CALMAT CAJON CREEK

SPECIFIC PLAN SP 90-1

TECHNICAL APPENDICES

CalMat Co.
3200 San Fernando Road
Los Angeles, CA 90065

May 10, 1993

APPENDIX A

MARKETING STUDY

PEYTON REED & Company

MARKET RESEARCH AND CONSULTATION FOR THE BUILDING INDUSTRY

858B

PRELIMINARY MARKET ANALYSIS AND ECONOMIC IMPACT EVALUATION FOR THE PROPOSED CAJON CREEK INDUSTRIAL PROJECT IN SAN BERNARDINO

Summary Report
January 31, 1990

Prepared For:
CalMat Properties Co.

4500 CAMPUS DRIVE · SUITE 208 · NEWPORT BEACH · CA 92660 · 714 756-1773

PEYTON REED & Company

MARKET RESEARCH AND CONSULTATION FOR THE BUILDING INDUSTRY

January 31, 1990

Mr. Wesley A. Murray 858B
Manager of Land Use Planning
CALMAT PROPERTIES CO.
3200 San Fernando Rd.
Los Angeles, Calif. 90065

SUBJECT: Preliminary Market Analysis and Economic Impact Evaluation for the Proposed Cajon Creek Industrial Project in San Bernardino

Dear Mr. Murray:

In accordance with our agreement, we have analyzed the build-out potential for the Cajon Creek industrial project. As agreed, this analysis focuses on only the maximum build out, and does not address absorption. Pricing in every case herein is expressed in current dollars. Our findings, conclusions and recommendations are summarized in this letter report.

Subject Site and Proposed Project

The subject site is located adjacent to the northwest portion of the city of San Bernardino just west of the I-215 freeway (Exhibit A). This area is characterized by vacant land, a limited number of industrial users and mining operations in the Cajon Creek wash. Access from the site to the I-215 freeway is direct and convenient via Palm Avenue/Institution Road. It is our understanding that this access is periodically interrupted by freight trains, but is clear most of the time.

In a regional context, the subject site location is truly strategic since it is central to the Inland Empire, the Victor Valley area and the Ontario Airport, and it is reasonably close to the East San Gabriel Valley market. In addition to the strategic location, relatively affordable land and building pricing will stimulate demand for industrial land and product in the foreseeable future.

The proposed project (see Exhibit B) envisions a variety of industrial uses which are summarized below:

Use	Acres	Parcels
Light industrial	129.0	A,E,G,H,K
Rail-served industrial	124.0	B,C,D
Cons't. material users	20.5	I,J
Sub-total Industrial	(273.5)	
Plant site	51.0	N
Mining	535.0	F,L,P,M
Total:	859.5	

The light industrial category envisions small free-standing buildings of 5,000 to 25,000 SF occupied primarily by firms actively involved in light manufacturing and assembly. The rail-served area should include both heavy manufacturing (30,000 to 80,000 SF) and warehousing & distribution operations (80,000 to 150,000 SF). The construction materials users will include a wide variety of businesses tied to the rapidly expanding construction industry in the Inland Empire. The primary attraction for these users will be the ready and convenient access to raw materials from CalMat for manufacturing of concrete and stone products and paving and fill operations.

Parcels I and J will be designated for the CMUP use only on an interim basis. Ultimately, it is envisioned that these parcels will be utilized for light manufacturing. Parcel M, which is designated for mining, will accommodate the CMUP use on an interim basis; i.e. while Parcel L is being mined and filled. Given favorable market conditions, as Parcel L is filled, the CMUP use would be relocated to this parcel.

The land use plan envisions the light industrial product as a physical and visual "buffer" along Cajon Blvd. which will serve to screen the more varied industrial uses behind these parcels to the west. In a general sense, the Cajon Creek plan is designed with built-in flexibility in terms of land uses and the ability to upgrade to higher uses as the park matures.

Economic Environment

San Bernardino County is projected to experience fairly substantial future growth as shown in Table 1. these projections indicate that for the county, the population will grow by 93%, housing will increase by 111% ('88-2010) and employment will expand by 142% ('84-2010). In all three categories, the county as a whole will achieve a somewhat higher level of growth than the East Valley area (Regional Statistical Area #29, Exhibit C). While this is true, the East Valley area will still experience fairly substantial growth which is projected at 88% for population, 102% for housing ('88-2010) and 99% for employment ('84-2010).

The majority of employers in San Bernardino County are small firms with less than 10 employees. This is clearly shown in Table 2 where 77% of all employers have from 1-9 employees. This is less true for manufacturing where only 54% have less than 10 employees. The primary sectors which will have the greatest propensity to occupy industrial buildings, and their respective percentages of employers with less than 10 employees is shown below:

Industry	% 1-9 Employees
Construction/mining/forestry	75
Manufacturing	54
Trans./comm./util.	68
Wholesale trade	68
Average:	68%

From the above, we conclude that the majority of the market support for industrial product is from small users with modest space requirements. Typical square footage utilization factors (SF/employee) by industrial user category are shown in Table 3. This table reveals that while the overall ratio is 680 SF/1 employee, ratios vary widely depending upon the type of user. Thus, though the typical light manufacturer experiences a ratio of only 480 SF/employee, warehousing operators have a ratio of 1,440 SF/employee. Given the ratios in Table 3 and the relatively small number of employees for the majority of users, the typical total space need is from 1,500 to 5,000 SF of space.

For the Cajon Creek Industrial Park (CCP), however, we envision larger users both in terms of total employees and the amount of space utilized per employee. In this regard, we envision that the thrust of the user audience for CCP will include light and heavy manufacturers, warehousing & distribution operators and construction materials users. Both heavy manufacturing and warehousing & distribution users will be accommodated on the rail-served parcels.

The acreage required for the different uses will vary depending upon the size of the user and the typical building coverage factor. In this regard, typical parking ratios and building coverage factors for the uses we envision for CCP are shown below:

User	Parking Ratio	Coverage Factor
Light Mfg.	2.5:1	38%
Heavy Mfg. (rail-served)	2.0:1	40%
Wrhsg. & Dist.	1.3:1	48%
Cons't Mtls. Users	2.0:1	6%

It should be noted here that the radical difference in the coverage factor between the construction materials users and other industrial users is due to the extensive outdoor storage area required.

Build-Out Model for CCP

In light of the anticipated strong economic growth for the East Valley area, we feel there will be an increasing demand for industrial space, especially from the target user audience envisioned above. This is due to the fact that higher land/building costs in markets to the west and south are forcing these users further east and north. Thus, CCP is well positioned geographically and in terms of timing to take advantage of this macro trend.

Given the above, we have constructed in Table 4 a model for the ultimate build out of the CCP project. This model illustrates the total occupied industrial space when completed, value of the

project (in current dollars) and the anticipated annual tax revenues. Table 5 indicates the total employment generated by CCP when totally built out. Totals from Tables 4 and 5 are shown below for convenient reference:

Totals	Total
Occupied space	4,724,000 SF
Project value	$186,105,000
Tax revenue	$2,326,000
Total employment	8,065

The above figures clearly demonstrate that the CCP project has considerable potential from a profit and property tax revenue generating standpoint. Also, the overall impact from this level of employment in terms of sales tax revenue and economic activity is substantial.

While this report does not address absorption, it is our conclusion that CCP will enjoy an increasing absorption rate over time as the location becomes relatively more desirable.

The opportunity to provide assistance on this project is appreciated and we look forward to a continuing contribution as you proceed.

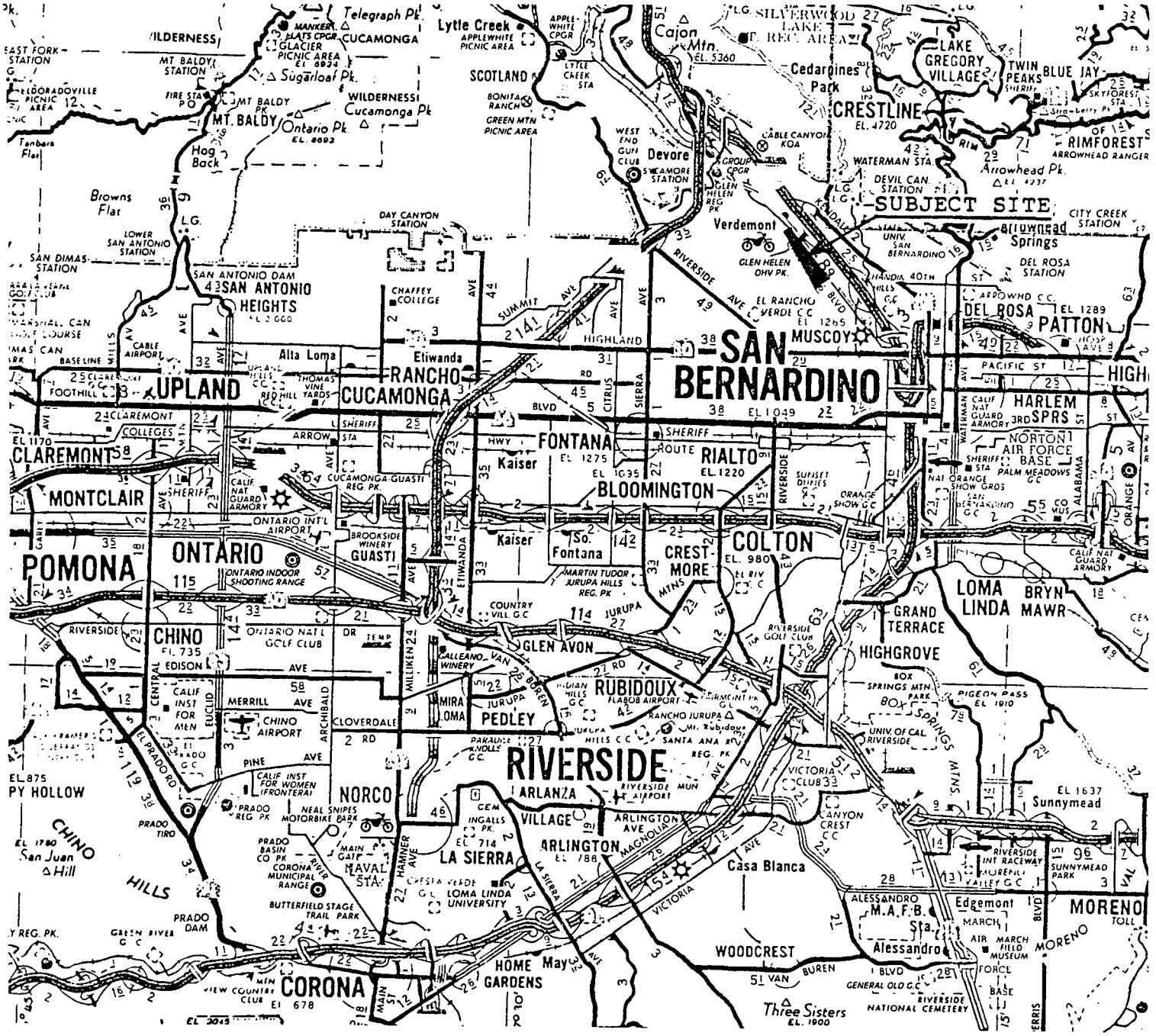
Sincerely,

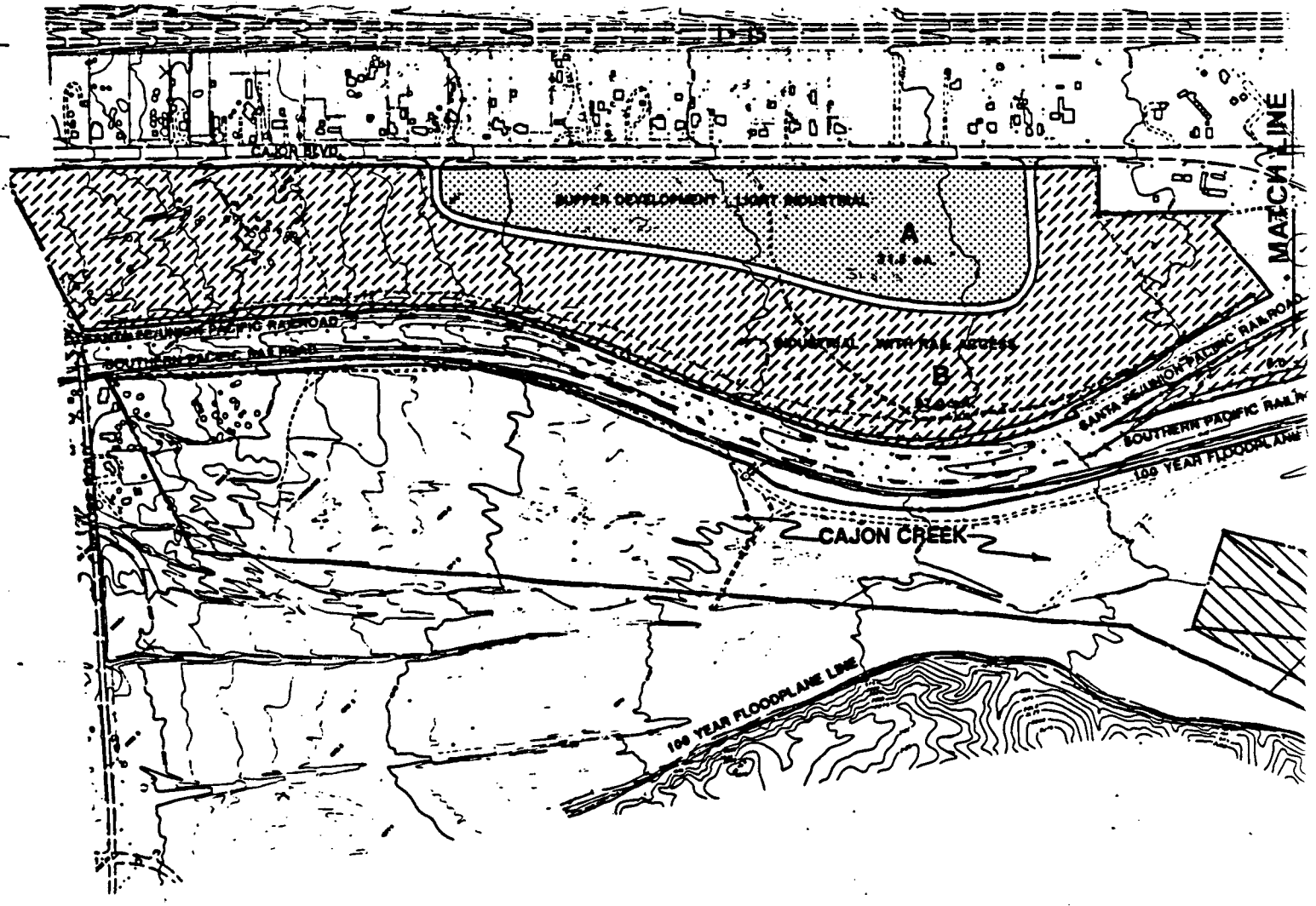
PEYTON REED & COMPANY

Peyton Reed

EXHIBIT A

CAJON CREEK
PROJECT LOCATION



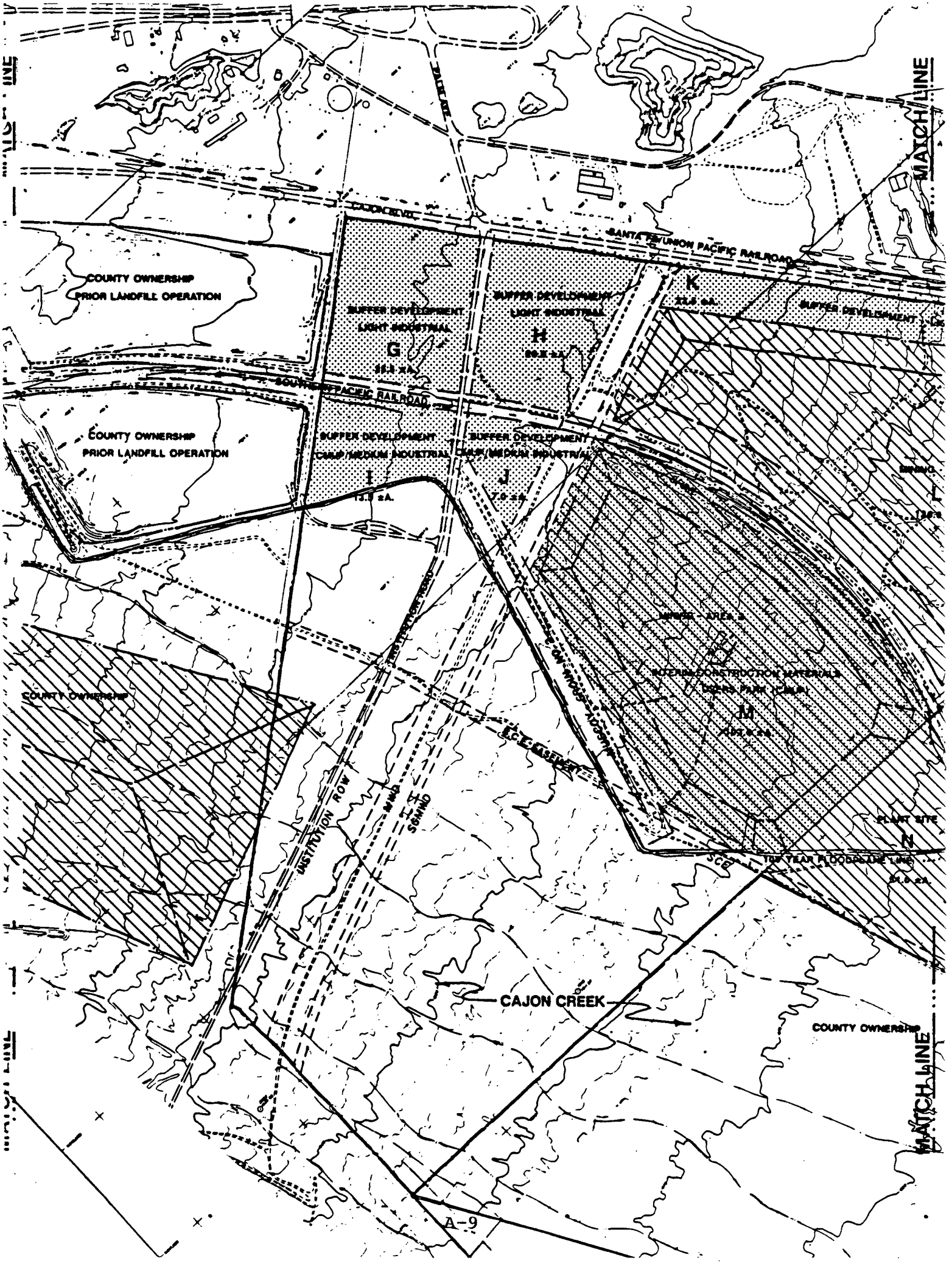


INDUSTRIAL		273.5 acres
	BUFFER (Light Industrial)	149.5 acres (20.5 acres of CMUP)
	RAIL SERVED (Mfg. & Distrib.)	124.0 acres

MINING		586.0 acres (100 acres in County)
	EXTRACTION	535.0 acres (103.0 acres of CMUP)
	PLANT SITE	51.0 acres

OPEN SPACE	439.5 acres


MATCH LINE
PRIVATE OWNERSHIP
BUFFER DEVELOPMENT - LIGHT INDUSTRIAL
ZONE
INDUSTRIAL WITH RAIL ACCESS
D
F
49.0 ac.
ZONING
CAJON CREEK
P
MATCH LINE


MATCH LINE
CAJON BLVD.
SANTA FE/UNION PACIFIC RAILROAD
COUNTY OWNERSHIP
PRIOR LANDFILL OPERATION
BUFFER DEVELOPMENT
LIGHT INDUSTRIAL
G
BUFFER DEVELOPMENT
LIGHT INDUSTRIAL
H
K
BUFFER DEVELOPMENT
SOUTHERN PACIFIC RAILROAD
COUNTY OWNERSHIP
PRIOR LANDFILL OPERATION
BUFFER DEVELOPMENT
CAMP/MEDIUM INDUSTRIAL
I
BUFFER DEVELOPMENT
CAMP/MEDIUM INDUSTRIAL
J
MINING - AREA 3
M
PLANT SITE
N
100 YEAR FLOODPLAIN LINE
COUNTY OWNERSHIP
INSTITUTION ROW
SCHOOL
CAJON CREEK
COUNTY OWNERSHIP
MATCH LINE

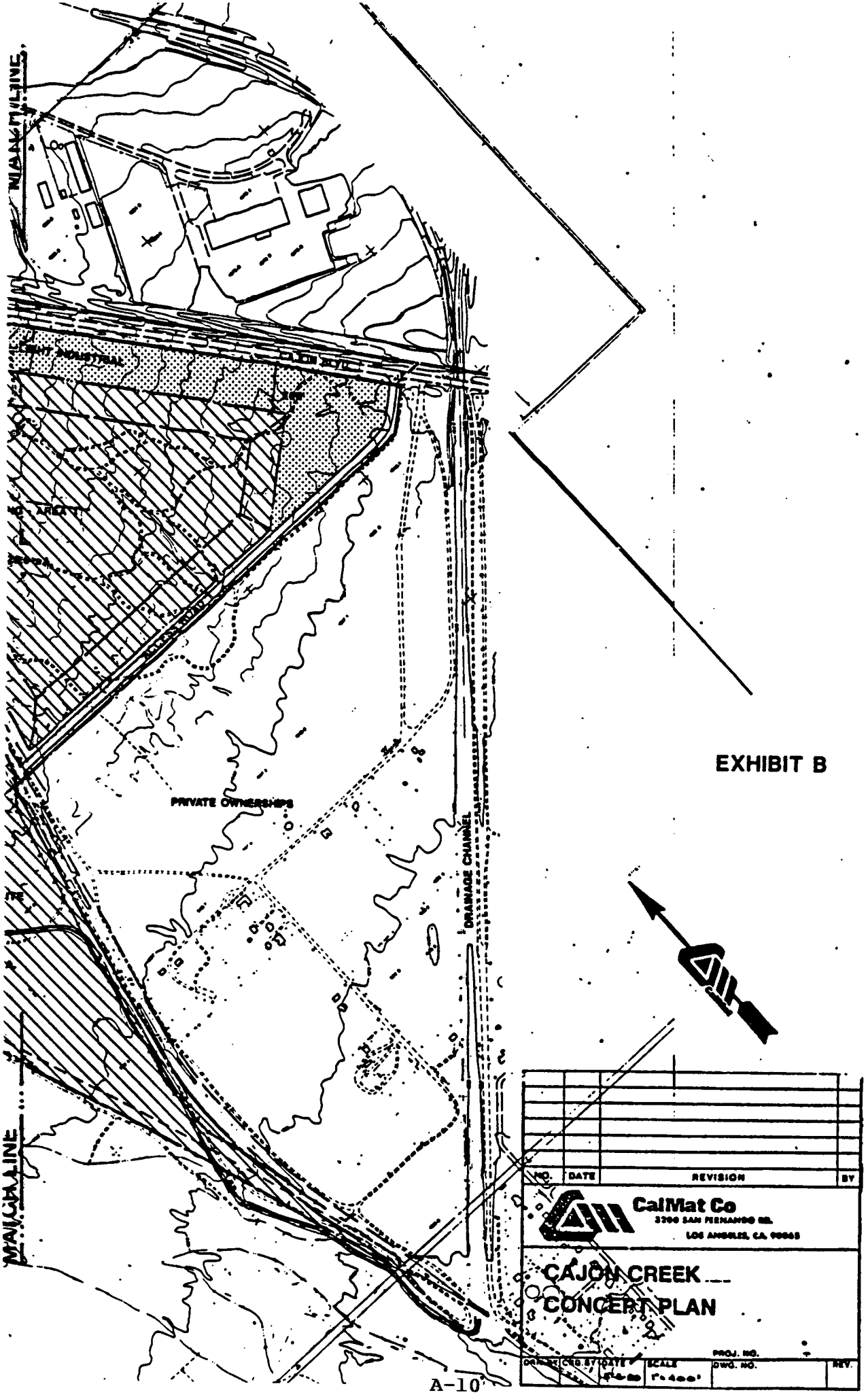

MAIN LINE
LIGHT INDUSTRIAL
OLIVE AVE.
AREA
PRIVATE OWNERSHIPS
DRAINAGE CHANNEL
MAIN LINE
NO.
DATE
REVISION
BY
CalMat Co
3200 SAN FERNANDO RD.
LOS ANGELES, CA. 90065
CAJON CREEK
CONCEPT PLAN
PROJ. NO.
DWN. BY
CHD. BY
DATE
SCALE
1"=400'
DWG. NO.
REV.

EXHIBIT B

TABLE 1

PROJECTED GROWTH
FOR SAN BERNARDINO COUNTY
AND THE EAST SAN BERNARDINO VALLEY AREA
1984-2010

Area	Year 1984	Year 1988	Year 2010	Period Growth	Period Increase
Population					
San Bernardino	757,500	1,240,000	2,171,600	1,157,100	93%
E. San Bern. Val.	379,400	451,100	774,800	395,400	88%
Housing					
San Bernardino	408,600	504,000	966,000	557,400	111%
E. San Bern. Val.	145,800	174,500	323,400	177,600	102%
Employment					
San Bernardino	325,000	NA	785,400	460,400	142%
E. San Bern. Val.	135,500	NA	270,300	134,800	99%

Source: Southern California Association of Governments

EXHIBIT C

SAN BERNARDINO
WEST VALLEY
REGIONAL STATISTICAL AREA #29

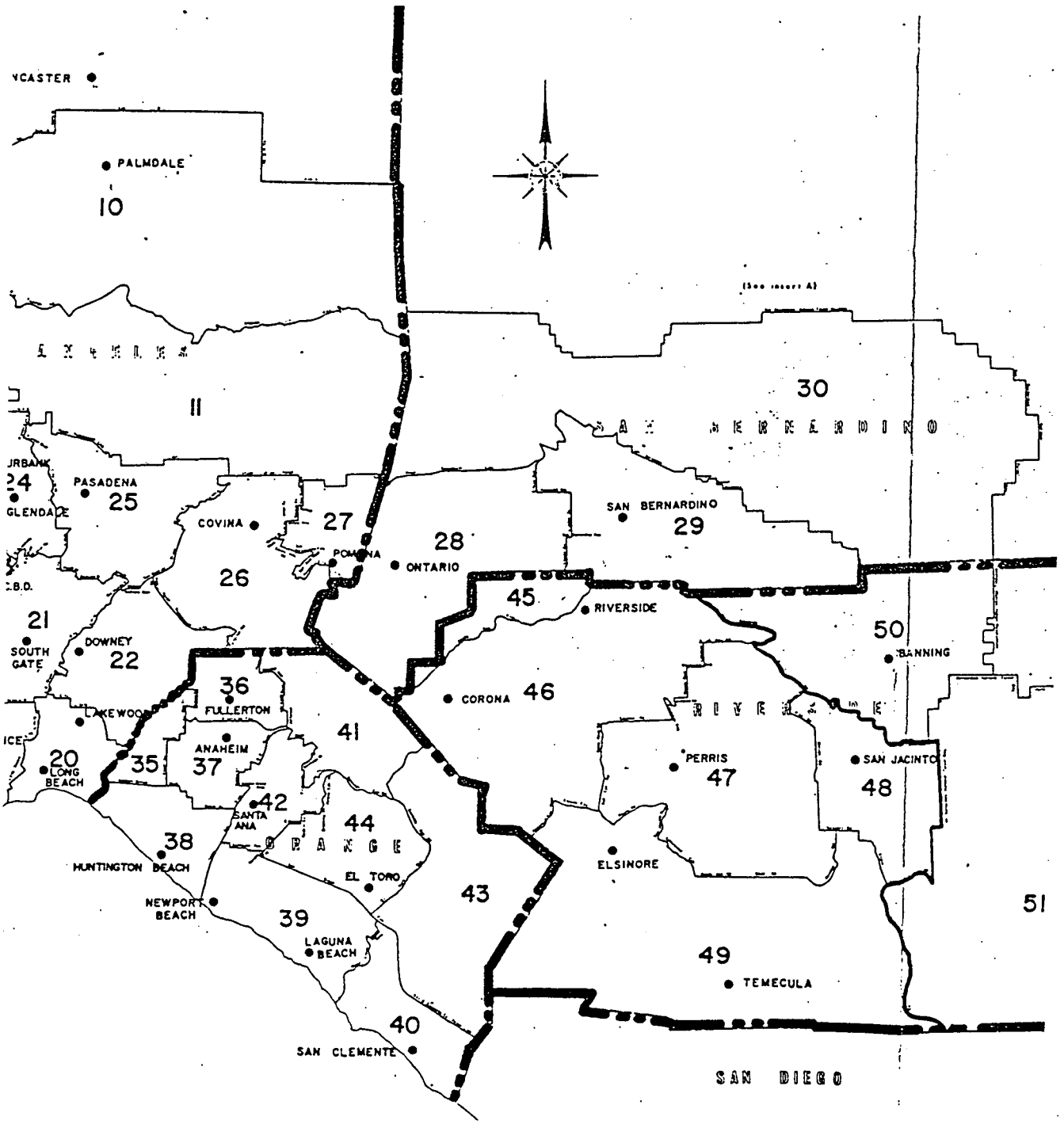


TABLE 2

DISTRIBUTION OF EMPLOYMENT
BY SIZE OF EMPLOYER
FOR SAN BERNARDINO COUNTY
1988

Industry	Total Empld.	Total Emplrs.	Size of Employer 0-9	10-19	20-49	40-99	100-249	250-499	500+
Ag/Forest/Mining	8,206	893	707	97	68	11	9	1	0
Contruction	31,363	2,777	2,081	342	245	67	28	13	1
Manufacturing	49,158	1,275	691	179	198	98	82	17	10
Trans/Comm/Util	18,563	775	530	102	86	33	14	4	6
Wholesale Trade	14,521	1,085	743	157	127	40	13	4	1
Retail Trade	77,958	4,070	2,844	594	373	150	74	15	20
F.I.R.E.	14,098	1,277	1,061	93	64	33	19	5	2
Services	78,818	8,474	7,406	530	315	113	73	20	17
Government	61,665	705	306	113	127	62	48	24	25
Other	1,039	216	189	20	6	0	1	0	0
Total	355,389	21,547	16,558	2,227	1,609	607	361	103	82

Source: California State Economic Development Department

TABLE 3

AVERAGE SPACE PER EMPLOYEE
FOR SELECTED INDUSTRIAL USERS

Industrial Use Category	Average SF/Employee
Heavy manufacturing	600
General manufacturing	670
Light manufacturing	480
Manufacturing, small module	530
Wholesale trade, industrial	760
Wholesale trade, commercial	1,180
Warehousing	1,440
General industrial	950
Construction Materials Users	715
Average:	680

Source: Urban Decision Systems and Peyton Reed & Company

TABLE 4

BUILD OUT MODEL
FOR THE CAJON CREEK INDUSTRIAL PARK

User	Total Acres	Coverage Factor	Occupied Space (SF)	Average Size (SF)	Average Price/SF	Total Value	Tax Revenue/Yr. 1/
Light Manufacturing	129.0	38%	2,135,000	15,000	$40.00	$85,400,000	$1,067,500
Rail-Served Manufacturing	95.0	40%	1,655,000	50,000	35.00	57,925,000	724,100
Warehousing & Distribution	29.0	48%	606,000	100,000	30.00	18,180,000	227,300
Cons't. Materials users	123.5	6%	328,000	30,000	75.00 2/	24,600,000	307,500
Totals:	376.5	29%	4,724,000	NA	$39.40	$186,105,000	$2,326,700

1/ Assumes property tax rate at 1.25%
2/ High price/SF reflects an allocation for excess land at $3.00/SF.

Note: All figures are rounded.

TABLE 5

TOTAL EMPLOYMENT
GENERATED AT BUILD OUT
FOR THE CAJON CREEK PROJECT

User	Total Space	Space/ Employee	Total Employed
Light Manufacturing	2,135,000	480	4,450
Rail-Served Mfg.	1,655,000	605	2,735
Wrhsg. & Dist.	606,000	1,440	420
Cons't Mtls. Users	328,000	715	460
Total:	4,724,000		8,065

PEYTON REED & Company

MARKET RESEARCH AND CONSULTATION FOR THE BUILDING INDUSTRY

PROFESSIONAL QUALIFICATIONS AND BACKGROUND INFORMATION

January 1990

4500 CAMPUS DRIVE · SUITE 208 · NEWPORT BEACH · CA 92660 · 714/756-1773

THE FIRM

Peyton Reed & Co., Inc. is a consulting organization established in 1972 to serve the building industry. The firm provides research and consulting services to builders, developers, lending institutions and investors involved in all types of residential and commercial real estate development. The approach to serving clients' needs focuses on Mr. Reed's personal involvement at all levels of research, and a work product custom-made to the specific requirements of each analysis.

Rather than maintaining a large staff, Peyton Reed & Co., Inc. makes use of independent consultants and technical specialists when required to augment the firm's capabilities. As a result, each client's needs can be met economically and with the best team for each assignment.

RESEARCH AND CONSULTING SERVICES

Though there are numerous types of studies and services performed, in general, they may be summarized in the broad categories outlined below:

Concept Validation: The objective of this type of study is to determine whether or not a project, as conceived, is valid from a marketing standpoint, and if it will achieve market acceptance and adequate absorption at the scheduled prices.

Product Determination: When a client has a site with only physical and political constraints, the research objective is to determine the most appropriate development scheme that will insure maximum profit potential for the site. The results of this research are translated into absorption estimates and pricing recommendations along with detailed product design specifications suitable for interpretation by architects and planners.

Performance Evaluation: There are times when a project either is not performing well or, for various reasons, is not expected to if marketing is attempted. In this case, the research objective is to establish the marketing position for the project and then evaluate its absorption and pricing potential. In light of these findings, recommendations are made to correct product and/or marketing deficiencies in order to optimize the project's market potential.

Design Review: Although this service may or may not involve research, it is directed to evaluating product marketability. Here, the client's product concept is analyzed to determine its

appeal to the intended target market segment. To the extent it is judged deficient, specific design revisions are recommended. In this regard, Mr. Reed interfaces closely with the architect, planner and client, to insure design conformance with the recommendations.

COMPONENTS OF ANALYSIS

There are basic components to the analysis utilized in nearly every type of study. Briefly, these may be summarized as follows:

Competition: A survey of the competitive market for any given project identifies the extent and character of the competition from active projects and those that are scheduled for future development. Each competitive project is analyzed to identify its positive, negative and unique characteristics along with its buyer or renter profile, pricing and market performance.

This analysis provides a basis for determining a proposed or existing project's market position, pricing and probable buyer or renter profile. It can also determine the advisability of pursuing a development in light of the extent and quality of competition.

Demand: An analysis of the depth of market for a given product is an essential component for most studies. This process utilizes computerized demographic data and official growth projections along with internal analytical formats to determine the demand by geographic area and the depth of market for any given product type. These analyses translate into the estimated absorption potential for the specific product under consideration.

Consumer: Nearly all studies involve analyses of consumer profiles and preferences. In many cases this involves secondary research such as personal interviews with brokers and sales or leasing agents who interact on a day-to-day basis with consumers. In addition, it is often of critical importance to obtain direct input from the consumer regarding product and locational preferences, affordability and trade-off alternatives. Here, various techniques are employed. The three most often used are focus group discussions, and personal or telephone interviews.

REPORT FORMAT

All reports are custom-made to the specific needs of each assignment. As such, reports vary in content and format. Some are brief letter reports and others are formal, fully documented reports for lenders. Regardless of the report format, however, each report focuses on data and issues that are truly relevant to the

task. Reports emphasize the conclusions from the research and focus on specific recommendations resulting from these conclusions. Thus, in every case, a clear picture is presented of specific market findings that lead to detailed recommendations.

EXPERIENCE

The above described research activities are directed by the firm's principal, Peyton Reed. Since establishing the firm in 1972, Mr. Reed has personally directed more than 900 studies in over 130 market areas throughout the U.S. including urban, suburban and rural communities in 25 states and Puerto Rico. This extensive geographic exposure and experience with diverse product types enables Mr. Reed to quickly understand the dynamics of any marketplace and relate its particular characteristics and trends to experience elsewhere. Thus, he provides clients with a valuable perspective that is unique among research consultants.

In addition to his broad geographic experience, Mr. Reed's analyses have included virtually every type of real estate product, market and problem. The following is a list of the types of products encompassed by Mr. Reed's studies:

Residential:

- Attached sales housing
- Garden apartments
- Mid and high-rise condominiums and apartments
- Condominium conversions
- Single-family homes
- Retirement housing
- Second homes
- Recreational land
- Time share
- Equestrian and estate residential
- Multi-product planned communities

Commercial:

- Retail
- Industrial
- Office
- Hotel
- Self-storage

The above studies include comprehensive analyses of the competition; economic, employment and demographic characteristics and trends; plus an investigation of consumer attitudes and preferences. Typically, these studies result in detailed product recommendations, pricing, absorption estimates, and an identification of the target buyer or renter profile.

The scope of studies ranges from small projects to large master-planned communities of several thousand acres involving numerous residential products, as well as commercial and a variety of other land uses.

RECENT STUDIES

The following represents a summary of major studies completed during the past two years (12/87 through 12/89, in chronological order).

Market Area	Project Size		Product Type
San Bernardino	160	AC	Industrial Park
Lancaster	128	DU	SFD
Trabuco	32	DU	Townhomes
Trabuco	72	DU	Condominiums
Woodland Hills	83	DU	Luxury SFD
Pomona	96	DU	Luxury SFD
Yorba Linda	161	DU	Seniors' Apts.
Murrieta	297	DU	Seniors' Apts.
Alhambra	62	DU	Apartments
Rancho Cucamonga	22	DU	Luxury SFD & Consumer Attitudes
Vista	86	DU	SFD
Walnut	108,000	SF	Off/Ind/Retail
Highland	97	DU	SFD
Rancho California	108	DU	SFD
Del Mar	42	DU	Luxury TH
Palm Springs	64	DU	Apartments
Riverside	113	DU	SFD
Tustin Ranch	205	DU	Luxury TH
Indio	272	DU	Apartments
Trabuco	162	DU	Luxury SFD
Anaheim	230	DU	Apartments
Sun City	158	DU	SFD
Lancaster	40	AC	SFD & Apts.
Victorville	300	DU	Apartments
Sacramento	---		Mobile Home Market
Pomona	120	DU	SFD
Sun City	214	DU	SFD
Anaheim	322	DU	SFD, TH & Apts. San
Bernardino	150	DU	Luxury SFD
La Palma	48	DU	Luxury SFD
Covina	84	DU	Seniors' Apts
Woodland Hills	87	DU	Luxury SFD

Market Area	Project Size		Product Type
Signal Hill	56	DU	Luxury SFD
La Costa	136	DU	Luxury Apts
Sun City	265	DU	Move-up SFD
Dana Point	--		Estate Lot Valuation
Corona	400	DU	SFD & TH
Catalina Island	60	DU	Luxury TH
Signal Hill	60	DU	Luxury SFD
Rancho Cucamonga	110	DU	Duplex TH
Riverside	101	DU	SFD
Hesperia	100	DU	Apartments
Chino Hills	352	AC	Planned Comm.
Rancho Cucamonga	170	DU	Apartments
Sun City	180	DU	Seniors' Apts.
Covina	178	DU	Townhomes
Dana Point	195	DU	Seniors' Condomimium
Woodland Hills	36	DU	Luxury SFD
Carbon Canyon	45	DU	Luxury SFD
Tustin Ranch	240	DU	Luxury TH
Las Vegas	110	DU	SFD
Murrieta	200	DU	Apartments
Hemet	420	AC	Mobile Home Park
Murrieta	239	DU	SFD
Oceanside	413	DU	Luxury SFD
Sun City	89,500	SF	Retail
Anaheim	60	DU	Townhomes
Loma Linda	29	AC	Seniors' Campus
Las Vegas	87	DU	SFD
Antelope Valley	1600	DU	Planned Comm.
Las Vegas	--		Apartment Market Analysis
San Bernardino	216	DU	Seniors' Apts.
Chino	591,000	SF	Industrial Park
Santa Ana	272	DU	Condo. Conv.
Sun City	310	AC	Planned Comm.
Orange	383	DU	Luxury Th & SFD
Redlands	17	DU	SFD
La Habra	160	DU	Estate Lots & Country Club
Orange	30	DU	Luxury SFD
Orange & Riverside Counties	--		Duplex Analysis
Placentia	96	DU	Seniors' Apts
Murrieta	848	DU	Seniors' Comm.
Inglewood	200	DU	Seniors' Apts.
Las Vegas (Desert Shores)	115	DU	SFD
El Monte	45	DU	SFD
Palm Springs	140	DU	Congregate Care

Market Area	Project Size		Product Type
Santa Barbara	21	DU	Luxury SFD
Placentia	29	DU	Luxury SFD
Chatsworth	220	DU	Luxury TH
Corona	180,000	SF	Retail
Ontario	70,000	SF	Retail
Corona	75	AC	Industrial Park
Victorville	144	DU	SFD
Rialto	18.5	AC	Retail &Industrial
Las Vegas (Silver Springs)	115	DU	SFD
Santa Rosa Valley	25	DU	Estate Lots
Corona	3,200	DU	Eagle Valley Planned Comm.
Victorville	100	DU	Luxury SFD
Coto de Caza	61	DU	Luxury Adult SFD
Corona	--		Attached Housing Opportunities
Anaheim	60	DU	Seniors Apts.
Hemet	269	DU	SFD
Roseville	185	DU	Luxury Apts.
Coto de Caza	--		Adult Consumer Attitudes
Victorville	245	DU	Entry Level SFD
La Verne	30	DU	Estate Lots
Moreno Valley	300	DU	Luxury SFD
Murrieta	--		Retirement SFD Consumer Attitudes
Dana Point	64	DU	Luxury Townhomes
Corona	3,200	DU	Foothill Ranch Planned Comm.
Laguna Hills	140	DU	Condo. Conv.
Corona	1,162	DU	Wild Rose Ranch Planned Comm.
Woodland Hills	36	DU	Luxury SFD
Elsinore	81	DU	Luxury SFD
San Juan Capistrano	250	DU	Luxury Townhomes
Telluride, Col.	100	AC	Resort Analysis
	140	DU	Estate Lots
Costa Mesa	--		Rental Analysis
Banning	138	DU	SFD
San Bernardino	154	DU	SFD
San Juan Capistrano	140,000	SF	For-sale Office
Corona	514	DU	Rental Apartments
Hesperia	50	DU	Seniors SFD
Corona	108	DU	SFD
	64	DU	Luxury Townhomes
Moreno Valley	406	DU	Luxury SFD
San Bernardino	300	AC	Industrial Park

RECENTLY COMPLETED PROJECTS

The following are recently completed or active projects for which Peyton Reed & Company provided a market analysis. These studies resulted in either an evaluation of a proposed product (validation study) or our recommended product design criteria, along with an absorption estimate and pricing recommendations (new product determination). Though in some cases, the time lag between our analysis and the project's reality has been as much as two years, all have performed or are performing successfully.

Residential

Single-Family

Vista Ladera	319	DU	Rancho Santa Margarita
Countryside I & II	51	DU	Long Beach
Ventana Canyon (Estate Lots)	74	DU	Tucson
Lakeview Estates	196	DU	Oceanside
Morningside	184	DU	Perris
Signet Series	223	DU	Rancho California
Brock Manor, Shadowridge	50	DU	Vista
Brock Homes, The Colony (Seniors)	300	DU	California Oaks
South Wind	101	DU	Pomona
San Moreno	63	DU	Moreno Valley
Country Gardens	214	DU	Sun City
Miralago	265	DU	Sun City
Siena	132	DU	California Oaks
Tanterra	36	DU	Woodland Hills
Country Crossings	144	DU	Pomona

Attached Housing

Villas Mallorca (TH)	136	DU	La Jolla
Westside (Conversion)	195	DU	Canoga Park
St. Albans (Flats)	220	DU	Santa Ana
South Coast Springs (Flats)	153	DU	Santa Ana
The Gardens at Mountain Meadows (TH)	79	DU	Pomona
Brookhaven (Flats & TH)	76	DU	Garden Grove
Turtle Rock Crest (Luxury TH)	112	DU	Irvine
Hamilton Cove I & II (Luxury Flats & TH)	78	DU	Catalina Island
Briar Oaks (Flats)	210	DU	Stanton
Allegro (Flats)	140	DU	Pomona
Cortina (TH)	119	DU	Corona

Apartments

Chatham Woods	272	DU	Anaheim
Meadowood	228	DU	Corona
Meadow Wood Village	206	DU	Long Beach
Oaktree Court	134	DU	Placentia
Rivermeadows	152	DU	Huntington Beach
Lakeside Apartments	112	DU	Elsinore
Pacific Village (Seniors)	132	DU	Pomona
Southridge	80	DU	Pomona
Gladstone Ridge	72	DU	Glendora
Club Pacifica	232	DU	Covina
Diamond Bar Village	136	DU	Diamond Bar
Sunrise Pointe	272	DU	Indio
Victoria Woods	328	DU	Rancho Cucamonga
Meadowbrook	238	DU	Banning
The Vintage (Seniors)	52	DU	Westminster
The Landing	144	DU	Sacramento
Tyler Springs (Seniors)	273	DU	Riverside
Victoria Woods (Seniors)	392	DU	Rowland Heights
Heritage Village (Seniors)	280	DU	Santa Fe Springs
ShorePark	393	DU	Sacramento
Promenade Terrace	330	DU	Corona
Rancho Las Brisas	200	DU	Murrieta

Commercial

Retail

Los Alisos Village	26,000 SF	Mission Viejo
Los Coyotes Diagonal	10,000 SF	Long Beach
Liberty Square	25,000 SF	Lakewood
Olympic Center	26,000 SF	Huntington Beach

Office

McClintock Plaza	9,000 SF	San Diego
Centerstone Plaza	110,000 SF	Irvine

Industrial

Olympic Center	62,000 SF	Huntington Beach
Corona Spectrum	92 AC	Corona
CalMat Carroll Center	63,000 SF	San Diego

Self-Storage

Olympic Center	116,000 SF	Huntington Beach
Store-for-Less	48,000 SF	Long Beach

PLANNED COMMUNITIES

Peyton Reed's involvement in planned communities has been extensive and continuous since 1973. Studies typically have included a major market analysis and, in many cases, consumer research resulting in an overall marketing strategy, development plan and detailed design recommendations for the product program.

Types of communities analyzed have included those with a recreational land, second home and primary home orientation. Some of these communities have been in a conceptual stage and others in a partially built-out condition.

Below is a list of planned communities for which Peyton Reed has conducted market studies:

AMELIA ISLAND, Jacksonville, Florida
AUBURN LAKES TRAILS, Auburn, California
BALL RANCH, Vacaville, California
BRANDERMILL, Richmond, Virginia
BRISTOL HARBOUR VILLAGE, Lake Canandaigua, New York
COUNTRYSIDE, Sun City, California
CROCKER HILLS, San Mateo, California
DEERFIELD HILLS, Colorado Springs, Colorado
EAGLE VALLEY, Corona, California
HARBISON, Columbia, South Carolina
HILLSDALE, Sacramento, California
IRONWOOD, Palm Desert, California
ISLE OF PALMS, Charleston, South Carolina
LAKE HUNTINGTON, Huntington Beach, California
LAKES AT CASTLE ROCK, Tucson, Arizona
LANDON, Cincinnati, Ohio
LA RESERVE, Tucson, Arizona
FOOTHILL RANCH, Corona, California
PEACHTREE CITY, Atlanta, Georgia
PINEHURST, Pinehurst, North Carolina
RESTON, Washington, D.C.
RIO HONDO, San Juan, Puerto Rico
ROTHENDALE, Louisville, Kentucky
STEAMBOAT LAKE, Routt County, Colorado
WELSH MEADOWS, Cincinnati, Ohio
WILD ROSE RANCH, Corona, California
WINDWARD, Atlanta, Georgia

HIGH-RISE RESIDENTIAL

Peyton Reed's involvement in high-rise residential projects has been extensive and continuous since 1973. High-rise studies have included both rentals and condominiums in a variety of urban and resort settings. Several studies included in-depth consumer interviews and focus group discussions in order to accurately identify product preferences and attitudes toward high-rise living.

Below is a list of market areas in which Peyton Reed has conducted high-rise market feasibility studies:

Location	# Studies
West Los Angeles, CA	5
San Diego, CA	3
Newport Beach, CA	3
Long Beach, CA	2
Portland, OR	2
Las Vegas, NV	1
Louisville, KY	1
Clearwater, FL	1
Miami, FL 1/	1
Ocean City, MD	1
San Francisco, CA	1
Los Angeles (Downtown), CA	1
Glendale, CA	1
Santa Ana, CA	1

1/ This study included analyses of high-rises in Chicago, Houston and New York, as well.

CLIENTS INCLUDE

AKINS DEVELOPMENT COMPANY
Newport Beach, California

ANDEN GROUP
Newport Beach,California

BAYSHORE DEVELOPMENT CO.
Newport Beach, California

BCE DEVELOPMENT, INC.
Irvine, California

BEARD & HOWARD
Newport Beach, California

BEAUCHAMP ENTERPRISES, INC.
Newport Beach, California

BREHM COMMUNITIES, INC.
San Diego, California

M. J. BROCK & SONS, INC.
San Diego, California

THE BUIE CORPORATION
Laguna Niguel, California

CALMARK HOMES
Los Angeles, California

CALMAT PROPERTIES
Los Angeles, California

THE CHILLINGWORTH CORPORATION
Pasadena, California

CITATION BUILDERS
Tustin, California

CHARTER PACIFIC HOLDINGS, INC.
Woodland Hills, California

COSTAIN HOMES, INC.
Newport Beach, California

COTO DE CAZA DEVELOPMENT CO.
Trabuco, California

DELMA CORPORATION
Huntington Beach, California

THE DOUCETTE COMPANY
Tucson, Arizona

EAGLE VALLEY DEVELOPMENT CO.
Anaheim, California

THE ESTES COMPANY
Tucson, Arizona

FARWEST SAVINGS
Newport Beach, California

FOOTHILL PROPERTIES
Newport Beach, California

GFELLER DEVELOPMENT CO., INC.
Tustin, California

GROVE INVESTMENT COMPANY
Costa Mesa, California

GRUPE DEVELOPMENT COMPANY
Woodland Hills, California

HUTTON DEVELOPMENT CO., INC.
Santa Ana, California

INTERAMERICAN BUILDERS, INC.
Irvine, CaliforniaR

THE LINPRO COMPANY
Los Angeles, California

THE MACKLIN COMPANIES
Newport Beach, California

PACIFIC SCENE, INC.
Walnut, California

REGIS HOMES CORPORATION
Newport Beach, California

RESCO DEVELOPMENT
Newport Beach, California

SPONGBERG, KIRKLAND & ASSOCIATES
Garden Grove, California

UDC HOMES
Corona, California

ROBERT P. WARMINGTON CO.
Costa Mesa, California

VED CORPORATION
Yorba Linda, California

THE HANCOCK COMPANY
Costa Mesa, California

THE HOELSCHER COMPANY
Newport Beach, California

KAUFMAN & BROAD, INC.
Los Angeles, California

MC KELLAR DEVELOPMENT
San Diego, California

PACESETTER HOMES, INC.
Newport Beach, California

PICERNE ASSOCIATES
Carlsbad, California

R&H HOMES, INC.
Redlands, California

SEQUOIA REAL ESTATE FUND
Torrance, California

KATHRYN G. THOMPSON DEVELOPMENT COMPANY
Irvine, California 92714

URBAN DEVELOPMENT CENTER
Costa Mesa, California

WALLER PROPERTIES
Irvine, California

APPENDIX B

FISCAL IMPACT REPORT

AGAJANIAN
& ASSOCIATES

Development Economic
& Planning Consultants

FISCAL IMPACT REPORT
Cajon Creek Industrial Project
San Bernardino, California

Prepared for:

CalMat Company
3200 San Fernando Road
Los Angeles, CA 90065

May 7, 1991

800 Newport Center Drive
Suite 475
Newport Beach, CA 92660
(714) 640-0654
FAX (714) 640-0668

INTRODUCTION AND SUMMARY

The purpose of this report is to present the net fiscal impacts of the proposed 1,392 acre Cajon Creek Industrial Project upon the City of San Bernardino and the San Bernardino Redevelopment Agency (RDA). More specifically, this analysis estimates municipal service costs and municipal and RDA revenues generated by the proposed open space (488 acres), mining (606 acres) and industrial (298 acres) uses through stabilized buildout in order to determine the net financial impact to the city and RDA budgets. The report summarizes the analysis and findings by presenting a description of the proposed project, the analytic approach used in the analysis, and the findings supported by the analysis.

This analysis relies on the most current information available from the city, the RDA, the client and independent information sources. The bulk of the information used in this report are from the following sources:

1. Project information supplied by the client, the client's consultants, and contained in "Preliminary Market Analysis Report" by Peyton Reed & Company (January, 1990).

2. Interviews with staff from the City Planning Department, City Finance Department and the RDA.

3. Current service costs and revenues from the 1989-1990 City of San Bernardino Budget.

These and other sources of information were used in the analysis to prepare estimates of the project's fiscal impacts through the 25 year project buildout period.

The findings of the fiscal impact analysis for the Cajon Creek Industrial Project are described in the report and can be summarized as follows:

1. The Cajon Creek Industrial Project will have a net positive impact upon

the City of San Bernardino budget and the San Bernardino Redevelopment Agency. With redevelopment of the annexable portion of the project area, the revenue to cost ratio would increase to 2.82. This indicates that the city and the RDA combined would receive $2.82 in revenues for every $1.00 of service cost on an annual basis at project buildout.

2. The choice of expanding the Northwest Redevelopment Project Area to included the annexable portion of the project site can have significant fiscal impacts. With redevelopment, the city's general fund loses property tax revenues while the RDA gains property tax increment revenues. Although the city budget is negatively impacted (-$609,500 annually at buildout), the combined net city and RDA revenues are positively impacted ($1,982,100 annually at buildout).

3. Without redevelopment of the annexable portion of the project site the city's budget is negatively impacted ($55,300 annually at buildout). However, the combined city and RDA budgets generate less net positive revenues ($560,000 annually at buildout) without redevelopment than with redevelopment ($1,982,100 annually at buildout).

PROJECT DESCRIPTION

The Cajon Creek Industrial Project is a 1,392 acre undeveloped site located in the northern portion of the City of San Bernardino (See EIR for map of site). The portion of the project site proposed for mining and industrial development accounts for 904.0 acres. The proposed development portion of the site is situated in two jurisdictions. The southern 215.5 acres are located in the City of San Bernardino and are within the city's Northwest Redevelopment Project Area. The northerly 688.5 acres are located in an unincorporated area of the County of San Bernardino.

The project site is composed of 15 planning areas, as presented on Table 1. Each of the planning areas has a planned future use. Due to the extractive activities at the site some of the areas are planned to have mining related interim uses. Planning areas D, F, I, J, L, and M all have interim uses including mining, rock/concrete/asphalt plants and construction materials users. Planning area D and I will serve as an interim plant site and will be subsequently developed with heavy industrial uses. Planning area F will be mined on an interim basis and will be subsequently developed with heavy industrial uses. Planning areas I, L, and M will be used for construction material users parks (CMUP) on an interim basis. Area M is planned for

mining uses in the 6-15 year period but will be finally used as sites for CMUP uses through the remaining 10 years of the 25 year planning period. Area L will be used for mining in the 6-25 year period. As proposed, the final mining use in planning area P is expected to continue beyond project buildout, as is the plant site proposed in planning area N. Final light industrial uses for planning areas L and M are expected to develop after year 25.

Final uses at the project site include light industrial, rail oriented industrial, heavy industrial, and ongoing mining activities. All industrial and CMUP uses are expected to be built out with improvements. Industrial development has been estimated using a site coverage factor of 38%, 40%, 40% and 6% for light, rail, heavy and CMUP uses respectively. CMUP uses have a low lot coverage factor because they traditionally required large amounts of outdoor space. Table 2 presents the planned absorption of industrial and CMUP uses.

There are an estimated 5,189,300 SF of industrial development planned for the project site. The bulk of the development is expected to be developed in the 16-25 year period. For analytic purposes project stabilization will occur in the 25th year. All absorption by period is assumed to occur on an average annual basis.

The estimated employment generated by development at the project site is presented on Table 3. These estimates were made using SF/employee factors of 624, 1,230, 927 and 715 for light, rail, heavy and CMUP industrial uses. The project is estimated to employ 525 persons by year 5, 2,050 persons by year 15 and 6,467 persons by buildout in year 25.

The assessed value for the improvements at the project site are estimated using development cost per SF factors of $42/SF, $35/SF, $75/SF and $37.50/SF for light, rail oriented, CMUP and heavy uses respectively. In addition to the value of industrial development, two planned plants are expected to add assessed value to the project site. The northern rock plant (Area D) is valued at $2,400,000. The southern plant (Area N), producing rock, ready mix concrete and asphalt, is expected to add $9,700,000 in value. Both plants are also expected to generate retail sales estimated at $4,000,000 annually for the northern plant and $11,400,000 annually for the southern plant.

ANALYTIC APPROACH

This fiscal impact report seeks to estimate the net fiscal impact of the Cajon Creek Industrial Project upon the city and the city Redevelopment Agency of

San Bernardino. This report addresses all of the issues identified in Exhibit "A" of the instructions for filing an application for a specific plan to the City of San Bernardino Planning Department.

The "net fiscal impact" is the principal measure used in this report to express the consequences of the proposed project upon municipal and RDA revenues and service costs.

The net fiscal impact is measured in two ways in this report: revenue/cost ratio and annual net fiscal impact. The revenue to cost ratio expresses the relationship between the revenues generated by the development in the proposed project and the costs for providing public safety and other governmental services to the project. A revenue to cost ratio of 1.0 indicates a balance between revenues to costs. A revenue to cost ratio greater than 1.0 indicates a positive fiscal impact since more new revenues are received than new costs for services are incurred. For example a revenue to cost ratio of 2.40 would indicate that $2.40 of new revenues are expected for every $1.00 of expected service costs. Conversely, a negative fiscal impact is indicated with a 0.80 revenue to cost ratio, or $0.80 of new revenues to every $1.00 of costs, for a net loss of $0.20 per dollar to the municipal budget.

The annual net fiscal impact of the proposed project can also be measured as the estimated total revenues minus the estimated service costs. These revenue and cost estimates are expressed in constant 1990 dollar values. The net fiscal impacts for the project are estimated on an annual basis through the 25th year of the buildout schedule. The 25th year represents the stabilized net fiscal impacts of the project.

The net fiscal impact of a phased project can change over time as the sources of revenues and needs for new services change. Consequently, it is necessary to specify both the measure and time in order to define the net fiscal impact of the project. For convenience, this report will use the net fiscal impact at buildout unless otherwise noted.

This fiscal impact analysis has sought to estimate the direct, significant and relevant revenues and costs to the City of San Bernardino and San Bernardino RDA budgets. The analysis is designed to closely approximate new revenues and costs that are most likely to have budget impacts. For this reason, sources of revenues and costs were selected using the following criteria:

1. Direct sources of revenues and costs were itemized while more indirect sources were aggregated into an "other" category.

2. Only sources of revenues which were significantly large in size were itemized while smaller sources were aggregated into an "other" category.

3. Self balancing accounts which charge established user fees for services rendered are not included since they can expect to have a net fiscal impact of zero.

4. All one-time capital costs associated with the project are not included since those costs will be the subject of future negotiations to establish conditions for approval of the specific plan. Consequently, only annually recurring revenues and costs are estimated in this analysis.

This fiscal impact analysis uses the incremental approach for approximating impacts by estimating the average cost or revenue per employee when direct means of calculating impacts are unavailable or inefficient. The per employee factors were derived by estimating the current share of service costs or revenues associated with each person employed in the city. This research found that the General Plan estimated that 6.72% of the developed land area was for commercial and industrial uses in 1986 (the most recent year available). Similarly, local non-public employment was estimated at 32,000 based upon updated 1986 employment estimates derived from commercial and industrial inventories.

The per employee factors for police costs, fire costs, other costs and utility users tax were all estimated using the same method. Each item's current cost or revenue was taken from the 1989-1990 city budget. These amounts were then multiplied by 0.0672 and divided by 32,000 to derive a per employee factor. These per employee factors are $23.86, $42.62, $15.13 and $25.09 for fire cost, police cost, other costs and utility user tax revenues respectively. Based upon discussions with the city Finance Department, the other cost category contained all of the general government expenses for the city excluding Planning, Building and Safety, Engineering, Public Buildings, Parks and Recreation, Streets, Risk Management and Emergency Services. These excluded categories, along with all of the non-general fund expenditures were eliminated based upon the criteria listed above.

Street maintenance costs were estimated for the short stretch of public roadway which connects the project area to Interstate 215. Based upon the application of an immediate 1½" overlay in year 1, annual sand seal, and slurry seal every 10th year, the annual maintenance costs for the roadway is estimated at $900 per year. This roadway maintenance cost has been incorporated into the "other" cost category.

Property tax revenues were estimated based upon added new assessed valuation at the project site. It was assumed that the unincorporated portion of the site would be annexed to the City of San Bernardino. It was further assumed that the Northwest Project Area would be expanded to cover the entire project site making all new assessed valuation subject to property tax increment revenues to the city RDA. (This report also examines the fiscal impacts if the unincorporated portion of the site is not part of the expanded project area.) Assessed valuation from the project is the combined new valuation from the industrial development, valuation from the plants and the annual 2% automatic increase in property valuation.

Retail sales tax estimates were based upon on-site sales of rock, ready mix concrete and asphalt. Current production estimates for the plants were multiplied by current commodity prices to derive retail sales in 1990 dollar values. Both plants, located in the annexable portion of the site, are expected to gross $4,000,000 and $11,400,000 at full production levels for the north and south plants respectively.

