. For exterior doors with inset windows, refer to Subparagraph 3.(A), below.

(3) Exterior glazing. Exterior glazing shall comply with the provisions of the California Building Code and with the following additional requirements:

(A) Exterior windows, window walls and glazed doors, and windows within exterior doors, shall be multi-layered glass panels (dual- or triple-paned), tempered glass, or other assemblies approved by the Building Official.

(B) Vinyl window frame assemblies shall be prohibited, except when they have all of the following characteristics:

(l) Frame and sash are comprised of vinyl material with welded corners;

(ll) Metal reinforcement in the interlock area;

(lll) Glazed with insulated glass or tempered;

(lV) Frame and sash profiles are certified in American Architectural Manufacturing Association (AAMA) Lineal Certification Program (verified with either an AAMA product label or Certified Products Directory); and

(V) Certified and labeled in compliance with American National Standards Institute (ANSI)/AAMA/National Wood Window and Door Association (NWWDA) structural requirements.

(4) Insulation. Paper-faced insulation shall be allowed in attics or ventilated spaces only if the paper is not exposed to the attic open space. Cellulose insulation is required to be fire retardant.

(5) Roof coverings. Roof coverings shall be either noncombustible or shall be fire retardant material not composed of organic fiber with a minimum Class A rating, as defined in the California Building Code. The tile shall be tight-fitting and the open ends of high-profile tile shall be capped with non-ignitable material to prevent birds' nests or other combustible material from accumulating. Gutters and downspouts shall be constructed of noncombustible material.

(6) Spark arresters. Each chimney used in conjunction with a fireplace, or other heating appliance in which solid or liquid fuel is used, shall be maintained with a spark arrester. An approved spark arrester shall mean a device constructed of stainless steel, copper or brass, woven galvanized wire mesh, 12 gauge minimum of three-eighths inch minimum to one-half inch maximum openings, mounted in or over all outside flue openings in a vertical and near vertical position, adequately supported to prevent movement and visible from the ground.

(7) Street address numbers. Each non-accessory building shall have internally illuminated non-combustible building address numbers legible from the street in compliance with the Uniform Fire Code.

(8) Vents and openings. Louvers, ventilators, or openings in walls, roofs, attics, and underfloor areas having headroom less than four feet in height that are not fitted with sash or doors, shall be covered with wire screen. The screen covering the openings shall be corrosion-resistant metal or other approved material that offers equivalent protection and shall have a maximum mesh of one-eighth inch. Eave-type attic ventilators and roof-mounted turbine vents are prohibited.

(9) Water faucets. A minimum of two, three-quarter-inch faucets with hose connections each served by a three-quarter-inch waterline and installed before any pressure-reducing device shall be available per habitable structure separated by at least one-third of the perimeter of the structure. The faucets shall be on the sides of a structure facing fire hazardous areas whenever possible.

(e) Perimeter access to fuel modified and fire hazard areas. Fire fighting vehicles shall have adequate access into areas between fire hazardous areas or fuel modified areas and the development perimeter, so that a wildland fire can be contained at the development perimeter and prevented from spreading to structures. Each development project shall provide adequate vehicular access for fire fighting vehicles to the development perimeter of the project along the portion of the development perimeter that is adjacent to either an existing or proposed fuel modified area, or a fire hazard area. Provisions shall be made and shall be required, where necessary, through conditions of approval for the development project for the continual maintenance of the areas intended to provide the access. Perimeter access shall be provided, through either of the following measures or through alternate measures in compliance with Section 82.13.090 (Alternate Hazard Protection Measures).

(1) The provision of an existing or proposed road along the development perimeter, or portion thereof that is exposed to a fire hazard or fuel modified area, and which is accessible to fire fighting equipment. The road shall be capable of supporting fire-fighting equipment, shall be at least 20 feet in width, and shall not exceed a grade of 14 percent. The conditions of approval for the development project shall require provisions to ensure that the roadway will be maintained, if it is not within the publicly maintained road system.

(2) Development projects shall provide access ways, at least 12 feet in width, with a grade not to exceed 14 percent, and capable of supporting fire fighting vehicles, between the development perimeter and proposed or existing streets. Access ways shall be spaced at intervals of no more than an average of 350 feet along each street. The conditions of approval for the development project shall require specific provisions to ensure that access ways will remain unobstructed and will be maintained. Where feasible, access ways may not be paved and shall be designed so as not to detract from the visual quality of the project.

(f) Length of cul-de-sacs. Cul-de-sacs shall not exceed 350 feet in length, except that they may be extended as allowed by this Subsection.

(1) Exception for parcels of less than five acres. A cul-de-sac may exceed 350 feet in length but shall not exceed 600 feet in length, if parcels that take access from the cul-de-sac are less than five acres, and:

(A) Alternate measures are utilized in compliance with Section 82.13.090 (Alternate Hazard Protection Measures); or

(B) Based upon consideration of the recommendation of the Fire Authority, the Department determines that the cul-de-sac is situated and designed so that each parcel taking access from it is not contiguous to or exposed to either undeveloped fuel modified areas along the development perimeter of the project or to fire hazard areas, and that the extension of the cul-de-sac will not increase the exposure of buildings to wildland fires.

(2) Exception for parcels larger than five acres. A cul-de-sac may exceed 600 feet in length if all parcels that take access from the cul-de-sac are five acres or greater in area and:

(A) The proposed cul-de-sac is not within or adjacent to areas that are zoned for or subdivided to parcels of five acres or less.

(B) Alternate measures are utilized in compliance with Section 82.13.090 (Alternate Hazard Protection Measures).

(3) Alternate measures. In compliance with Section 82.13.090 (Alternate Hazard Protection Measures) and dependent upon site specific conditions, one of the following measures or combination of measures may be used to mitigate the effect of creating cul-de-sacs up to 600 feet in length with parcels less than five acres in area:

(A) Limitation of the total number of dwelling units with access to the cul-de-sac to no more than 15, and restriction of further subdivision of parcels and construction of additional independent residential units which have access to the cul-de-sac. These restrictions shall be imposed through conditions of approval of the development project.

(B) A continuous perimeter access road at least 20 feet in width is provided along the portion of the cul-de-sac exposed to fire hazard or fuel modified areas such that it is drivable under normal conditions by fire fighting vehicles, provides adequate maneuvering space for the vehicles, and is designed so that at least one point of access to the perimeter access road is taken from roads other than the subject cul-de-sac.

(C) The cul-de-sac road will have a paved width of at least 40 feet with posted no parking for its entire length, and there is at least one area approximately at the midpoint of the cul-de-sac that serves the same function of a cul-de-sac bulb in allowing fire fighting vehicles adequate room to turn around. This measure may only be utilized if the expansion of the road width will not contribute to slope stability hazards either on-site or off-site.

(D) Other alternate measures approved by the Department in compliance with Section 82.13.090 (Alternate Hazard Protection Measures).

(g) Additional requirements. Dependent upon specific site conditions (e.g., building separation, fire flow, road conditions, slope, vegetation, etc.) or a combination of conditions, the responsible Fire Authority may require structures to meet more stringent construction standards (e.g., full perimeter exterior walls to be constructed to the modified or full one-hour construction standards, sprinklers, soffitted eaves, etc.) as additional mitigation to the fire threat.

Adopted 4011 (2007)

82.13.070 FS1 Additional Development Standards

The requirements of this Section apply only to the FS1 Overlay and are in addition to the requirements in Section 82.13.060 (FS1, FS2, and FS3 Development Standards).

(a) Concealed spaces. Unenclosed or projecting assemblies (e.g., cantilevered floors, bay windows, etc.) that contain concealed space shall be protected on the exposed surface with materials approved for the modified one-hour construction.

(b) Decks. Cantilevered or standard type decks shall be:

(1) Constructed with a minimum of at least one-and-one-half-inch wood decking; and/or

(2) Protected on the underside with materials approved for one hour fire resistive construction; and/or

(3) Composed of noncombustible materials, as defined in the California Building Code.

(c) Exposed piping. Exposed piping, except for plumbing vents above the roof, shall be noncombustible as defined in the California Building Code.

(d) Patio covers. Patio covers attached or within 10 feet of a residential structure with plastic, bamboo, straw or fiberglass or wood lathe lattice made of materials that are one-half-inch or less in width shall be prohibited.

Adopted 4011 (2007)

82.13.080 Soil Erosion and Sediment Control Plans/Permits

This Section provides regulations and procedures for project planning, preparation of Soil Erosion and Sediment Control Plans, runoff control, land clearing, and winter operations in order to control existing and potential conditions of human induced accelerated erosion.

(a) Applicability. The regulations in this Section apply to all areas within Fire Safety (FS) Overlays, except for ministerial projects within the FS2 and FS3 Areas that are located on parcels that are less than one acre and have a slope of less than 10 percent.

(b) Soil Erosion and Sediment Control Plans/Permits.

(1) Compliance of land clearing or grading activities with approved Plan. Land clearing or grading activities in Fire Safety (FS) Overlays shall comply with the provisions of an approved Soil Erosion and Sediment Control Plan, unless exempt as follows:

(A) Exempt in compliance with Section 88.02.030 (Exempt Activities); or

(B) Exempt as determined by the Building Official.

(2) Approval of Plan before issuance of permits. A Soil Erosion and Sediment Control Plan shall be submitted and approved before the issuance of the following:

(A) Building Permits.

(B) Grading Permits.

(C) Soil Erosion and Sediment Control Permits.

(D) Other permits where, in the opinion of the Building Official, erosion can reasonably be expected to occur.

(3) Plan contents. A Soil Erosion and Sediment Control Plan shall:

(A) Include the applicable measures required by this Chapter and other measures or modifications of proposed measures required by the Building Official.

(B) Identify building and access construction envelopes and identify areas that will not be disturbed by construction activity in order to minimize disturbance of erodible areas of a proposed development site.

(C) Preserve existing streams and drainage courses in their natural condition in order to retain their ability to accommodate runoff and water drainage with a minimum of erosion.

(4) Permit application requirements. The Building Official shall specify the following application requirements for Soil Erosion and Sediment Control Permits:

(A) Requirements for the submittal of plans and supporting data to accompany applications for Soil Erosion and Sediment Control Plans and Soil Erosion and Sediment Control Permits.

(B) Licensing and/or certification requirements for those preparing Soil Erosion and Sediment Control Plan and Permit submittals.

(C) The incorporation and coordination of Soil Erosion Control Plans and Permits with other plan requirements.

(D) Other data/materials identified by the Building Official.

(5) Additional permit requirements. For additional permit requirements, see Subsection 88.02.050(f)(2) (Winter operation measures Additional permit requirements).

(c) General erosion control requirements.

(1) Conditions causing accelerated erosion prohibited. No person shall cause, or allow the continued existence of, a condition on a site that is causing or is likely to cause accelerated erosion as determined by the Building Official.

(2) Notification to control erosion. Upon notification by the Building Official, the responsible person shall take appropriate measures to control erosion on the site within a reasonable period of time as determined by the Building Official.

(3) Plan/Permit approval. The Building Official may require that a property owner, whose property has been cited in compliance with Subsection (2) (Notification to control erosion), above, file and obtain approval of a Soil Erosion and Sediment Control Plan and Soil Erosion and Sediment Control Permit in compliance with Subsection (b) (Soil Erosion and Sediment Control Plans/Permits), above.

(4) Cessation of activities due to inclement weather. The Building Official may direct that a particular operation, process, or construction be stopped during periods of inclement weather if the Building Official determines that erosion problems are not adequately being controlled.

(5) Applicable laws and regulations. Land clearing and grading activities that comply with this Section shall also comply with all other applicable local, state, and Federal laws and regulations. Where there is a conflict with other preexisting County regulations, the conflict shall be resolved by using the least restrictive standard and shall be accomplished before the project is allowed to proceed.

(6) Appeals. A property owner, an aggrieved person, or a person whose interests are adversely affected by an action or determination of the Building Official may appeal the action or determination in compliance with Chapter 86.08 (Appeals).

(7) Variances. The Director may approve, conditionally approve, or deny a variance from the provisions of this Section, the permit conditions, or the plan specifications in compliance with Chapter 85.17 (Minor Variances). The Director may refer a variance request to the Commission in compliance with Section 85.17 (Variances).

(d) Runoff control measures. Activities subject to a development permit (e.g. Conditional Use Permit, Grading Permit, Planned Development Permit, Site Plan Permit, Temporary Use Permit, etc.) shall implement measures to control runoff in order to prevent erosion. Measures shall be adequate to control runoff from a 10-year storm.

(1) Prevention of sediment discharge. Erosion control and surface flow containment facilities shall be constructed and maintained to prevent discharge of sediment to surface waters or storm drainage systems.

(2) Permeability rate.

(A) More than two inches per hour. Where soils have a permeability rate of more than two inches per hour, runoff in excess of predevelopment levels shall be retained on the site by methods and in quantities approved by the Building Official. This may be accomplished through the use of infiltration basins, percolation pits or trenches, or other suitable means. This requirement may be waived where the Building Official determines that high groundwater, slope stability problems, etc., would inhibit or be aggravated by onsite retention, or where retention will provide no benefits for groundwater recharge or erosion control.

(B) Two inches per hour or less. Where soils have a permeability rate of two inches per hour or less and onsite percolation is not feasible, runoff shall be detained or dispersed over nonerodible vegetated surfaces so that the runoff rate does not exceed the predevelopment level. When the runoff rate must exceed the predevelopment level, the runoff water shall be discharged over nonerodible surfaces or at a velocity that will not erode. The Building Official shall require onsite detention unless the applicant shows that the runoff will not contribute to downstream erosion, flooding, or sedimentation.

(3) Onsite percolation devices. Concentrated runoff that cannot be effectively dispersed over nonerodible channels or conduits to the nearest drainage course shall be contained within onsite percolation devices.

(4) Energy dissipaters at point of discharge. Where water will be discharged to natural ground or channels, appropriate energy dissipaters shall be installed to prevent erosion at the point of discharge.

(5) Detention or filtration mechanisms. Runoff from disturbed areas shall be detained or filtered by berms, vegetated filter strips, catch basins, or other means necessary to prevent the escape of sediment from the disturbed area.

(6) Deposition of earth or materials prohibited. No earth, organic, or construction material shall be deposited in or placed where it may be directly carried into a stream, lake, marsh, slough, lagoon, or body of water.

(7) Buffer zone along land/water margin. Where land disturbing activities are in proximity to lakes or natural watercourses, a buffer zone shall be required along the land/water margin of sufficient width to confine visible siltation within 25 percent of the buffer zone nearest the land disturbing activities.

(e) Land clearing measures. Activities subject to a development permit (e.g. Conditional Use Permit, Grading Permit, Planned Development Permit, Site Plan Permit, Temporary Use Permit, etc.) shall provide the following land clearing measures:

(1) Approval of Plan/Permit required before commencement of activities. No land clearing activities, except as otherwise allowed by this Section, shall take place before approval of the Soil Erosion and Sediment Control Plan and/or Permit.

(2) Limitations on land clearing and vegetation removal. Land clearing shall be kept to a minimum. Vegetation removal shall be limited to that amount necessary for building, access, fire protection and construction as shown on the approved Soil Erosion and Sediment Control Plan or as allowed by the Building Official through a Soil Erosion and Sediment Control Permit.

(3) Establishment of vegetation. Disturbed surfaces shall be prepared and maintained to control erosion and to establish vegetative growth compatible with the area. This control shall consist of any one or a combination of the following:

1. Effective temporary planting (e.g., rye grass, fast germinating native seed, etc.) and/or mulching with straw, pine needles, chippings, or other slope stabilization material.

2. Permanent planting of compatible drought resistant species of ground cover, shrubs, trees, or other vegetation.

3. Mulching, fertilizing, watering, or other methods necessary to establish new vegetation.

(4) Installation and maintenance of protection. The protection required by this Section shall be installed before calling for final approval of the project and at all times between October 15 and April 15. The protection shall be maintained for at least one year or until permanent protection is established.

(5) Vegetation removal between October 15 and April 15. Vegetation removal between October 15 and April 15 shall not precede subsequent grading or construction activities by more than 15 days. During this period, erosion and sediment control measures shall be in place.

(f) Winter operation measures.

(1) Winter operation erosion control measures. Land clearing and grading activities during the winter months (i.e., activities between October 15 and April 15) that are subject to a development permit (e.g. Conditional Use Permit, Grading Permit, Planned Development Permit, Site Plan Permit, Temporary Use Permit, etc.) shall implement the following winter operation measures to prevent accelerated erosion. The Building Official may require additional measures when determined to be necessary by field inspection.

(A) The Building Official shall authorize the following activities between October 15 and April 15 only if the Building Official determines that the activities comply with the provisions of, and are consistent with the purposes of, this Section:

(I) Contiguous land clearing operations involving greater than one acre in a one-year period of time.

(II) Major grading operations (greater than 100 cubic yards).

(B) Between October 15 and April 15, disturbed surfaces not involved in the immediate operation shall be protected by mulching or other effective means of soil protection.

(C) Roads and driveways shall have drainage facilities sufficient to prevent erosion on or adjacent to the roadway or on downhill properties. Erosion-resistant surfacing may include, but is not limited to, slag, crushed rock or natural soil when compacted to 90 percent of maximum density.

(D) Runoff from a site shall be detained or filtered by berms, vegetated filter strips, or catch basins to prevent the escape of sediment from the site. These drainage controls shall be maintained by the permittee or property owner as necessary to achieve their purpose throughout the life of the project.

(E) Erosion control measures shall be in place at the end of each day's work.

(2) Additional permit requirements. In addition to the requirements in Section 82.13.080, the following shall also apply:

(A) When construction will be delayed due to the limitation on winter operations, the date for expiration of the permit shall be extended by that amount of time that work is delayed by the requirements of this Section.

(B) The Building Official shall stamp or attach the following statement to all development permits and plans issued for projects subject to the provisions of this Section.

NOTICE: IF THE CONSTRUCTION ACTIVITY WILL EXTEND INTO THE WINTER OPERATIONS PERIOD (OCTOBER 15 THROUGH APRIL 15), ADDITIONAL SOIL EROSION AND SEDIMENT CONTROL MEASURES MAY BE REQUIRED.

ANY DEVELOPMENT PROJECT WHICH IS REQUIRED TO IMPLEMENT AN APPROVED SOIL EROSION AND SEDIMENT CONTROL PLAN SHALL HAVE THE APPROVED PLAN AMENDED IF IT DOES NOT COMPLY WITH SUBSECTION 82.13.080 (f) (Winter Operation Measures) OF THE SAN BERNARDINO COUNTY DEVELOPMENT CODE. ALL REQUIRED WINTER OPERATION EROSION CONTROL DEVICES SHALL BE INSTALLED BEFORE OCTOBER 15 FOR ONGOING CONSTRUCTION PROJECTS AND BEFORE ANY CONSTRUCTION ACTIVITY FOR THOSE DEVELOPMENT PROJECTS COMMENCING BETWEEN OCTOBER 15 AND APRIL 15.

(g) Inspections.

(1) Types of inspections. The Building Official may perform the following inspections to ensure compliance with this Section:

(A) Pre-construction inspection. A pre-construction inspection to determine the potential for erosion resulting from the proposed project.

(B). Progress inspections. Periodic progress inspections to determine ongoing compliance with the Soil Erosion and Sediment Control Plan.

(C) Final inspection. A final inspection to determine compliance with the Soil Erosion and Sediment Control Plan and with other approved plans and specifications.

(2) Notification. The permittee shall provide the Building Official at least:

(A) Commencement of work. Twenty-four hours' advance notice before the commencement of authorized work.

(B) Inspection request. Nine business hours' advance notice of an inspection request.

(3) Right of entry. Filing an application for a development permit (e.g. Conditional Use Permit, Grading Permit, Planned Development Permit, Site Plan Permit, Temporary Use Permit, etc.) constitutes a grant of permission for the County to enter the permit area for the purpose of administering this Section from the date of the application filing to the termination of the erosion control maintenance period.

(h) Continued responsibility. The property owner and the permittee shall be responsible for ensuring that accelerated erosion does not occur from an activity during and after project construction. Additional measures, beyond those specified in an approved Soil Erosion and Sediment Control Plan, may be required by the Building Official as deemed necessary to control erosion after project completion.

(i) Post-approval procedures. The procedures and requirements in Division 6 (Development Code Administration), related to permit implementation, time limits, extensions, appeals, and revocations, shall apply following the decisions on Soil Erosion and Sediment Control Plans and Soil Erosion and Sediment Control Permits.

Adopted 4011 (2007)

82.13.090 Alternate Hazard Protection Measures

(a) Purpose. This Section allows greater design flexibility than would otherwise be permitted to more efficiently and effectively achieve the purposes of the FS Overlay. Design flexibility is provided by allowing the substitution of alternate measures for otherwise applicable requirements if it is found that they provide the same or a greater level of protection from wildland fires and other natural hazards, and that they will fulfill the same purpose as the established standard or requirement.

(b) Applicability.

(1) The provisions of this Section following shall apply only to the standards and requirements of:

(A) Subsection 82.13.060(c)2. (Building separation standards in FS1 and FS1 areas);

(B) Subsection 82.13.060(e) (Perimeter access to fuel modified and fire hazard areas); and

(C) Subsection 82.13.060(f) (Length of cul-de-sacs).

(2) Since these alternative measures apply to the standards and requirements that pertain to these three specific design elements, they are intended to be applied to development projects only and not to individual parcel conditions. Therefore, they do not apply to the determination of setbacks for residential construction on individual lots.

(c) Substitution of alternative measures for standards and requirements.

(1) If alternative measures are proposed, the Fire Authority shall determine, with specific consideration of the effect of the proposed alternative measures, whether the proposed development project has adequate provisions for fuel modification and management, including the ongoing maintenance of fuel modified areas.

(2) If the Fire Authority makes a positive determination in compliance with Paragraph 1, above, alternate measures may be substituted for the established standards and requirements if the Department, with consideration of the recommendation of the Fire Authority, finds and justifies all of the following:

(A) The approved alternative measures meet the intent of, and serve the same purpose as, the established standard or requirement.

(B) The approved alternative measures provide the same or a greater level of protection or are as effective as the established standard or requirement.

(C) There are clear and substantial reasons for utilizing the alternative measures because they provide for a more efficient and economic use of the site, or provide for a superior physical design, and are consistent with the intent of the FS Overlay.

Adopted 4011 (2007)

Appendix G:
Water and Sewer Feasibility Studies

G.1 - Sewer Feasibility Study for Mooncamp Project (San Bernardino County, April 2007)

SPECIAL DISTRICTS DEPARTMENT

COUNTY OF SAN BERNARDINO
PUBLIC AND SUPPORT
SERVICES GROUP

WATER AND SANITATION DIVISION
12402 Industrial Blvd., Building D, Suite 6
Victorville, CA 92395
PO Box 5004 • Victorville, CA 92393
(760) 955-9885 • (800) 554-0565
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CRESTLINE SANITATION DISTRICT
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THOMAS L. SUTTON
Director

MANUEL M. BENITEZ
Deputy Chief

April 17, 2007

Michael Perry
P. O. Box 706
Big Bear City, CA 92314

Subject: Updated Sewer Feasibility Study
APN: 0304-091-12, 13, 21 & 0304-082-04 TTM 16136
RCK Properties, Inc./Moon Camp
County Service Area 53, Improvement Zone B

Dear Mr. Perry:

The District Engineer has completed the Updated Sewer Feasibility Study. The purpose of the study was to determine the equivalent dwelling unit (EDU) assignment, costs/fees and evaluate sewer service alternatives. The study indicates County Service Area 53, Improvement Zone B can serve the above referenced project.

The study is valid for one-year from the date of issue.

If you decide to move forward with the project or have questions, please contact this office.

Sincerely,

Diana S. Parra

For: James A. Oravets
Division Chief, Engineering

JAO:ce

cc: Kathy Whalen, District Manager

Enclosure: Updated Sewer Feasibility Study

MARK H. UFFER
County Administrative Officer

NORMAN A. KANOLD
Assistant County Administrator
Public and Support
Services Group

X:\Development Services\Feasibility Study\SewerFStudyCompleted 4.doc

Board of Supervisors
BRAD MITZELFELT ..... First District
PAUL BIANE ..... Second District
JOSIE GONZALES ..... Fifth District
DENNIS HANSBERGER ..... Third District
GARY C. OVITT ..... Fourth District

So & Associates Engineers Inc.

16209 KAMANA RD., SUITE 200 • P.O. BOX 1712 • APPLE VALLEY, CA 92307 • PHONE (760) 242-2365 FAX (760) 242-3083

April 11, 2007

101.0110-359

County of San Bernardino
Special District Department
Water & Sanitation Division
12402 Industrial Blvd., Bldg. D, Suite 6
Victorville, CA 92392

Attention: Mr. Gary Martin
Interim Division Engineer

Reference: County Service Area 53, Improvement Zone B (CSA 53-B) Updated Sewer Feasibility Study for APN's 0304-091-12,13, 21 and 0304-082-04, TTM 16136 (RCK Properties, Inc./Moon Camp)

Dear Mr. Martin:

In accordance with CSA 53-B (District) authorization, we have completed the subject feasibility study for APN's 0304-091-12, 13 & 21 and 0304-082-04, TTM 16136 for connection to CSA 53-B sewer system. We are pleased to submit the FINAL feasibility study report for District's review and consideration.

A. Wastewater Flow From the Proposed Development

The proposed development is a housing development located within the portion of Northeast 1/4 of Section 13, Township 2 North and Range 1 West. The proposed project will consist of 50 single family housing as shown in Figure 1. The sewer capacity requirement of the proposed project will be calculated based on one equivalent dwelling unit (EDU's). For this study, average wastewater flow per EDU in the CSA 53 (Fawnskin) is typically estimated at 215 gpd (gallon per day). In this case, proposed project will be assigned a maximum occupancy of 50 EDU's with an average flow at 215 gpd/EDU × 50 = 10,750 gpd. For preliminary design purpose, a peaking factor of four will be used. The estimated peak wastewater flow for the proposed development will be 43,000 gpd (29.86 gallons per minute).

B. Existing Sewer System Capacity and Review and Buy-In Cost

The existing sewer system located to the southeast and southeast side of the project site should be capable of handling the wastewater flow from the proposed development based on estimated flows

as discussed above. The internal collection sewer system design has been presented in Figure 1 based on the grading plans. The project developer (through its civil engineer) will be required to submit the proposed internal collection system to CSA 53B for review and approval.

County Service Area 53-B Local Sewer Cost: On September 15, 2005 the County Board of Supervisors adopted an Ordinance authorizing the Special Districts Department to implement increases in fees and charges. The study included recommendations on capital funds required to construct infrastructure to ensure adequate capacity in the District's respective water and sewer systems. The local connection fee approved for County Service Area 53-B (Fawnskin) is $ 1,358.72.

Local Connection Fee = $1,358.72/EDU x 50 EDU
= $ 67,936.00

C. Estimate Cost of System Improvements

On-Site Facilities: The proposed development will be entirely responsible for all costs of internal plumbing and sewer facilities including manholes and re-connection to the CSA 53-B system at location(s) approved by CSA 53B. All on-site gravity facilities must be minimum 8-inch diameter. The proposed project will be required to construct the onsite collector sewer as shown in Figure 1. All on-site facilities must meet CSA 53-B standards and specifications, and construction plans must be submitted for plan check and approval by District Engineer.

Off-Site Facilities: Based on the grading plan and sewer layout plan of the proposed development, the developer of TTM 16136 will be responsible for an offsite sewer extension of about 1,200 LF along North Shore Drive to connect to the existing 8-inch collector sewer to the southwest of the property. This improvement will be able to serve some of the lots of the project as shown in Figure 1. The proposed development will be able to convey part of the wastewater flow via gravity sewer to the existing Pump Station "B"(to the southeast of the property, refer Figure 1); and some of the subdivided lots may require additional on-site sewage lift stations(s). CSA 53-B staff and engineer will continue to monitor and upgrade the collection sewer system to ensure adequate capacity and reliable service to its customers.

D. Regional Connection Fee

Regional connection fees imposed by BBARWA (Big Bear Area Regional Wastewater Authority) for sewage treatment and disposal are presently assessed at $2,704.99 per equivalent dwelling unit

(EDU) and an additional $ 100 fee for the Fawnskin area (CSA 53-B). The above connection fees are subject to adjustment each year. The exact connection fees for the proposed project will be reviewed at the time when application is made to connect to the District's sewer system, based on the most current project information. An estimate of the fee at this time would be as follows:

Regional Connection Fee	= $2,704.99/EDU x 50 EDU
	= $135,249.50

E. Plan Check/Inspection Fee

The sewer line design and connection details must be submitted through the Special Districts Department for plan check and approval. The District's current plan check fee is set per Board Resolution 97-95 and will be determined at a later date. Prior to start of construction, the property owner or the contractor must also deposit with the Special District's Department an inspection fee, again per District rules and regulations.

F. Monthly User Fee

The monthly user fee will be determined by the District's staff at the time the sewer connection application is made. Based on District's rules, regulations and the estimated number of EDUs. The current monthly user fee is $ 40.91/EDU.