Each of the revenue and costs estimates were made annually using a computerized fiscal impact estimating model. The results and findings of the analysis are presented in the next section.

FISCAL IMPACTS OF PROJECT

The results of the annualized fiscal impact analysis for the Cajon Creek Industrial Project are summarized on Table 4 for years 1, 5, 10, 15, 20 and through stabilized project buildout in year 25. The summary presents the fiscal impacts with and without the annexed portion of the project site becoming part of the expanded Northwest Redevelopment Project Area.

With redevelopment of the annexable portion the city and the RDA combined can expect to experience significant net positive impacts from the project with a stabilized revenue to cost ratio of 2.82 by buildout. This suggests that the city and the RDA can expect to receive $2.82 in new revenues for every $1.00 of new service costs. This translates into a positive net annual fiscal impact of $1,982,100 by buildout.

The principal source of revenues is from the RDA increment estimated at $2,594,700 by buildout. The RDA receives 66% of all new property taxes from the project above the frozen assessed valuation base. With expanded redevelopment the RDA captures all new property tax revenues from the entire site. By the same token, the city loses its property tax share from the

annexable area. The city, in essence, gives up its 28% share of all new property taxes to gain 66% of all new property taxes in the form of increment to the RDA. As a result, the net fiscal impact to the city is a negative $609,500 annually by buildout, principally due to the loss of all property tax revenues from the project.

Without redevelopment in the annexable portion of the site, the city would recover 28% of the new property taxes from the project and generate a net negative fiscal impact of $55,300 annually at buildout. However, the RDA would lose its property tax increment share from the annexable portion of the site (from $2,594,100 to $615,300 annually). This substantial loss of revenues would yield a revenue to cost ratio of 1.01 by buildout. However, the combined city and RDA impacts continue to generate net positive fiscal impacts of $560,000 in the 25th year.

It is clear that the proposed Cajon Creek Industrial Project will have a net positive fiscal impact to the city and the RDA regardless of the choice on redevelopment of the annexable portion of the site. Only the amount of additional revenues and the distribution of revenues appear to be affected by the redevelopment choice. With redevelopment the RDA gains more revenues while the city budget gets less. Without redevelopment the city budget gains more revenues while the RDA receives less. All told, the city needs to choose among more general fund revenues (and less increment) or less general fund revenues (and more increment).

From this review of the fiscal impacts associated with the Cajon Creek Industrial Project we may make the following findings:

1. The Cajon Creek Industrial Project will have a net positive impact upon the City of San Bernardino budget and the San Bernardino Redevelopment Agency. With redevelopment of the annexable portion of the project area, the revenue to cost ratio would increase to 2.82. This indicates that the city and the RDA combined would receive $2.82 in revenues for every $1.00 of service cost on an annual basis at project buildout.

2. The choice of expanding the Northwest Redevelopment Project Area to included the annexable portion of the project site can have significant fiscal impacts. With redevelopment, the city's general fund loses property tax revenues while the RDA gains property tax increment revenues. Although the city budget is negatively impacted (-$609,500 annually at buildout), the combined net city and RDA revenues are positively impacted ($1,982,100 annually at buildout).

3. Without redevelopment of the annexable portion of the project site the city's budget is negatively impacted ($55,300 annually at buildout). However, the combined city and RDA budgets generate less net positive revenues ($560,000 annually at buildout) without redevelopment than with redevelopment ($1,982,100 annually at buildout).

Table 1

PROJECT CHARACTERISTICS
Cajon Creek Industrial Project

Planning Area	Acres	Interim Use	Period	Final Use	Period
A	17.0			Light Ind.	16-25
B	47.0			Rail Ind.	16-25
C	6.0			Heavy Ind.	16-25
D	18.5	Plant Site	1-10	Heavy Ind.	11-15
E	14.0			Light Ind.	1-25
F	51.0	Mining	1-10	Heavy Ind.	16-25
G[1]	26.0			Light Ind.	1-25
H[1]	23.0			Light Ind.	1-25
I	36.5	Plant Site	1-5	Heavy Ind.	6-25
J	14.0	CMUP [2]	1-5	Heavy Ind.	6-25
K[1]	36.0			Light Ind.	1-25
L[1]	130.5	CMUP [2]	1-5	Mining	6-25
M	97.5	CMUP [2]	1-5[3]	CMUP [2]	16-25
N	70.0			Plant Site	6-25
P	257.0			Mining	1-25
Total	904.0				

1. 215.5 acres of the project are presently located in the City of San Bernardino.
2. Construction material user park operations (interim uses).
3. Mining activities will occur in the 6-15 year period.

Source: CalMat, AGAJANIAN & Associates

Table 2

ABSORPTION SCHEDULE
Cajon Creek Industrial Project

Period	Industrial Land Uses (SF)				
	Light	Rail	CMUP	Heavy	Total
1-5 years	327,700	0	632,500	0	327,700 [1]
6-15 years	655,500	0	0	440,000	1,095,500
16-25 years	936,900	818,900	254,800	1,755,500	3,766,100
Year 25 Buildout	1,920,100	818,900	254,800 [1]	2,195,500	5,189,300 [1]

1. Excludes 632,500 SF of CMUP interim uses.

Source: AGAJANIAN & Associates

Table 3

ESTIMATED EMPLOYMENT SCHEDULE
Cajon Creek Industrial Project

Period	Industrial Employment				
	Light	Rail	CMUP	Heavy	Total
1-5 years	525	0	885	0	525 [1]
6-15 years	1,050	0	0	475	1,525
16-25 years	1,501	666	356	1,894	4,417
Buildout	3,077	666	356	2,368	6,467 [1]

1. Excludes 885 jobs from CMUP interim uses.

Source: AGAJANIAN & Associates

Table 4

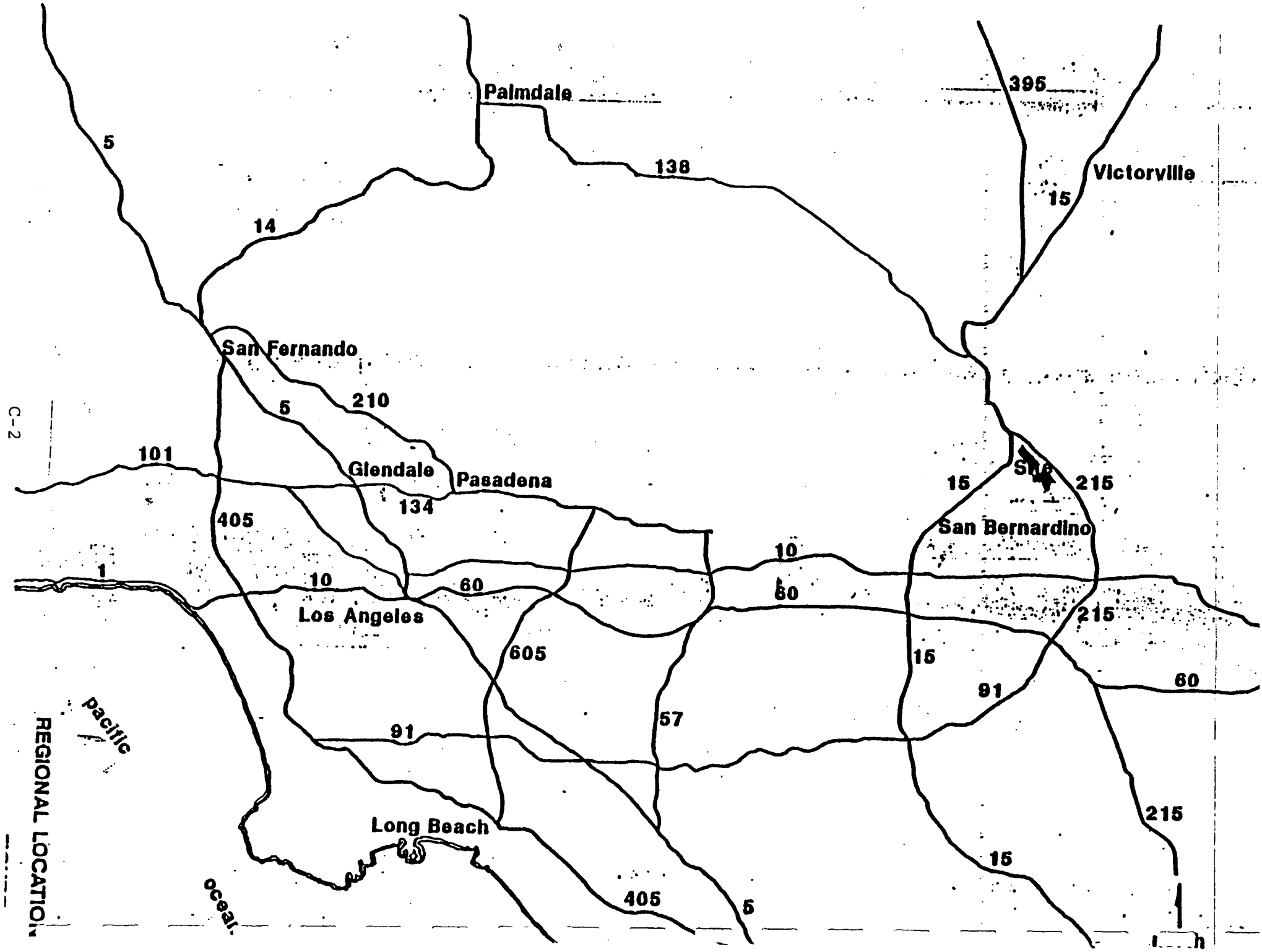
FISCAL IMPACT ESTIMATES
Cajon Creek Industrial Project

PROJECT YEAR	1	5	10	15	20	25
A. WITH DEVELOPMENT						
City Revenues:						
Property Tax	$1,889	$2,045	$2,257	$2,492	$2,752	$3,038
Sales Tax	$11,400	$57,000	$85,000	$114,000	$134,000	$154,000
Utility Tax	$2,636	$13,178	$32,310	$51,442	$269,130	$324,546
Total Revenues	$15,925	$72,223	$120,068	$167,934	$405,882	$481,584
City Service Costs:						
Police	$4,477	$22,385	$54,885	$87,384	$457,167	$551,301
Fire	$2,611	$13,057	$32,014	$50,970	$266,663	$321,571
Other	$2,489	$12,447	$28,484	$44,521	$180,293	$218,210
Total Costs	$9,578	$47,890	$115,382	$182,875	$904,124	$1,091,082
Net Fiscal Impact	$6,347	$24,333	$4,685	($14,941)	($498,242)	($609,498)
RDA Increment	$156,537	$814,625	$1,048,994	$1,307,756	$1,919,377	$2,594,655
Total Fiscal Impact	$160,995	$836,914	$1,051,421	$1,290,322	$1,418,383	$1,982,119
Revenue/Cost Ratio	18.01	18.52	10.13	8.07	2.57	2.82
B. WITHOUT REDEVELOPMENT						
Net Fiscal Impact	$27,899	$136,494	$170,402	$209,907	($116,849)	($55,267)
RDA Increment	$79,563	$414,052	$457,146	$504,727	$557,259	$615,259
Total Fiscal Impact	$107,463	$550,545	$627,549	$714,634	$440,410	$559,992
Revenue/Cost Ratio	16.61	17.29	7.29	5.52	1.23	1.01

Source: AGAJANIAN & Associates

APPENDIX C

TRAFFIC STUDY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14
San Fernando
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Glendale
Pasadena
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1
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Long Beach
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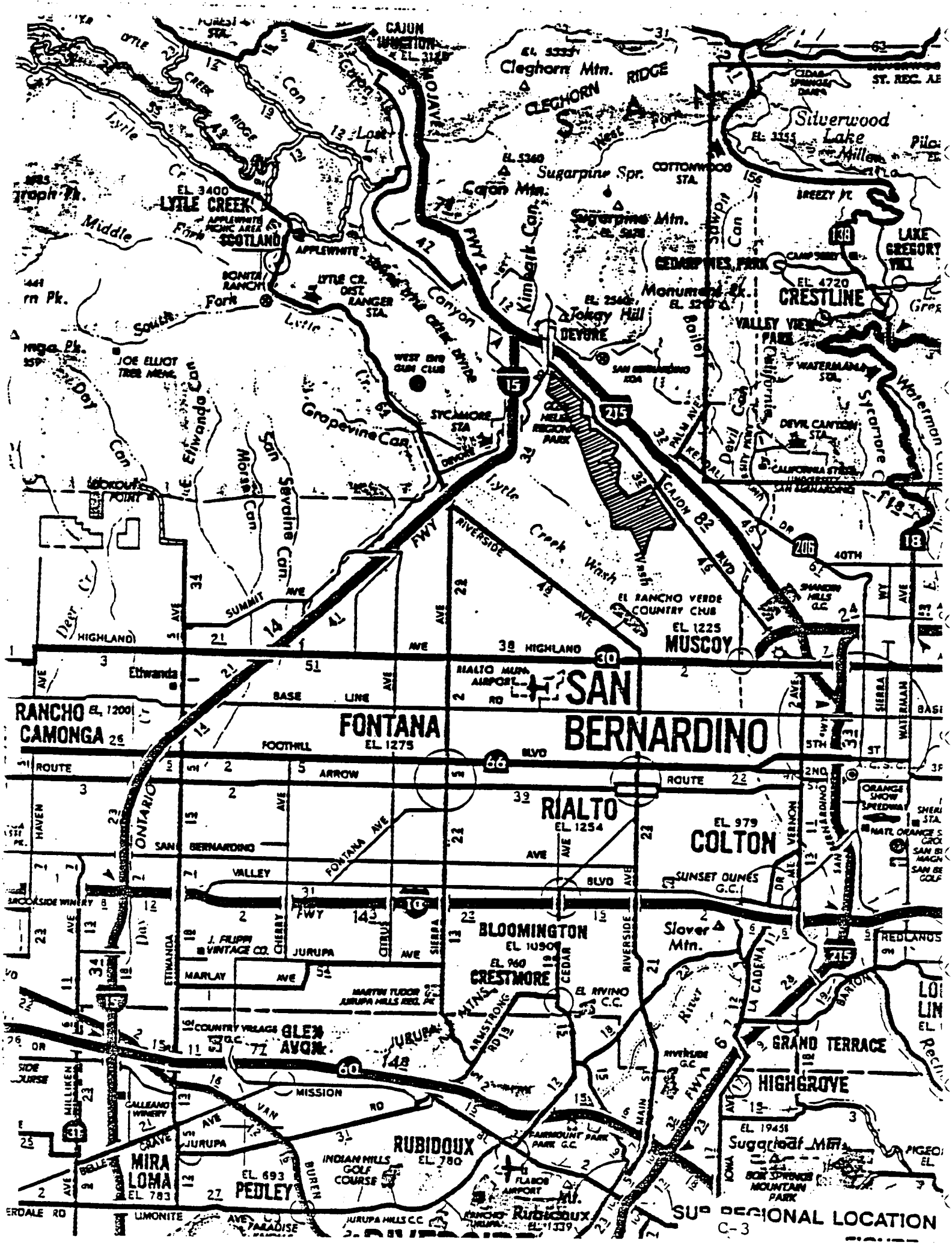
405
5
pacific
ocean
C-2



SUB REGIONAL LOCATION

NOTES:

1. LOCATION OF WATER LINES, SEWER LINES, STORM DRAIN LINES, RAILROAD SPURS, SUBDIVISION LOT LINES AND SUBDIVISION STREETS ARE APPROXIMATE ONLY AND DETAIL DESIGN WILL BE DONE AT THE DEVELOPMENT STAGE.
2. THIS PLAN DOES NOT SHOW GAS, ELECTRICITY, TELEPHONE OR CABLE T.V.

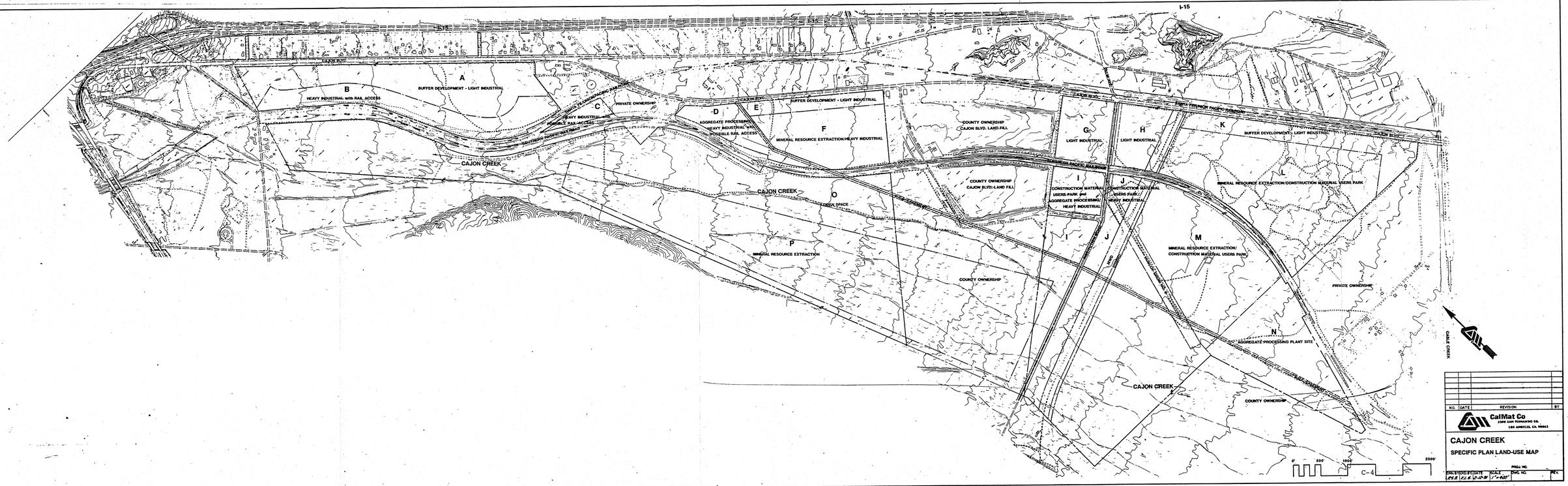
NO.	DATE	REVISION	BY
1	4-17-91	REVISED / ADDED TYPICAL SECTIONS	J.B.M.

CalMat Co
3200 SAN FERNANDO RD.
LOS ANGELES, CA 90065

CAJON CREEK
INFRASTRUCTURE IMPROVEMENT PLAN

DRN BY	CKD BY	DATE	SCALE	DWG. NO.	REV.
J.B.M.	K.L.S.	1-24-91	GRAPHIC		

10-11



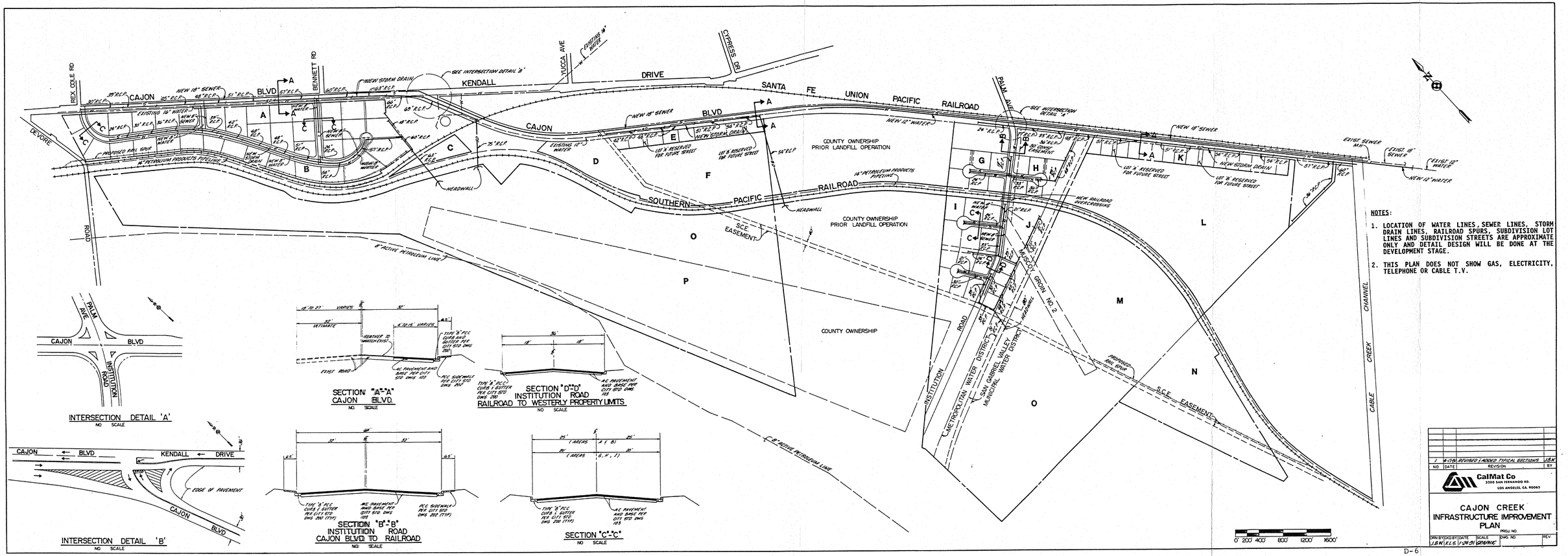
NO.	DATE	REVISION	BY

CalMat Co
2300 SAN FERNANDO RD.
LOS ANGELES, CA. 90065

CAJON CREEK
SPECIFIC PLAN LAND-USE MAP

PROJ. NO.

DRN BY	CHKD BY	DATE	SCALE	DWG. NO.	REV.
JRB	LLB	12-28-81	1"=400'		



INTERSECTION DETAIL 'A'
NO SCALE

INTERSECTION DETAIL 'B'
NO SCALE

SECTION "A"-"A"
CAJON BLVD.
NO SCALE

SECTION "D"-"D"
INSTITUTION ROAD
RAILROAD TO WESTERLY PROPERTY LIMITS
NO SCALE

SECTION "B"-"B"
INSTITUTION ROAD
CAJON BLVD. TO RAILROAD
NO SCALE

SECTION "C"-"C"
NO SCALE

NOTES:

1. LOCATION OF WATER LINES, SEWER LINES, STORM DRAIN LINES, RAILROAD SPURS, SUBDIVISION LOT LINES AND SUBDIVISION STREETS ARE APPROXIMATE ONLY AND DETAIL DESIGN WILL BE DONE AT THE DEVELOPMENT STAGE.
2. THIS PLAN DOES NOT SHOW GAS, ELECTRICITY, TELEPHONE OR CABLE T.V.

0 200 400 800 1200 1600

NO	DATE	REVISION	BY
1	4-17-91	REVISED & ADDED TYPICAL SECTIONS	LBK

CalMat Co
3200 SAN FERNANDO RD.
LOS ANGELES, CA. 90065

CAJON CREEK INFRASTRUCTURE IMPROVEMENT PLAN

PROJ. NO.

DRN BY	CKD BY	DATE	SCALE	DWG. NO.	REV.
LBK	K.L.S.	1-29-91	GRAPHIC		

Cable Canyon
Cable Creek
Interstate Highway 215
LITTLE LEAGUE DR.
BELMONT AVE.
IRVINGTON AVE.
PALM AVE.
PINE
KENDALL DR.
CAJON BLVD.
SPHERE OF INFLUENCE
Glen Helen Regional Park
Interstate Hwy
RE
RL
RS
PF
PCR
PP
RU
RU-1
CG-1
CG-3
IL
IH
IE
PFC
RL/3.5

LEGEND

	CODE	DESIGNATION
COMMERCIAL	CG-1	COMMERCIAL GENERAL
INDUSTRIAL	IL	INDUSTRIAL LIGHT
	IH	INDUSTRIAL HEAVY
	IE	INDUSTRIAL EXTRACTIVE
PUBLIC/QUASI-PUBLIC	PFC	PUBLIC FLOOD CONTROL

CAJON CREEK

CITY OF SAN BERNARDINO GENERAL PLAN

1990

TRAFFIC REPORT

CALMAT - CAJON CREEK PROJECT

August 30, 1991

Prepared for:

CalMat Co.
3200 San Fernando Road
Los Angeles, CA 90065

Prepared by

Charles P. Strong & Associates
6241 Del Cerro Boulevard
San Diego, CA 92120
(619) 583-3469

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INTRODUCTION

The 1392-acre CalMat Cajon Creek Specific Plan area is located within and adjacent to the extreme northwestern portion of the City of San Bernardino, approximately 5 1/2 miles northwest of the downtown (Figures 1 and 2). Approximately 215 acres of the southeastern portion of the CalMat property are currently within the City of San Bernardino. The remaining 1177 acres of the overall project site are located within the City's Sphere of Influence and are presently undergoing annexation proceedings. Approximately 180 acres of the Specific Plan area, located within Cajon Creek, is owned by the County of San Bernardino Department of Transportation and Flood Control.

The proposed CalMat Cajon Creek Specific Plan land uses can be seen in Figure 3.

Figure 4 shows the Cajon Creek Infrastructure Improvement Plan which locates the project's overall development by area "A" through "P," and identifies the basic circulation system.

Figure 5 shows the City of San Bernardino General Plan.

PROJECT DESCRIPTION

CalMat proposes to develop Planning Areas "A," "B," "C," "D,""E," "G," "H," "I," "K," and "J" as light- or heavy-industrial sites. Area "D" and a portion of Area "I" will have an interim use as aggregate processing plant sites, but ultimate use will be heavy industrial. Area "N" will be the permanent aggregate processing plant site for the long-term mining of Areas "L" & "M."

Area "F" will be mined and, following reclamation, developed as heavy industrial.

Areas "L" and "M" will be used as an interim Construction Material User Park during near term, mined during intermediate term, and when reclaimed in 30+ years, and redeveloped as light industrial/Construction Material Users Park (CMUP).

PHASING PLAN

CalMat proposes to phase the project as shown in Table 1.

San Bernardino City Department of Public Works has approved the use of a 5% per year growth factor for existing traffic in this report. For purposes of this study, it has been necessary to establish an estimated final year for each phase. In each mining area, this estimate is based on the amount of aggregate resource material available and an assumed extraction rate, based on the annual capacity of the proposed procesing plants. The projection development in the industrial areas also assumed an absorption rate for such land use in the community. These year-by-year estimates are intended for use in projecting traffic volumes for this report. They are not meant to direct project implementation.

Near term	1992-1997
Intermediate term	1997-2007
Long term	2007-2017

Table 1

CalMat Cajon Creek Specific Plan Development Phasing

Timing	Development Cluster	Planning Area	Planned Use
Near Term	1a	O	Open Space
	1b	D	Aggregate Processing
		F	Mineral Resource Extraction
		E	Buffer Development - Light Industrial
	1c	G	Light Industrial
		H	Light Industrial
		I (part)	Construction Material Users Park
		J	Construction Material Users Park
	1d	P	Mineral Resource Extraction
		I (part)	Aggregate Processing
	1e	L or M	Construction Material Users Park
		K	Buffer Development - Light Industrial

Table 1 (continued)

CalMat Cajon Creek Specific Plan Development Phasing

Timing	Development Cluster	Planning Area	Planned Use
Intermediate Term	2a	L	Mineral Resource Extraction
		M	Mineral Resource Extraction
		N	Aggregate Processing
	2b	I	Heavy Industrial - Redevelopment
		J	Heavy Industrial - Redevelopment
Long Term	3a	D	Heavy Industrial - Redevelopment
		F	Heavy Industrial - Redevelopment
	3b	A	Buffer Development - Light Industrial
		B	Heavy Industrial with Rail Access
		C	Heavy Industrial with Possible Rail Access
	3c	L	Light Industrial/ Construction Material Users Park - Redevelopment
		M	Light Industrial/ Construction Material Users Park - Redevelopment

TRAFFIC GENERATION

Three aggregate processing plant sites are planned. Site #1 will be in Area "D" and used for the mining of Area "F." This will be a portable plant only without an ancillary concrete and asphalt batching plant. It is assumed that this plant will generate 650 trips/day, which includes 600 truck trips. It is assumed that the processing operation will be completed by the year 2007.

Site #2 will be on a portion of Area "I." This plant site, portable without concrete and asphaltic batch plant, will be used during the mining of Area "P" in the Cajon Creek Floodplain area. It is again assumed that this plant will generate 650 trips/day, including 600 truck trips. It is assumed for this study that mining will be completed by year 2007, and Area "I" would subsequently be redeveloped.

Site #3 will be located on Area "N" and utilized during the long-term mining of Areas "L" and "M." This plant will be of similar size and makeup as CalMat plants in Mission Valley and Carroll Canyon in the City of San Diego. Recent studies of these plants made by Federhart & Associates showed a total of 9 0 vehicles per day at each site, of which 800 trips were tr :ks. This site will have asphalt and concrete batch plants.

After consultation with the City of San Bernardino Traffic Engineer, it was agreed that, for purposes of this study, a

generation rate of 60 trips per acre would be used for all light and heavy industrial sites.

In the phasing plan (see Table 1) CalMat proposes to utilize Areas "L" and "M" of the project as Construction Material Users Park (CMUP) This use will, in fact, be a low intensity land use which will include activities such as concrete pipe manufacture. It is not viewed as a major traffic generator, and a generation rate of 5 trips per acre for Areas "L" and "M" has been assigned for such uses in this report. In the smaller, similar interim use areas, within Planning Areas "I" and "J," a rate of 10 trips per acre was used. These rates were approved by the City Traffic Engineer.

Table 2

Traffic Generation by Area and Phasing Time

Near Term

Planning Areas	AC	Land Use	Generation Rate	ADT
A & B	113.0 (net)	Lt & Heavy Ind	- 0 -	0
C	6.0	Heavy Ind	- 0 -	0
D	18.5	Aggregate Plant	650/Plant	0
E	14.0	Lt Ind	60/AC	840
F	51.0	Mineral Extraction	- 0 -	0
G	25.1 (net)	Lt Ind	60/AC	1506
H	22.3 (net)	Lt Ind	60/AC	1338
I	17.4	Aggregate Plant	650/Plant	650
	17.4	Const. Matl. User Park	10/AC	174
J	14.0	Const. Matl. User Park	10/AC	140
K	36.0	Lt Ind	60/AC	2160
L	130.5	Const. Matl. User Park	5/AC	653
M	97.5	Const. Matl. User Park	5/AC	488
N	70.0	Future Plant Site	- 0 -	0
O	488.0	Open Space	- 0-	0
P	257.0	Mineral Extraction	- 0 -	0

NEAR TERM TOTAL (1992-1997) = 8599

Table 2

Traffic Generation by Area and Phasing Time

Intermediate Term

Planning Areas	AC	Land Use	Generation Rate	ADT
A & B	113.0 (net)	Lt & Heavy Ind	60/AC	0
C	6.0	Heavy Ind	60/AC	0
D	18.5	Reclamation	- 0 -	0
E	14.0	Lt Ind	60/AC	840
F	51.0	Reclamation	- 0 -	0
G	25.1 (net)	Lt Ind	60/AC	1506
H	22.3 (net)	Lt Ind	60/AC	1338
I	34.8	Heavy Ind	60/AC	2088
J	14.0	Heavy Ind	60/AC	840
K	36.0	Lt Ind	60/AC	2160
L	130.5	Mineral Extraction	- 0 -	0
M	97.5	Mineral Extraction	- 0 -	0
N	70.0	Plant Site	950/Plant	950
O	488.0	Open Space	- 0-	0
P	257.0	Open Space	- 0 -	0

INTERMEDIATE TERM TOTAL (1997-2007) 9722 ADT

Table 2

Traffic Generation by Area and Phasing Time

Long Term

Planning Areas	AC	Land Use	Generation Rate	ADT
A & B	113.0 (net)	Lt & Heavy Ind	60/AC	6780
C	6.0	Heavy Ind	60/AC	360
D	18.5	Heavy Ind	60/AC	1110
E	14.0	Lt Ind	60/AC	840
F	30.4 (net)	Const. Matl. User Park	10/AC	304
G	25.1 (net)	Lt Ind	60/AC	1506
H	22.3 (net)	Lt Ind	60/AC	1338
I	34.8 (net)	Heavy Ind	60/AC	2088
J	14.0	Heavy Ind	60/AC	840
K	36.0	Lt Ind	60/AC	2160
L	130.5	Const. Matl. User Park (small part may be Lt Ind)	5/AC	653
M	97.5	Const. Matl. User Park (some extraction may continue)	5/AC	488
N	70.0	Plant Site	950/Plant	950
O	488.0	Open Space	- 0-	0
P	257.0	Open Space	- 0 -	0
		LONG TERM TOTAL (2007-2017)		**19,417 ADT**

TRAFFIC DISTRIBUTION

After review with the San Bernardino Traffic Engineer, the following traffic distribution will be used when assigning project traffic to the street system.

Table 3

Traffic Distribution

General - Regional
To the south 85%
To the north 15% (part of traffic is to I-15 south)

Areas A, B, & C south traffic (85% of total)

90% will use Kendall to reach Palm and I-215
10% will use Cajon Blvd. to south of project

North traffic:

All will use Cajon Blvd. (15% of total)

Areas D, E, & F

South traffic: (85% of total)

90% will use Cajon Blvd. to Palm to I-215
10% will use Cajon Blvd. to south of project

North traffic:

All will use Cajon Blvd. (15% of total)

Areas G, H, I, & J

90% of all traffic will use Palm Ave.--I-215 N & S
10% of all traffic will use Cajon to south

Area K

60% of all traffic will use Palm Ave.--I-215 N & S
40% of all traffic will use Cajon Blvd. to south

Areas L, M, & N

70% north to Palm
30% south on Cajon

EXISTING CONDITION

Cajon Boulevard varies in width along the length of the project. It was built by CalTrans during the first half of this century and formerly designated Route 66. It is basically a 40' roadway in a 60' right-of-way between the south end of the project and north of Planning Area "G." Along areas "D" &" E," some improvements have been made to the easterly side of the roadway. The underpass of the railroad north of Area "D" and south of Kendall Drive is 30' wide. North of Kendall Drive and along Areas "A" and "B" Cajon Boulevard is 50' to 58' wide and striped for four lanes.

The City of San Bernardino proposes that Cajon Boulevard be constructed as a 64' roadway along the project area within a 90' right-of-way.

Palm Avenue, which will serve the project as access to I-215, is 72' in width near the Interstate 215 freeway. In the area between I-215 and Cajon Boulevard, adjacent development will complete Palm Avenue to its planned 72' width.

Institution Road is currently 30'wide through the project area. The City proposes the widening of this road to 64'.

Traffic counts have been made in the area of Cajon Boulevard, Palm Avenue, Institution Road, and Kendall Drive by the County of San Bernardino in 1989. They are shown in Figure 6.

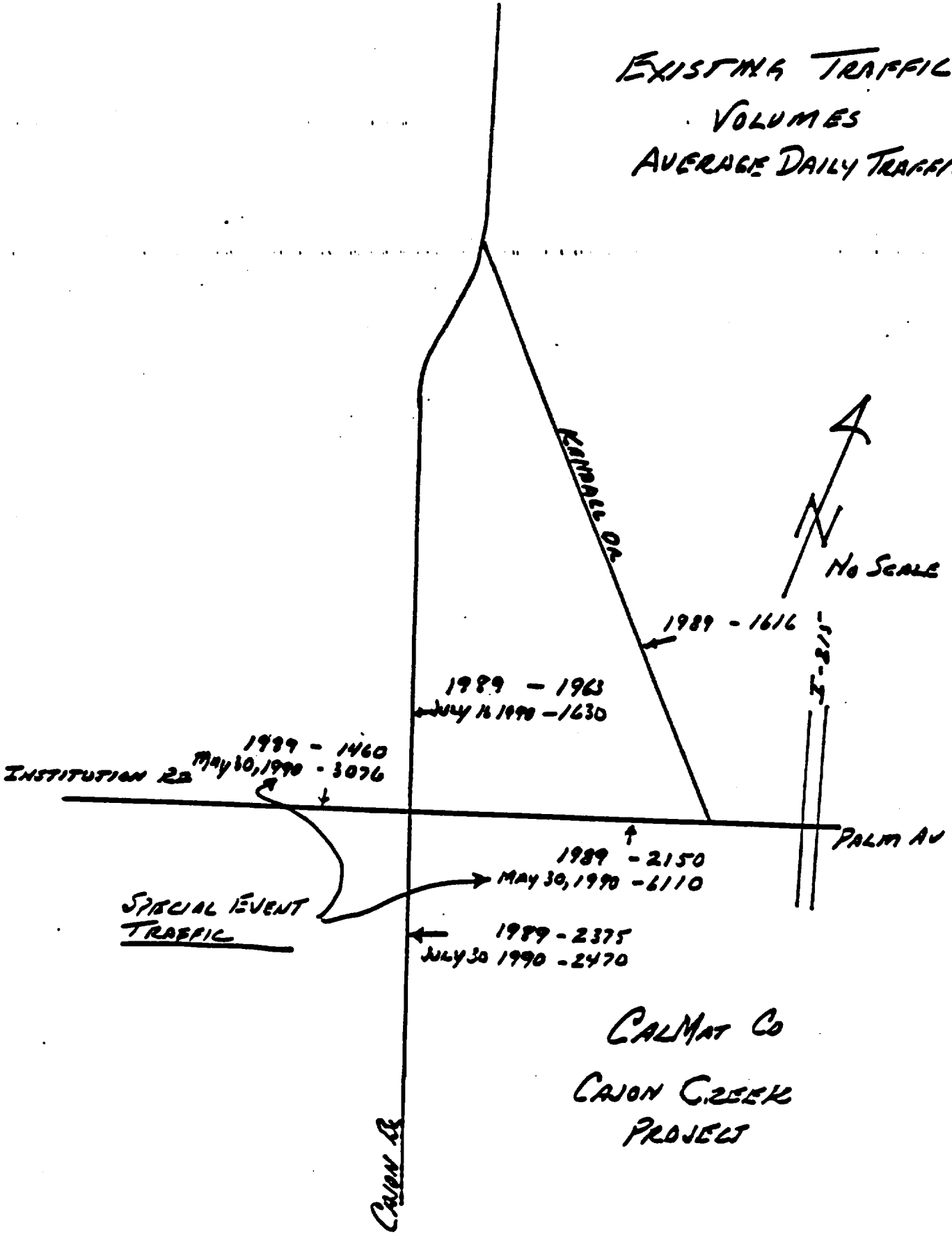

EXISTING TRAFFIC
VOLUMES
AVERAGE DAILY TRAFFIC
KENDALL DR
No SCALE
1989 - 1616
I-215
1989 - 1963
July 11 1990 - 1630
1989 - 1460
May 30, 1990 - 3076
INSTITUTION RD
PALM AV
1989 - 2150
May 30, 1990 - 6110
SPECIAL EVENT TRAFFIC
1989 - 2375
July 30 1990 - 2470
CAJON RD
CALMAT CO
CAJON CREEK
PROJECT

FIGURE 6

In addition, traffic counts were made on May 30, 1990, on Palm Avenue/Institution Road that reflect a special event at the Don Brown Racing Facility. This facility holds Wednesday night events during their racing season. This nighttime traffic would not conflict with the project's mining or industrial traffic. These counts were 6110 on Palm Avenue and 3076 on Institution Road. For a worst case analysis, these special count increases over the normal counts were added to the normal counts each year, but were not compounded at 5%.

Traffic counts were also made on Cajon Boulevard on July 16, 1990, north and south of Palm. These counts are shown on Figure 6 and serve to confirm the 1989 counts. These 1990 counts were averaged with the 1989 counts and used as 1989 counts for purposes of this report.

Charles P. Strong and Associates made manual turning movement count at the intersections of Cajon Boulevard and Palm/Institution during the A.M. peak hours on March 20, 1990, and P.M. peak hours on February 23, 1990. The A.M. peak was found to be 7:15 to 8:15 A.M. The P.M. peak was found to be 4:00 to 5:00 P.M. This intersection was found to be operating at Level of Service "A" during both the A.M. and P.M. peak hours. These traffic counts are shown in the Appendix.

The City of San Bernardino requested that a Traffic Engineering Study traffic count be made at the intersection of Cajon Boulevard and State College Way, which is 1 1/2 miles south of the project. A P.M. manual count was made between 4:00 P.M.

and 6:00 P.M. The peak hour was 4:30-5:30 P.M.. Level of Service was found to be "A." However, because of the offset nature of this intersection and lack of traffic signals, the intersection functioned poorly.

The consultant contacted the County of San Bernardino and found that a traffic signal study was made on 12/5/88 (copy attached). The County staff stated that the intersection met traffic signal warrants at that time. It ranked #18 on their signal priority list. They estimated that it would be signalized in 3 to 4 years (1992-93).

Property owners in the area report that negotiations are underway to obtain additional right-of-way for the reconfiguration of the intersection.

EXISTING TRAFFIC GROWTH RATE

As previously discussed, the City Department of Public Works staff approved a growth rate of 5% per year compounded to be used on existing traffic flow for purposes of estimating future traffic volume over which project traffic will be superimposed. Table 4 shows this background traffic by selected year based on the County of San Bernardino's 1989 traffic counts.

Table 4

Existing Traffic Growth Rate
(5%/year)
(approved 9/18/90)

Year	Kendall No. of Palm	Cajon No. of Palm	Cajon So. of Palm	Institution West of Cajon	Palm East of Cajon
1989	1616	1796	2422	3076	6110
1990	1697	1886	2543	3149	6218
1997	2388	2653	3578	3774	7138
2007	3888	4322	5828	5131	9138
2017	6330	7040	9491	7344	12396

TRAFFIC ASSIGNMENT

Using the traffic generation rates, the Specific Phasing Plan, and traffic distribution as previously described, a manual average daily traffic assignment was made. These traffic volumes were combined with the existing traffic volumes expanded to the years 1997, 2007, and 2017. These volumes are shown in Figures 7, 8, and 9.

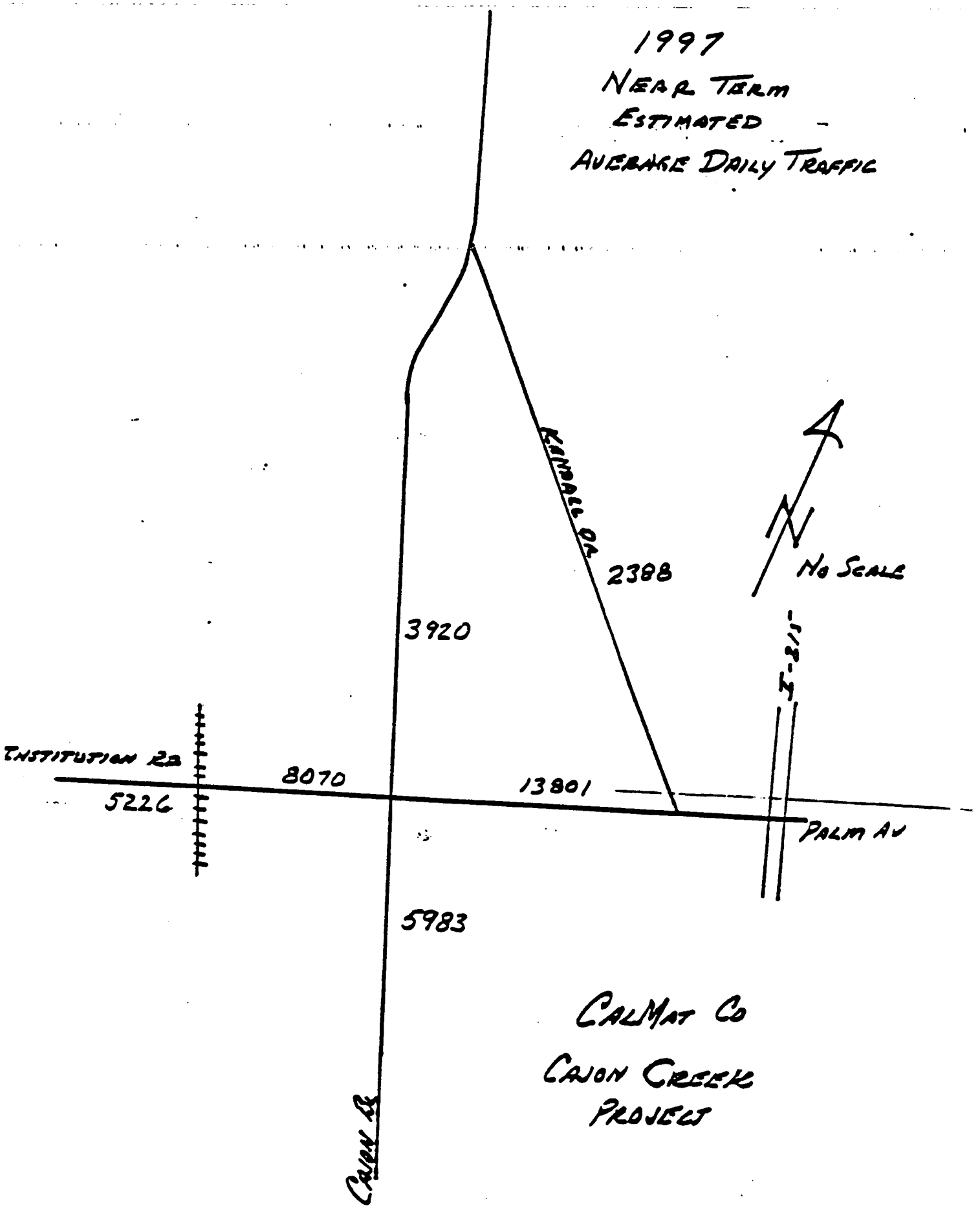

1997
NEAR TERM
ESTIMATED
AVERAGE DAILY TRAFFIC
KENDALL DR
2388
NO SCALE
3920
I-215
INSTITUTION RD
5226
8070
13801
PALM AV
5983
CAJON BL
CALMAT CO
CAJON CREEK
PROJECT

Figure 7

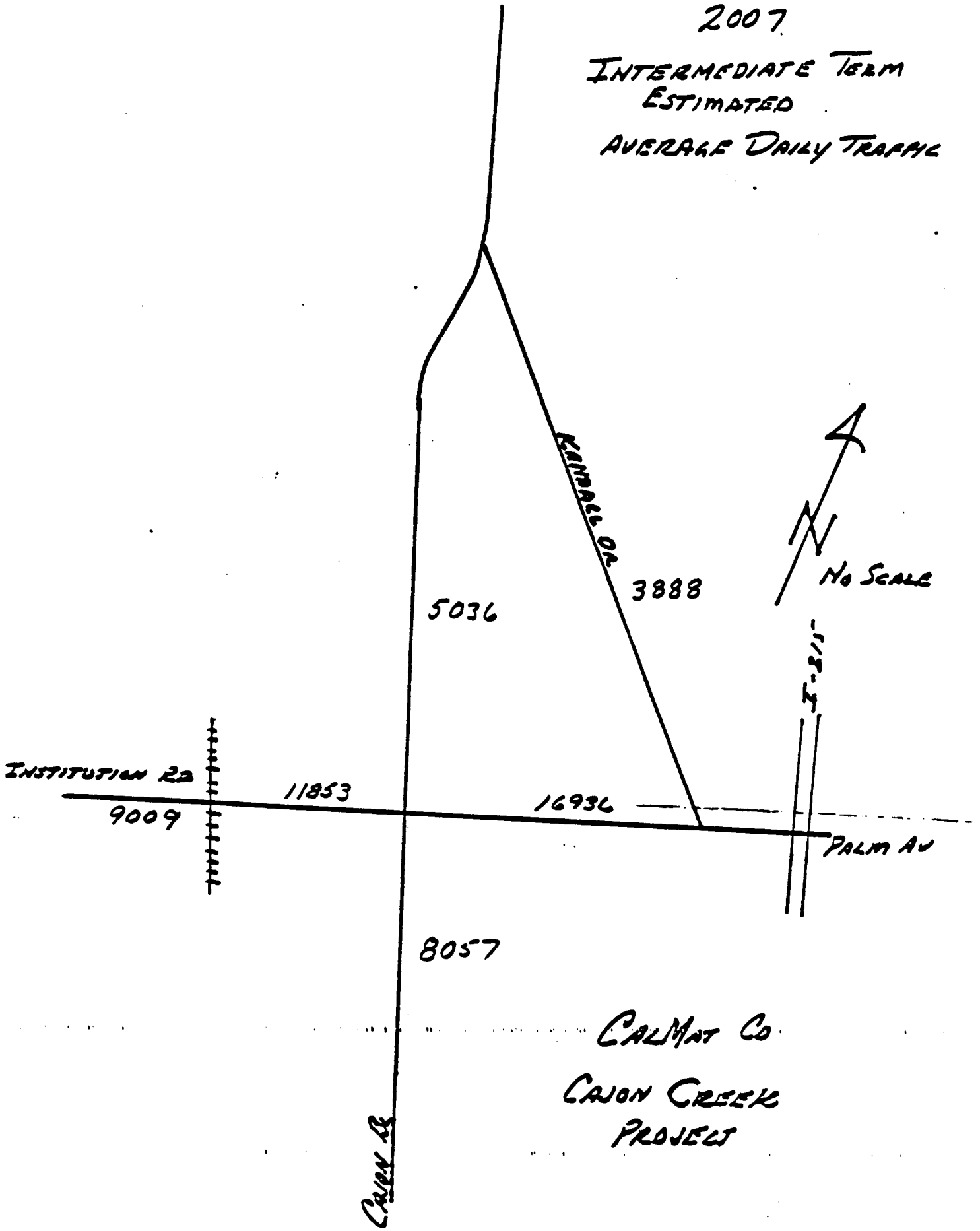

2007
INTERMEDIATE TERM
ESTIMATED
AVERAGE DAILY TRAFFIC
KIMBALL DR
3888
5036
No Scale
I-215
INSTITUTION RD
9009
11853
16936
PALM AV
8057
CAJON RD
CALMAT CO
CAJON CREEK
PROJECT

Figure 8

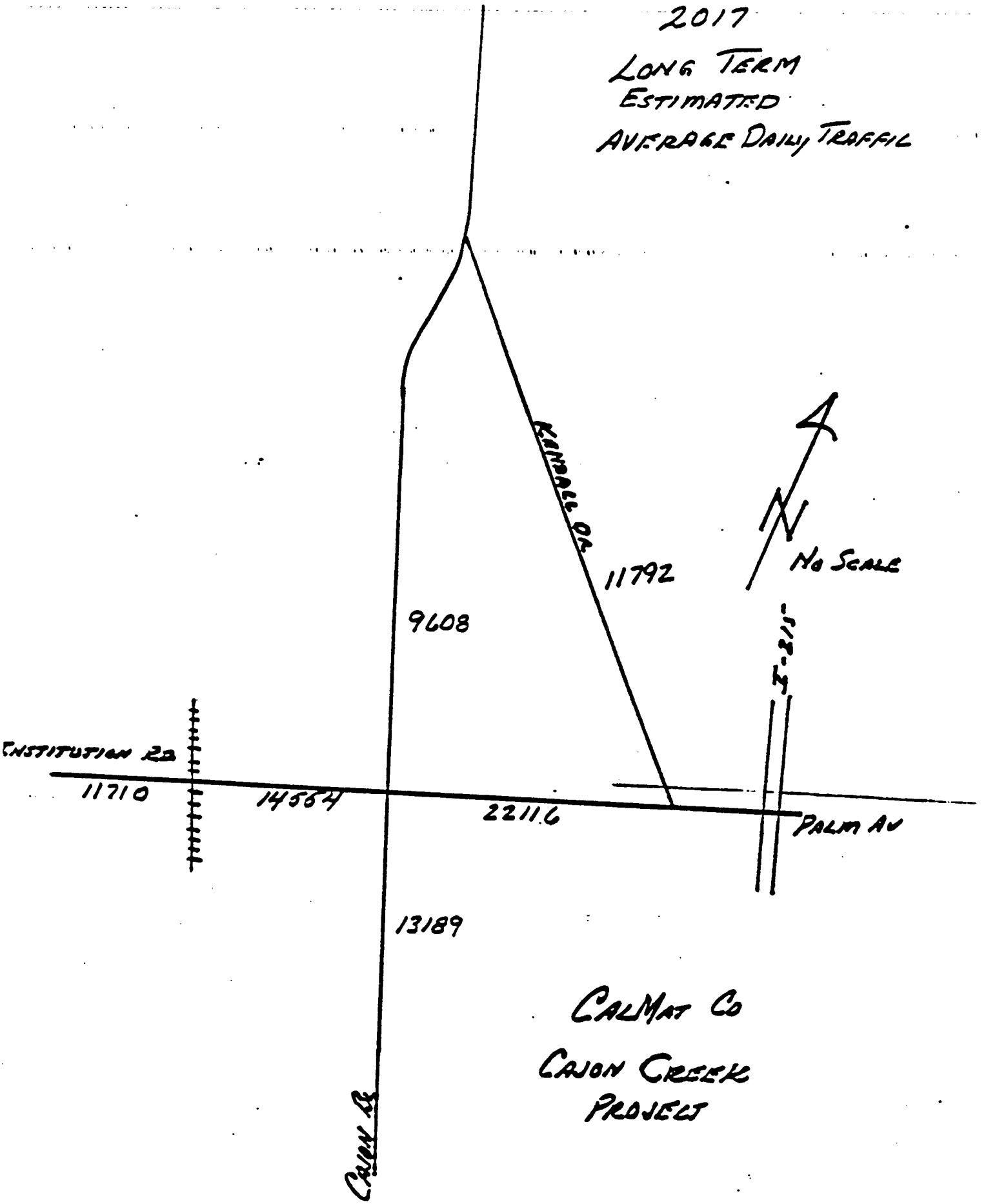

2017
LONG TERM
ESTIMATED
AVERAGE DAILY TRAFFIC
KENDALL DR
11792
9608
No SCALE
I-215
INSTITUTION RD
11710
14564
22116
PALM AV
13189
CAJON BL
CALMAT CO
CAJON CREEK
PROJECT

Figure 9

CAJON BOULEVARD RAILROAD UNDERPASS

The City of San Bernardino requested an analysis of the future traffic volumes at the Cajon Boulevard underpass of the AT&SF Railroad tracks south of the intersection of Cajon Boulevard and Kendall Drive.

The closest available traffic count is on Cajon Boulevard, just north of Palm Avenue. In 1989 the traffic volume at this location was 1796 vehicles per day.

After an evaluation of the existing development, freeway interchanges, and street patterns, it was estimated that the traffic volumes at the underpass would be at a maximum of 2/3 of the Cajon Boulevard traffic volumes just north of Palm Avenue. Using the approved 5% annual growth factor for the nonproject traffic volumes, the traffic volumes shown on Figure 10 were obtained.

The CalMat-Cajon Creek Project traffic has been assigned as previously described. Few near-term traffic volumes were assigned north on Cajon Boulevard to reach I-215 and the north (15%). The majority of all traffic was assigned to and from the south.

During the long-term development (year 2017), most of which is north of the Cajon Boulevard and Kendall Drive intersection, 10% of Areas "A," "B," and "C" project traffic will be assigned to this section of roadway. This volume of 1359 vehicles per day is also shown in Figure 10.

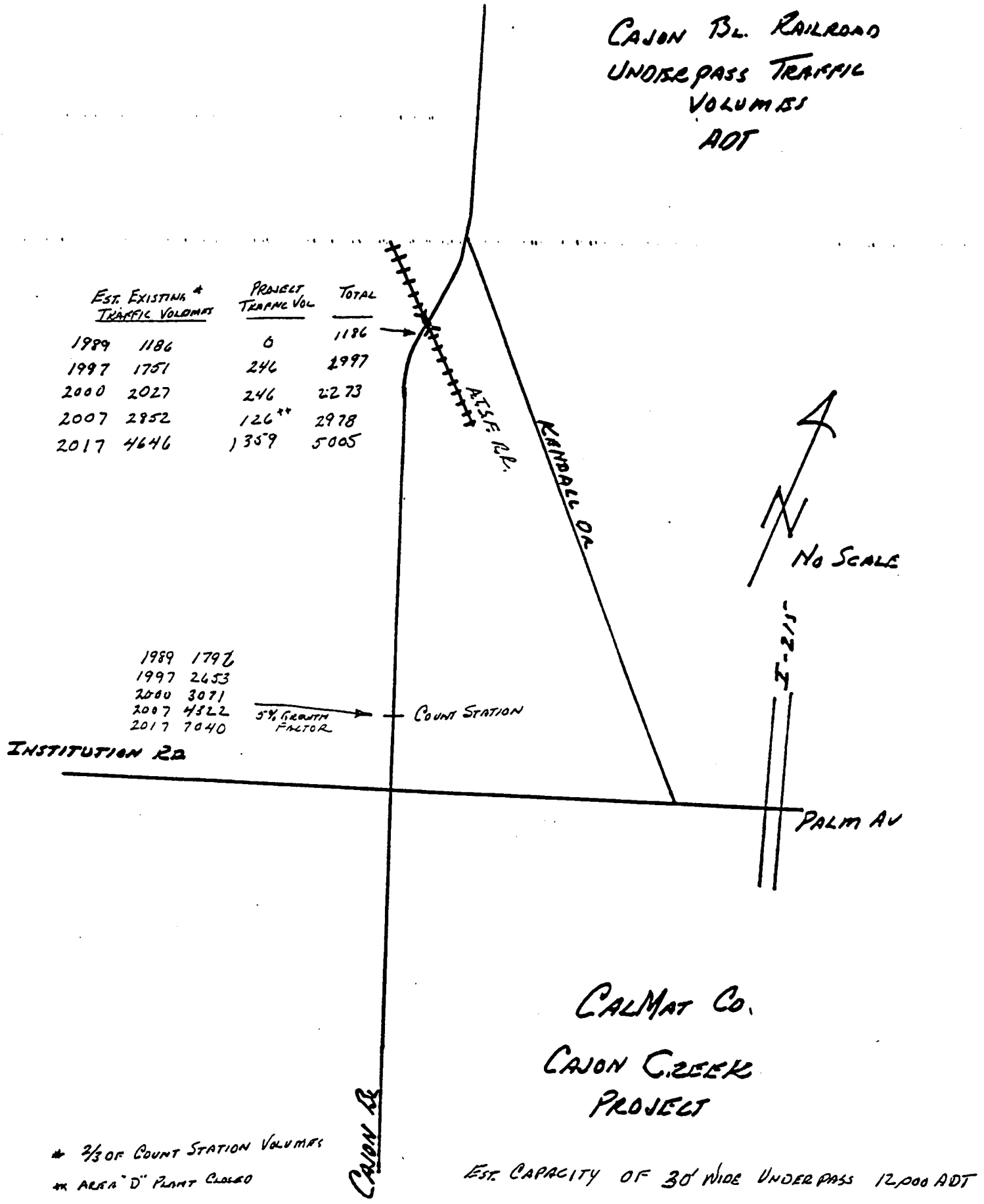

CAJON BL. RAILROAD
UNDERPASS TRAFFIC
VOLUMES
ADT
EST. EXISTING * TRAFFIC VOLUMES
PROJECT TRAFFIC VOL
TOTAL
1989 1186 0 1186
1997 1751 246 1997
2000 2027 246 2273
2007 2852 126** 2978
2017 4646 1359 5005
ATSF R.R.
KENDALL DR
NO SCALE
I-215
1989 1792
1997 2453
2000 3071
2007 4322
2017 7040
5% GROWTH FACTOR
COUNT STATION
INSTITUTION RD
PALM AV
CAJON RD
CALMAT CO.
CAJON CREEK
PROJECT
* 2/3 OF COUNT STATION VOLUMES
** AREA "D" PLANT CLOSED
EST. CAPACITY OF 30' WIDE UNDERPASS 12,000 ADT

Figure 10

It is estimated that the traffic volume at the underpass will reach 5,000 vehicles per day in 2017. The capacity of this roadway is estimated at 12,000 vehicles per day. We foresee no need to widen the underpass during the life of this project, if ever. In this section of the City of San Bernardino, Kendall Drive will carry a higher traffic volume than Cajon Boulevard.

PEAK HOUR TRAFFIC ANALYSIS

A detailed traffic analysis of the A.M. and P.M. peak traffic was made for the through intersection of Palm Avenue and Cajon Boulevard, Palm Avenue and Kendall/SB I-215 ramps, and Palm Avenue and NB I-215 ramps for the existing year (1990 or 1991), and the years 1997, 2007, and 2017. Because of the voluminous nature of the hand calculations and computer printouts necessary for this analysis (250+ pages), a copy of this data, presented as a "Technical Appendix," will be given to the Public Works Department for their analysis and file. The following is a summary of the analysis.

PEAK-HOUR PROJECT VOLUMES ON CMP NETWORK SHEETS FOR THE YEAR 2000

The proposed Congestion Management Program (CMP) for San Bernardino County proposes a detailed analysis of project traffic volumes on their street network that exceeds 50 vehicles per hour and 100 vehicles per hour on freeways in the year 2000. Since a regional computer assignment of the region is not available at this time, the manual traffic assignment performed by the consultant, with the assistance of the City Traffic Engineer, was made.

All project data is based on the years 1997 and 2007. We will give the peak-hour estimate for 1997 and 2007. These volumes are shown on Figure 11.

Cajon Boulevard north of the project is estimated to have peak-hour volumes less than 50 vehicles per hour until the year 2017. No additional analysis was made.

Cajon Boulevard south of the project will have traffic volumes 54 and 96 during the peak hours. It is estimated that the volumes will be less than 50 vehicles per hour on the intersection of Cajon Boulevard and State College Way. This intersection will be improved by the County of San Bernardino. A discussion of their planned improvements are discussed on page 20 of this report.

Peak-hour traffic volume on Palm Avenue east of I-215 Freeway will vary from 54 to 96 vehicles per hour. These volumes will not exceed 50 vehicles per hour past the intersection of Route 206 (Kendall Drive) and Palm Avenue.

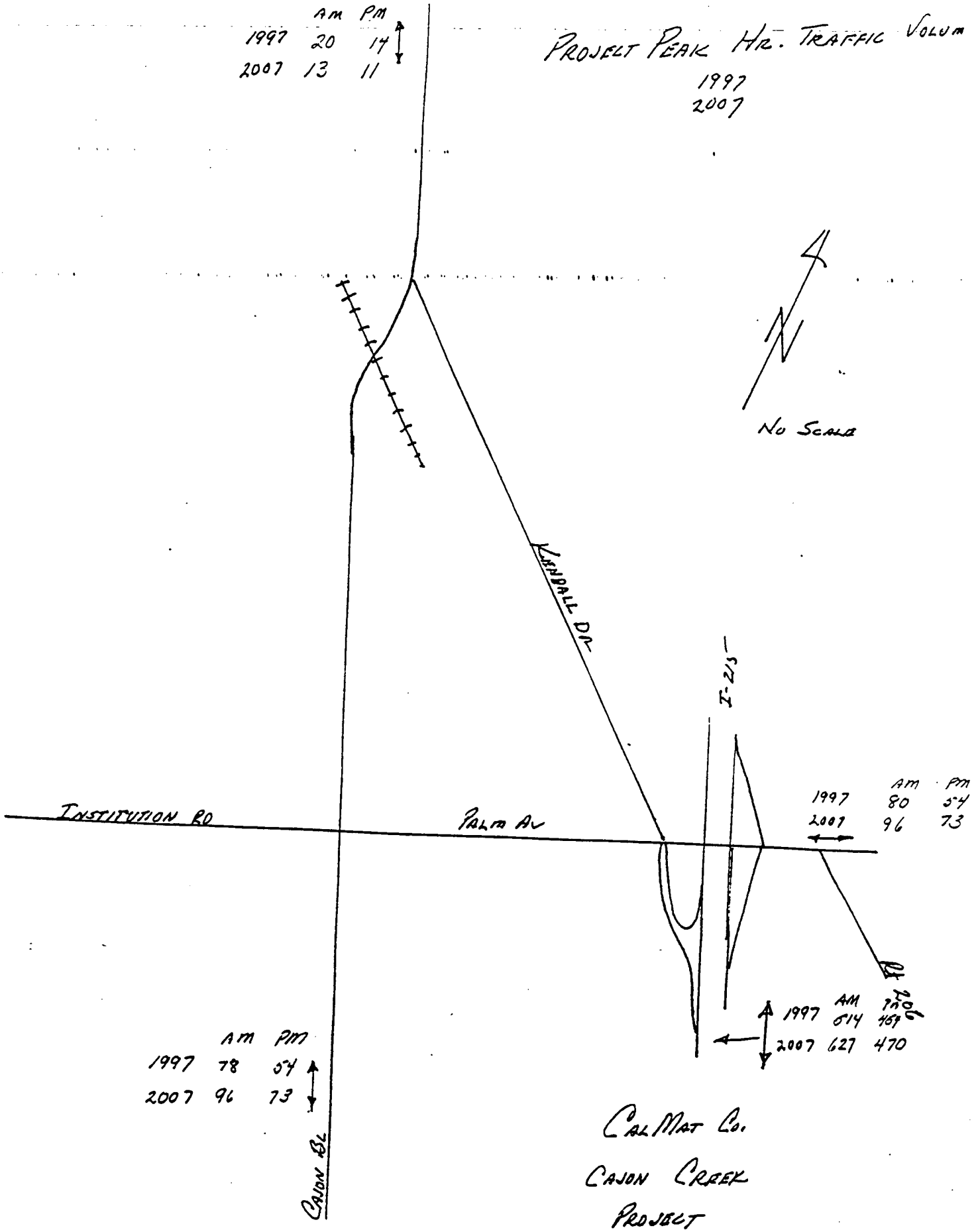

PROJECT PEAK HR. TRAFFIC VOLUM
1997
2007
AM PM
1997 20 14
2007 13 11
NO SCALE
LANDALL DR
I-215
INSTITUTION RD
PALM AV
AM PM
1997 80 54
2007 96 73
AM PM
1997 614 469
2007 627 470
AM PM
1997 78 54
2007 96 73
CAJON BL
CAL MAT CO.
CAJON CREEK
PROJECT

Figure 11

The peak-hour traffic volume on I-215 Freeway will not exceed 100 vehicles per hour north of Palm Avenue during the year 2000 time frame. South of Palm Avenue the peak-hour traffic will be well in excess of 100 vehicles per hour. Without a regional traffic assignment, we are unable to determine the freeway distribution beyond this point.

PEAK HOUR INTERSECTION ANALYSIS

Table 5 shows a summary of the detailed analysis. All calculations are in accord with the 1985 Highway Capacity Manual. The computer programs do not provide for a four-way stop analysis. Therefore, hand calculations were made. Enclosed in the Technical Appendix is a description of the method used.

A major inherent error is involved with the years 2007 and 2017 estimated traffic volumes that requires caution in looking at the data presented. Expansion factors used on the existing traffic to expand these volumes from 1991-2007 and 1991-2017 resulted in multiplying existing data by factors of 219% and 355%. This resulted in some traffic moves that are not realistic. However, with the widening of the freeway off-and-on ramps to accept two or three lanes, all the traffic signals at the I-215 interchange can be made to work without major redesign of the interchange. It is our recommendation the interchange ramps be signalized between the years 1997 and 2000. However, the design should be based on then existing counts and not compound expansion of 1990 and 1991 counts.

Table 5 provides the A.M. and P.M. level of service at the through intersections for the years 1997, 2007, and 2017.

Table 5

Intersection Level of Service

Intersection: Palm Avenue and Cajon

Year	A.M. LOS	P.M. LOS	COMMENTS
Existing	A	A	Existing 4-way stop
1997	C	A	Existing 4-way stop
2007	B	B	Ultimate signalized intersection 60 sec. cycle 13.5 & 13.6 sec. delay
2017	B	B	60 sec. cycle 11.5 & 14.3 sec. delay

Intersection: Palm Avenue and I-215 SB Ramps/Kendall

Year	A.M. LOS	P.M. LOS	COMMENTS
Existing	A	A	Existing 4-way stop
1997	B	B	4-way stop
1997	B	C	Signalized 60 sec. cycle 13.8 & 16.6 sec. delay
2007	B	B	Signalized 60 sec. cycle 13.9 & 14.9 sec. delay P.M. required a 3-lane ramp from freeway
2017	E	C	Signalized 60 sec. cycle 49.5 & 19.7 sec. delay Added capacity needed in ramp storage

Table 5 (continued)

Intersection Level of Service

Intersection: Palm Avenue and I-215 NB Ramps

Year	A.M. LOS	P.M. LOS	COMMENTS
Existing	A-D	A-D	Nonsignal no-ramp stop The EB to NB move has delay
1997	B	B	Signalized 60 sec. cycle 9.7 - 9.6 delay Dual left
2007	B	B	Signalized 60 sec. cycle 9.6 - 11.7 sec. delay Dual left
2017	C	--	Signalized 60 sec. cycle 22.6 sec. A.M. delay V/C 1.243 P.M. - must add dual right NB to work

TRAFFIC IMPACTS AND MITIGATION

It should be the goal of this project to have in place infrastructure improvements sufficient to handle the existing and project traffic **before** such traffic develops.

Existing traffic volumes on the local roadways are low. Much of the development proposed for the Near Term is also of relatively low traffic intensity. As a result few, if any, major improvements, other than those normally required as part of the Subdivision approval process, would be necessary for most of the Near Term development.

Near Term development will include mining and CMUP uses which will require only minor improvements, as well as light industrial development associated with tentative maps being processed concurrently, which will require traffic improvement.

As can be seen in Table 6, aggregate resource extraction and processing in Planning Areas "D," "F," "I," and "P" would not significantly impact the existing roadway and thus would not require any significant roadway improvements, other than very localized access improvements such as lane striping or minor pavement widening. Such improvements would be specified by the Department of Public Works as part of the Conditional Use Permit approval process. A tentative Subdivision Map for Planning Area "E" is being concurrently processed along with a Conditional Use Permit which includes Planning Areas "D" and "F." Thus, normal Cajon Boulevard frontage improvements, designed to City Standards associated with this map would be required along Planning Area "D," as well as Planning Area "E."

Table 6

Traffic Improvement Requirements

Near Term Development

Plng. Area	Use	Total ADT	Traffic Improvements Required
D	Aggreg. Proc.	650	Cajon Blvd. Frontage Impr.
F	Extr.	-	None
E	Lt. Ind.	840	Cajon Blvd. Frontage Impr.
G	Lt. Ind.	1506	Cajon Blvd./Inst. Rd. Intersection Impr. Required. Institution Rd./Cajon Blvd. Frontage Improvements
H	Lt. Ind.	1338	Cajon Blvd./Inst. Rd. Intersection Impr. Required. Institution Rd./Cajon Blvd. Frontage Improvements
I	CMUP	174	None/Minor
J	CMUP	140	None/Minor
K	Lt. Ind.	2160	Frontage Improvements on Cajon Blvd.
L	CMUP	653	None/Minor
M	CMUP	488	None/Minor
P	Extr.	-	None/Minor
I	Aggreg. Proc.	650	None/Minor

Table 6 (continued)

Traffic Improvement Requirements

Intermediate Term Development*

Plng. Area	Use	ADT	Traffic Improvements Required
L	Extr.	-	None
M	Extr.	-	None
N	Aggreg. Proc.	950	Access Rd./Institution Rd. Intersection Improvements
I	Hvy. Ind.	2088	Institution Road Frontage Improvements
J	Hvy. Ind.	840	Institution Road Frontage Improvements

Long-Term Development*

Plng. Area	Use	ADT	Traffic Improvements Required
D	Hvy. Ind.	1110	None
F	Hvy. Ind./CMUP	304	None
A B	Lt. Ind. } Hvy. Ind. }	6780	Cajon Blvd. Frontage Impr. Minor Impr. at Cajon Blvd./ Kendall Dr.
C	Hvy. Ind.	360	Possible Cajon Blvd. Access Improvements
L	CMUP	653	None
M	CMUP	488	None

* Assumes Cajon Blvd./Palm Ave./Institution Road Intersection has been improved.

Interim Construction Material Users Park (CMUP) uses are anticipated for Planning Areas "L" and "M," in advance of subsequent mineral resource extraction, as well as in Planning Area "J" and portions of Planning Area "I." These low-intensity, low-traffic uses are adequately accommodated by the existing roadway system. Light Industrial development within Planning Area "K" would necessitate Cajon Boulevard frontage improvements as a requirement of Subdivision map approval.

Near Term

Near Term development of Planning Areas "G" and "H," located both north and south of Institution Road at the Cajon Boulevard intersection, would require Cajon Boulevard and Institution Road frontage improvements, as well as intersection improvement as part of the Subdivision approval process. This intersection improvement may either be of an interim nature, involving realignment of the Institution Road leg of this intersection and possible signalization in order to accommodate the traffic generated by these two light industrial subdivisions, or full ultimate improvement of this intersection, as shown in Detail A in Figure 4, could be made. A proposed detailed intersection drawing is shown in the Appendix. This ultimate intersection improvement should easily accommodate all future traffic, both project-related and non-project future traffic through the life of the entire project.

Intermediate Term

Intermediate Term development will include mineral resource extraction activity in Planning Areas "L" and "M," with construction of a permanent aggregate processing plant in Planing Area "N." This will necessitate access road intersection improvements at Institution Road, including provision of a westbound left-turn lane. It is expected that Planning Areas "I" and "J" would be redeveloped into more intensive, Heavy Industrial land use. Institution Road frontage improvements would be required as part of the Subdivision approval process for both Planning Areas "I" and "J."

Projected ultimate (year 2017) traffic volumes along Institution Road west of the Southern Pacific Railroad undercrossing would be approximately 11,730 ADT. This could be adequately accommodated by transitioning the four-lane portion of Institution Road between Cajon Boulevard and the railroad, which would have been made as part of development of Planning Areas "G" and "H," down to two lanes through the existing under-crossing.

Long Term

Long Term development will consist of continuing resource extraction within Planning Area "M" and processing in Planning Area "N," the traffic improvements for which will already have been provided. Upon completion of extraction within Planning Area "L" and possibly portions of Planning Area "M," CMUP uses would be expected to resume. No further improvements would be expected to be required in this regard.

Upon completion of extractive and processing activities in Planning Areas "D" and "F," and following reclamation these areas would be redeveloped with Heavy Industrial and possibly CMUP uses. Necessary Cajon Boulevard frontage improvements will already have been made. Development of Planning Area "A" with Light Industrial and Planning Area "B" with Heavy Industrial uses will require that Cajon Boulevard frontage improvements be made as part of Subdivision approval process. The intersection of Cajon Boulevard and Kendall Drive may require minor redesign at that time. A proposed design is shown as Detail B on Figure 4. Sufficient right-of-way exists to make these revisions with little, if any, new construction needed.

Off-site widening of Cajon Boulevard, both north and south of the Palm Avenue/Institution Road intersection, in the vicinity of the former County landfill, and the MWD/SGUWD aqueducts to the south of this intersection are not part of the proposed project. However, provision will at some point have to be made in order to provide continuity between the improved Planning Area "E" and Planning Area "G" frontage improvements, as well as between Planning Areas "H" and "K." It is expected that half-width Cajon Boulevard frontage improvements along the project frontage can be designed to accommodate the estimated traffic volumes, except at the intersection of Cajon Boulevard and Palm Avenue, where full-width improvement will be required.

CONCLUSION

This project, for planning purposes, including this traffic study, phased over an approximate 25-year time frame, is a major undertaking. The estimating of future traffic volumes for this period is a broad estimate, at best. However, with the early construction of the major intersection improvement of Cajon Boulevard and Palm Avenue, I foresee few, if any, transportation or congestion problems in the area as a result of full development of this project or the growth of existing traffic, except in later years at the I-215 interchange where expansion of existing traffic presents a problem.

It is our understanding that the existing off-site traffic problems at the Cajon Boulevard and State Street intersection are in the process of being corrected by the County of San Bernardino and should be completed before significant project-related traffic develops.

The traffic generation rates and phasing assumes full use of all mining and aggregate plant land at all times for use as either CMUP uses or mining. This is not realistic and thus results in a worst-case traffic assignment.

No future peak-hour traffic assignments were attempted because of the difficulty in estimating such volume in such a diverse area and the overdesign of the only major conflict point.

This project will fully mitigate its traffic impacts.

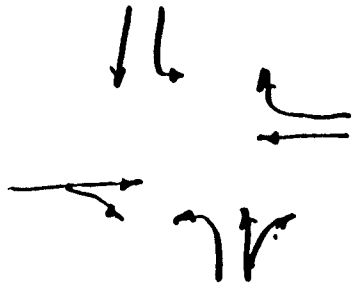
Charles P. Strong & Associates

APPENDICES

TRAFFIC TURNING MOVEMENTS COUNTS

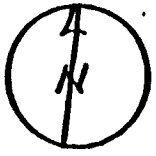
INTERSECTION Cajon Bl & Palm

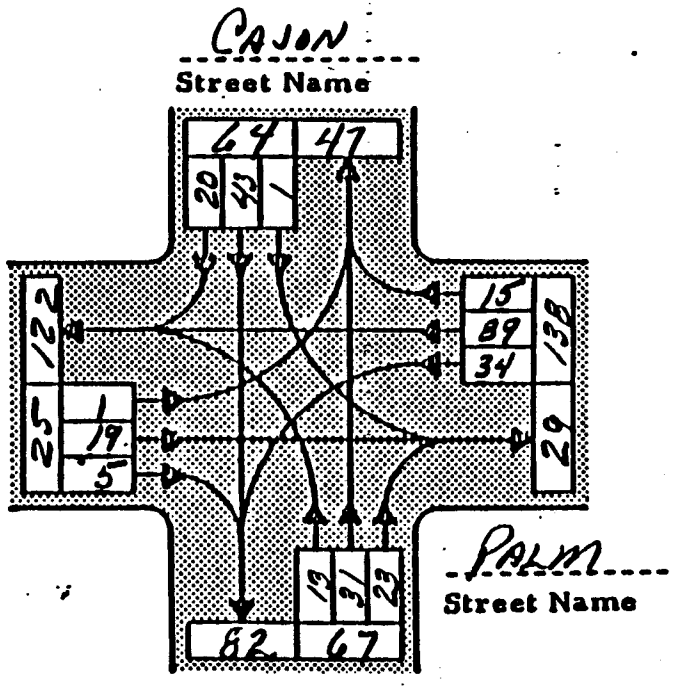
PROJECT Calmat Cajon Creek



			min
NBL	$\frac{13}{1600}$	= 0.008	0.10
SBT	$\frac{43}{1600}$	= 0.027	0.10
WBT	$\frac{89}{1600}$	= 0.056	0.10
EBL	$\frac{1}{1600}$	= 0.001	0.10
		0.092	0.40

LOS A





A M. PEAK HOUR VOLUME

Peak Hour: 7:15 - 8:15

Date: 3/20/90

Figure

Charles P. Siring & Associates
5241 Del Cerro Blvd.
San Diego, CA 92120
(619) 583-3469

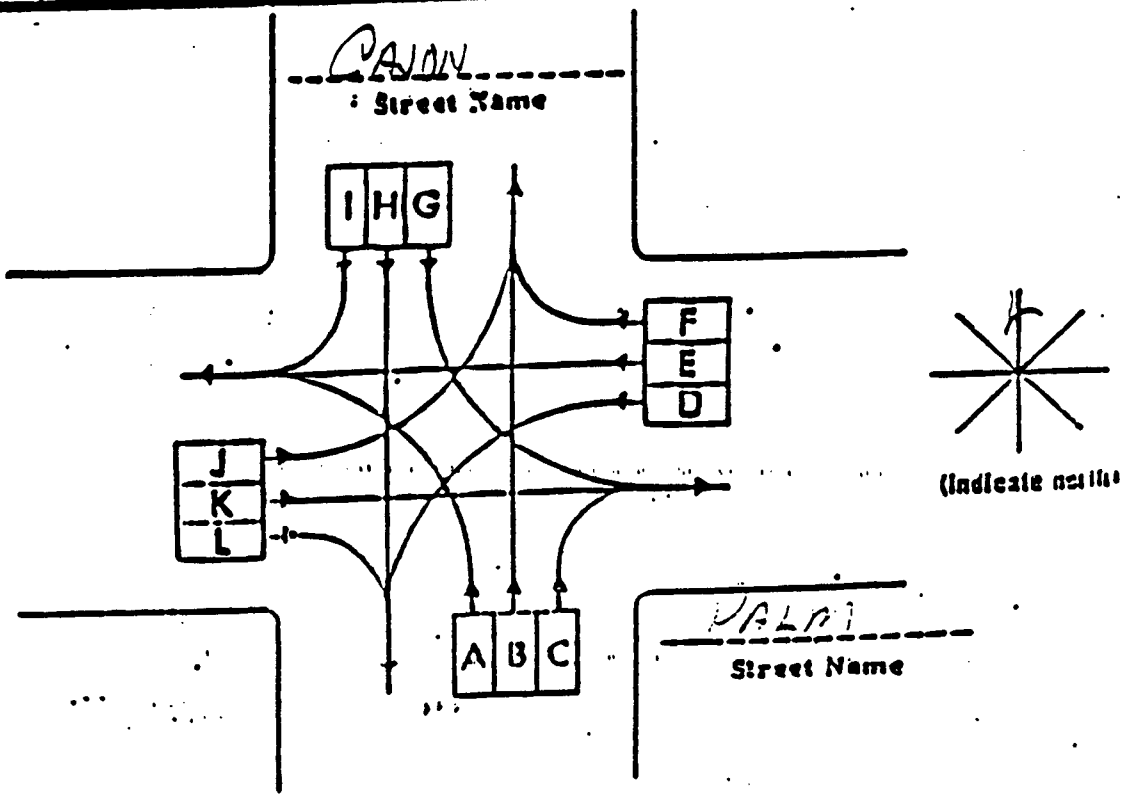
TRAFFIC TURNING MOVEMENTS COUNT

CALMAT - CAJON CREEK
(City or Project)

Intersection of CAJON BL and PALM

Date 3/20/ Day of Week TUE Weather CLEAR Recorder STRING

Time Period	CAJON (Street) S. from the			PALM (Street) E from the			CAJON (Street) N from the			INSTITUTE (Street) from the			
	Lt.	St.	Rt.	Lt.	St.	Rt.	Lt.	St.	Rt.	Lt.	St.	Rt	
	A	B	C	D	E	F	G	H	I	J	K	L	
7:00-7:15	0	10	12	8	11	1	1	10	2	0	5	0	60
:15	1	9	8	11	11	2	0	7	9	0	8	2	68
:30	4	3	2	7	34	3	1	16	4	0	4	0	80
:45	4	7	4	9	28	9	0	5	4	0	3	1	74
:00	4	10	9	7	16	1	0	15	3	1	4	2	72
:15	0	11	2	7	16	2	2	16	2	2	5	2	67
:30	3	11	2	5	1	1	2	11	1	0	4	3	46
:45-8:00	4	5	0	10	7	0	2	11	1	1	6	0	52
	20	68	44	64	127	19	8	91	26	4	39	12	519
			-18 TRUCK	-21 TRUCK									



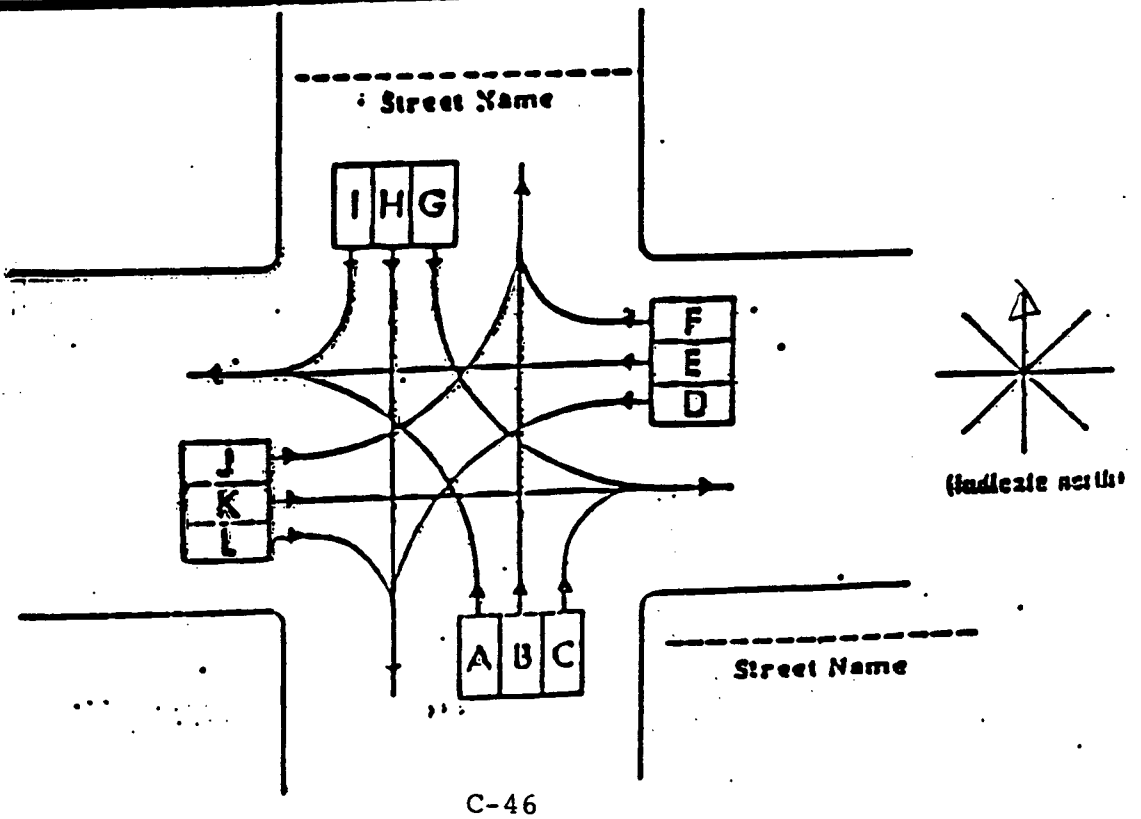
Charles P. Strong & Associates
1241 Del Cerro Blvd.
San Diego, CA 92120
(619) 583-3469

TRAFFIC TURNING MOVEMENTS COUNT

Location of CAJON St (City or Project) and PALM

Date 3/23 Day of Week TUE Weather [illegible] Recorder [illegible]

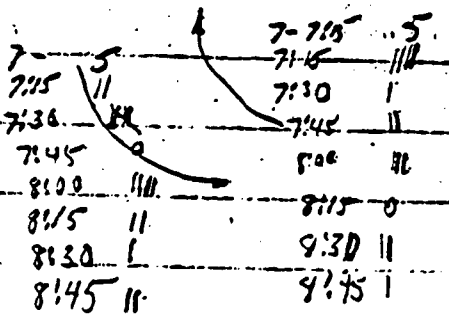
Time Period	CAJON (Street) from the S			PALM (Street) from the E			CAJON (Street) from the N			(Street) from the		
	Lt. A	St. B	Rt. C	Lt. D	St. E	Rt. F	Lt. G	St. H	Rt. I	Lt. J	St. K	Rt. L
7:00 - 7:15	0	10	12	9	11	1	1	10	2			
7:15	1	19	20	19	22	3	1	17	11			
7:30	5	24	22	26	56	6	2	33	15			
7:45	9	31	26	35	94	15	2	38	19			
8:00	13	41	35	42	100	16	2	53	22			
8:15	13	52	37	49	116	18	4	69	24			
8:30	16	63	39	54	117	19	6	80	25			
8:45 - 9:00	20	68	44	64	124	19	8	91	25			



Tuscarora / Palm

	LT	ST	RT
7:00 - 7:15	0	5	0
7:15	0	7	2
7:30	0	4	0
7:45	0	3	1
8:00	1	4	2
8:15	2	5	2
8:30	0	4	5
8:45 - 9:00	1	2	0

Asphalt Truck To / From Repaving on Palm & Pine



21 Truck

18 Truck

Pine To Palm S/B Palm To

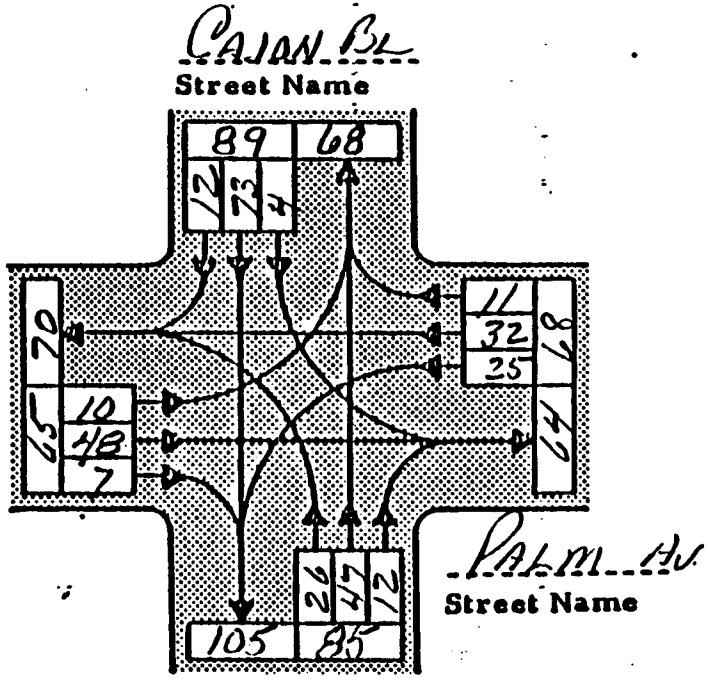
TRAFFIC TURNING MOVEMENTS COUNTS

INTERSECTION CAJON Bl. & PALM AV/ INSTITUTE **PROJECT** PALMER - UNION CLEF

ICU

		ICU	ICU Min
NBL	26/1600	= 0.016	0.10
SB T	73/1600	= 0.046	0.10
NB L	25/1600	= 0.016	0.10
EB T	48/1600	= 0.030	0.10
		0.108	0.40

LOS A



P.M. PEAK HOUR VOLUME

Peak Hour: 4:00 To 5:00

Date: 2/23/90

Figure

Charles P. Strong & Associates
3241 Del Cerro Blvd.
San Diego, CA 92120
(619) 583-3469

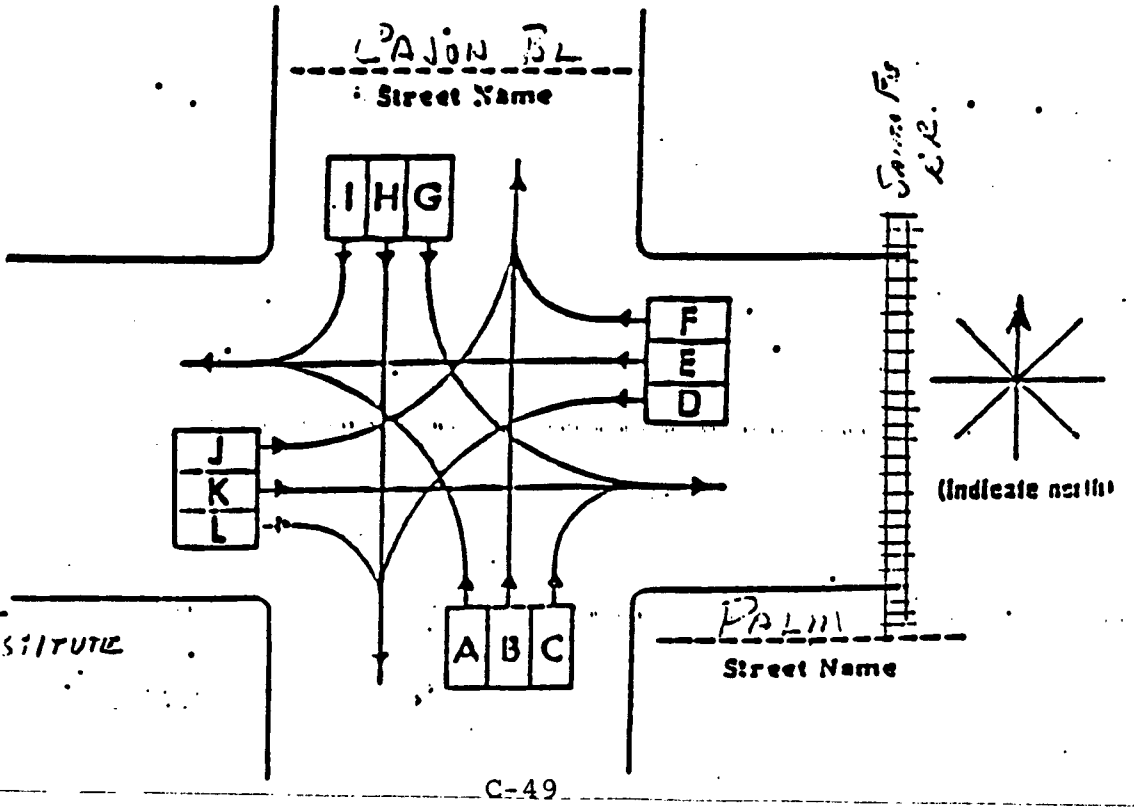
TRAFFIC TURNING MOVEMENTS COUNT

(City or Project)

Intersection of CAJON BL and PALM AV. / INSTITUTE

Date 2/23/90 Day of Week FRI Weather SUNNY Recorder STRONG

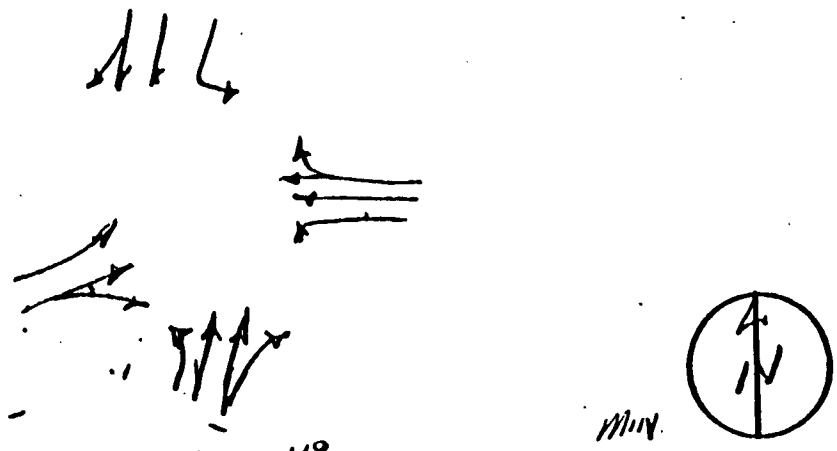
Time Period START	CAJON BL (Street) from the SO. Lt. A	St. B	Rt. C	INSTITUTE (Street) from the W. Lt. D	St. E	Rt. F	PALM AV. (Street) from the N. Lt. G	St. H	Rt. I	PALM (Street) from the E. Lt. J	St. K	Rt. L	
4:00	0	7	6	2	20	6	4	17	1	6	6	3	78
:15	2	14	4	4	17	1	4	16	1	5	11	2	81
:30	5	7	11	0	4	1	4	14	0	7	8	5	66
:45	5/24	19/47	5/13	1/10	7/46	2/5	0/4	26/58	2/12	7/44	7/36	1/21	82
5:00	5	6	3	0	2	8	7	13	1	6	14	3	70
:15	5	9	5	1	12	5	3	7	3	8	16	1	77
	22	62	36	8	62	23	22	95	8	39	62	15	454



TRAFFIC TURNING MOVEMENTS COUNTS

INTERSECTION Cajon Bl & State / Uni. Av

PROJECT Colmate - Cajon Creek



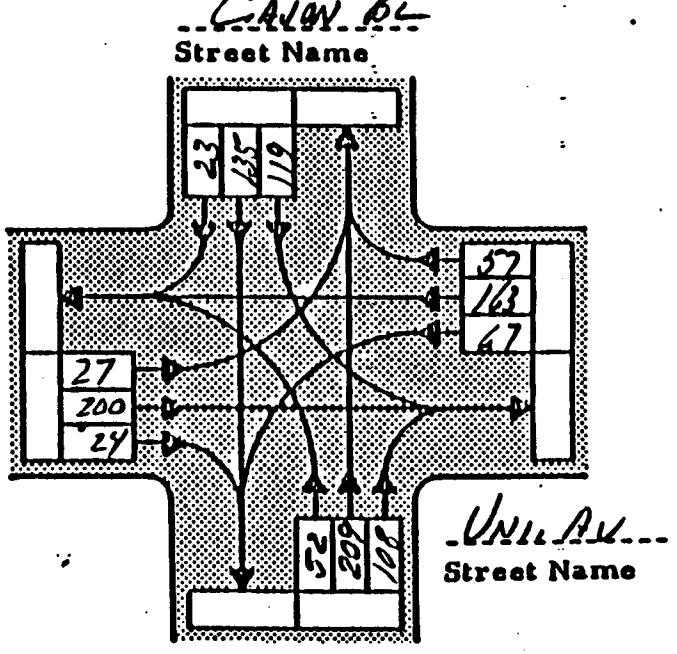
SBL $\frac{119}{1600}$ = 0.074 — Min 0.10

NBT $\frac{317}{3600}$ = 0.088 — 0.10

EBT $\frac{200}{1600}$ = 0.125

WBL $\frac{67}{1600}$ = 0.042 — $\frac{0.10}{0.425}$

LOS A



P.M. PEAK HOUR VOLUME

Peak Hour: 4:30 - 5:30 PM

Date: 3/19/90

C-50

Figure

Charles P. Strong & Associates
1841 Del Cerro Blvd.
San Diego, CA 92120
(619) 583-3469

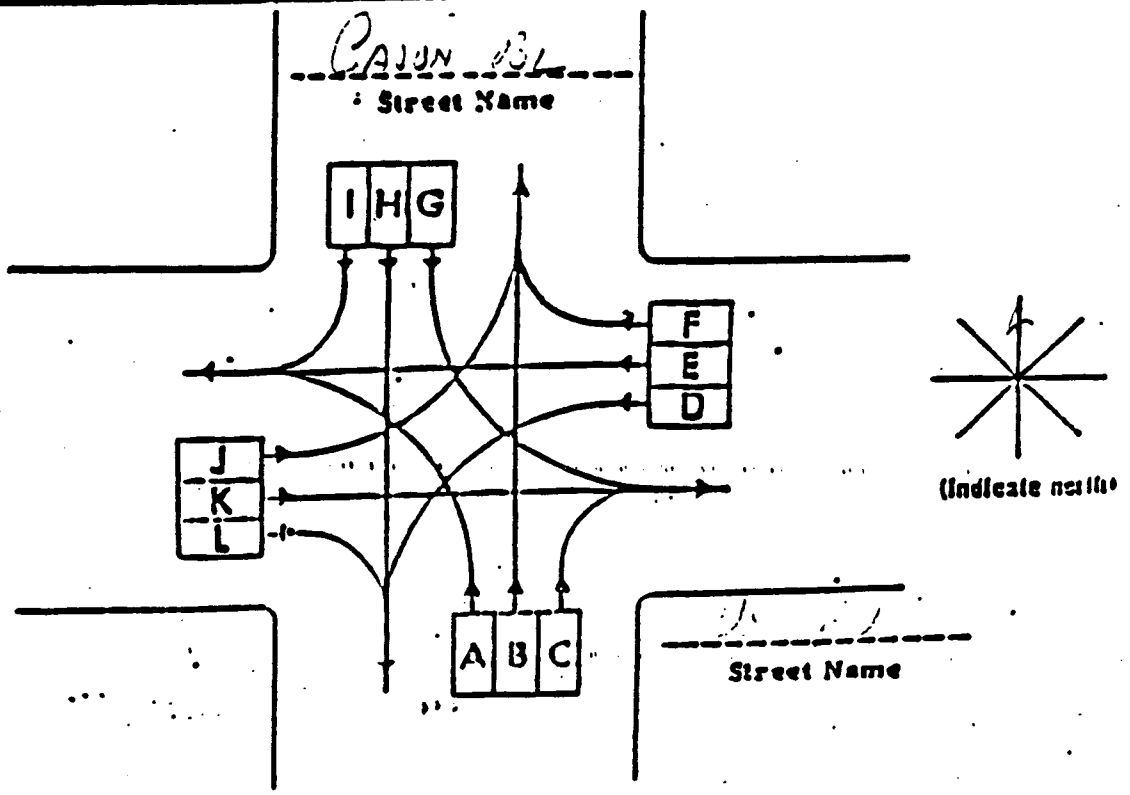
TRAFFIC TURNING MOVEMENTS COUNT

CALMAT. - SB
(City or Project)

Intersection of UNIVERSITY AV / STATE ST and CAJON BL

Date 3/19/90 Day of Week MON Weather CLEAR Recorder STRONG

Time Period	CAJON BL (Street) from the E			UNI. AV (Street) from the E			CAJON BL (Street) from the N			STATE ST (Street) from the W			
	Lt.	St.	Rt.	Lt.	St.	Rt.	Lt.	St.	Rt.	Lt.	St.	Rt	
	A	B	C	D	E	F	G	H	I	J	K	L	
PM PEAK													
4:00-4:15	8	46	25	15	46	19	34	31	8	4	38	7	276
:15	10	47	18	14	48	11	29	32	14	7	37	5	276
:30	13	51	25	17	52	27	32	43	6	4	47	8	325
4:45	9	50	24	17	45	8	30	38	4	10	45	6	286
:00	13	54	36	14	26	13	24	31	4	7	50	5	271
:15	17	54	22	19	39	9	33	33	9	6	58	5	294
:30	7	44	18	10	37	7	31	30	13	5	54	6	264
:45	10	43	15	12	46	10	28	30	10	7	41	5	271
	77	389	214	116	338	103	241	258	68	48	390	45	2210
PEAK HR	52	209	108	67	161	57	119	135	43	27	201	24	



Charles P. Strong & Associates
6241 Del Cerro Blvd.
San Diego, CA 92120
(619) 583-3469

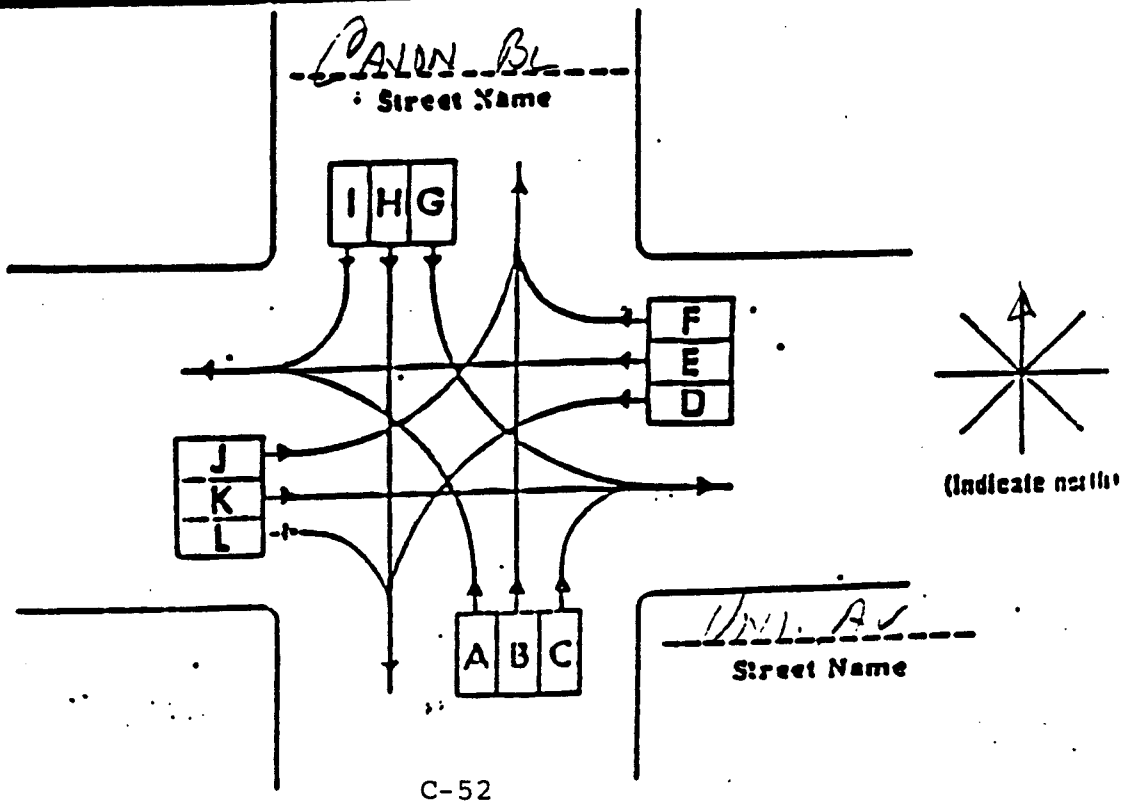
TRAFFIC TURNING MOVEMENTS COUNT

(City or Project) CALMAT - SB

Intersection of UNIVERSITY AV / STATE ST and CALON BL

Site 3/10/ Day of Week MON Weather CLEAR Recorder STAFF

Time Period START	CALON BL (Street) S from the			UNI AV (Street) from the E			CALON (Street) from the N			STATE (Street) from the		
	Lt.	St.	Rt.	Lt.	St.	Rt.	Lt.	St.	Rt.	Lt.	St.	Rt
	A	B	C	D	E	F	G	H	I	J	K	L
4:00 - 4:15	8	46	25	13	46	16	34	51	8			
4:15	18	93	43	27	94	27	63	63	22			
4:30	31	144	68	44	146	39	95	106	28			
4:45	40	194	92	61	191	62	125	144	32			
5:00	53	245	128	75	217	75	149	175	36			
5:15	70	302	157	96	255	84	182	198	45			
5:30	77	346	169	104	292	93	213	228	57			
5:45 - 6:00	87	389	184	116	338	103	241	258	68			



Carson Bl. & Uni. / State

STATE ST.

	LT	ST	RT
4:00–4:15	4	38	7
4:15	7	37	3
4:30	4	47	8
4:45	10	45	6
5:00	7	50	5
5:15	6	58	5
5:30	3	54	6
5:45–6:00	7	61	5

DIRECTIONAL TRAFFIC COUNT
SUMMARY
12- 5-93

[illegible] 1.1.1 [illegible] COUNT 12- 1-93
[illegible] 77.[illegible] MAJOR RD NAME CAJON BLVD RD NBR 199950 MINOR

12 Hr adj To 24hr
18th on Signal Sist
3-4 years never

*** NORTH LEG ***

	TOTAL	[illegible]	2	3	4	5	6
[illegible]	[illegible]			1			
[illegible]	2291	41	17	6	1	4	
[illegible]	259	3	4	1			
ENTERING TOTAL	2647	44	21	10	1	4	
DEPARTING TOTAL	4529	92	37	24	8	6	10
TOTAL LEG VOLUME	7176	134	61	34	9	12	10

2½ //

TRUCK PERCENT = 3.[illegible]

*** WEST LEG ***

	TOTAL	[illegible]	[illegible]	[illegible]	4	5	6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
[illegible]	[illegible]						
ENTERING TOTAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		7
DEPARTING TOTAL	[illegible]	55	[illegible]	[illegible]	7	1	[illegible]
TOTAL LEG VOLUME	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]

TRUCK PERCENT = [illegible]

*** EAST LEG ***

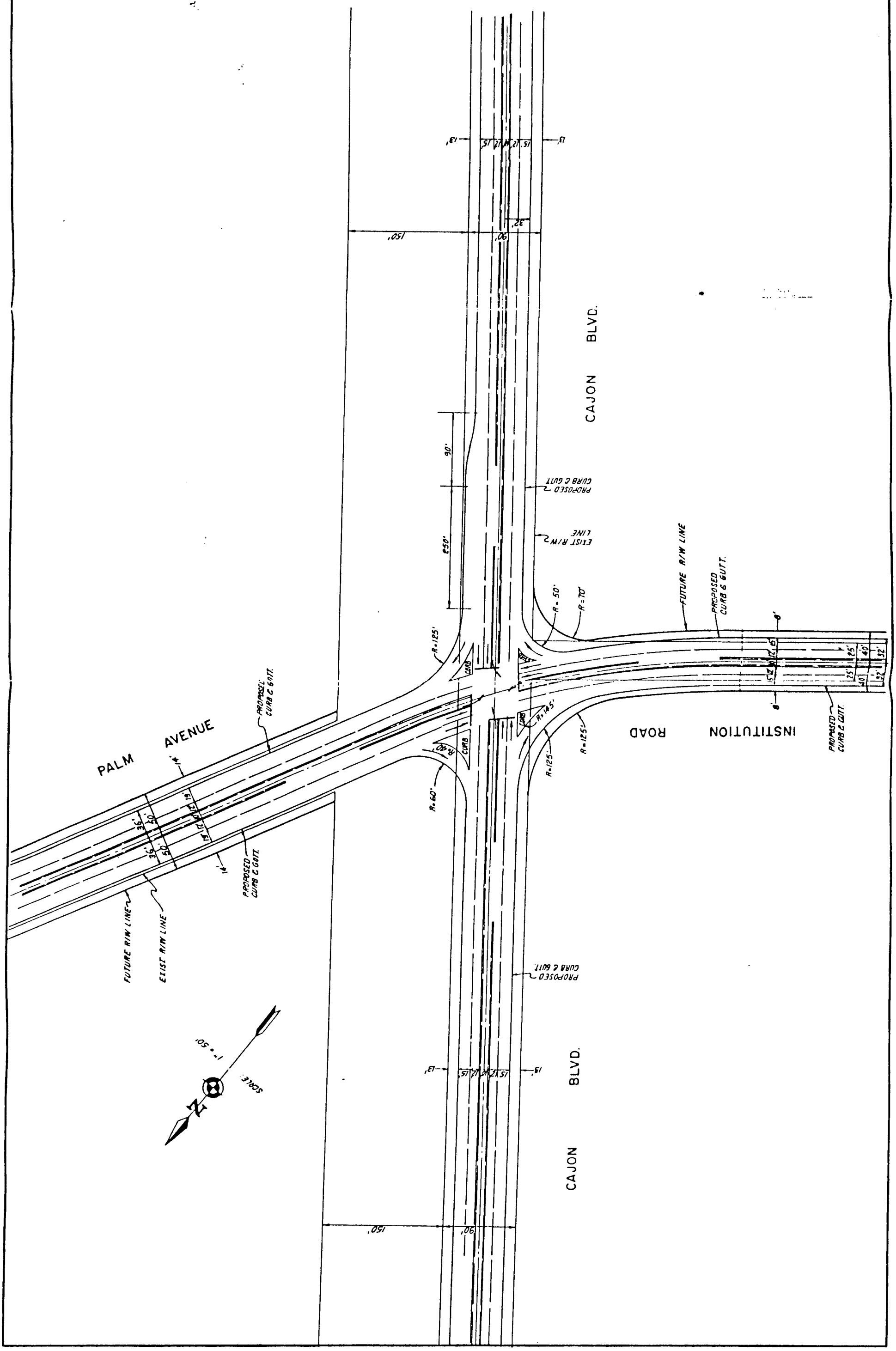
	TOTAL	B	2	3	4	5	6
WB-N	1394	14	20	1	3	1	4
WB-W	1729	13	20	5	4		5
WB-S	421	4	4	1			
ENTERING TOTAL	3544	36	44	7	7	1	9
DEPARTING TOTAL	2072	21	22	10	3	1	4
TOTAL LEG VOLUME	5616	57	66	17	10	2	13

TRUCK PERCENT = 2.9

*** SOUTH LEG ***

	TOTAL	[illegible]	2	3	4	5	6
[illegible]	960	37	22	4	3	1	3
[illegible]	23[illegible]	51	14	11	5	7	3
[illegible]	317	5	1			1	
ENTERING TOTAL	3499	93	37	15	8	9	6
DEPARTING TOTAL	3071	45	24	9	1	4	
TOTAL LEG VOLUME	6570	135	61	24	9	13	6

TRUCK PERCENT = 3.2

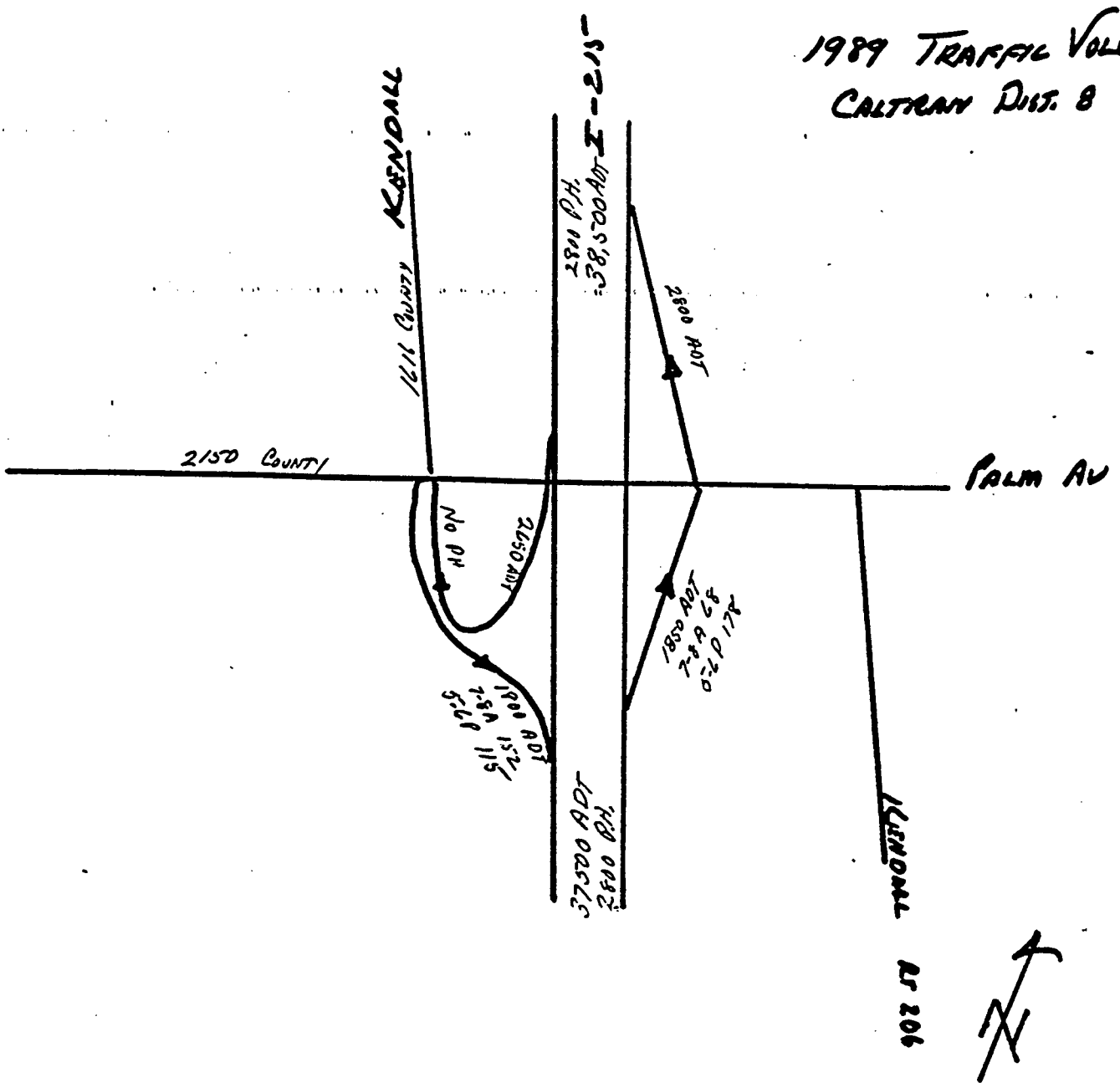

CAJON BLVD.
INSTITUTION ROAD
PALM AVENUE
PROPOSED CURB & GUTT.
FUTURE R/W LINE
EXIST R/W LINE
R=125'
R=50'
R=70'
R=60'
R=145'
CURB
90'
150'
32'
13'
15' 12' 14' 12' 15'
SCALE 1" = 50'
N

P POST P MILE S	DESCRIPTION	1989 ADT	1988 ADT	1987 ADT	1986 ADT	1985 ADT	1984 ADT	1983 ADT	1982 ADT	1981 ADT	1980 ADT	H G SEQ NUMBER
					08-SBD-215							
008.949	NB OFF TO MUSCUPIABE DR	2250				1775			1100			D 0046761
009.127	NB ON FM MASSACHUSETTS	380				260	260			190		D 0046821
009.311	NB OFF TO WB RTE 30	3050				2775	2850			2300		D 0046861
009.419	SB ON FR MT VERN-27TH	6700				5400	5200			4500		D 0046931
009.497	NBOFF TO MT VERNON-27TH	3350				2450	2350			1950		D 0046961
009.812	NB ON FR MT VERNON-27TH	4000				2775	2600			2150		D 0047031
009.941	SBOFF TO MT VERNON-27TH	3600				2300	2150			1800		D 0047061
011.418	NBOFF TO UNIVERSITY PKY	7400				4225			3950			D 0047141
011.448	SB ON FR UNIVERSITY PKY	7900				4150			2800			D 0047161
011.816	NB ON FR UNIVERSITY PKY	1300				575			320			D 0047431
011.857	SBOFF TO UNIVERSITY PKY	1500				600			330			D 0047461
013.877	SB ON FR PALM/206	1800	↑ 7-8 152 5-6 115			1075	780				500	D 0047861
013.974	NB OFF TO PALM/206	1850	AM 7-8 68 PM 5-6 178			925	650				460	D 0047891
013.999	SB OFF TO PALM/206 JR Cons	2650	no PM.			1400	820	940				D 0047931
014.310	NB ON FR PALM/206 JR Cons	2800	no PM.			1125			190		740	D 0048211
017.075	SEG SB ON FR CAJON BL	3600				1450			1100			D 0048511
017.146	NB OFF TO DEVORE RD	850				750			750			D 0048661
017.253	NB ON FM DEVORE RD	950				950			840			D 0048701
017.489	NB OFF TO SB RTE 15	3350				1400	620					D 0048861
017.654	SEG SB OFF TO CAJON BL	4000				500	420					D 0049012

From District 8 Count Files

Mile-post	Description	Peak Hour	ADT Pk. Mo.	ADT Annual
22.76	Ethanac Road			
23.20	Begin Freeway	3,500	36,000	35,500
23.54	Jct. Rte. 74 Southeast, Case Road Interchange			
26.31	Jct. Rte. 74 West, Fourth Street Interchange	3,500	45,500	45,000
27.23	Perris, D Street Interchange	3,600	40,000	39,500
27.56	End Freeway	3,700	45,500	45,000
27.89	Nuevo Road, Perris, North	3,750	49,000	48,500
		3,900	55,000	54,000
31.08	Ramona Expressway	4,050	59,000	58,000
		4,200	60,000	59,000
34.22	Van Buren Boulevard			
35.93	Cactus Avenue Interchange (Road to March Air Force Base)	4,300	50,000	49,000
		4,400	49,500	48,500
36.38	Allesandro Boulevard	4,450	56,000	55,000
R38.11	Begin Freeway			
R38.34	Box Springs, Jct. Rte. 60 East	4,500	56,000	55,000
R38.92	Riverside, Fisher Road Interchange	10,900	141,000	139,000
R38.93 =38.62	Milepost Equation	10,300	145,000	143,000
39.48	Riverside, Central Avenue Interchange			
40.29	Riverside, University Knolls Interchange	9,600	140,000	137,000
40.98	Riverside, Pennsylvania Avenue Interchange	9,000	135,000	132,000
41.04	Riverside, University Avenue Interchange	8,300	138,000	135,000
42.16	Riverside, Blaine Street Interchange	7,600	137,000	133,000
42.84	Riverside, Spruce Street Interchange	6,900	142,000	138,000
43.27	Riverside, Jct. Rtes. 60 and 91 West, Riverside-Escondido Freeway	6,200	158,000	154,000
43.90	Riverside, Columbia Avenue Interchange	10,600	139,000	134,000
		10,600	133,000	128,000
45.01	Center Street Interchange			

Mile-post	Description	Peak Hour	ADT Pk. Mo.	ADT Annual
45.01	Center Street Interchange			
45.33 =0.00	Riverside County San Bernardino County	10,700	128,000	123,000
0.40	Iowa Avenue Interchange			
		10,600	129,000	124,000
1.31	Barton Road Interchange			
2.69	Colton, Mount Vernon Avenue/Washington Street Interchange	10,700	129,000	124,000
4.05	Colton, Jct. Rte. 10, San Bernardino-Riverside Freeway Interchange	10,800	130,000	129,000
5.03	San Bernardino, Orange Show Road Interchange	10,800	160,000	159,000
5.58	San Bernardino, Inland Center Drive	10,800	150,000	149,000
6.06	San Bernardino, Mill Street Interchange	10,800	141,000	140,000
6.79	San Bernardino, Second Street Interchange	10,800	143,000	142,000
7.18	San Bernardino, Jct. Rte. 66 West, Fifth Street Interchange	10,800	127,000	126,000
8.06	San Bernardino, Baseline Street Interchange	10,700	136,000	131,000
8.60	San Bernardino, Jct. Rte. 259 North, I Street Interchange	10,700	124,000	119,000
9.03	San Bernardino, Massachusetts Avenue Interchange	10,800	58,000	53,000
9.36	San Bernardino, Jct. Rte. 30, Highland Avenue Interchange	10,700	59,000	54,000
9.72	San Bernardino, 27th Street Interchange	10,700	56,000	51,000
11.63	San Bernardino, University Parkway Interchange	10,700	54,000	49,000
14.10	San Bernardino, Jct. Rte. 206, Kendall Drive-Palm Avenue Interchange	2,800	38,500	37,500
		2,800	39,500	38,500
17.32	Devore Road Interchange			
		2,800	29,000	28,000
17.73	Jct. Rte. 15 Freeway			


1989 TRAFFIC VOLUMES
CALTRAN DIST. 8
KENDALL
1611 COUNTY
I-215
2800 P.H.
=38,500 ADT
2800 ADT
2150 COUNTY
PALM AV
2650 ADT
1850 ADT
3700 ADT
2600 P.H.
KENDALL DR 206

COUNTS UNLIMITED

Site Code : DILGINIS
N-S STREET: I-215 NORTHBOUND RAMPS
E-W STREET: PALM AVENUE
WEATHER : SUNNY

Movements by: Primary

PAGE: 1
FILE: 8B215N2P
DATE: 8/20/91

Time Begin	From North PEDS	RT	THRU	LT	From East PEDS	RT	THRU	LT	From South PEDS	RT	THRU	LT	From West PEDS	RT	THRU	LT	Vehicle Total	PEDS Total
4:00 PM	0	0	0	0	1	43	35	0	0	42	1	14	1	0	82	6	223	2
4:15	0	0	0	0	1	35	35	0	0	43	0	7	0	0	122	6	248	1
4:30	0	0	0	0	1	41	41	0	0	58	0	9	0	0	91	6	246	1
4:45	0	0	0	0	0	39	41	0	0	59	0	9	0	0	97	0	245	0
HR TOTAL	0	0	0	0	3	158	152	0	0	202	1	39	1	0	392	18	962	4
5:00 PM	0	0	0	0	0	47	34	0	0	62	1	15	2	0	105	5	289	2
5:15	0	0	0	0	2	36	38	0	0	49	1	11	1	0	123	10	268	3
5:30	0	0	0	0	0	40	39	0	0	66	1	24	1	0	133	8	313	1
5:45	0	0	0	0	0	37	49	0	0	38	0	22	0	0	114	7	267	0
HR TOTAL	0	0	0	0	2	160	160	0	0	217	3	72	4	0	475	30	1117	6
DAY TOTAL	0	0	0	0	5	318	312	0	0	419	4	111	5	0	867	48	2079	10