G. Summary of Estimated Costs

Based on limited information provided by the developer's engineer, the following briefly summarizes the various sewering costs and connection fees:

- On-site collector sewer and lift stations(s) = Developer to pay for the costs
- Off-site sewer extensions = Developer to pay for the costs
- Local sewer connection fees = $ 67,936.00
- Regional connection fee = $135,249.50

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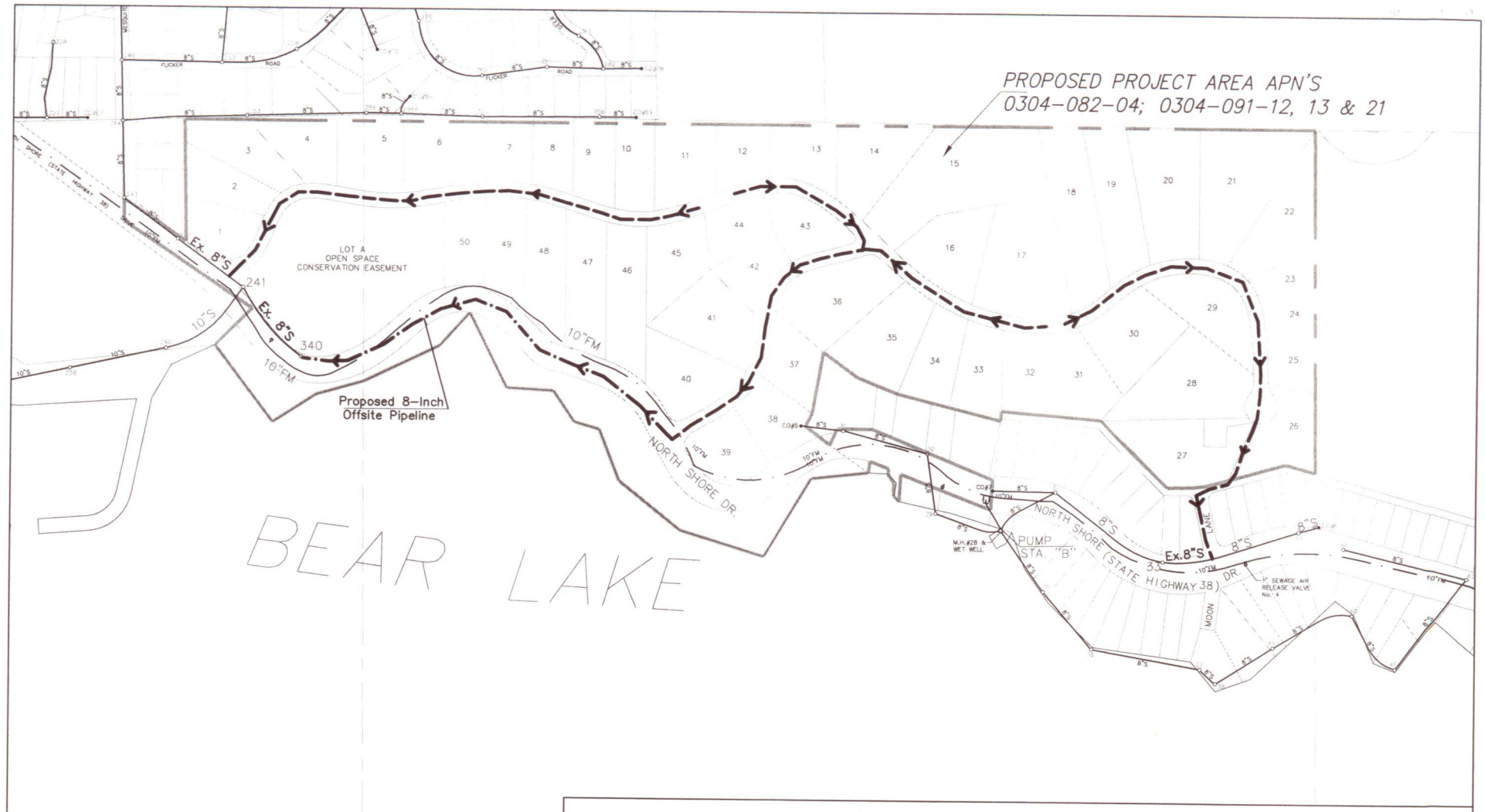
We trust that the information provided in this report will be helpful to the property owner and the Special District Department. Information provided in this letter report is valid for a period of one year from date of final report.

Very truly yours,

Wilson F. So, P.E.
District Engineer

Prepared By:

Kanchan Joshi



NORTH

SCALE: 1"=400'

LEGEND

- EXISTING SEWER LINES
- MANHOLE
- CLEANOUT
- PROPOSED OFFSITE SEWER (L=± 1,200 LF)
- PROPOSED ONSITE SEWER

PREPARED BY:
So & Associates
Engineers Inc.

FIGURE 1
COUNTY SERVICE AREA 53B
SEWER FEASIBILITY STUDY
(APN'S 0304-091-12,13 & 21
AND 0304-082-04, TTM 16136)

13

G.2 - Final Water Feasibility Study (Alda Engineering, Inc. March 2007)

ALDA Engineering Inc.
9996 Orange Street
Alta Loma, CA 91737
Tel: 909-297-3741
Fax: 909-498-0423

March 6, 2007

Mr. Scott Heule, C.E.G./C.H.G., Assistant General Manager
City of Big Bear Lake
Department of Water & Power
41972 Garstin Drive
Big Bear Lake, CA 92315

Subject: **Final Feasibility Study to Serve the Proposed Moon Camp Residential Development** (Tentative Tract No. 16136)

Dear Mr. Heule:

Pursuant to your request, ALDA Engineering Inc. (ALDA) has conducted a feasibility study to determine the necessary system facilities to serve the above referenced development. This report summarizes the results of our investigation and recommendations. This report presents the project background, an assessment of demand and supply issues, the results of the system analysis, and the recommended improvements.

Project Background

The proposed Moon Camp development consists of 50 residential lots to be developed over approximately 62 acres of land. The proposed development is located along North Shore Drive, in the community of Fawnskin on the north side of Big Bear Lake, and ranges in elevation from approximately 6,750 ft. near the lake to approximately 6,950 ft. in the northeasterly quadrant. Individual lots range in size from approximately half an acre to well over two acres depending on location and are anticipated to be developed as single family residential units; average lot size is approximately one and a quarter acres. Because of its location and lot size, some of the residential units are anticipated to be fairly large and potentially exceed 4,000 square feet in size.

Water service to the proposed development will be provided off the Upper Fawnskin pressure zone as the Lower Fawnskin zone would not provide enough static head to provide the development adequate fire flow. DWP's closest pipeline off the Upper Fawnskin system is a single 6-inch diameter pipeline located near the intersection of Flicker Road and Chinook Road, approximately 2,000 ft away from the westerly boundary of the proposed development. Significant transmission improvements in the Fawnskin system are needed to provide fire flow to the proposed tract.

Currently, there are two groundwater production wells within the proposed residential tract. These wells are located in subarea A of the North Shore hydrologic subunit. It is our understanding that these wells will be deeded to the DWP at the time the tract map is recorded. The developer plans to equip the FP-2 well initially to meet the development projected water demands. The DWP will use excess capacity from this well to help reduce reliance on the leased North Shore Well No. 1. Groundwater production capacity from this well is estimated at approximately 100 gallons per minute. The second well (FP-3), located to the east of the FP-2 well, will not be initially equipped by DWP.

Pressure Zone Service Area

Based on the elevation range of the proposed development, 6,750 ft. to 6,950 ft., the development can be served off the Upper Fawnskin pressure zone. This pressure zone has an operating hydraulic grade of 7,113 ft. set by the high water level of the existing 0.25-million gallon Racoon Reservoir. Based on this hydraulic elevation, static pressures would range from a low of 71 psi at the highest point in Lot 18 to 157 psi near the lake. Individual pressure regulators would be required for all lots with static pressures exceeding 80 psi.

Water supply in the Fawnskin area is provided by two groundwater wells in the Lower Fawnskin pressure zone and by slant wells in the vicinity of the Racoon Reservoir. Excess groundwater production from the Lower Fawnskin pressure zone is conveyed to the Upper Fawnskin pressure zone through a booster station located at the Cline Miller Reservoir.

Water Demand

Projected water demand for the proposed development is based on the average consumption rate of 250 gallons per day per connection. Maximum day demand is estimated based on information provided in the recently completed water master plan and it is equivalent to 1.76 times the average day demand. Therefore, the average and maximum day demands for the proposed 50-lot subdivision are estimated as follows:

- Average Day Demand (ADD) = 12,500 gpd or 8.68 gpm
- Maximum Day Demand (MDD) = 15.27 gpm

Based on an estimated average day demand of 12,500 gallons, the annual water demand for the development is estimated at 4.56 million gallons or 14.00 ac-ft per year.

Water Supply

Water supply sources for this development must meet projected maximum day demands during the summer as well as annual demands. The existing on-site FP-2 well, when equipped by the developer, would be capable of meeting the projected maximum day demand for the proposed Tract 16136.

To meet the projected annual demand, the developer would have to participate in the Water Demand Offset Plan currently being implemented by DWP. This plan requires that any development that creates new lots must pay for the necessary facilities to reduce water demand somewhere else in the service area. The demand to be reduced is equivalent to one half of the average water demand for residential parcels in the service area, estimated at 250 gallons per day, for each new lot developed. Therefore, in the case of the proposed tract, a demand equivalent to 6,250 gallons per day (50 EDUs times 250 gallons per day per EDU times 50 percent) would need to be offset.

Fire Flow Requirements

Fire flow protection in the Fawnskin area is provided by the County of San Bernardino Fire Department. Information obtained from the Office of the Fire Marshall for the county indicates the following fire flow requirements for residential structures in the Fawnskin area:

- Structures less than 3,600 ft^2 - 1,000 gpm @ 20 psi with a two-hour duration
- Structures between 3,601 to 4,800 ft^2 - 1,750 gpm @ 20 psi with a two-hour duration
- Structures between 4,801 to 6,200 ft^2 - 2,000 gpm @ 20 psi with a two-hour duration

Additional information provided by the Office of the Fire Marshall indicates that fire flow requirements could be lowered if fire sprinklers are installed; however, actual requirements are determined individually based on the construction plans for individual residences.

For the purpose of this analysis and based on discussions held with DWP staff, a fire flow of 1,750 gpm @ 20 psi with a two-hour duration was used to size transmission, pumping, and storage facilities that would be needed to serve the proposed development.

Storage Requirements

Storage capacity for this development was sized to meet the operational, emergency and fire flow storage requirements. Operational storage is used to meet the hourly fluctuations in demand during maximum day conditions and has been established as 30 percent of maximum day. Emergency storage is used to meet demands during a power outage or other emergency situation when supply sources and boosting pumps may not be available; DWP requirements for emergency storage are equivalent to one day of maximum day demand.

Fire flow storage is equal to the fire flow capacity (1,750 gpm) times its duration (two-hours). Storage requirements for the proposed development are as follows:

▪ Operational Storage = 30% of MDD (15.27 gpm):	6,600 gallons
▪ Emergency Storage = 100% of MDD (15.27 gpm):	22,000 gallons
▪ Fire Flow Storage for 1,750 gpm (based on 120 min):	210,000 gallons
Total storage requirement for indoor use:	238,600 gallons

According to the recently completed water master plan, DWP has sized its storage facilities to provide a maximum fire flow of 1,500 gpm with a two-hour duration for residential development. Additional storage to provide incremental fire flow requirements would be the responsibility of individual developers in each of the pressure zones impacted. In the case of Tract 16136, the incremental fire flow of 250 gpm (1,750 gpm – 1,500 gpm) results in an additional storage requirement of 30,000 gallons. Storage requirements for operational and emergency storage are provided by the DWP as part of the meter connection charges.

Existing storage facilities in the Upper Fawnskin pressure zone consist of a single 0.25 million gallon reservoir that is fed by a combination of slant wells, located in the vicinity of the reservoir site, and the Cline Miller booster station that supplies water from the Lower Fawsnkin pressure zone. The existing reservoir capacity is adequately sized to meet current storage requirements of existing users while providing fire flow protection for a flow rate of 1,500 gpm over a two-hour duration. Current storage requirements in this zone are estimated at approximately 225,000 gallons; this value is approximately 10 percent below existing storage capacity.

An additional storage of 30,000 gallons would be required in the Upper Fawnskin pressure zone to supply the recommended 1,750 gpm fire flow over a two-hour duration. This additional storage could be provided by either constructing a second reservoir adjacent to the existing Racoon Reservoir or conveying surplus storage capacity in the Lower Fawnskin pressure zone through the existing Cline Miller booster station. This booster station consists of two booster units with a combined capacity of approximately 190 gpm. To make surplus storage from the Lower Fawnskin pressure zone available during power outages, a backup generator at the Cline Miller booster station would be needed. In addition, the capacity of the existing booster station would need to be increased to pump 303 gpm. This flow rate represents a combination of a) estimated maximum day demand at full development in the Upper Fawnskin pressure zone of 38 gpm, b) estimated maximum day demand of 15 gpm from tract 16136, and c) 250 gpm of incremental fire flow into the Upper pressure zone.

Alternatives to Serve Proposed Tract 16136

Under average and peak summer demands, the proposed development could be served by simply extending existing facilities in the Upper Fawnskin pressure zone. The closest facility in this pressure zone that the development can be connected to consist of a 6-inch pipeline in the vicinity of Flicker Road and Chinook Road. However, existing distribution facilities would not be able to provide the required fire flow capacity needed to protect future residential development in the area. Existing system facilities consist of pipelines ranging in size from 2 to 8 inches in diameter with limited fire flow carrying capacity.

To provide the fire flow requirements indicated by the Office of the Fire Marshall, transmission improvements will be required in the Upper Fawnskin pressure zone. Two alternatives were evaluated to serve the proposed development; a brief description of these alternatives and the required facilities is presented below. Figure 1 illustrates the alignment of proposed transmission facilities for each alternative and the recommended pipelines within the proposed residential tract.

Facilities Common to Both Alternatives. Transmission facilities south of the intersection of Flicker Road and Mesquite Drive to the westerly boundary of the proposed tract are common to both alternatives and consist of approximately 700 ft of 12-inch diameter pipeline. The alignment of this pipeline is shown in Figure 1.

Alternative A. This alternative consists of serving the proposed tract by constructing a dedicated 12-inch transmission pipeline from the vicinity of the Cline Miller Reservoir to the proposed development site. This alternative would also require the construction of a fire booster station at the Cline Miller Reservoir site to augment the capacity of the existing booster units as they are not adequate to provide the recommended fire flow capacity into the Upper Fawnskin pressure zone. To assure that the fire booster unit is operational during power outages, the installation of a 200 kilowatt on-site electric generator is recommended.

The alignment of the recommended transmission pipeline between the Cline Miller Reservoir and the intersection of Flicker Road and Mesquite Drive is depicted in Figure 1. The estimated length of this pipeline is approximately 2,450 ft.

Alternative B. This alternative consists of serving the proposed development by gravity off the existing Racoon Reservoir. Transmission improvements in the Upper Fawnskin pressure zone would be required as existing distribution facilities have limited fire flow carrying capacity; they consist primarily of small pipelines ranging in size from 2 to 8 inches in diameter. Recommended improvements consist of a series of 12-inch segments between the reservoir site and the intersection of Flicker Road and Mesquite Drive as illustrated in Figure 1. The estimated combined length of proposed facilities is approximately 2,800 ft.

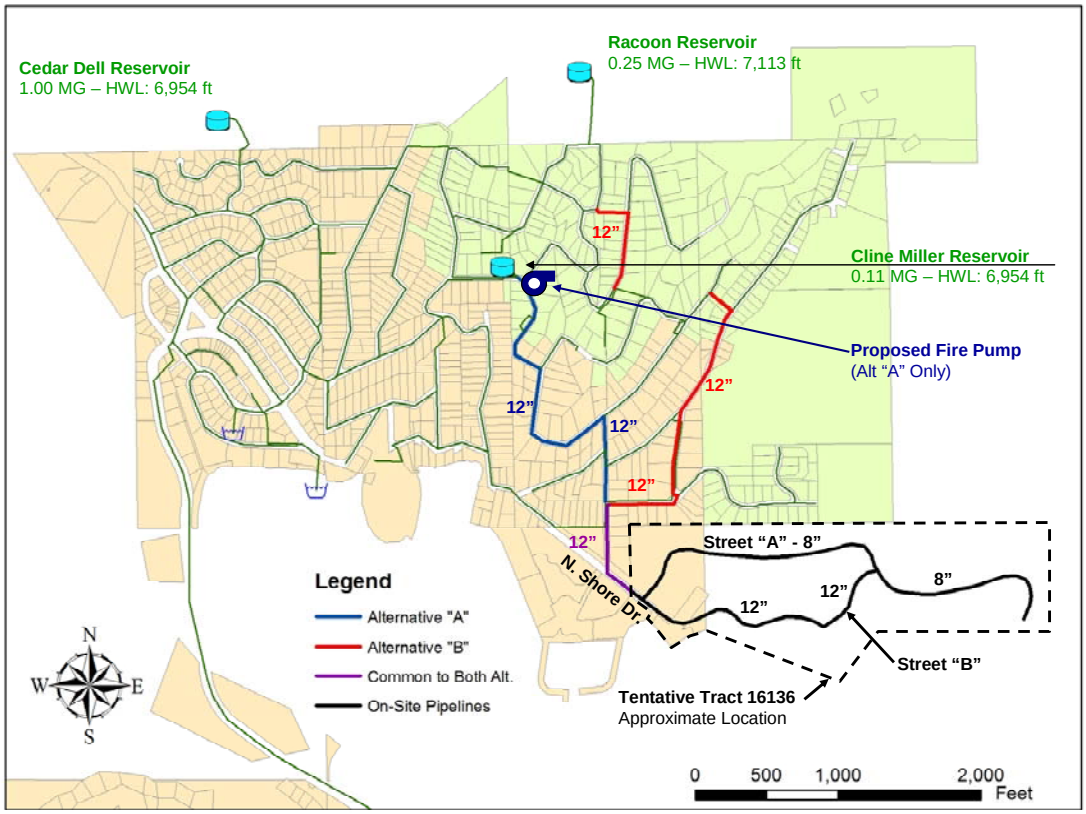


Figure 1

Tentative Tract 16136 - Recommended Facilities Both Alternatives

Alternative "B" would not require the construction of a fire pump at the Cline Miller Reservoir to pump from the Lower to the Upper Fawnskin pressure zone as the majority of the fire flow would be provided by gravity off the existing Racoon Reservoir. However, the existing Cline Miller booster station would have to be refurbished to increase its capacity to convey surplus storage from the Lower Fawnskin pressure zone during a fire flow event. The capacity of this booster station would be increased from its current capacity of 190 gpm to 303 gpm. In addition, an on-site generator would be required to operate the station during power outages. The enhancement of this booster station would eliminate the need to construct additional storage facilities in USFS lands, which are difficult to obtain approval for.

On-Site Facilities. The sizing of pipelines within the proposed tract is the same for both alternatives. Recommended pipeline diameters for the various street segments shown in Figure 1 are described as follows:

- North Shore Dr. from tract boundary to Street "A": 150 ft of 12-inch pipeline
- North Shore Dr. from Street "A" to Street "B": 1,600 ft of 12-inch pipeline
- Street "B" from North Shore Dr. to Street "A": 700 ft of 12-inch pipeline
- Street "A" from North Shore Dr. to Street "B": 2,000 ft of 8-inch pipeline
- Street "A" from Street "B" to end of Cul-de-sac: 1,500 ft of 8-inch pipeline

Estimated Cost of Improvements

The capital cost of proposed improvements was based on construction information provided by DWP and from other construction cost information available. The estimated cost of construction for pipelines is estimated at $15 per diameter inch; the cost for pump stations is estimated at $2,500 per horsepower. Construction contingencies are estimated at 20 percent while engineering cost is estimated at 15 percent.

It should be noted that estimated capital cost of proposed improvements shown here is for planning purposes only; actual cost of improvements may vary significantly depending on materials and labor cost at the time of construction.

Alternative "A" – Dedicated line from the Cline Miller Reservoir

2,450 ft of 12-inch diameter off-site pipeline	$ 440,000
700 ft of 12-inch diameter off-site – Common to both Alt.	$ 130,000
175 Hp Cline Miller booster fire pump	$ 440,000
200 KW on-site emergency generator (1)	$ 65,000
Sub-total:	$ 1,075,000
Contingency during construction – 20 percent	$ 215,000
Engineering, administration, inspection – 15 percent	$ 165,000
Overall construction cost for off-site improvements	$ 1,455,000

(1) Capital cost estimate includes cost of generator and transfer switch.

Alternative "B" – Gravity flow from the Racoon Reservoir

■ 2,800 ft of 12-inch diameter off-site pipeline	$ 505,000
■ 700 ft of 12-inch diameter off-site – Common to both Alt.	$ 130,000
■ Refurbishing of existing Cline Miller booster station	$ 100,000
■ 50 KW on-site emergency generator (1)	$ 35,000
Sub-total:	$ 770,000
Contingency during construction – 20 percent	$ 155,000
Engineering, administration, inspection – 15 percent	$ 115,000
Overall construction cost for off-site improvements	$ 1,030,000

(2) Capital cost estimate includes cost of generator and transfer switch.

Recommendations

The implementation of either alternative should provide the proposed development with the necessary facilities to meet the recommended fire flow protection of 1,750 gpm during maximum day demand conditions. However, Alternative "B" is preferred because it also enhances the distribution and fire flow capacity of the existing system in the Upper Fawskin pressure zone. In addition, the implementation of this alternative is approximately 29 percent less expensive than Alternative "A".

Disclaimer

This feasibility study is based on current system conditions and it is valid for a period of 12 months from the date of this letter. The feasibility of developing the Tract 16136 subdivision may need to be revised and/or reassessed if the project is delayed for a significant period of time. Revisions may result from changes in future water demands, system conditions, and construction cost of recommended facilities.

Should you have any questions, please contact us at 909-587-9916 during normal business hours.

Very truly yours

ALDA Engineering Inc.

F. Anibal Blandon, P.E.
Principal

G.3 - Results of Rehabilitation and Aquifer Testing Well FP-Z (California Collaborative Solutions, August 2008)

California Collaborative Solutions
Results of Rehabilitation and Aquifer Testing
Moon Camp Well FP-2

August 7, 2008

GEOSCIENCE Support Services, Inc.
P.O. Box 220, Claremont, CA 91711
Tel: (909) 920-0707 Fax: (909) 920-0403
email: email@geoscience-water.com

THIS REPORT IS RENDERED TO CALIFORNIA COLLABORATIVE SOLUTIONS AS OF THE DATE HEREOF, SOLELY FOR THEIR BENEFIT IN CONNECTION WITH ITS STATED PURPOSE AND MAY NOT BE RELIED ON BY ANY OTHER PERSON OR ENTITY OR BY THEM IN ANY OTHER CONTEXT. ALL CALCULATIONS WERE PERFORMED USING ACCEPTED PROFESSIONAL STANDARDS.

AS DATA IS UPDATED FROM TIME TO TIME, ANY RELIANCE ON THIS REPORT AT A FUTURE DATE SHOULD TAKE INTO ACCOUNT UPDATED DATA.

Dennis E. Williams, Ph.D., PG, CHG

CERTIFIED HYDROGEOLOGIST
DENNIS E. WILLIAMS
NO. 139
STATE OF CALIFORNIA

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CALIFORNIA COLLABORATIVE SOLUTIONS
RESULTS OF REHABILITATION AND AQUIFER TESTING
MOON CAMP WELL FP-2

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TABLE

No.	Description
1	Summary of Required Water Quality Analyses

APPENDICES

Ltr.	Description
A	Pumping Test Data
B	Water Quality Data
C	Microscopic Particulate Analysis

CALIFORNIA COLLABORATIVE SOLUTIONS
RESULTS OF REHABILITATION AND AQUIFER TESTING
MOON CAMP WELL FP-2

1.0 INTRODUCTION

This report summarizes the results of rehabilitation and testing of Well FP-2, located in the vicinity of the proposed Moon Camp development, east of Fawnskin, California (see Figures 1 and 2). Well FP-2 is a potential water source for the development, however, prior to recent activities, it had not been pumped since its construction in 1987. In order to assess the suitability of the well for water supply, GEOSCIENCE developed and implemented a well rehabilitation and testing program.

1.1 Purpose and Scope

The purpose of rehabilitation and testing of Moon Camp Well FP-2 was to:

1) Assess the current condition of the well;

2) Develop a rehabilitation program adequate to restore the specific capacity of the well so that its potential yield and water quality could be evaluated;

3) Implement the rehabilitation and testing program; and

4) Collect and analyze the data necessary for evaluating aquifer characteristics including water quality, potential interference to nearby wells, and possible hydraulic continuity with Big Bear Lake.

The scope of work to address the objectives included:

1) Conducting a downhole video survey of the well;

2) Developing a rehabilitation and testing program and coordinating implementation of the program with a rehabilitation contractor;

3) Implementing the rehabilitation program;

4) Conducting a 72-hour aquifer pumping test;

5) Collecting ground water quality samples from the well and having them analyzed for full Title 22 suite and microscopic particulate analysis (MPA); and

6) Analysis of the data and preparation of the report.

1.2 Background

The Moon Camp Well FP-2 was drilled in 1987 by Howard Pump Company of Barstow, California, using the mud rotary drilling method. A 17-inch borehole was drilled to a depth of 50 ft below ground surface (bgs), below which a 15-inch borehole was drilled to the total depth of 385 ft bgs. Well casing and screen, consisting of 8 1/8-inch inside diameter (ID) mild steel with a 1/4-inch wall thickness was installed to a total depth of 380 ft bgs. The screened portion of the well consists of Johnson Hi-Cap, a type of wire-wrap, located at depths of 60 to 120, 156 to 176, 216 to 278, and 310 to 370 ft bgs. The well was equipped with a 2-inch sounding tube that attaches to the well casing just below the ground surface. The well was filter packed using an 8 x 16 Monterey Sand from the total borehole depth to 53 ft bgs. A 2-foot bentonite layer was placed above the filter pack from 51 to 53 ft bgs and a cement annular seal was placed above the bentonite layer from 51 ft bgs to the ground surface.

Following well construction, the well was developed by bailing and pumping. Following development, an 8-hour variable rate (step drawdown) test was performed. During this test, a maximum discharge rate of 100 gallons per minute (gpm) was achieved with a pumping water level of 26 ft bgs. The specific capacity calculated from data collected during this test was approximately 5 gpm per foot of drawdown.

2.0 DOWNHOLE VIDEO SURVEY

On May 2, 2008, Pacific Surveys, LLC, conducted a downhole video survey of Well FP-2. GEOSCIENCE personnel were on site to note observations made during the survey and to direct the operation of the camera as necessary.

At the time of the video survey, the depth to static ground water level was approximately 2 ft bgs. The camera reached a depth of approximately 376 ft bgs before visibility within the water column became so reduced (i.e. blackout conditions) as to warrant the removal of the camera.

The video survey showed that the blank well casing and screen was locally scaled and corroded although no obvious structural damage was observed. The blank well casing was coated with moderate to heavy scale, with encrustants occurring in localized patches, particularly along welded casing joints. Large mounds of encrustants became more frequent and larger with depth. The wire-wrapped screen sections showed minor to complete clogging with some localized patches of encrustants and tubercles. Where screens were open, no filter pack could be seen through the screen apertures. Some of the encrusting material was observed to be relatively fragile and brittle and became dislodged from contact with the video camera.

3.0 WELL REHABILITATION PROCEDURE

Based on review of the video log, GEOSCIENCE developed a chemical and mechanical rehabilitation program for Well FP-2[1]. Rehabilitation was performed by Roadrunner Drilling & Pump Company of Winnemucca, Nevada (Contractor). The rehabilitation program was initiated on June 27, 2008.

Initial rehabilitation of Well FP-2 included mechanical dislodging of encrusted material throughout the wetted portion of the well casing and screen using a spirally-wound nylon brush. Scale and debris were dislodged by gently raising and lowering the brush throughout the specified area. The Contractor brushed each wetted foot of blank well casing for one minute and each wetted foot of screen for two minutes, for a total of 10 hours brushing time. Following brushing, a bailer was used to remove material that had accumulated at the bottom of the well.

The well was disinfected through a combination of acidification and chlorination. Using a tremie pipe, acid was introduced throughout the length of the well. The acid was mixed into the screened portion by gently lifting and lowering a bailer tool. Once the pH of the well water had been lowered to approximately 4.5 pH units, a chlorine solution was added through the tremie pipe and worked into the screened portion of the well by lifting and lowering the bailer. Once the chlorine concentration of the water in the well exceeded 200 milligrams per liter (mg/L), the well was allowed to sit idle for 24 hours.

Following chlorination, the Contractor continued rehabilitation of Well FP-2 using a combination swab and airlift tool. Swabbing was accomplished by gently lifting and lowering the double-packer tool opposite 10-foot sections of the well screen, effectively dislodging any remaining biofilm and/or fine-grained sediment from the gravel pack and near well zone. Following several passes with the swab tool through a 10-foot screened interval, the interval was

[1] Letter to Michael Perry dated May 9, 2008

pumped (air lifted) using the tool until the discharged water was clear and free of sediment. The screened portion of the well was swabbed and airlifted for a total of 20 hours.

Following swabbing and airlifting, a submersible test pump was installed within the well for final development and testing. The test pump intake was installed at a depth of approximately 130 ft bgs. Initial pumping was performed at a relatively low flow rate (approximately 30 gpm) and was gradually increased as water clarity improved and sand production decreased. Pumping was periodically interrupted to surge the well, a process where water in the pump column is allowed to flow back into the screened section of the well. This process was repeated until the discharge water was clear and the sand content was less than 0.1 parts per million (ppm). The well was developed by pumping for approximately 11 hours. The maximum discharge rate during development was approximately 150 gpm with approximately 25 feet of drawdown.

4.0 AQUIFER PUMPING TEST

A 72-hour variable rate (step-drawdown) pumping test was conducted at Well FP-2 during the period from July 1 to 4, 2008. The well was pumped in 24-hour "steps" at average discharge rates of 35 gpm, 60 gpm and 105 gpm (see Figure 3). During the pumping test, the pumping water level, discharge rate, and sand content were closely monitored (see Appendix A). Ground water levels in a nearby private well, referred to as the Fujimoto Well (see Figure 2), were also monitored during the pumping test. The pumping test was followed by 4 hours of recovery measurements in both the pumping well and the observation well. The field procedure for the pumping test followed the American Society for Testing and Materials (ASTM, 1994), Standard Test Method D4050.

4.1 Pumping Test Methodology

4.1.1 Basic Assumptions Used in Analysis of Pumping Test Data

The purpose of a pumping test is to obtain field data, which when substituted into an equation or set of equations, will yield estimates of well and aquifer properties. As certain assumptions have been used to derive these equations, it is important to consider or control these factors during the test. These assumptions are:

- The aquifer material is assumed to consist of porous media, with flow velocities being laminar and obeying Darcy's law.
- The aquifer is considered to be homogeneous, isotropic, of infinite aerial extent, and of constant thickness throughout.
- Water is released from (or added to) internal aquifer storage instantaneously upon change in water level.

- No storage occurs in the semi-confining layers of leaky aquifers.
- The storage in the well is negligible.
- The pumping well penetrates the entire aquifer and receives water from the entire thickness by horizontal flow.
- The slope of the water table or piezometric surface is assumed to be flat during the test with no natural (or other) recharge occurring, which would affect test results.
- The pumping rate is assumed constant during the entire time period of pumping during a constant-rate test, and constant during each discharge step in a variable-rate test.