PEAK PERIOD ANALYSIS FOR THE PERIOD: 4:00 PM - 6:00 PM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES PEDS	Right	Thru	Left	Total	PERCENTS PEDS	Right	Thru	Left
North	12:00 AM	0.00	0	0	0	0	0	-	0	0	0
East	5:00 PM	0.93	2	160	160	0	320	-	50	50	0
South	4:45 PM	0.81	0	238	3	59	300	-	79	1	20
West	5:00 PM	0.90	4	0	475	30	505	-	0	94	6

Entire Intersection

North	5:00 PM	0.00	0	0	0	0	0	-	0	0	0
East		0.93	2	160	160	0	320	-	50	50	0
South		0.78	0	217	3	72	292	-	74	1	25
West		0.90	4	0	475	30	505	-	0	94	6

Site Code : DILOINIS
N-S STREET: I-215 NORTHBOUND RAMPS
E-W STREET: PALM AVENUE
WEATHER : SUNNY

Movements by: Primary

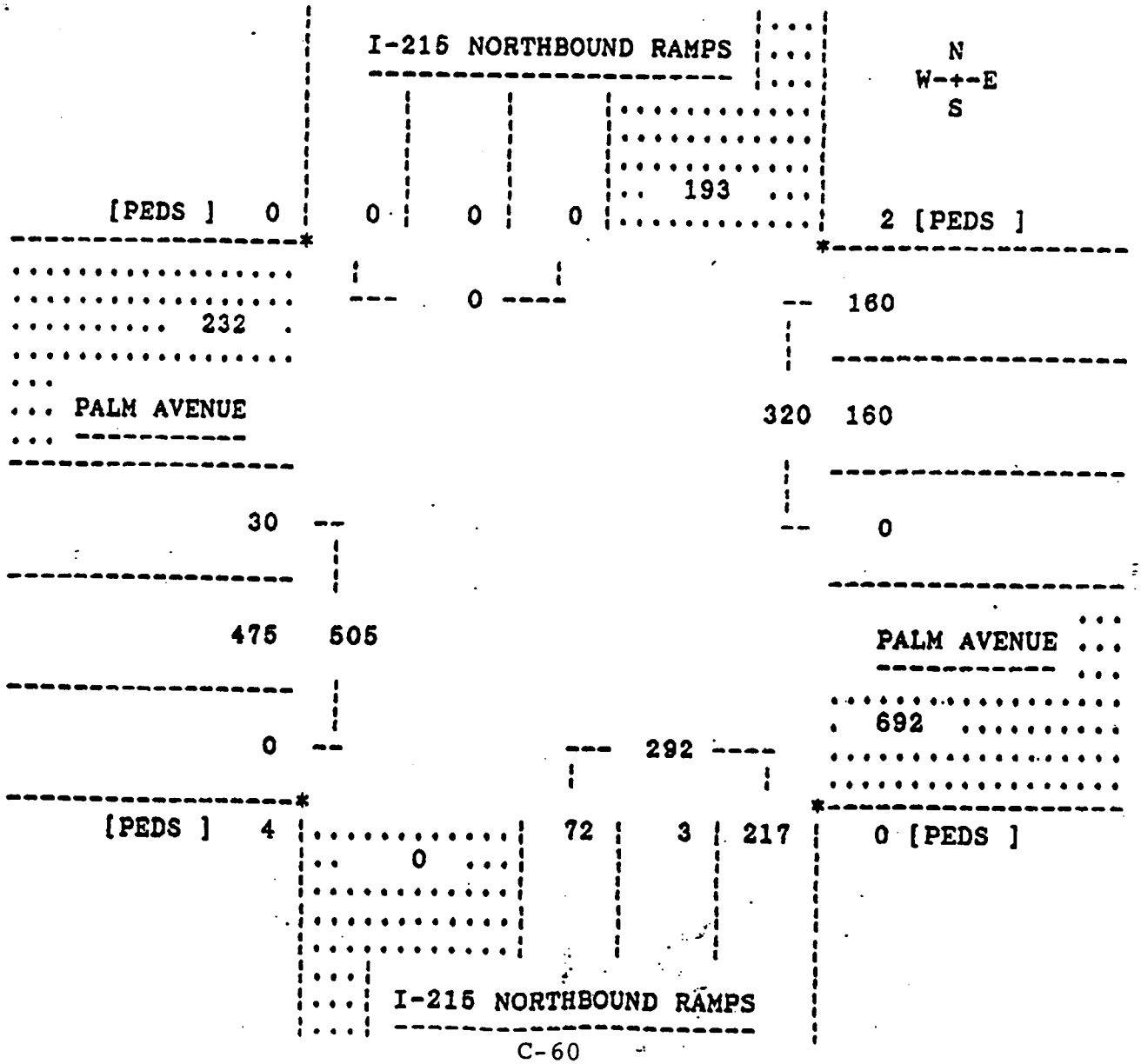
PAGE: 1
FILE: 88215NPP
DATE: 8/20/91

PEAK PERIOD ANALYSIS FOR THE PERIOD: 4:00 PM - 6:00 PM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES PEDS	Right	Thru	Left	Total	PERCENTS PEDS	Right	Thru	Left
North	5:00 PM	0.00	0	0	0	0	0	-	0	0	0
East	5:00 PM	0.93	2	160	160	0	320	-	50	50	0
South	4:45 PM	0.81	0	238	3	59	300	-	79	1	20
West	5:00 PM	0.90	4	0	475	30	505	-	0	94	6

Entire Intersection

North	5:00 PM	0.00	0	0	0	0	0	-	0	0	0
East		0.93	2	160	160	0	320	-	50	50	0
South		0.78	0	217	3	72	292	-	74	1	25
West		0.90	4	0	475	30	505	-	0	94	6



COUNTS UNLIMITED

Site Code : DILGINI3
N-S STREET: I-215 SB RAMPS/KENDALL
E-W STREET: PALM AVENUE
WEATHER : SUNNY

Movements by: Primary

FILE: SB215SPP
DATE: 8/20/91

Time Begin	From North PEDS	RT	THRU	LT	From East PEDS	RT	THRU	LT	From South PEDS	RT	THRU	LT	From West PEDS	RT	THRU	LT	Vehicle Total	PEDS Total
4:00 PM	0	2	8	11	0	11	11	24	0	64	0	1	1	13	22	1	168	1
4:15	0	0	5	21	0	12	9	20	0	78	0	3	1	6	18	1	171	1
4:30	0	0	9	13	0	8	14	26	0	13	1	5	1	6	11	2	167	1
4:45	0	1	6	11	0	15	9	27	0	79	0	4	0	6	10	0	168	0
HR TOTAL	0	3	28	56	0	46	43	96	0	234	1	13	3	31	59	4	674	3
5:00 PM	2	0	3	9	0	13	18	16	0	88	2	8	2	8	18	2	183	4
5:15	0	0	3	6	2	8	14	21	0	101	0	15	1	11	25	1	205	3
5:30	0	1	5	14	0	6	29	27	0	101	0	17	1	13	20	1	234	1
5:45	0	3	5	13	0	12	31	25	0	87	0	15	0	9	18	0	218	0
HR TOTAL	2	4	16	42	2	39	92	89	0	377	2	55	4	39	81	4	840	8
DAY TOTAL	2	7	44	98	2	85	135	185	0	671	3	68	7	70	140	8	1514	11

PEAK PERIOD ANALYSIS FOR THE PERIOD: 4:00 PM - 6:00 PM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES PEDS	Right	Thru	Left	Total	PERCENTS PEDS	Right	Thru	Left
North	4:00 PM	0.84	0	3	28	56	87	-	3	32	64
East	5:00 PM	0.81	2	39	92	89	220	-	18	42	40
South	5:00 PM	0.92	0	377	2	55	434	-	87	0	13
West	5:00 PM	0.84	4	39	81	4	124	-	31	65	3

Entire Intersection

North	5:00 PM	0.74	2	4	16	42	62	-	6	26	68
East		0.81	2	39	92	89	220	-	18	42	40
South		0.92	0	377	2	55	434	-	87	0	13
West		0.84	4	39	81	4	124	-	31	65	3

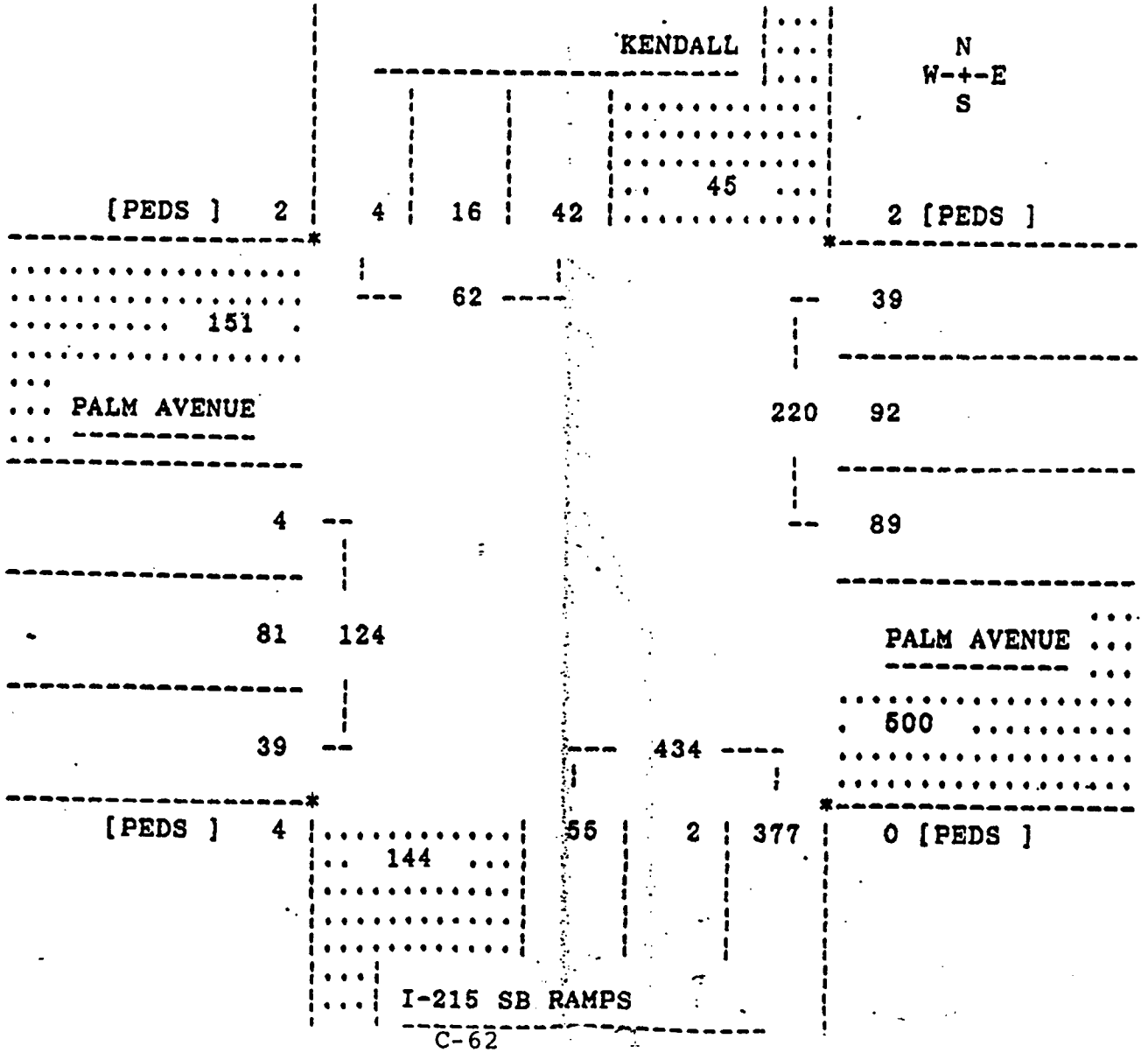
Site Code : DILGINIS
N-S STREET: I-215 SB RAMPS/KENDALL
E-W STREET: PALM AVENUE
WEATHER : SUNNY

Movements by: Primary

PAGE: 1
FILE: SB2158PP
DATE: 8/20/91

PEAK PERIOD ANALYSIS FOR THE PERIOD: 4:00 PM - 6:00 PM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES PEDS	Right	Thru	Left	Total	PERCENTS PEDS	Right	Thru	Left
North	4:00 PM	0.84	0	3	28	56	87	-	3	32	64
East	5:00 PM	0.81	2	39	92	89	220	-	18	42	40
South	5:00 PM	0.92	0	377	2	55	434	-	87	0	13
West	5:00 PM	0.84	4	39	81	4	124	-	31	65	3
Entire Intersection											
North	5:00 PM	0.74	2	4	16	42	62	-	6	26	68
East		0.81	2	39	92	89	220	-	18	42	40
South		0.92	0	377	2	55	434	-	87	0	13
West		0.84	4	39	81	4	124	-	31	65	3



COUNTS UNLIMITED

Site Code : DILGINIS
N-S STREET: I-215 SB RAMPS/KENDALL AV
E-W STREET: PALM AVENUE
WEATHER :

PAGE: 1
FILE: SB215SPA
DATE: 8/20/91

Movements by: Primary

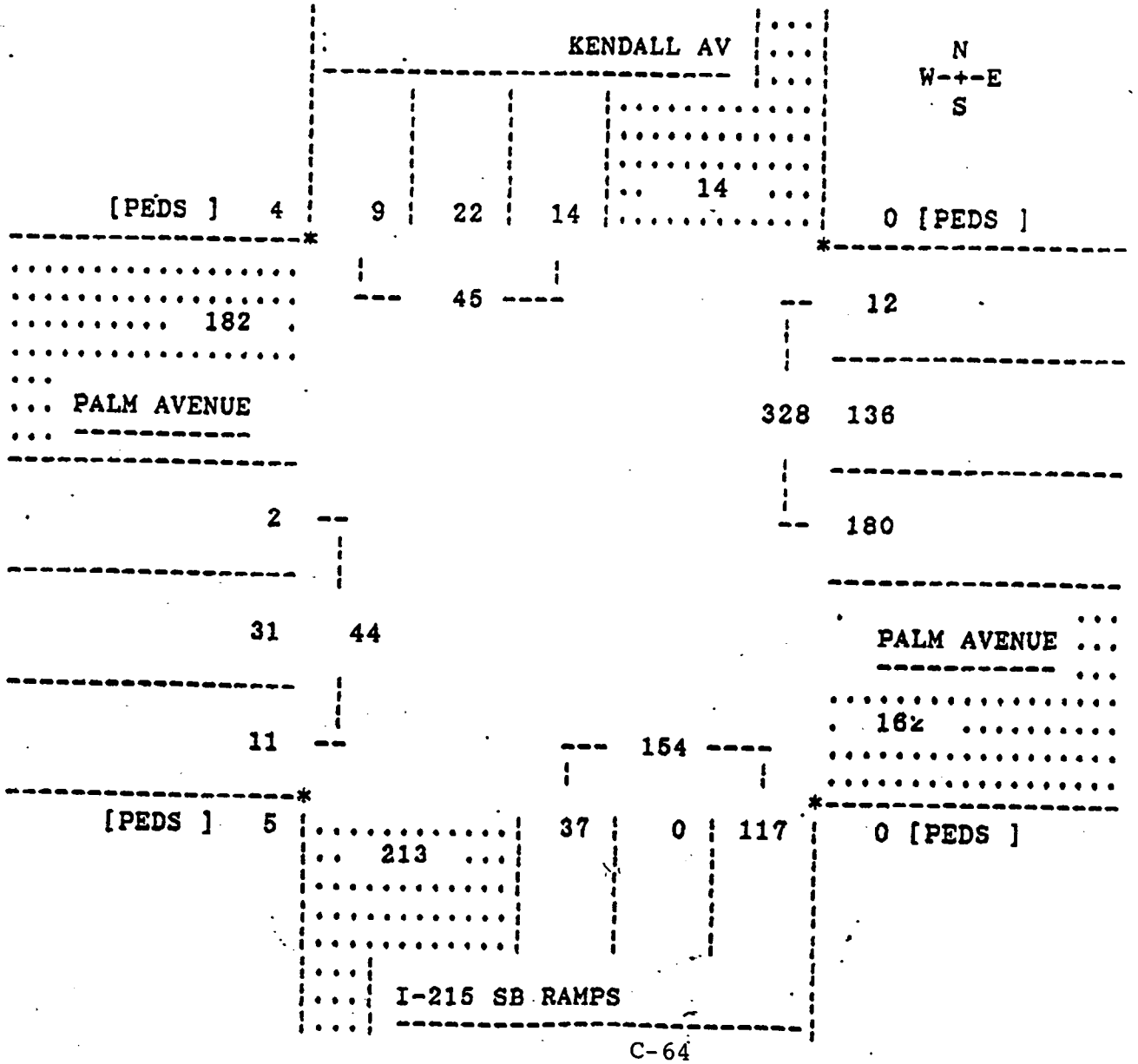
Time Begin	From North PEDS	From North RT	From North THRU	From North LT	From East PEDS	From East RT	From East THRU	From East LT	From South PEDS	From South RT	From South THRU	From South LT	From West PEDS	From West RT	From West THRU	From West LT	Vehicle Total	PEDS Total
6:30	3	3	8	4	0	4	50	39	0	35	0	16	3	1	4	0	164	6
6:45	1	4	3	3	0	4	47	36	0	32	0	10	1	3	9	0	151	2
HR TOTAL	4	7	11	7	0	8	97	75	0	67	0	26	4	4	13	0	315	8
7:00 AM	0	0	4	2	0	2	24	46	0	21	0	7	1	2	12	0	120	1
7:15	0	2	7	5	0	2	16	59	0	29	0	4	0	6	6	2	136	0
7:30	0	1	6	6	0	5	21	89	0	26	0	3	0	1	6	0	135	0
7:45	0	3	4	4	1	6	18	60	0	18	0	7	2	3	5	1	129	3
HR TOTAL	0	6	22	17	1	15	78	224	0	94	0	21	3	11	29	3	520	4
8:00 AM	0	1	10	6	0	4	14	40	0	33	1	6	0	6	6	1	128	0
8:15	0	1	8	8	0	5	12	26	0	22	1	3	0	7	13	3	108	0
DAY TOTAL	4	15	51	38	1	32	201	364	0	216	2	56	7	28	61	7	1071	12

PEAK PERIOD ANALYSIS FOR THE PERIOD: 6:30 AM - 8:30 AM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES PEDS	VOLUMES Right	VOLUMES Thru	VOLUMES Left	VOLUMES Total	PERCENTS PEDS	PERCENTS Right	PERCENTS Thru	PERCENTS Left
North	7:30 AM	0.87	0	6	29	24	59	-	10	49	41
East	6:30 AM	0.88	0	12	136	180	328	-	4	41	55
South	6:30 AM	0.75	0	117	0	37	154	-	76	0	24
West	7:30 AM	0.57	2	17	30	5	52	-	33	58	10
Entire Intersection											
North	6:30 AM	0.75	4	9	22	14	45	-	20	49	31
East		0.88	0	12	136	180	328	-	4	41	55
South		0.75	0	117	0	37	154	-	76	0	24
West		0.79	5	11	31	2	44	-	25	70	5

PEAK PERIOD ANALYSIS FOR THE PERIOD: 6:30 AM - 8:30 AM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES PEDS	Right	Thru	Left	Total	PERCENTS PEDS	Right	Thru	Left
North	7:30 AM	0.87	0	6	28	24	59	-	10	49	41
East	6:30 AM	0.88	0	12	136	180	328	-	4	41	55
South	6:30 AM	0.75	0	117	0	37	154	-	76	0	24
West	7:30 AM	0.57	2	17	30	6	52	-	33	58	10
Entire Intersection											
North	6:30 AM	0.75	4	9	22	14	46	-	20	49	31
East		0.88	0	12	136	180	328	-	4	41	55
South		0.75	0	117	0	37	154	-	76	0	24
West		0.79	5	11	31	2	44	-	25	70	5



COUNTS UNLIMITED

Site Code : DILGINIS
N-S STREET: I-215 NORTHBOUND RAMPS
E-W STREET: PALM AVENUE
WEATHER : SUNNY

PAGE: 1
FILE: SB215NPA

Movements by: Primary

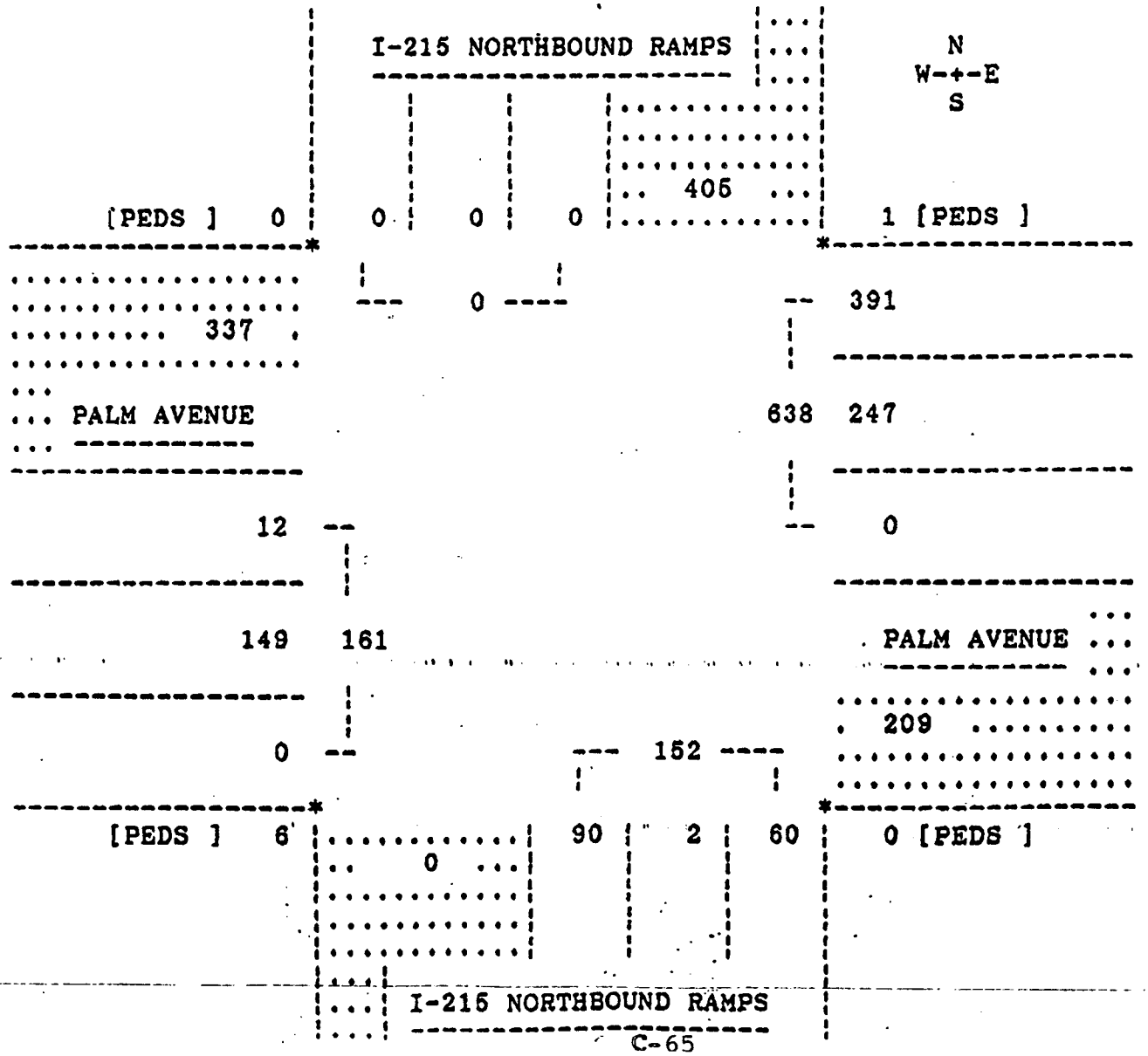
TUE DATE: 8/20/91

PEAK PERIOD ANALYSIS FOR THE PERIOD: 6:30 AM - 8:30 AM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES PEDS	Right	Thru	Left	Total	PERCENTS PEDS	Right	Thru	Left
North	6:30 AM	0.00	0	0	0	0	0	-	0	0	0
East	6:30 AM	0.91	1	391	247	0	638	-	61	39	0
South	6:30 AM	0.75	0	60	2	90	152	-	39	1	59
West	6:30 AM	0.86	6	0	149	12	161	-	0	93	7

Entire Intersection

North	6:30 AM	0.00	0	0	0	0	0	-	0	0	0
East		0.91	1	391	247	0	638	-	61	39	0
South		0.75	0	60	2	90	152	-	39	1	59
West		0.86	6	0	149	12	161	-	0	93	7



Site Code : DILGINIS
N-S STREET: I-215 NORTHBOUND RAMPS
E-W STREET: PALM AVENUE
WEATHER : SUNNY

PAGE: 1
FILE: SB215NPA

Movements by: Primary

DATE: 8/20/91

Time Begin	From North PEDS	RT	THRU	LT	From East PEDS	RT	THRU	LT	From South PEDS	RT	THRU	LT	From West PEDS	RT	THRU	LT	Vehicle Total	PEDS Total
6:30	0	0	0	0	0	112	64	0	0	14	1	36	4	0	40	2	269	4
6:45	0	0	0	0	1	75	62	0	0	19	0	27	1	0	43	4	230	2
HR TOTAL	0	0	0	0	1	187	126	0	0	33	1	63	5	0	83	6	499	6
7:00 AM	0	0	0	0	0	101	57	0	0	13	0	16	0	0	29	3	218	0
7:15	0	0	0	0	0	103	64	0	0	14	1	18	1	0	37	3	234	1
7:30	0	0	0	0	0	95	69	0	0	15	2	18	0	0	40	1	240	0
7:45	0	0	0	0	2	69	73	0	0	18	3	13	1	0	28	1	205	3
HR TOTAL	0	0	0	0	2	368	263	0	0	60	6	58	2	0	134	8	897	4
8:00 AM	0	0	0	0	0	48	49	0	0	23	0	9	0	0	39	4	172	0
8:15	1	0	0	0	3	45	39	0	1	8	1	4	3	0	33	8	138	8
DAY TOTAL	1	0	0	0	6	648	477	0	1	124	8	134	10	0	289	26	1706	18

PEAK PERIOD ANALYSIS FOR THE PERIOD: 6:30 AM - 8:30 AM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES PEDS	Right	Thru	Left	Total	PERCENTS PEDS	Right	Thru	Left
North	12:00 AM	0.00	0	0	0	0	0	-	0	0	0
East	6:30 AM	0.91	1	391	247	0	639	-	61	39	0
South	6:30 AM	0.75	0	60	2	90	152	-	39	1	59
West	6:30 AM	0.86	6	0	149	12	161	-	0	93	7

Entire Intersection

North	6:30 AM	0.00	0	0	0	0	0	-	0	0	0
East		0.91	1	391	247	0	638	-	61	39	0
South		0.75	0	60	2	90	152	-	39	1	59
West		0.86	6	0	149	12	161	-	0	93	7

APPENDIX D

INFRASTRUCTURE IMPROVEMENT PLAN

Bement
Dainwood
Sturgeon

CIVIL ENGINEERS, A Corporation

6859 FEDERAL BOULEVARD ● LEMON GROVE, CALIF. 92045 ● (619) 582-4992

JAMES D. BEMENT, President
KENT L. STURGEON, Vice President
THOMAS A. JONES, Vice President
GORDON K. AXELSON, Associate

February 13, 1991

Mr. Douglas Sprague
CalMat Co
P. O. Box 2950, Terminal Annex
Los Angeles, California 90051

Reference: Cajon Creek

Dear Mr. Sprague:

Please find enclosed a summary and plan of the anticipated infrastructure required to develop the projects within the specific plan area.

Very truly yours,

BEMENT-DAINWOOD-STURGEON
Civil Engineers

Kent L. Sturgeon

KLS:ls

Enclosure

INFRASTRUCTURE IMPROVEMENTS

The following is a summary of the various components of the infrastructure which will have to be constructed in order to provide the necessary levels of service to the project areas.

See the Infrastructure Improvement Plan for a schematic of these summaries.

STREET IMPROVEMENT PLAN SUMMARY

Cajon Boulevard will ultimately have a street width of 64 feet curb to curb. As the various phases develop this will require a widening on the project side of the street to obtain the half-width street. The widening will vary between 4 feet and 15 feet. A 6 foot sidewalk will be built contiguous to the curb.

The intersection of Cajon Boulevard, Palm Avenue and Institution Road will have to be reconstructed to accommodate the ultimate traffic. A major part of this reconstruction will consist of the realignment and widening of Palm and Institution as they approach the intersection. These two roads are currently offset to each other. A traffic signal will also be a major part of the work.

The intersection at Cajon Boulevard and Kendall Drive will have to be modified if the ultimate traffic warrants.

The future internal streets in Planning Area A-B will require a curb to curb street width of 50 feet. There will be no sidewalks required.

The internal streets in Planning Areas G, H, I and J will require a curb to curb street width of 40 feet. There will be no sidewalks required. As G, H, I and J develop, Institution Road will have to be reconstructed. The curb to curb street width from Cajon Boulevard to the railroad will be 64 feet. A 6 foot sidewalk will be built contiguous to the curb. The curb to curb street width under the railroad to the westerly property line will be 36 feet.

RAILROAD SPURS

It is anticipated that railroad spurs will be constructed to serve Planning Areas A-B and N. See the Infrastructure Improvement Plan for the preliminary locations.

WATER SYSTEM PLAN SUMMARY

See Table "A" for the Specific Plan water requirements.

Planning Areas A and B:

There is an existing 16" water main in Cajon Boulevard, which fronts on Planning Areas A & B. The existing system is adequate to serve Areas A & B. When the development occurs, an 8" water main will be constructed in the interior streets to distribute water to the lots.

Planning Areas C, D, E, F:

There is an existing 12" water main in Cajon Boulevard, which fronts on Planning Areas C, D, E & F. These areas will be served directly from Cajon Boulevard.

Planning Area D will initially be the site for an aggregate processing plant. The water demand for this site will initially be approximately 328,000 gal/day.

Planning Area F is a mining area. It is anticipated that a portion of this mining area will be reclaimed for development. The type of development should be similar to Area E.

The existing 12" system is adequate to serve Areas C, D, E and F.

Planning Areas G, H, I, J, K, L:

There is no water line fronting on these planning areas. There is an existing 12" water main in Cajon Boulevard approximately 1,300' southerly of the southern Specific Plan limits. There is also an existing 12" water main in Cajon Boulevard which terminates approximately 1,200' southerly of Little League Drive. Either of these lines has the capacity to serve the project when extended.

Planning Area I will initially be the site for an aggregate processing plant using a dry processing method. The water demand for this site will initially be approximately 79,000 gal/day.

As Planning Areas G, H, I, J develop, a new 8" water main will be extended down Institution Road. Lots fronting on Cajon Boulevard and Institution Road will be provided service from the water mains in these streets. Additional 8" branches of the water main will be built in each of the cul-de-sac streets to distribute water to the interior lots.

Planning Area L is a mining area. It is anticipated that a portion of this mining area will be reclaimed for development. The type of development should be similar to Area K.

Planning Areas M and N:

Planning Area M is a mining area and will not require water service. Planning Area N is the site of an aggregate processing plant, Portland cement concrete batch plant and hot mix asphalt batch plant. Approximately 372,000 gallons of water per day will be required. It is proposed this water will be supplied from an on-site metered well.

SEWER SYSTEM PLAN SUMMARY

See Table "A" for the Specific Plan sewer requirements.

There is no existing sewer main fronting on the Specific Plan Area. There is an existing 18" sewer main in Cajon Boulevard. It terminates southerly of Cable Creek Drainage Channel. This 18" main which has adequate capacity to serve the Specific Plan Area, will have to be extended northerly in Cajon Boulevard before development can take place.

Planning Areas A and B:

When the development occurs, an 8" sewer main will be constructed in the interior streets to serve the lots.

Planning Areas E and K:

These areas will be served directly from Cajon Boulevard.

Planning Areas G, H, I, J:

As Planning Areas G, H, I, J develop, a new 8" sewer main will be extended down Institution Road. Lots fronting on Cajon Boulevard and Institution Road will be served from the sewer mains in these streets. Additional 8" branches of the sewer main will be built in each of the cul-de-sac street to serve the interior lots.

Planning Areas D and N:

Planning Areas D and N are both sites for aggregate processing plants. Sewer needs will be met by chemical toilets or septic systems.

UNDERGROUND STORM DRAIN PLAN SUMMARY

The underground storm drainage system for this project will be classified as major drains. Therefore, a 25 year frequency storm will be carried in the system.

There is no existing underground storm drain system in the area of the project site. As the various phases of the project develop the storm drains will have to be constructed to handle the adjacent drainage basins.

Preliminary hydrology work has been done to determine approximate storm drain sizes necessary to serve the development. Please see the Infrastructure Improvement Plan for the approximate location and sizing of the lines.

In order to outlet these storm drains in Cajon Creek, it will be necessary to obtain easements from the County of San Bernardino and the Railroads.

TABLE "A"

WATER/SEWER
SPECIFIC PLAN SUMMARY

PLAN AREA	ACRES	NET DESIGN ACRES *	WATER GAL./DAY	SEWER GAL./DAY
A (LIGHT IND.)	77.0	61.6	246,400	215,600
B (HEAVY IND.)	47.0	37.6	225,600	188,000
C (HEAVY IND.)	6.0	4.8	28,800	24,000
D (HEAVY IND.)**	18.5	14.8	88,800	74,000
E (LIGHT IND.)	14.0	11.2	44,800	39,200
F (EXTRACTION)	51.0	N/A	---	---
G (LIGHT IND.)	26.0	20.8	83,200	72,800
H (LIGHT IND.)	23.0	18.4	73,600	64,400
I (HEAVY IND.)***	36.5	29.2	175,200	146,000
J (HEAVY IND.)	14.0	11.2	67,200	56,000
K (LIGHT IND.)	36.0	28.8	115,200	100,800
L (EXTRACTION)	130.5	N/A	---	---
M (EXTRACTION)	97.5	N/A	---	---
N (PLANT SITE)****	70.0	N/A	200,000	---
O (OPEN SPACE)	488.0	N/A	---	---
P (EXTRACTION)	257.0	N/A	---	---
TOTALS	1,392.0	238.4	1,348,800	980,800

* This is 0.8 X Acres.

** Initially a plant site with a demand of 328,000 gal/day of make-up water. Sewer needs would be taken care of with chemical toilets or septic tanks.

*** Initially a portable plant site with lower water needs (79,000 gal/day). Sewer needs would be taken care of with chemical toilets or septic tanks.

**** This plant site will require about 372,000 gal/day of make-up water. As an alternative to City supplied water, it is proposed this water be purchased and supplied by means of a metered on-site well. Sewer needs would be taken care of with chemical toilets or septic tanks.

APPENDIX E

PRELIMINARY GEOLOGIC RECONNAISSANCE

PRELIMINARY GEOLOGIC RECONNAISSANCE FOR THE PROPOSED CAJON CREEK PROJECT

DECEMBER 4, 1990

Prepared for:

CalMat Company
3200 San Fernando Road
Los Angeles, California

1550 Hotel Circle North
San Diego, CA 92108
(619) 294-9400
FAX: (619) 293-7920

Woodward-Clyde Consultants

December 4, 1990
Project No. 9053139N-2000

CalMat Company
3200 San Fernando Road
Los Angeles, California

Attention: Mr. Douglas Sprague

PRELIMINARY GEOLOGIC RECONNAISSANCE
FOR THE PROPOSED CAJON CREEK PROJECT
SAN BERNARDINO, CALIFORNIA

Gentlemen:

Woodward-Clyde Consultants (WCC) is pleased to provide the accompanying report, which presents the results of our preliminary geologic reconnaissance for the project. This study was performed in accordance with our proposal dated May 1, 1990 under terms and conditions of our contract between CalMat Company and WCC dated May 1, 1990.

This report presents our conclusions and recommendations pertaining to the proposed sand and gravel extraction and the industrial development.

Our geologist assigned to this project is Mr. Michael E. Hatch, if you have any questions or if we can be of further service, please give us a call.

Very truly yours,

WOODWARD-CLYDE CONSULTANTS

Michael E. Hatch
Project Manager

David L. Schug
C.E.G. 1212

MEH/DLS/eg (b/meh1)

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PRELIMINARY GEOLOGIC RECONNAISSANCE FOR THE PROPOSED CAJON CREEK PROJECT

1.0 INTRODUCTION

1.1 Purpose and Scope of Investigation

This report presents the results of our preliminary geologic reconnaissance and geotechnical feasibility studies at the site of the proposed Cajon Creek Project. The site is located in San Bernardino County in the northern portion of the San Bernardino Valley, in and adjacent to Cajon Creek Wash. The general site area is between the communities of Devore and Muscoy in the Verdemont area.

This report has been prepared exclusively for CalMat Company (CalMat) and their consultants for use in evaluating the property and to provide technical information to be incorporated into a Draft Environmental Impact Report for the proposed project. This report presents our conclusions and/or recommendations regarding:

- The geologic setting of the site;
- Potential geologic hazards;
- General subsurface soil conditions based on available information;
- General extent of existing fill soils;
- Groundwater conditions based on published and available information;
- Preliminary evaluation of stability of proposed cut slopes; and
- General foundation considerations.

1.2 Description of the Project

For our study we have discussed the project with Messrs. Wesley A. Murray and Douglas W. Sprague of CalMat, and Mr. Ed Dilginis of New Horizons. We have also been provided with plans from CalMat titled "Cajon Creek Project Concept Plan", dated May 5, 1989 and topographic base maps of the project area dated May 27, 1987.

We understand that the proposed project will include sand and gravel extraction and processing, and the development of light industrial and rail-access industrial land use. The location and layout of the proposed mining sites and the industrial development are shown on the Site Plan (Figure 1).

1.3 Site Investigation

Our site investigation included visual geologic reconnaissances of the existing surface conditions on July 13, 1990 and August 15, 1990. No subsurface investigations were conducted as part of this study. Subsurface conditions discussed in the following section are based on published and available information, including test boring logs and results of gradation analyses (provided by CalMat) and logs from monitoring wells and water wells.

In addition, we have conducted photogeologic interpretation of stereographic aerial photographs taken in 1938, 1969, 1978 and 1986; a review of pertinent geologic reports and maps; and a review of our files for nearby projects. Local agencies were contacted and searches were conducted to gather information on existing wells in the site vicinity.

2.0 SITE CONDITIONS

2.1 Geologic Setting

The study area is located in and immediately east of Cajon Creek Wash, upstream of the confluence of Cajon and Lytle Creeks in the northwesterly portion of the San Bernardino Valley. The valley is bounded by the San Bernardino Mountains to the northeast and by a portion of the Transverse Ranges, the San Gabriel Mountains, to the northwest.

The San Bernardino Valley is a fault-controlled structural block defined by the San Andreas fault zone to the northeast and by the San Jacinto fault zone to the southwest. The southwestern margin of the block is complicated by a series of stepping and branching faults within the San Jacinto fault zone, including the Glen Helen fault which projects into the site area along three different mapped traces.

Roughly 3 miles to the west of the site area lies the terminus of the Cucamonga-Sierra Madre fault zone. The Cucamonga-Sierra Madre fault zone is a series of east-west trending thrust faults that define the southern mountain front of the Transverse Ranges in the eastern portion of the Los Angeles Basin. The Cucamonga fault is the easternmost fault in this fault zone.

The San Andreas fault zone is located about 1 to 2 miles northeast of the site and trends roughly parallel to the northeastern site boundary. Individual fault splays within the San Andreas fault zone are mapped to within 1/2 mile of the northernmost portion of the site.

Locations of above-mentioned fault zones are shown on Figure 5.

2.2 Surface Conditions

The study site is in an area of low topographic relief in and adjacent to the flood plain of Cajon Creek. Cajon Creek is an alluvial channel, which is dry except during periods of significant rainfall or heavy spring runoff. The active channel areas typically have sparse vegetation and are characterized by sand and gravel exposed at the ground surface. The channel margin areas are slightly higher topographically and are underlain by similar deposits of recent sand and gravel with a very thin, weakly developed mantle of soil that supports a modest growth of chaparral.

The site area is undeveloped in terms of habitable structures but a number of transportation corridors, utility easements, and flood control structures are present on and adjacent to the site. Three adjacent rail lines, the Southern Pacific, the Santa Fe and Union Pacific, are present in the northern portion of the site (Figure 1). The Southern Pacific railroad passes through the central portion of the site in a generally north to south direction, while the Santa Fe and Union Pacific lines split off from the mutual rail corridor and pass along the eastern boundary of the site area.

In the vicinity of the project site the railway is built on a raised fill berm. An underpass structure allows Institution Road to pass below the Southern Pacific rail line. Four roads are present that cross or bound some portion of the site. Devore Road bounds the northern

end of the site area, Kendall Road and Cajon Boulevard bound portions of the eastern site margin and Institution Road traverses the south central site area in a northeast direction. Numerous dirt roads and trails are present on site. Generally unrestricted access to the site area along these dirt roads and trails has resulted in the abandonment of vehicles and the placement of numerous piles of debris, household trash and other fill materials.

Utilities in the site vicinity include: water aqueducts, overhead power transmission lines, petroleum and gas pipelines, telephone lines and municipal water and sewer lines.

2.3 Subsurface Conditions

The following discussion on subsurface conditions is based on limited information from published reports and available documents and on our understanding of the geologic setting of the site.

Channel alluvium and alluvial fan deposits dominate the near-surface geology of the Cajon Creek area. The geologic setting of the area is such that the alluvial deposits of the active Cajon Creek coalesce or interfinger with the alluvial fan deposits emanating from the adjacent bedrock highlands at the mouths of various canyons including Hopper, Ames, Cable and Meyers Canyons.

High energy alluvial processes have deposited materials that are generally very coarse-grained with boulder-sized clasts common. Finer grained, predominantly sandy deposits may also occur at depth as a result of distal alluvial fan deposition from the adjacent mountain fronts. In the site vicinity, the coarser, high energy alluvial deposits are likely predominant in the subsurface. Figure 2 shows the site geology based on existing mapping, aerial photo review, and our limited visual geologic reconnaissance.

Based largely on previous geophysical studies, the thickness of alluvial deposits in the San Bernardino area has been contoured and the depth to bedrock in the site area is estimated to vary from 100 to 200 feet in the northern part of the site, to an estimated 400 to 600 feet in the southern part of the site (Fife and others, 1976).

Exploratory borings advanced by CalMat in the proposed areas of extraction revealed dry conditions and predominantly gravel and sand deposits to depths of greater than 75 to 100 feet below ground surface (Boring 89-1, 89-2, and 79-7 on Figure 2). In the central area of the site, six monitoring wells were placed around the perimeter of a closed Cajon landfill, operated by the County of San Bernardino. These wells were advanced to depths ranging from 280 to 353 feet and encountered alluvial deposits to depths ranging from roughly 265 to greater than 353 feet. Materials encountered included primarily coarse-grained sand and gravel deposits with lesser amount of predominantly sandy material. Few silty intervals and no significant clay layers were recorded on the subsurface logs from these previous investigations.

2.4 Groundwater

2.4.1 Hydrogeologic Setting

The study area lies within the Bunker Hill groundwater basin, an area of about 92 square miles that is bounded by smaller groundwater basins including the Lytle Creek and Rialto-Colton Basins (Dutcher and Garrett, 1963). Natural barriers, including faults and bedrock highs influence the movement of groundwater between the various groundwater basins. Minor barriers to groundwater movement, of varying effectiveness, also exist within the groundwater basins, creating water level variations and localized anamolies. Some of the more prominent minor barriers are the basis for dividing the basins into subbasins, while other barriers are present that further separate the subbasins into compartments. In general, the hydrologic setting of the area is complex given the restricted basin, local stratigraphic variations, faulting, numerous groundwater barriers, and the seasonal variations in the inflow of water into the system.

The complexity of the hydrogeologic setting results in temporal and spatial variations in the depth to water. The variations are sometimes dramatic, as shown by the changes in water depth in a municipal well located in the north central part of the site. This well (Cajon Well No. 1; IN/5W-3H01), has historic water level data covering periods from 1927 to 1957 and from 1973 to the present. This data is considered generally representative of the relative range and duration of water table fluctuations in the site region. Figure 3 shows the

depth to water recorded over a period of almost 50 years and Figure 4 shows the depth to water for the same well recorded over the last 17 years.

Water level fluctuations of greater than a hundred feet are noted at Cajon Well No. 1 during wet years. The current drought is also clearly shown as the depth to water has dropped to greater than 200 feet below the ground surface. Historic minimum depths to water are relatively shallow as shown by Figures 3 and 4 and reflect extended periods of high rainfall. Depth to groundwater for the general site vicinity is normally greater than 120 feet and greater than 300 feet during dry periods. Increased water usage in the San Bernardino area is likely, and may lower groundwater levels in the future. Artificial recharge programs help maintain water levels in some areas of San Bernardino but to our knowledge such recharge efforts are not being conducted in or upgradient of the site vicinity.

2.4.2 Groundwater Levels On-Site

The most representative groundwater data for estimation of the depth to water in the proposed extraction area (E, L, and M) are available from the monitoring wells located in the vicinity of the County of San Bernardino landfill site. The landfill site is in the central part of our study area and is shown on Figures 1 and 2. Six wells were placed in 1988 after the closure of the landfill and are monitored and sampled periodically by the County of San Bernardino. Groundwater levels for two of the wells have been included on the short term hydrograph, Figure 4.

Depth to water in the landfill area measured in March of 1990 varied from 238 feet to greater than 348 feet below the ground surface for well CJ-6 to CJ-1A (some wells have gone dry). An anomaly is present in the landfill area in that adjacent monitoring wells show a marked difference in depths to groundwater and in the depth to bedrock. On the basis of those observations, a suspected fault which acts as a groundwater barrier in the deeper portions of the alluvium has been postulated (I.T., 1989). This postulated fault is shown on Figure 2.

The limited groundwater data from the County landfill area in the vicinity of the planned mining areas suggest excavations to depths of about 120 to possibly 170 feet will likely be

above the regional water table. It is important to note that the landfill groundwater data is fairly limited and that the local groundwater setting is considered complex.

3.0 SEISMICITY

3.1 Tectonic Setting

The site is located in a complex structural zone near the convergence of the San Jacinto and San Andreas Faults. The San Andreas Fault Zone is the dominant structural element in California. However, roughly one-third of the overall slip found on the San Andreas Fault zone in northern and central California is transferred to the San Jacinto Fault in southern California. Slip is transferred across this zone of convergence from the San Andreas Fault to the San Jacinto Fault along a series of en echelon, or stepping, faults.

The Glen Helen Fault is one of the northernmost faults in this en echelon zone within the San Jacinto Fault system. Movement along the Glen Helen Fault, like the San Andreas and the San Jacinto Faults, is characterized as right-slip.

The location of the Glen Helen Fault is well-constrained northwest of the site where the fault's geomorphic expression is clearly visible in bedrock and older alluvial terrain. In the young alluvial deposits of Cajon Creek however, the fault is not well located and our preliminary interpretations of the approximate, buried locations (Figure 1 and 2) are based on the projections of the faults exposed in the bedrock to the northwest of the site and on subtle geomorphology and vegetative lineaments visible on aerial photographs.

Other suspected faults have been mapped by previous workers in the general site vicinity and have been categorized as "questionable faults" on the City of San Bernardino's General Plan. Three of these features have been mapped to the east of the site and are shown of Figure 2. One of these questionable faults has been mapped on-site in the vicinity of the proposed processing plant. Also shown of Figure 2 is the suspected fault postulated as buried beneath the alluvial deposits on the County of San Bernardino's Cajon Boulevard Landfill (I.T. 1989).

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3.2 Historical Seismicity

The San Bernardino Valley is a very active seismic area because of the proximity of the San Andreas and San Jacinto Fault Zones. Other nearby active faults include the Sierra Madre-Cucamonga Fault Zone and the Elsinore-Whittier Fault Zone. Figure 5 shows historic earthquake epicenter locations and magnitudes and their relationship to the major faults in southern California.

Based on the historical seismicity, the San Jacinto Fault Zone can be considered the most active fault zone in southern California (Allen and others, 1965). Eight moderate to large earthquakes have occurred historically on the San Jacinto Fault Zone between Cajon Pass and the Mexican border.

The southern segment of the San Andreas Fault has been less active than the San Jacinto historically, but the San Andreas is capable of generating larger, more damaging earthquakes than the San Jacinto Fault. Detailed studies of the earthquake geology of the southern San Andreas Fault have revealed that a number of seismic events have occurred in the last several thousand years (Weldon and Sieh, 1985). Recurrence of these earthquakes may be on the order of 150 to 200 years. Based on paleoseismic studies, the last large magnitude event on the southern segment of the San Andreas was probably in 1812 (Jacoby and others, 1987).

4.0 DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

The discussions, conclusions, and recommendations presented in this report are based on the information provided to us, results of our field studies, analyses, and professional judgment.

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4.1 Potential Geologic Hazards

4.1.1 Faulting and Ground Rupture

The site is located in a seismically active area near the juncture of two major strike-slip faults zones, the San Andreas and the San Jacinto Fault Zones. Potentially active faults related to the San Jacinto Fault Zone have been mapped on the subject site. The potentially active faults mapped on site are traces of the Glen Helen Fault that have been included in an Alquist-Priolo Special Study Zone (APSSZ), as defined by the State of California and delineated by the State Geologist. Figure 1 shows the Alquist-Priolo Special Studies Zone and the three alternate interpretations of traces of the Glen Helen Fault that have been mapped as buried beneath the young alluvium of Cajon Creek. Ground rupture along these potentially active fault traces is a potential hazard if a moderate to large earthquake were to occur on the Glen Helen Fault. Current site development plans do not include the construction of any habitable structures within the APSSZ and thus, based on the available information, the potential for damage resulting from ground rupture on the mapped traces of the Glen Helen Fault on the subject site is considered low. It should be noted that other unmapped faults may be present given the complex tectonic setting of San Bernardino Valley.

4.1.2 Ground Shaking

The site lies in an area where nearby major active faults including the San Andreas, San Jacinto and Cucamonga-Sierra Madre Fault Zones are capable of generating moderate to large earthquakes. Strong ground motions are likely to occur at the subject site and the surrounding area in the event of a moderate to large earthquake on one of the nearby faults. For planning purposes, the City of San Bernardino in their General Plan (1989) has adopted maximum credible earthquake (MCE) magnitudes and resultant peak ground accelerations derived from regional studies (Fife and others, 1976). This information is tabulated below, along with our estimates of the maximum probable earthquake (MPE) magnitudes which are considered more likely seismic events based on our current understanding of these faults. These estimated accelerations are intended to provide a general assessment of the site seismic hazard, and are not intended to be used as design values.

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MAXIMUM CREDIBLE AND PROBABLE EARTHQUAKE

Fault	Approximate Distance from Site	MCE[1]	Peak Ground[1] Accelerations	MPE[2]	Peak[3] Ground Acceleration
San Andreas	1.6 km	8.5	.80g	7.5	.68 (g)
San Jacinto	0.3 km	7.5	.70g	7.0	.54 (g)
Cucamonga	5.5 km	6.5	.58g	6.0	.26 (g)

Notes: (1) Based on Fife and others (1976). Units are expressed relative to gravity (g).
(2) Modified from U.S. Geological Survey Open-File Report 88-398, (1988).
(3) Based on Joyner and Boore (1988). Units are expressed relative to gravity (g).

It should be noted that the Maximum Credible Earthquake and the resultant accelerations are considered rare events when compared to the probability of occurrence of the Maximum Probable Earthquake. Maximum Credible Earthquake estimates are generally used when critical facilities (like hospitals and schools) are being evaluated. The Maximum Probable Earthquake is generally considered a more likely seismic event. The San Andreas Fault presents what we consider to be the most significant seismic shaking hazard to the subject site because of the larger seismic events expected and its proximity to the site. Statistical analyses suggest that the southern San Andreas has a relatively high probability for a major earthquake in the near future (Sykes and Nishenko, 1984; Wesnousky, 1986).

4.1.3 Liquefaction

The project site lies in an area of high liquefaction susceptibility as delineated by the City of San Bernardino General Plan (1989). The General Plan based its zonation on regional studies conducted by the U.S. Geological Survey (Matti and Carson, 1986). The key issue in these studies is that the minimum depth to water is on the order of 30 to 50 feet for most of the site and as shallow as 10 feet in the northern end of the site. These studies were regional in scope, and apparently did not review subsurface data in the area of CalMat Cajon Creek project. Liquefaction is less likely to occur in areas where the depth to regional water table exceeds 50 feet or so. For the general subsurface conditions in the Cajon Creek study area, the liquefaction susceptibility is, in our opinion, low because of

the very coarse-grained deposits that predominate in the upper 50 feet and given that groundwater levels are typically deeper than 50 feet below ground surface.

4.1.4 Subsidence

Subsidence has been identified as a potential geologic hazard in the central portions of San Bernardino Valley but is not considered a significant geologic hazard in the northern portions of the valley where the Cajon Creek Project is located. Historical subsidence has not been reported for the general project area.

4.1.5 Flooding

Flooding in the site vicinity is considered likely only in the area of the active drainage of Cajon Creek. No development is planned within the 100-year flood plain area, (shown on Figure 2) and thus flooding associated with the 100-year event is not considered a significant impact to the development.

4.1.6 Groundwater

Groundwater conditions are not likely to impact the industrial development portions of the proposed project even during periods of shallow groundwater occurrence. The mining operations, however, will be effected if shallow groundwater occurs. Based on information from Cajon Well No. 1 (1N/5W-3H01) shallow groundwater conditions have occurred in the north central portions of the site. In the past, these periods of shallow groundwater occurrence have varied from a few months to three years in duration.

During shallow groundwater periods, mining operations could be limited to the upper areas of the pit and thus continue to mine dry sand and gravel resources without being significantly impacted. Groundwater conditions should not be significantly impacted by temporary ponding in a small portion of the mine area if the extraction operations remain in the unsaturated areas.

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Anticipated mining depths are 75 feet for area "F" and 120 feet for areas "L" and "M." Actual depth to water in areas "F", "L" and "M" are likely to be significantly deeper than the depths indicated in the Cajon Well (IN/5W-3H1). The depth to water in the prior landfill area is roughly 60 to 170 feet deeper than the levels shown in the Cajon Well for similar periods. Given their proximity to the proposed extraction areas, water levels from the landfill area wells are likely to be more representative of the conditions in the proposed mining areas than the Cajon Well. The data from the landfill wells suggest that it is unlikely that the depth to groundwater will be less than 120 feet, except for short-term responses to heavy rainfall of flood events.

4.2 Geotechnical Considerations

4.2.1 Slope Stability

The extraction areas "F", "L", and "M" all have granular soils consisting of various proportions of sand, gravel and cobbles. A typical sample is expected to have 25 to 35 percent gravel, 2 to 5 percent fines and the remainder sand-sized material. No clay layers were encountered in any of the borings made. For analysis of slope stability an angle of internal friction of 40 degrees was used. A water table level at the base of the pit was assumed.

The static stability of slopes made at an inclination of 2 horizontal to 1 vertical is greater than 1.5 when analyzed using the computer program "PC Slope" and assuming a potential circular failure surface. To analyze the stability of slopes during ground motions associated with a maximum credible event on the San Andreas fault we used a deformation analysis and a horizontal ground acceleration of 0.8 g. The method used is similar to that presented in the paper, "A Simplified Procedure For Estimating Earthquake-Induced Deformation in Dams and Embankments" by Makdisi and Seed. The results of these analyses (considering a 120 foot high slope and 0.8 g. horizontal ground acceleration) indicate that:

- The overall stability of the 2 horizontal:1 vertical slope is likely to be adequate. Instability involving massive, deep seated failure of the slope appears unlikely.

b/meh1

- Shallow ravelling of the slope may however, occur. Slumping of the crest of the slope can also occur. Ravelling and slumping of materials may represent a hazard to structures, equipment, or people working at the toe of the slope.

- The potential for deformations (in this case considered to be settlements) of up to 1/2 foot is moderate within 50 feet of the crest of the slope.

- Deformations at locations beyond 80 feet from the slope crest are likely to be smaller than 1 inch.

- If the groundwater table is above the foot of the excavation, deformations of over 1 foot may occur within 80 feet of the crest; deformations beyond 80 feet are likely to be small.

During times of flooding in the active channel of the stream there may be some lateral movement of infiltrating water that could surface on mine slopes. We would expect some slope ravelling and sloughing during the relatively short duration of such seepage but no major slope instability.

4.2.2 Foundation Design

The design of building foundations for the proposed Light Industrial development, which is proposed for some of the areas adjacent to the mines, will require consideration by the structural engineer of probable differential settlements of footing and floor slab due to settlement of the alluvial foundation soils during an earthquake. However, as our analyses indicate, the settlements should be manageable, provided structures are distanced from the tops of slopes as indicated above.

Designs to resist lateral loads should utilize normal increases of allowable soil bearing pressure for seismic loading. The granular soils are typically good foundation materials. Some near-surface recompaction of loose zones may be required prior to construction.

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4.3 Mitigation of Possible Geologic and Geotechnical Impacts

4.3.1 Faulting and Ground Rupture

Active or potentially active faults are present in the site area, and portions of the site are within an Alquist-Priolo Special Studies Zone (APSSZ). Human-occupancy structures should not be placed within the APSSZ or near suspected fault traces without an investigation into the location and level of activity of the suspected fault. The Cajon Creek project does not propose to locate any human-occupancy structures within the APSSZ; and thus, detailed fault studies do not appear to be warranted.

The City of San Bernardino has identified "questionable faults", one of which is present in the southern portion of the site near the proposed plant facility. To mitigate any potential hazard represented by this suspected fault, a fault study is recommended if structures for human occupancy are planned for this area. Such a study should be designed to locate the fault if present on the site, assess its activity and establish setbacks if warranted.

4.3.2 Ground Shaking

Ground shaking resulting from a moderate to large earthquake in the San Bernardino area is likely to occur within the anticipated life of the project. To mitigate possible high levels of ground motion, human occupancy structures should be designed according to appropriate local building codes. Even so, earthquake damage is possible.

4.3.3 Liquefaction

In our opinion, the liquefaction potential is considered low for most of the site area. Site specific geotechnical studies should include subsurface investigations that would further evaluate liquefaction potential. If liquefaction-susceptible areas are identified, mitigation for proposed buildings would be site specific and might involve enhanced foundation design, remedial grading, or perhaps relocation of the structure.

b/meh1

4.3.4 Subsidence

Subsidence resulting from fluid withdrawal or hydrocompaction has not been reported in the project area and does not appear likely in our opinion. Dramatic changes in the groundwater level appear to be a common occurrence in the site area and apparently have not resulted in detectable area-wide subsidence. Based on existing information, subsidence is not considered a significant geologic hazard on the subject site, and no mitigation measures are suggested.

4.3.5 Flooding

The flood potential for the developed portions of the site is largely mitigated by existing flood control levees. Proposed plant sites and industrial development areas are located outside the 100-year flood plain. Flood susceptibility for the site should be evaluated for final design.

4.3.6 Groundwater

Although open mining pits are not likely to encounter groundwater during extended wet periods, in the unlikely event of such occurrence, the impact would be the loss of water due to evaporation. This is not expected to to have a significant effect on groundwater resources. No mitigation is warranted because the amount of water lost would be very small when compared to the abundance of water that the region will have during such a period of high groundwater levels.

4.3.7 Slope Stability

Slope instability is considered a potential hazard only for periods of strong ground motions accompanying large earthquakes. To mitigate the potential effects of seismic-induced slope instability we recommend:

- For commercial, residential, and industrial buildings, a minimum setback from the top of the slope of 80 feet.

- For preliminary planning purposes, and depending on the level of acceptable risk, a minimum setback of 50 feet may be used for roads, pipelines, railroads, transmission line towers, and flood control structures. The ability of these structures to withstand a few inches of displacement should be evaluated.

4.3.8 Foundation Design

To mitigate the effects of ground shaking, possible liquefaction, and loose surficial soils we recommend:

- Normal geotechnical and structural engineering practices, and providing continuous perimeter footings and floor slabs with reinforcing, should mitigate the effects of seismically-induced differential settlements.

- Recompaction of near-surface, loose or disturbed zones of soil should provide good foundation conditions for the proposed light structures in the Light Industrial development proposed. Site-specific geotechnical studies should be made for grading and construction on the sites.

5.0 UNCERTAINTY AND LIMITATIONS

The recommendations made herein are based on the assumption that soil condition do not deviate appreciably from those found during our preliminary literature review and limited geologic reconnaissance.

This report is intended for planning purposes only and is not sufficient to design the project. Site-specific, design-level studies are recommended for the various elements of the proposed project.

b/meh1

California, including San Bernardino is an area of high seismic risk. It is generally considered economically unfeasible to build a totally earthquake-resistant project; it is, therefore, possible that a large or nearby earthquake could cause damage at the site.

Geotechnical engineering and the geologic sciences are characterized by uncertainty. Professional judgements presented herein are based partly on our understanding of the proposed construction, and partly on our general experience. Our engineering work and judgements rendered meet current professional standards.

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b/meh1

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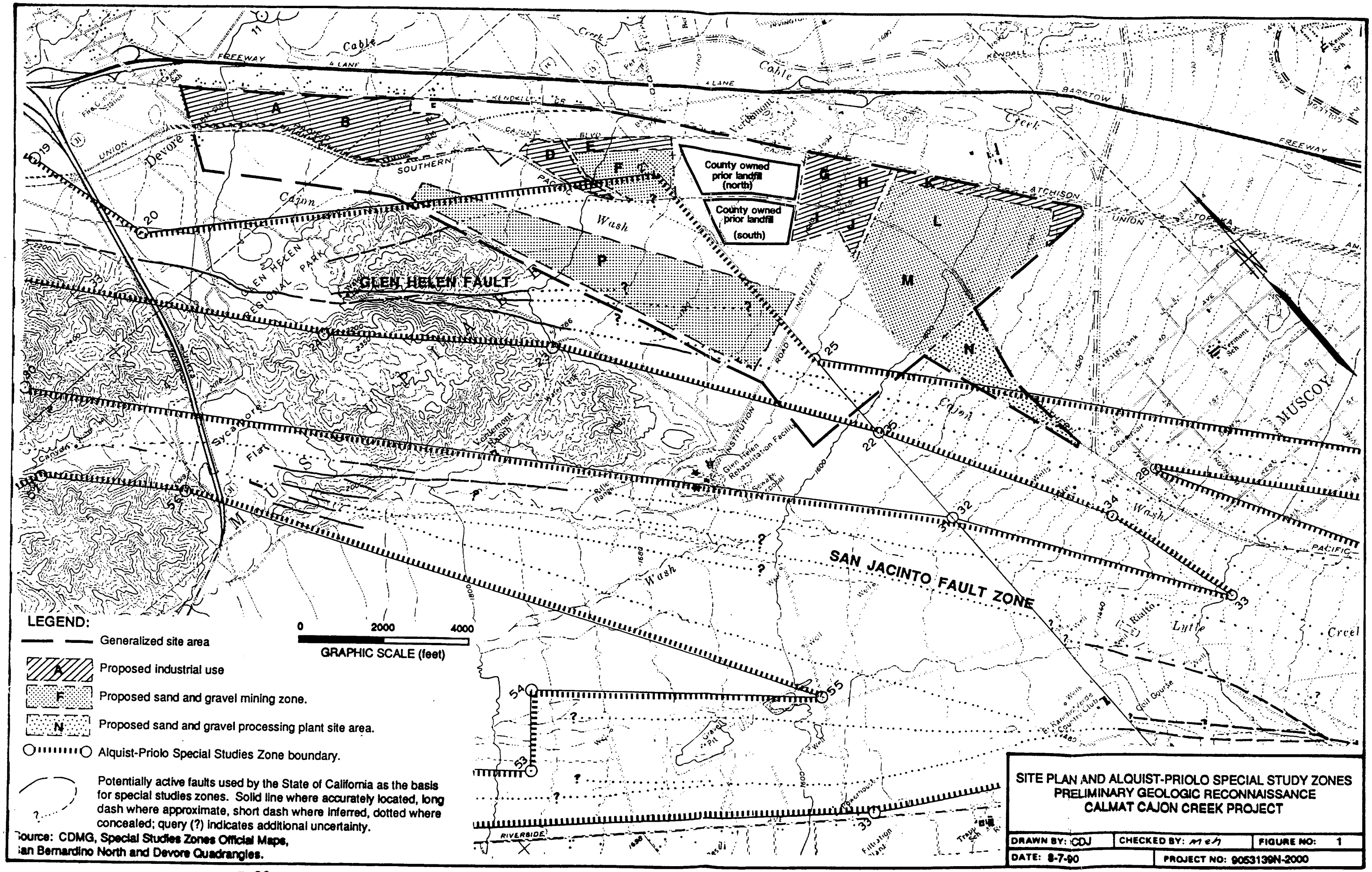


LEGEND:

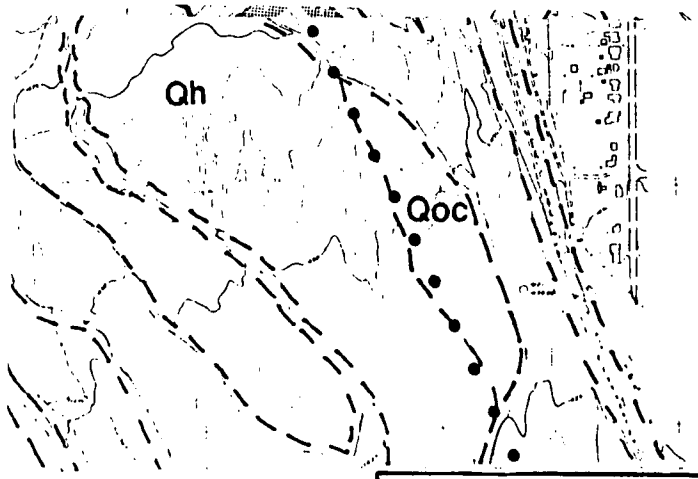
- Generalized site area
- A — Proposed industrial use
- F — Proposed sand and gravel mining zone.
- N — Proposed sand and gravel processing plant site area.
- Alquist-Priolo Special Studies Zone boundary.
- Potentially active faults used by the State of California as the basis for special studies zones. Solid line where accurately located, long dash where approximate, short dash where inferred, dotted where concealed; query (?) indicates additional uncertainty.

0 2000 4000
GRAPHIC SCALE (feet)

Source: CDMG, Special Studies Zones Official Maps, San Bernardino North and Devore Quadrangles.

SITE PLAN AND ALQUIST-PRIOLO SPECIAL STUDY ZONES
PRELIMINARY GEOLOGIC RECONNAISSANCE
CALMAT CAJON CREEK PROJECT

DRAWN BY: CDJ	CHECKED BY: MEH	FIGURE NO: 1
DATE: 8-7-90	PROJECT NO: 9053139N-2000	



SITE GEOLOGIC MAP

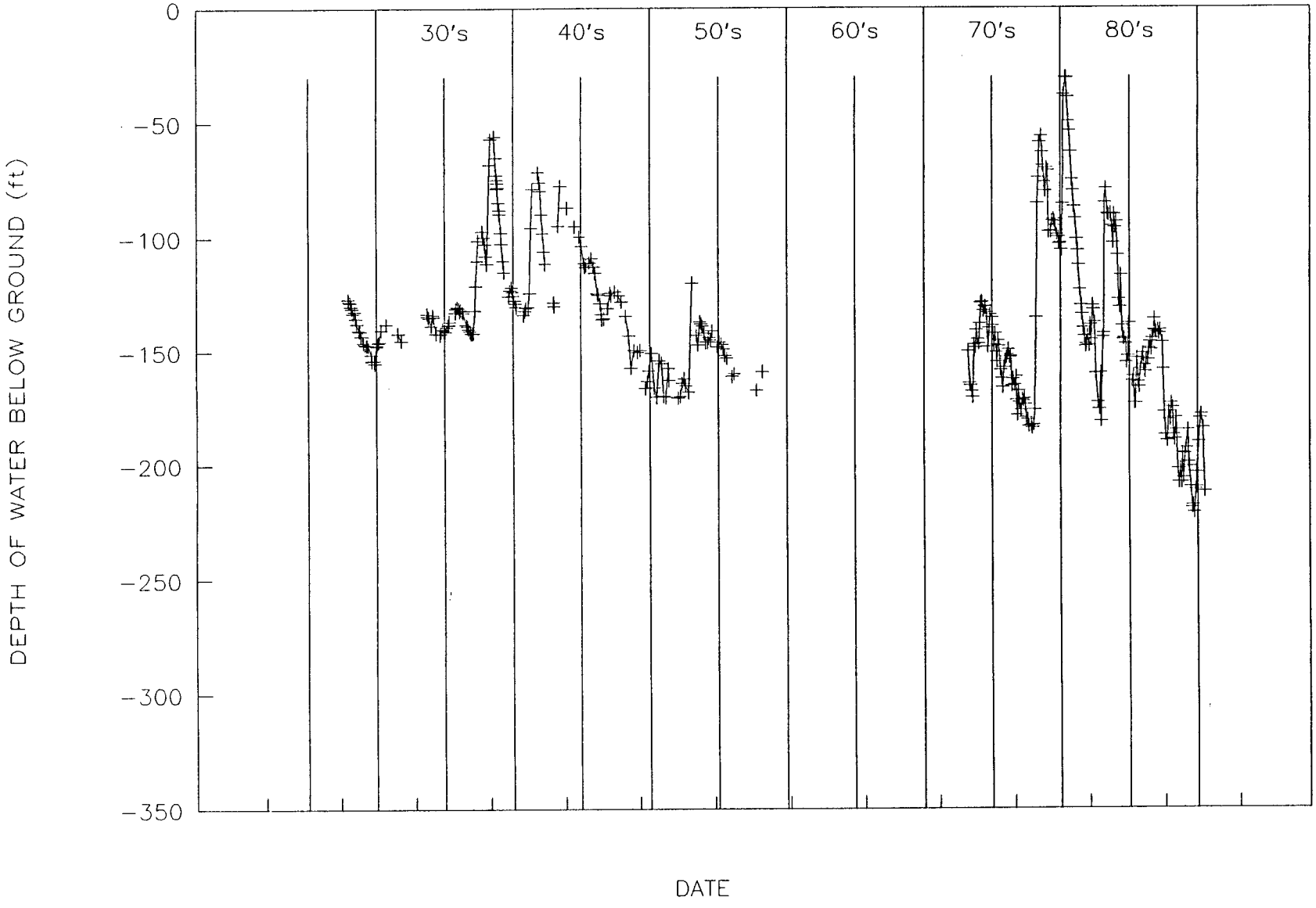
CALMAT CAJON CREEK

PROJ. MANAGER: meh		Figure-2
DESIGNED BY:		
DRAFTED BY: dm		DATE: 8-28-90
CHECKED BY: mch		PROJ.NO.: 9053139N-2000

Woodward-Clyde Consultants

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

1550 HOTEL CIRCLE NORTH , SAN DIEGO CA. 92108 (619)294-9400

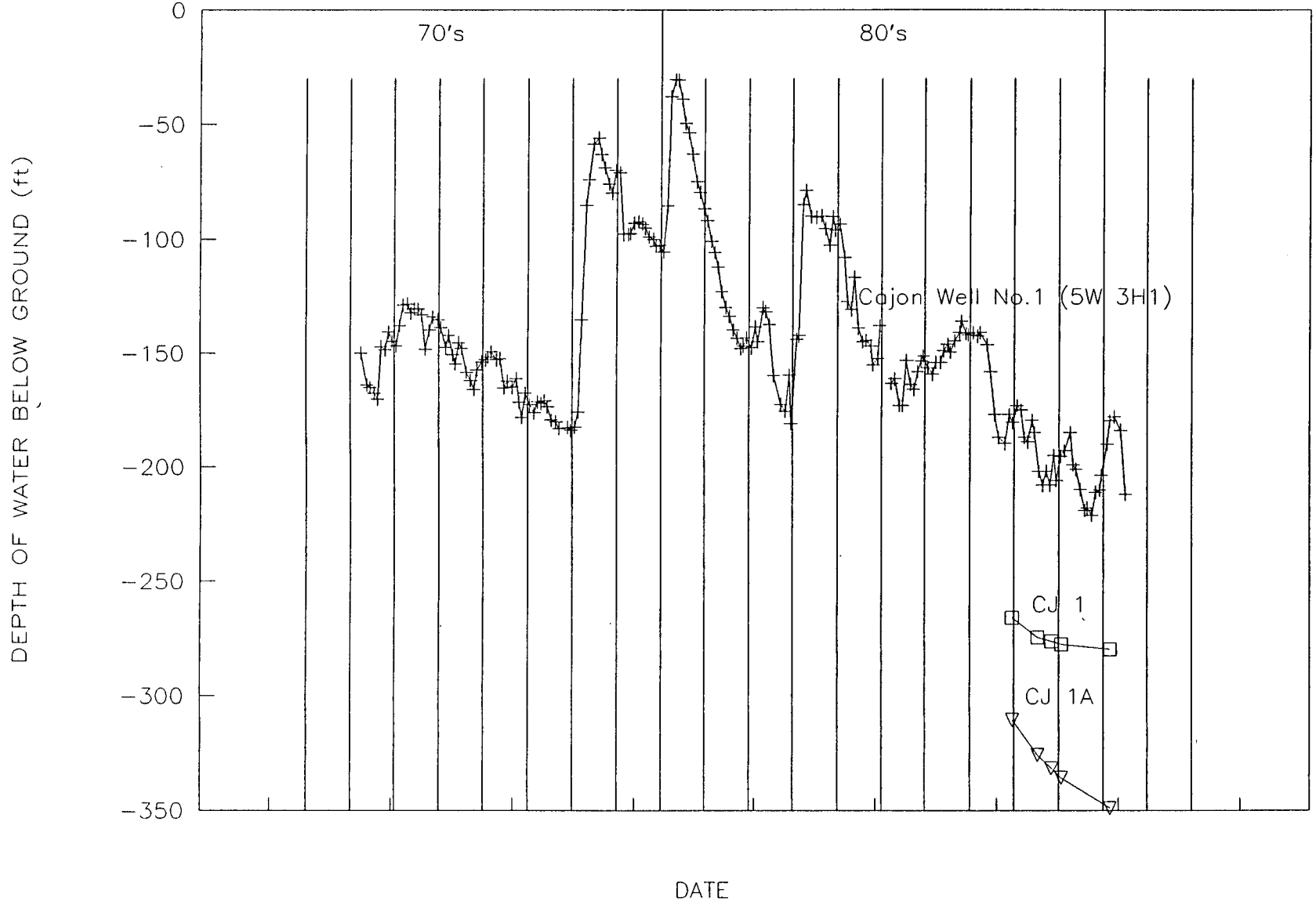


LONG TERM HYDROGRAPH - CAJON WELL NO. 1
1927 - 1957; 1973 - 1990
CALMAT CAJON CREEK PROJECT

SEE FIGURE 2 FOR WELL LOCATION

DRAWN BY: cb	CHECKED BY: mch	PROJECT NO: 9053139N-2000	DATE: 9-20-90	FIGURE NO: 3

WOODWARD-CLYDE CONSULTANTS

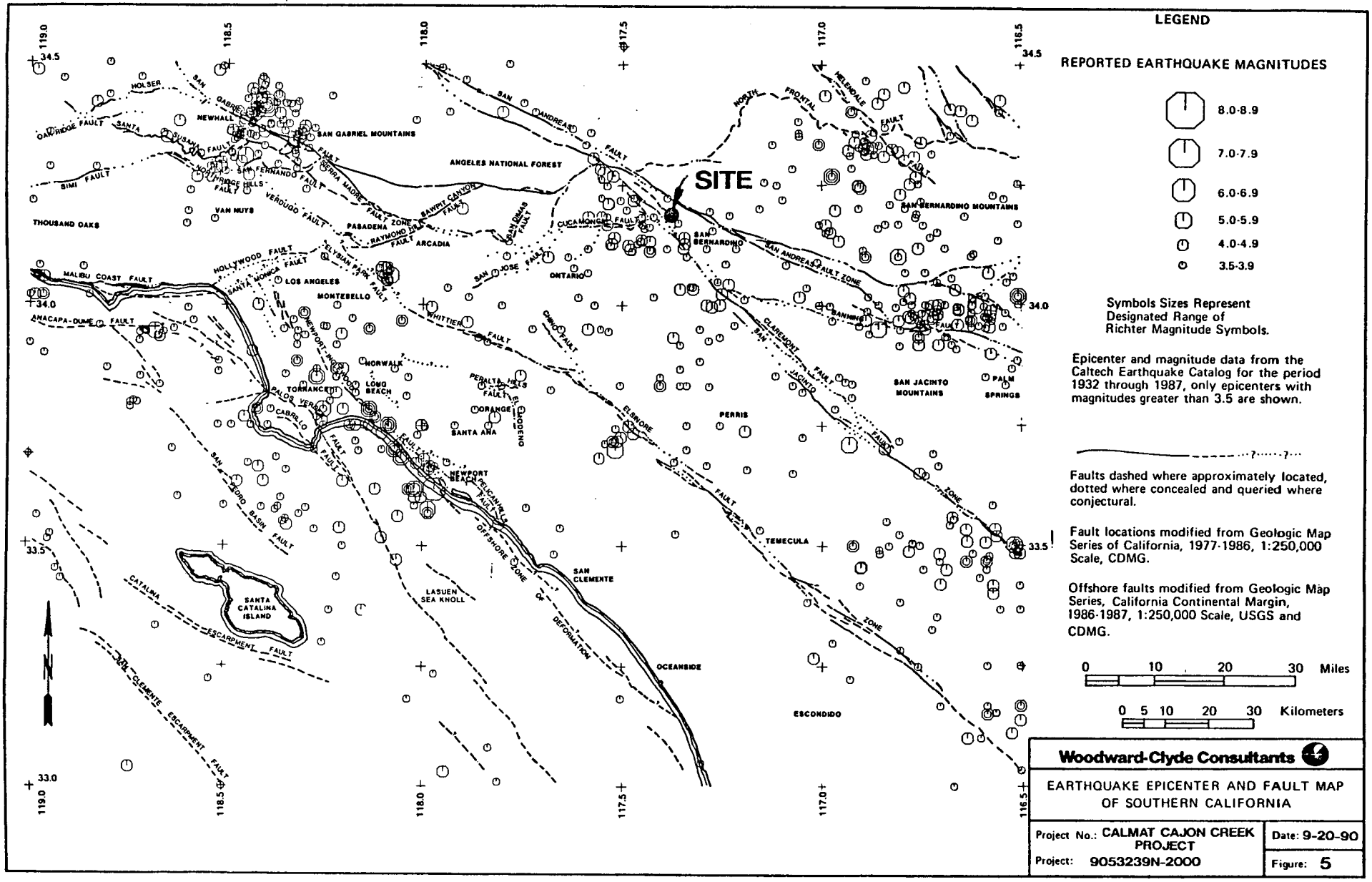


SHORT TERM HYDROGRAPH - CAJON WELL NO. 1
AND MONITORING WELLS CJ-1 AND CJ-1A
CALMAT CAJON CREEK PROJECT

SEE FIGURE 2 FOR WELL LOCATION

DRAWN BY: cb	CHECKED BY: MCM	PROJECT NO: 9053139N-2000	DATE: 9-20-90	FIGURE NO: 4

WOODWARD-CLYDE CONSULTANTS



Woodward-Clyde Consultants

EARTHQUAKE EPICENTER AND FAULT MAP OF SOUTHERN CALIFORNIA

Project No.: CALMAT CAJON CREEK PROJECT	Date: 9-20-90
Project: 9053239N-2000	Figure: 5

APPENDIX F

HYDROLOGIC STUDY

Bement
Dainwood
Sturgeon

CIVIL ENGINEERS. A Corporation

6859 FEDERAL BOULEVARD ● LEMON GROVE, CALIF. 92045 ● (619) 582-4992

JAMES D. BEMENT, President
KENT L. STURGEON, Vice President
THOMAS A. JONES, Vice President
GORDON K. AXELSON, Associate

January 25, 1991

Mr. Douglas Sprague
CalMat Co
P.O. Box 2950, Terminal Annex
Los Angeles, California 90051

Reference: Cajon Creek
BDS No. 90-01

Dear Mr. Sprague:

Please find attached the HEC-2 hydrology study performed by Dr. Howard Chang, at our request, in December 1990. The cross-sectional input data was prepared by our firm, based on topographic information furnished by CalMat.

Cajon Creek has a large flood plain width and a relative steep slope for a large drainage way. As the HEC-2 study shows this results in shallow depth of flooding, typically 3 feet or less. The areas easterly of the S.C.E. easement are considered to be ineffective flow areas.

It is Dr. Chang's opinion that this area easterly of the S.C.E. easement can be encroached upon within the guidelines of the Federal Emergency Management Agency (FEMA).

Please let me know if you need any additional information.

Very truly yours,

BEMENT-DAINWOOD-STURGEON
Civil Engineers

Kent L. Sturgeon

KLS:ls

Attachment

```
**********************************************************
*  WATER SURFACE PROFILES                                *
*  VERSION OF SEPTEMBER 1988                             *
*  ERROR: 01,02,03,04                                    *
*  UPDATED:  JUNE 1990                                   *
*  RUN DATE    12/ 4/90      TIME   16:24:26             *
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****************************************
*  U.S. ARMY CORPS OF ENGINEERS        *
*  THE HYDROLOGIC ENGINEERING CENTER   *
*  609 SECOND STREET, SUITE D          *
*  DAVIS, CALIFORNIA 95616-4687        *
*                                      *
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X     X  XXXXXXX   XXXXX              XXXXX
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X     X  X        X                       X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX


::::::::::::::::::::::::::::::::::::::::::::::
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:::                                        :::
:::   FULL MICRO-COMPUTER IMPLEMENTATION   :::
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END OF BANNER

THIS RUN EXECUTED 12/ 4/90 16:24:26

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**************************************************
  HEC2 RELEASE DATED SEP 88 UPDATED JUN  1990


  ERROR CORR -  01,02,03,04
  MODIFICATION -
**************************************************
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```
T1    CAJON CREEK IN SAN BERNARDINO COUNTY
T2    SEPTEMBER 1990 BY HOWARD H. CHANG
T3    AREAS EAST OF SCE EASEMENT ARE CONSIDERED TO BE INEFFECTIVE FLOW AREAS

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                2                             -1                                    1550

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

    -1                  -1


QT        2     24700     24700
NC     0.04      0.04      0.04       0.1       0.3
X1     6940        43      3370      6750
X3                                   3370                          6750
GR     1550      3080      1553      3150      1550      3230      1550      3280      1547      3320
GR     1550      3370      1547      3550      1550      3630      1552      3670      1550      3700
GR     1549      3800      1550      3850      1550      3950      1549      4050      1550      4100
GR     1550      4150      1551      4230      1550      4300      1547      4400      1550      4470
GR     1551      4550      1550      4650      1550      4900      1547      5000      1546      5170
GR     1547      5260      1550      5300      1550      5400      1549      5420      1545      5770
GR     1550      5840      1550      5880      1547      5960      1550      6100      1550      6330
GR     1548      6370      1550      6400      1550      6650      1549      6700      1550      6750
GR     1550      6950      1547      6970      1550      7000
```

X1	8100	32	3400	6900	1160	1160	1160			
GR	1575	3250	1578	3300	1579	3400	1575	3530	1573	3600
GR	1574	3840	1575	3850	1575	3930	1574	4000	1573	4350
GR	1575	4400	1575	4450	1574	4470	1574	4600	1575	4650
GR	1576	4700	1577	4850	1575	4950	1575	5000	1574	5050
GR	1575	5100	1575	5200	1573	5300	1573	5800	1575	5850
GR	1577	5950	1575	6430	1573	6550	1575	6640	1575	6820
GR	1574	6850	1576	6900						
X1	9130	29	3500	6750	1030	1030	1030			
X3				3500						
GR	1600	3450	1602	3500	1600	3550	1599	3600	1600	3700
GR	1599	3760	1600	3850	1600	4000	1598	4100	1600	4150
GR	1600	4270	1598	4350	1600	4400	1600	4600	1599	4700
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GR	1599	6200	1600	6300	1599	6450	1599	6750		
X1	10290	39	3450	7100	1160	1160	1160			
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GR	1625	3820	1625	3900	1623	3950	1622	4000	1624	4100
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GR	1623	6800	1624	6850	1625	6900	1630	7100		
X1	11420	42	3000	7000	1130	1130	1130			
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GR	1651	5000	1650	5100	1652	5200	1650	5300	1647	5400
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GR	1650	5800	1648	5850	1649	5950	1649	6200	1650	6220
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GR	1647	6900	1650	7000						
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GR	1674	3900	1675	3950	1675	4100	1672	4120	1673	4200
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GR	1674	6150	1675	6200	1673	6400	1672	6500	1675	6550
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66	1710	5080	1708	5150	1709	5300	1710	5320	1710	5460
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GR	1750	4000	1754	4020	1750	4040	1749	4050	1748	4100
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GR     1750      4560      1748      4600      1748      4640      1748      4700      1750      4720
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GR     1747      5350      1749      5450      1747      5510      1750      5560      1747      5630
GR     1750      5700      1748      5770      1750      5850
```

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

```
*PROF 1


CCHV=     .100 CEHV=     .300
*SECNO 6940.000

3265 DIVIDED FLOW

3280 CROSS SECTION   6940.00 EXTENDED       .08 FEET

3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     3370.0    6750.0  TYPE=      1  TARGET=     3380.000
  6940.000      5.08   1550.08   1550.08   1550.00   1550.72       .65       .00       .00   1550.00
   24700.0        .0   24700.0        .0        .0    3825.8        .0        .0        .0 100000.00
       .00       .00      6.46       .00      .000      .040      .000      .000   1545.00   3370.00
   .021920        0.        0.        0.         0         4         0       .00   3007.53   6750.00


*SECNO 8100.000

3265 DIVIDED FLOW

3280 CROSS SECTION   8100.00 EXTENDED       .39 FEET

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
  8100.000      2.39   1575.39   1575.39       .00   1576.10       .71     25.20       .02   1579.00
   24700.0       2.3   24697.7        .0       1.3    3651.3        .0      99.6      75.3   1576.00
       .05      1.77      6.76       .00      .040      .040      .000      .000   1573.00   3250.00
   .021527     1160.     1160.     1160.         6        14         0       .00   2647.50   6884.83


*SECNO 9130.000

3265 DIVIDED FLOW

3280 CROSS SECTION   9130.00 EXTENDED      1.41 FEET

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS=     3500.0    6750.0  TYPE=      1  TARGET=    -3500.000
```

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

```
  9130.000      2.41   1600.41   1600.41       .00   1601.04       .63     22.46       .01   1602.00
   24700.0        .0   24700.0        .0        .0    3888.9        .0      188.7     143.9 100000.00
       .09       .00      6.35       .00      .000      .040      .000      .000   1598.00   3539.69
   .022099     1030.     1030.     1030.         5         5         0       .00   3151.54   6750.00
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*SECNO 10290.000

3265 DIVIDED FLOW

3280 CROSS SECTION 10290.00 EXTENDED .57 FEET

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3720 CRITICAL DEPTH ASSUMED

10290.000	3.57	1625.57	1625.57	.00	1626.19	.62	25.70	.00	1625.00
24700.0	.0	24700.0	.0	.0	3921.0	.0	292.7	228.8	1630.00
.14	.00	6.30	.00	.000	.040	.000	.000	1622.00	3450.00
.022205	1160.	1160.	1160.	20	14	0	.00	3229.19	6922.75

*SECNO 11420.000

3265 DIVIDED FLOW

3280 CROSS SECTION 11420.00 EXTENDED 1.86 FEET

11420.000	2.87	1649.87	1649.80	.00	1650.51	.64	24.32	.01	1650.00
24700.0	439.0	24261.0	.0	86.9	3755.5	.0	393.4	308.8	1650.00
.19	5.05	6.46	.00	.040	.040	.000	.000	1647.00	2900.00
.020863	1130.	1130.	1130.	9	12	0	.00	2935.61	6995.48

*SECNO 12370.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

12370.000	2.83	1674.83	1674.83	.00	1675.55	.72	21.00	.02	1675.00
24700.0	.0	24700.0	.0	.0	3622.6	.0	474.8	370.9	1675.00
.23	.00	6.82	.00	.000	.040	.000	.000	1672.00	3222.61
.023472	950.	950.	950.	10	5	0	.00	2762.31	6547.09

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 13750.000

3265 DIVIDED FLOW

3280 CROSS SECTION 13750.00 EXTENDED .87 FEET

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

13750.000	2.87	1710.87	1710.87	.00	1711.63	.77	30.15	.01	1710.00
24700.0	.0	24700.0	.0	.0	3516.4	.0	587.9	451.2	1710.00
.29	.00	7.02	.00	.000	.040	.000	.000	1708.00	3700.00
.020382	1380.	1380.	1380.	20	5	0	.00	2303.96	6050.00

*SECNO 14320.000

3265 DIVIDED FLOW

3280 CROSS SECTION 14320.00 EXTENDED .63 FEET

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

14320.000	2.63	1725.63	1725.63	.00	1726.36	.73	11.96	.00	1725.00
24700.0	.0	24700.0	.0	.0	3605.6	.0	634.5	483.0	1725.00

```
      .31       .00      6.85       .00      .000      .040      .000      .000   1723.00   3350.00
   .021609      570.      570.      570.         8        11         0       .00   2564.48   6000.00

 *SECNO 15420.000

 3265 DIVIDED FLOW

 3280 CROSS SECTION  15420.00 EXTENDED       .53 FEET

 7185 MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED
  15420.000      3.53   1750.53   1750.53       .00   1751.41       .88     22.65       .05   1752.00
    24700.0        .0   24700.0        .0        .0   3282.9        .0     721.5      539.2   1750.00
        .35       .00      7.52       .00      .000      .040      .000      .000   1747.00   3388.10
   .019637      1100.     1100.     1100.         4        11         0       .00   1887.27   5850.00

 **************************************************
  HEC2 RELEASE DATED SEP 88 UPDATED JUN  1990


  ERROR CORR -  01,02,03,04
  MODIFICATION -
**************************************************

 NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

 EAS EAST OF SCE EASEMENT

 SUMMARY PRINTOUT TABLE  150

     SECNO      XLCH      ELTRD     ELLC      ELMIN      Q         CWSEL     CRIWS     EG        10*KS     VCH    AREA      .01K

*  6940.000       .00       .00      .00    1545.00  24700.00   1550.08   1550.08   1550.72    219.20    6.46  3825.85  1668.29
*  8100.000   1160.00       .00      .00    1573.00  24700.00   1575.39   1575.39   1576.10    215.27    6.76  3652.59  1683.47
*  9130.000   1030.00       .00      .00    1598.00  24700.00   1600.41   1600.41   1601.04    220.99    6.35  3888.92  1661.53
* 10290.000   1160.00       .00      .00    1622.00  24700.00   1625.57   1625.57   1626.19    222.05    6.30  3920.95  1657.56
  11420.000   1130.00       .00      .00    1647.00  24700.00   1649.87   1649.80   1650.51    208.63    6.46  3842.39  1710.06
*  12370.000    950.00       .00      .00    1672.00  24700.00   1674.83   1674.83   1675.55    234.72    6.82  3622.58  1612.22
*  13750.000   1380.00       .00      .00    1708.00  24700.00   1710.87   1710.87   1711.63    203.82    7.02  3516.40  1730.13
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*  15420.000   1100.00       .00      .00    1747.00  24700.00   1750.53   1750.53   1751.41    196.37    7.52  3282.89  1762.61

EAS EAST OF SCE EASEMENT

 SUMMARY PRINTOUT TABLE  150

     SECNO        Q         CWSEL     DIFWSP    DIFWSX    DIFKWS    TOPWID    XLCH

*  6940.000  24700.00   1550.08       .00       .00       .08   3007.53       .00
*  8100.000  24700.00   1575.39       .00     25.32       .00   2647.50   1160.00
*  9130.000  24700.00   1600.41       .00     25.02       .00   3151.54   1030.00
* 10290.000  24700.00   1625.57       .00     25.16       .00   3229.19   1160.00
```

	11420.000	24700.00	1649.87	.00	24.30	.00	2935.61	1130.00
*	12370.000	24700.00	1674.83	.00	24.96	.00	2762.31	950.00
*	13750.000	24700.00	1710.87	.00	36.04	.00	2303.96	1380.00
*	14320.000	24700.00	1725.63	.00	14.76	.00	2564.48	570.00
*	15420.000	24700.00	1750.53	.00	24.90	.00	1887.27	1100.00

SUMMARY OF ERRORS AND SPECIAL NOTES

CAUTION SECNO= 6940.000 PROFILE= 1 CRITICAL DEPTH ASSUMED

CAUTION SECNO= 8100.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 8100.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 9130.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 9130.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

CAUTION SECNO= 10290.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 10290.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 12370.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 12370.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

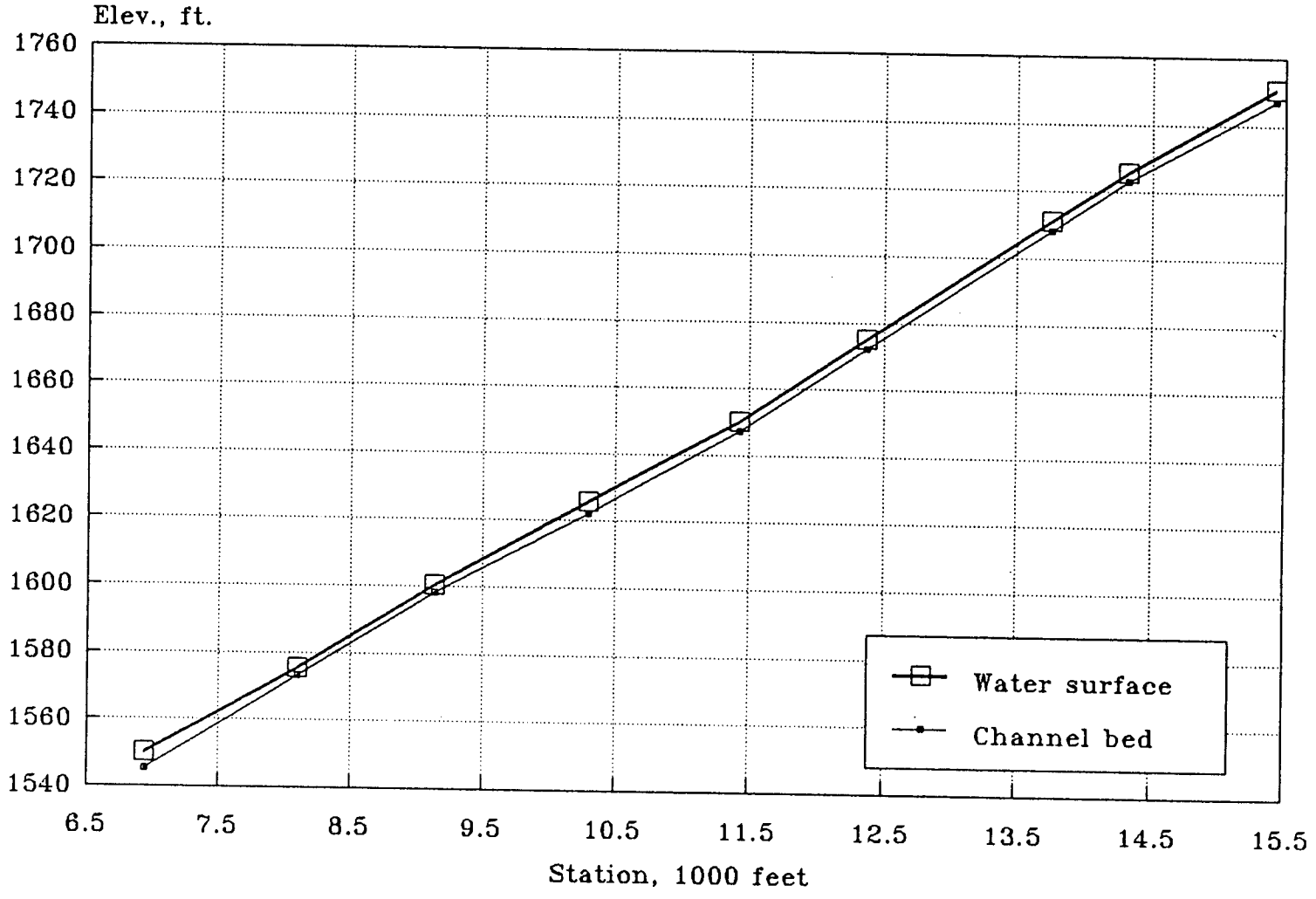
CAUTION SECNO= 13750.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 13750.000 PROFILE= 1 PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO= 13750.000 PROFILE= 1 20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO= 14320.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 14320.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

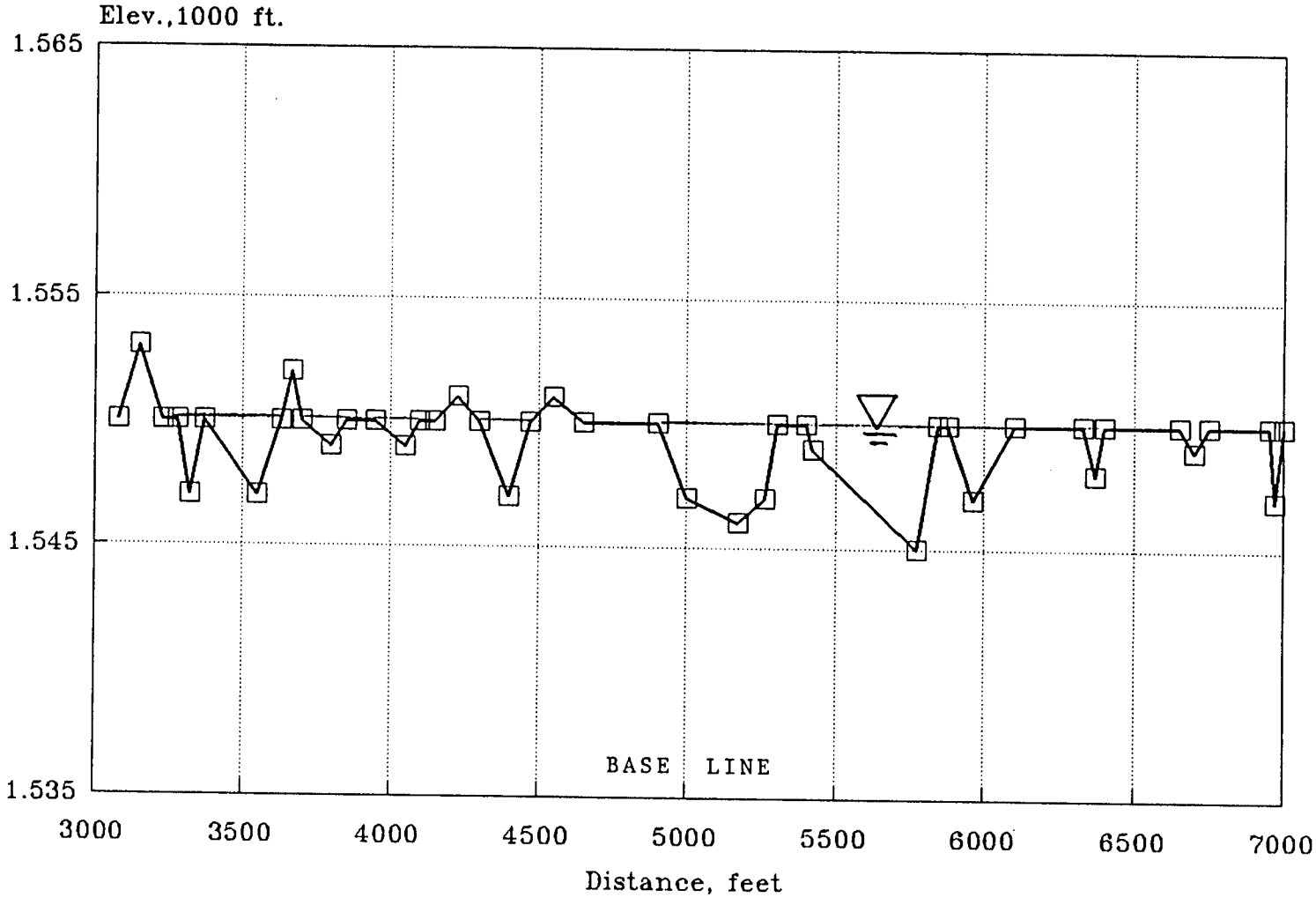
CAUTION SECNO= 15420.000 PROFILE= 1 CRITICAL DEPTH ASSUMED
CAUTION SECNO= 15420.000 PROFILE= 1 MINIMUM SPECIFIC ENERGY