4.1.2 Theis Equation

Estimation of aquifer parameters from pumping test data is based on analytical solutions of the basic differential equation of ground water flow that can be derived from fundamental laws of physics. One of the most widely used solutions of this equation for non-steady radial flow to wells is the "Theis Equation":

$$s(r,t) = \frac{114.6Q}{T} W(u) \qquad \text{"Theis Equation"} \qquad (1)$$

where:

s(r,t) = Drawdown in the vicinity of an artesian well, [ft]

r = Distance from pumping well, [ft]

Q = Discharge rate of pumping well, [gpm]

T = Transmissivity of aquifer, [gpd/ft]

W(u) = "Well function of Theis"

u = $\frac{1.87r^2S}{Tt}$

where:

S = Storativity, [fraction]

t = Time after pumping started, [days]

4.1.3 Jacob's Straight-Line (Modified Theis Non-Equilibrium) Method

According to Jacob (1950), for small values of "u" (u < 0.05), the Theis equation may be approximated by Jacob's equation:

$$s(r,t) = \frac{264Q}{T}\log\left(\frac{0.3\,Tt}{r^2 S}\right) \qquad \text{"Jacob's Equation"} \qquad (2)$$

Jacob's equation is valid for use for most hydrogeologic problems of practical interest, is easier to use than the Theis equation, and involves a simple graphical procedure to estimate transmissivity and storativity. This method (D 4105) is summarized by ASTM (1994).

Transmissivity (T, in gpd/ft) can be estimated as:

$$T = \frac{264Q}{\Delta s} \qquad (3)$$

where:

Q = Pumping rate, [gpm]

Δs = Change in drawdown over one log cycle of time, [ft]

4.2 Pumping Well

Well FP-2 served as the pumping well for the 72-hour constant rate pumping test. The static ground water level in the well was measured to be approximately 6 ft bgs prior to the start of pumping. Ground water levels were measured during the pumping test and recovery phase using a downhole pressure transducer programmed to collect measurements at one-minute intervals. Additionally, an electric wireline sounder was used to manually collect ground water levels in FP-2 during the pumping and recovery phases.

The discharge rate was monitored with a flowmeter equipped with a totalizer and instantaneous rate gauge. During the course of the 72-hour pumping test, Well FP-2 pumped at average discharge rates of 35, 60, and 105 gpm (Steps 1, 2, and 3, respectively). The total volume of ground water pumped during testing was 289,350 gallons.

Ground water samples were collected during the 72-hour step test after approximately 44 hours of pumping (July 2, 2008). The samples were submitted to E.S. Babcock & Sons, Inc. of Riverside, California for analysis of constituents required by the State of California Code of Regulations Title 22 Rule as well as other selected constituents. A complete list of the constituents tested and their detection limits are provided in Table 1. Laboratory results of the water quality testing are presented in Appendix B.

A microscopic particulate analysis (MPA) was performed during the first 24 hours of the step drawdown test. After approximately 1,000 gallons of discharge water were run through a filtering apparatus, the filter was submitted to BioVir laboratories, Inc. of Benicia, California. The sample was analyzed according to EPA Method 910/9-92-029 including *Giardia* species and *Cryptosporidium*. Results of the MPA are presented in Appendix C.

4.3 Observation Well

Ground water levels were monitored before, during and after the pumping test in an observation well (a private well referred to as the Fujimoto Well) located approximately 910 ft east of Well FP-2. Water level measurements were collected and recorded in this well using a pressure transducer.

5.0 PUMPING TEST RESULTS

5.1 Production Well (FP-2)

As shown on Figure 3, Well FP-2 can be pumped at a rate of 35 gpm on a long-term basis with less than 10 ft of drawdown in the well. The well can also sustain a pumping rate of 105 gpm on a long-term basis although the rate of ground water level decline is greater. Analysis of the 105 gpm step using Jacob's straight-line interpretation shows an aquifer transmissivity of approximately 14,600 gallons per day per foot of drawdown (gpd/ft; see Figure 4). At a pumping rate of 105 gpm, the specific capacity of FP-2 is approximately 4.7 gpm/ft.

The specific capacity (the inverse of specific drawdown), of the well during Step 1 was less than the specific capacity measured during Steps 2 and 3. This results in a negative trendline when plotting specific drawdown with discharge rate, and thus, well efficiency cannot be calculated (see Figure 5).

Calculated recovery is a method of analysis whereby extrapolated drawdown data is compared to actual recovery data from the pumping well. It can be used to calculate transmissivity using Jacob's straight line interpretation in a similar manner as used with the pumping drawdown data. Results of the calculated recovery analysis for well FP-2 shows an aquifer transmissivity of approximately 8,900 gpd/ft (see Figure 6). Residual drawdown analysis, a method whereby residual drawdown (the difference between the static and recovering water level) is plotted with respect to the ratio between the time since pumping stopped and the time since pumping started, can also be used for calculating aquifer transmissivity using Jacob's straight line interpretation. Results of the residual drawdown analysis for Well FP-2 shows an aquifer transmissivity of approximately 9,600 gpd/ft (see Figure 7).

5.2 Observation Well

Ground water level data collected from the observation (Fujimoto) well, located approximately 910 ft east of Well FP-2, during the pumping test shows minor ground water pumping interference that can be attributed to pumping of Well FP-2. Given that the Fujimoto well was an actively pumping well that cycled on and off periodically during the pumping test, it was necessary to interpret pumping interference from Well FP-2 through the ground water level "noise" of the pumping observation well. To account for this, static ground water levels were used to interpret interference trends (see Figure 8). Interpretation of static ground water trends during the pumping test shows a decline of approximately 0.3 ft that can be attributed to interference from pumping Well FP-2 at a rate of 35 gpm.

5.3 Ground Water Quality

Ground water quality data from Well FP-2 indicate that water produced from the well is suitable for municipal supply. The water is of calcium-bicarbonate type (see Figure 9). The total dissolved solids (TDS) concentration was reported to be 300 mg/L, below the recommended California Department of Public Health (CDPH) secondary maximum contaminant level (MCL) of 500 mg/L. Toluene was detected at a concentration of 1.2 micrograms per liter (µg/L), below the CDPH primary MCL of 150 µg/L, and is likely from materials used during installation of the test pump. Chloroform was detected at a concentration of 0.98 µg/L, below the USEPA MCL of 80 µg/L for trihalomethanes, and is likely a by-product of the chlorine used during rehabilitation of the well casing and screen. All other detected constituents were below their respective MCLs or notification levels.

The results of the water quality analyses are summarized in the following table:

Water Quality Analytical Data – Moon Camp Well FP-2

		Analysis Result	Drinking Water Regulatory Standards
Aluminum	**[µg/L]**	< 50	200[2]/1,000[1]
Arsenic	**[µg/L]**	< 2.0	10[1]
Boron	**[µg/L]**	< 100	1,000[3]
Chloride	**[mg/L]**	2.7	250-500[2]
Chromium, Hexavalent	**[µg/L]**	< 1.0	50[1,4]
Chromium, Total	**[µg/L]**	1.1	50[1]
Color	**[Color Units]**	< 3.0	15[2]
Fluoride	**[mg/L]**	< 1.0	2.0[1]
Iron	**[µg/L]**	< 100	300[2]
Manganese	**[µg/L]**	< 20	50[2]
Nitrate (as NO_3^-)	**[mg/L]**	< 1.0	45[1]
Odor	**[TON]**	< 1.0	3[2]
Perchlorate	**[µg/L]**	< 4.0	6.0[1]
pH	**[pH Units]**	7.5	6.5 - 8.5[5]
Silica, Total	**[mg/L]**	25	NA[6]
Specific Conductance	**[µmhos/cm]**	510	900-1,600[2]
Sulfate (as SO_4)	**[mg/L]**	5.2	250-500[2]
Surfactants (MBAS)	**[mg/L]**	< 0.05	0.5[2]
Total Dissolved Solids (TDS)	**[mg/L]**	300	500 - 1,000[2]
Total Hardness	**[mg/L]**	270	NA[6]
Turbidity	**[NTU]**	0.39	5[2]
Vanadium	**[µg/L]**	< 3.0	50[3]
1,2,3-Trichloropropane	**[µg/L]**	< 0.005	0.005[3]
Gross Alpha	**[pCi/L]**	1.74 +/- 1.33	15[1]
Radon	**[pCi/L]**	447 +/- 43.1	300-4,000[7]
Volatile Organic Compounds (EPA Method 524.2) except as noted below:	**[µg/L]**	ND	Varies with Chemical[1]
Chloroform	**[µg/L]**	0.98	80[8]
Toluene	**[µg/L]**	1.2	150[1]

1 California Department of Public Health (CDPH) primary maximum contaminant level (MCL).
2 CDPH secondary MCL.
3 CDPH notification level for unregulated chemicals.
4 Chromium-6 (hexavalent chromium) is regulated by CDPH under the 50 µg/L total chromium MCL.
5 United States Environmental Protection Agency (USEPA) secondary standard for pH.
6 Not Applicable – no current MCL.
7 USEPA proposed MCL and alternative MCL
8 Chloroform is regulated under the 80 µg/L USEPA MCL for total trihalomethanes.
ND Not detected above laboratory detection limit.
BOLD Equal to or above current CDPH MCL or notification level.

5.4 Microscopic Particulate Analysis

Microscopic particulate analysis (MPA) did not show any primary or secondary particulates in the well discharge, with the exception of plant pollen. The plant pollen identified was determined to be pine pollen, and is likely an airborne contaminant that contacted the sampling apparatus during field set-up. Given this, there is no evidence from the MPA that the ground water produced by Well FP-2 is under the direct influence of surface water in Big Bear Lake. A copy of the complete MPA report is presented in Appendix C.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the data collected during this investigation, we have developed the following conclusions:

- Well FP-2 has successfully been rehabilitated and its specific capacity restored to near original levels;
- Extreme care should be exercised when equipping or redeveloping the well in the future to avoid damaging the wire-wrap screen. Although no clear damage was visible from the video survey, the screen design is fragile and can easily be damaged;
- Well FP-2 can yield up to 35 gpm on a long-term basis with less than 10 ft of drawdown;
- At the 35 gpm discharge rate, pumping interference with the closest private well is expected to be less than 0.3 ft;
- Ground water quality data from Well FP-2 indicates the water from the well is suitable for municipal supply;
- Microscopic particulate analysis of discharge water detected pine pollen on the sampling filter. However, the detection was likely the result of an airborne contaminant and not from ground water under the direct influence of surface water. Confirmation sampling and analysis may be necessary to verify this conclusion prior to permitting the well with the CDPH.

7.0 REFERENCES

American Society for Testing and Materials, 1994. ASTM Standards on Ground Water and Vadose Zone Investigations. 2nd Edition.

Jacob, C.E., 1950. Engineering Hydraulics. J. Wiley and Sons, New York.

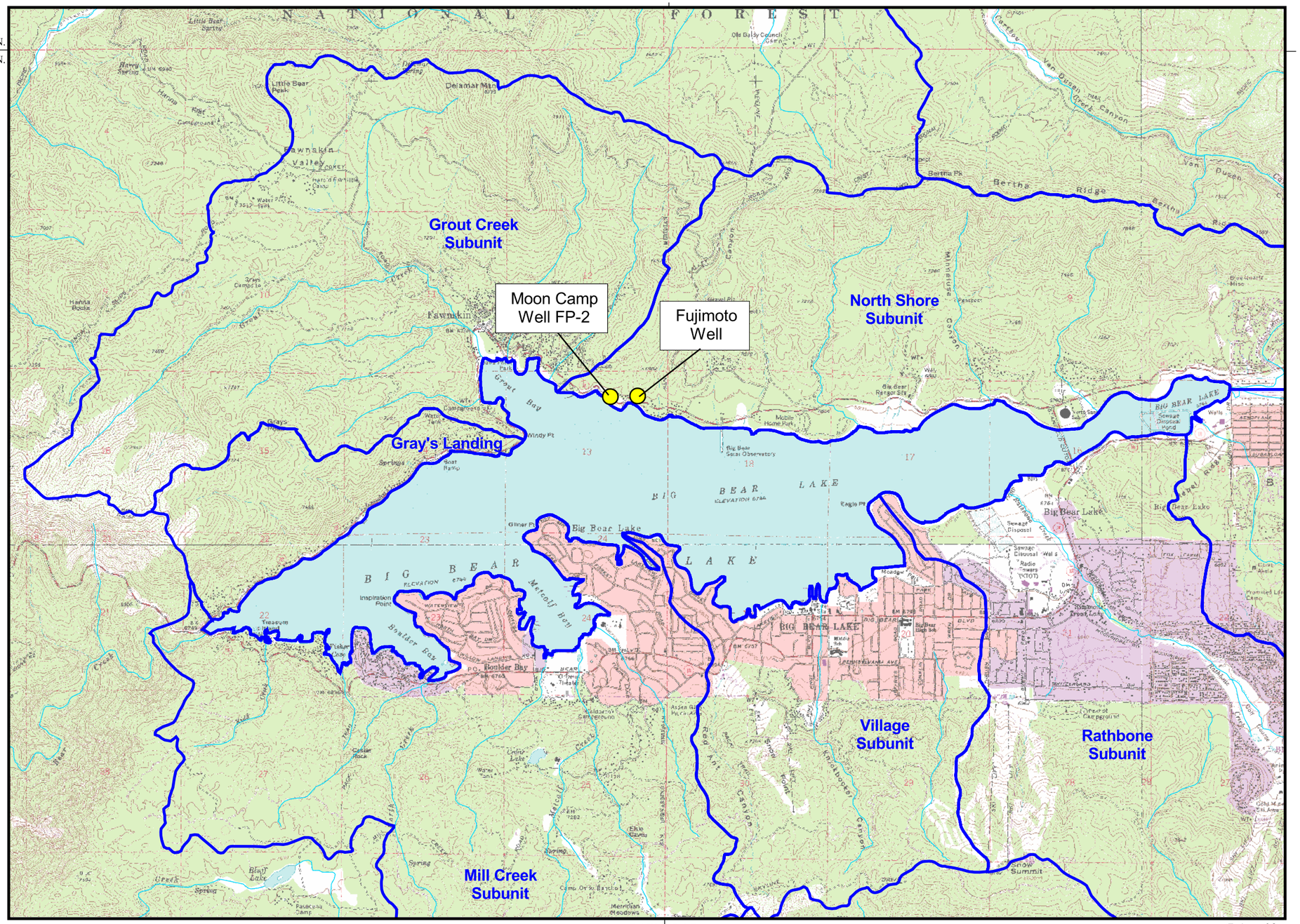
Driscoll, Fletcher G., 1986. Groundwater and Wells. Second Edition. U.S. Filter/Johnson Screens, St Paul Minnesota.

FIGURES

CALIFORNIA COLLABORATIVE SOLUTIONS

RESULTS OF REHABILITATION AND
AQUIFER TESTING MOON CAMP WELL FP-2

GENERAL LOCATION



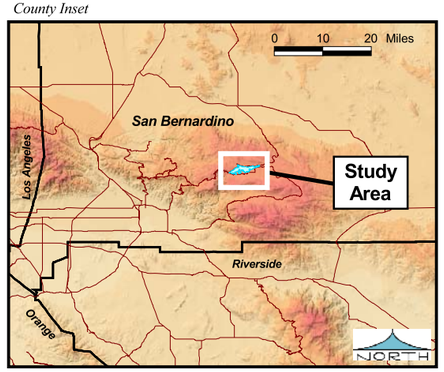
7-Aug-08

EXPLANATION

Well Location

Hydrologic Subunit Boundary

County Inset



NORTH

0 2000 4000 Feet

Prepared by: DWB

Map Projection:
UTM Zone 11, NAD27
Central Meridian: -117 degrees

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Figure 1

GIS_proj\ca_col_soltns_mooncamp_rehab_8-08\0_Mooncamp_rehab_8-08.apr

CALIFORNIA COLLABORATIVE SOLUTIONS

RESULTS OF REHABILITATION AND
AQUIFER TESTING MOON CAMP WELL FP-2

DETAILED LOCATION

EXPLANATION

Moon Camp Well FP-2 and Fujimoto Well Locations

Well Classification

- Municipal
- Private
- Test Well

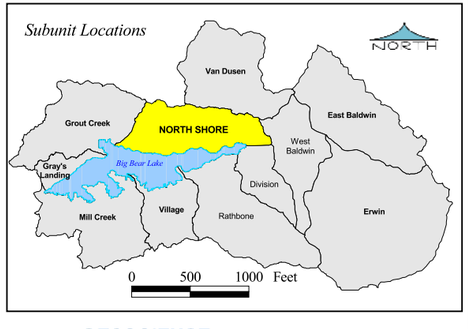
Well Status

- Abandoned
- Destroyed
- Non-Pumping
- Pumping
- Unknown

Example: = Pumping Municipal Well

Hydrologic Subunit Boundary

Creek or Drainage Channel



7-Aug-08

Prepared by: DWB

Map Projection:
UTM 1927 (Zone 11)
Central Meridian: -117 degrees

Base Map from:
USGS 7 1/2 minute Big Bear City (1994)
and Moonridge (1994) Quadrangles.

NORTH

0 1000 2000 Feet

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Figure 2

GIS_proj\ca_col_soltns_mooncamp_rehab_8-08\0_Mooncamp_rehab_8-08.apr

Step Drawdown Test
Moon Camp Well FP-2

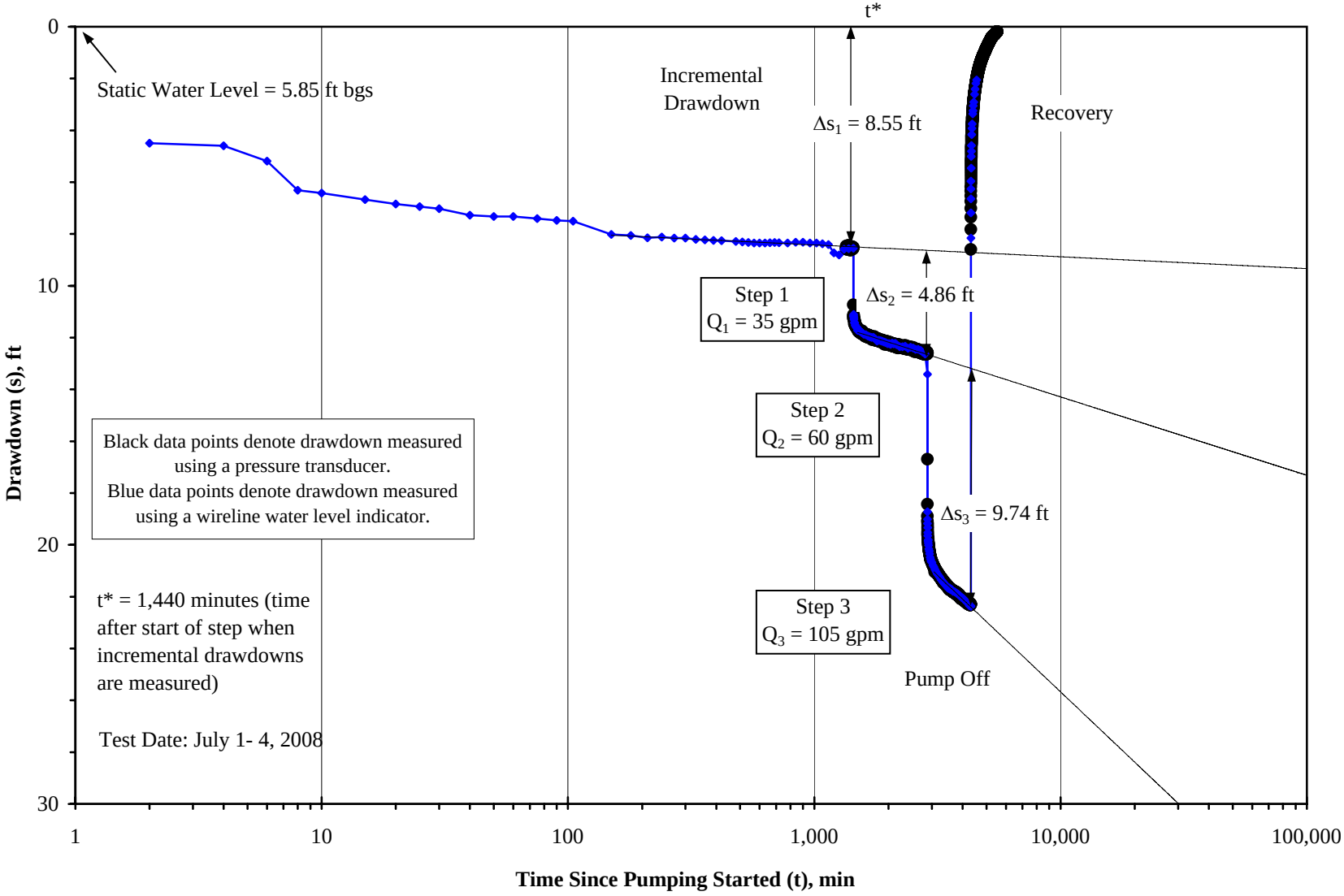


Figure 3

Step Drawdown Test - Step 3 (105 gpm)
Moon Camp Well FP-2

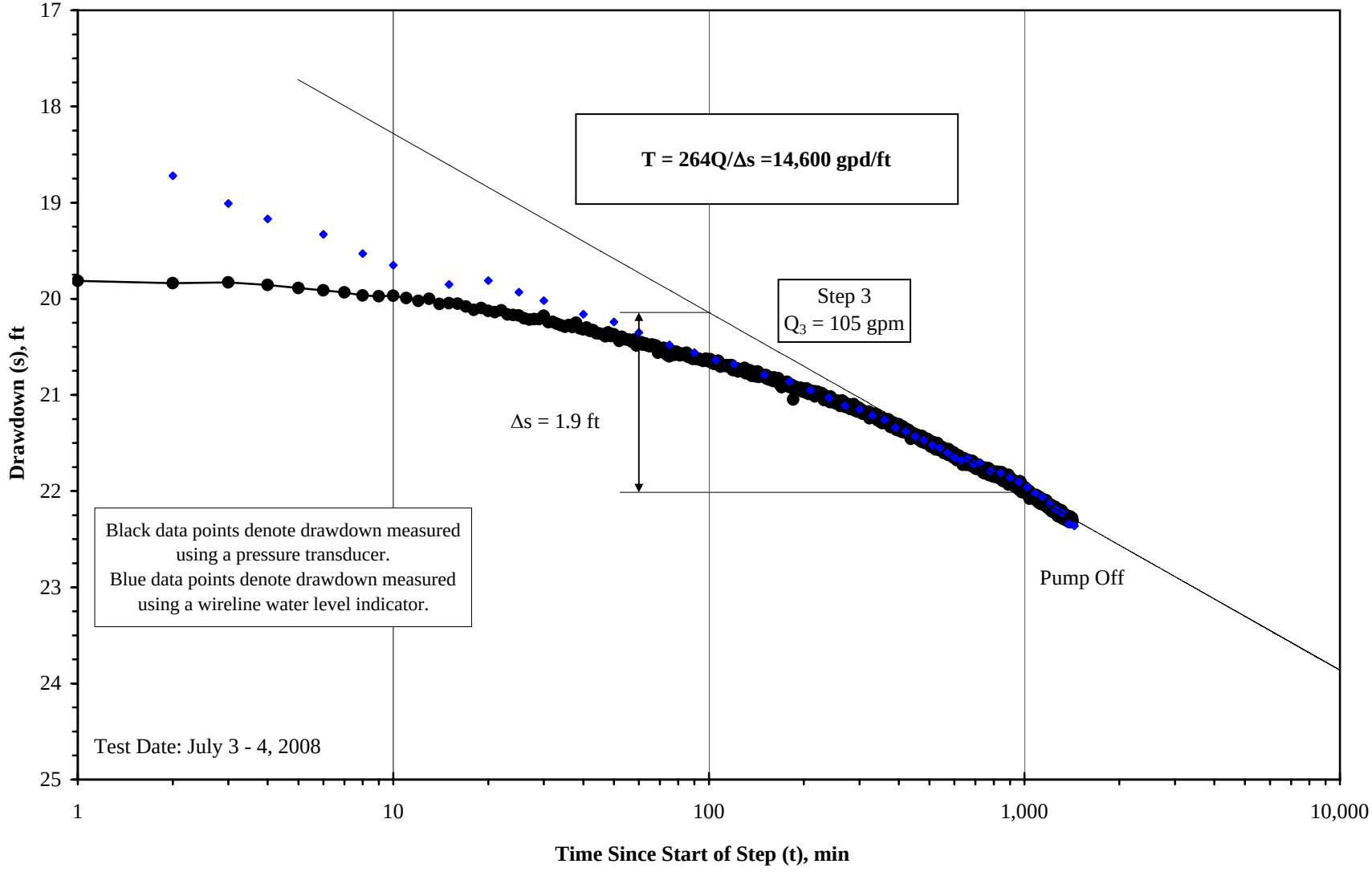


Figure 4

Specific Drawdown
Moon Camp Well FP-2

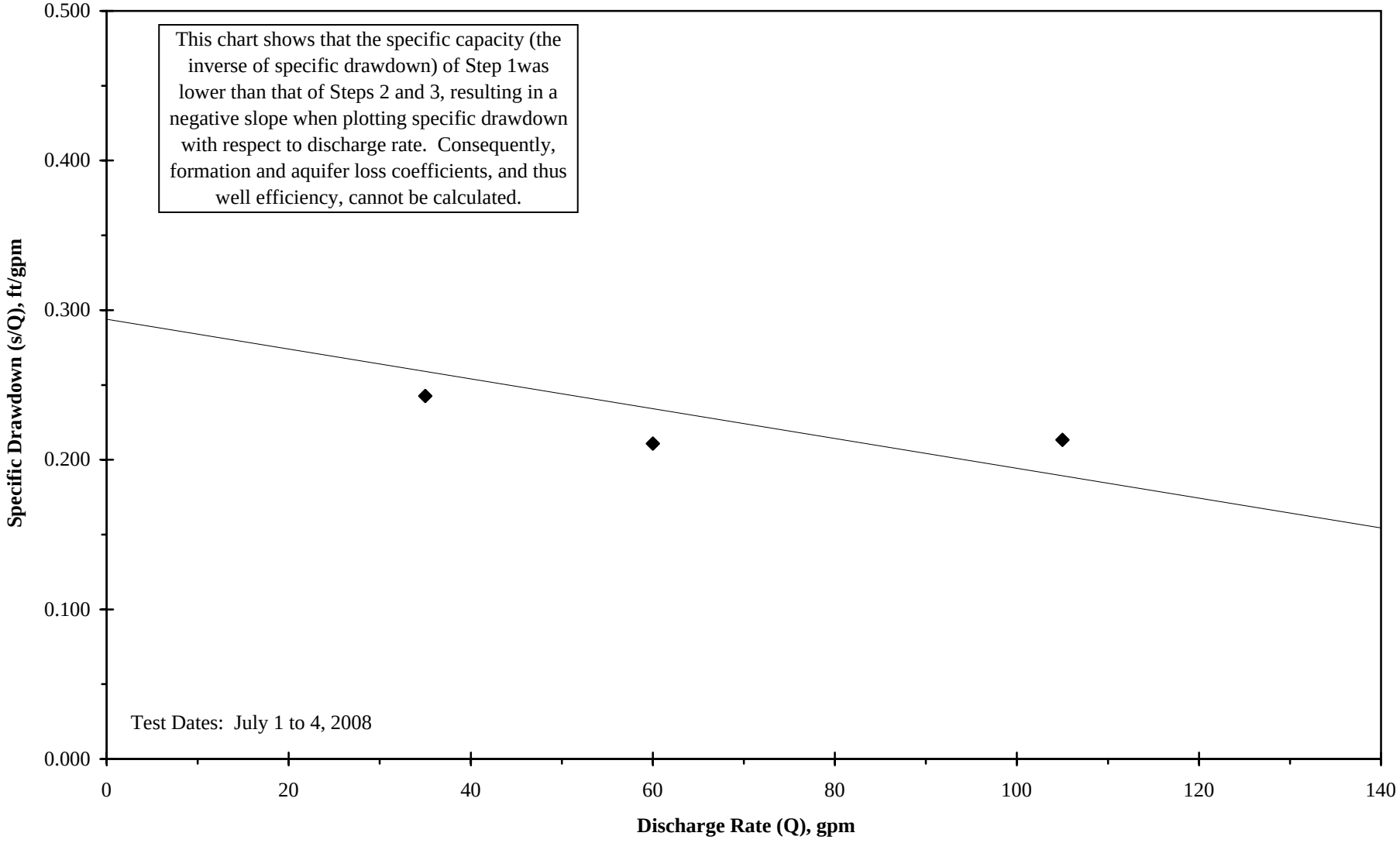


Figure 5

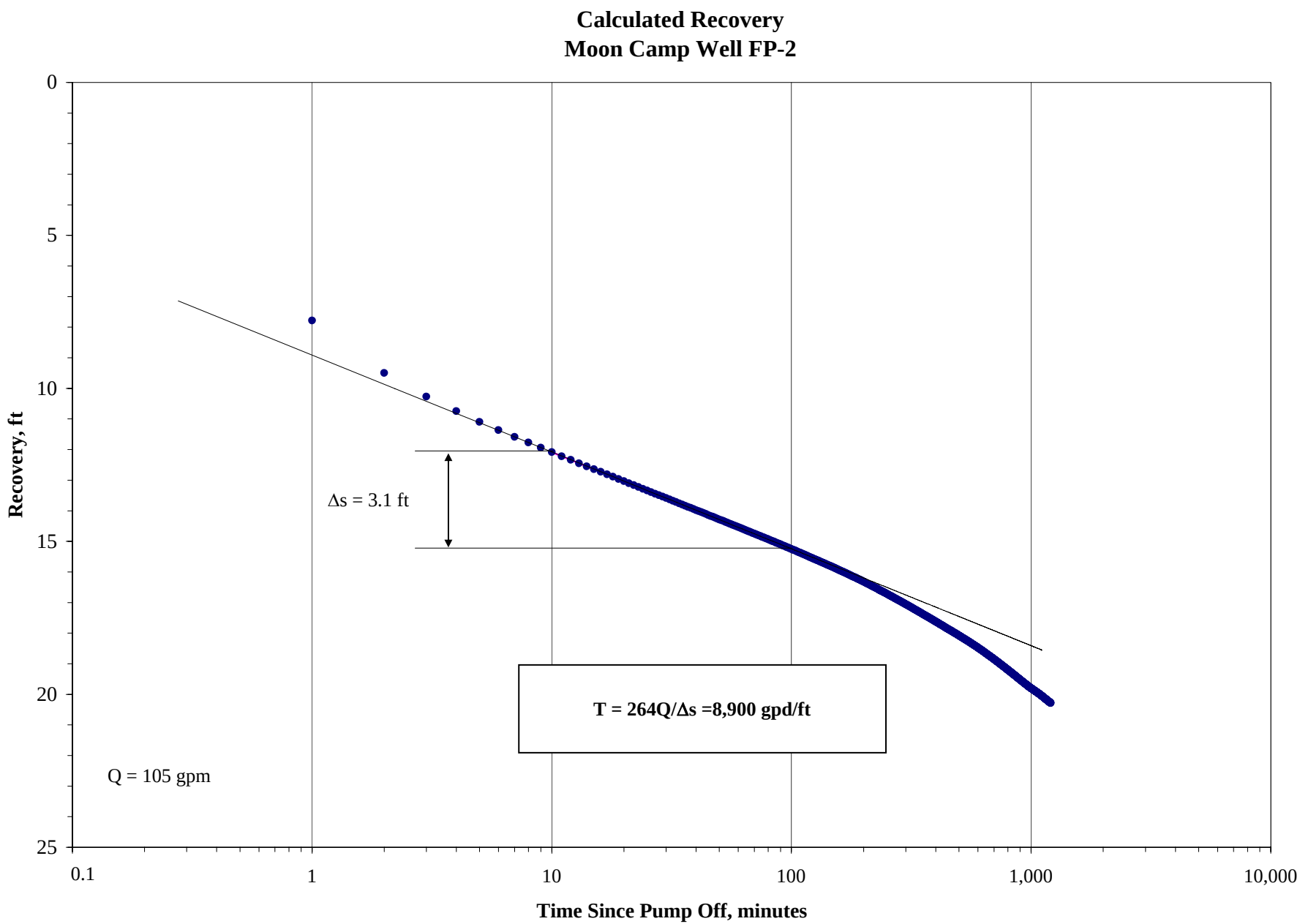

Calculated Recovery
Moon Camp Well FP-2
Recovery, ft
0
5
10
15
20
25
0.1
1
10
100
1,000
10,000
Time Since Pump Off, minutes
Δs = 3.1 ft
T = 264Q/Δs =8,900 gpd/ft
Q = 105 gpm