Normal program termination

Cajon Creek
Water-Surface and Channel-Bed Profiles

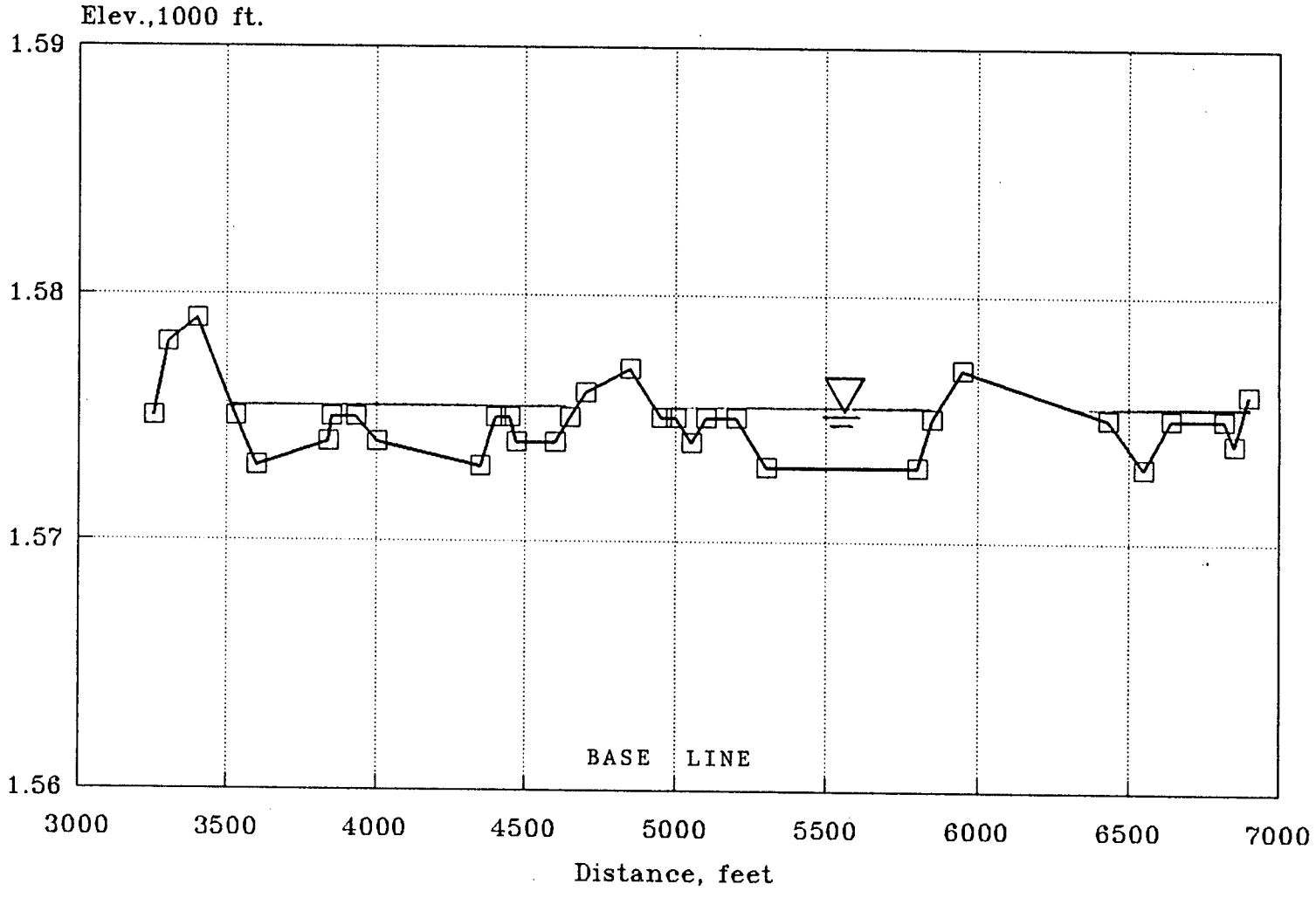


Cajon Creek
Cross-sectional Profile



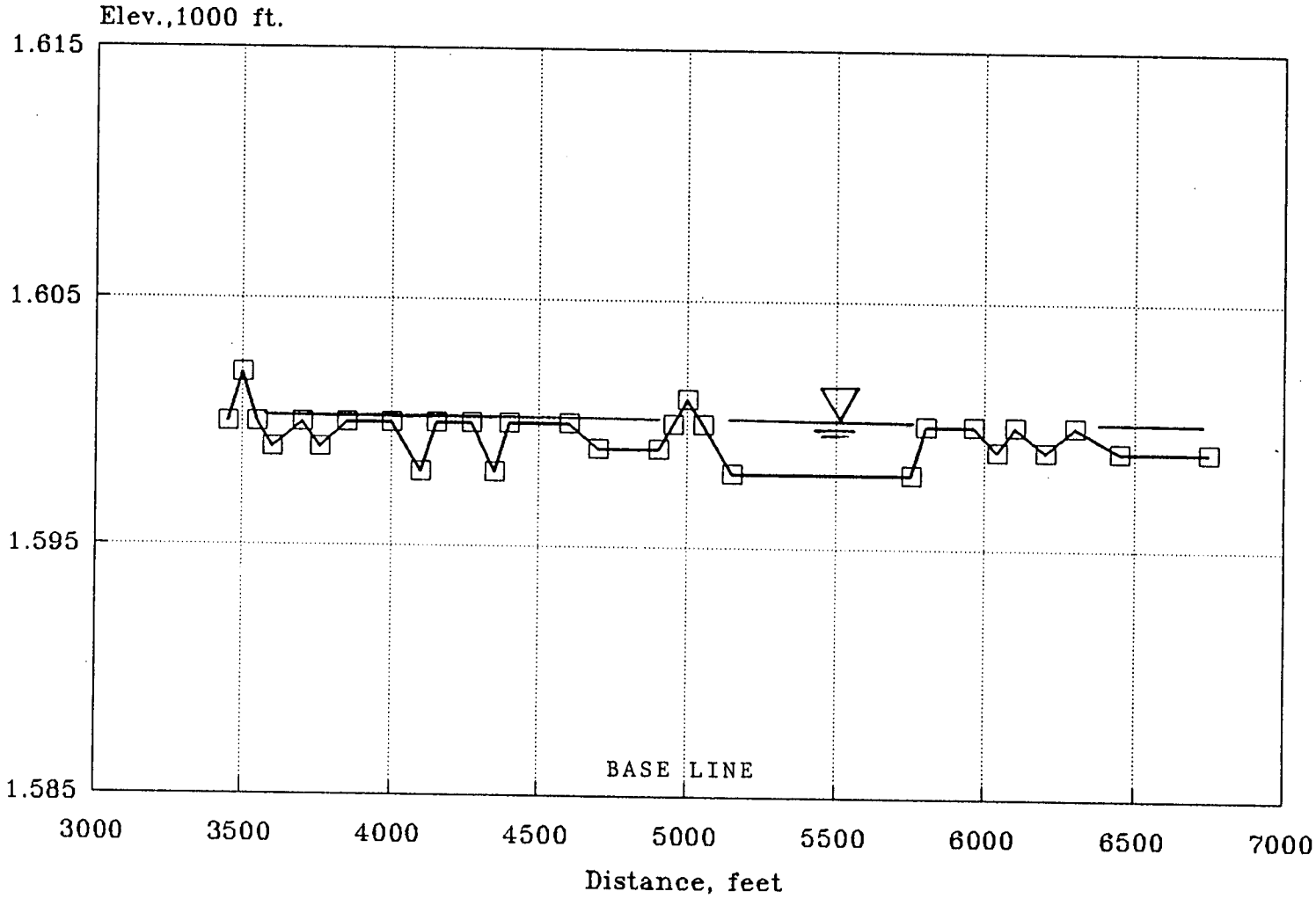
Section 69+40, looking downstream

Cajon Creek
Cross-sectional Profile



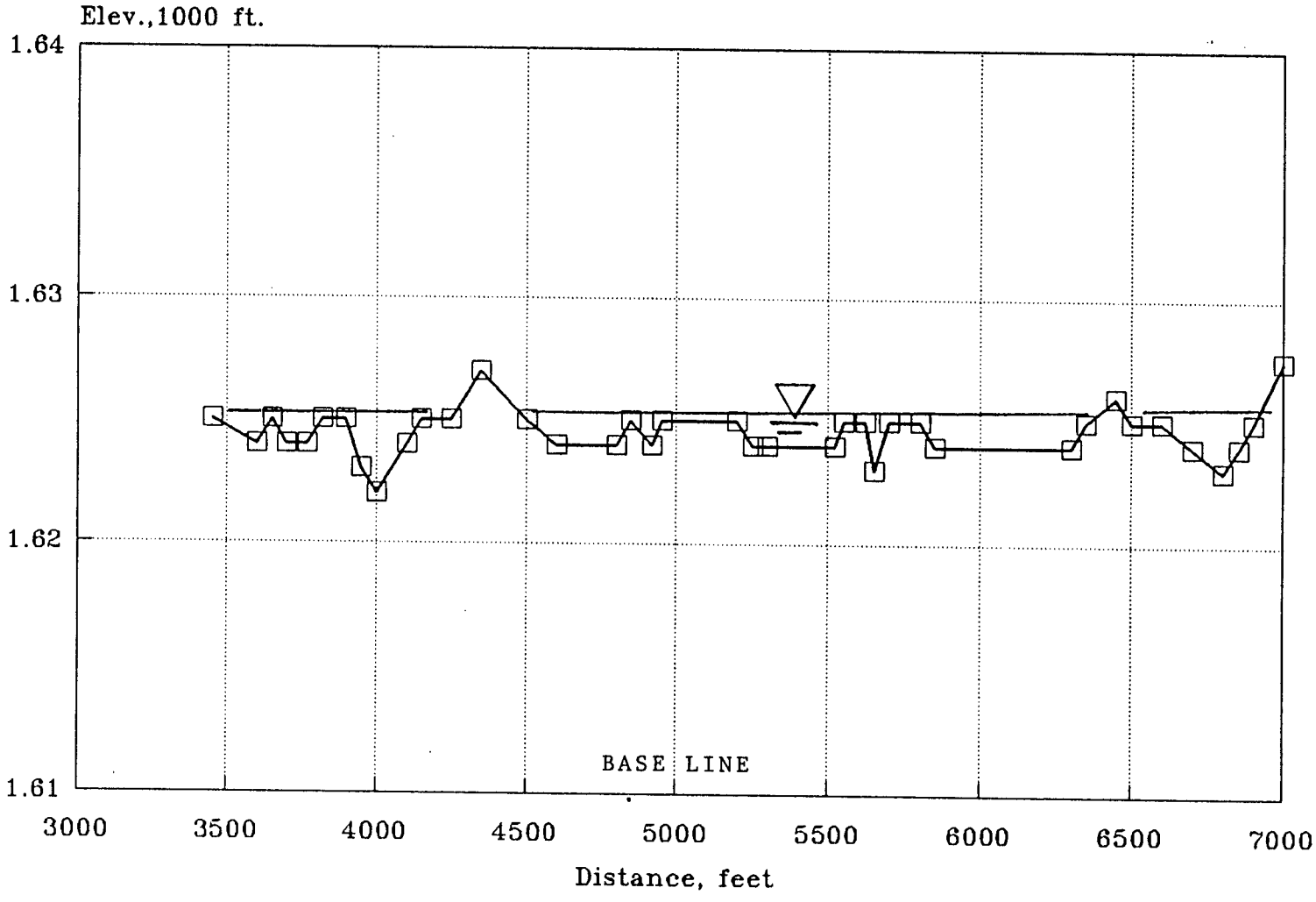
Section 81+00, looking downstream

Cajon Creek
Cross-sectional Profile



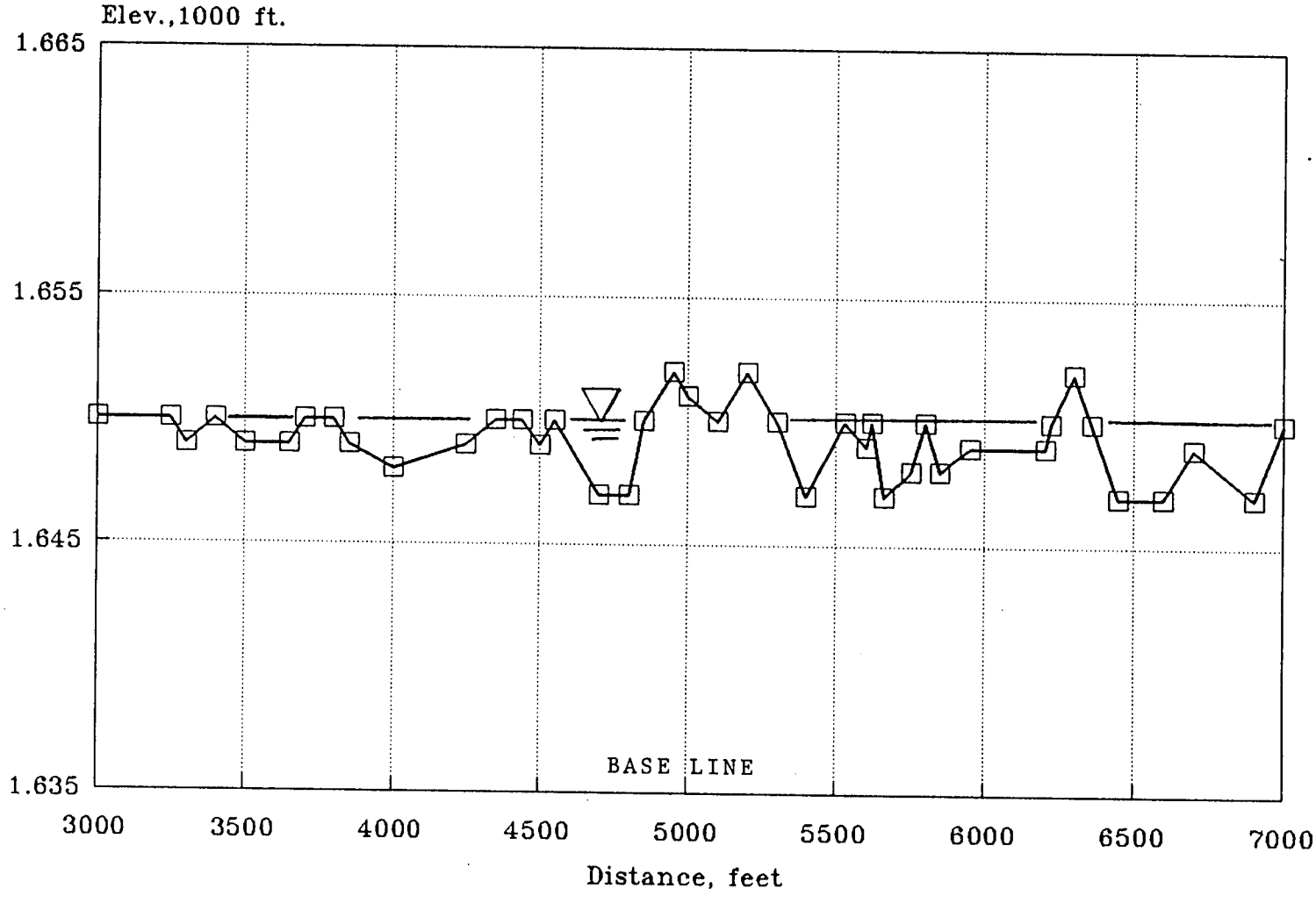
Section 91+30, looking downstream

Cajon Creek
Cross-sectional Profile



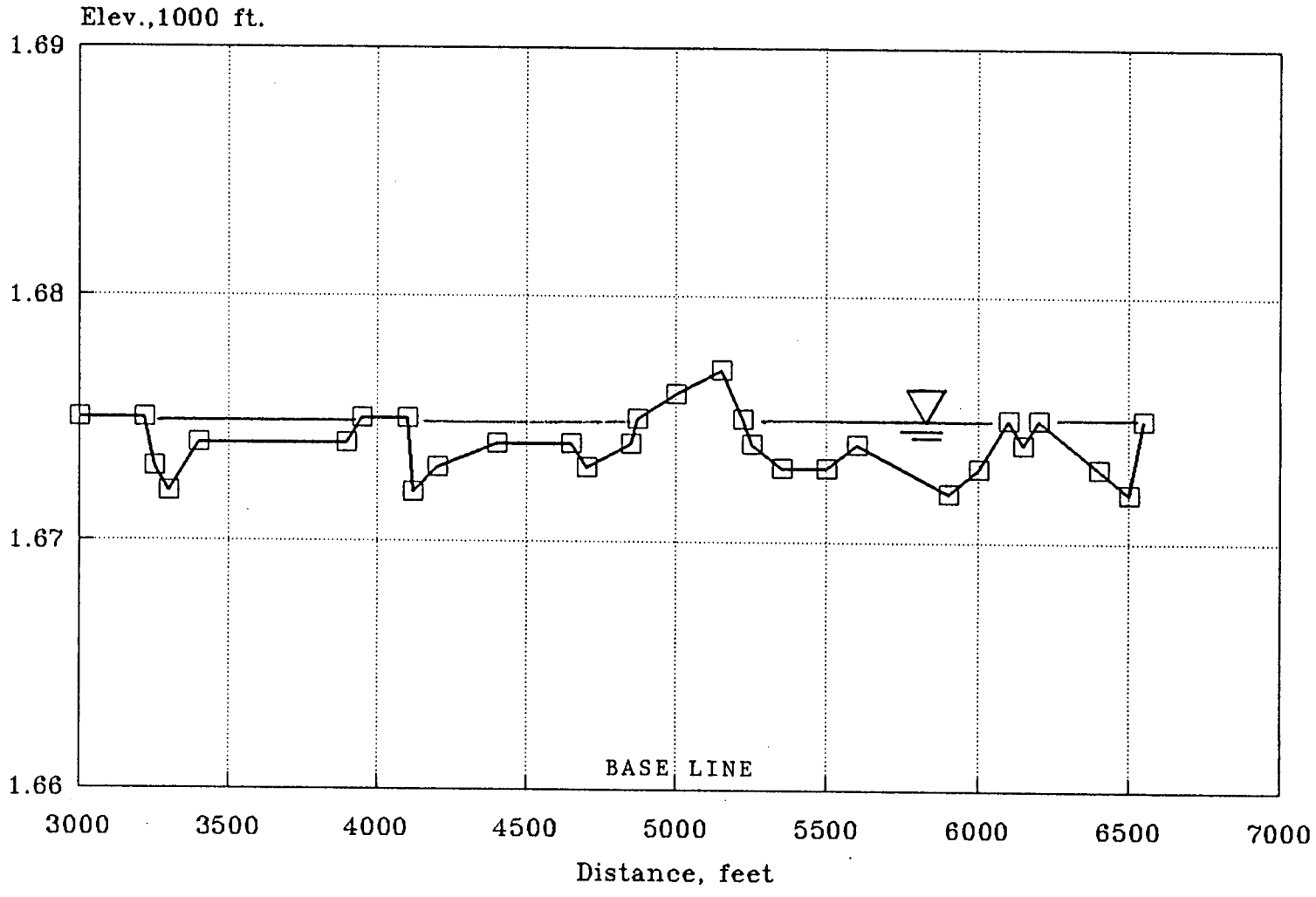
Section 102+90, looking downstream

Cajon Creek
Cross-sectional Profile



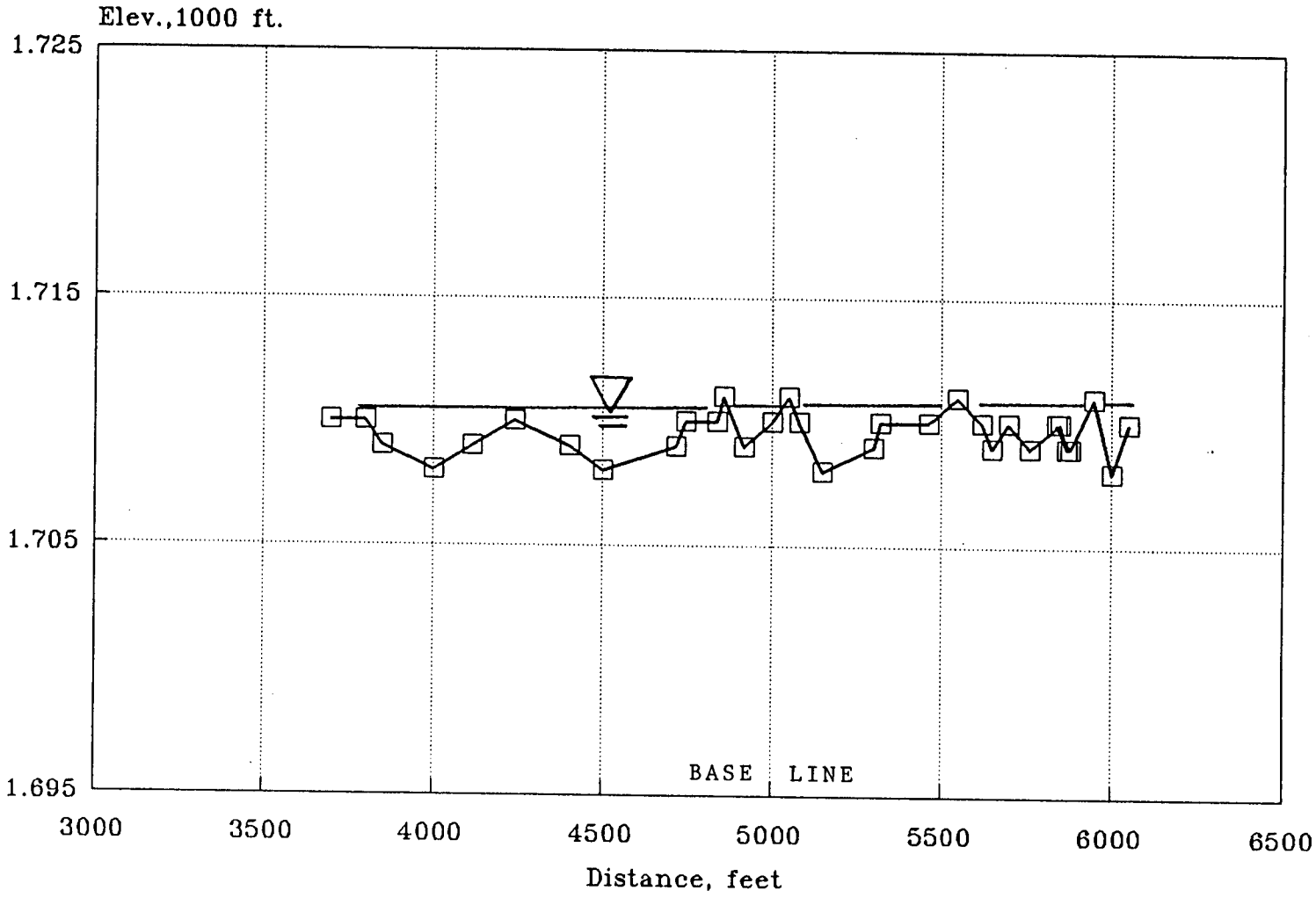
Section 114+20, looking downstream

Cajon Creek
Cross-sectional Profile



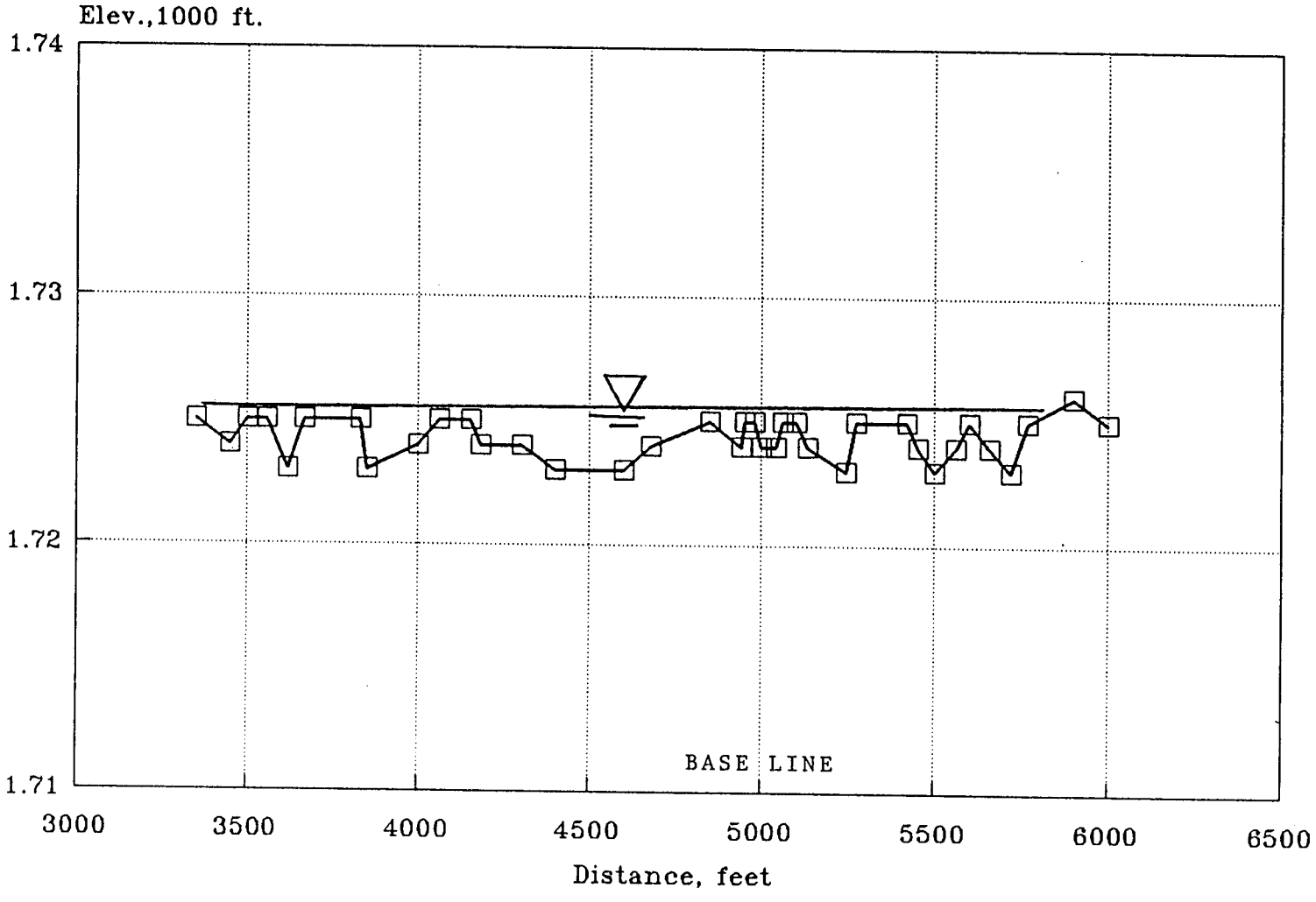
Section 123+70, looking downstream

Cajon Creek
Cross-sectional Profile



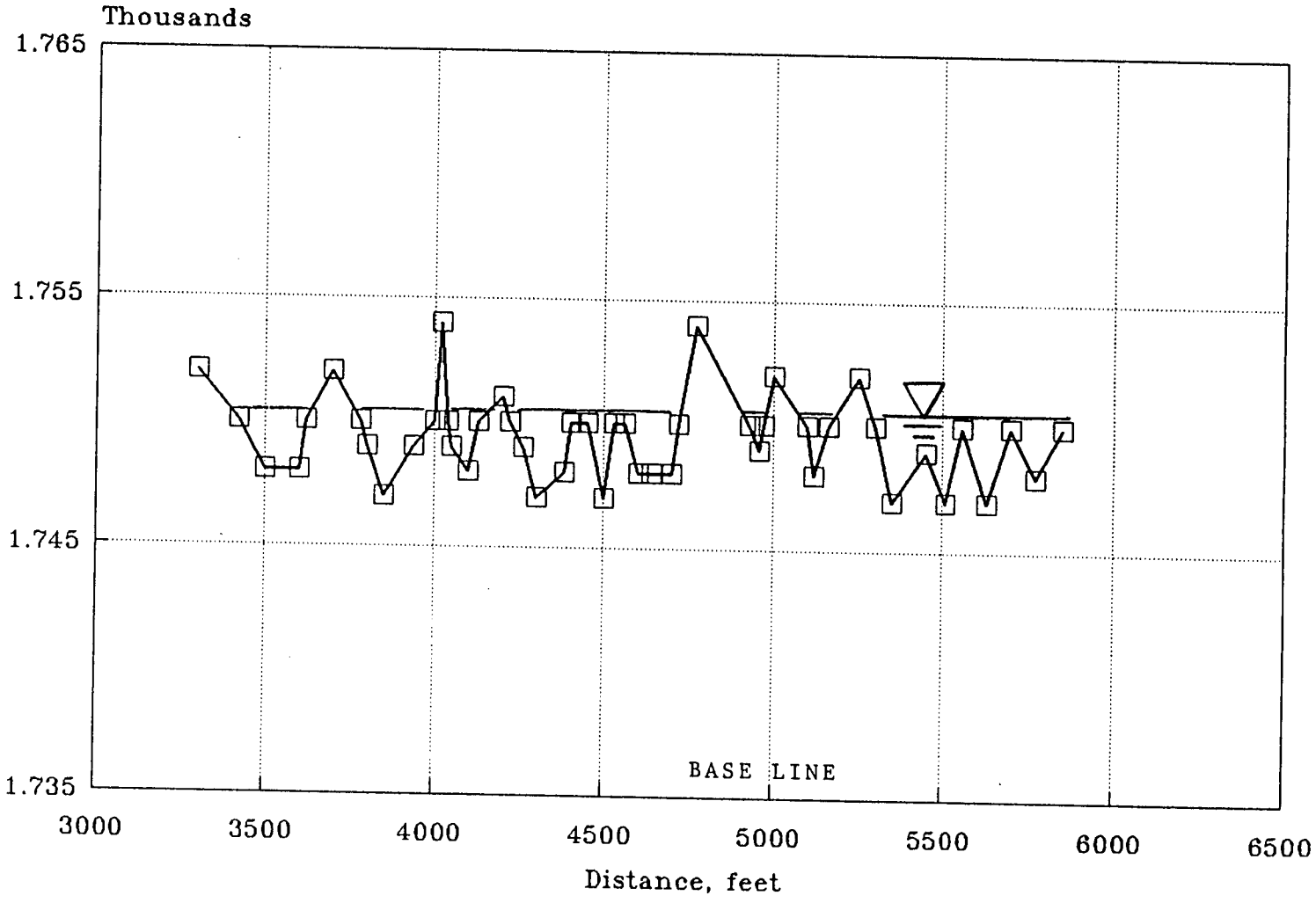
Section 137+50, looking downstream

Cajon Creek
Cross-sectional Profile

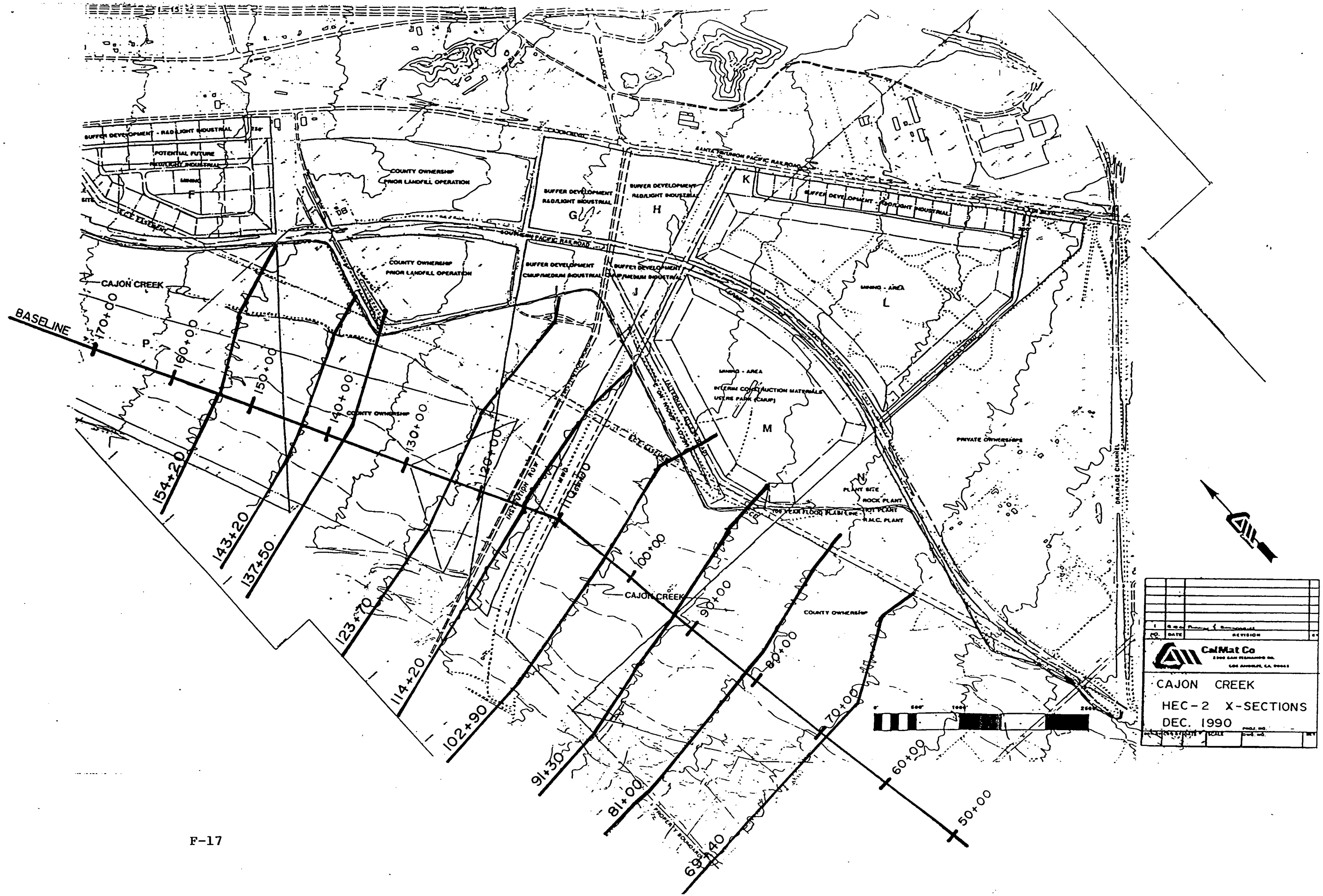


Section 143+20, looking downstream

Cajon Creek
Cross-sectional Profile



Section 154+20, looking downstream


BUFFER DEVELOPMENT - R&D/LIGHT INDUSTRIAL
POTENTIAL FUTURE R&D/LIGHT INDUSTRIAL
MINING
F
COUNTY OWNERSHIP PRIOR LANDFILL OPERATION
BUFFER DEVELOPMENT R&D/LIGHT INDUSTRIAL
G
H
K
SANTA FE SOUTHERN PACIFIC RAILROAD
SOUTHERN PACIFIC RAILROAD
BUFFER DEVELOPMENT CAMP/MEDIUM INDUSTRIAL
J
MINING - AREA
L
CAJON CREEK
BASELINE
P
170+00
160+00
150+00
140+00
130+00
120+00
110+00
100+00
90+00
80+00
70+00
60+00
50+00
154+20
143+20
137+50
123+70
114+20
102+90
91+30
81+00
69+40
MINING - AREA
INTERIM CONSTRUCTION MATERIALS USE PER CAMUP
M
PRIVATE OWNERSHIPS
PLANT SITE
ROCK PLANT
101 PLANT
R.M.C. PLANT
100 YEAR FLOOD PLAIN LINE
DRAINAGE CHANNEL
CAJON CREEK
COUNTY OWNERSHIP
PROPERTY BOUNDARY
CalMat Co
CAJON CREEK
HEC-2 X-SECTIONS
DEC. 1990

INDEX

APPENDIX G

BIOLOGICAL ASSESSMENT

CalMat Cajon Creek Concept Plan

Biological Assessment

Prepared For:

CalMat Properties Division
3200 San Fernando Road
Los Angeles, CA 90065

Prepared By:

Tierra Madre Consultants, Inc.
1271 Columbia Ave, Suite F-10
Riverside, CA 92507

September 20, 1990

I certify that this report is a complete and accurate account of the findings and conclusions of the biological assessment for the CalMat Cajon Creek Concept Plan.

TIERRA MADRE CONSULTANTS, INC.

Scott White

Scott White
Consulting Biologist

CalMat Cajon Creek Concept Plan
Draft Revised
Biological Assessment

Scott White
Tierra Madre Consultants, Inc.

September 20, 1990

Introduction

This report was contracted by CalMat Company as part of the baseline data necessary for consideration of the proposed project by San Bernardino County, the City of San Bernardino and other concerned regulating agencies. The property described in this report totals about 1,300 acres. It is located in Cajon Wash, adjacent to Cajon Blvd. The northern end of the project area is near Devore Road, in Devore. The southern end is about one mile south of the intersection of Cajon Blvd. with Institution Road (Map 1). The Cajon Creek Concept Plan encompasses two separate parcels of land owned by CalMat and a parcel owned by the County of San Bernardino.

As proposed by the Cajon Creek Concept Plan, 586 acres are planned for aggregate mining and a processing site, 268 acres are planned for industrial development, and 440 acres are planned as open space. In this report, the biological resources of the site are described and potential impacts to those resources resulting from the proposed mining and development are discussed.

Methods

A literature review was conducted to identify any sensitive biological elements which are known to occur in the vicinity of the property. The literature review included consultation with the California Natural Diversity Data Base (CNDDB) and reviews of California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California, the U.S. Department of Agriculture Soil Conservation Service's Soil Survey of San Bernardino County, Southwestern Part, California, and unpublished biological reports on nearby sites.

Following the literature review, field surveys were performed by Scott White, Megan Phillips, Gjon Hazard, Richard Montijo, Steve Gardner and Kelly Campbell in May, June and July, 1990. Field surveys were designed primarily to locate suitable slender-horned spineflower habitat and the plant itself if it occurs. In addition, they were intended to provide a thorough characterization of biological resources on the property. Most of the site was systematically walked along linear transects in order to locate suitable habitat for slender-horned spineflower. Where apparently suitable habitat was located, it was carefully examined for the plant. Part of the property was not surveyed until after the spineflower's flowering season (Map 2); this area was briefly examined to locate suitable habitat but detailed searches were not made.

Thirty person-hours were devoted specifically to bird surveys, forty person-hours were devoted to reptile surveys, and forty hours were devoted to locating and measuring woolly-stars to determine whether populations on the property are the endangered Santa Ana River woolly-star. A total of about 225 person-hours were spent on the property. Throughout all fieldwork, all vascular plants and vertebrate animal species seen or identified by sign were recorded in field notes. Plant species of uncertain identity were collected and subsequently identified by Andrew C. Sanders, herbarium curator at the University of California, Riverside campus. All species are referred to in the text by common names. Complete species lists, using both Latin and common names, are included at the end of this report.

Results

Soils

The soil survey of southwestern San Bernardino County (USDA Soil Conservation Service, 1980) indicates four soil types on the subject property, listed below.

Ps -- Psamments and fluvents, frequently flooded.
SoC -- Soboba gravelly loamy sand, 0 to 9 percent slopes.
SpC -- Soboba stony loamy sand, 2 to 9 percent slopes.
TuC -- Tujunga gravelly, loamy sand, 0 to 9 percent slopes.

These soil types are widespread in the San Bernardino area, and are typical of flood plains throughout interior southern California valleys. The soils are substrate for two endangered plants restricted to sandy flood plains (discussed later in the report) but do not provide habitat for sensitive plant species associated only with clay soils. The soil series found on the site are discussed more fully below:

Psamments and Fluvents, frequently flooded - Sandy and gravelly material in intermittent streambeds. Alluvium is deposited and reworked during each flood. Vegetation is generally annual grasses, forbs and shrubs with a few willows or cottonwood trees.

Soboba - Found on talus slopes and alluvial fans. Are excessively drained soils on alluvium from gravelly, cobbly, or stony granitic materials. Annual grasses, forbs, and chamise are common.

Tujunga - Excessively drained soils on alluvial fans and flood plains. Developed on alluvium from predominantly granite materials. Annual grasses, forbs, chamise, willows, and a few cottonwoods are typical.

Vegetation and Flora

The proposed project site is in the alluvial fan of Cajon Creek, south of Cajon Pass, the divide between two major mountain ranges, the San Bernardinos and the San Gabriels. The project site includes land no longer subject to natural flooding and land within the 100-year flood plain as defined by the San Bernardino County Flood Control Department. The land not subject to

flooding is located to the east of levees and raised railroad lines and is protected by these developments (Map 3). The remainder of the property, west of the railroad tracks and levees, is within the 100 year flood plain and remains subject to natural flood processes.

Most vegetation on the property is characteristic Riversidian alluvial fan sage scrub (Holland, 1986). Riversidian alluvial fan sage scrub is considered a sensitive plant community ("communities with highest inventory priority," Holland, 1986). Lands still subject to natural flooding are more representative of this sensitive community, while lands above the flood plain are expected to develop into a plant community resembling upland chaparral as succession continues.

Riversidian alluvial fan sage scrub in the Cajon Wash area is particularly noteworthy because of desert plants occurring there. Desert agave and antelope bush, two plants not normally found on the coastal side of the mountains, were both located on the property. Joshua trees are known from a site adjacent to the CalMat property, though they were not seen on the project site. This may be the species' furthest intrusion into into the San Bernardino Valley.

Flood plain vegetation

To the west of the railroad tracks and flood control structures, most of the Riversidian alluvial fan sage scrub remains in a natural state. An area not planned for mining or development, north of Institution Road and east of the County land planned for mining, has been graded, causing a degradation of habitat quality (Map 1). There are occasional off-road vehicle trails tnroughout the western project site.

The area is a patchwork of open washes and alluvial benches dating to past flood events, representing various successional stages of the plant community. Open washes are dominated by California buckwheat and scalebroom with sparse cover of herbs including chia, Thurber's buckwheat and phacelia. Alluvial benches support these plants, along with chaparral yucca, prickly-pear cactus, mountain mahogany, deerweed and basketbush. Older alluvial benches support older and larger woody plants such as redberry, walnut, sycamore and juniper, along with the shrubs and herbs listed above.

Vegetation above flood plain

To the east of the railroad tracks and levees, vegetation has been degraded by human activity (grading, trash dumping, off-road vehicle use, etc.) and it has been altered by protection from natural flooding. Riversidian alluvial fan sage scrub vegetation experiences periodic natural flood events which remove vegetation and rework soils, leading to a new cycle of plant succession. Areas protected by levees and raised railroad tracks have not been flooded since these structures were built and will not be flooded in the foreseeable future.

The native vegetation has aged and is following a successional pattern which seems to be developing away from Riversidian alluvial fan sage scrub and instead into upland chaparral, dominated by chamise, hoary-leaf ceanothus, sugar

bush, basketbush and other shrubs. There is a large component of herbaceous weedy plants among the native shrubs. These annual weeds tend to reduce habitat quality for native plants, including the endangered slender-horned spineflower and Santa Ana River woolly-star. Further, weeds alter natural fire behavior by igniting easily and carrying fire through open areas between shrubs which might otherwise have stopped or slowed fires.

Although the eastern area is somewhat degraded, it continues to provide suitable habitat for sensitive plants and animals and should not be considered biologically unimportant.

Wildlife Habitat and Fauna

Most of the project site provides suitable habitat for a wide variety of common animal species found in the area. Riversidian alluvial fan sage scrub is a diverse assemblage of plant species, providing abundant seeds and green plant material for herbivorous animals. Degraded habitat to the east of the railroad tracks and levees supports a similar assemblage of birds and mammals to the more natural areas to the west. Vegetation provides cover and nest sites for bird species including California thrasher, California quail, Bewick's wren, loggerhead shrike, rufous-sided towhee, and many others. The habitat is very productive for rodents and rabbits, and provides excellent foraging habitat for birds of prey such as red-tailed hawks, kestrels, great horned owls, golden eagles and prairie falcons.

Audubon's cottontail, Beechy ground squirrels and a bobcat were seen during the field survey. Sign of Botta pocket gopher, kangaroo rats, wood rats, coyote and gray fox were also noted.

The open sandy and rocky areas with sparse shrub cover are excellent reptile habitat. Shaded cover and productive foraging areas support a diverse assemblage of snakes and lizards. Reptiles observed on the site include red racer, San Diego horned lizard, zebra-tailed lizard and others.

Fauna on the site displays a desert influence comparable to the flora's. Zebra-tailed lizard and cactus wren are examples of animals on the Cajon Wash property normally restricted to southern California's deserts.

Sensitive Elements

Plant and animal taxa may be considered sensitive due to declining populations, vulnerability to habitat change or restricted distribution. Certain sensitive species have been listed as threatened or endangered by the U.S. Fish and Wildlife Service or by the California Fish and Game Commission and are protected by federal or state law. Some habitat types, including Riversidian alluvial fan sage scrub, are also considered sensitive biological resources by the California Natural Diversity Data Base.

The literature review showed that sixteen sensitive elements (seven plants, two reptiles, two birds, one mammal and four community types) are known to occur within a five mile radius of the subject property. Five of the plants and three of the plant communities, described below, are not on the property and are excluded from more detailed discussion.

Thread-leaved brodiaea, Orcutt's brodiaea, many-stemmed dudleya, San Bernardino Mountain owl's clover and San Bernardino Mountain bluegrass all occur in the mountains to the northeast of the CalMat property (CNDDB 1989, San Bernardino North quad) and are found in plant communities much different from those on the site. No suitable habitat for these species is located on the property. Cottonwood-willow riparian forest, sycamore alluvial riparian scrub and California walnut woodland are sensitive plant communities in the area. None occurs on the CalMat property, though elements of each community type are found in the Riversidian alluvial fan sage scrub vegetation.

The remaining eight sensitive elements (two plants, two reptiles, two birds and one mammal) are summarized in Table 1 and are discussed in the following paragraphs. Three other sensitive elements were seen during field visits to the area. These are prairie falcon, northern harrier and Plummer's mariposa lily. These three species are included in Table 1 and in the following discussion.

Table 1. Sensitive species considered for CalMat Cajon Wash property.

Sensitive element and associated habitat	Status Designation*	Occurrence Probability*	Number of Sightings
Calochortus plummerae **Plummer's mariposa lily** Mountains, foothills and washes	Fed: ND Calif: ND CNPS: ND Noteworthy	occurs	about 30
Centrostegia leptoceras **Slender-horned spineflower** Alluvial benches	Fed: E Calif: CE CNPS: List 1B R-E-D 3-3-3	high	0
Eriastrum densifolium ssp. sanctorum **Santa Ana River woolly-star** Flood plain of Santa Ana River and tributaries	Fed: E Calif: CE CNPS: List 1B R-E-D 3-3-3	absent	0
Cnemidophorus hyperythrus **Orange-throated whiptail** Brush with rock outcrops	Fed: C2 Calif: CSC	high	0

*status designations and occurrence probability defined at end of table.

Table 1, continued.

Sensitive element and associated habitat	Status Designation*	Occurrence Probability*	Number of Sightings
Phrynosoma coronatum blainvillei **San Diego horned lizard** Sandy areas in grassland or brush	Fed: C2 Calif: CSC	occurs	4
Circus cyaneus **Northern harrier** Various open areas	Fed: ND Calif: CSC	nesting:absent foraging:high	0
Aquilia chrysaetos **Golden eagle** Grassland, brushland, hills and mountains	Fed: ND Calif: CP, CSC	nesting:absent foraging: occurs	2
Accipiter striatus **Sharp-shinned hawk** Hilly areas, brush, woodlands	Fed: ND Calif: CSC, W	nesting:absent foraging: moderate	0
Falco mexicanus **Prairie falcon** Grassland, brushland, hills and mountains	Fed: ND Calif: CSC	nesting:absent foraging: occurs	2
Polioptila californica **California gnatcatcher** Coastal sage scrub	Fed: C2 Calif: CSC	moderate	0
Perognathus longi-membris brevinasus **Los Angeles pocket mouse** Coastal sage scrub and grassland	Fed: C2 Calif: CSC	high	0
Riversidian alluvial fan sage scrub	Fed: ND Calif: CHIP	occurs	n/a

Status designations:

Federal designations:
- E = Federally listed, endangered.
- C2 = Category 2 candidate species. Threat and/or distribution data are not sufficient to support federal listing at this time.
- ND = Not designated.

Table 1, continued

Status designations, continued:

State designations:
- CE = State listed, endangered.
- CP = Fully protected under California Fish and Game Code, Sections 3511, 4700, 5050, 5515.
- CSC = California Department of Fish and Game Species of Special Concern.
- ND = Not designated.
- W = Watch list
- CHIP = Communities with highest inventory priorities.

California Native Plant Society (CNPS):
- List 1B = Plants rare and endangered in California and elsewhere.

R-E-D CODE (CNPS):

R (Rarity)
- 1 - Rare, but found in sufficient numbers and distributed widely enough that the potential for extinction or extirpation is low at this time.
- 2 - Occurrence confined to several populations or one extended population.
- 3 - Occurrence limited to one or a few highly restricted populations, or present in such small numbers that it is seldom reported.

E (Endangerment)
- 1 - Not endangered.
- 2 - Endangered in a portion of its range.
- 3 - Endangered throughout its range.

D (Distribution)
- 1 - More or less widespread outside California.
- 2 - Rare outside California.
- 3 - Endemic to California (i.e., does not occur outside California).

Species listed as "noteworthy" are considered by Tierra Madre Consultants to be unusual occurrences, species of limited distribution or ecologically significant.

Definitions of occurrence probability:

Occurs: Observed on the site by field personnel of Tierra Madre Consultants, or recorded on-site observations by other qualified biologists.

High: Observed on similar habitat in surrounding region by field personnel of Tierra Madre Consultants, or habitat on the site is a type often utilized by the species and the site is within the known range of the species.

Table 1, continued

Definitions of occurrence probability, continued:

Moderate: Reported sightings in surrounding region, habitat on the site is a type occasionally utilized by the species; or site is within the known range of the species and habitat on the site is a type occasionally utilized by the species.

Low: Site is within or near the known range of the species but habitat on the site is rarely used by the species.

Absent: A focused study for this species failed to reveal its presence, or, no suitable habitat is present.

Sources: CNDDB, 1989; CNPS, 1988.

Discussion of sensitive elements listed in Table 1:

Plummer's mariposa lily (Calochortus plummerae) is a violet-flowered herbaceous plant in the lily family. The plant was collected on CalMat property and identified by Andrew Sanders of the UC Riverside Herbarium. According to Sanders, the plant is quite uncommon and may warrant special consideration, but it is not included in the Inventory of Rare and Endangered Vascular Plants of California (CNPS 1988). Based on Sanders' suggestion, the herbarium collection at Rancho Santa Ana Botanic Garden was examined for Calochortus plummerae specimens.

Herbarium collections indicate that it is widely distributed in cismontane southern California, from the Santa Monica Mountains to the San Jacintos and San Bernardinos. It occurs on sandy and rocky soils, usually of granitic or alluvial material, in plant communities including coastal sage scrub, chaparral (including burned-over chaparral), open yellow pine forest, and grasslands. Its elevational distribution ranges from below 1,000 feet to about 5,000 feet.

Many of the collection sites have been extirpated, and there is no doubt that much of the species' habitat has been lost to development. Examples of presumably extirpated sites include Los Angeles (1892), Rialto (1938), Claremont (1912), and Monrovia (1960). Even so, many of the sites have not been developed. These include locations on National Forest land in the San Gabriel, San Bernardino and San Jacinto Mountains. It does not appear that the proposed project would significantly impact this species, although the ongoing cumulative loss of habitat may eventually become a significant impact.

Slender-horned spineflower (Centrostegia leptoceras) is a small, prostrate, spring-blooming annual of the buckwheat family. Its habitat is dry sandy benches of washes within coastal sage scrub vegetation. Populations of the slender-horned spineflower range from the San Fernando Valley to the San Bernardino Valley and the Elsinore area, but most historic locations have been

eliminated by urbanization and flood control channel modification (CNPS, 1988). Even where the plant's habitat has not been destroyed by development, it has been altered by flood control activities so that flooding no longer occurs on many historic sites. The plant seems to be dependent on periodic flooding, and this extensive loss or alteration of habitat has resulted in the listing of slender-horned spineflower as endangered by both the State of California and the US Fish & Wildlife Service.

Slender-horned spineflower blooms between April and June. It cannot be detected outside this period. The plant may not germinate every year, possibly due to fluctuations in rainfall or other environmental factors. In order to determine its presence or absence, an area should be surveyed in each of several consecutive springs. Surveys should consist of closely spaced transects through suitable habitat. Because it is so small, slender-horned spineflower can easily be overlooked.

Much of the CalMat property in Cajon Wash may be suitable habitat for Centrostegia leptoceras. Alluvial benches on the western portion of the property seem to provide the best habitat because they are still subject to natural flooding, there is little human disturbance and little competition from non-native weedy grasses and herbs. By comparison, the area to the east of the railroad tracks is not subject to flooding, it is somewhat disturbed by human activity, and there is a heavy cover of weedy plants.

Tierra Madre Consultants has surveyed the entire area east of the Southern Pacific railroad tracks, and much of the area west of the tracks between May 10 and June 15 (Map 2). Slender-horned spineflower was not located during the survey, but seed may be present that did not germinate this year due to the drought.

Tierra Madre Consultants briefly examined the unsurveyed areas west of the railroad tracks for suitable slender-horned spineflower habitat, but did not examine the area more closely because the species' flowering season had ended. Suitable habitat for slender-horned spineflower is shown on Map 4.

Santa Ana River woolly-star (Eriastrum densifolium ssp. sanctorum) is a small gray-green shrub with bright blue flowers. It occurs in alluvial fan sage scrub communities in the flood plain terraces of the Santa Ana River and its tributaries. The historic range of the species spanned about sixty river miles from the former Rancho Santa Ana in Orange County (at 500' elevation) to the vicinity of Highland in San Bernardino County (at about 1500'). It is now restricted to a few populations on Lytle Creek and the flood plain of the Santa Ana River between Redlands and the mouth of the Santa Ana Canyon, near Mentone (reviewed by Zembel and Kramer, 1984). Zembel and Kramer estimated in 1984 that more than 90% of the Santa Ana River woolly-star's habitat had been eliminated by urbanization, flood control activity, grazing, aggregate mining, and farming. It is now listed as endangered by the State of California and by the US Fish and Wildlife Service.

The Santa Ana River woolly-star is closely related to a more common subspecies, the chaparral woolly-star (Eriastrum densifolium ssp. elongatum). The chaparral woolly-star is common on Riversidian alluvial fan sage scrub in the Cajon Wash area, including the CalMat property. In a biological report for an adjacent parcel, Tierra Madre Consultants (1988) identified plants that appeared to be intermediate between the endangered Santa Ana River woolly-star and the common chaparral woolly-star. This seemingly intermediate population is contiguous with woolly-stars on CalMat property. Whether these plants are protected under the State or Federal Endangered Species Acts was not clear, and required further investigation.

Tierra Madre Consultants has carried out a study of woolly-stars on CalMat's property, including measurement of all populations on the property and determination of samples by Dr. Robert Patterson of San Francisco State University. Dr. Patterson is currently reviewing the taxonomic descriptions of the genus Eriastrum for the upcoming revision of Jepson's Manual of the Flowering Plants of California.

The woolly-star study consisted of a literature review of current and previous research conducted on the species Eriastrum densifolium. Following the literature review, a field survey was performed by Megan Phillips. Over forty hours were spent revisiting the woolly-star populations, mapped during the spineflower surveys, and collecting samples.

The distinguishing characteristics for the respective woolly-star subspecies, as defined by Craig (1934), are stature, pubescence and corolla length. Eriastrum densifolium ssp. elongatum is 20-90 cm in height, woolly when young, but becomes glabrous (without hair) in maturity, and has corolla lengths of 14-19 mm. Eriastrum densifolium ssp. sanctorum is 25-75 cm tall, woolly throughout its lifespan, and has corolla lengths of 25-32 mm. Woolly-stars of uncertain subspecies in the Cajon Wash area have characteristics resembling both subspecies, but corolla lengths range from 20 to 23 mm, as documented by Craig (1934) and Maureen Pendleton (Tierra Madre Consultants, 1988).

The woolly-star populations on CalMat's property, totaling more than 2,000 plants, were separated into six study areas (Fig. 5), each of which supported approximately 300 woolly-stars. Each study area was visited and thirty plants were randomly chosen for sampling. Three corollas per chosen plant were collected. The three corollas were then measured with a vernier caliper. Mean corolla length was calculated for each study area, and compared to a sample collected from an area in Highland known to support the endangered Santa Ana River woolly-star.

The other distinguishing characteristics, stature and pubescence, were also noted. Little difference in stature was detected, but pubescence was notably different between Cajon wash and known Santa Ana River woolly-star populations near Highland. The Cajon wash woolly-stars were sub-glabrous to glabrous (little to no wool) while both young and mature plants in the known Eriastrum densifolium ssp. sanctorum were lanate (woolly).

Samples of eight plants collected from CalMat property and adjacent property were sent to Dr. Patterson for subspecies verification. Dr. Patterson's reply states that the plants "fall

best within the circumscription" of the chaparral woolly-star, which is not listed as an endangered species. Dr. Patterson cautions that overlap between the two subspecies is to be expected, and that "it would be difficult to discount completely" an argument that these plants are at the extreme end of subspecies sanctorum's variability. Copies of Tierra Madre Consultants' letter to Dr. Patterson and his reply are included as appendices.

The results for the corolla length analysis are summarized in the following table. We note that many of the measurements are smaller than the described length of even the common chaparral woolly-star. It is unclear why these plants seem to be outside the range of even the short-flowered subspecies. A table of raw corolla-length data is included as an appendix.

Table 2. Eriastrum densifolium Corolla-length Sampling Results.

Study Area	COROLLA LENGTHS	
	Range	Mean
1	9.65 - 11.33mm	10.24mm
2	8.45 - 15.65mm	12.04mm
3	13.80 - 18.43mm	16.73mm
4	14.00 - 18.43mm	16.59mm
5	12.43 - 17.50mm	14.53mm
6	13.80 - 18.20mm	16.88mm
7*	21.50 - 29.03mm	26.61mm

* denotes comparative population of known Eriastrum densifolium ssp. sanctorum.

According to the results of this survey and the verification by Robert Patterson, Tierra Madre Consultants concludes that the endangered Santa Ana River woolly-star, Eriastrum densifolium ssp. sanctorum, does not occur on CalMat's proposed Cajon Wash project site. The woolly-stars found on the site are the more common Eriastrum densifolium ssp. elongatum. CalMat's proposed mining and development will not impact the Santa Ana River woolly-star.

The **orange-throated whiptail** (Cnemidophorus hyperythrus) occupies washes and other sandy areas where there are rocks and patches of brush nearby (Behler and King, 1979). Populations of this species are declining as habitat is lost to land conversion for agriculture and development. It is a category 2 candidate for federal listing and is a California species of special concern.

Orange-throated whiptails are known from the immediate west (Tierra Madre Consultants, 1988), but were not located on the CalMat property during this survey. The property is at the northern edge of the species' range and most of it seems to be marginal habitat at best. Orange-throated whiptails on the adjacent property were seen at the base of Lytle Creek ridge, near the Glen Helen Rehabilitation Facility in more typical habitat. There is a high probability that they occasionally are found near the western property boundary where the wash habitat meets Lytle Creek Ridge.

The **San Diego horned lizard** (Phrynosoma coronatum blainvillei) is found in a variety of habitat types including coastal sage scrub, broad-leaved woodlands, and grasslands where there is loose sandy soil with low-growing brush nearby (Behler and King, 1979). Its numbers are declining due to habitat loss and extensive collecting on wildlands near urban development.

Four San Diego horned lizards and several of their distinctive scats were seen during the field survey of the property. Horned lizards and/or their sign were seen on both sides of the railroad tracks indicating that the entire proposed project area is occupied San Diego horned lizard habitat.

The **northern harrier** (Circus cyaneus, formerly called marsh hawk) is a common winter visitor and increasingly rare breeding species in most of southern California (Garrett and Dunn, 1981). It inhabits marshes, meadows, and open lands. It nests on the ground in marshes or grassy meadows. The northern harrier feeds on ground-dwelling mammals and other animals. Its breeding population has declined in California over the past fifty years, mainly due to loss of marsh habitat. Conversion of land to agricultural and residential uses have reduced available nesting and foraging habitat of local populations. A northern harrier was seen about three miles west of CalMat's property, foraging over similar habitat, in the winter of 1989-90. Northern harriers were not seen over the subject property during this survey, but there is a high probability that they occasionally use the property for foraging.

The **golden eagle** (Aquilia chrysaetos) nests in rugged mountainous areas near open grassland or scrubland where prey occurs. It feeds mainly on ground squirrels, rabbits, and other small to medium-sized mammals. Its home range averages 36 square miles (USDA, 1980). Threats to the species include habitat loss, shooting, electrocution from high-voltage power lines, and human disturbance to nests (Remsen, 1978).

Two golden eagles were seen foraging over the property during the field survey. No suitable nesting sites are present on the property, but the alluvial fan sage scrub is productive mammal habitat well suited to the golden eagle's foraging technique. Development on the property would contribute to the ongoing loss of golden eagle foraging area in the region.

The **sharp-shinned hawk** (Accipiter striatus) is a fairly common winter visitor to southwestern Riverside County. It does

not nest in the valleys of southern California (Garrett and Dunn, 1981). This raptor feeds on small birds it captures beneath forest and woodland canopy or over annual grassland (USDA, 1980). A sharp-shinned hawk was reported less than a mile east of the property in October, 1989 (Tierra Madre Consultants, 1989). Presumably, the reported bird was a migrant or a winter visitor.

No woodlands occur on the property, but wintering sharp-shinned hawks may occasionally hunt over the open scrub vegetation. The property does not provide ideal habitat, but there is a high probability that these raptors occasionally use the area.

The **prairie falcon** (Falco mexicanus) extends over much of the western United States. It is an uncommon resident in arid parts of southern California (Garrett and Dunn, 1981). Birds which breed at higher elevations may winter in valleys. Known home ranges have varied from about two to ten square miles (USDA, 1980). The prairie falcon nests on high cliff faces and feeds on birds and small mammals over open, arid land. Prairie falcons are known to nest in the Mormon Rocks area near Cajon Pass.

Prairie falcons were seen foraging over the CalMat property on two field visits during May. As discussed above for other raptors, loss of foraging area would contribute to the ongoing loss of habitat throughout the region.

The **California gnatcatcher** (Polioptila californica) has recently been recognized as a distinct species by the American Ornithologists' Union. It was previously considered a race of the black-tailed gnatcatcher (Polioptila melanura). This "split" was based largely on a detailed study of the genus by Atwood (1988).

Atwood (1980) states "...it appears that numbers of [Polioptila] californica are seriously low, with further declines to be expected due to continuing habitat destruction." In southern California, California gnatcatchers are normally associated with coastal sage scrub vegetation, which has been subject to extensive alteration and fragmentation. O'Leary (1989) estimates that as little as ten to twenty-five percent of former coastal sage scrub habitat remains in California.

The California gnatcatcher is a Category 2 candidate species for listing as threatened or endangered by the U.S. Fish and Wildlife Service (FWS) and it is a California Department of Fish and Game "Species of Special Concern." Its status is presently under review by the FWS. In view of its recent taxonomic elevation to full species and ongoing habitat loss, it is likely that its designation will be changed to Category 1 candidate and, eventually, listing as threatened or endangered.

California gnatcatchers were not observed on the subject property during the extensive field surveys, and have not been reported from the vicinity by the CNDDB (1989, San Bernardino North, Devore, Cajon, San Bernardino South, Silverwood Lake quads). There has been one California gnatcatcher sighting near the confluence of Cajon Wash and Lytle Creek, about one mile south of the subject property, reported by Doug Willick (personal communication).

The property is near the boundary of the species' known range, and the vegetation differs from the gnatcatcher's favored coastal sage scrub habitat. Riversidian sage scrub is more open than other forms of coastal sage scrub and it is dominated by different plant species. There is a moderate probability that California gnatcatchers occasionally occur on the site.

Very little is known about the **Los Angeles pocket mouse** (Perognathus longimembris brevinasus). It apparently digs underground burrows and is nocturnal, and is therefore not often detected except in trapping surveys. The geographic range is restricted to lower elevations in open areas from Burbank to San Bernardino and eastward to Aguanga and Beaumont. Urbanization and cultivation have eliminated much of the habitat of this uncommon mammal (reviewed by Williams, 1986).

Tierra Madre Consultants has identified the Los Angeles pocket mouse on San Bernardino County Flood Control property between the northern and southern CalMat parcels (report in preparation). In addition, it has been reported from several sites in the vicinity of the CalMat property: nine specimens from "Cajon Wash," three specimens from "4.75 miles north of San Bernardino, 1600'," thirty-two specimens "five miles northwest of San Bernardino," one from "Slover Mountain, near Colton," and several from Reche Canyon (locations listed by Williams, 1986). These are undated historical records; other than the 1990 Tierra Madre record, the nearest dated record is 4.5 miles southeast of the CalMat property, from 1931. None of these records include descriptions of habitats where the animals were found.

The Tierra Madre record is from disturbed Riversidian sage scrub habitat. While the other locations are general, three of them seem to be very near the CalMat property. Los Angeles pocket mice from the reported Cajon Wash site were almost certainly in habitat similar to that found on the CalMat property, since Riversidian alluvial fan sage scrub is the predominant vegetation throughout Cajon Wash. The site north of San Bernardino at 1600' elevation could be on CalMat property (the 1600' contour line crosses the project site). The site five miles northwest of San Bernardino is certainly in the Cajon Wash area and may be on CalMat property.

Without performing a trapping survey on CalMat land, Tierra Madre Consultants considers the site as having a very high probability of supporting Los Angeles pocket mouse.

Riversidian alluvial fan sage scrub is a variety of coastal sage scrub occurring on alluvial fan soils (Smith, 1980) in interior southern California (Holland, 1986). It is distinct from other forms of coastal sage scrub in its species composition and in the physical forces that influence it (particularly flooding). Alluvial fan sage scrub is being lost throughout its range by development, flood control, and other activity, and is therefore considered a "community with highest inventory priority" by the California Department of Fish and Game Natural Heritage Division.

Discussion

Project Impacts

The proposed project would grade or otherwise alter about two-thirds of the subject property while retaining about 440 acres as open space. Project impacts would include the loss of essentially all vegetation and wildlife in the eastern portion of the project site (above the 100-year flood plain) and about 260 acres of high quality Riversidian alluvial fan sage scrub within the flood plain. The proposed project would also preserve about 440 acres of high quality habitat within the flood plain. Impacts to each of the sensitive elements listed earlier are discussed below.

Impacts to sensitive plants: Slender-horned spineflower may occur on the proposed project site. Further studies will be necessary to determine the presence or absence of this species. If it is absent, then there would be no direct "take," but the project would indirectly impact the plant by destroying habitat, reducing the potential for its future recovery. Suitable habitat for the slender-horned spineflower is common to the west of the railroad tracks (Map 4), and the species could conceivably recolonize this area at some time in the future if the site is not developed.

Development or mining on property to the east of the railroad tracks would not impact slender-horned spineflower populations over the long term. The area will not provide suitable spineflower habitat long into the future because of the absence of natural flooding. Nevertheless, any impact to slender-horned spineflowers would be a significant environmental impact under the California Environmental Quality Act. If they occur there, loss of individual plants could affect the possibility for eventual recovery of the species by eliminating a potential seed source for eventual establishment of a population on protected habitat.

Aggregate mining to the west of the railroad tracks would destroy suitable spineflower habitat. This impact could potentially be mitigated through reclamation of the land after completion of mining activity and preservation of undisturbed habitat. Proposed open space preservation in the project area could benefit the slender-horned spineflower by providing land for eventual recolonization by the species.

Impacts to sensitive reptiles: The site provides suitable habitat for two sensitive reptiles, the orange-throated whiptail and the San Diego horned lizard. San Diego horned lizards occur throughout the site; orange-throated whiptails may occasionally use the western margin of the property, near the base of Lytle Creek Ridge. Both animals are candidates for federal listing (category 2) and are California species of special concern.

Development and mining would destroy habitat and would result in the loss of San Diego horned lizards; proposed open space preservation areas would continue to provide San Diego horned lizard habitat. Little is known of the population biology of San Diego horned lizards or orange-throated whiptails and it

is uncertain whether the loss of animals or habitat on this site would significantly impact regional populations. Both species range over a large area, and the property under consideration for this project is only a small portion of their ranges.

Impacts to sensitive raptors: The project would impact foraging habitat of four sensitive raptor species (Table 1).

Sharp-shinned hawks feed primarily on birds they capture in flight. Development and mining on the site would eliminate or reduce its value as foraging habitat for this bird by altering or eliminating prey habitat and by increasing noise and other disturbances which would tend to keep sharp-shinned hawks from using the site.

Golden eagles, prairie falcons and northern harriers feed on mammals and other ground-dwelling animals. The property provides productive prey habitat. All of these raptors forage in the area. Golden eagles and prairie falcons were seen over the property and the habitat is better suited to them than to northern harriers. The loss of foraging habitat would have a greater impact on the eagles and falcons than on northern harriers but it is difficult to evaluate the impact's significance for any of these birds. Open space preserved by the project will continue to provide suitable foraging habitat. The area is presently impacted by the noise and disturbance of nearby railroad tracks and an off-road vehicle park; mining and developoment will increase noise and other disturbances, but their impacts on suitability of raptor foraging habitat are uncertain. Quality of preserved habitat may be reduced by increased disturbances.

Development in the region continues to cumulatively impact raptors. The ongoing loss of raptor habitat is a regionally significant impact on biological resources and the present project will contribute to this cumulative loss. Without specific data on population densities, home ranges, seasonal use, historic nesting sites and availability of alternate wintering habitat, it is not possible to predict the extent of these impacts.

Impacts to California gnatcatchers: California gnatcatchers do not appear to occupy the site, though they have been reported from nearby. The site is near the species' range boundary and none were detected during the extensive field survey. There is a moderate probability that the project could impact marginal California gnatcatcher habitat.

Impacts to Los Angeles pocket mouse: The proposed mining and development would destroy apparently suitable habitat and probably would result in loss of Los Angeles pocket mice. The species' habitat requirements, population sizes, and other biological aspects are little-known, and it is uncertain whether the proposed project's impacts would be significant.

Impacts to Riversidian alluvial fan sage scrub: About half of the proposed project site is high quality Riversidian alluvial fan sage scrub, still subject to natural flooding. About 257

acres of this vegetation would be destroyed by proposed aggregate mining and about 440 acres would be retained as open space.

Riversidian alluvial fan sage scrub has never been completely restored through replanting. Some of the plants characteristic of this habitat are readily propagated (e.g., California buckwheat), but others (e.g., California juniper) have not been successfully grown under cultivation. Because of the difficulty of cultivating these plants and because of the complex nature of any ecological community, it probably will not be possible to completely mitigate the loss of this vegetation through restoration efforts.

The most effective mitigation for this impact would be a combination of habitat preservation and restoration of natural conditions (to allow eventual natural regeneration of Riversidian alluvial fan sage scrub) on the site following the completion of the mining project.

Recommended Mitigation Measures

The most important biological impacts of the CalMat Cajon Creek Concept Plan would be the loss of Riversidian alluvial fan sage scrub habitat, and the plants and animals (including sensitive species) found there. Land east of the railroad tracks no longer functions as Riversidian alluvial fan sage scrub because of the absence of natural flooding. Nevertheless, this area provides valuable habitat for sensitive species including golden eagle and San Diego horned lizard. The development of this upland habitat would impact these sensitive species and contribute to the ongoing loss of natural open space throughout the region. CalMat property outside the 100-year flood plain scheduled for development, or for mining followed by reclamation to development, would be permanently lost as habitat.

Mining areas to the west of the railroad tracks (within the flood plain) would not be available as habitat during mining but could potentially be reclaimed to restore some or all biological values after mining is complete. They probably cannot be reclaimed to completely replace the high-quality Riversidian alluvial fan sage scrub now present, but conditions approximating nature can be restored, allowing natural regeneration to eventually replace existing habitat values. The project proposes to restore a natural hydrologic regime to the quarry and the site is expected to regenerate naturally after mining and reclamation.

The impacts to biological resources of development and mining at the CalMat Cajon Creek site can be partially mitigated by preserving open space for the retention of biological resources. The 440 acres on the property proposed as open space provide suitable habitat for mitigation of losses that would result from the proposed project. In order to mitigate habitat loss, like habitat must be preserved, preferably <u>in perpetuity</u>, but at least until impacted mining areas have been fully reclaimed to their original biological values.

The following recommendations are intended to minimize impacts to biological resources and to mitigate remaining impacts as fully as possible.

A. Avoid impacts to slender-horned spineflower.

1. Do not conduct mining operations or other soil-disturbing activity on any suitable habitat within the delineated 100-year flood plain until surveys for slender-horned spineflower have been conducted during a total of at least three flowering seasons.

2. Do not conduct soil-disturbing activity on lands outside the 100-year flood plain until surveys for slender-horned spineflower have been conducted during at least one flowering season in addition to the survey already conducted for this report.

3. Do not conduct soil-disturbing activity on suitable habitat, either within or outside the 100-year flood plain, without the habitat preservation measures outlined below.

4. If slender-horned spineflower is located during surveys, the California Department of Fish and Game and the US Fish and Wildlife Service should be notified of the species presence on the site. These agencies may wish to salvage plant populations that would be impacted by proposed mining or development.

B. Preservation of open space: These two measures are intended to preserve high quality Riversidian alluvial fan sage scrub, which would also provide suitable habitat for slender-horned spineflower and other sensitive species. Preservation would not reduce the impacts of mining and development on sensitive elements and habitat, but would assure long-term availability of suitable habitat and would preserve a significant acreage of Riversidian alluvial fan sage scrub.

1. Preserve the property south of Institution Road and west of the 100-year flood plain boundary (not planned for mining or development) as open space to retain biological resources either in perpetuity or until all adverse biological impacts of mining in the flood plain have been fully eliminated through reclamation of the mine site.

2. Seek an agreement with the San Bernardino County Flood Control District to preserve land between CalMat's Cajon Creek property and CalMat's San Bernardino Plant as open space.

C. Provide for the long-term management of natural open space for biological resources. Management should be according to a plan which would identify a managing entity, identify requisite funding, and include the following management elements.

1. Exclusion of off-road vehicles, shooting and trespassing.

2. Restoration plans for degraded Riversidian alluvial fan sage scrub within the preserved open space areas.

3. Fire management to prevent human-caused fires while allowing for natural fires and preventing damage to habitat which may result from firefighting efforts.

4. Retention of natural hydrologic conditions.

D. Reclaim the western mining area to restore biological values: The proposed mining area within the 100-year flood plain should be reclaimed to restore Riversidian alluvial fan sage scrub vegetation as fully as possible. Restoration of this plant community will also serve to restore sensitive plant and animal habitat.

1. A reclamation plan for the western mining area should be designed to restore natural conditions as fully as possible and allow natural processes to continue. The reclamation plan should include provisions for the following:

a. Final contours should allow for sheet flow of floodwaters across Institution Road and onto open space to the south.

b. Final configurations of the western mining area should allow for continuation of natural hydrologic processes, maximizing the probability of natural restoration of the mine site.

c. The western mining area should be reseeded with native plants now growing on the property to restore elements of habitat conditions now present. No non-native species should be included in restoration efforts.

d. Restoration should include reestablishment of trees and large shrubs at suitable sites to provide nesting, roosting and perching sites for birds and to provide shaded cover for mammals.

E. Design a mitigation monitoring plan to assure implementation of any mitigation measures finally adopted, and its success. California law requires that any mitigation measures imposed under the California Environmental Quality Act (CEQA) be monitored to ensure compliance with CEQA. The following recommendations address this requirement.

1. The mitigation monitoring plan should be implemented by an agency or other entity independent from CalMat.

2. Mitigation monitoring should ensure compliance with required mitigation measures (preservation and management of open space and implementation of a reclamation program).

3. The mitigation monitoring plan should include measures to periodically monitor habitat quality within open space and, eventually, on reclaimed mining areas. This information should be used in management of the open space and in evaluating the effectiveness of the reclamation efforts.