Figure 6

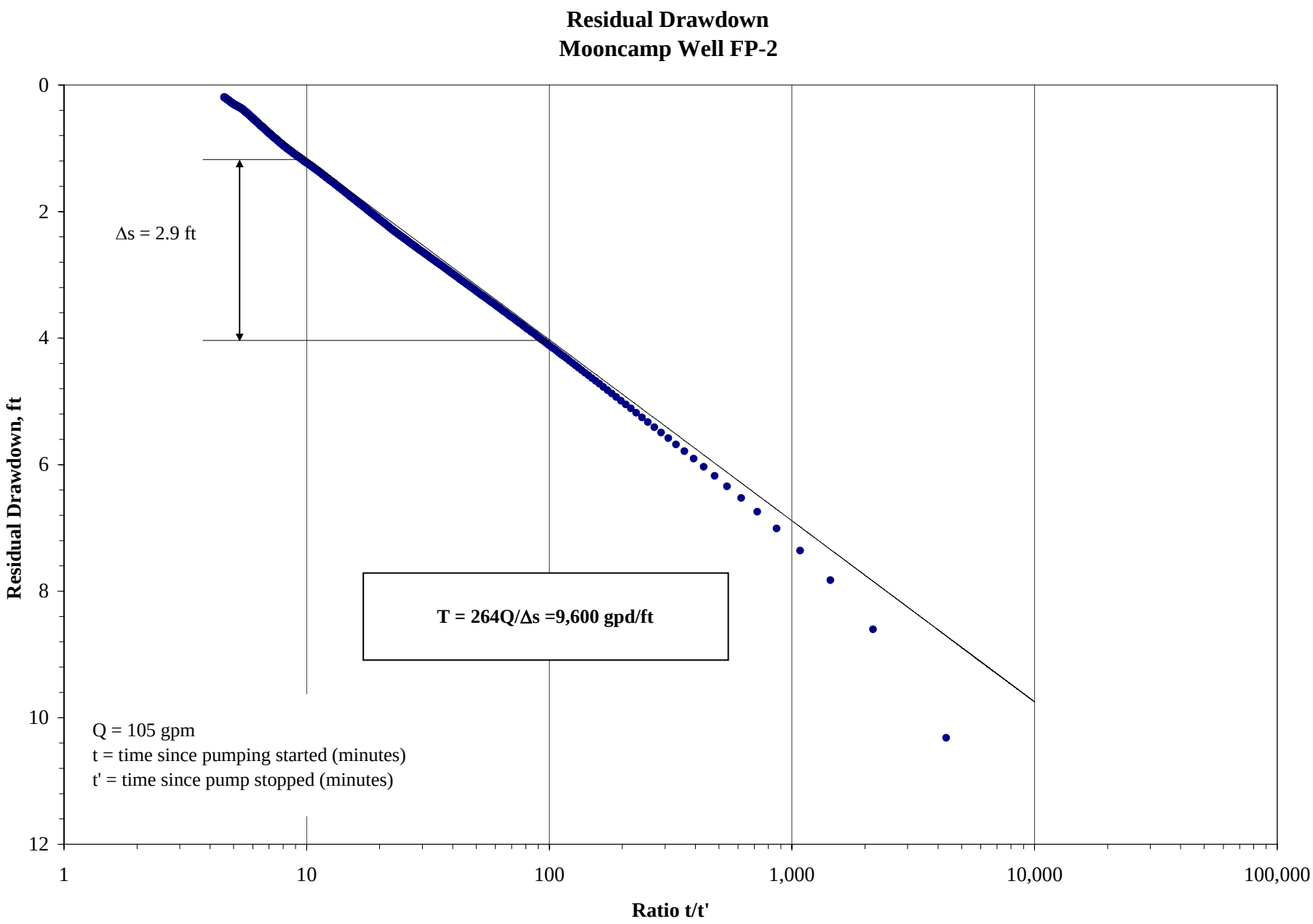

Residual Drawdown
Mooncamp Well FP-2
Residual Drawdown, ft
0
2
4
6
8
10
12
Δs = 2.9 ft
T = 264Q/Δs =9,600 gpd/ft
Q = 105 gpm
t = time since pumping started (minutes)
t' = time since pump stopped (minutes)
1
10
100
1,000
10,000
100,000
Ratio t/t'

Figure 7

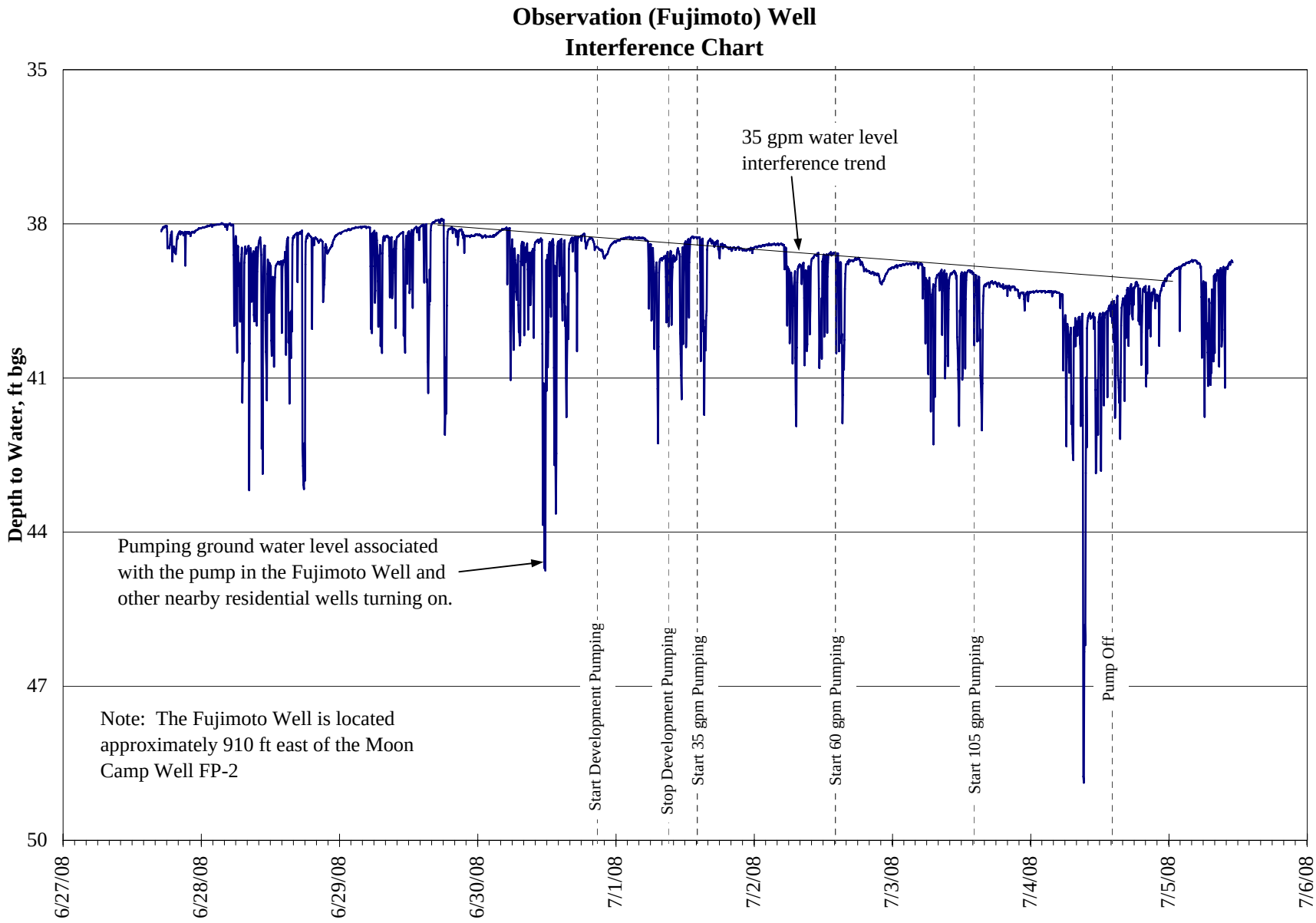

Observation (Fujimoto) Well
Interference Chart
Depth to Water, ft bgs
35
38
41
44
47
50
35 gpm water level
interference trend
Pumping ground water level associated
with the pump in the Fujimoto Well and
other nearby residential wells turning on.
Note: The Fujimoto Well is located
approximately 910 ft east of the Moon
Camp Well FP-2
Start Development Pumping
Stop Development Pumping
Start 35 gpm Pumping
Start 60 gpm Pumping
Start 105 gpm Pumping
Pump Off
6/27/08
6/28/08
6/29/08
6/30/08
7/1/08
7/2/08
7/3/08
7/4/08
7/5/08
7/6/08

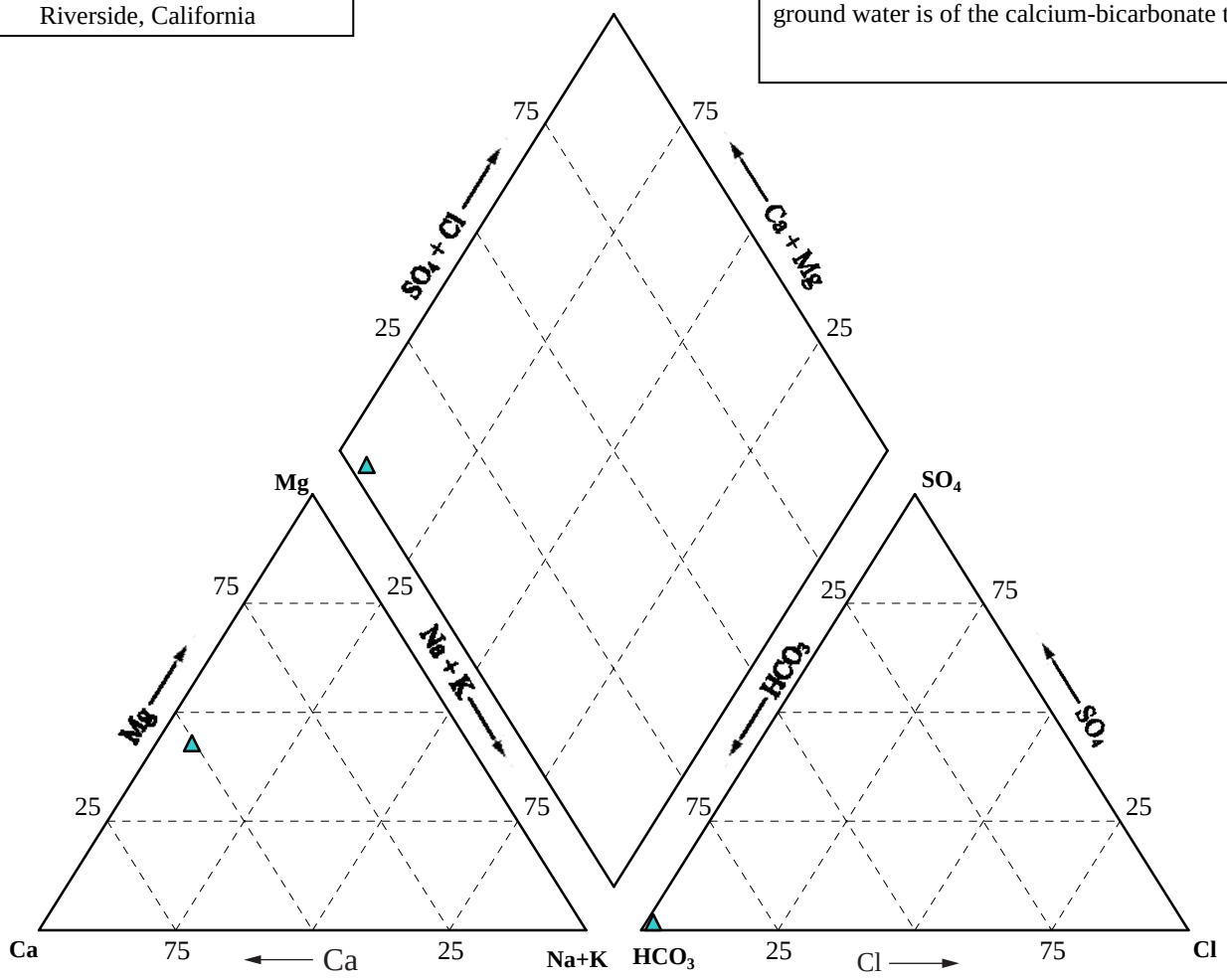
Figure 8

Figure 9

Trilinear Diagram
Water Quality Data
Moon Camp Well FP-2

Water Quality Results from E.S. Babcock & Sons, Inc. of Riverside, California

Water Quality samples collected from the Moon Camp Well FP-2 on July 2, 2008 indicate that ground water is of the calcium-bicarbonate type.



TABLE

Table 1

Summary of Required Water Quality Analyses

Constituent	Units	Detection Limit
General Physical Properties		
Color	Color unit	3
Odor	Odor unit	1
Turbidity	NTU[1]	0.2
MBAS	mg/L[2]	0.05
General Minerals		
Total Hardness	mg/L	3
Calcium	mg/L	1
Magnesium	mg/L	1
Sodium	mg/L	1
Potassium	mg/L	1
Total Alkalinity, as $CaCO_3$	mg/L	3
Hydroxide	mg/L	3
Carbonate	mg/L	3
Bicarbonate	mg/L	3
Sulfate	mg/L	0.5
Chloride	mg/L	1
pH	pH unit	1
Iron	µg/L	20.0
Zinc	µg/L	10.0
Manganese	µg/L	10.0
Copper	µg/L	10.0
Specific Conductance	umhos/cm[3]	1
Total Dissolved Solids (TDS)	mg/L	20
Aggressive Index	-	-
Langlier Index	-	-
Inorganic Chemicals		
Aluminum	µg/L[4]	50.0
Antimony	µg/L	6.0
Arsenic	µg/L	2.0
Barium	µg/L	100.0
Beryllium	µg/L	1.0
Cadmium	µg/L	1.0
Chromium (Total)	µg/L	1.0
Chromium, hexavalent (CrVI)	µg/L	1.0
Cyanide	mg/L	0.1
Fluoride	mg/L	0.1
Lead	µg/L	5.0
Mercury	µg/L	1.0
Nickel	µg/L	10.0
Nitrate, as NO_3	mg/L	1.0
Nitrate, as N	mg/L	0.2
Nitrite, as N	mg/L	0.1
Selenium	µg/L	5.0
Silver	µg/L	10.0
Thallium	µg/L	1.0

Table 1

Constituent	Units	Detection Limit
EPA Organic Methods		
Volatiles (EPA 524.2) - includes MTBE	µg/L	various
EDB and DBCP (EPA 504.1)	µg/L	various
Nitrogen & Phosphorus Pesticides (EPA 507)	µg/L	various
Chlorinated Pesticides & PCB's as DCP (EPA 508)	µg/L	various
Chlorinated Acid Herbicides (EPA 515.3)	µg/L	various
DEHP, DEHA, Benzo(EPA a)Pyrene (EPA 525.2)	µg/L	various
Carbamates (EPA 531.1)	µg/L	various
Glyphosate (EPA 547)	µg/L	25.0
Endothall (EPA 548.1)	µg/L	45.0
Diquat (EPA 549.1)	µg/L	4.0
Dioxin (2,3,7,8 TCDD) (EPA 1613)	µg/L	0.000005
Perchlorate (EPA 314.0)	µg/L	4.0
Unregulated Contaminant Monitoring Rule (State and Federal) not Covered Under EPA Organic Methods		
Vanadium	µg/L	3.0
Boron	µg/L	100.0
1,2,3-Trichloropropane (1,2,3-TCP)	µg/L	0.005
Additional Analysis		
Radioactivity (Gross Alpha)	pCi/L[5]	3
Uranium*	µg/L	1
Radium-226*	pCi/L	1
Radium-228**	pCi/L	1
Radon	pCi/L	10
Asbestos	MFL[6]	0.2
Silica (Total)	mg/L	1.0

[1] nephelometric turbidity units
[2] milligrams per liter
[3] micromhos per centimeter
[4] micrograms per liter
[5] picocuries per liter
[6] million fibers per liter
*Analysis for Uranium and Radium-226 should occur only if Gross Alpha is detected above 5 pCi/L
** Analysis for Radium 228 should occur only if Radium 226 is detected above 3 pCi/L

APPENDIX A

Pumping Test Data

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PUMPING TEST DATA

Test Date: July 1 - 4, 2008

Well Name/Number: Mooncamp Well FP-2

Circle Well Type: Pumping Observation (r = ft)

Circle Test Type: Step Drawdown Constant Rate Recovery Development

Static Water Level Depth: 5.85 ft bgs Reference Point Elevation: + 1.64 ft above ground surface

Time of Day	Time Step [min]	Time Total [min]	Depth to Water [ft]	Draw-down [ft]	Pumping Rate [gpm]	Sand Content [ppm]	Totalizer [gal x 10]	Remarks and Other Data
14:05	0	0	7.49	-	-	-	115,464.0	Pump on.
14:07	2	2	11.98	4.49	38	tr	115,471.5	
14:09	4	4	12.09	4.60	18	0	115,475.0	
14:11	6	6	12.68	5.19	20	0	115,479.0	
14:13	8	8	13.80	6.31	33	0	115,485.5	
14:15	10	10	13.91	6.42	33	0	115,492.0	
14:20	15	15	14.16	6.67	30	0	115,507.0	
14:25	20	20	14.33	6.84	31	0	115,522.5	
14:30	25	25	14.43	6.94	30	0	115,537.5	
14:35	30	30	14.51	7.02	31	0	115,553.0	
14:45	40	40	14.76	7.27	30	0	115,582.5	
14:55	50	50	14.81	7.32	29	0	115,611.5	
15:05	60	60	14.81	7.32	30	0	115,641.0	
15:20	75	75	14.89	7.40	29	-	115,684.5	
15:35	90	90	14.96	7.47	27	0	115,725.5	Totalizer briefly not spinning freely
15:45	100	100	-	-	28	0	115,753.0	
15:50	105	105	14.99	7.50	19	0	115,762.5	
16:05	120	120	16.45	8.96	42	0	115,825.0	
16:15	130	130	-	-	36	0	115,861.0	
16:35	150	150	15.51	8.02	33	0	115,926.5	
17:05	180	180	15.55	8.06	36	0	116,033.5	
17:35	210	210	15.64	8.15	35	0	116,139.0	
18:05	240	240	15.61	8.12	35	0	116,244.0	
18:35	270	270	15.65	8.16	36	0	116,352.0	
19:05	300	300	15.65	8.16	36	0	116,460.0	
19:35	330	330	15.70	8.21	36	0	116,568.0	
20:05	360	360	15.72	8.23	35	0	116,672.0	
20:35	390	390	15.74	8.25	36	0	116,779.0	
21:05	420	420	15.75	8.26	36	0	116,886.0	
22:05	480	480	15.78	8.29	36	0	117,100.5	
22:35	510	510	15.80	8.31	37	0	117,210.0	

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PUMPING TEST DATA

Test Date: July 1 - 4, 2008

Well Name/Number: Mooncamp Well FP-2

Circle Well Type: Pumping Observation (r = ft)

Circle Test Type: Step Drawdown Constant Rate Recovery Development

Static Water Level Depth: 5.85 ft bgs Reference Point Elevation: + 1.64 ft above ground surface

Time of Day	Time Step [min]	Time Total [min]	Depth to Water [ft]	Draw-down [ft]	Pumping Rate [gpm]	Sand Content [ppm]	Totalizer [gal x 10]	Remarks and Other Data
23:05	540	540	15.82	8.33	36	0	117,317.0	
23:35	570	570	15.84	8.35	34	0	117,420.0	
0:05	600	600	15.84	8.35	38	0	117,533.0	
0:35	630	630	15.84	8.35	35	0	117,639.0	
1:05	660	660	15.83	8.34	36	0	117,746.0	
1:35	690	690	15.82	8.33	37	0	117,856.0	
2:05	720	720	15.83	8.34	42	0	117,981.0	
3:05	780	780	15.84	8.35	31	0	118,169.0	
4:05	840	840	15.81	8.32	37	0	118,389.0	
5:05	900	900	15.81	8.32	36	0	118,604.0	
6:05	960	960	15.84	8.35	36	0	118,822.0	
7:05	1020	1020	15.84	8.35	36	0	119,037.0	
8:05	1080	1080	15.87	8.38	39	0	119,272.0	
9:05	1140	1140	15.90	8.41	35	0	119,480.0	
10:05	1200	1200	16.22	8.73	34	0	119,682.0	
11:05	1260	1260	16.30	8.81	36	0	119,896.0	
12:05	1320	1320	16.08	8.59	36	0	120,114.0	
13:05	1380	1380	16.06	8.57	34	0	120,319.0	Q_1 = 35 gpm, SC_1 = 4.1 gpm/ft
14:05	1440	1440	16.04	8.55	35	0	120,526.0	Adjust Q up.
14:07	2	1442	18.66	11.17	55	0	120,537.0	
14:09	4	1444	18.60	11.11	65	0	120,550.0	
14:11	6	1446	18.67	11.18	60	0	120,562.0	
14:13	8	1448	18.73	11.24	60	0	120,574.0	
14:15	10	1450	18.79	11.30	60	0	120,586.0	
14:20	15	1455	18.91	11.42	62	0	120,617.0	
14:25	20	1460	18.93	11.44	60	0	120,647.0	
14:30	25	1465	19.01	11.52	62	0	120,678.0	
14:35	30	1470	19.03	11.54	60	0	120,708.0	
14:45	40	1480	19.09	11.60	61	0	120,769.0	
14:50	45	1485	19.09	11.60	60	0	120,799.0	
14:55	50	1490	19.10	11.61	62	0	120,830.0	

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PUMPING TEST DATA

Test Date: July 1 - 4, 2008

Well Name/Number: Mooncamp Well FP-2

Circle Well Type: Pumping Observation (r = ft)

Circle Test Type: Step Drawdown Constant Rate Recovery Development

Static Water Level Depth: 5.85 ft bgs Reference Point Elevation: + 1.64 ft above ground surface

Time of Day	Time Step [min]	Time Total [min]	Depth to Water [ft]	Draw-down [ft]	Pumping Rate [gpm]	Sand Content [ppm]	Totalizer [gal x 10]	Remarks and Other Data
15:05	60	1500	19.21	11.72	61	0	120,890.5	
15:20	75	1515	19.21	11.72	60	0	120,980.0	
15:35	90	1530	19.24	11.75	60	0	121,070.5	
15:50	105	1545	19.26	11.77	61	0	121,162.5	
16:05	120	1560	19.30	11.81	59	0	121,251.5	
16:35	150	1590	19.36	11.87	60	0	121,432.0	
17:05	180	1620	19.38	11.89	61	0	121,614.0	
17:35	210	1650	19.43	11.94	61	0	121,798.0	
18:05	240	1680	19.46	11.97	60	0	121,978.0	
18:35	270	1710	19.48	11.99	61	0	122,160.0	
19:05	300	1740	19.48	11.99	61	0	122,343.0	
19:35	330	1770	19.54	12.05	61	0	122,526.0	
20:05	360	1800	19.62	12.13	61	0	122,709.0	
20:35	390	1830	19.59	12.10	61	0	122,892.0	
21:05	420	1860	19.61	12.12	61	0	123,074.0	
21:35	450	1890	19.63	12.14	61	0	123,256.0	
22:05	480	1920	19.66	12.17	61	0	123,438.0	
22:35	510	1950	19.68	12.19	60	0	123,619.0	
23:05	540	1980	19.72	12.23	61	0	123,801.0	
23:35	570	2010	19.72	12.23	60	0	123,982.0	
0:05	600	2040	19.75	12.26	60	0	124,163.0	
0:35	630	2070	19.70	12.21	53	0	124,322.0	
1:05	660	2100	19.73	12.24	61	0	124,506.0	
1:35	690	2130	19.71	12.22	61	0	124,689.0	
2:05	720	2160	19.76	12.27	57	0	124,860.0	
3:05	780	2220	19.84	12.35	64	0	125,245.0	
4:05	840	2280	19.84	12.35	59	0	125,598.0	
5:05	900	2340	19.82	12.33	59	0	125,950.0	
6:05	960	2400	19.90	12.41	61	0	126,318.0	
7:05	1020	2460	19.86	12.37	59	0	126,671.0	
8:05	1080	2520	19.89	12.40	61	0	127,035.0	

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PUMPING TEST DATA

Test Date: July 1 - 4, 2008

Well Name/Number: Mooncamp Well FP-2

Circle Well Type: Pumping Observation (r = ft)

Circle Test Type: Step Drawdown Constant Rate Recovery Development

Static Water Level Depth: 5.85 ft bgs Reference Point Elevation: + 1.64 ft above ground surface

Time of Day	Time Step [min]	Time Total [min]	Depth to Water [ft]	Draw-down [ft]	Pumping Rate [gpm]	Sand Content [ppm]	Totalizer [gal x 10]	Remarks and Other Data
9:05	1140	2580	19.94	12.45	61	0	127,399.0	
10:05	1200	2640	19.94	12.45	62	0	127,771.0	
11:05	1260	2700	19.98	12.49	61	0	128,135.0	
12:05	1320	2760	20.05	12.56	62	0	128,504.5	
13:05	1380	2820	20.12	12.63	60	0	128,865.0	Q_2 = 60 gpm, SC_2 = 4.5 gpm/ft
14:05	1440	2880	20.90	13.41	60	0	129,226.0	Adjust Q up.
14:07	2	2882	26.21	18.72	100	0	129,246.0	
14:08	3	2883	26.50	19.01	105	0	129,256.5	
14:09	4	2884	26.66	19.17	110	0	129,267.5	
14:11	6	2886	26.82	19.33	108	0	129,289.0	
14:13	8	2888	27.02	19.53	105	0	129,310.0	
14:15	10	2890	27.14	19.65	108	0	129,331.5	
14:20	15	2895	27.34	19.85	105	0	129,384.0	
14:25	20	2900	27.30	19.81	104	0	129,436.0	
14:30	25	2905	27.42	19.93	106	0	129,489.0	
14:35	30	2910	27.51	20.02	105	0	129,541.5	
14:45	40	2920	27.65	20.16	104	0	129,645.5	
14:55	50	2930	27.73	20.24	105	0	129,750.5	
15:05	60	2940	27.84	20.35	105	0	129,855.0	
15:20	75	2955	27.97	20.48	100	0	130,005.0	
15:35	90	2970	28.05	20.56	110	0	130,170.0	
15:50	105	2985	28.13	20.64	104	0	130,326.5	
16:05	120	3000	28.17	20.68	106	0	130,485.0	
16:35	150	3030	28.28	20.79	105	0	130,799.0	
17:05	180	3060	28.35	20.86	105	0	131,112.5	
17:35	210	3090	28.44	20.95	105	0	131,426.0	
18:05	240	3120	28.52	21.03	101	0	131,730.0	
18:35	270	3150	28.60	21.11	108	0	132,054.0	
19:05	300	3180	28.64	21.15	104	0	132,367.0	
19:35	330	3210	28.70	21.21	104	0	132,680.0	
20:05	360	3240	28.75	21.26	105	0	132,994.0	

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PUMPING TEST DATA

Test Date: July 1 - 4, 2008

Well Name/Number: Mooncamp Well FP-2

Circle Well Type: Pumping Observation (r = ft)

Circle Test Type: Step Drawdown Constant Rate Recovery Development

Static Water Level Depth: 5.85 ft bgs Reference Point Elevation: + 1.64 ft above ground surface

Time of Day	Time Step [min]	Time Total [min]	Depth to Water [ft]	Draw-down [ft]	Pumping Rate [gpm]	Sand Content [ppm]	Totalizer [gal x 10]	Remarks and Other Data
20:35	390	3270	28.83	21.34	104	0	133,307.0	
21:05	420	3300	28.87	21.38	104	0	133,620.0	
21:35	450	3330	28.92	21.43	105	0	133,934.0	
22:05	480	3360	28.96	21.47	104	0	134,247.0	
22:35	510	3390	29.01	21.52	104	0	134,560.0	
23:05	540	3420	29.04	21.55	105	0	134,873.5	
23:35	570	3450	29.09	21.60	105	0	135,187.0	
0:05	600	3480	29.14	21.65	104	0	135,500.0	
0:35	630	3510	29.17	21.68	105	0	135,814.0	
1:05	660	3540	29.15	21.66	109	0	136,140.0	
1:35	690	3570	29.21	21.72	105	0	136,455.0	
2:05	720	3600	29.20	21.71	103	0	136,764.0	
3:05	780	3660	29.28	21.79	107	0	137,405.0	
4:05	840	3720	29.30	21.81	105	0	138,037.0	
5:05	900	3780	29.35	21.86	107	0	138,678.0	
6:05	960	3840	29.39	21.90	106	0	139,312.0	
7:05	1020	3900	29.45	21.96	104	0	139,938.0	
8:05	1080	3960	29.51	22.02	105	0	140,567.0	
9:05	1140	4020	29.55	22.06	108	0	141,215.0	
10:05	1200	4080	29.62	22.13	104	0	141,838.0	
11:05	1260	4140	29.68	22.19	107	0	142,480.0	
12:05	1320	4200	29.72	22.23	109	0	143,132.0	
13:05	1380	4260	29.83	22.34	105	0	143,762.5	Q_3 = 105 gpm, SC_3 = 4.7 gpm/ft
14:05	1440	4320	29.85	22.36	106	0	144,399.5	Pump off.