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SPECIES LISTS

Animals

REPTILIA	REPTILES
Iguanidae	**Iguanids**
Callisaurus draconoides	Zebra-tailed lizard
Sceloporus orcutti	Granite spiny lizard
Sceloporus occidentalis	Western fence lizard
Uta stansburiana	Side-blotched lizard
Phrynosoma coronatum blainvillei	San Diego horned lizard
Teiidae	**Whiptails**
Cnemidophorus tigris	Western whiptail
Anguidae	**Alligator lizards**
Gerrhonotus multicarinatus	Southern alligator lizard
Colubridae	**Colubrids**
Coluber constrictor	Racer
Masticophis flagellum	Coachwhip
Pituophis melanoleucus	Gopher snake
Viperidae	**Vipers**
Crotalus viridis	Western rattlesnake

AVES	BIRDS
Anatidae	**Ducks, geese and swans**
Anas platyrhynchos	Mallard
Cathartidae	**Vultures**
Cathartes aura	Turkey vulture
Accipitridae	**Hawks, eagles, harriers**
Buteo jamaicensis	Red-tailed hawk
Aquila chrysaetos	Golden eagle
Falconidae	**Falcons**
Falco sparverius	American kestrel
Falco mexicanus	Prairie falcon
Phasianidae	**Grouse and quail**
Callipepla californica	California quail
Charadriidae	**Plovers**
Charadrius vociferus	Killdeer
Scoloracidae	**Sandpipers**
Tringa melanoleuca	Greater yellowlegs

Columbidae	**Pigeons and doves**
Columba livia	Rock dove
Zenaida macroura	Mourning dove
Columbina passerina	Common ground-dove
Cuculidae	**Cuckoos**
Geococcyx californianus	Greater roadrunner
Strigidae	**Typical owls**
Bubo virginianus	Great horned owl
Camprimulgidae	**Nightjars**
Chordeiles acutipennis	Lesser nighthawk
Apodidae	**Swifts**
Aeronautes saxatalis	White-throated swift
Chaetura vauxi	Vaux's swift
Trochilidae	**Hummingbirds**
Archilochus alexandri	Black-chinned hummingbird
Calypte anna	Anna's hummingbird
Calypte costae	Costa's hummingbird
Picidae	**Woodpeckers**
Colaptes auratus	Northern flicker
Picoides nuttallii	Nuttall's woodpecker
Tyrannidae	**Tyrant flycatchers**
Contopus borealis	Olive-sided flycatcher
Empidonax difficilis	Pacific-slope flycatcher
Sayornis nigricans	Black phoebe
Myiarchus cinerascens	Ash-throated flycatcher
Tyrannus verticalis	Western kingbird
Alaudidae	**Larks**
Eremophila alpestris	Horned lark
Hirundinidae	**Swallows**
Tachycineta thalassina	Violet-green swallow
Stelgidopteryx serripennis	Northern rough-winged swallow
Hirundo pyrrhonota	Cliff swallow
Hirundo rustica	Barn swallow
Corvidae	**Crows and jays**
Aphelocoma coerulescens	Scrub jay
Corvus brachyrhynchos	American crow
Corvus corax	Common raven
Paridae	**Chickadees and titmice**
Parus inornatus	Plain titmouse
Aegithalidae	**Bushtits**
Psaltriparus minimus	Bushtit

Troglodytidae	**Wrens**
Campylorhynchus brunneicapillus	Cactus wren
Thryomanes bewickii	Bewick's wren
Salpinctes obsoletus	Rock wren
Muscicapidae	**Thrushes and allies**
Chamaea fasciata	Wrentit
Polioptila caerula	Blue-gray gnatcatcher
Mimidae	**Mockingbirds and thrashers**
Mimus polyglottos	Northern mockingbird
Toxostoma redivivum	California thrasher
Ptilogonatidae	**Silky flycatchers**
Phainopepla nitens	Phainopepla
Laniidae	**Shrikes**
Lanius ludovicianus	Loggerhead shrike
Sturnidae	**Starlings**
Sturnus vulgaris	European starling
Vireonidae	**Vireos**
Vireo gilvus	Warbling vireo
Emberizidae	**Sparrows, warblers, tanagers**
Vermivora celata	Orange-crowned warbler
Vermivora ruficapilla	Nashville warbler
Dendroica petechia	Yellow warbler
Dendroica nigrescens	Black-throated gray warbler
Oporornis tolmiei	MacGillivary's warbler
Wilsonia pusilla	Wilson's warbler
Pheucticus melanocephalus	Black-headed grosbeak
Passerina amoena	Lazuli bunting
Pipilo erythrophthalmus	Rufous-sided towhee
Pipilo crissalis	California towhee
Aimophila ruficeps	Rufous-crowned sparrow
Chondestes grammacus	Lark sparrow
Amphispiza belli	Sage sparrow
Zonothrichia leucophrys	White-crowned sparrow
Junco hyemalis	Dark-eyed junco
Sturnella neglecta	Western meadowlark
Euphagus cyanocephalus	Brewer's blackbird
Molothrus ater	Brown-headed cowbird
Icterus cucullatus	Hooded oriole
Icterus galbula	Northern oriole
Fringillidae	**Finches**
Carpodacus mexicanus	House finch
Carduelis psaltria	Lesser goldfinch
Carduelis lawrencei	Lawrence's goldfinch
Passeridae	**Weavers**
Passer domesticus	House sparrow

MAMMALIA	MAMMALS
Leporidae	**Hares and rabbits**
Lepus californicus	Black-tailed hare
Sylvilagus audubonii	Audubon cottontail
Sylvilagus bachmani	Brush rabbit
Sciuridae	**Squirrels**
Otospermophilus beecheyi	Beechey ground squirrel
Geomyidae	**Pocket gophers**
Thomomys bottae	Botta pocket gopher
Heteromyidae	**Pocket mice**
Perognathus sp.	Pocket mouse
Dipodomys sp.	Kangaroo rat
Cricetidae	**Rats and mice**
Neotoma lepida	Desert wood rat
Peromyscus sp.	Deer mouse
Canidae	**Foxes, wolves and coyotes**
Canis latrans	Coyote
Urocyon cinereoargenteus	Gray fox
Mustelidae	**Weasels and skunks**
Mephitis mephitis	Striped skunk
Felidae	**Cats**
Lynx rufus	Bobcat
Cervidae	**Elks, moose, caribou, deer**
Odocoileus hemionus	Mule deer

Plants

CONIFERAE	CONE-BEARING PLANTS
Cupressaceae	**Cypress family**
Juniperus californica	California juniper
ANGIOSPERMAE: DICOTYLEDONES	DICOT FLOWERING PLANTS
Anacardiaceae	**Sumac family**
Rhus ovata	Sugarbush
Rhus trilobata	Basket bush
Toxicodendron diversilobum	Poison oak
Asteraceae	**Sunflower family**
Ambrosia acanthicarpa	Annual bur-weed
Artemisia californica	California sagebrush
Artemisia dracunculus	Tarragon
Artemesia douglassiana	Mugwort
Baccharis glutinosa	Mulefat

Asteraceae (continued)	**Sunflower family**
*Centaurea melitensis	Star thistle
Chaenactis glabriuscula	Golden curls
Chrysopsis villosa	Golden-aster
Cirsium sp.	Thistle
Corethrogyne filaginifolia	Corethrogyne
*Cnicus benedictus	Blessed thistle
Erigeron foliosus	Leafy daisy
Eriophyllum confertiflorum	Golden yarrow
Gnaphalium californicum	California ever-lasting
Gutierrezia bracteata	Matchweed
Haplopappus linearifolius	Goldenbush
Haplopappus pinifolius	Pine bush
Helianthus annuus	Western sunflower
Heterotheca grandiflora	Telegraph weed
Lepidospartum squamatum	Scalebroom
Lessingia cf. glandulifera	Lessingia
Senecio douglasii	Groundsel
Tetradymia comosa	Cotton-thorn
Boraginaceae	**Borage family**
Cryptantha intermedia	Forget-me-not
Cryptantha muricata	Forget-me-not
Brassicaceae	**Mustard family**
*Brassica geniculata	Short-pod mustard
*Lobularia maritima	Sweet alyssum
*Sisymbrium orientale	Hare's-ear cabbage
*Sisymbrium altissimum	Tumble-mustard
Cactaceae	**Cactus family**
Opuntia littoralis	Prickly-pear cactus
Opuntia parryi	Valley cholla
Caprifoliaceae	**Honeysuckle family**
Sambucus mexicana	Mexican elderberry
Convolvulaceae	**Morning-glory family**
Cuscuta sp.	Dodder
Cucurbitaceae	**Gourd family**
Marah macrocarpus	Wild cucumber
Ericaceae	**Heath family**
Arctostaphylos glauca	Bigberry manzanita
Euphorbiaceae	**Spurge family**
Croton californicus	Croton
Ricinus communis	Castor-bean
Stillingia linearifolia	Stillingia

Fabaceae	**Pea family**
Astragalus pomonensis	Pomona locoweed
Lotus scoparius	Deerweed
Fagaceae	**Beech family**
Quercus chrysolepis	Canyon live oak
Quercus dumosa	Scrub oak
Fumariaceae	**Bleeding-hearts Family**
Dicentra chrysantha	Golden tear-drops
Garryaceae	**Silk-tassle family**
Garrya veatchii	Vetch silk-tassle
Geraneaceae	**Geranium family**
*Erodium cicutarium	Red-stemmed filaree
*Erodium botrys	Long-beak filaree
Hydrophyllaceae	**Water-leaf family**
Emmenanthe penduliflora	Whispering bells
Eriodictyon trichocalyx	Yerba santa
Eucrypta chrysanthemifolia	Eucrypta
Phacelia ramosissima	Many-stemmed phacelia
Juglandaceae	**Walnut family**
Juglans californica	California walnut
Lamiaceae	**Mint family**
*Marrubium vulgare	Horehound
Salvia apiana	White sage
Salvia columbariae	Chia
Salvia mellifera	Black sage
Loasaceae	**Stick-leaf family**
Mentzelia laevicaulis	Giant blazing-star
Malvaceae	**Mallow family**
Malacothamnus fasciculatus	Bushmallow
Oleaceae	**Olive family**
Fraxinus velutina	Arizona ash
Onagraceae	**Evening-primrose family**
Camissonia bistorta	Southern sun cup
Camissonia californica	Camissonia
Camissonia hirtella	Field suncup
Oenothera californica	Oenothera
Paeoniaceae	**Peony family**
Paeonia californica	Calif. peony

Papaveraceae	**Poppy family**
Argemone munita	Prickly-poppy
Dendromecon rigida	Bush poppy
Eschscholzia californica	California poppy
Platanaceae	**Sycamore family**
Platanus racemosa	California sycamore
Polemoniaceae	**Phlox family**
Eriastrum densifolium	Woolly star
Eriastrum sapphirinum	Mojave woolly star
Polygonaceae	**Buckwheat family**
Chorizanthe coriacea	Lastarriaea
Chorizanthe parryi	San Fernando spine-flower
Eriogonum fasciculatum	California buckwheat
Eriogonum gracile	Slender buckwheat
Eriogonum thurberi	Thurber's buckwheat
Ranunculaceae	**Crowsfoot family**
Delphinium cardinale	Scarlet larkspur
Rhamnaceae	**Buckthorn family**
Ceanothus crassifolius	Hoary ceanothus
Ceanothus leucodermis	Chaparral whitethorn
Rhamnus crocea	Redberry
Rhamnus ilicifolia	Hollyleaf redberry
Rosaceae	**Rose family**
Adenostoma fasciculatum	Chamise
Cercocarpus betuloides	Mountain mahogany
Heteromyles arbutifolia	Toyon
Prunus ilicifolia	Holly-leaved cherry
Purshia glandulosa	Mohave antelope bush
Rubiaceae	**Madder family**
Galium angustifolium	Narrow-leaf bedstraw
Galium aparine	Common bedstraw
Salicaceae	**Willow family**
Populus fremontii	Fremont cottonwood
Salix lasiolepis	Arroyo willow
Salix laevigata	Red willow
Saxifragaceae	**Saxifrage family**
Ribes malvaceum	Chaparral currant
Scrophulariaceae	**Figwort family**
Castilleja sp.	Paintbrush
Penstemon spectabilis	Showy penstemon
Antirrhinum coulterianum	Coulter's snapdragon

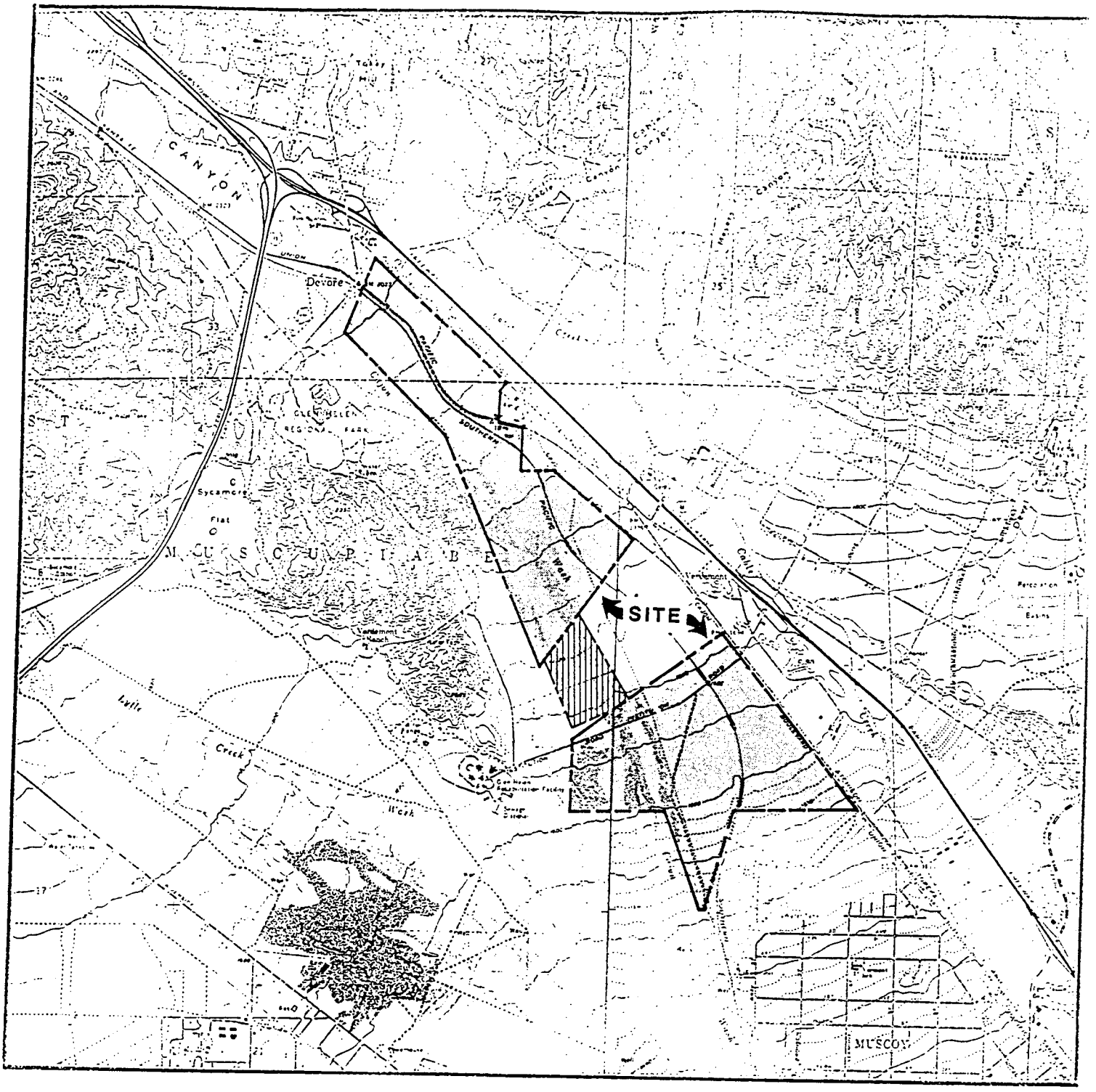
Solanaceae	**Nightshade family**
Datura meteloides	Jimsonweed
*Nicotiana glauca	Tree tobacco
Solanum xanti	Nightshade
Urticaceae	**Nettle family**
*Urtica urens	Dwarf nettle
Visaceae	**Mistletoe family**
Phoradendron sp.	Mistletoe

ANGIOSPERMAE: MONOCOTYLEDONES	MONOCOT FLOWERING PLANTS
Agavaceae	**Agave family**
Agave deserti	Desert agave
Yucca whipplei	Chaparral yucca
Amaryllidaceae	**Amaryllis family**
Dichelostemma pulchella	Blue dicks
Iridaceae	**Iris family**
Iris germanica	Ornamental iris
Sisyrinchium bellum	Blue-eyed grass
Liliaceae	**Lily family**
Calochortus plummerae	Plummer's mariposa-lily
Poaceae	**Grass family**
*Arundo donax	Giant reed
*Avena barbata	Slender wild oat
*Bromus diandrus	Common ripgut-grass
*Bromus mollis	Soft chess
*Bromus rubens	Red brome
*Bromus tectorum	Cheat grass
Elymus condensatus	Ryegrass
Festuca megalura	Fescue
Muhlenbergia rigens	Deergrass
*Schismus barbatus	Abu-mashi

* - indicates a non-native (introduced) species.
c.f. - compares favorably to.

This list reports only those species actually observed on the site by this study. Other species may have been overlooked or undetectable due to the seasonal nature of their occurrence.

Nomenclature follows Munz (1974), Behler and King (1979), A.O.U. (1983 and supplements through 1989), and Ingles (1965).



MAP 1. VICINITY MAP FOR CAJON CREEK CONCEPT PLAN.

☐ CALMAT PROPERTY

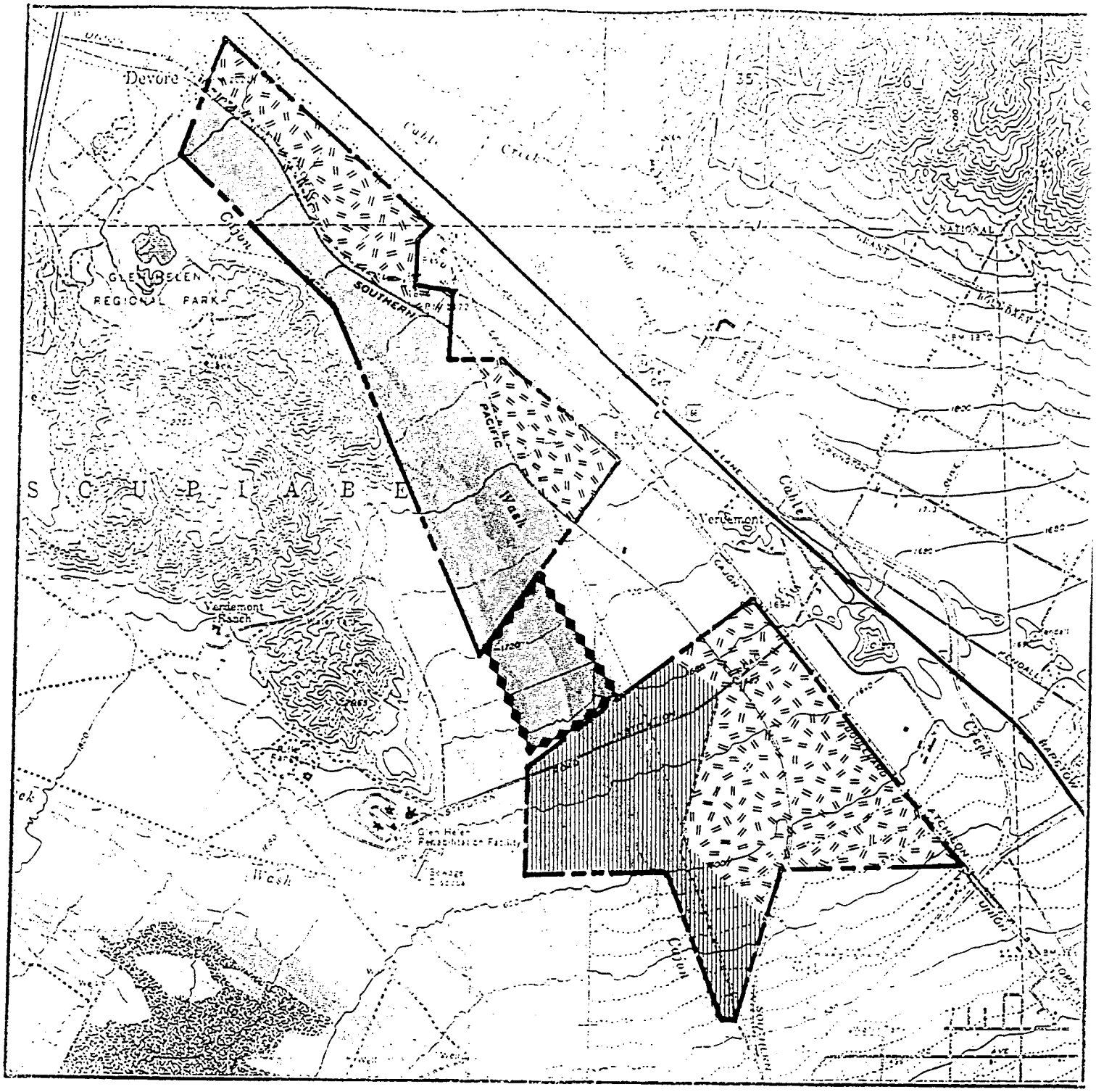
▨ SAN BERNARDINO COUNTY PROPERTY

SCALE: 1":: 4000'

6/28/90: MP

Tierra Madre Consultants

MAP SOURCE: USGS 7.5' DEVORE & SAN BERNARDINO NORTH QUADS.



MAP 2. SLENDER-HORNED SPINEFLOWER SURVEY

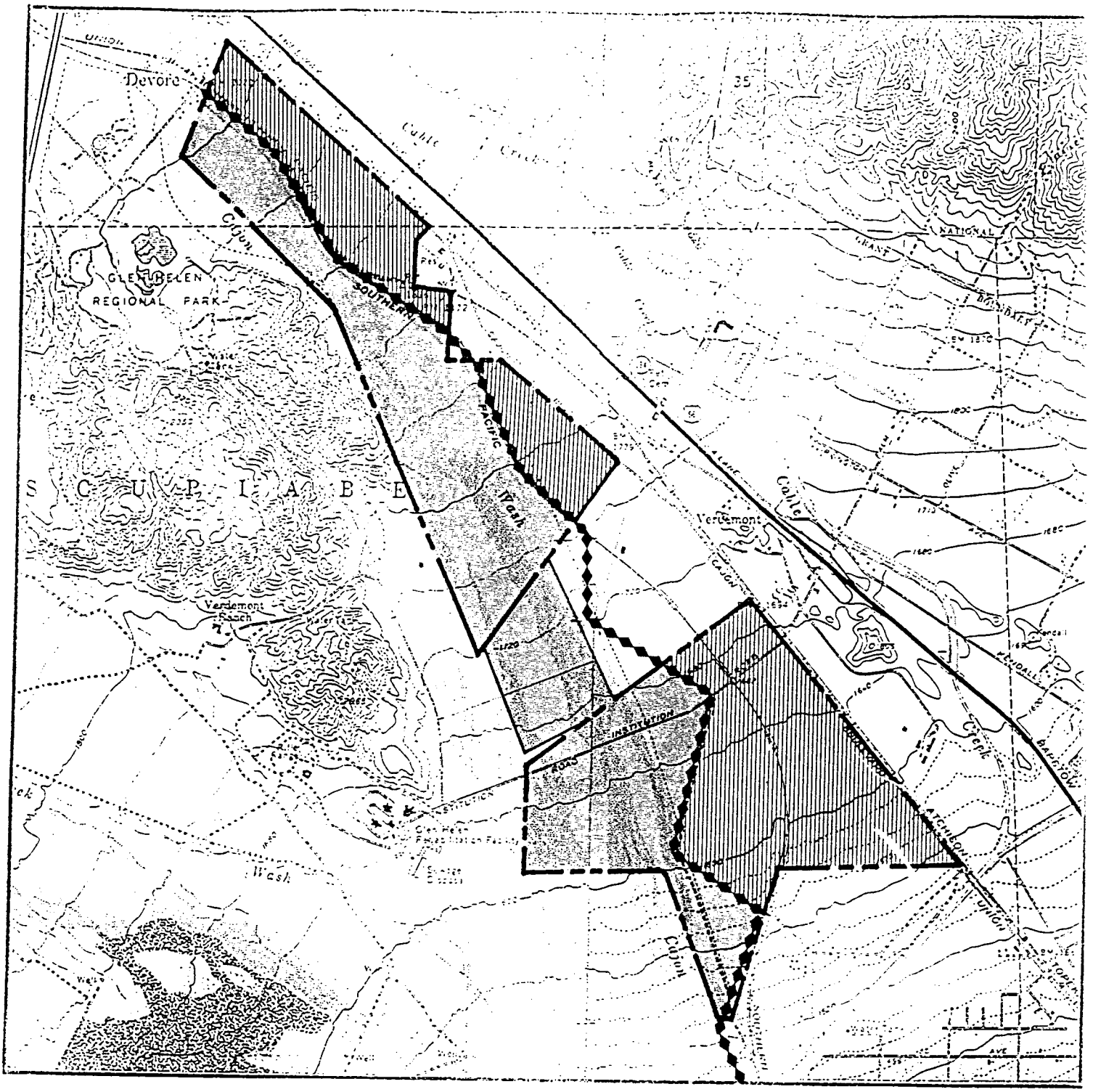
- UPLAND HABITAT SURVEYED FOR SLENDER-HORNED SPINEFLOWER (ONE YEAR ADDITIONAL SURVEY RECOMMENDED)
- FLOODPLAIN HABITAT SURVEYED FOR SLENDER-HORNED SPINEFLOWER (TWO YEARS ADDITIONAL SURVEY RECOMMENDED)
- AREA NOT SURVEYED (THREE YEARS SURVEY RECOMMENDED)
- SAN BERNARDINO COUNTY PROPERTY PROPOSED FOR AGGREGATE MINING

SCALE: 1"= 1500'

7/6/90:mp

Tierra Madre Consultants

MAP SOURCE: USGS 7.5' DEVORE & SAN BERNARDINO NORTH QUADS.



MAP 3. 100 YEAR FLOODPLAIN

HABITAT PROTECTED FROM NATURAL FLOODING

HABITAT STILL SUBJECT TO PERIODIC NATURAL FLOODING

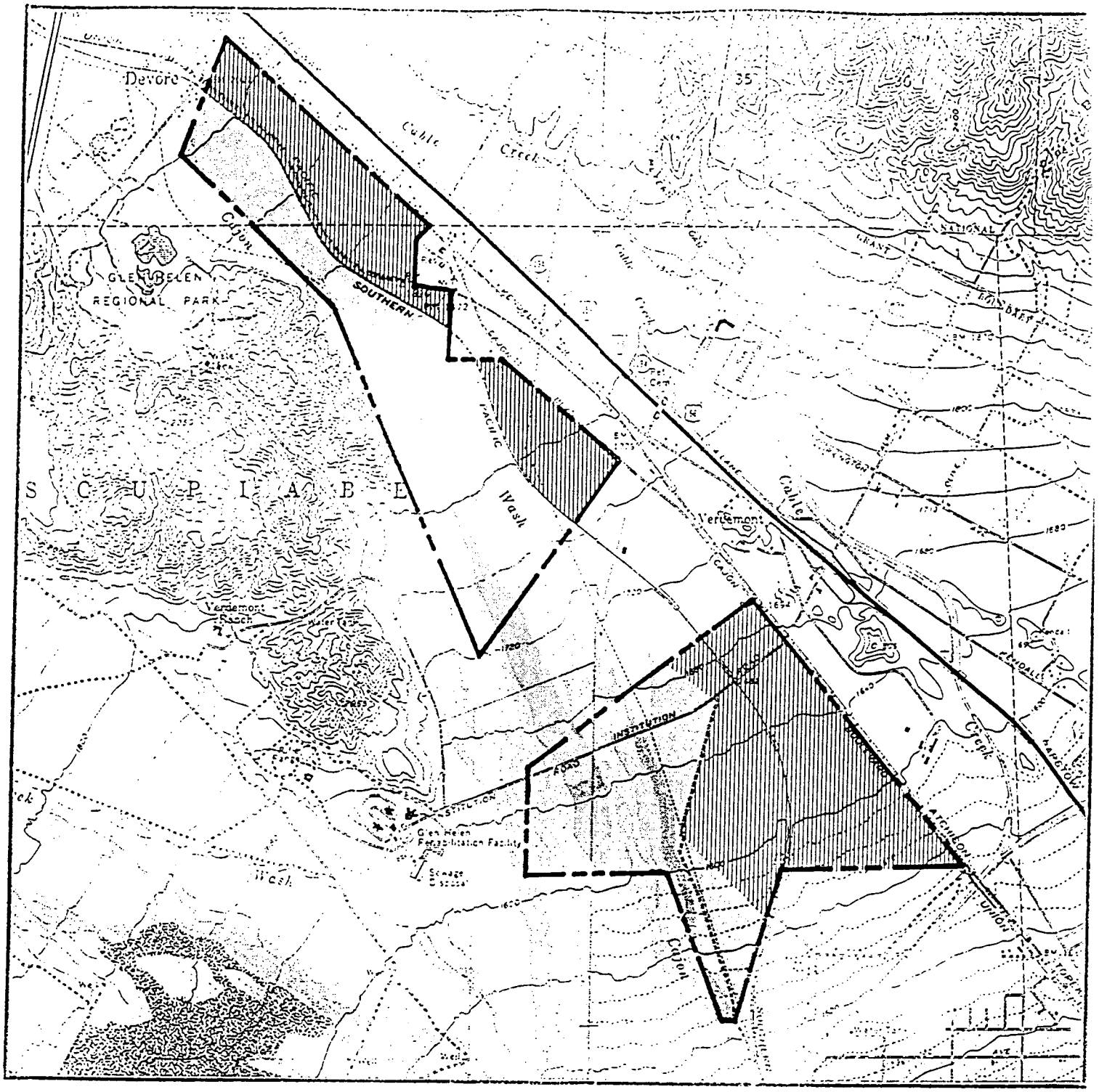
BOUNDARY OF 100-YEAR FLOODPLAIN

SCALE: 1"= 1500'

7/6/90:mp

Tierra Madre Consultants

MAP SOURCE: USGS 7.5' DEVORE & SAN BERNARDINO NORTH QUADS.

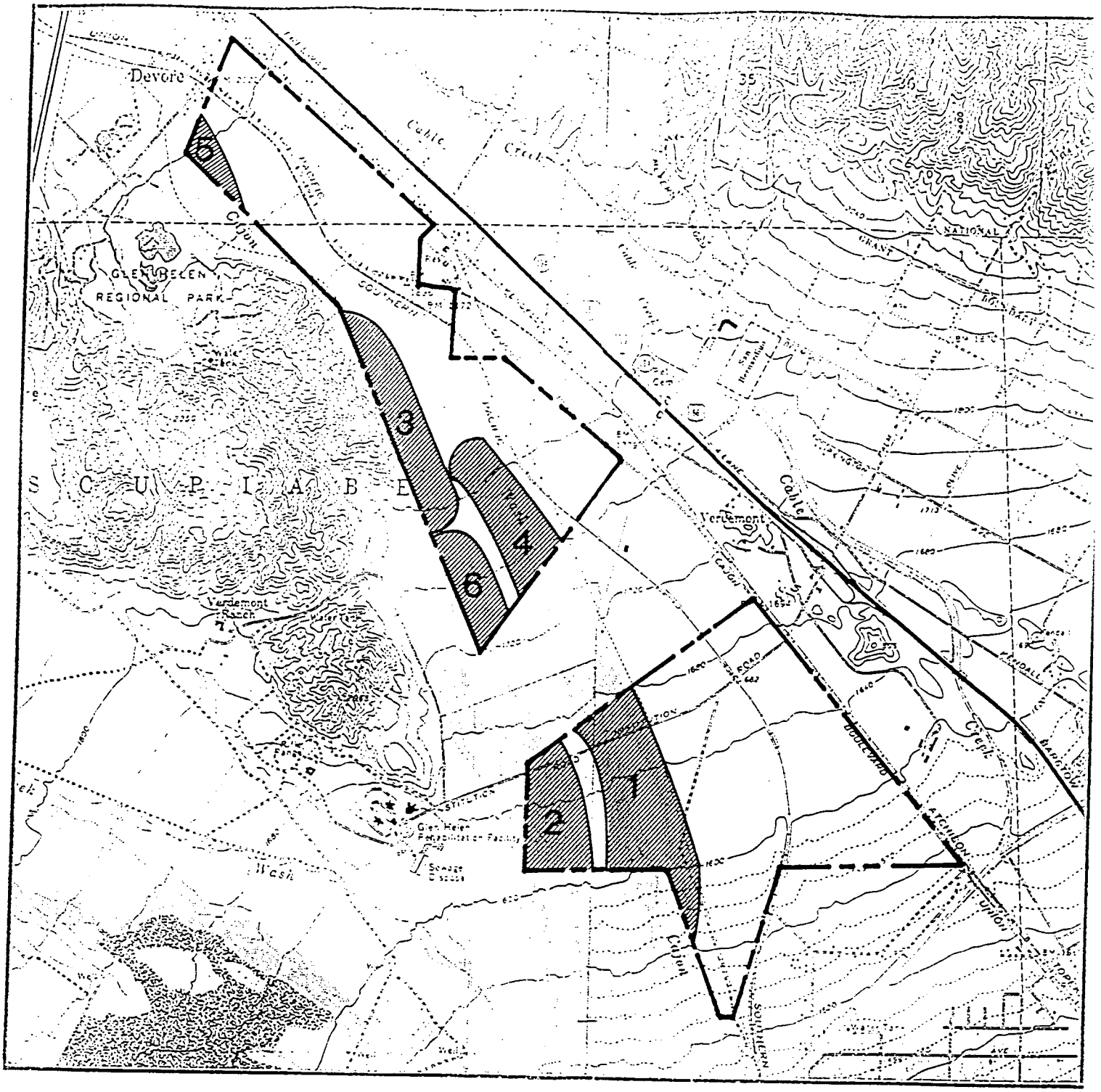


MAP 4. SUITABLE HABITAT FOR SLENDER-HORNED SPINEFLOWER

- **SUITABLE HABITAT IN FLOODPLAIN**
- **POTENTIAL REMNANT POPULATIONS IN LANDS PROTECTED BY FLOOD CONTROL STRUCTURES**

SCALE: 1":: 1500'
7/6/90:mp
Tierra Madre Consultants

MAP SOURCE: USGS 7.5' DEVORE & SAN BERNARDINO NORTH QUADS.



MAP 5. STUDY AREAS FOR WOOLLY-STAR SURVEY.

EACH STUDY AREA SUPPORTS APPROXIMATELY 300 WOOLLY-STAR PLANTS.

SCALE: 1"= 1500'

7/6/90:mp

Tierra Madre Consultants

MAP SOURCE: USGS 7.5' DEVORE & SAN BERNARDINO NORTH QUADS.

APPENDIX 1.
SAMPLING DATA FOR WOOLLY-STAR SURVEY

STUDY AREA #1

PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)	PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)
1	9.83	9.70	9.96	16	10.33	10.33	10.15
2	9.98	10.02	9.97	17	9.63	9.55	9.57
3	11.13	11.10	11.01	18	9.88	9.90	9.57
4	9.88	9.70	9.81	19	10.28	10.07	10.01
5	10.68	10.50	10.35	20	9.83	9.95	9.62
6	10.55	10.51	10.44	21	11.12	11.00	10.94
7	10.35	10.36	10.30	22	10.24	10.20	10.04
8	9.85	9.89	9.72	23	9.80	9.70	9.66
9	9.65	9.70	9.62	24	9.90	9.98	9.86
10	9.75	9.81	9.52	25	9.70	9.52	9.46
11	11.15	11.20	10.93	26	10.88	10.80	10.79
12	10.50	10.32	10.37	27	11.00	11.11	11.07
13	10.45	10.35	10.42	28	10.90	10.69	10.67
14	9.70	9.68	9.53	29	10.01	9.98	10.04
15	11.33	11.22	11.10	30	11.12	11.10	10.81
MEAN	-----	-----	-----	----	-----	-----	10.24

STUDY AREA #2**

PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)	PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)
1	12.35	12.43	10.97	21	14.18	12.78	13.10
2	8.58	8.45	10.05	22	11.77	12.78	13.10
3	10.35	9.30	9.601	23	11.10	11.65	11.90
4	13.23	13.00	12.95	24	11.13	12.98	13.45
5	13.08	12.03	11.90	25	12.55	14.00	13.65
6	9.83	9.98	11.13	26	14.00	14.37	13.35
7	10.85	12.40	13.10	27	10.90	12.95	12.55
8	11.95	11.85	11.60	28	10.05	10.90	9.67
9	10.55	11.28	10.28	29	11.48	13.45	13.07
10	13.15	12.73	12.98	30	13.83	12.77	11.58
11	10.90	10.55	10.70	31	12.25	11.25	12.02
12	13.98	11.95	13.25	32	9.63	12.68	12.15
13	11.28	10.90	11.58	33	9.80	10.57	9.12
14	14.00	12.90	12.63	34	14.07	12.27	13.28
15	12.60	13.53	12.55	35	13.38	12.10	12.10
16	11.45	10.70	11.20	36	10.90	11.63	13.41
17	11.17	12.00	9.50	37	12.67	15.22	12.55
18	10.45	12.12	9.50	38	14.40	15.31	12.77
19	11.65	11.87	11.82	39	14.45	15.65	13.97
20	10.05	11.12	9.95	40	13.46	12.34	12.26
MEAN	-----	-----	-----	----	-----	-----	12.04

STUDY AREA #3

PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)	PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)
1	13.80	14.33	14.00	16	14.33	13.99	13.80
2	16.03	15.75	16.08	17	18.43	18.18	18.38
3	16.08	16.03	15.40	18	16.85	16.55	16.60
4	16.70	16.85	16.90	19	16.83	16.90	16.82
5	17.15	17.25	16.83	20	15.75	16.08	15.72
6	17.25	17.15	16.55	21	17.45	17.38	17.25
7	17.78	17.40	17.49	22	14.00	13.80	13.96
8	17.88	17.93	17.78	23	16.55	16.70	16.90
9	17.93	17.88	17.91	24	16.90	17.15	16.83
10	18.18	17.78	17.70	25	16.50	16.67	16.70
11	15.40	15.40	16.03	26	17.50	17.78	17.39
12	17.40	17.45	17.38	27	18.41	18.18	18.44
13	17.78	17.93	17.88	28	16.87	16.80	16.90
14	17.70	17.52	17.40	29	13.98	14.33	14.10
15	17.38	17.52	17.42	30	17.42	17.78	17.70
MEAN	-----	-----	-----	----	-----	-----	16.73

STUDY AREA #4

PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)	PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)
1	17.78	17.75	17.80	16	16.04	15.99	16.01
2	17.70	17.73	17.75	17	16.93	16.85	16.90
3	17.38	17.35	17.40	18	16.56	16.51	16.54
4	14.33	14.30	14.35	19	17.46	17.41	17.44
5	18.43	18.40	18.45	20	15.36	15.36	15.31
6	16.85	16.85	16.83	21	13.96	13.96	14.01
7	16.83	16.80	16.80	22	17.51	17.46	17.47
8	15.75	15.78	15.73	23	15.74	15.76	15.71
9	17.45	17.48	17.50	24	16.81	16.78	16.90
10	14.00	13.98	13.95	25	16.84	16.83	16.87
11	15.40	15.38	15.35	26	18.45	18.38	18.35
12	17.40	17.43	17.45	27	14.35	14.28	14.29
13	16.55	16.53	16.55	28	17.41	17.33	17.39
14	16.90	16.87	16.92	29	17.76	17.71	17.74
15	16.03	16.01	16.03	30	17.81	17.73	17.77
MEAN	-----	-----	-----	----	-----	-----	16.59

STUDY AREA #5**

PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)	PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)
1	12.43	13.13	12.87	11	14.27	14.25	14.11
2	14.15	14.03	14.17	12	15.22	15.32	15.17
3	14.40	14.35	14.21	13	16.30	16.17	16.24
4	14.00	13.65	13.99	14	12.98	13.12	12.89
5	14.70	15.01	14.67	15	12.87	12.73	12.85
6	17.50	17.27	17.15	16	13.11	13.16	13.07
7	13.50	13.37	13.45	17	14.52	14.47	14.38
8	16.71	16.92	16.83	18	14.77	14.89	14.83
9	14.22	14.17	14.33	19	14.31	14.19	14.23
10	14.35	14.43	14.47	20	16.21	16.37	16.18
MEAN	-----	-----	-----	----	-----	-----	14.53

STUDY AREA #6

PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)	PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)
1	16.03	15.99	16.07	16	17.14	17.00	17.01
2	17.78	17.84	17.81	17	16.07	16.05	16.12
3	16.70	16.61	16.72	18	18.16	18.12	18.20
4	17.93	17.91	17.99	19	17.24	17.21	17.21
5	13.80	13.82	13.89	20	17.87	17.89	17.81
6	17.15	17.13	17.19	21	16.04	16.21	16.14
7	16.08	15.99	16.07	22	17.79	17.50	17.61
8	18.18	18.09	18.23	23	16.71	16.83	16.81
9	17.25	17.20	17.27	24	17.94	17.92	17.90
10	17.88	17.81	17.86	25	13.82	13.86	13.85
11	16.02	16.05	16.11	26	17.15	17.12	17.21
12	17.77	17.69	17.71	27	16.09	16.11	16.12
13	16.69	16.73	16.77	28	18.19	18.11	18.18
14	17.92	17.95	17.81	29	17.26	17.33	17.31
15	13.91	13.85	13.87	30	17.89	17.77	17.89
MEAN	-----	-----	-----	----	-----	-----	16.88

STUDY AREA #7

PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)	PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)
1	21.50	23.86	24.01	16	23.41	22.83	22.72
2	23.40	24.69	25.33	17	25.62	24.71	24.83
3	25.25	25.63	25.43	18	24.66	24.78	24.83
4	25.60	25.74	25.66	19	25.54	24.62	24.63
5	26.85	26.81	27.01	20	28.22	28.41	28.37
6	27.20	27.29	27.25	21	28.41	28.73	28.66
7	27.50	27.69	27.67	22	26.44	25.51	25.45
8	27.58	27.74	27.65	23	27.10	27.21	27.17
9	27.88	27.89	28.02	24	28.55	28.72	28.62
10	28.65	28.74	28.67	25	28.10	28.15	28.21
11	28.90	28.92	29.01	26	28.72	28.98	28.89
12	29.03	28.98	29.01	27	26.51	25.59	25.62
13	25.44	25.59	25.64	28	25.60	25.69	25.67
14	25.51	24.47	24.67	29	26.61	26.77	26.64
15	25.60	25.70	25.67	30	27.72	27.82	27.87
MEAN	-----	-----	-----	----	-----	-----	26.61

** Sample size for Study Area #5 was reduced due to the low density of woolly-star. The sample size for Study Area #2 was correspondingly increased.

Tierra Madre Consultants

Environmental Analysis and Resource Planning
Endangered Species Surveys • Mitigation Design • Ecological Services

1271 Columbia Ave., Suite F-10
Riverside, CA 92507
(714) 684-7081 (FAX) 784-5647

June 25, 1990

Dr. Robert Patterson
Dept. of Biological Sciences
San Francisco State University
1600 Holloway Ave.
San Francisco, CA 94132

Re. Eriastrum densifolium identifications

Dear Dr. Patterson:

I am enclosing eight Eriastrum densifolium samples from Cajon Wash. They have been oven-dried overnight, and should be sterile. I am also sending field notes and maps indicating their locations, and a discussion of this woolly-star population from a report prepared by Maureen Pendleton.

As we discussed on the telephone last week, I will appreciate it if you can identify these plants to subspecies. As you know, it is particularly important to know whether the plants may be the endangered subspecies, E. d. sanctorum. I understand that they may not clearly fall into a described subspecies.

You may keep all of these samples. I am providing specimens from the same individual plants to the UC Riverside Herbarium. I also have sent along a sample of Eriastrum sappharinum from the same area. I thought it might be useful in your taxonomic work.

Sincerely,

TIERRA MADRE CONSULTANTS, INC.

Scott White
Natural Resource Specialist

San Francisco State University
1600 Holloway Avenue
San Francisco, California 94132

Department of Biology
415/338-1548

18 July 1990

Scott White
Tierra Madre Consultants
1271 Columbia Avenue, Suite F-10
Riverside, CA

Dear Mr. White:

I received your specimens of perennial Eriastrum and have examined them. My opinion is that they all fall best within the circumscription of E. densifolium subsp. elongatum. The corolla tubes do not appear to be as long as "typical" subsp. sanctorum; neither does the indumentum appear to be as dense as that of subsp. sanctorum.

The problem here is that the differences between subsp. elongatum and subsp. sanctorum are not discontinuous, and that there is great difficulty assessing where one subspecies' circumscription ends and that of the other begins. This is, of course, the nature of plant subspecies, where morphological discontinuity does not necessarily define infraspecific taxa.

The bottom line is that what you sent me is probably what botanists would call subsp. elongatum, but it would be difficult to discount completely a strong argument for these specimens to be recognized within the morphological range (although at an extreme) of subsp. sanctorum. Such is the nature of taxonomy.

The question of possible hybrids between these two subspecies is probably moot. First, subspecies are commonly interfertile, so "hybrids" wouldn't be unexpected. Second, care must be taken not to substitute the word "hybrid" for "intermediate". While hybrids are often intermediate morphologically, the demonstration of hybridization is a complex matter that may be impossible to undertake.

I hope this helps you out. From a personal perspective, I would suggest close monitoring be continued of these populations with the intent of further comparison with known populations of "good" subsp. sanctorum. Although sanctorum is appropriately listed, we still have much to learn about it and its relatives. Many thanks for the specimens, and feel free to call me if you need further clarification.

Yours truly,

Bob Patterson
Professor of Biology
San Francisco State University
(415) 338-1237

APPENDIX H

NOISE STUDY

NOISE IMPACT STUDY

CAJON CREEK

CITY OF SAN BERNARDINO, CALIFORNIA

Prepared For:

New Horizons Planning Consultants, Inc.
Attn: Ed Dilginis
341 West Broadway, #282
San Diego, CA 92101

Date:

May 15, 1991

17744 Sky Park Circle, Suite 210
Irvine, California 92714

Phone: (714) 851-8609
Fax: (714) 851-8612

NOISE SETTING

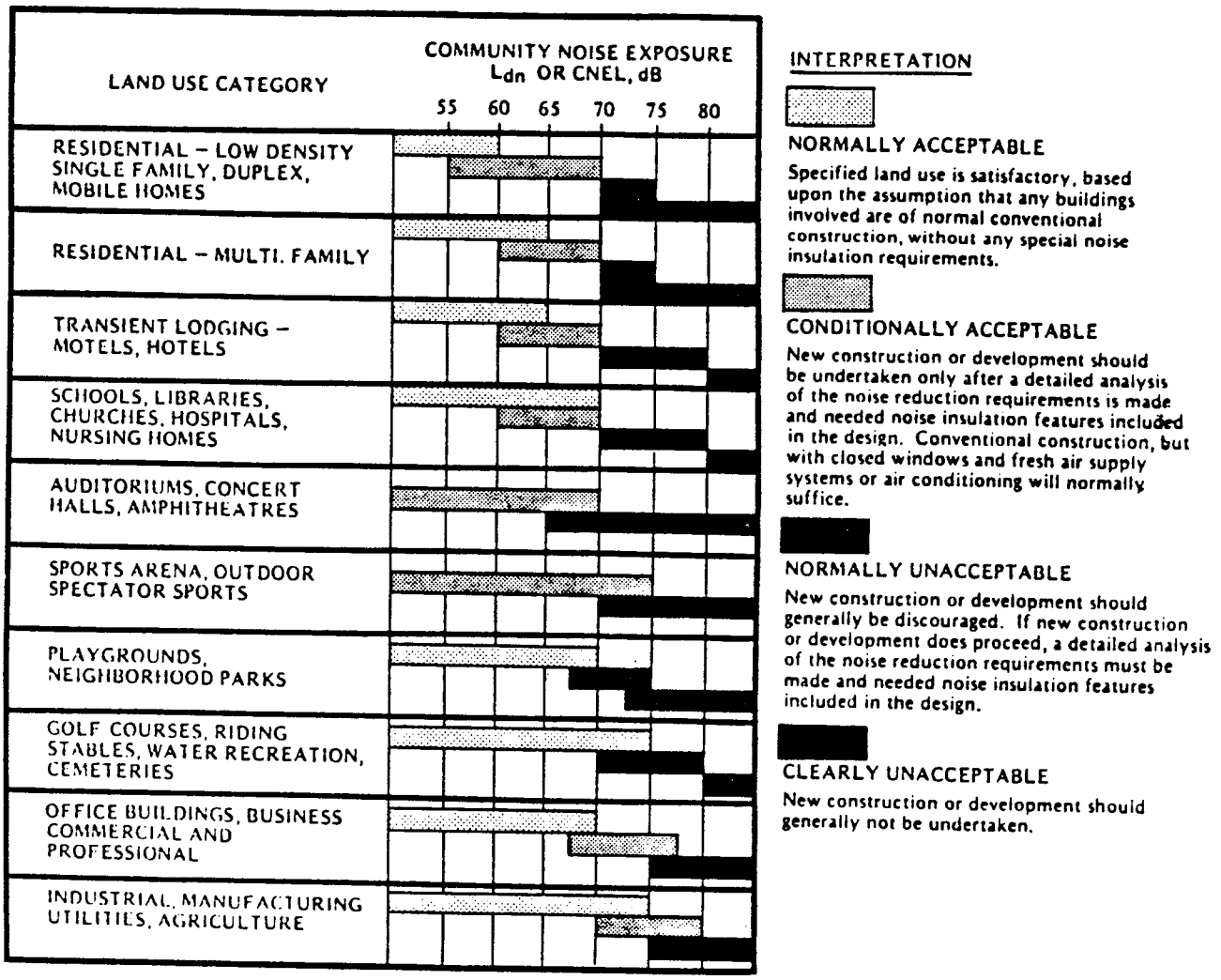
Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is generally defined as unwanted sound. Sound is characterized by various parameters that describe the rate of oscillation of sound waves, the distance between successive troughs or crests, the speed of propagation, and the pressure level or energy content of a given sound wave. In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. The unit of sound pressure ratioed to an assumed zero sound level is called a decibel (dB). Because sound or noise can vary in intensity by over one million times within the range of human hearing, a logarithmic loudness scale similar to the Richter Scale for earthquake intensity is used to keep sound intensity numbers at a convenient and manageable level. Since the human ear is not equally sensitive to all sound frequencies within the entire spectrum, noise levels at maximum human sensitivity (middle A and its higher harmonics) are factored more heavily into sound descriptions in a process called "A-weighting" written as dB(A).

Time variations in noise exposure are normally expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called Leq), or, alternately, as a statistical description of the sound level that is exceeded over some fraction of a given observation period. Finally, because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law requires that, for planning purposes, an artificial dB increment be added to quiet time noise levels in a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL). An interior CNEL of 45 dB(A) is mandated by the State of California Noise Insulation Standards (CAC, Title 24, Part 6, Section T25-28) for multiple family dwellings and is considered a desirable noise exposure for single family dwelling units as well. Since typical noise attenuation within residential structures with closed windows is about 20 dB, an exterior noise exposure of 65 dB CNEL is generally the noise land use compatibility guideline for new residential dwellings in California. Because commercial or industrial uses are not occupied on a 24-hour basis, the exterior noise exposure standard for less sensitive land uses generally is somewhat less stringent.

In many communities where a quiet environment is considered an important asset that enhances the natural scenic values, a somewhat more stringent land use compatibility guideline has often been adopted. In the Noise Element in the City of San Bernardino General Plan, the State of California Office of Noise Control, guidelines are used to specify a range of community noise exposure acceptable for various receiver site land uses, as seen in Figure 1. An exterior noise exposure standard of 60 dB CNEL is identified as most desirable for residential, school, visitor accommodation and other noise-sensitive receptors.

FIGURE 1

CITY OF SAN BERNARDINO
NOISE/LAND USE COMPATIBILITY GUIDELINES



Source: Office of Noise Control, California Department of Health--as shown in San Bernardino General Plan Noise Element, Figure 56

Noise exposures of up to 70 dB CNEL are considered conditionally acceptable if noise barriers such as perimeter walls have been used to mitigate levels as much as possible, while an exterior noise exposure in excess of 70 dB CNEL is considered patently unacceptable. Within the normally acceptable range of 60-70 dB for residential uses, the City of San Bernardino generally uses the mid-point value of 65 dB CNEL as an acceptable residential exterior exposure. Industrial areas are less noise sensitive and, therefore, require less stringent guidelines for noise/land use compatibility. Noise exposures below 70 dB CNEL are normally acceptable for industrial land uses, with exposures between 70-80 CNEL conditionally acceptable.

Existing noise levels within Cajon Creek derive mainly from vehicular sources on the highways and secondary roads in the area. Railroad traffic, occasional aircraft activity and some manufacturing processes constitute additional noise intrusions with their integrated contribution to the 24-hour community noise level, a significant additional burden to the overall noise environment. It is recognized that the proposed mineral product extraction and processing activities and the proposed light industrial uses will be located in an area that already experiences a partially degraded noise environment.

In order to document existing baseline noise levels, a brief on-site noise monitoring program was conducted at many receiver locations around the Cajon Creek site on September 16, 1990. Locations ranged from southern residential areas near Mesa and Duffy Streets to residential and commercial areas in the north off of Cajon Boulevard and Kendall Drive. Other monitoring locations included The Blake Street Park, additional residential/railroad areas near Ogden and Gray Streets, areas near the Verdemont Boys Camp and along Verdemont Road, the Glen Helen Off-Road Vehicle Park, the Sheriff's Academy and San Bernardino jail.

In addition, to answer concerns raised about the plans for a proposed school site on land adjacent to the Cajon Creek Project, a second noise monitoring survey was conducted on the possible future school site on October 26, 1990. Three locations (near Cajon Boulevard, on the southern edge of the site and along the northwestern edge of the site closest to the proposed main aggregate processing plant) were chosen. The results of the monitoring are summarized in Table A.

Several pertinent conclusions can be drawn from this data. Except in very close proximity to the freeway or railroad tracks, noise exposure in the testing area is generally low and well below the exterior 60 dB goal for noise sensitive land uses. The acceptable exposure limit was only exceeded at three of the monitoring locations. Two locations are Cajon Boulevard at Bennet with 63.0 dB Leq and Cajon Boulevard on the school site with 62.4 dB Leq.

TABLE A

CAJON CREEK PROJECT
ON-SITE NOISE MONITORING SUMMARY

Location	Auto/Med/Hvy	Speed	Leq	Lmax	Lmin	L01	L10	L25	L50
Southern Residential									
A. Duffy St. near Mesa o	50/10/0	35	52.6	71.0	38.5	65.5	55.5	48.5	45.0
B. Duffy St. 150' oo	——	–	49.1	64.5	36.0	62.5	50.0	44.0	41.0
Blake St Park									
C. Blake St. 50' oo	——	–	44.1	56.0	37.0	51.0	47.0	44.5	42.0
D. Blake St. 200' oo	——	–	45.1	64.5	35.5	54.5	47.5	45.5	42.0
Ogden St. near Gray St.									
E. End of Ogden	——	–	40.6	55.0	35.0	50.5	43.0	39.5	37.5
F. Other side of tracks 200' East of E.	——	–	38.9	51.0	34.0	47.5	41.0	39.0	37.0
Verdemont Road									
G. Near Boys Camp o	50/0/0	50	50.1	68.5	37.5	65.0	52.5	45.0	41.0
H. Verdemont Road o	50/0/0	50	53.3	73.5	35.0	68.0	52.5	46.5	41.5
I. Off-Road Vehicle Park (no activity)	——	–	50.1	67.0	35.5	62.0	53.0	48.5	43.5
Institute Road									
J. Near Jail o	60/0/0	45	53.7	66.5	39.0	62.5	57.5	54.5	50.0
K. R/R Crossing Overpass	60/0/0	65	50.2	63.5	34.0	60.5	54.0	49.5	44.5
Northern Residential									
L. Cajon Blvd. at Bennet 50' oo	220/0/10	75	63.0	78.5	42.5	75.0	67.5	61.0	52.5
M. Kendall Dr. near Yucca 50' oo	160/10/0	65	72.6	93.5	41.0	88.5	66.5	62.5	53.5
School Site									
N. Cajon Blvd. o	80/20/10	60	62.4	80.0	44.5	75.5	66.0	56.5	49.5
O. S. Edge	——	–	43.9	53.5	38.0	52.0	48.0	43.5	41.0
P. NW. Edge	——	–	43.9	59.5	36.5	57.0	44.5	41.5	39.0

—— = no data
o = 50 feet from center of roadway
oo = 50 feet from edge of roadway

Source: On-Site Noise Monitoring 09/16/90 (11:20-15:20) and 10/26/90 (10:15-11:30)

These noise levels could be attributed to vehicular traffic at high speeds and truck traffic along Cajon Boulevard. The noise exposure recorded at Kendall Drive near Yucca Avenue was 72.6 dB Leq. The proximity to traffic on Kendall Drive plus proximity to both freight and passenger trains passing in the 25 minute monitoring period created a noise exposure level well above the desired 60 dB CNEL. Clearly, no single simple descriptor can characterize areawide noise quality because of the inhomogeneity of existing source distributions. Any project noise impact analysis will need to take this marked spatial variation into account.

Noise review procedure for all development applications in the City of San Bernardino are specified in the City Noise Element. This review process is designed to preclude the development of incompatible uses in noise impacted areas but also to prevent siting major noise producers adjacent to areas of enhanced noise sensitivity. The review procedures, therefore, mandate a careful site survey to analyze for potential compatibility problems. Land use incompatibility is presumed to exist if a noise-producing activity creates a noise hazard even if the impacted property is currently vacant. If any noise producing land use such as a mineral extraction/processing activity creates noise levels in excess of 60 dB CNEL at a sensitive land use, acoustical studies shall be prepared. If the impact cannot be mitigated at least to the 65 dB CNEL level, a sensitive land use incompatibility exists that would be unacceptable under most circumstances. If the noise-producing impact on a sensitive land use cannot be mitigated below 70 dB CNEL, such an impact would be considered unacceptable under almost any circumstance. Project noise impacts on any adjacent industrial uses would be considered acceptable below 70 dB CNEL, conditionally acceptable with mitigation at 75 dB CNEL and unacceptable at noise levels above 80 dB CNEL. These criteria thus form the basis for evaluating the noise impact from the proposed Cajon Creek sand and gravel resource extraction and on-site processing project plus traffic noise impacts from both mineral resource activities as well as from proposed industrial development of the planning area.

NOISE IMPACTS

Significance Criteria

There are no absolute standards of noise impact significance because public impacts are rarely at hearing loss thresholds, but rather more at levels that cause psychological damage. Noisy environments create a perception that external intrusion has degraded the quality of one's life. There are some health impacts such as sleep disturbance that can occur in even relatively quiet areas, but excessive noise is more of a nuisance rather than a trigger for adverse health effects. Although noise standards have been established to distinguish between sensitivity as a function of land use, and artificial penalties have been added to noise events that occur during periods of greater sensitivity, neither the standard nor the noise metric tied to the standard are ideal mechanisms to evaluate nuisance potential. A drippy faucet, a brief dog bark or one noisy motorcycle may all waken a sleeping person without violating a standard or even measurably changing the CNEL. Similarly, people living near a freeway with noise levels 20-30 dB higher than a rural home learn to "tune out" the steady rumble and sleep without interruption. Although one typically uses an incremental increase in CNEL or the existence of noise levels above certain thresholds as criteria for determining impact significance, these measures are not perfect yardsticks. Any impact thus must be evaluated within the context in which it happens in order to determine impact significance.

An increase in noise exposure is generally determined to be significant if:

1. It represents a perceptible increase in noise exposure over the pre-project condition, or,

2. It creates a substantial unsuitability for uses exposed to such noise.

Perceptible for most humans is around a 3 dB change. For an industrial project such as a rock plant, that change can occur almost instantaneously between the plant quiet versus the plant operating. For automotive traffic noise sources, the change is very gradual such that there usually is not a sudden perception that it has gotten noisier. Complaints associated with transportation noise tend to be more focused on single event intrusions such as an aircraft overflight or a train passage rather than for a semi-continuous rumble of vehicles. Nevertheless, a 3 dB change is generally taken as a significance criterion for project impacts even if the impact occurs gradually over an extended period of time.

Changes in noise/land use compatibility levels require a determination of the extent that a

given receiver location has been made unsuitable for a current or planned land use. Clearly, a change in noise quality from a level designated "normally acceptable" to one that is "normally unacceptable" is significant. A small incremental degradation that makes the noise exposure only slightly less acceptable is more difficult to evaluate. Accuracy of noise models, especially for traffic sources, is typically only ± 1 dB. Differentiation of the exact contour distances from a source of various classes of acceptability, therefore, has some uncertainty. A noise impact is, therefore, considered significant if it creates a worsening of site suitability for residential use while accompanied by a measurable (+ 1 dB) increase in noise exposure.

Two significance criteria will, therefore, be employed for this analysis, namely,

1. An increase of 3 dB in noise exposure, or,

2. A change in the site suitability for a given land use accompanied by a measurable increase (+ 1 dB) in noise levels.

As previously noted, these arbitrary criteria need to be considered within the context of the existing noise setting. Some locations within the project vicinity are relatively quiet and will be sensitive to changes in the noise loading. Other locations near freeways, train tracks or existing industrial sources are chronically exposed to loud noise and will thus be considerably less sensitive to any changes created by adoption of SP 90-1.

On-Site Noise Impacts

The Cajon Creek project is unique in terms of noise impacts. It is a complex project with industrial growth occurring simultaneously with mineral extraction and processing. The project is, therefore, transitional with progressively more intensive land uses gradually replacing the more passive mineral resource extraction. Noise impacts from site activities will shift concurrently with such transitional development. Initially, on-site rock plant activities and specified plant access routes will create well defined point and line sources at the two simultaneously operating rock plant sites and their primary truck access routes. With increased industrial development, automobiles and trucks dispersed throughout the local transportation grid will become increasingly dominant. Although there will be a cumulative noise effect of all development activities, the on-site processing and off-site transportation noise sources are sufficiently distinct as to be treated/analyzed separately.

Mineral Resource Processing Impacts

Mineral resource extraction, hauling, crushing, screening, loading and other site activities will create noise from a variety of on-site sources. The noise emissions are most heavily concentrated within the processing area because extraction noise is generally shielded by the walls of the quarry itself. The observed noise impact at the nearest residential receptors south and east of the two proposed rock plant sites from all activities will thus be a combination of distinct point radiators and a diffuse collection of mobile combustion equipment noise sources.

Noise emissions from similar operations have been measured on many occasions, and their spherical radiation pattern lends itself well to predicting off-site noise exposure from such sources. However, the noise level around one plant is often different from a comparable plant with similar equipment. In areas of complex terrain, noise levels may vary over short distances such that site-specific effects are difficult to incorporate in a noise impact assessment based on generalized measurements from a prototype plant.

Noise impacts from rock processing activities derive from a wide variety of sources that differ in intensity, frequency and duration. The nature of the rock resource itself tends to contribute to noise generation as the size of the material will determine crushing/screening requirements, as will the ease with which the rock shatters during crushing determine crusher resistance. One characteristic of rock processing and related uses such as concrete production, is that the noise is relatively steady-state such that the noise is more psychologically adaptable to a human observer. One other characteristic is that aggregate resource processing produces considerable low frequency tones that carry for long distances with only partial atmospheric attenuation. Such activities thus unfortunately may be more intrusive at considerable distances from the activity, especially at night. One factor mitigating low frequency noise impacts is that the primary crusher, as one of the main noise generators, will be located within the extraction pit. Both the physical walls of the pit and the greater source to receiver distance will reduce low frequency noise impact potential.

Noise emission rates from individual components within aggregate resource operations have been measured on many occasions such that one can determine a source strength to an arbitrary combination of such sources. Practically, there is a wide array of structural components that limit the effective propagation direction such that crushers may be most audible in one direction, screen discharges in another, and rocks bouncing on a screen in a third. Despite this diversity, one can typically ascribe an effective source strength that is accurate within a rather narrow range of uncertainty. Effective source strength of a rock plant as measured at the C. L. Pharris Church Street Plant in Redlands/Highland is around

72-75 dB at 400 feet from plant center if there is a clear line of sight to the plant and there are no nearby activities such as mobile equipment, stacker discharges, etc. The inclusion of a ready mix plant or an asphaltic concrete plant generally does not substantially change the overall far-field noise level because the rock plant is the more dominant noise generator. The indicated 3 dB range of exposure, in addition to any nearby contamination or obstructions to line-of-sight propagation, depends mainly on whether the primary crusher is operating at the plant or within the quarry removed from the final processing. Differences in percentage of dry versus wet processing also affect noise exposure with wet processing considerably quieter.

Under the assumption of a spherically radiating surface with a clear transmission path, the hourly noise exposure at the nearest off-site residential structure at 1,000 feet from the Parcel N main processing plant will be 64-67 dBA. In terms of an integrated daily (CNEL) exposure from such hourly loading consistent with City Noise Element guidelines, it will depend on the number of hours of operation of the facility and on any measures taken to reduce the overall noise loading. The noise exposure to the possible high school site at 2,000 feet from the proposed main Parcel N plant is 57-60 dB. Because the school site would be occupied primarily during the daytime, plant noise impacts would never exceed the City's 65 dB standard for noise-sensitive land uses. However, if the plant is operated for many hours per day, including from 7-10 p.m. when sound pressure levels are artificially tripled in the CNEL metric, and from 10 p.m. to 7 a.m. when levels are presumed ten times as high as in reality, the acceptability standard form maximally sensitive land uses could be substantially exceeded. The noise exposure at the nearest residence and the school site, as a function of various possible hours of plant operation, is as follows:

	Noise Exposure (dB CNEL)	
Hours of Operation	Nearest Home	High School
07 a.m. - 07 p.m.	61 - 64	54 - 57
07 a.m. - 10 p.m.	64 - 67	57 - 60
06 a.m. - 07 p.m.	64 - 67	57 - 60
06 a.m. - 10 p.m.	65 - 68	58 - 61
06 a.m. - 12 p.m.	67 - 70	60 - 63
24 hours/day	71 - 74	64 - 67

Clearly, City standards of 65 dB as most desirable for maximally sensitive land uses may be exceeded for any operations during periods of enhanced noise sensitivity. Exposure becomes increasingly less acceptable with plant operations during more hours of greater noise sensitivity. Given that there is property even closer than the current nearest home that could be developed into residential uses, a potentially significant impact exists.

Candidate noise reduction measures, in addition to possible limits on hours of operation to avoid the 10 p.m. to 7 a.m. period as much as possible, include design features in the process stream to deaden noise, physical obstructions to line of sight propagation, and building a low profile plant that keeps screens and discharge chutes lower to the ground to where they can be more readily shielded by perimeter berms, or using product stockpiles and/or perimeter berms to help break the line of sight. Noise reduction effectiveness of about 5 dB has been observed at Calmat rock plants in San Diego that use rubberized screen fabric and rubberized discharge chutes/aprons. Rubberizing creates greater maintenance requirements, it can contaminate aggregate quality if it abrades substantially, and it requires much larger screens for the same rock throughput because large portions of the screen mesh are the rubber fabric. Nevertheless, such sound deadening, especially from the upper levels of a rock plant that are hardest to shield from line of sight impacts, is the state of the art in noise impact control.

Shielding of crushers will occur either by quarry walls for the primary crusher, or by product stockpiles for the cone crushers in the processing plant. Crusher and screen noise at residences south of the plant can also be reduced by facing the screens and crushers northward. The shielding of low-level plant sources, including mobile loaders with their annoying back-up alarms, haul trucks, ready mix loading, etc. can be enhanced by perimeter berming which will create substantial additional noise reduction benefit. Some berming benefit already exists from the railroad embankment such that a similar berm on other sides of the plant, coupled with maintaining a 30-foot maximum height on the top of any screen, will substantially further reduce plant noise impacts. With partial screening of ground-based sources, the additional noise benefit will be a 5-10 dB reduction. With full shielding of line of sight of all processing components except the tops of conveyors and silos, the noise reduction will be 10-15 dB.

There is, therefore, a detailed menu of control options that may be employed for noise control. Because each option entails a set of economic trade-offs, it might be most preferable to establish a performance standard at the nearest sensitive receiver site and let the applicant pick from those control options that generate the greatest noise reduction benefit for the least additional cost. An hourly noise exposure of 65 dB from 7 a.m. to 7 p.m., 60 dB from 7 p.m. to 10 p.m., and 55 dB from 10 p.m. to 7 a.m., would insure

maintaining the City standard while leaving the applicant maximum flexibility. The unabated hourly noise level was calculated to be 64-67 dB at the closest receiver. Noise reduction of around 5 dB by day and 10 dB during maximum sensitivity are needed to meet the suggested performance standard. As noted above, such reduction is well within the range of possible control, and is easily verified with a mitigation effectiveness monitoring program after plant start-up. Because the change in exterior noise levels from current exposures in the 40-50 dB range to levels above 60 dB CNEL will occur at the nearest residences to the project site, the change substantially exceeds the 3 dB threshold of significance. Noise abatement should, therefore, strive to not just barely meet the City standard, but to reduce exposure with as much additional margin safety as possible.