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PUMPING TEST DATA

Test Date: July 4, 2008

Well Name/Number: Mooncamp Well FP-2

Circle Well Type: Pumping Observation (r = ft)
Circle Test Type: Step Drawdown Constant Rate Recovery Development
Static Water Level Depth: 5.85 ft bgs Reference Point Elevation: + 1.64 ft above ground surface

Time of Day	Time Step [min]	Time Total [min]	Depth to Water [ft]	Draw-down [ft]	Pumping Rate [gpm]	Sand Content [ppm]	Totalizer [kgal]	Remarks and Other Data
2:05 PM	0	4,320	29.85	22.36	-	-	144,399.5	Pump off.
2:07 PM	2	4,322	15.65	8.16	-	-	-	
2:09 PM	4	4,324	14.67	7.18	-	-	-	
2:11 PM	6	4,326	14.13	6.64	-	-	-	
2:13 PM	8	4,328	13.75	6.26	-	-	-	
2:15 PM	10	4,330	13.45	5.96	-	-	-	
2:20 PM	15	4,335	12.95	5.46	-	-	-	
2:25 PM	20	4,340	12.50	5.01	-	-	-	
2:30 PM	25	4,345	12.30	4.81	-	-	-	
2:35 PM	30	4,350	12.08	4.59	-	-	-	
2:45 PM	40	4,360	11.65	4.16	-	-	-	
2:55 PM	50	4,370	11.41	3.92	-	-	-	
3:05 PM	60	4,380	11.24	3.75	-	-	-	
3:26 PM	81	4,401	10.85	3.36	-	-	-	
3:36 PM	91	4,411	10.73	3.24	-	-	-	
3:50 PM	105	4,425	10.54	3.05	-	-	-	
4:05 PM	120	4,440	10.40	2.91	-	-	-	
4:35 PM	150	4,470	10.10	2.61	-	-	-	
5:05 PM	180	4,500	9.90	2.41	-	-	-	
5:35 PM	210	4,530	9.68	2.19	-	-	-	
6:05 PM	240	4,560	9.55	2.06	-	-	-	

APPENDIX B

Water Quality Data

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

Client Name: Geoscience Support Services Inc.
Contact: Diane Smith
Address: P.O. Box 220
Claremont, CA 91711

Report Date: 16-Jul-2008

Analytical Report: Page 1 of 9
Project Name: Geo - Well Testing
Project Number: [none]

Work Order Number: A8G0246

Received on Ice (Y/N): Yes Temp: 6 °C

Attached is the analytical report for the sample(s) received for your project. Below is a list of the individual sample descriptions with the corresponding laboratory number(s). Also, enclosed is a copy of the Chain of Custody document (if received with your sample(s)). Please note any unused portion of the sample(s) may be responsibly discarded after 30 days from the above report date, unless you have requested otherwise.

Thank you for the opportunity to serve your analytical needs. If you have any questions or concerns regarding this report please contact our client service department.

Sample Identification

Lab Sample #	Client Sample ID	Matrix	Date Sampled	By	Date Submitted	By
A8G0246-01	Moon Camp Well FP2, Fawnskin CA	Water	07/02/08 10:00	Christofer Coppinger	07/02/08 14:50	Nathan Reynolds

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Riverside, CA 92502-0432

location
6100 Quail Valley Court
Riverside, CA 92507-0704

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www.babcocklabs.com

NELAP no. 02101CA
CA ELAP no. 1156
EPA no. CA00102

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

Client Name: Geoscience Support Services Inc.
Contact: Diane Smith
Address: P.O. Box 220
Claremont, CA 91711

Report Date: 16-Jul-2008

Analytical Report: Page 2 of 9
Project Name: Geo - Well Testing
Project Number: [none]

Work Order Number: A8G0246
Received on Ice (Y/N): Yes Temp: 6 °C

Laboratory Reference Number
A8G0246-01

Sample Description	Matrix	Sampled Date/Time	Received Date/Time
Moon Camp Well FP2, Fawnskin CA	Water	07/02/08 10:00	07/02/08 14:50

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
Cations							
Total Hardness	270	3.0	mg/L	SM 3120B	07/08/08 15:17	lmt	
Calcium	58	1.0	mg/L	EPA 200.7	07/08/08 15:17	lmt	
Magnesium	30	1.0	mg/L	EPA 200.7	07/08/08 15:17	lmt	
Sodium	7.6	1.0	mg/L	EPA 200.7	07/08/08 15:17	lmt	
Potassium	1.6	1.0	mg/L	EPA 200.7	07/08/08 15:17	lmt	
Total Cations	5.8	0.05	me/L	Calculation			
Anions							
Total Alkalinity	280	3.0	mg/L	SM 2320B	07/11/08 13:38	ctl	
Hydroxide	ND	3.0	mg/L	SM 2320B	07/11/08 13:38	ctl	
Carbonate	ND	3.0	mg/L	SM 2320B	07/11/08 13:38	ctl	
Bicarbonate	340	3.0	mg/L	SM 2320B	07/11/08 13:38	ctl	
Chloride	2.7	1.0	mg/L	EPA 300.0	07/02/08 23:44	JC	
Sulfate	5.2	0.50	mg/L	EPA 300.0	07/02/08 23:44	JC	
Nitrate as N	0.20	0.20	mg/L	EPA 300.0	07/02/08 23:44	JC	
Fluoride	ND	0.1	mg/L	SM 4500F C	07/11/08 14:20	hga	
Nitrate	ND	1.0	mg/L	EPA 300.0	07/02/08 23:44	JC	
Total Anions	5.80	0.05	me/L	Calculation			
Aggregate Properties							
pH	7.5	1.0	pH Units	SM 4500H+ B	07/02/08 20:08	sbd	
Specific Conductance	510	1.0	umhos/cm	SM 2510 B	07/02/08 20:08	sbd	
Aggressive Index	12.2	1.0	N/A	Calculation			
Langlier Index @ Site Temp.	0.30		N/A	SM 2330 B	07/03/08 12:37	saf	

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NELAP no. 02101CA
CA ELAP no. 1156
EPA no. CA00102

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

Client Name: Geoscience Support Services Inc.
Contact: Diane Smith
Address: P.O. Box 220
Claremont, CA 91711

Report Date: 16-Jul-2008

Analytical Report: Page 3 of 9
Project Name: Geo - Well Testing
Project Number: [none]

Work Order Number: A8G0246
Received on Ice (Y/N): Yes Temp: 6 °C

Laboratory Reference Number
A8G0246-01

Sample Description	Matrix	Sampled Date/Time	Received Date/Time
Moon Camp Well FP2, Fawnskin CA	Water	07/02/08 10:00	07/02/08 14:50

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
Solids							
Total Dissolved Solids	300	20	mg/L	SM 2540C	07/08/08 14:45	hga	
General Physical							
Color	ND	3.0	Color Units	SM 2120B	07/03/08 19:17	sbd	
Odor	ND	1.0	T.O.N.*	SM 2150	07/03/08 19:17	sbd	
Turbidity	0.39	0.20	NTU	SM 2130 B	07/03/08 19:17	sbd	
Surfactants							
MBAS	ND	0.05	mg/L	SM 5540C	07/03/08 11:28	ctl	
General Inorganics							
Cyanide	ND	100	ug/L	SM 4500CN E	07/09/08 14:19	mds	N_pScr
Perchlorate	ND	4.0	ug/L	EPA 314.0	07/11/08 19:32	cth	
Nutrients							
Nitrite as N	ND	100	ug/L	SM 4500NO2 B	07/03/08 17:00	adb	
Metals and Metalloids							
Aluminum	ND	50	ug/L	EPA 200.7	07/08/08 15:17	lmt	
Antimony	ND	6.0	ug/L	EPA 200.8	07/09/08 17:17	ap	
Arsenic	ND	2.0	ug/L	EPA 200.8	07/09/08 17:17	ap	
Barium	ND	100	ug/L	EPA 200.8	07/09/08 17:17	ap	
Beryllium	ND	1.0	ug/L	EPA 200.8	07/09/08 17:17	ap	
Boron	ND	100	ug/L	EPA 200.7	07/08/08 15:17	lmt	
Cadmium	ND	1.0	ug/L	EPA 200.8	07/09/08 17:17	ap	
Total Chromium	1.1	1.0	ug/L	EPA 200.8	07/08/08 10:15	krv	
Hexavalent Chromium	ND	1.0	ug/L	EPA 218.6	07/08/08 18:42	jc	N_pFilt
Copper	ND	50	ug/L	EPA 200.8	07/09/08 17:17	ap	
Iron	ND	100	ug/L	EPA 200.7	07/08/08 15:17	lmt	
Lead	ND	5.0	ug/L	EPA 200.8	07/09/08 17:17	ap	
Manganese	ND	20	ug/L	EPA 200.8	07/09/08 17:17	ap	

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NELAP no. 02101CA
CA ELAP no. 1156
EPA no. CA00102

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

Client Name: Geoscience Support Services Inc.
Contact: Diane Smith
Address: P.O. Box 220
Claremont, CA 91711

Report Date: 16-Jul-2008

Analytical Report: Page 4 of 9
Project Name: Geo - Well Testing
Project Number: [none]

Work Order Number: A8G0246
Received on Ice (Y/N): Yes Temp: 6 °C

Laboratory Reference Number
A8G0246-01

Sample Description	Matrix	Sampled Date/Time	Received Date/Time
Moon Camp Well FP2, Fawnskin CA	Water	07/02/08 10:00	07/02/08 14:50

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
Metals and Metalloids							
Mercury	ND	1.0	ug/L	EPA 200.8	07/09/08 17:17	ap	
Nickel	ND	10	ug/L	EPA 200.8	07/09/08 17:17	ap	
Selenium	ND	5.0	ug/L	EPA 200.8	07/09/08 17:17	ap	
Total Silica	25	5.0	mg/L	EPA 200.7	07/08/08 15:17	lmt	
Silver	ND	10	ug/L	EPA 200.8	07/09/08 17:17	ap	
Thallium	ND	1.0	ug/L	EPA 200.8	07/09/08 17:17	ap	
Vanadium	ND	3.0	ug/L	EPA 200.8	07/08/08 10:15	krv	
Zinc	ND	50	ug/L	EPA 200.8	07/09/08 17:17	ap	
EDB and DBCP by EPA 504							
Ethylene dibromide	ND	0.020	ug/L	EPA 504.1	07/03/08 18:23	cya	
Dibromochloropropane	ND	0.010	ug/L	EPA 504.1	07/03/08 18:23	cya	
Nitrogen-Phosphorus Pesticides by EPA 507							
Alachlor	ND	1.0	ug/L	EPA 507	07/07/08 20:52	kos	
Atrazine	ND	0.50	ug/L	EPA 507	07/07/08 20:52	kos	
Butachlor	ND	0.38	ug/L	EPA 507	07/07/08 20:52	kos	
Diazinon	ND	0.25	ug/L	EPA 507	07/07/08 20:52	kos	
Metolachlor	ND	1.0	ug/L	EPA 507	07/07/08 20:52	kos	
Metribuzin	ND	1.0	ug/L	EPA 507	07/07/08 20:52	kos	
Molinate	ND	0.90	ug/L	EPA 507	07/07/08 20:52	kos	
Prometryn	ND	2.0	ug/L	EPA 507	07/07/08 20:52	kos	
Simazine	ND	1.0	ug/L	EPA 507	07/07/08 20:52	kos	
Thiobencarb	ND	1.0	ug/L	EPA 507	07/07/08 20:52	kos	
Surrogate: 1,3-Dimethyl-2-Nitrobenzene	96.5	% 70-130		EPA 507	07/07/08 20:52	kos	

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NELAP no. 02101CA
CA ELAP no. 1156
EPA no. CA00102

E.S.BABCOCK&Sons,Inc.
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Client Name: Geoscience Support Services Inc.
Contact: Diane Smith
Address: P.O. Box 220
Claremont, CA 91711

Report Date: 16-Jul-2008

Analytical Report: Page 5 of 9
Project Name: Geo - Well Testing
Project Number: [none]

Work Order Number: A8G0246
Received on Ice (Y/N): Yes Temp: 6 °C

Laboratory Reference Number
A8G0246-01

Sample Description	Matrix	Sampled Date/Time	Received Date/Time
Moon Camp Well FP2, Fawnskin CA	Water	07/02/08 10:00	07/02/08 14:50

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
Organochlorine Pesticides and PCBs by EPA 508							
Aldrin	ND	0.075	ug/L	EPA 508	07/07/08 17:46	DF	
Chlordane	ND	0.10	ug/L	EPA 508	07/07/08 17:46	DF	
Dieldrin	ND	0.020	ug/L	EPA 508	07/07/08 17:46	DF	
Endrin	ND	0.10	ug/L	EPA 508	07/07/08 17:46	DF	
Heptachlor	ND	0.010	ug/L	EPA 508	07/07/08 17:46	DF	
Heptachlor Epoxide	ND	0.010	ug/L	EPA 508	07/07/08 17:46	DF	
Hexachlorobenzene	ND	0.50	ug/L	EPA 508	07/07/08 17:46	DF	
Hexachlorocyclopentadiene	ND	1.0	ug/L	EPA 508	07/07/08 17:46	DF	
Lindane	ND	0.20	ug/L	EPA 508	07/07/08 17:46	DF	
Methoxychlor	ND	10	ug/L	EPA 508	07/07/08 17:46	DF	
Polychlorinated Biphenyls (Total PCB's)	ND	0.50	ug/L	EPA 508	07/07/08 17:46	DF	
Propachlor	ND	0.50	ug/L	EPA 508	07/07/08 17:46	DF	
Toxaphene	ND	1.0	ug/L	EPA 508	07/07/08 17:46	DF	
Surrogate: Decachlorobiphenyl	95.5	% 70-130		EPA 508	07/07/08 17:46	DF	
Chlorinated Herbicides by EPA 515.3							
2,4,5-TP Silvex	ND	1.0	ug/L	EPA 515.3	07/09/08 07:05	DF	
2,4-D	ND	10	ug/L	EPA 515.3	07/09/08 07:05	DF	
Bentazon	ND	2.0	ug/L	EPA 515.3	07/09/08 07:05	DF	
Dalapon	ND	10	ug/L	EPA 515.3	07/09/08 07:05	DF	
Dicamba	ND	1.5	ug/L	EPA 515.3	07/09/08 07:05	DF	
Dinoseb	ND	2.0	ug/L	EPA 515.3	07/09/08 07:05	DF	
Pentachlorophenol	ND	0.20	ug/L	EPA 515.3	07/09/08 07:05	DF	
Pichloram	ND	1.0	ug/L	EPA 515.3	07/09/08 07:05	DF	
Surrogate: DCAA	96.3	% 70-130		EPA 515.3	07/09/08 07:05	DF	

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NELAP no. 02101CA
CA ELAP no. 1156
EPA no. CA00102

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

Client Name: Geoscience Support Services Inc.
Contact: Diane Smith
Address: P.O. Box 220
Claremont, CA 91711

Report Date: 16-Jul-2008

Analytical Report: Page 6 of 9
Project Name: Geo - Well Testing
Project Number: [none]

Work Order Number: A8G0246
Received on Ice (Y/N): Yes Temp: 6 °C

Laboratory Reference Number
A8G0246-01

Sample Description	Matrix	Sampled Date/Time	Received Date/Time
Moon Camp Well FP2, Fawnskin CA	Water	07/02/08 10:00	07/02/08 14:50

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
Volatile Organic Compounds by EPA 524.2							Nconf, NTBnr
1,1,1,2-Tetrachloroethane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,1,1-Trichloroethane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,1,2,2-Tetrachloroethane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,1,2-Trichloroethane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,1-Dichloroethane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,1-Dichloroethene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,1-Dichloropropene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,2,3-Trichlorobenzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,2,4-Trichlorobenzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,2,4-Trimethylbenzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,2-Dichlorobenzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,2-Dichloroethane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,2-Dichloropropane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,3,5-Trimethylbenzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,3-Dichlorobenzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,3-Dichloropropane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
1,4-Dichlorobenzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
2,2-Dichloropropane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	NCALI
2-Butanone(MEK-EPA 8260)	ND	5.0	ug/L	EPA 524.2	07/07/08 16:22	EEC	
2-Chlorotoluene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
4-Chlorotoluene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
4-Methyl-2-Pentanone(MIBK)	ND	5.0	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Benzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Bis(2-chloroethyl)ether (Non-NELAP)	ND	5.0	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Bromobenzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Bromochloromethane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Bromodichloromethane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Bromoform	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Bromomethane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	

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NELAP no. 02101CA
CA ELAP no. 1156
EPA no. CA00102

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

Client Name: Geoscience Support Services Inc.
Contact: Diane Smith
Address: P.O. Box 220
Claremont, CA 91711

Report Date: 16-Jul-2008

Analytical Report: Page 7 of 9
Project Name: Geo - Well Testing
Project Number: [none]

Work Order Number: A8G0246
Received on Ice (Y/N): Yes Temp: 6 °C

Laboratory Reference Number
A8G0246-01

Sample Description	Matrix	Sampled Date/Time	Received Date/Time
Moon Camp Well FP2, Fawnskin CA	Water	07/02/08 10:00	07/02/08 14:50

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
Volatile Organic Compounds by EPA 524.2							Nconf, NTBnr
Carbon Tetrachloride	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Chlorobenzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Chloroethane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Chloroform	0.98	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Chloromethane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
cis-1,2-Dichloroethene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
cis-1,3-Dichloropropene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Dibromochloromethane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Dibromomethane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Dichlorodifluoromethane	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Di-isopropyl ether	ND	3.0	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Ethyl tert-Butyl Ether	ND	3.0	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Ethylbenzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Hexachlorobutadiene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Isopropylbenzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Methyl tert butyl Ether	ND	3.0	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Methylene Chloride	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
n-Butylbenzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
n-Propylbenzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Naphthalene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
p-Isopropyltoluene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
sec-Butylbenzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Styrene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
tert-Amyl Methyl Ether	ND	3.0	ug/L	EPA 524.2	07/07/08 16:22	EEC	
tert-Butyl alcohol	ND	2.0	ug/L	EPA 524.2	07/07/08 16:22	EEC	
tert-Butylbenzene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Tetrachloroethene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Toluene	1.2	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
trans-1,2-Dichloroethene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
trans-1,3-Dichloropropene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	

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Client Name: Geoscience Support Services Inc.
Contact: Diane Smith
Address: P.O. Box 220
Claremont, CA 91711

Report Date: 16-Jul-2008

Analytical Report: Page 8 of 9
Project Name: Geo - Well Testing
Project Number: [none]

Work Order Number: A8G0246
Received on Ice (Y/N): Yes Temp: 6 °C

Laboratory Reference Number
A8G0246-01

Sample Description	Matrix	Sampled Date/Time	Received Date/Time
Moon Camp Well FP2, Fawnskin CA	Water	07/02/08 10:00	07/02/08 14:50

Analyte(s)	Result	RDL	Units	Method	Analysis Date	Analyst	Flag
Volatile Organic Compounds by EPA 524.2							Nconf, NTBnr
Trichloroethene	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Trichlorofluoromethane	ND	5.0	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Trichlorotrifluoroethane	ND	10	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Vinyl Chloride	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Xylenes (m+p)	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Xylenes (ortho)	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Xylenes (Total)	ND	0.50	ug/L	EPA 524.2	07/07/08 16:22	EEC	
Surrogate: 1,2-Dichloroethane-d4	135	% 50-150		EPA 524.2	07/07/08 16:22	EEC	
Surrogate: Bromofluorobenzene	113	% 50-150		EPA 524.2	07/07/08 16:22	EEC	
Surrogate: Toluene-d8	100	% 50-150		EPA 524.2	07/07/08 16:22	EEC	
1,2,3-TCP by Purge & Trap GC/MS							
1,2,3-Trichloropropane	ND	0.005	ug/L	CA DHS-SRL	07/07/08 13:26	JES	
Semivolatile Organic Compounds by EPA 525.2							
Benzo(a)pyrene	ND	0.10	ug/L	EPA 525.2	07/07/08 19:55	DF	
DEH-Adipate	ND	5.0	ug/L	EPA 525.2	07/07/08 19:55	DF	
DEH-Phthalate	ND	3.0	ug/L	EPA 525.2	07/07/08 19:55	DF	
Surrogate: 4-Terphenyl-d14	108	% 70-130		EPA 525.2	07/07/08 19:55	DF	
Endothall by EPA 548.1							
Endothall	ND	45	ug/L	EPA 548.1	07/10/08 12:29	kos	

* NELAP does not offer accreditation for this analyte/method/matrix combination

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NELAP no. 02101CA
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Environmental Laboratories est 1906

Client Name: Geoscience Support Services Inc.
Contact: Diane Smith
Address: P.O. Box 220
Claremont, CA 91711

Report Date: 16-Jul-2008

Analytical Report: Page 9 of 9
Project Name: Geo - Well Testing
Project Number: [none]

Work Order Number: A8G0246
Received on Ice (Y/N): Yes Temp: 6 °C

Notes and Definitions

pH:	Regulatory 15 minute holding time exceeded (A8G0246-01)
N_pFilt	Sample filtered and preserved upon receipt to the laboratory.
N_pScr	Sample screened for interference and preserved upon receipt to the laboratory.
NCALI	The sample result(s) are estimate(s). The instrument calibration verification result(s) were below laboratory acceptance criteria.
Nconf	Result(s) confirmed by re-analysis.
NTBnr	No travel blank was received with this sample.
ND:	Analyte NOT DETECTED at or above the Method Detection Limit **(if MDL is reported)**, otherwise at or above the Reportable Detection Limit (RDL)
NR:	Not Reported
RDL:	Reportable Detection Limit
MDL:	Method Detection Limit

* / (Non-NELAP): NELAP does not offer accreditation for this analyte/method/matrix combination

Approval

Enclosed are the analytical results for the submitted sample(s). Babcock Laboratories certify the data presented as part of this report meet the minimum quality standards in the referenced analytical methods. Any exceptions have been noted. Babcock Laboratories and its officers and employees assume no responsibility and make no warranty, express or implied, for uses or interpretations made by any recipients, intended or unintended, of this report.

Lorenzo Rodriguez

☒ Lorenzo Rodriguez, Project Manager ☐ Allison Mackenzie, General Manager ☐ Lawrence J. Chrystal, Laboratory Director

cc:

ESB_Short_.Report

mailing P.O. Box 432 Riverside, CA 92502-0432 | *location* 6100 Quail Valley Court Riverside, CA 92507-0704 | P 951 653 3351 F 951 653 1662 www.babcocklabs.com | NELAP no. 02101CA CA ELAP no. 1156 EPA no. CA00102

DATE:	July 11, 2008
CLIENT:	EDWARD S. BABCOCK & SONS, INC. P.O. BOX 432 RIVERSIDE, CA 92502-0432
ATTENTION:	Humaira Saleem
REFERENCE:	A8G0240
REPORT NO:	122252
SUBJECT:	ANALYSIS OF WATER SAMPLE FOR ASBESTOS BY TEM
ACCREDITED:	California Department of Health Services (ELAP-1119)

The date and times of collection, receipt, filtration, and analysis are as follows:

SAMPLE NO:	A8G0240-01
COLLECTED:	7/2/08 at 1000 by Christofer Coppinger (Geoscience Services, Inc.)
RECEIVED:	7/3/08 at 1125
FILTERED:	7/3/08 at 1150
ANALYZED:	7/9/08

The sample was analyzed for fibers >10 μm in length to conform with the drinking water document, EPA 600 94 134, 100.2. This regulation calls for an MCL (maximum contaminant level) of 7 MFL and an analytical sensitivity level of 0.2 MFL.

No asbestos structures >10μm in length were detected. The analytical sensitivity of 0.2 MFL was reached.

The results of the analysis and the detection limit are summarized on the following pages.

Respectfully submitted,
EMS LABORATORIES, INC.

B. M. Kolk
Laboratory Director

BMK/ah

NOTE: The results of the analysis are based upon the samples submitted to the laboratory. No representation is made regarding the sampling area other than that implied by the analytical results for the immediate vicinity of the samples analyzed as calculated from the data presented with those samples.

This report, from a NIST laboratory through NVLAP, must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

This report shall not be reproduced, except in full, without the written approval of EMS Laboratories, Inc.

Any deviation or exclusion from the test method is noted in this cover letter.

Unless otherwise noted in this cover letter, the samples were received properly packaged, clearly identified and intact.

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 /626-568-4065

SUBCONTRACT ORDER

E.S. Babcock & Sons, Inc.

A8G0240

SENDING LABORATORY:

E.S. Babcock & Sons, Inc.
P. O. Box 432
Riverside, CA 92502-0432
Phone: (951) 653-3351
Fax: (951) 653-1662
Project Manager: Humaira Saleem

RECEIVING LABORATORY:

EMS Laboratories
117 W. Bellevue Drive
Pasadena, CA 91105
Phone :(626) 568-4065
Fax: (626) 796-5282

Client: Geoscience Support Services Inc.
Sampler: Christofer Coppinger

No State Form

Analysis	Due	Expires Regulatory Days Past Date Sampled	Laboratory ID	Comments
Sample ID: A8G0240-01	**Water**	**Sampled:07/02/08 10:00**	**Mooncamp FP2, Fawnskin, CA**	
Asbestos *Containers Supplied:* Quart Poly - Unpres (E)	07/14/08 17:00	12/29/08 10:00		

All Containers Intact: X Yes ____No Samples Preserved Properly: ____Yes ____No

Samples Received at _____ oC Sample Lables / COC Agree: X Yes ____No Custody Seals Present: ____Yes X No

An acknowledgement of sample receipt is requested. Please reply to slozen@babcocklabs.com or Fax to 951-653-3351. Thank You.

Released By	Date	Received By	Date
	7/2/08		7-3-08 11:25
Released By	Date	Received By	Date

Page 1 of 1

ANALYSIS OF WATER BY TEM (EPA-600 R 94 134) EPA 100.2

LAB NO: 122252
CLIENT: E.S. Babcock & Sons, Inc.
7/9/2008

Laboratory I.D.	Client I.D.	FILTER MEDIA DATA Type	Diameter mm	Effective Area mm^2	No. of G.O.	Analyzed Area, mm^2	Sample Volume (ml)
122252-1	A8G0240-01*	PC	47	1017	6	0.0558	100

* FOR FIBERS > 10um ONLY

INDIVIDUAL ANALYTICAL RESULTS

Laboratory I.D.	Client I.D.	No. of Asbestos Str	Str >5um	Str >10um	Detection Limit (MFL)	CONCENTRATION (MFL) Str	Str >5um	Str >10um
122252-1	A8G0240-01*	-	-	N.D.	0.2	-	-	N.D.

* FOR FIBERS > 10um ONLY

The analysis was carried out to the approved TEM method. This laboratory is in compliance with the quality specified by the method.

Authorized Signature

Analysis of Water by Transmission Electron Microscopy
(EPA-600 R 94 134) EPA 100.2

EMS No.	122252	**Client**	E.S. Babcock & Sons, Inc
Sample No.	A8G0240-01	**Date Analyzed**	7/9/2008

Fibers > 10 µm in length (chrysotile)	BDL*	MFL
Mass (chrysotile)	0	ug/L
More/Less than 5 Fibers in Sample (chrysotile)	LESS	
Poisson 95% Confidence Interval	0 to 0.7	MFL
Detection Limit	0.2	MFL

* BDL : Below Detection Limit; MFL: Million Fibers per Liter

Particle Size Distribution (Chrysotile)

Particle Length - Microns

O -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 - 4.99	5.00 - 9.99	10 & UP
0	0	0	0	0	0	0	0

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 - .49	.50 - .99	1 & UP
0	0	0	0	0	0	0	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 - 99	100 - 199	200 & UP
0	0	0	0	0	0	0	0

TEM 7B (1994)

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 /626-568-4065

Analysis of Water by Transmission Electron Microscopy
(EPA-600/4-83-043)

EMS No.	122252	**Date Analyzed**	7/9/2008
Client	E.S. Babcock & Sons, Inc		
Sample No.	EMS BLANK		

Fibers (chrysotile)	ND	MFL
> 5 Micron length (chrysotile)	ND	MFL
Mass (chrysotile)	0	ug/L
More/Less than 5 Fibers in Sample (chrysotile)	LESS	
Sensitivity Level	0	MFL

Particle Size Distribution (Chrysotile)

Particle Length - Microns

O -0.49	0.50 - 0.99	1.00 - 1.49	1.50 - 1.99	2.00 - 2.49	2.5 & UP
0	0	0	0	0	0

Particle Width - Microns

O - .04	.05 - .09	.1 - .14	.15 - .19	.2 - .24	.25 & UP
0	0	0	0	0	0

Aspect Ratio L/W

0 - 9.9	10 - 19.9	20 - 29.9	30 - 39.9	40 - 49.9	50 & UP
0	0	0	0	0	0

EMS LABORATORIES 117 West Bellevue Drive / Pasadena CA 91105-2503 /626-568-4065

ENVIRONMENTAL

Analytical Chemists

July 18, 2008

Babcock & Sons, Inc.
P.O. Box 432
Riverside, CA 92502

Lab ID : SP 0807287-001
Customer ID : 2-14

Sampled On : July 2, 2008-10:00
Sampled By : Christofer Coppinger
Received On : July 3, 2008-10:45
Matrix : Drinking Water

Description : Mooncamp FP2, Fawnskin, CA
Project : Geoscience Support Services, Inc. (A8G0240-01)

Sample Result - Radio

Constituent	Result ± Error	MDA	Units	MCL	Sample Preparation		Sample Analysis	
					Method	Date/ID	Method	Date/ID
Radio Chemistry[P:1]								
Gross Alpha	1.74 ± 1.33	1.43	pCi/L	15	900.0	07/09/08:206705	900.0	07/14/08:207955
Radon	447 ± 43.1	17.9	pCi/L		SM7500Rn	07/03/08:206570	SM7500Rn	07/07/08:207567

ND=Non-Detected. PQL=Practical Quantitation Limit. Containers: (P) Plastic Preservatives: N/A

MCL = Maximum Contamination Level. MDA = Minimum Detectable Activity. Data utilized by the DHS to determine matrix interference.
CCR Section 64442: Compliance Note: If Gross Alpha (Result + (0.84 x error)) exceeds 5 pCi/L run Uranium. If Gross Alpha minus Uranium exceeds 5 pCi/L run Radium 226. Samples that exceed 5 pCi/L are held for 6 months at FGL.

Compliance:
Gross Alpha minus Uranium is less than or equal to 15 pCi/L
Uranium is less than or equal to 20 pCi/L
Radium 226 + Radium 228 is less than or equal to 5 pCi/L

Corporate Offices & Laboratory
853 Corporation Street
Santa Paula, CA 93060
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FAX: 805/525-4172
CA NELAP Certification No. 01110CA

Office & Laboratory
2500 Stagecoach Road
Stockton, CA 95215
TEL: 209/942-0182
FAX: 209/942-0423
CA ELAP Certification No. 1563

Office & Laboratory
563 E. Lindo Avenue
Chico, CA 95926
TEL: 530/343-5818
FAX: 530/343-3807
CA ELAP Certification No. 2670

Field Office
Visalia, California
TEL: 559/734-9473
Mobile: 559/737-2399
FAX: 559/734-8435

ENVIRONMENTAL

Analytical Chemists

July 18, 2008 — Lab ID : SP 0807287

Babcock & Sons, Inc. — Customer : 2-14

Quality Control - Radio

Constituent	Method	Date/ID	Type	Units	Conc.	QC Data	DQO	Note
Radio								
Alpha	900.0	07/14/2008:207955	CCV	cpm	11560	39.8 %	37 - 48	
			CCB	cpm		0.100	0.24	
Gross Alpha	900.0	07/09/2008:206705	Blank	pCi/L		0.01	3	
			LCS	pCi/L	146.4	86.9 %	75-125	
			MS	pCi/L	146.4	102 %	60-140	
		(SP 0807311-001)	MSD	pCi/L	146.4	92.6 %	60-140	
			MSRPD	pCi/L	146.4	9.2%	≤30	
Radon	SM7500Rn	07/03/2008:206570	Dup	pCi/L		1.2%	25	
	SM7500Rn	07/07/2008:207567	CCV	pCi/L	985.4	102 %	90-110	
			CCB	pCi/L		-2.8	20	

Definition

CCV	: Continuing Calibration Verification - Analyzed to verify the instrument calibration is within criteria.
CCB	: Continuing Calibration Blank - Analyzed to verify the instrument baseline is within criteria.
Blank	: Method Blank - Prepared to verify that the preparation process is not contributing contamination to the samples.
LCS	: Laboratory Control Standard/Sample - Prepared to verify that the preparation process is not affecting analyte recovery.
MS	: Matrix Spikes - A random sample is spiked with a known amount of analyte. The recoveries are an indication of how that sample matrix affects analyte recovery.
MSD	: Matrix Spike Duplicate of MS/MSD pair - A random sample duplicate is spiked with a known amount of analyted. The recoveries are an indication of how that sample matrix affects analyte recovery.
Dup	: Duplicate Sample - A random sample with each batch is prepared and analyzed in duplicate. The relative percent difference is an indication of precision for the preparation and analysis.
MSRPD	: MS/MSD Relative Percent Difference (RPD) - The MS relative percent difference is an indication of precision for the preparation and analysis.
DQO	: Data Quality Objective - This is the criteria against which the quality control data is compared.

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563 E. Lindo Avenue
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TEL: 530/343-5818
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CA ELAP Certification No. 2670

Field Office
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TEL: 559/734-9473
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FAX: 559/734-8435

ENVIRONMENTAL

Analytical Chemists

July 18, 2008

Babcock & Sons, Inc.
P.O. Box 432
Riverside, CA 92502

Lab ID : SP 0807287
Customer : 2-14

Laboratory Report

Introduction: This report package contains total of 4 pages divided into 3 sections:

Case Narrative	(2 pages)	: An overview of the work performed at FGL.
Sample Results	(1 page)	: Results for each sample submitted.
Quality Control	(1 page)	: Supporting Quality Control (QC) results.

Case Narrative

This Case Narrative pertains to the following samples:

Sample Description	Date Sampled	Date Received	FGL Lab ID #	Matrix
Mooncamp FP2, Fawnskin, CA	07/02/2008	07/03/2008	SP 0807287-001	DW

Sampling and Receipt Information: The sample was received, prepared and analyzed within the method specified holding times. All samples arrived at 6 °C. All samples were checked for pH if acid or base preservation is required (except for VOAs). For details of sample receipt information, please see the attached Chain of Custody and Condition Upon Receipt Form.

Quality Control: All samples were prepared and analyzed according to the following tables:

Radio QC

900.0	07/14/2008:207955 All analysis quality controls are within established criteria
	07/09/2008:206705 All preparation quality controls are within established criteria
SM7500Rn	07/07/2008:207567 All analysis quality controls are within established criteria
	07/03/2008:206570 All preparation quality controls are within established criteria

Discussion of Analytical Results: Amended Report

SP 0807287-001 Mooncamp FP2, Fawnskin, CA — Amended to include Laboratory Manager's signature.

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Santa Paula, CA 93060
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Mobile: 559/737-2399
FAX: 559/734-8435

July 18, 2008
Babcock & Sons, Inc.

Lab ID : SP 0807287
Customer : 2-14

Certification:: I certify that this data package is in compliance with NELAC standards, both technically and for completeness, except for any conditions listed above. Release of the data contained in this data package is authorized by the Laboratory Director or his designee, as verified by the following electronic signature.

KD:CEA

Approved By **Michel M. Franco, B.A.**

Digitally signed by Michel M. Franco, B.A.
Title: Radiochemistry Lab Manager
Date: 2008-07-18

SUBCONTRACT ORDER

E.S. Babcock & Sons, Inc.

A8G0240

807287

SENDING LABORATORY:

E.S. Babcock & Sons, Inc.
P. O. Box 432
Riverside, CA 92502-0432
Phone: (951) 653-3351
Fax: (951) 653-1662
Project Manager: Humaira Saleem

RECEIVING LABORATORY:

FGL Environmental, Inc. - Subcontracts
853 Corporation Street
Santa Paula, CA 93060
Phone :(805) 392-2000
Fax: (805) 525-4172

Client: Geoscience Support Services Inc.
Sampler: Christofer Coppinger

No State Form

Analysis	Due	Expires Regulatory Days Past Date Sampled	Laboratory ID	Comments
Sample ID: A8G0240-01	**Water**	**Sampled:07/02/08 10:00**	**Mooncamp FP2, Fawnskin, CA**	
Radio-Radon	07/14/08 17:00	12/29/08 10:00		
Radio-Gross Alpha	07/14/08 17:00	12/29/08 10:00	If > 5 pci/L Run Uranium & Radium 226; If R226 > 3 pci/L Run Radium 228	

Containers Supplied:
Half gal Poly-HNO3 (A) Quart Poly - HNO3 (B) Quart Poly - HNO3 (C) Quart Poly - HNO3 (D) 250 ml Amber-Unpres. (L)
250 ml Amber-Unpres. (M)

All Containers Intact: ✓ Yes ____No Samples Preserved Properly: ____Yes ____No

Samples Received at 6 oC Sample Lables / COC Agree: ✓ Yes ____No Custody Seals Present: ✓ Yes ____No

An acknowledgement of sample receipt is requested. Please reply to slozon@babcocklabs.com or Fax to 951-653-3351. Thank You.

Released By [signature] Date 7/2/08 Received By [signature] Date 7/3/08 1045a

Released By Date Received By Date

Page 1 of 1

NORTH COAST LABORATORIES LTD.

July 17, 2008

Edward S. Babcock & Sons, Inc
P.O. Box 432
Riverside, CA 92502-0432

Attn: Humaira Saleem

RE: A8G0240

Order No.: 0807067
Invoice No.: 75896
PO No.: A8G0240
ELAP No. 1247-Expires July 2008

SAMPLE IDENTIFICATION

Fraction	Client Sample Description
01A	A8G0240-01
01B	A8G0240-01
01D	A8G0240-01

ND = Not Detected at the Reporting Limit
Limit = Reporting Limit
All solid results are expressed on a wet-weight basis unless otherwise noted.

REPORT CERTIFIED BY

Laboratory Supervisor(s) | QA Unit | Jesse G. Chaney, Jr. Laboratory Director

5680 West End Road • Arcata California 95521-9202 • 707-822-4649 • FAX 707-822-6831
Printed on Recycled Paper

North Coast Laboratories, Ltd. **Date:** 17-Jul-2008

CLIENT: Edward S. Babcock & Sons, Inc
Project: A8G0240
Lab Order: 0807067

CASE NARRATIVE

EPA 531.1:
The laboratory control sample (LCS) recovery was above the upper acceptance limit for aldicarb sulfone and oxamyl. The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recoveries were above the upper acceptance limits for aldicarb. These recoveries indicate that the sample results may be erroneously high. There were no detectable levels of the analytes in the sample; therefore, the data were accepted.

EPA 547:
The samples for glyphosate analysis were poured off and frozen upon receipt at North Coast Laboratories. The holding time is extended to eighteen months when samples are frozen.

EPA 549.2:
Diquat strongly adsorbs to soil particles that are suspended in water. The strong chemical bonds make the herbicide chemically inactive. When bound with soil particles, the extraction procedure for method EPA 549.2 is ineffective at isolating the bound diquat. Any reported diquat represents the dissolved analyte in the water that has not been bound to the soil particles.

NORTH COAST LABORATORIES
5680 West End Road • Arcata, California 95521-9202 • 707-822-4649 • FAX 707-822-6831
Printed on Recycled Paper

Date: 17-Jul-2008
WorkOrder: 0807067

ANALYTICAL REPORT

Client Sample ID: A8G0240-01 **Received:** 7/3/08 **Collected:** 7/2/08 10:00
Lab ID: 0807067-01A

Test Name: EPA 549.2 **Reference:** EPA 549.2

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Diquat (dissolved)	ND	0.40	µg/L	1.0	7/9/08	7/9/08

Client Sample ID: A8G0240-01 **Received:** 7/3/08 **Collected:** 7/2/08 10:00
Lab ID: 0807067-01B

Test Name: Glyphosate **Reference:** EPA 547

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Glyphosate	ND	10	µg/L	1.0	7/10/08	7/11/08

Client Sample ID: A8G0240-01 **Received:** 7/3/08 **Collected:** 7/2/08 10:00
Lab ID: 0807067-01D

Test Name: N-methyl -carbamoyloximes and carbamates **Reference:** EPA 531.1

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
Aldicarb Sulfoxide	ND	3.0	µg/L	1.0	7/11/08	7/15/08
Aldicarb Sulfone	ND	4.0	µg/L	1.0	7/11/08	7/15/08
Oxamyl	ND	5.0	µg/L	1.0	7/11/08	7/15/08
Methomyl	ND	2.0	µg/L	1.0	7/11/08	7/15/08
3-OH-Carbofuran	ND	3.0	µg/L	1.0	7/11/08	7/15/08
Aldicarb	ND	3.0	µg/L	1.0	7/11/08	7/15/08
Propoxur	ND	5.0	µg/L	1.0	7/11/08	7/15/08
Carbofuran	ND	5.0	µg/L	1.0	7/11/08	7/15/08
Carbaryl	ND	5.0	µg/L	1.0	7/11/08	7/15/08
Methiocarb	ND	5.0	µg/L	1.0	7/11/08	7/15/08
Surrogate: BDMC	96.4	51.7-134	% Rec	1.0	7/11/08	7/15/08

NORTH COAST LABORATORIES
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Printed on Recycled Paper

North Coast Laboratories, Ltd.

Date: 17-Jul-2008

CLIENT: Edward S. Babcock & Sons, Inc
Work Order: 0807067
Project: A8G0240

QC SUMMARY REPORT

Method Blank

Sample ID: MB | Batch ID: R53200 | Test Code: 531W | Units: µg/L | Analysis Date 7/12/08 00:55:43 | Prep Date: 7/11/08
Client ID: | Run ID: ORLC6_080714A | SeqNo: 774807

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aldicarb Sulfoxide	ND	3.0									
Aldicarb Sulfone	ND	4.0									
Oxamyl	ND	5.0									
Methomyl	ND	2.0									
3-OH-Carbofuran	ND	3.0									
Aldicarb	ND	3.0									
Propoxur	ND	5.0									
Carbofuran	ND	5.0									
Carbaryl	ND	5.0									
Methiocarb	ND	5.0									
BDMC	17.9	0.10	20.0	0	89.3%	52	134	0			

Sample ID: MB | Batch ID: R53186A | Test Code: 547W | Units: µg/L | Analysis Date 7/10/08 23:23:41 | Prep Date: 7/10/08
Client ID: | Run ID: ORLC6_080710A | SeqNo: 774628

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Glyphosate	ND	10									

Sample ID: MB-20563 | Batch ID: 20563 | Test Code: 549W | Units: µg/L | Analysis Date 7/9/08 17:35:45 | Prep Date: 7/9/08
Client ID: | Run ID: ORLC2_080709A | SeqNo: 774339

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diquat (dissolved)	ND	0.40									

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

North Coast Laboratories, Ltd.

Date: 17-Jul-2008

CLIENT: Edward S. Babcock & Sons, Inc
Work Order: 0807067
Project: A8G0240

QC SUMMARY REPORT
Laboratory Control Spike

Sample ID: **LCS** Batch ID: **R53200** Test Code: **531W** Units: **µg/L** Analysis Date **7/12/08 01:58:06** Prep Date: **7/11/08**
Client ID: Run ID: **ORLC6_080714A** SeqNo: **774808**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aldicarb Sulfoxide	5.841	3.0	6.00	0	97.3%	70	105	0			
Aldicarb Sulfone	8.601	4.0	8.00	0	108%	72	107	0			S
Oxamyl	10.61	5.0	10.0	0	106%	67	105	0			S
Methomyl	3.971	2.0	4.00	0	99.3%	73	106	0			
3-OH-Carbofuran	6.448	3.0	6.00	0	107%	64	111	0			
Aldicarb	8.117	3.0	6.00	0	135%	73	111	0			S
Propoxur	10.12	5.0	10.0	0	101%	72	107	0			
Carbofuran	9.663	5.0	10.0	0	96.6%	69	115	0			
Carbaryl	10.42	5.0	10.0	0	104%	77	107	0			
Methiocarb	9.105	5.0	10.0	0	91.1%	69	111	0			
BDMC	18.7	0.10	20.0	0	93.4%	52	134	0			

Sample ID: **LCSD** Batch ID: **R53200** Test Code: **531W** Units: **µg/L** Analysis Date **7/12/08 03:00:28** Prep Date: **7/11/08**
Client ID: Run ID: **ORLC6_080714A** SeqNo: **774809**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aldicarb Sulfoxide	5.785	3.0	6.00	0	96.4%	70	105	5.84	0.963%	20	
Aldicarb Sulfone	8.053	4.0	8.00	0	101%	72	107	8.60	6.57%	20	
Oxamyl	10.38	5.0	10.0	0	104%	67	105	10.6	2.20%	20	
Methomyl	3.879	2.0	4.00	0	97.0%	73	106	3.97	2.35%	20	
3-OH-Carbofuran	5.993	3.0	6.00	0	99.9%	64	111	6.45	7.32%	20	
Aldicarb	7.868	3.0	6.00	0	131%	73	111	8.12	3.11%	20	S
Propoxur	9.349	5.0	10.0	0	93.5%	72	107	10.1	7.92%	20	
Carbofuran	9.077	5.0	10.0	0	90.8%	69	115	9.66	6.25%	20	
Carbaryl	9.883	5.0	10.0	0	98.8%	77	107	10.4	5.27%	20	
Methiocarb	8.919	5.0	10.0	0	89.2%	69	111	9.10	2.06%	20	
BDMC	19.5	0.10	20.0	0	97.4%	52	134	18.7	4.20%	20	

Qualifiers: ND - Not Detected at the Reporting Limit; J - Analyte detected below quantitation limits; S - Spike Recovery outside accepted recovery limits; R - RPD outside accepted recovery limits; B - Analyte detected in the associated Method Blank

CLIENT: Edward S. Babcock & Sons, Inc
Work Order: 0807067
Project: A8G0240

QC SUMMARY REPORT

Laboratory Control Spike

Sample ID: **LCS** Batch ID: **R53186A** Test Code: **547W** Units: **µg/L** Analysis Date **7/10/08 23:46:03** Prep Date: **7/10/08**
Client ID: Run ID: **ORLC6_080710A** SeqNo: **774629**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Glyphosate	52.31	10	50.0	0	105%	73	128	0			

Sample ID: **LCSD** Batch ID: **R53186A** Test Code: **547W** Units: **µg/L** Analysis Date **7/11/08 00:08:21** Prep Date: **7/10/08**
Client ID: Run ID: **ORLC6_080710A** SeqNo: **774630**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Glyphosate	52.22	10	50.0	0	104%	73	128	52.3	0.172%	20	

Sample ID: **LCS-20563** Batch ID: **20563** Test Code: **549W** Units: **µg/L** Analysis Date **7/9/08 17:53:33** Prep Date: **7/9/08**
Client ID: Run ID: **ORLC2_080709A** SeqNo: **774340**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diquat (dissolved)	1.557	0.40	2.00	0	77.9%	59	102	0			

Sample ID: **LCSD-20563** Batch ID: **20563** Test Code: **549W** Units: **µg/L** Analysis Date **7/9/08 18:11:22** Prep Date: **7/9/08**
Client ID: Run ID: **ORLC2_080709A** SeqNo: **774341**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Diquat (dissolved)	1.520	0.40	2.00	0	76.0%	59	102	1.56	2.39%	20	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

SUBCONTRACT ORDER

E.S. Babcock & Sons, Inc.

A8G0240

0807067

SENDING LABORATORY:

E.S. Babcock & Sons, Inc.
P. O. Box 432
Riverside, CA 92502-0432
Phone: (951) 653-3351
Fax: (951) 653-1662
Project Manager: Humaira Saleem

RECEIVING LABORATORY:

North Coast Labs - Subcontract
5680 West End Road
Arcata, CA 95521
Phone :(707) 822-4649
Fax: (707) 822-6831

Client: Geoscience Support Services Inc.
Sampler: Christofer Coppinger

No State Form

Analysis	Due	Expires Regulatory Days Past Date Sampled	Laboratory ID	Comments
Sample ID: A8G0240-01	**Water**	**Sampled:07/02/08 10:00**	**Mooncamp FP2, Fawnskin, CA**	
549-Diquat	07/14/08 17:00	07/09/08 10:00		
547	07/14/08 17:00	07/16/08 10:00		
531	07/14/08 17:00	07/30/08 10:00		
Containers Supplied:				
Quart Poly - Unpres (G)	Voa Vial MCAA, Na2S2O3 · Voa Vial MCAA, Na2S2O3 · Voa Vial -Unpres (J)			Voa Vial -Unpres (K)

All Containers Intact: X Yes ____ No Samples Preserved Properly: X Yes ____ No

Samples Received at 0-4 oC Sample Lables / COC Agree: X Yes ____ No Custody Seals Present: ____ Yes X No

An acknowledgement of sample receipt is requested. Please reply to slozon@babcocklabs.com or Fax to 951-653-3351. Thank You.

Released By	Date	Received By	Date
	7/2/08		7/3/08 1040
Released By	Date	Received By	Date
			temp 0.4°C

Page 1 of 1

Pace Analytical™

www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street
Minneapolis, MN 55414
Phone: 612.607.1700
Fax: 612.607.6444

Report Prepared for:

Cathy Iijima
Edward S. Babcock & Sons, Inc.
6100 Quail Valley Court
Riverside CA 92507

REPORT OF LABORATORY ANALYSIS FOR 2,3,7,8-TCDD

Report Summary:

This report contains results of one drinking water sample analyzed to determine 2,3,7,8-TCDD content. This sample was analyzed according to Method 1613 by High Resolution Gas Chromatography/High Resolution Mass Spectrometry.

Report Prepared Date:

July 18, 2008

Report Information:

Pace Project #: 1076418
Sample Receipt Date: 07/03/2008
Client Project #: A8G0240
Client Sub PO #: N/A
State Cert #: 01155CA

Invoicing & Reporting Options:

The report provided has been invoiced as a Level 2 Drinking Water Report. If an upgrade of this report package is requested, an additional charge may be applied.

Please review the attached invoice for accuracy and forward any questions to Nate Habte, your Pace Project Manager.

This report has been reviewed and prepared by:

For Nate Habte

Nate Habte, Project Manager
(612) 607-6407
(612) 607-6444 (fax)
natnael.habte@pacelabs.com

ACCREDITED IN ACCORDANCE WITH nelac

Report of Laboratory Analysis

This report should not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc.

The results relate only to the samples included in this report.

1150

SUBCONTRACT ORDER

E.S. Babcock & Sons, Inc.

A8G0240

1076418

SENDING LABORATORY:

E.S. Babcock & Sons, Inc.
P. O. Box 432
Riverside, CA 92502-0432
Phone: (951) 653-3351
Fax: (951) 653-1662
Project Manager: Humaira Saleem

RECEIVING LABORATORY:

Pace Analytical - Subcontract
1700 Elm Street SE, Suite 200
Minneapolis, MN 55414
Phone :(612) 607-6383
Fax: 9612) 607-6444

Client: Geoscience Support Services Inc.
Sampler: Christofer Coppinger

No State Form

Analysis	Due	Expires Regulatory Days Past Date Sampled	Laboratory ID	Comments
Sample ID: A8G0240-01	**Water**	**Sampled:07/02/08 10:00**	**Mooncamp FP2, Fawnskin, CA**	001
Dioxin *Containers Supplied:* 1L Amber-Na2S2O3 (F)	07/14/08 17:00	07/30/08 10:00	D.W. as per Humaira Saleem 7/3/08 MAH	

All Containers Intact: X Yes ___ No Samples Preserved Properly: X Yes ___ No

Samples Received at 5.2 oC Sample Lables / COC Agree: X Yes ___ No Custody Seals Present: X Yes ___ No

An acknowledgement of sample receipt is requested. Please reply to slozon@babcocklabs.com or Fax to 951-653-3351. Thank You.

Released By	Date	Received By	Date
	7/2/08	Pace	7/3/08 9:39
Released By	Date	Received By	Date

Page 1 of 1

2 of 4

Report No.....1076418_1613DW

Sample Condition Upon Receipt

Pace Analytical

Client Name: E.S. Babcock Project # 1076418

Courier: ☐ Fed Ex ☒ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Tracking #: 1Z5781X9014929635

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☒ no

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other _____

Thermometer Used ~~23010401B, 72310129~~ 79425 Type of Ice: Wet (Blue) None ☐ Samples on ice, cooling process has begun

Cooler Temperature 5.7°C Biological Tissue is Frozen: Yes No

Temp should be above freezing to 6°C

Date and Initials of person examining contents: 7308

		Comments:
Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☐Yes ☒No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☒No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☒No ☐N/A	7.
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No ☐N/A	9.
-Pace Containers Used:	☐Yes ☒No ☐N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC:	☒Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: WT		
All containers needing preservation have been checked.	☐Yes ☐No ☒N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☐No ☒N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☒No	Initial when completed / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☒N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☒N/A	15.
Trip Blank Present:	☐Yes ☐No ☒N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased): _____		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: KAH Date: 7/7/08

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Report No. 1076418.1613DW Revision No. 11 September 2006

Pace Analytical™

Pace AnalyticalServices, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414

Tel: 612-607-1700
Fax: 612-607-6444

Drinking Water Analysis Results
2,3,7,8-TCDD -- USEPA Method 1613B

Sample ID.....A8G0240-01
Client.....Edward S. Babcock & Sons, Inc.
Lab Sample ID.....1076418001

Date Collected.....07/02/2008
Date Received.....07/03/2008
Date Extracted.....07/15/2008

	Sample A8G0240-01	Method Blank	Lab Spike	Lab Spike Dup
[2,3,7,8-TCDD]	**ND**	ND	--	--
RL	5 pg/L	5 pg/L	--	--
2,3,7,8-TCDD Recovery	--	--	97%	93%
Spike Recovery Limit	--	--	73-146%	73-146%
RPD			4.1%	
IS Recovery	**79%**	80%	76%	76%
IS Recovery Limits	31-137%	31-137%	25-141%	25-141%
CS Recovery	**87%**	83%	81%	83%
CS Recovery Limits	42-164%	42-164%	37-158%	37-158%
Filename	D80717A19	D80716A06	D80716A03_08071	D80716A04
Analysis Date	07/17/2008	07/16/2008	07/16/2008	07/16/2008
Analysis Time	18:20	11:36	10:02	10:32
Analyst	JB	JB	JB	JB
Volume	0.950L	1.030L	1.035L	1.045L
Dilution	NA	NA	NA	NA
ICAL Date	07/08/2008	07/08/2008	07/08/2008	07/08/2008
CCAL Filename	D80717A02	D80716A02	D80716A02	D80716A02

! = Outside the Control Limits
ND = Not Detected
RL = Reporting Limit
Limits = Control Limits from Method 1613 (10/94 Revision), Tables 6A and 7A
RPD = Relative Percent Difference of Lab Spike Recoveries
IS = Internal Standard [2,3,7,8-TCDD-$^{13}C_{12}$]
CS = Cleanup Standard [2,3,7,8-TCDD-$^{37}Cl_4$]

Analyst: Julie Brenner

Project No.....1076418

Report No.....1076418_1613DW

E.S.BABCOCK&Sons,Inc.
Environmental Laboratories est 1906

6100 Quail Valley Court Riverside, CA 92507
(951) 653-3351 • FAX (951) 653-1662
www.babcocklabs.com

Chain of Custody & Sample Information Record

Client: Geoscience Support Services Contact: Russ Kyle Fax No. 909 920 0403
Phone No. 909 920 0707 email: Rkyle@geoscience-water.com
Project Name: Moonscamp FP2 Turn Around Time: Routine *72 Hour Rush *48 Hour Rush *24 Hour Rush
Project Location: Fawnskin CA *Lab TAT Approval: By: *Additional Charges Apply

Additional Reporting Requests
Include QC Data Package: ☐ Yes ☐ No
FAX Results: ☐ Yes ☐ No
Email Results: ☐ Yes ☐ No
State EDT: ☐ Yes ☐ No
(Include Source Number in Notes)

Sampler Information
Name: Christofer Coppinger
Employer: Geoscience Support Services
Signature: Christofer Coppinger

Matrix: DW = Drinking Water; WW = Waste Water; GW = Ground Water; S = Soil; SG = Sludge; L = Liquid; M = Miscellaneous

Sample ID	Date	Time	Unpreserved	H_2SO_4	HCl	HNO_3	$Na_2S_2O_3$	NaOH	NaOH/Zn Acetate	NH_4Cl	MCAA	$NaSO_4$	Total # of Containers	Routine	Resample	Special	See 2 attached sheets. Uranium and Radium 226 only if Gross Alpha Greater than 5pCi/L Ra228 only if 226 Greater than 3pCi/L	Matrix	Notes
1 Liter Amber	7/2/08	10:00					9						9					GW	Temp 15.5c
½ gal Poly			2										2						TDS 290 PPM
1 quart Poly			5			1							6						Turbit. 1.36 NTU*
1 pint Poly			1					1					2						pH 6.9
Radon			2										2						
VOA Vials			5		3						2		10						* No filter note in comments per Lorenzo. AD 7/2/08
liters Amber												2							
													31						

Notes: Email Results to Rkyle@geoscience-water.com. See Attached for Analysis -

Relinquished By (sign)	Print Name / Company	Date / Time	Received By (sign)	Print Name / Company
Christofer Coppinger	Chris Coppinger	7/2/08 13:00	[illegible]	N. Reynolds / GEOSCIENCE
[illegible]	N. Reynolds / GSST	7/2/08 14:50	[illegible]	Cijima / ESB

(For Lab Use Only) Sample Integrity Upon Receipt

Sample(s) Submitted on Ice? Yes No Temperature 6°C
Custody Seal(s) Intact? Yes No NA
Sample(s) Intact? Yes No ☐ Cooler Blank

Lab Notes

Lab No. AB60246 AE

Page 1 of 1

Rev. 6/07

APPENDIX C

Microscopic Particulate Analysis Report

BioVir Laboratories, Inc.

NELAC #05234CA
EPA ID #01401, CA-ELAP # 1795

685 Stone Road, Unit 6 · Benicia, CA 94510 · (707) 747-5906 · 1-800-GIARDIA · FAX (707) 747-1751 · WEB: www.biovir.com

REPORT OF SAMPLE EVALUATION

REPORT: 081588-1

PAGE: 1 of 2

CLIENT: Geoscience Support Services
Attention: Russ Kyle
PO Box 220
Claremont, CA 91711

CLIENT NO.: GEO007

SAMPLE INFORMATION:

Name of Sampler:	Christofer Coppinger	Sample Date:	07/02/08
Sample Source:	New Well Discharge	Sample Time:	09:10
Sample Location:	Mooncamp FP-2	Turbidity:	1.36
Filter Type:	Parker Hannifan, M39R10A	Temperature:	15.5
Sample Volume:	996.8 Gallons	Comments:	Drinking Water

Sample Received Date:	07/03/08
Sample Received Time:	08:10
Sample Received Temp:	7.9 C

ASSAY RESULTS:

1. Giardia species Assay: 0 Giardia species cyst seen / 3394 Liters.
   (SM 18TH; SEC. 9711B; FA)
2. Cryptosporidium Assay: 0 Cryptosporidium oocyst seen / 3394 Liters.
   (SM 18TH; SEC. 9711B; FA)
3. Microscopic Particulate Analysis: See page 2
   (EPA 910/9-92-029)

Commentary:
An aliquot representing 378.5 Liters was taken from the 3773 Liter sample concentrate for particulate analysis.

1 Gallon = 3.785 Liters

REPORT NO.: 081558-1
PAGE NO.: 2 of 2
CLIENT NO.: GEO007

MICROSCOPIC PARTICULATE ANALYSIS

PRIMARY PARTICULATES (per 378.5 Liters)		SECONDARY PARTICULATES (per 378.5 Liters)	
Giardia:	NS	*Plant Pollen:	127
Cryptosporidium:	NS	Nematodes:	NS
Diatoms:	NS	Crustacea:	NS
Other Algae:	NS	Amoeba:	NS
Insect/Larvae:	NS	Ciliates/Flagellates:	NS
Rotifers:	NS	Other Organisms:	NS
Plant Debris:	NS		

Key: * Plant Pollen = Pine

EH - extremely heavy
H - heavy
M - moderate
R - rare
NS - none seen

SAMPLE EVALUATION PERFORMANCE CRITERIA: The precise rates of recovery of organisms from environmental samples cannot be determined. BioVir Laboratories has analyzed your sample(s) in accordance with the method described with each analyte above, however, due to inherent limitations of these methods organisms may avoid detection. For additional information regarding the limitations of the method(s) referred to above please call us at 1-800-GIARDIA.
COMPANY IS NOT AN INSURER: BioVir Laboratories is not an insurer or guarantor of the quality and/or purity of water, wastewater, biosolid or other material from which the sample was taken. BioVir offers no express or implied warranties whatsoever concerning the quality or purity of any water, wastewater, biosolid or other material which is ultimately consumed, distributed, applied or otherwise disposed of.

07/07/08
COMPLETION DATE

SIGNATURE/DATE 07/23/08

F:\WP\REPDIR\Geo007 GeoScience-See Sou013\081588-1.wpd

BioVir LABORATORIES ®

MICROSCOPIC PARTICULATE ANALYSIS

Primary Particulates

Numerical range of each primary bio-indicator based on numbers counted per 378.5 Liters sampled

Surface Water	EH	H	M	R	NS
Giardia	**	**	**	**	None Seen
Coccidia	**	**	**	**	None Seen
Diatoms	>150	41-149	11-40	1-10	None Seen
Other Algae	>300	96-299	21-95	1-20	None Seen
Insects/Larvae	>100	31-99	16-30	1-15	None Seen
Rotifers	>150	61-149	21-60	1-20	None Seen
Plant Debris	>200	71-199	26-70	1-25	None Seen

Giardia lamblia	**	Assayed by Immunofluorescent Method. The presence of any amount of these organisims represents a HIGH RISK to surface water contamination.
Giardia species		
Cryptosporidium		

Key:

EH	- extremely heavy	M	- moderate	NS	- none seen
H	- heavy	R	- rare		

SECONDARY PARTICULATES

Secondary bio-indicators are reported as a number based on relative concentration per 100 gallons sampled and should be used only to support information derived from the primary bio-indicator category.

BioVir Laboratories, Inc., 685 Stone Road, Benicia, California 94510
Phone: 1-800-GIARDIA (442-7342) Fax: 707-747-1751

1-800-GIARDIA

RELATIVE SURFACE WATER RISK FACTOR

Indicators of Surface Water	EH	H	M	R	NS
Giardia	40	30	25	20	0
Coccidia	35	30	25	20	0
Diatoms	16	13	11	6	0
Other Algae	14	12	9	4	0
Insects/Larvae	9	7	5	3	0
Rotifers	4	3	2	1	0
Plant Debris	3	2	1	0	0

Indicators of Surface Water:

According to EPA "Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources", March, 1991 ed.

Range of Indicators Key:

EH - extremely heavy
H - heavy
M - moderate
R - rare
NS - none seen

RISK OF SURFACE WATER CONTAMINATION

High Risk	=	20 or greater
Moderate Risk	=	10-19
Low Risk	=	9 or less

\\Biovirserver\F\WP\FORMS\MPA.TBL

BioVir LABORATORIES ®

GIARDIA / CRYPTOSPORIDIUM / MPA ASSAY SAMPLE DATA SHEET

(Please fill out applicable areas, sign and return to BioVir with the sample.)
Phone: 1-800-GIARDIA Fax: 707-747-1751 WEB: www.biovir.com

LAB USE ONLY:
LIMS #: 0815887
Client #: GE0007
Date Rec'd: 7/3/08
Time Rec'd: 0810
Temp Rec'd: 7.9

Note: Please print clearly using waterproof ink

NAME & ADDRESS: Geoscience Support Services PO 220 Lincoln CA 95	SAMPLE DATE: [illegible]	SAMPLE TIME: 09:10 AM
	Water Temp (C): 15.5	Turbidity (NTU): 1.36
PWS ID: / FACILITY ID:	TREATMENT CHARACTERISTICS (Check One):	
NAME OF SAMPLER: Chris Tower Coppinger	Raw Surface Water ☐ Treated Drinking Water ☐	
SAMPLE SOURCE: [illegible] FP-2	Treated Wastewater ☐ Wastewater ☐	
	Ground Water ☒ Other: [illegible] Discharge	
SAMPLE LOCATION: Fow[illegible] CA	DECHLORINATION/ DISINFECTANT NEUTRALIZATION (If Treated Water): Yes NO	
SAMPLE COLLECTION POINT ID:	SAMPLE DESCRIPTION (G/C)	
SAMPLE VOLUME: (Meter # [illegible] 1571) Meter Start: 1762[illegible] Meter Stop: 1862[illegible]	Regular Grab Sample ☐ Matrix Spike Grab ☐ Regular Filtered Sample ☒	
Total Volume: 7.0 Gallons _____ Liters	Matrix Spike Grab / Matrix Spike Filter Pair ☐ Filtered Volume: _____ Liters Grab Volume: _____ Liters	

Client Sample ID: ~~[illegible]~~ or FP-2	P.O. #:

ASSAY REQUESTED: Please check one of the following

LT2 Samples: Special care should be taken for samples intended to satisfy the requirements of the Long Term 2 Enhanced Surface Water Treatment Rule. Samples must be at least 10 Liters in volume (at least 22lbs. plus vessel for grab samples). Samples must arrive at BioVir between 0 to 20 degrees C (not frozen). Pre-chill samples during sampling or before shipment for best results.

METHOD 1623: Cryptosporidium and Giardia (EPA 821-R-01-025)	
	REGULAR SAMPLE ☐ (Check if repeat sample for LT2. Original Sample Date:)
	MATRIX SPIKE SAMPLE -Required in addition to the first sample from a source and every 20 samples thereafter (e.g. 21st, 41st, etc.)
METHOD 1622: Cryptosporidium Only (EPA 821-R-01-026)	
	REGULAR SAMPLE ☐ (Check if repeat sample for LT2. Original Sample Date:)
	MATRIX SPIKE SAMPLE -Required in addition to the first sample from a source and every 20 samples thereafter (e.g. 21st, 41st, etc.)
MICROSCOPIC PARTICULATE ANALYSIS (MPA)	
✓	Microscopic Particulate Analysis (MPA) - (EPA 910/9-92-029)
OTHER ANALYTES (Please indicate Analyte & Method)	

COMMENTS:

COPY

RELINQUISHED BY: [illegible]	DATE / TIME:
RECEIVED BY: [illegible]	DATE / TIME: 7/3/08

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA, CALIFORNIA 94510
WHITE = BIOVIR COPY YELLOW = CUSTOMER COPY

F:\WP\FORMS\Datasheets\G&C and MPA Data Sheet 04.05.07.doc

G.4 - Water Supply Analysis (California Collaborative Solutions, February 2009)

Nancy @ MBA

California Collaborative Solutions

Water Supply Analysis

Tentative Tract No. 16136

Moon Camp Tract

Fawnskin, Ca

February 11, 2009

P.O. Box 706 Big Bear City, CA 92314 909 586-5819 calcolsol@gmail.com

Tentative Tract No. 16136 --- Moon Camp

Water Supply Analysis

February 11, 2009

Background:

The Moon Camp Tract was originally proposed as a 92 lot subdivision. An existing, onsite domestic water well, FP2, was proposed to provide the water supply for the subdivision. Well FP2 extracts its groundwater from Sub Area "A" of the North Shore Groundwater Basin. During the evaluation of the Water Supply, it was determined that the Perennial Yield of Sub Area "A" is between 14 and 44 acre-feet per year (Geoscience Support Services, December 2, 2003 Focused Geohydrologic Evaluation, Summary of North Shore Subareas, Page 3, copy attached). The Geoscience Focused Evaluation and the DWP's Master Plan (November, 2006, Table 4-2, copy attached) uses the mid-point of this range, 29 acre-feet per year, as Sub Area A's annual yield. However, County Planning Staff stated that they would only support a project that utilized the most conservative 14 acre-feet per year. ALDA Engineering completed a Final Feasibility Study that determined that 50 lots (occupied full-time) could be served by the 14 acre-feet per year (DWP report dated March 6, 2007, Page 2, copy attached). As a result, the Proposed Subdivision was redesigned as 50, one-half acre minimum lots.

During the preparation of the Draft EIR by MBA, it was discovered that the existing Private Well production within Sub Area "A" is 5 acre-feet per year (Table 4-2, DWP Water Master Plan, November, 2006, copy attached). In order to provide 5 acre-feet per year of groundwater yield to the subdivision from a groundwater basin other than Sub Area "A", the developer has drilled Well FP4 in the adjoining Grout Creek Groundwater Basin. The Grout Creek Basin has a Perennial Yield of 280 acre-feet per year; existing private well production of 7 acre-feet per year; and DWP domestic well production of 121 acre-feet per year (Tables 4-1 and 4-2, DWP Water Master Plan, November, 2006, copies attached). Based on this data, the Grout Creek Basin has 152 acre-feet per year of Perennial Yield available.

Water Well FP2:

In order to produce 9 - 14 acre-feet per year from Sub Area "A", Well FP2 would need to pump at a rate of 5.6 – 8.7 gpm. In June, 2008, Well FP2 was cleaned, pump tested and a Title 22 Water Quality Analysis was performed (Geoscience Support Services Report, August 7, 2008, copy attached). Geoscience concluded:

- Well FP2 can be pumped at a rate of 35 gpm on a long-term basis with less than 10 feet of drawdown in the well (Well FP2 is 380' deep and the static water level is 2 feet below ground surface)
- At the 35 gpm discharge rate, pumping interference with the closest private well is expected to be less than 0.3 feet (the nearest private well is approximately 1,000 feet to the east of Well FP2)

- Title 22 Ground water quality data from Well FP2 indicates the water from the well is suitable for municipal supply

The 35 gpm rate from Well FP2 can produce 56 acre-feet per year and supports Geoscience's Focused Evaluation and the DWP Master Plan's conclusion that Sub Area A can produce 29 acre-feet per year.

Water Well FP4:

In December of 2008, Harich Enterprises drilled Well FP4 to a depth of 240 feet. Well FP4 is located in the north-west corner of the proposed subdivision, within the Grout Creek Groundwater Basin. In order to produce 5 acre-feet per year from the Grout Creek Basin, Well FP4 would need to pump at a rate of 3.1 gpm. Harich pump tested Well FP4 at 3.4 gpm (Harich Driller's Report, February, 2009, copy attached) and the County's Special Districts Department obtained Title 22 Water Quality samples for analysis. The results concluded:

- Well FP4 can be pumped at a rate of 3.4 gpm on a long-term basis with 87 feet of drawdown in the well (Well FP4 is 240 feet deep and the static water level is 22 feet below ground surface)

The 3.4 gpm pumping rate from Well FP4 will produce 5.5 acre-feet per year from the Grout Creek Basin.

Water Service Provider:

Based upon the January 24, 2008 letter from LAFCO Executive Officer Kathleen Rollings-McDonald (copy attached), County Service Area 53C can own and operate the Moon Camp Subdivision Water System, including Water Wells FP2 and FP4. Special Districts staff has stated that they would operate the water system with their existing staff. Currently, Special Districts staff operate the Fawnskin Sewer System through CSA 53B.

Conclusion:

The combined pumping capacity of FP2 and FP4 is more than adequate to meet the long term water supply needs of the proposed 50 lot subdivision without adverse impacts to either Sub-Area "A" of the North Shore Basin, or the Grout Creek groundwater basin.

References:

GEOSCIENCE Support Services Inc., 2003. Focused Geohydrologic Evaluation of the Maximum Perennial Yield of the North Shore and Grout Creek Hydrologic Subunit Tributary Subareas. Prepared for the City of Big Bear Lake, Department of Water and Power. December 2, 2003.

ALDA Engineering, Inc., 2007. Final Feasibility Study to Serve the Proposed Moon Camp Residential Development (Tentative Tract No. 16136). Prepared for the City of Big Bear Lake, Department of Water and Power. March 6, 2007.

Camp, Dresser & McKee, Inc., 2006. Water Master Plan. Prepared for the City of Big Bear Lake, Department of Water and Power. November, 2006.

GEOSCIENCE Support Services Inc., 2008. Results of Rehabilitation and Aquifer Testing Moon Camp Well FP-2. Prepared for California Collaborative Solutions. August 7, 2008.

HARICH Enterprises, 2009. Well FP4 Driller's Report. February, 2009.

Local Agency Formation Commission. 2008. Memorandum, Water Service to Tentative Tract 16136; Moon Camp Residential Subdivision. Prepared by Kathleen Rollings-McDonald, Executive Officer. January 24, 2008.

Focused Geohydrologic Evaluation of the Maximum Perennial Yield of the North Shore and Grout Creek Hydrologic Subunit Tributary Subareas

Prepared for: City of Big Bear Lake Department of Water and Power

December 2, 2003

GEOSCIENCE Support Services, Inc.
Tel: (909) 920-0707
Fax: (909) 920-0403
Mailing: P. O. Box 220, Claremont, CA 91711
1326 Monte Vista Ave., Suite 3, Upland, CA 91786
email: email@geoscience-water.com

- Long-term precipitation records from weather stations within the Big Bear Lake watershed,
- Evapotranspiration data from evaporation pans and weather stations within the watershed,
- Ground water levels, and
- Ground water production.

However, most of the input parameters that are required for a detailed evaluation of the average annual ground water recharge had to be estimated or assumed from data collected outside the Grout Creek and North Shore subunits or outside the Big Bear Lake Watershed due to lack of measured data in the area. Although the assumed values are published and are from reliable sources (i.e. the U.S. Environmental Protection Agency, United States Geological Survey, etc.), they are not specific to the area of interest. Numerous additional monitoring features can be developed to collect the data necessary to refine the ground water recharge estimates. However, priority should be given to the construction of monitoring wells and the development of a reliable ground water level baseline for the tributary subareas.

The results of the ground water recharge analysis for the North Shore Subunit are as follows:

Summary of Ground Water Recharge Results
North Shore Tributary Subareas

Tributary Subarea	Area [acres]	Annual Precipitation [inches]	Average Annual Ground Water Recharge - Low Estimate [acre-ft/yr]	Average Annual Ground Water Recharge - High Estimate [acre-ft/yr]	Average of Ground Water Recharge Estimate Range [acre-ft/yr]
A	247	27.87	14	44	29
B	720	25.45	36	110	73
C	828	23.01	37	107	72
D	558	21.45	22	63	43
E	392	20.01	15	39	27
F	814	18.27	23	66	44

WATER MASTER PLAN

November 2006

Department of Water and Power

Big Bear Lake, California

Mission

The mission of the DWP is to manage our limited water resources through responsible planning in order to assure quality water and essential services in the most cost-effective manner for our current and future customers.

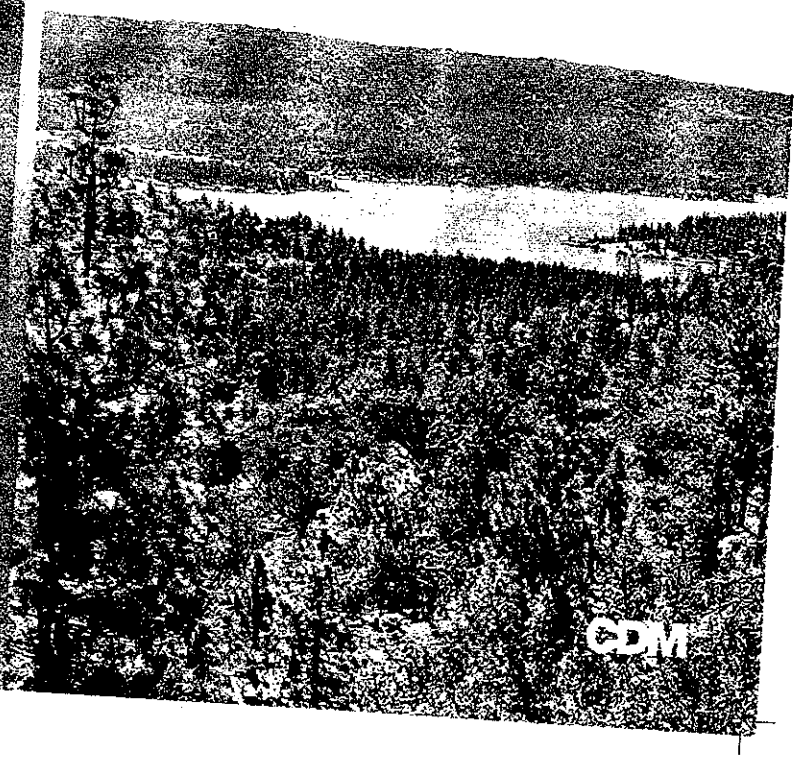


Table 4-1
Current and Projected Annual Demand and Supply Requirements by Pressure Zone

Current and Projected Annual Demand and Supply Requirements by Pressure Zone

Pressure Zone	Current		Full Development			
			25% Full-Time Equivalent		50% Full-Time Equivalent	
	Consumption (ac-ft/yr)	Supply (ac-ft/yr)	Consumption (ac-ft/yr)	Supply (ac-ft/yr)	Consumption (ac-ft/yr)	MDD (gpm)
Erwin Lake / Sugarloaf/ Lake William						
Erwin Lake	87	93	144	154	194	208
Lower Sugarloaf	173	186	225	241	339	363
Upper Sugarloaf	86	92	120	129	201	215
Lake William	28	29	45	48	57	61
Sub-total	374	400	535	572	791	846
Moonridge						
Wolf Booster	31	33	53	56	84	90
Wolf Tank	117	125	162	173	284	303
Lassen	54	58	70	75	104	111
Minton	11	12	17	18	30	32
Traventine	4	5	8	9	14	15
Lower Moonridge	162	173	207	221	286	306
High Timber Ranch	-	-	45	48	64	68
Sub-total	378	405	562	601	865	926
Big Bear Lake						
Town [1]	1,585	1,696	2,370	2,536	2,847	3,046
Conklin Booster	14	15	26	27	41	44
Ironwood Booster	18	19	35	37	48	51
Sub-total	1,617	1,730	2,431	2,601	2,935	3,141
Unmatched	61	65	--	--	--	--
"BIG FOUR" TOTAL:	2,431	2,601	3,527	3,774	4,591	4,913
Fawnskin						
Lower Fawnskin	102	109	172	184	224	240
Upper Fawnskin	19	20	32	35	51	54
Sub-total	121	129	204	219	275	294
Rim Forest	47	50	47	50	47	50
OVERALL TOTAL	2,598	2,780	3,778	4,043	4,913	5,257

(1) Includes Knickerbocker and Pontiac pressure zones.

Table 4-2
Maximum Perennial Yield Estimate by Subunit (ac-ft/yr)

Maximum Perennial Yield Estimates by Hydrologic Subunit (ac-ft/yr)			
Subunit	*Perennial Yield Estimate*	*Private Wells Production*	*Available to DWP (ac-ft/yr)*
Grout Creek (1)	280	7	273
Mill Creek	100-175	3	147
Village	250	3	247
Rathbone	1,100	135	965
Division	496	2	494
North Shore			
Sub-Area A (1)	29	5	24
Sub-Area B	71		71
Sub-Area C	70		70
Sub-Area D	43		43
Sub-Area E	27		27
Sub-Area F	44		44
Erwin (2)	890	14	576
TOTAL:	3,400 - 3,475	169	2,981

(1) Assumed to be available to the Fawnskin system only.

(2) Only 576 ac-ft/yr are available to DWP from the Erwin Lake Subunit as an estimated 300 ac-ft/yr are produced by CSD. An additional 14 ac-ft/yr are produced by private wells

The Perennial Yield from the Grout Creek subunit (280 ac-ft per year) and from Sub A of the North Shore subunit (29 ac-ft per year) is only available to the Fawnskin area. However, only 297 ac-ft per year are available to the DWP as an estimated 12 ac-ft per year are pumped by private wells. Therefore, an estimated 2,684 ac-ft per year are available to DWP to meet the water needs of the "Big Four" system on the south side of the lake. This number assumes that DWP would be able to develop all water sources in the remaining sub-areas in the North Shore subunit given that they are located in United States Forest Service (USFS) lands.

A comparison of supply requirements from Table 4-1 with available local supplies from Table 4-2 indicates that local supplies are capable of meeting current and projected water demands in the Fawnskin system. Local groundwater supplies available to the "Big Four" system are sufficient to meet current water demand of 2,601 ac-ft per year in that system; however, there would be a need to either reduce projected demands through conservation, secure additional supplies, or a combination of both options to meet demands at full development or resulting from conversion to full-time equivalent use. The supply deficit in the "Big Four" is estimated at approximately 1,090 ac-ft per year to meet projected demands at full development assuming the current distribution of full-time equivalent use is maintained; an additional 1,139 ac-ft per year of new supplies would be required to address the impact from demographics.

ALDA Engineering Inc.
9996 Orange Street
Alta Loma, CA 91737
Tel: 909-297-3741
Fax: 909-498-0423

March 6, 2007

Mr. Scott Heule, C.E.G./C.H.G., Assistant General Manager
City of Big Bear Lake
Department of Water & Power
41972 Garstin Drive
Big Bear Lake, CA 92315

Subject: **Final Feasibility Study to Serve the Proposed Moon Camp Residential Development** (Tentative Tract No. 16136)

Dear Mr. Heule:

Pursuant to your request, ALDA Engineering Inc. (ALDA) has conducted a feasibility study to determine the necessary system facilities to serve the above referenced development. This report summarizes the results of our investigation and recommendations. This report presents the project background, an assessment of demand and supply issues, the results of the system analysis, and the recommended improvements.

Project Background

The proposed Moon Camp development consists of 50 residential lots to be developed over approximately 62 acres of land. The proposed development is located along North Shore Drive, in the community of Fawnskin on the north side of Big Bear Lake, and ranges in elevation from approximately 6,750 ft. near the lake to approximately 6,950 ft. in the northeasterly quadrant. Individual lots range in size from approximately half an acre to well over two acres depending on location and are anticipated to be developed as single family residential units; average lot size is approximately one and a quarter acres. Because of its location and lot size, some of the residential units are anticipated to be fairly large and potentially exceed 4,000 square feet in size.

Water service to the proposed development will be provided off the Upper Fawnskin pressure zone as the Lower Fawnskin zone would not provide enough static head to provide the development adequate fire flow. DWP's closest pipeline off the Upper Fawnskin system is a single 6-inch diameter pipeline located near the intersection of Flicker Road and Chinook Road, approximately 2,000 ft away from the westerly boundary of the proposed development. Significant transmission improvements in the Fawnskin system are needed to provide fire flow to the proposed tract.

Currently, there are two groundwater production wells within the proposed residential tract. These wells are located in subarea A of the North Shore hydrologic subunit. It is our understanding that these wells will be deeded to the DWP at the time the tract map is recorded. The developer plans to equip the FP-2 well initially to meet the development projected water demands. The DWP will use excess capacity from this well to help reduce reliance on the leased North Shore Well No. 1. Groundwater production capacity from this well is estimated at approximately 100 gallons per minute. The second well (FP-3), located to the east of the FP-2 well, will not be initially equipped by DWP.

Pressure Zone Service Area

Based on the elevation range of the proposed development, 6,750 ft. to 6,950 ft., the development can be served off the Upper Fawnskin pressure zone. This pressure zone has an operating hydraulic grade of 7,113 ft. set by the high water level of the existing 0.25-million gallon Racoon Reservoir. Based on this hydraulic elevation, static pressures would range from a low of 71 psi at the highest point in Lot 18 to 157 psi near the lake. Individual pressure regulators would be required for all lots with static pressures exceeding 80 psi.

Water supply in the Fawnskin area is provided by two groundwater wells in the Lower Fawnskin pressure zone and by slant wells in the vicinity of the Racoon Reservoir. Excess groundwater production from the Lower Fawnskin pressure zone is conveyed to the Upper Fawnskin pressure zone through a booster station located at the Cline Miller Reservoir.

Water Demand

Projected water demand for the proposed development is based on the average consumption rate of 250 gallons per day per connection. Maximum day demand is estimated based on information provided in the recently completed water master plan and it is equivalent to 1.76 times the average day demand. Therefore, the average and maximum day demands for the proposed 50-lot subdivision are estimated as follows:

- Average Day Demand (ADD) = 12,500 gpd or 8.68 gpm
- Maximum Day Demand (MDD) = 15.27 gpm

Based on an estimated average day demand of 12,500 gallons, the annual water demand for the development is estimated at 4.56 million gallons or 14.00 ac-ft per year.

LOCAL AGENCY FORMATION COMMISSION
COUNTY OF SAN BERNARDINO

215 North "D" Street, Suite 204
San Bernardino, CA 92415-0490 • (909) 383-9900 • Fax (909) 383-9901
E-mail: lafco@lafco.sbcounty.gov
www.sbclafco.org

RECEIVED
JAN 2 2008
LAND USE SERVICES DEPT.
PLANNING DIVISION

DATE: **JANUARY 24, 2008**

FROM: **KATHLEEN ROLLINGS-McDONALD, Executive Officer**

TO: **MATTHEW SLOWIK, Senior Planner**
Advance Planning Division – Land Use Services Department

SUBJECT: **WATER SERVICE TO TENTATIVE TRACT 16136; MOONCAMP RESIDENTIAL SUBDIVISION**

In response to your memorandum, dated January 15, 2008, I would like to provide a description of the three options for water service to this tract and the implications of Government Code Section 56133 to them from the LAFCO staff perspective.

First, Option #1, as previously identified to LAFCO staff, would be for the City of Big Bear Lake Department of Water and Power (hereafter DWP) to extend its infrastructure to serve the entirety of the residential subdivision. As I understand it, a portion of the tract is within the boundaries of the former SoCal Water Company which was condemned and acquired by the City of Big Lake and now operates under the DWP. Pursuant to the provisions of Government Code Section 56133 and LAFCO policies, the DWP has been authorized to continue to expand its services within the former boundaries of the SoCal system without the need for review and approval of LAFCO pursuant to Govt. Code Section 56133, but not beyond. Therefore, a review of the current project with our Special Counsel indicated that Option #1, to extend services by the DWP, was not viable since it would require consideration under §56133 which precludes service outside an agency's sphere of influence. None of the Fawnskin community is within the City of Big Bear Lake sphere of influence.

Please note that there is an area outside the existing DWP boundary defined as the former certificated service area of the SoCal Water Company that is receiving water service from DWP. The agreement between the DWP and Big

Bear Shores Homeowners Association was entered into in 1993, prior to the 1994 enactment of §56133. A copy of this agreement is included as an attachment to this memorandum.

Option #2, as presented to LAFCO staff, was the creation of a Joint Powers Authority (JPA) between the City of Big Bear Lake and County Service Area 53 Improvement Zone C (hereafter CSA 53C) to provide for domestic water service to the area outside the DWP system. CSA 53C was created with water powers to encompass the whole of the North Shore of Big Bear Lake including the entirety of the community of Fawnskin. This option is viable for the provision of domestic water service should it be the choice of the developers of the project.

Option #3, identified by LAFCO staff, would be for CSA 53C to own and/or install the domestic water system required by the project including development of wells and infrastructure and contract with the DWP to operate the system. CSA 53C, as noted above, includes the whole of the Fawnskin community, including areas inside and outside the service area of DWP, and is authorized water service as its only function. In the LAFCO staff view, such a management contract would be exempt from review by LAFCO under provisions of Government Code Section 56133 Subsection (e) which reads as follows:

> *"(e) This section does not apply to contracts or agreements solely involving two or more public agencies where the public service to be provided is an alternative to, or substitute for, public services already being provided by an existing public service provider and where the level of service to be provided is consistent with the level of service contemplated by the existing service provider..."*

The determination of exemption is made by the Commission following the receipt of a written request for consideration. The request shall include a copy of the contract for service, a map delineating the area to be served and a description of the manner in which the service is to be provided. Precedent for this procedure includes the contracts for service between the County (for law enforcement) and County Service Area 38 (Fire protection) and the City of Redlands related to service delivery to the "Donut Hole". A copy of these exemptions is included as an attachment to this memorandum.

Please contact me if you have any questions at (909) 383-9900.

/KRM

Attachments (3)

HARICH ENTERPRISES INC

Michael Perry
California Collaborative Solutions
P.O. Box 706
Big Bear City, Ca 92314

February 12, 2009

RE: Driller's Report and Pump Test for Moon Camp Well FP4

Dear Mr. Perry:

Enclosed please find the Well Completion Report and the results of the 48 hour constant rate pumping test for your Moon Camp Well FP4.

Harich Enterprises drilled Well FP4 at a 12" diameter to a total depth of 240 feet, with the screened interval from 100 to 240 feet and a 60' sanitary seal. Well FP4 is permitted through the County of San Bernardino as a municipal well. The well screen is a 6" diameter Roscoe Moss "Ful-Flo Louver" steel pipe. An Aquarium Sand filter pack was installed per the Special Districts Department specifications.

Static water level in the well was 22 feet measured on 2/4/09. The well was pumped at 3.4 gpm for 48 hours with the drawdown stabilizing at 87 feet (see enclosed Constant Rate Test Drawdown Chart).

Well FP4 was drilled in the northwest corner of the Moon Camp Tract as shown on the enclosed map.

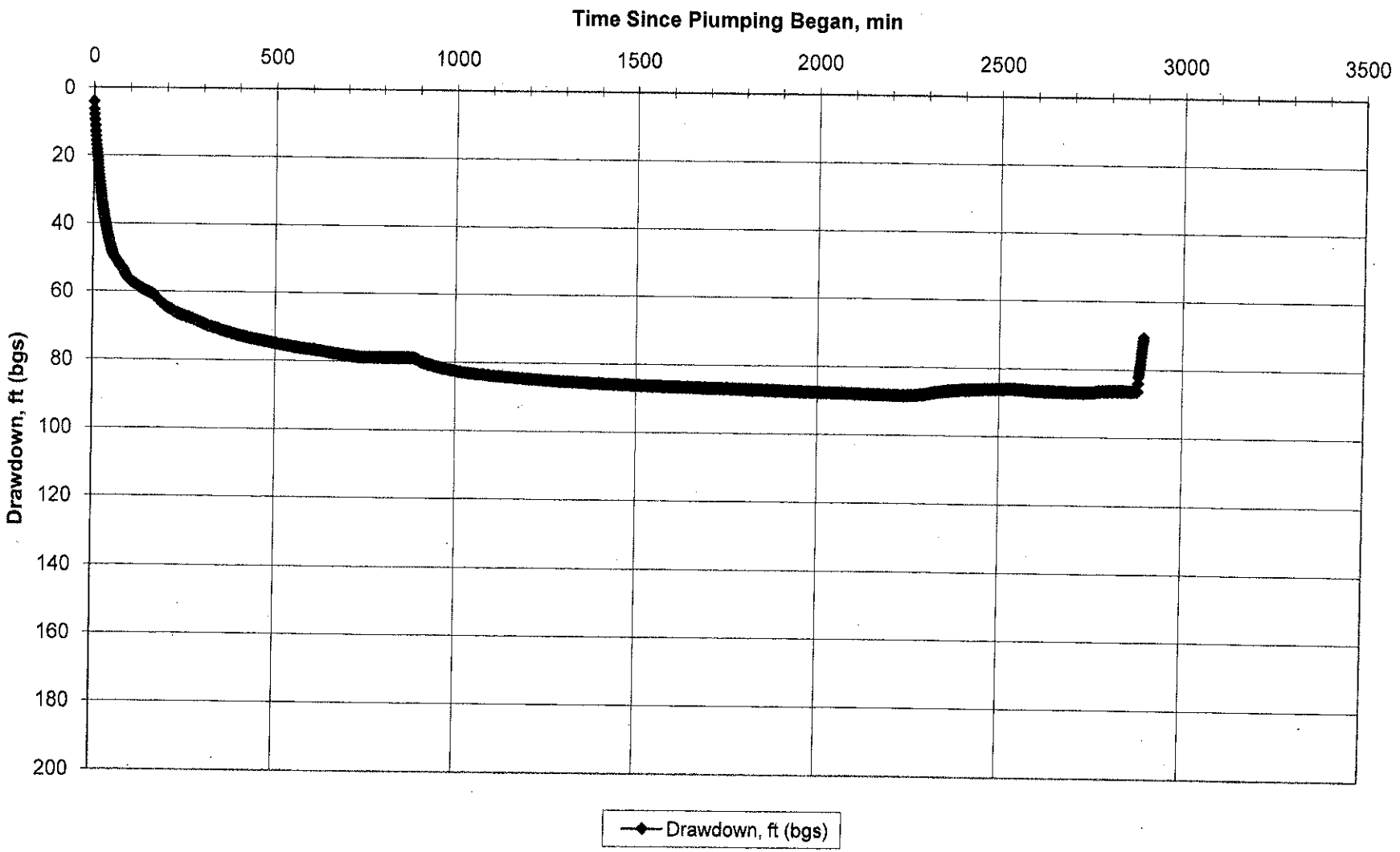
Please call me if you need any additional information.

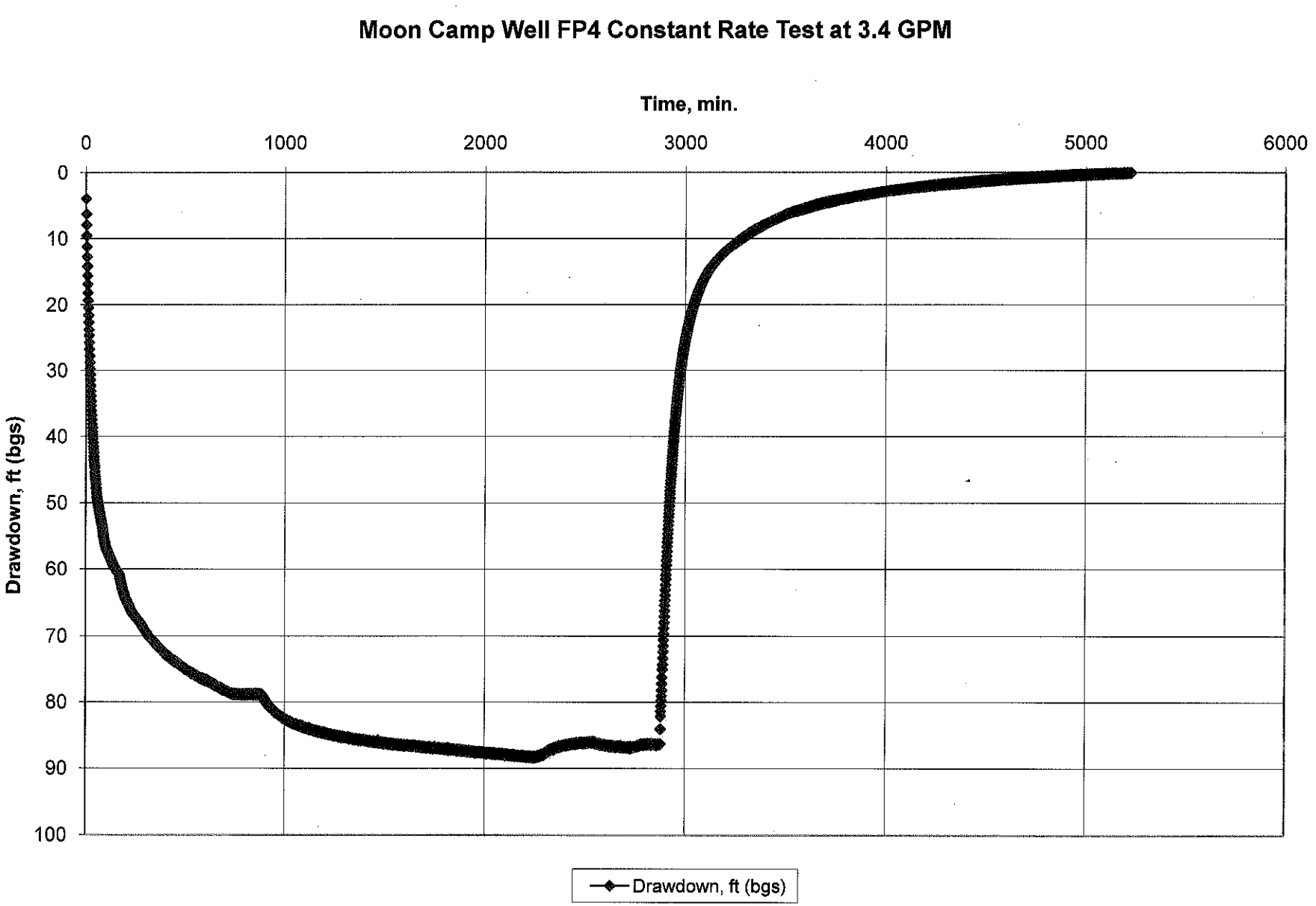
Sincerely,

David Harich
Harich Enterprises Inc.

WATER RESOURCES DEVELOPMENT
POST OFFICE BOX 2233 RUNNING SPRINGS, CA. 92382
FAX (909)867-7759 / OFFICE (909) 867-2483

Constant Rate Test Moon Camp Well FP4
Constant Flow Rate at 3.4 GPM




Moon Camp Well FP4 Constant Rate Test at 3.4 GPM
Time, min.
0
1000
2000
3000
4000
5000
6000
Drawdown, ft (bgs)
0
10
20
30
40
50
60
70
80
90
100
Drawdown, ft (bgs)

TRIPLICATE
Owner's Copy
Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. e0085096

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. WELL FP4
Date Work Began 12/17/2009 , Ended 2/6/2009
Local Permit Agency SAN BERNARDINO
Permit No. 2008100582 Permit Date 9/26/2008

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL — HORIZONTAL — ANGLE — (SPECIFY)
DRILLING METHOD ROTARY FLUID AIR

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION Describe material, grain, size, color, etc.
0	10	BROWN/RED/COBBLES/CLAY
10	20	BROWN/CLAY
20	40	BROWN/CLAY/GRAVELS
40	75	BROWN CLAY/PINK QUARTZITE
75	85	TAN/SANDS/GRAVELS/COBBLES/ 1st WATER
85	110	TAN/PINK/BLACK/COBBLES/SAND
110	120	BROWN/CLAY/GRAVELS
120	140	TAN/SAND (ADDITIONAL WATER)
140	150	TAN/GREY/BROKEN GRANITE(SMALL WATER)
150	240	GREY/SOLID GRANITE

TOTAL DEPTH OF BORING 240 (Feet)
TOTAL DEPTH OF COMPLETED WELL 240 (Feet)

WELL OWNER

Name TIM WOOD MOON CAMP
Mailing Address P.O. BOX 6820
BIG BEAR LAKE CA 92315
CITY STATE ZIP

WELL LOCATION

Address HWY 18 & CANYON RD.
City FAWNSKIN, CA CA 92333
County SAN BERNARDINO
APN Book 0304 Page 091 Parcel 22
Township 2 N Range 1 W Section 13
Latitude 34 15 56 N (DEG. MIN. SEC.) 116 56 15 W (DEG. MIN. SEC.)

LOCATION SKETCH

NORTH
WEST EAST
SOUTH

See Attached

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

✓ NEW WELL
MODIFICATION/REPAIR
Deepen
Other (Specify)
DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)

WATER SUPPLY
Domestic ✓ Public
Irrigation Industrial
MONITORING
TEST WELL
CATHODIC PROTECTION
HEAT EXCHANGE
DIRECT PUSH
INJECTION
VAPOR EXTRACTION
SPARGING
REMEDIATION
OTHER (SPECIFY)

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH TO FIRST WATER 80 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL 22 (Ft.) & DATE MEASURED 2/4/2009
ESTIMATED YIELD 3.4 (GPM) & TEST TYPE PUMP
TEST LENGTH 48 (Hrs.) TOTAL DRAWDOWN 87 (Ft.)
May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	60	12"			✓		STEEL	6"	.188	
60	100	12"				✓	STEEL	6"	.188	
100	240	12"		✓			STEEL	6"	.188	.093
							(Roscoe Mo	Ful-flo	Louvered	Pipe)

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	60	✓			
60	240				AQUARIUM SAND

ATTACHMENTS (✓)

Geologic Log
Well Construction Diagram
Geophysical Log(s)
Soil/Water Chemical Analysis
Other
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME HARICH ENTERPRISES, INC.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
P.O. BOX 2233 RUNNING SPRING CA 92382
ADDRESS CITY STATE ZIP
Signed
WELL DRILLER/AUTHORIZED REPRESENTATIVE
02/10/09 DATE SIGNED
618447 C-57 LICENSE NUMBER

DWR 188 REV 11-97

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

California Collaborative Solutions
Results of Rehabilitation and Aquifer Testing
Moon Camp Well FP-2

August 7, 2008

GEOSCIENCE Support Services, Inc.
P.O. Box 220, Claremont, CA 91711
Tel: (909) 920-0707 Fax: (909) 920-0403
email: email@geoscience-water.com

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CALIFORNIA COLLABORATIVE SOLUTIONS
RESULTS OF REHABILITATION AND AQUIFER TESTING
MOON CAMP WELL FP-2

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TABLE

No.	Description
1	Summary of Required Water Quality Analyses

APPENDICES

Ltr.	Description
A	Pumping Test Data
B	Water Quality Data
C	Microscopic Particulate Analysis

CALIFORNIA COLLABORATIVE SOLUTIONS
RESULTS OF REHABILITATION AND AQUIFER TESTING
MOON CAMP WELL FP-2

1.0 INTRODUCTION

This report summarizes the results of rehabilitation and testing of Well FP-2, located in the vicinity of the proposed Moon Camp development, east of Fawnskin, California (see Figures 1 and 2). Well FP-2 is a potential water source for the development, however, prior to recent activities, it had not been pumped since its construction in 1987. In order to assess the suitability of the well for water supply, GEOSCIENCE developed and implemented a well rehabilitation and testing program.

1.1 Purpose and Scope

The purpose of rehabilitation and testing of Moon Camp Well FP-2 was to:

1) Assess the current condition of the well;

2) Develop a rehabilitation program adequate to restore the specific capacity of the well so that its potential yield and water quality could be evaluated;

3) Implement the rehabilitation and testing program; and

4) Collect and analyze the data necessary for evaluating aquifer characteristics including water quality, potential interference to nearby wells, and possible hydraulic continuity with Big Bear Lake.

The scope of work to address the objectives included:

1) Conducting a downhole video survey of the well;

2) Developing a rehabilitation and testing program and coordinating implementation of the program with a rehabilitation contractor;

3) Implementing the rehabilitation program;

4) Conducting a 72-hour aquifer pumping test;

5) Collecting ground water quality samples from the well and having them analyzed for full Title 22 suite and microscopic particulate analysis (MPA); and

6) Analysis of the data and preparation of the report.

1.2 Background

The Moon Camp Well FP-2 was drilled in 1987 by Howard Pump Company of Barstow, California, using the mud rotary drilling method. A 17-inch borehole was drilled to a depth of 50 ft below ground surface (bgs), below which a 15-inch borehole was drilled to the total depth of 385 ft bgs. Well casing and screen, consisting of 8 1/8-inch inside diameter (ID) mild steel with a 1/4-inch wall thickness was installed to a total depth of 380 ft bgs. The screened portion of the well consists of Johnson Hi-Cap, a type of wire-wrap, located at depths of 60 to 120, 156 to 176, 216 to 278, and 310 to 370 ft bgs. The well was equipped with a 2-inch sounding tube that attaches to the well casing just below the ground surface. The well was filter packed using an 8 x 16 Monterey Sand from the total borehole depth to 53 ft bgs. A 2-foot bentonite layer was placed above the filter pack from 51 to 53 ft bgs and a cement annular seal was placed above the bentonite layer from 51 ft bgs to the ground surface.

Following well construction, the well was developed by bailing and pumping. Following development, an 8-hour variable rate (step drawdown) test was performed. During this test, a maximum discharge rate of 100 gallons per minute (gpm) was achieved with a pumping water level of 26 ft bgs. The specific capacity calculated from data collected during this test was approximately 5 gpm per foot of drawdown.

2.0 DOWNHOLE VIDEO SURVEY

On May 2, 2008, Pacific Surveys, LLC, conducted a downhole video survey of Well FP-2. GEOSCIENCE personnel were on site to note observations made during the survey and to direct the operation of the camera as necessary.

At the time of the video survey, the depth to static ground water level was approximately 2 ft bgs. The camera reached a depth of approximately 376 ft bgs before visibility within the water column became so reduced (i.e. blackout conditions) as to warrant the removal of the camera.

The video survey showed that the blank well casing and screen was locally scaled and corroded although no obvious structural damage was observed. The blank well casing was coated with moderate to heavy scale, with encrustants occurring in localized patches, particularly along welded casing joints. Large mounds of encrustants became more frequent and larger with depth. The wire-wrapped screen sections showed minor to complete clogging with some localized patches of encrustants and tubercles. Where screens were open, no filter pack could be seen through the screen apertures. Some of the encrusting material was observed to be relatively fragile and brittle and became dislodged from contact with the video camera.

3.0 WELL REHABILITATION PROCEDURE

Based on review of the video log, GEOSCIENCE developed a chemical and mechanical rehabilitation program for Well FP-2[1]. Rehabilitation was performed by Roadrunner Drilling & Pump Company of Winnemucca, Nevada (Contractor). The rehabilitation program was initiated on June 27, 2008.

Initial rehabilitation of Well FP-2 included mechanical dislodging of encrusted material throughout the wetted portion of the well casing and screen using a spirally-wound nylon brush. Scale and debris were dislodged by gently raising and lowering the brush throughout the specified area. The Contractor brushed each wetted foot of blank well casing for one minute and each wetted foot of screen for two minutes, for a total of 10 hours brushing time. Following brushing, a bailer was used to remove material that had accumulated at the bottom of the well.

The well was disinfected through a combination of acidification and chlorination. Using a tremie pipe, acid was introduced throughout the length of the well. The acid was mixed into the screened portion by gently lifting and lowering a bailer tool. Once the pH of the well water had been lowered to approximately 4.5 pH units, a chlorine solution was added through the tremie pipe and worked into the screened portion of the well by lifting and lowering the bailer. Once the chlorine concentration of the water in the well exceeded 200 milligrams per liter (mg/L), the well was allowed to sit idle for 24 hours.

Following chlorination, the Contractor continued rehabilitation of Well FP-2 using a combination swab and airlift tool. Swabbing was accomplished by gently lifting and lowering the double-packer tool opposite 10-foot sections of the well screen, effectively dislodging any remaining biofilm and/or fine-grained sediment from the gravel pack and near well zone. Following several passes with the swab tool through a 10-foot screened interval, the interval was

[1] Letter to Michael Perry dated May 9, 2008

pumped (air lifted) using the tool until the discharged water was clear and free of sediment. The screened portion of the well was swabbed and airlifted for a total of 20 hours.

Following swabbing and airlifting, a submersible test pump was installed within the well for final development and testing. The test pump intake was installed at a depth of approximately 130 ft bgs. Initial pumping was performed at a relatively low flow rate (approximately 30 gpm) and was gradually increased as water clarity improved and sand production decreased. Pumping was periodically interrupted to surge the well, a process where water in the pump column is allowed to flow back into the screened section of the well. This process was repeated until the discharge water was clear and the sand content was less than 0.1 parts per million (ppm). The well was developed by pumping for approximately 11 hours. The maximum discharge rate during development was approximately 150 gpm with approximately 25 feet of drawdown.

4.0 AQUIFER PUMPING TEST

A 72-hour variable rate (step-drawdown) pumping test was conducted at Well FP-2 during the period from July 1 to 4, 2008. The well was pumped in 24-hour "steps" at average discharge rates of 35 gpm, 60 gpm and 105 gpm (see Figure 3). During the pumping test, the pumping water level, discharge rate, and sand content were closely monitored (see Appendix A). Ground water levels in a nearby private well, referred to as the Fujimoto Well (see Figure 2), were also monitored during the pumping test. The pumping test was followed by 4 hours of recovery measurements in both the pumping well and the observation well. The field procedure for the pumping test followed the American Society for Testing and Materials (ASTM, 1994), Standard Test Method D4050.

4.1 Pumping Test Methodology

4.1.1 Basic Assumptions Used in Analysis of Pumping Test Data

The purpose of a pumping test is to obtain field data, which when substituted into an equation or set of equations, will yield estimates of well and aquifer properties. As certain assumptions have been used to derive these equations, it is important to consider or control these factors during the test. These assumptions are:

- The aquifer material is assumed to consist of porous media, with flow velocities being laminar and obeying Darcy's law.
- The aquifer is considered to be homogeneous, isotropic, of infinite aerial extent, and of constant thickness throughout.
- Water is released from (or added to) internal aquifer storage instantaneously upon change in water level.

- No storage occurs in the semi-confining layers of leaky aquifers.
- The storage in the well is negligible.
- The pumping well penetrates the entire aquifer and receives water from the entire thickness by horizontal flow.
- The slope of the water table or piezometric surface is assumed to be flat during the test with no natural (or other) recharge occurring, which would affect test results.
- The pumping rate is assumed constant during the entire time period of pumping during a constant-rate test, and constant during each discharge step in a variable-rate test.

4.1.2 Theis Equation

Estimation of aquifer parameters from pumping test data is based on analytical solutions of the basic differential equation of ground water flow that can be derived from fundamental laws of physics. One of the most widely used solutions of this equation for non-steady radial flow to wells is the "Theis Equation":

$$s(r,t) = \frac{114.6Q}{T} W(u) \qquad \text{"Theis Equation"} \qquad (1)$$

where:

s(r,t) = Drawdown in the vicinity of an artesian well, [ft]

r = Distance from pumping well, [ft]

Q = Discharge rate of pumping well, [gpm]

T = Transmissivity of aquifer, [gpd/ft]

W(u) = "Well function of Theis"

u = $\frac{1.87r^2S}{Tt}$

where:

S = Storativity, [fraction]

t = Time after pumping started, [days]

4.1.3 Jacob's Straight-Line (Modified Theis Non-Equilibrium) Method

According to Jacob (1950), for small values of "u" (u < 0.05), the Theis equation may be approximated by Jacob's equation:

$$s(r,t) = \frac{264Q}{T}\log\left(\frac{0.3\,Tt}{r^2 S}\right) \qquad \text{"Jacob's Equation"} \qquad (2)$$

Jacob's equation is valid for use for most hydrogeologic problems of practical interest, is easier to use than the Theis equation, and involves a simple graphical procedure to estimate transmissivity and storativity. This method (D 4105) is summarized by ASTM (1994).

Transmissivity (T, in gpd/ft) can be estimated as:

$$T = \frac{264Q}{\Delta s} \qquad (3)$$

where:

Q = Pumping rate, [gpm]

Δs = Change in drawdown over one log cycle of time, [ft]

4.2 Pumping Well

Well FP-2 served as the pumping well for the 72-hour constant rate pumping test. The static ground water level in the well was measured to be approximately 6 ft bgs prior to the start of pumping. Ground water levels were measured during the pumping test and recovery phase using a downhole pressure transducer programmed to collect measurements at one-minute intervals. Additionally, an electric wireline sounder was used to manually collect ground water levels in FP-2 during the pumping and recovery phases.

The discharge rate was monitored with a flowmeter equipped with a totalizer and instantaneous rate gauge. During the course of the 72-hour pumping test, Well FP-2 pumped at average discharge rates of 35, 60, and 105 gpm (Steps 1, 2, and 3, respectively). The total volume of ground water pumped during testing was 289,350 gallons.

Ground water samples were collected during the 72-hour step test after approximately 44 hours of pumping (July 2, 2008). The samples were submitted to E.S. Babcock & Sons, Inc. of Riverside, California for analysis of constituents required by the State of California Code of Regulations Title 22 Rule as well as other selected constituents. A complete list of the constituents tested and their detection limits are provided in Table 1. Laboratory results of the water quality testing are presented in Appendix B.

A microscopic particulate analysis (MPA) was performed during the first 24 hours of the step drawdown test. After approximately 1,000 gallons of discharge water were run through a filtering apparatus, the filter was submitted to BioVir laboratories, Inc. of Benicia, California. The sample was analyzed according to EPA Method 910/9-92-029 including *Giardia* species and *Cryptosporidium*. Results of the MPA are presented in Appendix C.

4.3 Observation Well

Ground water levels were monitored before, during and after the pumping test in an observation well (a private well referred to as the Fujimoto Well) located approximately 910 ft east of Well FP-2. Water level measurements were collected and recorded in this well using a pressure transducer.

5.0 PUMPING TEST RESULTS

5.1 Production Well (FP-2)

As shown on Figure 3, Well FP-2 can be pumped at a rate of 35 gpm on a long-term basis with less than 10 ft of drawdown in the well. The well can also sustain a pumping rate of 105 gpm on a long-term basis although the rate of ground water level decline is greater. Analysis of the 105 gpm step using Jacob's straight-line interpretation shows an aquifer transmissivity of approximately 14,600 gallons per day per foot of drawdown (gpd/ft; see Figure 4). At a pumping rate of 105 gpm, the specific capacity of FP-2 is approximately 4.7 gpm/ft.

The specific capacity (the inverse of specific drawdown), of the well during Step 1 was less than the specific capacity measured during Steps 2 and 3. This results in a negative trendline when plotting specific drawdown with discharge rate, and thus, well efficiency cannot be calculated (see Figure 5).

Calculated recovery is a method of analysis whereby extrapolated drawdown data is compared to actual recovery data from the pumping well. It can be used to calculate transmissivity using Jacob's straight line interpretation in a similar manner as used with the pumping drawdown data. Results of the calculated recovery analysis for well FP-2 shows an aquifer transmissivity of approximately 8,900 gpd/ft (see Figure 6). Residual drawdown analysis, a method whereby residual drawdown (the difference between the static and recovering water level) is plotted with respect to the ratio between the time since pumping stopped and the time since pumping started, can also be used for calculating aquifer transmissivity using Jacob's straight line interpretation. Results of the residual drawdown analysis for Well FP-2 shows an aquifer transmissivity of approximately 9,600 gpd/ft (see Figure 7).

5.2 Observation Well

Ground water level data collected from the observation (Fujimoto) well, located approximately 910 ft east of Well FP-2, during the pumping test shows minor ground water pumping interference that can be attributed to pumping of Well FP-2. Given that the Fujimoto well was an actively pumping well that cycled on and off periodically during the pumping test, it was necessary to interpret pumping interference from Well FP-2 through the ground water level "noise" of the pumping observation well. To account for this, static ground water levels were used to interpret interference trends (see Figure 8). Interpretation of static ground water trends during the pumping test shows a decline of approximately 0.3 ft that can be attributed to interference from pumping Well FP-2 at a rate of 35 gpm.

5.3 Ground Water Quality

Ground water quality data from Well FP-2 indicate that water produced from the well is suitable for municipal supply. The water is of calcium-bicarbonate type (see Figure 9). The total dissolved solids (TDS) concentration was reported to be 300 mg/L, below the recommended California Department of Public Health (CDPH) secondary maximum contaminant level (MCL) of 500 mg/L. Toluene was detected at a concentration of 1.2 micrograms per liter (µg/L), below the CDPH primary MCL of 150 µg/L, and is likely from materials used during installation of the test pump. Chloroform was detected at a concentration of 0.98 µg/L, below the USEPA MCL of 80 µg/L for trihalomethanes, and is likely a by-product of the chlorine used during rehabilitation of the well casing and screen. All other detected constituents were below their respective MCLs or notification levels.

The results of the water quality analyses are summarized in the following table:

Water Quality Analytical Data – Moon Camp Well FP-2

		Analysis Result	Drinking Water Regulatory Standards
Aluminum	[µg/L]	< 50	200[2]/1,000[1]
Arsenic	[µg/L]	< 2.0	10[1]
Boron	[µg/L]	< 100	1,000[3]
Chloride	[mg/L]	2.7	250-500[2]
Chromium, Hexavalent	[µg/L]	< 1.0	50[1,4]
Chromium, Total	[µg/L]	1.1	50[1]
Color	[Color Units]	< 3.0	15[2]
Fluoride	[mg/L]	< 1.0	2.0[1]
Iron	[µg/L]	< 100	300[2]
Manganese	[µg/L]	< 20	50[2]
Nitrate (as NO_3^-)	[mg/L]	< 1.0	45[1]
Odor	[TON]	< 1.0	3[2]
Perchlorate	[µg/L]	< 4.0	6.0[1]
pH	[pH Units]	7.5	6.5 - 8.5[5]
Silica, Total	[mg/L]	25	NA[6]
Specific Conductance	[µmhos/cm]	510	900-1,600[2]
Sulfate (as SO_4)	[mg/L]	5.2	250-500[2]
Surfactants (MBAS)	[mg/L]	< 0.05	0.5[2]
Total Dissolved Solids (TDS)	[mg/L]	300	500 - 1,000[2]
Total Hardness	[mg/L]	270	NA[6]
Turbidity	[NTU]	0.39	5[2]
Vanadium	[µg/L]	< 3.0	50[3]
1,2,3-Trichloropropane	[µg/L]	< 0.005	0.005[3]
Gross Alpha	[pCi/L]	1.74 +/- 1.33	15[1]
Radon	[pCi/L]	447 +/- 43.1	300-4,000[7]
Volatile Organic Compounds (EPA Method 524.2) except as noted below:	[µg/L]	ND	Varies with Chemical[1]
Chloroform	[µg/L]	0.98	80[8]
Toluene	[µg/L]	1.2	150[1]

1 California Department of Public Health (CDPH) primary maximum contaminant level (MCL).
2 CDPH secondary MCL.
3 CDPH notification level for unregulated chemicals.
4 Chromium-6 (hexavalent chromium) is regulated by CDPH under the 50 µg/L total chromium MCL.
5 United States Environmental Protection Agency (USEPA) secondary standard for pH.
6 Not Applicable – no current MCL.
7 USEPA proposed MCL and alternative MCL
8 Chloroform is regulated under the 80 µg/L USEPA MCL for total trihalomethanes.
ND Not detected above laboratory detection limit.
BOLD Equal to or above current CDPH MCL or notification level.

5.4 Microscopic Particulate Analysis

Microscopic particulate analysis (MPA) did not show any primary or secondary particulates in the well discharge, with the exception of plant pollen. The plant pollen identified was determined to be pine pollen, and is likely an airborne contaminant that contacted the sampling apparatus during field set-up. Given this, there is no evidence from the MPA that the ground water produced by Well FP-2 is under the direct influence of surface water in Big Bear Lake. A copy of the complete MPA report is presented in Appendix C.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the data collected during this investigation, we have developed the following conclusions:

- Well FP-2 has successfully been rehabilitated and its specific capacity restored to near original levels;
- Extreme care should be exercised when equipping or redeveloping the well in the future to avoid damaging the wire-wrap screen. Although no clear damage was visible from the video survey, the screen design is fragile and can easily be damaged;
- Well FP-2 can yield up to 35 gpm on a long-term basis with less than 10 ft of drawdown;
- At the 35 gpm discharge rate, pumping interference with the closest private well is expected to be less than 0.3 ft;
- Ground water quality data from Well FP-2 indicates the water from the well is suitable for municipal supply;
- Microscopic particulate analysis of discharge water detected pine pollen on the sampling filter. However, the detection was likely the result of an airborne contaminant and not from ground water under the direct influence of surface water. Confirmation sampling and analysis may be necessary to verify this conclusion prior to permitting the well with the CDPH.

7.0 REFERENCES

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Jacob, C.E., 1950. Engineering Hydraulics. J. Wiley and Sons, New York.

Driscoll, Fletcher G., 1986. Groundwater and Wells. Second Edition. U.S. Filter/Johnson Screens, St Paul Minnesota.

G.5 - Recommendations for Ground Water Monitoring in the Mooncamp Development Area. (GEOSCIENCE, September 2004

GEOSCIENCE

September 2, 2004

Mr. Jerry Gruber
General Manager
City of Big Bear Lake Department of Water and Power
41972 Garstin Drive
P.O. Box 1929
Big Bear Lake, CA 92315

Subject: **Recommendations for Ground Water Monitoring and Management in the Moon Camp Development Area**

Dear Jerry:

As a follow-up to our 30-Jul-04 meeting at the County of San Bernardino regarding the proposed Moon Camp development near Fawnskin, this letter outlines a process to establish a monitoring well and develop a ground water monitoring and management plan (GWMP) specific to the tributary subarea within which the proposed development would be located. The maximum perennial yield of the tributary subarea surrounding the proposed development has been estimated to range from 14 to 44 acre-ft/yr. However, the relatively wide range of potential yield reflects the limited data available to determine the estimate. At the 30-Jul-04 meeting, the County of San Bernardino indicated they would not permit a project with a water supply requirement that exceeded the low end of the maximum perennial yield estimate until it could be demonstrated, with additional data, that the yield was indeed higher.

To refine the maximum perennial yield estimate and, perhaps more importantly, provide a basis for managing the ground water resources within the tributary subunit encompassing the proposed development, it is recommended to establish one or more monitoring wells (i.e. wells that are not pumped) in this area to enable the collection of ground water level data. Monitoring wells could consist of existing wells in the area or newly constructed wells. Future monitoring wells should be drilled and completed to the bedrock surface. The wells should be at least 4 inches in diameter (to allow for the collection of future water quality samples) and can be constructed of

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Schedule 40 PVC or mild steel casing and screen. The perforated intervals of the wells should be similar to those of nearby production wells.

The monitoring wells for the tributary subarea around the Moon Camp Development would be incorporated into the existing City of Big Bear Lake Department of Water and Power GWMP, which outlines a standard methodology for the collection of ground water data for the purpose of facilitating ground water management decisions. The types of data to be collected from the monitoring wells in accordance with the GWMP would include ground water levels and ground water quality. At least one of the monitoring wells should be established as a "key" monitoring well, in which a ground water level thresholds are identified to guide decision-making.

The location of monitoring wells will depend on the suitability of the existing U.S. Forest Service wells for production. It is planned to evaluate these wells in the near future. Using the information obtained from this evaluation, existing and/or proposed future monitoring wells will be identified.

If you have any questions, please call.

Sincerely,

Dennis E. Williams, Ph.D
President