Portable plant sites aside from the main Area N permanent plant will be surround by less sensitive land uses, and any noise constraints on their operation will be diminished by the lack of any adjacent sensitive receiver population. The same level of noise control will not be necessary. A performance standard of 70 dB at any adjacent occupied light industrial use would be a reasonable limit. Such a level is typically met within 500 feet of the plant center, especially when product stockpile create intermittent transmission barriers. As long as the main plant is carefully controlled, and as long as site traffic is funneled toward Institution/Palm Avenue for freeway access and Cajon Blvd. traffic is minimized, aggregate resource development will not have an adverse noise impact on the surrounding community.

Mobile Source Impacts

Construction Impacts

Temporary equipment noise will result from construction of facilities either from parcels not to be mined or from reuse when mining is completed. The surrounding land use to such activities either has a reduced sensitivity, or the nearest sensitive receivers are so far away as to create an insignificant impact potential. Temporary equipment noise levels of 90 dB may result during construction similar to a rock plant, but these noises occur mainly by day under time constraints imposed on grading/construction permits, and are not a chronic source. Development of the main processing plant will entail considerable effort, but much of the mobile equipment activity will be at ground level shielded from the nearest homes by the railroad embankment. Given the combination of time limits, distance, low surrounding sensitivity and an existing propagation barrier at the nearest homes or school site at the south end of the project, any construction noise impacts will be insignificant. Similarly, the separation distance and freeway background masking effect at the homes near the north end of the project site will sustain any construction activity noise impacts at an insignificant level.

Traffic Noise Impacts

The traffic noise impact analysis was based on a combination of existing traffic dominated by moderate travel speeds and high truck volumes which were expected to continue to well into the future given the industrial nature of proposed development in the Specific Plan area. Noise exposure was calculated using the Federal Highway Traffic Noise Prediction Model (FHWA-Rd-77-108) modified with California-specific vehicle noise characteristics (CALVENO-85). Model calibration was performed by comparing vehicle noise observations from the proposed high school site along Cajon Blvd. with those predicted by the Caltrans microcomputer version of the FHWA Noise Model. With a model-observation difference of less than 1.0 dB, the computer model was judged to be a very suitable tool to evaluate project-related acoustic impacts.

Noise exposure calculations from roadway sources were made for existing traffic and for three horizon years (1997, 2007 and 2017). Calculations were made to determine the CNEL at a fixed reference distance, and the contour distance to various levels of receptor sensitivity were determined from the reference distance calculation. A daytime truck percentage of nine percent heavy trucks was maintained throughout the analysis period to properly simulate the noise effects of truck-intensive uses such as rock products distribution, construction equipment storage and staging, goods warehousing, and industrial development. Roadway noise calculations are summarized in Table B for the 100 foot reference distance CNEL exposure and in Tables C, D and E for the distance to the 60, 65 and 70 dB CNEL contour. The 60 dB CNEL contour distance is the set-back needed for any noise-sensitive not requiring any noise attenuation, 65 dB is the exposure that is not to be exceeded even with mitigation for such sensitive uses, and 70 dB CNEL is the exposure at which noise attenuation must be considered for less noise-sensitive uses such as commercial or light industrial development.

Despite the limited development intensity of the project area, noise levels in close proximity to local roadways exceed the 60 dB CNEL standard out to a moderate distance from area roadways because of heavy truck traffic and rapid travel speeds. Table E shows, however, that the 70 dB contour distance is currently within the roadway right of way along all roads analyzed and thus presents no development constraint for any proposed project light or heavy industrial uses governed by the 70 dB CNEL exposure guideline. Although the 3 dB threshold of significance is marginally exceeded for the "with project" versus "no project" condition, there are only limited noise-sensitive land uses where such a change in noise exposure might be important.

Residential uses along Cajon Blvd. at the north end of the Specific Plan area, Muscoy

TABLE B

CNEL @ 100' TO ROADWAY CENTERLINE (dBA)

Roadway Segment	Exist (1989)	1997 NP	1997 WP	2007 NP	2007 WP	2017 NP	2017 WP
Institution/Palm Ave							
W of RR Tracks	62.4	63.3	64.6	64.6	67.0	66.1	68.2
RR Tracks--Cajon	62.4	63.3	66.6	64.6	68.2	66.1	69.2
Cajon--Kendall	65.3	66.4	68.9	67.1	69.8	68.4	71.0
Cajon Blvd.							
N of Palm	60.0	61.7	63.4	63.8	64.5	66.0	67.3
S of Palm	61.3	63.3	65.3	65.1	66.5	67.2	68.7
Kendall Drive							
Cajon--Palm	59.6	61.2	61.2	63.4	63.4	65.5	68.2

Source: FHWA-RD-77-108 (CALVENO-85 mod.)

NP = No Project

WP = With Project

TABLE C

DISTANCE FROM CENTERLINE TO 60 dB CNEL CONTOUR FROM CENTERLINE

Roadway Segment	Exist (1989)	1997 NP	1997 WP	2007 NP	2007 WP	2017 NP	2017 WP
Institution/Palm Ave							
W of RR Tracks	144'	165'	202'	202'	294'	257'	351'
RR Tracks--Cajon	144'	165'	273'	202'	353'	257'	414'
Cajon--Kendall	227'	268'	391'	297'	448'	364'	541'
Cajon Blvd.							
N of Palm	100'	130'	169'	180'	200'	250'	307'
S of Palm	123'	165'	224'	220'	273'	304'	380'
Kendall Drive							
Cajon--Palm	94'	121'	121'	168'	168'	233'	352'

Source: FHWA-RD-77-108 (CALVENO-85 mod.)

NP = No Project

WP = With Project

TABLE D

DISTANCE FROM CENTERLINE TO 65 dB CNEL CONTOUR FROM CENTERLINE

Roadway Segment	Exist (1989)	1997 NP	1997 WP	2007 NP	2007 WP	2017 NP	2017 WP
Institution/Palm Ave							
W of RR Tracks	67'	77'	94'	94'	137'	119'	163'
RR Tracks--Cajon	67'	77'	127'	94'	164'	119'	192'
Cajon--Kendall	105'	125'	182'	138'	208'	169'	251'
Cajon Blvd.							
N of Palm	<50'	60'	78'	83'	93'	116'	143'
S of Palm	57'	77'	104'	102'	127'	141'	176'
Kendall Drive							
Cajon--Palm	<50'	56'	56'	78'	78'	108'	164'

Source: FHWA-RD-77-108 (CALVENO-85 mod.)

NP = No Project

WP = With Project

TABLE E

DISTANCE FROM CENTERLINE TO 70 dB CNEL CONTOUR

Roadway Segment	Exist (1989)	1997 NP	1997 WP	2007 NP	2007 WP	2017 NP	2017 WP
Institution/Palm Ave							
W of RR Tracks	<50'	<50'	<50'	<50'	64'	55'	76'
RR Tracks--Cajon	<50'	<50'	59'	<50'	76'	55'	89'
Cajon--Kendall	<50'	58'	84'	64'	97'	78'	117'
Cajon Blvd.							
N of Palm	<50'	<50'	<50'	<50'	<50'	54'	66'
S of Palm	<50'	<50'	<50'	<50'	59'	66'	82'
Kendall Drive							
Cajon--Palm	<50'	<50'	<50'	<50'	<50'	50'	76'

Source: FHWA-RD-77-108 (CALVENO-85 mod.)

NP = No Project

WP = With Project

residents at the south end, and the proposed school site are the three main sensitive receiver sites affected by traffic noise changes. The northern residences back up to I-215, and, therefore, have a high baseline noise exposure that will mask any arterial noise impacts. Most Cajon Creek traffic will head southward such that noise impacts near Devore will be limited in any event by the prevailing traffic pattern. Muscoy community homes generally do not back upon or directly face Cajon Blvd. They have adequate set-back to retain an acceptable noise exposure. The amount of frontage for the school site along Cajon Blvd. is very small. Any school buildings would have to be built farther down Fifth Avenue since the possible school property almost comes to a point near Cajon Blvd. At each possible sensitive receiver site (current residences or the future possible high school) background masking or set-back will preclude formation of any adverse noise impacts. A noise conflict could occur if future residences southeast of the project site are built in closer proximity to Cajon Blvd. City noise standards are specific in requiring acceptable exposures not only for existing land uses, but for future uses allowed under current zoning or general plan designation. However, any such homes would need to incorporate sufficient acoustic protection to shield the homes from a noise level of 72 dB CNEL at 200 feet from the AT&SF railroad track (City General Plan, Section 14, p. 14-7). That shielding will similarly protect those same homes from roadway noise exposure. Traffic noise impacts from implementation of Specific Plan SP 90-1 are thus not judged to constitute a significant deterioration of the local noise environment.

MITIGATION

The permanent aggregate processing plant (Planning Area N) noise impact on scattered existing semi-rural residences (and possible future construction) is the only impact identified as requiring mitigation. A variety of mechanisms to achieve an acceptable noise exposure have been identified. It is recommended that the project applicant select those design features that achieve a recommended performance standard and that compliance with that standard is confirmed by subsequent mitigation monitoring imposed as a CUP condition. Mitigation in the way of a performance standard is as follows:

1. Plant operations, including aggregate extraction, processing, handling and formulation of any construction materials, shall not cause hourly noise levels to exceed 65 dB LEQ from 7 a.m. to 7 p.m., 60 dB LEQ from 7 p.m. to 10 p.m., and not to exceed 55 dB LEQ from 10 p.m. to 7 a.m. at the nearest occupied residence to the plant site.

Additionally,

2. Truck traffic, except for local deliveries, shall access I-215 via Palm/Institution to minimize project-related traffic on Cajon Blvd.

3. Construction activities at any permanent facilities within the Specific Plan area shall occur only from 7 a.m. to 7 p.m. on Monday through Saturday, excluding any nationally recognized holidays.

APPENDIX I

AIR QUALITY STUDY

AIR QUALITY IMPACT ANALYSIS

CAJON CREEK AGGREGATE PROJECT

CITY OF SAN BERNARDINO, CALIFORNIA

Prepared For:

New Horizons Planning Consultants, Inc.
Attn: Ed Dilginis
341 West Broadway, #282
San Diego, CA 92101

Date:

July 31, 1991

7744 Sky Park Circle, Suite 210
vine, California 92714

Phone: (714) 851-8609
Fax: (714) 851-8612

METEOROLOGY/CLIMATE

The climate of the San Bernardino area, as with all of Southern California, is governed largely by the strength and location of the semi-permanent high pressure center over the Pacific Ocean and the moderating effects of the nearby vast oceanic heat reservoir. Local climatic conditions are characterized by very warm summers, mild winters, infrequent rainfall, moderate daytime on-shore breezes, and comfortable humidities. Unfortunately, the same climatic conditions that create such a desirable living climate combine to severely restrict the ability of the local atmosphere to disperse the large volumes of air pollution generated by the population and industry attracted in part by the climate. San Bernardino is situated in an area where the pollutants generated in coastal portions of the Los Angeles basin undergo photochemical reactions and then move inland across the project site during the daily sea breeze cycle. The resulting smog at times gives San Bernardino some of the worst air quality in all of California. Fortunately, significant air quality improvement in the last decade suggests that healthful air quality may someday be attained despite the limited regional meteorological dispersion potential.

Winds across the project area are an important meteorological parameter because they control both the initial rate of dilution of locally generated air pollutant emissions as well as controlling their regional trajectory. Winds across the project site display a very unidirectional onshore flow from the southwest-northwest that is strongest in summer with a weaker offshore return flow from the northeast that is strongest on winter nights when the land is colder than the ocean. The onshore winds during the day average 8-12 mph while the offshore flow is often calm or drifts slowly westward at 1-3 mph. During the daytime, any locally generated air emissions are thus rapidly transported eastward toward Cajon Pass without generating any localized air quality impacts. The nocturnal drainage winds which move slowly across the area have some potential for localized stagnation, but fortunately, these winds have their origin in the adjacent mountains where background pollution levels are low such that any localized contributions do not create any unhealthful impacts.

In conjunction with the two characteristic wind regimes that affect the rate and orientation of horizontal pollutant transport, there are two similarly distinct types of temperature inversions that control the vertical depth through which pollutants are mixed. The summer on-shore flow is capped by a massive dome of warm, sinking air which caps a shallow layer of cooler ocean air. These marine/subsidence inversions act like a giant lid over the basin. They allow for local mixing of emissions, but they confine the entire polluted air mass within the basin until it escapes into the desert or along the thermal chimneys formed along heated mountain slopes. In winter, when the air near the ground cools while the air aloft remains warm, radiation inversions are formed that trap low-level emissions such as automobile

exhaust near their source. As background levels of primary vehicular exhaust rise during the seaward return flow, the combination of rising non-local baseline levels plus emissions trapped locally by these radiation inversions creates microscale air pollution "hot spots" near freeways, shopping centers and other traffic concentrations in coastal areas of the Los Angeles Basin. The combination of winds and inversions are thus critical determinants in leading to the highly degraded air quality in summer, and the generally good air quality in winter in the San Bernardino area.

AIR QUALITY SETTING

Ambient Air Quality Standards (AAQS): In order to gauge the significance of the air quality impacts of the proposed Cajon Creek project, those impacts, together with existing background air quality levels, must be compared to the applicable ambient air quality standards. These standards are the levels of air quality considered safe, with an adequate margin of safety, to protect the public health and welfare. They are designed to protect those people most susceptible to further respiratory distress such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise, called "sensitive receptors." Healthy adults can tolerate occasional exposure to air pollutant concentrations considerably above these minimum standards before adverse effects are observed. Recent research has shown, however, that chronic exposure to ozone even at the federal clean air standard level can create unhealthful reactions through pulmonary distress.

National AAQS were established in 1971 for six pollution species with states retaining the option to add other pollutants, require more stringent compliance, or to include different exposure periods. The initial attainment deadline of 1977 was extended to 1987 for national AAQS, and with the passage of the 1987 deadline, attainment is still nowhere near being met in air quality problem areas like Southern California. Because California had established AAQS several years before the federal action and because of unique air quality problems introduced by the restrictive dispersion meteorology, there is considerable difference between state and national clean air standards. Those standards currently in effect in California are shown in Table 1.

Baseline Air Quality: Existing levels of ambient air quality and historical trends and projections in the San Bernardino area are best documented from measurements made near the project site. The South Coast Air Quality Management District (SCAQMD) operates a monitoring station in San Bernardino that measures the complete spectrum of gaseous and particulate pollutants for which there are clean air standards. From these data resources, one can well infer that baseline air quality levels near the Cajon Creek project site are occasionally very unhealthful, but there are some encouraging signs that the air is slowly, but surely, getting better. Attainment may still be many years away, but the frequency of smog alerts, especially those considered unhealthy for all people, has dropped considerably in the last decade. Table 2 summarizes the last six years of published monitoring data from the San Bernardino station. Ozone, the primary ingredient in photochemical smog, is obviously the biggest pollution problem in the area. About one-third of all days of the year experience a violation of the national hourly ozone standard with 25-30 first stage alerts called each year. The encouraging sign is the complete lack of any second stage smog alerts

TABLE 1
Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards		National Standards		
		Concentration	Method	Primary	Secondary	Method
Ozone	1 Hour	0.09 ppm (180 ug/m3)	Ultraviolet Photometry	0.12 ppm (235 ug/m3)	Same as Primary Std.	Ethylene Chemiluminescence
Carbon Monoxide	8 Hour	9.0 ppm (10 mg/m3)	Non-dispersive Infrared Spectroscopy (NDIR)	9.0 ppm (10 mg/m3)	Same as Primary Stds.	Non-dispersive Infrared Spectroscopy (NDIR)
	1 Hour	20 ppm (23 mg/m3)		35 ppm (40 mg/m3)		
Nitrogen Dioxide	Annual Average	-	Gas Phase Chemiluminescence	0.053 ppm (100 ug/m3)	Same as Primary Std.	Gas Phase Chemiluminescence
	1 Hour	0.25 ppm (470 ug/m3)		-		
Sulfur Dioxide	Annual Average	-	Ultraviolet Fluorescence	80 ug/m3 (0.03 ppm)	-	Pararosoaniline
	24 Hour	0.05 ppm (131 ug/m3)		365 ug/m3 (0.14 ppm)	-	
	3 Hour	-		-	1300 ug/m3 (0.5 ppm)	
	1 Hour	0.25 ppm (655 ug/m3)		-	-	
Suspended Particulate Matter (PM_{10})	Annual Geometric Mean	30 ug/m3	Size Selective Inlet High Volume Sampler and Gravimetric Analysis	-	-	-
	24 Hour	50 ug/m3		150 ug/m3	Same as Primary Stds.	Inertial Seperation and Gravimetric Analysis
	Annual Arithmetic Mean	-	-	50 ug/m3		
Sulfates	24 Hour	25 ug/m3	Turbidimetric Barium Sulfate	-	-	-
Lead	30 Day Average	1.5 ug/m3	Atomic Absorption	-	-	Atomic Absorption
	Calendar Quarter	-		1.5 ug/m3	Same as Primary Std.	
Hydrogen Sulfide	1 Hour	0.03 ppm (42 ug/m3)	Cadmium Hydroxide STRactan	-	-	-
Vinyl Chloride (Chloroethene)	24 Hour	0.010 ppm (26 ug/m3)	Tedlar Bag Collection, Gas Chromatography	-	-	-
Visibility Reducing Particles	1 Observation	In sufficient amount to reduce the prevailing visibility to less than 10 miles when the relative humidity is less than 70%		-	-	-
Applicable Only in the Lake Tahoe Air Basin						
Carbon Monoxide	8 Hour	6 ppm (7 mg/m3)	NDIR	-	-	-
Visibility Reducing Particles	1 Observation	In sufficient amount to reduce the prevailing visibility to less than 30 miles when the relative humidity is less than 70%.		-	-	-

TABLE 2

AIR QUALITY MONITORING SUMMARY
CAJON CREEK AGGREGATE PROJECT
(Days Exceeding Standards and Observed Maximum Levels)

Pollutant/Standard	1984	1985	1986	1987	1988	1989
Ozone:						
1-Hour > 0.09 ppm	173	155	149	166	173	159
1-Hour > 0.12 ppm	125	111	108	117	121	115
1-Hour ≥ 0.20 ppm	36	30	41	27	31	22
1-Hour ≥ 0.35 ppm	0	0	0	0	0	0
Max. 1-Hour Conc. (ppm)	0.30	0.27	0.30	0.25	0.28	0.30
Carbon Monoxide:						
1-Hour > 20. ppm	0	0	0	0	0	0
8-Hour > 9. ppm	0	0	0	0	0	0
Max. 1-Hour Conc. (ppm)	9	9	9	11	9	11
Max. 8-Hour Conc. (ppm)	5.1	5.3	6.7	6.7	7.6	8.1
Nitrogen Dioxide:						
1-Hour > 0.25 ppm	0	0	0	0	0	0
Max. 1-Hour Conc. (ppm)	0.20	0.15	0.18	0.19	0.19	0.18
Suspended Particulates:						
24-Hour ≥ 100 ug/m^3	37/57	33/60	25/35	35/60	42/59	43/60
24-Hour > 260 ug/m^3	0/57	1/60	1/35	2/60	3/59	2/60
Max. 24-Hour Conc. (ug/m^3)	219.	277.	385.	271.	486.	327.
Particulate Lead:						
1-Month ≥ 1.5 ug/m^3	0/57	0/60	0/25	0/60	0/59	0/60
Max. 1-Month Conc. (ug/m^3)	0.47	0.31	0.23	0.15	0.12	0.09
Particulate Sulfate:						
24-Hour ≥ 25. ug/m^3	—	—	0/29	0/61	0/56	0/59
Max. 24-Hour Conc. (ug/m^3)	—	—	18.4	18.3	17.8	18.5
Inhalable Particulates (PM_{10}):						
24-Hour > 50 ug/m^3	—	—	20/29	36/61	38/47	44/59
24-Hour > 150 ug/m^3	—	—	2/29	2/61	3/47	3/59
Max. 24-Hour Conc. (ug/m^3)	—	—	285.	211.	289.	271.

Source: South Coast AQMD Annual Summaries, 1984-89, San Bernardino Monitoring Stations.

— = No data available

in San Bernardino since 1982, and the general reduction in average ozone concentrations throughout the 1980s. These trends are taken as an indication that stationary source controls, the retirement of older, polluting cars and the mandatory vehicle inspection program are all contributing to a positive improvement in inland valley air quality. While the secondary pollution levels of ozone and to a certain extent particulates are high from transport of pollution into the area, the primary vehicular pollution levels of species such as carbon monoxide (CO) and nitrogen oxides (NOx) are quite low. Standards for these species are not violated in San Bernardino. In contrast to the high pollution levels during the summer, winter air quality around the project site is thus quite good. The air quality impact implications of existing baseline air quality levels in the San Bernardino area are that such development will be exposed to occasional levels of regional pollutants such as ozone and particulates far in excess of healthful standards. The low levels of primary vehicular pollutants such as CO and NOx, however, also mean that the atmosphere has considerable excess carrying capacity that will allow such development to occur with only a negligible impact on localized levels of these pollutants.

In addition to gaseous air pollution concerns, western San Bernardino County experiences frequent violations of standards for 10-micron diameter respirable particulate matter (PM-10) as well as for larger diameter total suspended particulates (TSP). High dust levels occur during Santa Ana wind conditions, as well as from the trapped accumulation of soot, roadway dust and byproducts of atmospheric chemical reactions during warm season days with poor visibility. The existence of elevated baseline PM-10 levels is a vital concern to planned aggregate operations in Cajon Creek that may incrementally add particulate matter to the current violations of standards. Fortunately, the prevailing winds blow up Cajon Creek during the day when plant dust emissions may occur such that there will be a very limited receptor population potentially exposed to any possible project-related exacerbation of existing PM-10 violations.

Air Quality Management Planning: The Clean Air Act Amendments of 1977 required that each state develop an implementation plan that outlined the pollution control measures by which attainment was to occur in all non-attainment areas of the state by 1987. Such a document was prepared by the SCAQMD and the Southern California Association of Governments (SCAG) in 1978 called the South Coast Air Basin Air Quality Management Plan (AQMP). The basic premise of the AQMP was that Southern California could have a reasonable rate of growth and still achieve clean air goals if a number of assumptions were realized. It soon became apparent that the assumptions in the AQMP were completely unrealistic. In the update to the plan issued in 1982, the SCAQMD and SCAG acknowledged that air quality was still so far from attainment and that control measures needed to obtain attainment were so drastic and unacceptable, that a realistic expectation

for attainment was well into the 21st century.

With the passage of the 1987 attainment deadline and with the expiration of the Clean Air Act in 1988, the EPA developed a set of administrative guidelines for development of a post-'87 attainment plan. The need for such a plan was further confirmed by the 9th Circuit Court of Appeals which instructed the EPA to revoke its previous conditional approval of the South Coast Air Basin portion of the California State Implementation Plan and ordered that a new AQMP be prepared. If a satisfactory plan could not be developed at the local level, the EPA was instructed to impose an air quality plan on the region. Development of a new basin AQMP was already in progress which culminated in the adoption of a new basinwide AQMP by AQMD and SCAG in March 1989, and ARB approval for submittal to EPA in July 1989.

The new AQMP is a three-tiered approach based on enhanced existing technology (Tier I), development of emerging technologies (Tier II), and anticipation of new technologies still on the horizon (Tier III). The plan incorporates additional strong controls on industry, but also focuses more and more on transportation, land use and life style as major contributors to air quality problems that must be significantly reduced if attainment is to occur. Some of the tactics in the new plan (which individually must be enacted into law to be enforced) that may affect people of the region include proposed limits on the number of cars a household may register, banning gas-powered mowers, aerosol deodorants, liquid charcoal lighter or bias ply tires, requiring afterburners on restaurant grills, etc. By far, the greatest pollution reduction is expected from conversion of the travel fleet to methanol or other clean fuels, a major shift to transit, electrification of the railway system and the conversion of solvent-based paints, coatings and manufacturing processes to water-based systems. The Bush Administration and the U.S. Congress have both recently proposed separate plans for a new Clean Air Act such that the current AQMP may require additional modification to be consistent with any new federal clean air program if and when such a program is adopted.

Proposed development of the Cajon Creek project relates to the AQMP through the land use assumptions used by SCAG to forecast land use and transportation patterns in the air basin. To the extent that the project meets a demand for industrial space and sand and gravel product uses as close as possible to the source of the demand, a project minimizes travel requirements and reduces vehicular emissions. If there is such an existing demand, and if applicable AQMP measures are adopted and implemented by project proponents and responsible regulatory agencies, the project will not have an adverse regional air quality impact. Among the AQMP measures, the most important concern for continuing land use intensification is to examine to what extent the proposed development contributes positively

or negatively to the existing and growing basinwide jobs/housing imbalance. If regional employment growth in San Bernardino County does not keep pace with residential growth, the incremental air quality impact of any development, while small on a basinwide scale, may nevertheless be perceived as creating an adverse air quality impact. Because the industrial component of the project is jobs intensive, the Cajon Creek project likely will have a positive regional air quality impact.

AIR QUALITY IMPACT

Significance Criteria

Federal, state and local air quality rules forbid the creation of an impact that causes ambient air quality standards to be exceeded. This prohibition theoretically represents a well defined impact significance criterion. In reality, there are several difficulties with this simple definition of significance. Because of the complex atmospheric chemistry, many of the end products of pollution emissions are not formed until many hours later and many miles away from their release. An individual project thus contributes only a very small pollution increment to the overall burden without any violation of standards being uniquely ascribable to the project.

Furthermore, in many cases the air quality for the pre-project condition already exceeds standards. Impacts will, therefore, be superimposed upon already unhealthful conditions. Impact significance in such cases becomes a matter of not measurably worsening an existing violation rather than creating a new violation of standards. As previously noted, some reasoning suggests that even one molecule of additional pollution in a non-attainment area is incrementally significant. The South Coast AQMD, which formerly had a statutory threshold of insignificance of around 100 pounds per day of new pollution per permitted source, uses a "zero tolerance threshold" in that any new permitted source emitting more than 1 pound per day of any pollutant must cause a reduction of an even greater amount of pollution upwind of the new source. This offset requirement mitigates the regional incremental air quality impact of a project, but there may still be local effects important to receptors with very small source to receptor distances. In such cases, the "measurable worsening" threshold is taken to mean an ambient pollution level that can be measured accurately and is a reportable amount. The primary (unreacted) pollutants near a source that may have a direct impact on a nearby receiver are carbon monoxide (CO), sulfur dioxide (SO2) and particulates (PM-10). Very little SO2 is emitted in Southern California. For CO, the reportable hourly concentration is to the nearest whole ppm (5% of the standard) such that 1 ppm would be a significant change if the San Bernardino area were a CO non-attainment sub-area (which it is not) of the South Coast Air Basin CO non-attainment area. For PM-10, the accuracy and reproducibility of samples is somewhat less than for gaseous pollutants. A change of 5% of the most stringent California 24-hour PM-10 standard (a 2.5 ug/m^3 increase) is the threshold used in the project impact analysis, but a 2.5 ug/m^3 change in dust levels is difficult to detect with conventional instrumentation. A 10% change is probably a more realistic significance threshold based on "measurable worsening."

Impact Sources

Heavy industry, whether processing aggregate resources on extraction and plant-site parcels of the planning area or from non-aggregate industry in designated industrial parks, create visions of serious air quality degradation associated with "smokestack" industries. The non-aggregate industry that would locate on any heavy industry parcel, however, has to cope with such restrictive AQMD rules that it simply would locate outside AQMD jurisdiction. To keep such industry from just moving "across the hill" to the Victor or Apple Valleys, the San Bernardino County APCD has adopted very similar rules to the AQMD such that most of California is closed to heavy polluters. Thus, although the mix of expected tenants on any industrial development areas of the Specific Plan is not known, their potential to possibly impact air quality is severely restricted by regulatory constraints. Any air quality impacts from such uses will derive primarily from transportation sources (trucks, employee commuting and possibly train delivery of goods). Minor emissions may result from light industrial activities (surface coating, parts cleaning, sandblasting, etc.). The exact nature of any such emissions is unknown. Air quality rules, however, strictly limit even small emitters and the AQMD also has general rules prohibiting emissions of fumes, odors, dusts, mists, etc. that may cause annoyance or nuisance to any significant number of people even if the emissions are not regulated by specific prohibitions. Thus, although air quality impacts from such potential uses cannot be completely predicted at this time, the presumption must be that the AQMD would not allow siting such uses if indeed they had the potential to create an adverse air quality impact.

The most readily identifiable sources of possible impact are the proposed aggregate extraction, processing, sale and building product manufacturing operations. These activities are also controlled by AQMD permit conditions and by specified control measures in the District's Best Available Control Technology (BACT) guidelines. A new source of emissions cannot receive a permit to even begin construction unless BACT is used where it is economically feasible. BACT in aggregate operations once meant water sprays on transfer points but now requires highly efficient dust collectors on major source points within the aggregate process stream. Similarly, any concrete production (asphalt, ready-mix, etc.) requires the utilization of stringent controls on all steps of such operations. Aggregate facilities are still significant emitters of air pollution, but those emissions derive more from scattered sources not amenable to fully effective control (called fugitive sources) rather than from specific pieces of processing equipment. Control of such sources results from good operational practices, proper housekeeping and use of supplemental dust suppression measures. Although impacts can generally be maintained within acceptable levels by such measures, there will be instances where aggregate resource development may incrementally degrade air quality (especially for particulates) beyond the project boundary. Historical

measurements of dust levels at rock plants have found a dust "signature" of the plant that may extend as much as one mile beyond the plant boundary. These measurements, sponsored by the Southern California Rock Products Association in the late 1970s, do not reflect the current level of BACT requirements and would not necessarily be fully applicable to any of the proposed Cajon Creek plant sites. However, the processing technology is still similar even if control procedures have been stiffened in the last decade. Many of the fugitive sources that existed in the SCRPA study are still the same today as then. Cajon Creek is also in a high wind hazard zone from Santa Ana Winds blowing north to south into West San Bernardino (the hazard zone extends northward from Highland Avenue all the way to Cajon Pass) such that loose dust is readily blown southward into populated areas. Impacts from aggregate operations, including extensive truck traffic on area streets, represents the major air quality impact concern of project implementation.

Dust Emissions and Impacts

On-site dust emissions from aggregate operations were calculated using factors supplied by the AQMD (see Appendix A). These factors assume the use of standard control procedures and equipment required by air quality regulatory agencies, including best available control technology on in-plant processing dust sources. Total TSP emissions of 6 pounds/day for aggregate processing are predicted by this method based on the assumed split of material through the processing cycle for a 1,000 ton/hour rock plant. The process breakdown and associated dust emissions is shown in Table 3. As a worst-case assumption, a permanent plant on Parcel N and one of the temporary plants was assumed operating simultaneously with a maximum throughput of 12,000 tons/day at each site. A daily dust emission level of 78 pounds is predicted from all rock production and distribution within the planning area. If processing operations occur over a 12-hour period, hourly dust emission level will be around 7.8 pounds per hour.

Because the soil disturbance from materials processing and hauling is a "fresh" disturbance where the heavier airborne particles have not had time to settle out, a large percentage of the above TSP emissions are larger than 10 microns outside the PM-10 range. The PM-10 fraction of TSP from such sources has been variously estimated somewhere from 10 to 50 percent. The range of project-related PM-10 emissions is, therefore, from 5.6 to 2.8 pounds per day, or 0.8 to 3.9 pounds per hour.

An estimate of the ambient air quality impacts of the respirable fraction of project-related dust emissions was made by assuming that PM-10 emissions were 33% of TSP. It was also assumed that these emissions were approximately homogeneously mixed into a parcel of air 100 meters deep and 1,000 meters wide during normal daytime upcanyon winds of 3 m/sec

DUST EMISSIONS CALCULATIONS FOR CAJON CREEK ROCK PLANT
(12 Hours/Day)

Point	Description	Process Rate TPH	Emission Factor (lb/ton)	Control Means	Control Efficiency (%)	Total (lb/hr)	Emissions (lb/day)
1	Transfer	1000	0.001	Wet Suppression	90.00%	0.1000	1.20
2	Jaw Crusher	109	0.005	Baghouse	99.90%	0.0005	0.01
3	Transfer	529	0.001	Wet Suppression.	90.00%	0.0529	0.63
4	Transfer	500	0.001	Wet Suppression	90.00%	0.0500	0.60
5	Cone Crusher(s)	92	0.01	Baghouse	99.90%	0.0009	0.01
6	Transfer	109	0.001	Wet Suppression	90.00%	0.0109	0.13
7	Transfer	891	0.001	Wet Suppression	90.00%	0.0891	1.07
8	Transfer	179	0.001	Wet Suppression	90.00%	0.0179	0.21
9	Transfer	60	0.001	Wet Suppression	90.00%	0.0060	0.07
10	Transfer	166	0.001	Wet Suppression	90.00%	0.0166	0.20
11	Cone Crusher	127	0.01	Baghouse	99.99%	0.0001	0.00
12	Transfer	500	0.001	Wet Suppression	90.00%	0.0500	0.60
13	Transfer	798	0.001	Wet Suppression	90.00%	0.0798	0.96
14	Transfer	102	0.001	Wet Suppression	90.00%	0.0102	0.12
15	Transfer	104	0.001	Wet Suppression	90.00%	0.0104	0.12
16	Transfer	38	0.001	Wet Suppression	90.00%	0.0038	0.05
17	Transfer	19	0.001	Wet Suppression	90.00%	0.0019	0.02
18	Transfer	7	0.001	Wet Suppression	90.00%	0.0007	0.01
TOTALS						0.5018	6.0215

Quarry Extraction - 9 transfer points x 0.0001 lb/ton x 12,000 ton/day = 10.8

Storage Piles - 2 acres x 10.95 lb/acre/day x 0.1 (90% control) = 2.19

Fugitive Dust (In-Plant Trucks)
1 lb/mi/truck x 0.5 mi (in plant) x 400 truck/day x 0.1 (90% control) = 20.0

TOTAL ROCK PLANT = 39.0

(about 6 mph). The hourly PM-10 level downwind of the proposed processing and hauling operations was calculated as follows:

$$\text{Hourly PM-10} = \frac{2.6 \text{ lb/hour} \times 453.6 \text{ g/lb} \times 10^6 \text{ ug/g}}{100 \text{ m} \times 1000 \text{ m} \times 3 \text{ m/sec} \times 3600 \text{ sec/hour}}$$

$$= 1.1 \text{ ug/m}^3$$

$$\text{Daily PM-10} = 0.4 \times \text{Hourly PM-10}$$

$$= 0.5 \text{ ug/m}^3$$

$$\text{Annual PM-10} = 0.1 \times \text{Hourly PM-10}$$

$$= 0.1 \text{ ug/m}^3$$

The 24-hour PM-10 impact of 0.5 ug/m^3 compares to a state standard of 50 ug/m^3 and a federal standard of 150 ug/m^3. By itself, the project will not "make measurably worse" the existing violations of state and federal PM-10 standards. With the level of controls on aggregate operations now imposed by the AQMD, the fixed plant and one temporary site will not have a significant air quality impact presuming that material transfer from the quarry to the processing plant occurs via a conveyor system. Substantial off-road hauling with associated increased dust emissions could bring the impact estimate somewhat closer to the assumed significance threshold.

These calculations are based on normal daytime airflow. However, during Santa Ana winds toward San Bernardino, these activities will create a disturbed surface that increases the rate of particulate lofting. It would be difficult to isolate any project-specific dust contribution during such wind events because the air already contains high levels of dust from both man-made and natural sources throughout Cajon Creek Canyon. However, some incremental addition to that incoming burden will certainly result from these proposed Cajon Creek aggregate resource operations. Under atypical conditions, aggregate operations may thus have a significant particulate impact particularly on residences south of the Parcel N main processing plant. Additional mitigation beyond the mandatory measures required by AQMD permits must, therefore, be incorporated to reduce the probability of creating a localized dust nuisance.

Cumulative particulate effects from on-site sources may occur in conjunction with vehicular dust generation as traffic levels increase, as well as from other dust generating resource

development and site construction effects. A Specific Plan for Lytle Creek similar to the Cajon Creek operation has been under consideration in the past where two major aggregate resource operations might co-exist within reasonable proximity. While the individual particulate impact from either one or the other large-scale aggregate resource operation may be maintained within an acceptable level, their combined impacts when air meets after flowing down both creek drainage could be cumulatively significant for PM-10 levels. Because of intervening topography, however, airflow within Lytle Creek and Cajon Creek Canyons does not significantly interact. As previously noted, the maximum "dust signature" from an aggregate plant extends about one mile. This general conclusion on impact radius is also why operations in Cajon or Lytle Creeks will not have a cumulatively significant impact. Such a relatively finite impact zone for particulate matter is also why there will not be any cumulative interaction between the existing Calmat Highland Avenue plant and the new facilities, or between on-site emissions from essentially a stationary source and off-site emissions from project-related vehicular sources hauling rock, concrete or asphalt and from vehicles associated with Specific Plan area industrial development sites.

Concrete Batch Plant Dust Impacts

Batch plant emissions are shown in the AQMD memo to be relatively substantial if not controlled. Baghouse control on charging the cement silo and on conveying cement to the mixing drum are standard design features in modern plants (besides being required by AQMD rules). Most new plants also use a pre-mix drum that blends aggregate, cement and water and then discharges to the mixer truck in a wet slurry instead of a dry powder. AQMD emission factors for concrete batching using standard controls are about 0.01 pound of dust per yard of concrete batched. Although the size of any ready-mix plant has not yet been determined, a 1,000 yard per day facility is a reasonable estimate. Such batching operations generate about 10 pounds of dust per day. Compared to the larger fugitive dust burden of about 40 pounds for the aggregate mining and processing, any batch plant dust emissions represent only a small particulate increment without changing any conclusions regarding overall project dust impact significance.

Asphaltic Concrete Dust Impacts

For purposes of analysis, a daily production of 2,400 tons of asphaltic concrete was assumed. Emission factors of 0.005 pound of total dust per ton of asphalt was assumed from the rotary drier using a baghouse for dust control. Another 0.005 pounds per ton will result from aggregate handling. Total daily dust emissions (TSP) will total about 24 pounds, of which only a fraction is PM-10. As with the concrete batch plant, the level of dust generated is much less than the production and sale of rock product. Any cumulative

impacts of dust from production of asphaltic concrete is small when considered within the context of overall dust generation.

Combustion Emissions and Impacts

Considerable quantities of pollutant emissions from fuel combustion processes will be released into the atmosphere in connection with both any aggregate resource activities as well as from the gradual conversion of the Specific Plan area into an industrial park. Most of these emissions will not be released from the project site itself but will be spread over a larger region. The predominant type of such emissions will be vehicular exhausts, with a small portion of the emissions due to fuel combustion in an asphaltic concrete plant and in on-site thermal energy devices for certain types of industrial uses. Some fuel combustion will result from on-site heavy equipment used to extract rock material, feed the conveying system, and product loading after the aggregate has been processed.

Aggregate Product Hauling Impacts

Daily trip generation from the main Cajon Creek plant is estimated at 950 trip ends per day with 650 trips from the secondary north plant. Of these 1,600 trips, 1,500 are assumed due to trucks and 100 due to employee commuting. A one-way trip length of 20 miles has been assumed (many trips shorter, a few trips longer) such that around 30,000 truck vehicle miles traveled will be generated by aggregate resource activities. Assuming all commuting trips are "cold-start" trips and all trucks are diesel-powered, the following aggregate activities emissions (pounds/day) will be generated from rock product-related travel:

	Commuting	Trucks	Total
Reactive Organic Gases	4.2	184.4	188.6
Carbon Monoxide	56.8	521.8	578.6
Nitrogen Oxides	4.4	943.8	948.2

Source: EMFAC7pc Emission Model, Year = 1990, T = 60° F

These emission levels are substantial by any standard of significance. However, the "no build" alternative would not leave several hundred trucks per day idle. People will still move to San Bernardino County, roads and buildings will need to be built and other "hardscape" constructed. If the demand for building materials is not met at Cajon Creek, it may be met elsewhere in the area (or even out of the local area) with the same or even greater vehicular emissions. The Inland Empire is forecast to be the major growth area of the air basin in the next two decades. A demand for building materials will accompany that demand. By meeting that demand as close to the source as possible to minimize truck travel, truck and employee commuting emissions, while substantial, are not judged as individually significant.

Cumulatively, vehicular exhaust from all vehicles accessing the Cajon Creek site will mix with that from millions of other vehicles in the basin. Exhaust emissions from this project will thus incrementally impede the ultimate attainment of clean air standards. That fact places a special responsibility on Calmat and its customers to develop as much mitigation as possible to reduce the number of trips, their length of travel, or to ship product at times that interfere less with existing (and future) congested roadways. With good rail access to the project site, distribution of aggregate by train instead of truck, even within the basin to other batch facilities with rail access, should be investigated. That same concept should be considered with respect to raw materials. If screened rock were train-hauled to other major rock plants such as Irwindale, both the processing dust emissions and the truck haul exhaust could be more widely dispersed within the region instead of being concentrated within the Cajon Creek area.

Industrial Park Vehicular Emissions

After the completion of the first phase of industrial park development, the Cajon Creek area will generate around 5,844 daily trips. By the year 2010, trip generation will total about 16,942 per day. While these vehicles are generally "cleaner" than the aggregate resource big rigs, they nevertheless will create a substantial volume of exhaust emissions. Vehicular source emissions were calculated using the ARB's URBEMIS3 (Urban Emissions) computer program for four analysis years (1995 - near term, 2000 + 2005 - intermediate term, and 2010 - long term) identified in the project traffic study. Table 4 summarizes the mobile source emissions which hold generally steady at around 110 pounds per day of ROG, 200 pounds per day of NOx and 1,300 pounds per day of CO until after 2005. Long-term conversion of depleted extraction areas to industrial uses after 2005 dramatically increases mobile source emissions. (See Appendix B for computer model output.)

As with the aggregate trucking activity, the mobile sources are substantial and should be considered significant in a cumulative sense. Individually, the need for employment

TABLE 4

CAJON CREEK SPECIFIC PLAN AREA
MOBILE SOURCE EMISSIONS

(Pounds/Day)

Year	ROG*	CO	NOx	PM-10	SO2
1995	89.1	973.3	137.5	440.7	16.7
2000	116.7	1332.9	201.4	459.5	24.2
2005	108.6	1250.2	196.2	448.0	23.0
2010	211.6	2439.1	386.1	760.0	44.7

* = Assumes 92% of total organic gases (TOG) are reactive organic gases (ROG).

Source: URBEMIS3 Computer Model

opportunities will exist regardless of project implementation. In fact, the San Bernardino area has a forecast growth of 246,200 jobs in 25 years from the mid-1980s to 2010. In 1984, western San Bernardino County had 0.99 jobs for every house compared to a regional average of 1.22. In 2010, even with SCAG growth policies that mandate better jobs/housing balance, this part of the County will still have only 1.16 jobs per dwelling unit compared to a regional jobs/housing ratio projection of 1.27. Clearly, any job-intensive development in western San Bernardino County is air pollution positive by reducing the commuting distance of County residents. This positive contribution to jobs/housing goals in no way reduces the responsibility of site developers, tenants or approving agencies to develop additional mobile source mitigation measures that might further reduce travel and associated air emissions. While South Coast AQMD Reg. XV will require major employers to develop a trip/VMT reduction plan, many of the small employers in the future Cajon Creek Industrial Park may be too small to have an employee base sufficiently large to effectively implement those measures most successful in generating substantial trip diversion/reduction. If, however, all small employers participated in a transportation demand management (TDM) program being developed by the City of San Bernardino, then the effectiveness of Reg. XV-type measures could be extended to encompass not just major employers, but the entire Specific Plan area work force. Provision for inclusion of all site tenants into the City's program should, therefore, be included as a condition for any discretionary approvals of the Specific Plan.

Warehousing and Outdoor Storage Emissions Impacts

Outdoor warehousing of construction materials represents interim uses on certain parcels that are ultimately planned for mineral resource extraction. They will generate limited amounts of traffic, but are more planned as storage and distribution facilities rather than any high turn-over operations. Their trip generation is estimated at around 1,400 per day, and the termination of such uses will only occur in the late stages of resource completion. Daily emissions (in pounds per day) associated with such uses are predicted to be as follows:

Year	ROG	CO	NOx	PM-10	SO2
1995	25.1	279.5	38.0	69.8	4.6
2010	18.8	218.0	34.1	58.1	3.9

Because the number of trips generated have been assumed constant for such uses from 1995 to 2010, the small emissions decrease with time shown above reflects the expected continued small improvement in mobile source emission characteristics within the analysis timeframe. Compared to the truck-dominated aggregate resource vehicular emissions, and to the much larger light industrial mobile source emissions component, the construction materials users park contribution to the total development mobile source pollution burden is small. As with other traffic generators associated with this development, the air quality impact of each individual component is insignificant, but becomes significant on a cumulative basis in conjunction with the continued predicted non-attainment status of the air basin into the early part of the 21st century.

Stationary Source Emissions Impacts

Fuel combustion in basin power plants, in light industrial uses for heating, drying, hot water, etc. and for heat to dry the asphaltic concrete all will result in air pollution byproducts. Electrical and natural gas consumption cannot be estimated very accurately based solely on gross Cajon Creek acreage until the future tenant mix becomes better defined. However, AQMD rules strongly discourage the use of liquid fuels in power plants, and similarly require the use of electricity or natural gas for any local on-site thermal needs.

The one source where more highly polluting liquid fuels have traditionally been used is in the asphalt plant rotary dryer. When diesel fuel is used to supply the heat needed to coat the rock with liquified asphalt oil, emissions of all pollution species are relatively high because diesel fuel combustion is usually not complete. With the current AQMD "clean fuels policy," natural gas or propane will almost certainly be required. Natural gas combustion creates substantially less ROG per unit of heat output than does fuel oil. The estimated asphaltic concrete plant stationary source emissions are as follows:

Pollutant	Emission Factor (lb/ton)	Emissions (lb/day)
Sulfur Dioxide (SO_2)	0.0002	0.5
Nitrogen Oxides (NOx)	0.034	81.6
Reactive Organic Gases (ROG)	0.0004	1.0
Carbon Monoxide (CO)	0.0008	19.2
Particulates	negl. (baghouse control)	

The NOx emissions are seen to be the most substantial air pollutant from any on-site asphalt production. In order to meet AQMD Regulation XIII requirements, emissions off-sets will need to be provided by retiring an even greater amount of emissions upwind of Cajon Creek than the 81.6 pounds of NOx to be generated. The 19.2 pound of CO will need to be off-set while the other pollutants fall below the 1 pound per day off-set trigger level. With respect to asphaltic concrete, AQMD rules already govern the volatility of the asphalt itself. With such limits, and with the use of BACT on the plant, the plant can be built while maintaining a minimum air quality impact. Confirmation of this preliminary conclusion will be required as part of the AQMD permit process. In order to obtain an authority to construct and then a permit to operate, plant operators must go through the following steps:

1. Document that BACT is employed in all phases of plant operations (baghouse for dust control, low pollution fuel in the dryer, water spray on aggregate transfer and storage, etc.)

2. Reduce emissions at some other facility upwind of San Bernardino at a greater level than the new emissions from the Cajon Creek plant.

3. Verify that air emissions from the new plant will not cause clean air standards to be violated outside the plant boundary.

Asphaltic Plant Odor Impacts

Asphalt plants heat a petroleum product as a binder medium, and then dry the aggregate mixture in a rotary dryer. Poorly controlled plants may have excessive emissions of odorous organic material which condenses in the atmosphere to form a gray haze ("blue smoke"). Odor impacts from such plants derive both from uncontrolled processing operations as well as from poor housekeeping procedures where warm material is spilled during batching and loading operations. Any observable air quality impacts (mainly odor) derive from inadequate emissions controls and poor operational procedures. The AQMD recognizes the special need for emissions controls from asphalt plants. Conditions on the air permits needed from the AQMD will, therefore, be strongly conditioned to control asphalt odor emissions as well as from pollutants with ambient standards. With such stringent controls on asphalt production, there are numerous asphalt plants located near odor-sensitive land uses in Southern California that do so with little or no observable odor or other air emissions impacts. The technology to run as asphalt plant with minimal air quality impacts certainly exists. Thus, despite the fact that early morning light drainage winds associated with limited mixing blow from the plant site toward the scattered homes to the south, the pollution control features to be required by the AQMD will minimize any odor nuisance potential as well.

Construction Activity Impacts

In most projects, the temporary nature of construction is generally used to justify finding that project buildout will not have an adverse air quality impact. At Cajon Creek, however, construction may last for 20 years or more such that this is hardly a temporary source of emissions. It should be noted, that the AQMD has placed a very strong emphasis on control of construction dust because of its contribution to the non-attainment status of the basin for PM-10. In the current AQMP, the air district is proposing a rule to address minimum dust control measures scheduled for adoption before 1995. Similarly, the ARB has proposed emissions controls on off-road heavy duty construction equipment such as catalytic converters on bulldozer exhausts. If these rules are passed, then the discretionary action of requiring soil watering or using well-tuned equipment generally included in major construction projects will be replaced by mandatory measures. Some discretionary latitude will continue to exist such as encouraging ridesharing by construction workers and insuring that construction of any project does not have "spill-over" effects into public travel lanes from lane blockage, detours, or spilled dirt. Thus, even with AQMD rules about construction impact reduction, there will continue to be a responsibility on developers/contractors to control emissions as effectively as possible and on local approving agencies to enforce such controls.

To some extent, construction emissions impact reduction will occur naturally both because of the nature of the surface as well as the procedures to be followed in preparing individual parcels for development. Several sieve analyses of the aggregate resource in Cajon Creek have shown that water flow over long periods has washed most of the fines out of the ore body down to a depth of several hundred feet. Only four percent of the soil material will pass through a 200-mesh (75 micron) screen. Such a low percentage of fines translates into a corresponding limited potential for dust to loft during construction. Aggregate removal will also prepare the parcel for subsequent development as pit slopes are stabilized and the bottom leveled for future construction. The unusually low soil silt and the fact that future needs for grading, clearing and other disturbance are substantially reduced both make the AQMD's average construction dust emission factor not applicable for Cajon Creek development. Although one cannot readily quantify the construction dust and equipment exhaust impact, it will certainly be much less than if the same type of light and heavy industrial development were built on ground that has more silt and has not been "prepped" by previous site activity. If one acknowledges a need in the San Bernardino area for employment intensive development, then construction at Cajon Creek is certainly more air quality positive than at other potential development sites.

Toxic Air Contaminants Impacts

Toxic air contaminants (TACs) are generally not associated with quarries, rock plants and other proposed Cajon Creek land uses. Some TACs may be used in industrial uses as solvents, cleaning compounds, degreasers, etc. AQMD authority into fugitive releases of even small amounts of TACs has been expanding under programs such as AB-2588, but very small users are not easily identified. Within the timeframe of much of the development of Cajon Creek, TAC regulations will probably be further strengthened. It would be useful, however, to establish requirements for any tenant that uses compounds listed under programs such as AB-1807 or Prop. 65 to document that such use poses no excessive threat to any adjacent land use.

Within rock processing operations, there may be minerals released that are lung irritants. The mechanism for such action results when the immune system tries to rid the body of such inhaled substances. If the mineral crystal is unusually shaped, the human body may inadvertently damage its own lung tissue because the immune system attacks the foreign substance too aggressively. Long crystalline needles or sharp-cornered cubic crystals are the primary potential problems. Needles are found in rock formations such as serpentine which contain asbestiform minerals. There is little serpentine in the San Gabriel or San Bernardino Mountains such that asbestos needle crystals are not a major concern in Southern California aggregate operations. Crystalline silica is found around rock plants, but not in

concentrations that would trigger silicosis responses in either on-site employees or the off-site general public. A detailed review of the silicosis issue around rock plants was undertaken for the proposed Webster Quarry project in the Santa Ana River between Redlands and Highlands (P & D Technologies, 1988). The County Health Department and the Department of Environmental Medicine at the University of California, Irvine, concluded that the only identified risk is for occupational exposure, not to the public. Occupational exposure is controlled by MSHA (the federal Mine Safety and Health Administration). MSHA's position on crystalline silica is that as long as occupational standards are met within plant boundaries, the additional dispersion during transport from the plant to the surrounding community will correspondingly protect public health. The results of the crystalline silica/silicosis issue are summarized in Appendix C.

MITIGATION

The proposed Cajon Creek project is really two somewhat distinct developments with different types of impacts and different mitigation potential. The aggregate operations are a semi-stationary source of emissions with well-defined control rules except perhaps for various fugitive dust sources. The industrial component has few stationary sources with the primary impact deriving from vehicular emissions. Although the AQMD's authority to reduce vehicular emissions has been expanding in the last few years through programs such as Regulation XV, an individual's choice of travel mode still is not strongly regulated. While stationary source control is through a stick, travel mode choice is still mainly a carrot approach through various incentives to encourage drivers to abandon the single occupant vehicle. The level of discretionary action recommended for inclusion in any Specific Plan approval for industrial development is, therefore, different than for the aggregate resource component.

Aggregate Resource Development Impact Mitigation

Impacts from aggregate materials hauling, processing and distribution of finished product create potentially significant air quality concerns, especially from the creation of dust during the hauling and processing activities. Mitigation of vehicular emissions from product distribution on a regional scale depends on locating the processing activity as closely as possible to the demand for such product until an alternative to the diesel fueled truck is developed for movement of materials. Mitigation through discretionary action by project proponents and local regulatory agencies, therefore, must concentrate on on-site impact minimization, especially from any dust generation. Such measures include:

1. Air quality permits mandated by the AQMD (Authority to Construct and Permit to Operate) will be obtained and renewed as required. The AQMD will require the best available control technology (BACT) on those processing components amenable to dust control. BACT typically entails the use of water spray on transfer points and a bag-house on crushers or other sources amenable to such controls.

2. Fugitive dust impacts from materials handling and in-plant travel will be controlled through a program of paving the off-site access road and major in-plant travel paths, through the use of water or other dust palliatives on storage piles and load out systems, and through an aggressive program of roadway sweeping and watering to remove spillage from public and private roadways. Minimum implementation action of this mitigation measure will be to meet the requirements of AQMD Rule 401 prohibiting a visible dust plume at the project boundary.

3. Dust transport away from the facility can be reduced through a landscaping program that utilizes fast-growing species with minimum water demands to reduce wind erosion and off-site transport. Because the strongest winds are from the north during Santa Ana wind conditions, a windbreak north of the processing plant to reduce winds through the plant plus a line of landscaping near the southern site boundary to trap dust already picked up will be the most effective areas of landscaping to reduce dust impacts. A berm system in conjunction with landscaping will have air quality benefits by allowing the strongest winds to pass over the top of the plant complex while exposing storage piles and loose surface material to much reduced wind velocities.

4. Aggregate facilities access/egress shall be designed to minimize use of local arterial roadways or areas of existing or potential future air quality sensitivity.

The combination of favorable meteorology, few receptors along the primary daytime airflow pathway and the implementation of the above measures will reduce the individual project air quality impact of this project to a level of insignificance.

Industrial Park Transportation Impact Mitigation

Large industrial tenants will be required to submit trip reduction plans as required by AQMD Reg. XV. The current threshold for plan submittal is 100 employees, but the threshold is expected to drop in the future to encompass smaller companies as well. Effective trip reduction strategies require a sufficient participant pool to make carpools, vanpools or transit alternatives work. For small employers, those measures are not viable unless many small companies coordinate their efforts. Even for larger companies, effectiveness can be enhanced if their program could be coordinated with other nearby companies. This consolidation of trip/VMT reduction is best performed through a coordinated effort within the context of the City of San Bernardino's TDM program. As the future industrial tenant base increases, the program can be more localized within the Specific Plan area through the formation of a Cajon Creek transportation management agency (TMA). Calmat already has a company-wide transportation demand management program in place such that the Cajon Creek TMA can probably initially operate within the company structure. As other participants are added, the TMA will need to become an independent agency. Given the importance being placed on transportation control to improve air quality, any commitment as part of the Specific Plan approval process must, therefore, reflect the seriousness with which that responsibility is being taken as an integral part of the Cajon Creek project.

APPENDIX A

SOUTH COAST AQMD EMISSIONS DATA

FOR AGGREGATE AND CONCRETE BATCH PLANTS

South Coast
AIR QUALITY MANAGEMENT DISTRICT
9150 FLAIR DRIVE, EL MONTE, CA 91731 (818) 572-6200

March 6, 1990

Hans Giroux
17744 Sky Park, No. 210
Irvine, CA 92714

Dear Hans,

The following are emission factors used in the Mechanical Operations Unit to estimate particulate emissions from aggregate plants and concrete batch plants:

Aggregate Plants

Material transfer points	0.001 lbs/ton of throughput
Cone crusher	0.01 lbs/ton of throughput
Jaw crusher	0.005 lbs/ton of throughput

The emission factors are based on the aggregate's surface being saturated with moisture in order to prevent excessive visible emissions and not vented to control equipment.

Concrete Batch Plants

Uncontrolled Particulate Emission Factors

Cement Silo	0.001 lbs/lbs of cement
Cement Conveying	0.05 lbs/yard^3 of concrete
Aggregate Conveying	0.005 lbs/yard^3 of concrete

Controlled Particulate Emission Factors

Cement Silo	0.00001 lbs/lbs of cement
Cement Conveying	0.005 lbs/yard^3 of concrete
Aggregate Conveying	0.005 lbs/yard^3 of concrete

The cement silo emissions are the particulate emissions that occur due to the loading of the cement silo. The controlled emission factor is based on a well designed baghouse or filter vent servicing the cement silo.

The cement conveying emissions are the particulate emissions that occur due to the cement handling processes after the cement leaves its storage silo. The controlled emission factor is based on a well designed baghouse system venting the batching operations.

The aggregate conveying emissions are the particulate emissions that occur due to the handling of the aggregate throughout the plant. Both the uncontrolled and controlled emission factors are based on the aggregate being moist enough to prevent excessive visible emissions. The controlled emission factor is the same as the uncontrolled emission factor since the aggregate conveying and handling systems are usually not vented to control equipment in a concrete batch plant.

These emission factors are from two memos dated March 2, 1978 and November 21, 1978 and do not reference any sources. In the near future we plan to revisit these memos and possibly revise the emission factors. If you have any questions, please call me at (818)572-6213.

Very truly yours,

William J. Dennison
Director of Engineering

Gary Turner
Acting Supervising AQ Engineer

GLT

APPENDIX B

URBEMIS3 COMPUTER MODEL OUTPUT

CAJON CREEK SPA 90-1 MOBILE SOURCES

Project Name : INTERMEDIATE TERM Date : 05-02-1991

Analysis Year = 2000 Temperature = 75
EMFAC7 VERSION : EMFAC7D ...11/88

Unit Type	Trip Rate	Size	Tot Trips	Days Op.
-al Light Industry	60.0/Acre	97	5844	1
-al Heavy Industry	60.0/Acre	49	2928	1
-al Heavy Industry	950.0/Plant	1	950	1
-al Heavy Industry	650.0/Plant	1	650	1

	Residential			Commercial	
	Home-Work	Home-Shop	Home-Other	Work	Non-Work
Length	8.8	3.2	5.2	8.1	5.5
ırted Cold	88.3	40.2	58.3	77.4	27.2
Speed	35	35	35	30	30
ent Trip	27.3	21.2	51.5		

Vehicle Fleetmix

cle Type	Percent Type	Leaded	Unleaded	Diesel
ıt Duty Autos	72.8	0.2	97.3	2.5
t Duty Trucks	14.3	0.6	96.8	2.6
um Duty Trucks	4.3	2.0	98.0	0.0
y Duty Trucks	3.9	18.0	82.0	N/A
y Duty Trucks	3.9	N/A	N/A	100.0
rcycles	0.9	100.0	N/A	N/A

Project Emissions Report in Lb/Day

Unit Type	TOG	CO	NOx
eral Light Industry	79.9	831.9	127.9
eral Heavy Industry	47.0	501.0	73.5
eral Heavy Industry	15.2	162.5	23.8
eral Heavy Industry	10.4	111.2	16.3

Project Emissions Report in Lb/Day

Unit Type	FUEL USE	PM10	SOx
eral Light Industry	1633.9	389.6	15.3
eral Heavy Industry	947.1	69.9	8.9
eral Heavy Industry	307.3	22.7	2.9
eral Heavy Industry	210.2	15.5	2.0

Project Name : NEAR TERM Date : 05-02-1991

Analysis Year = 1995 Temperature = 75
EMFAC7' VERSION : EMFAC7D ...11/88

Unit Type	Trip Rate	Size	Tot Trips	Days Op.
ral Light Industry	60.0/Acre	97	5844	1
ral Heavy Industry	650.0/Plant	2	1300	1
house	10.0/Acre	31	314	1
age Yard	5.0/Acre	228	1140	1

	Residential			Commercial	
	Home-Work	Home-Shop	Home-Other	Work	Non-Work
Length	8.8	3.2	5.2	8.1	5.5
arted Cold	88.2	40.1	58.0	77.2	27.0
Speed	35	35	35	30	30
ent Trip	27.3	21.2	51.5		

Vehicle Fleetmix

cle Type	Percent Type	Leaded	Unleaded	Diesel
ht Duty Autos	72.8	1.7	95.6	2.7
ht Duty Trucks	14.3	2.2	95.0	2.8
ium Duty Trucks	4.3	5.3	94.7	0.0
y Duty Trucks	3.9	29.8	70.3	N/A
y Duty Trucks	3.9	N/A	N/A	100.0
rcycles	0.9	100.0	N/A	N/A

Project Emissions Report in Lb/Day

Unit Type	TOG	CO	NOx
eral Light Industry	96.8	973.3	137.5
eral Heavy Industry	25.4	261.0	35.1
ehouse	5.9	60.4	8.2
rage Yard	21.4	219.1	29.8

Project Emissions Report in Lb/Day

Unit Type	FUEL USE	PM10	SOx
eral Light Industry	1779.2	440.7	16.7
eral Heavy Industry	457.9	35.1	4.3
ehouse	106.8	15.1	1.0
rage Yard	387.9	54.7	3.6

Project Name : INTERMEDIATE TERM Date : 05-02-1991

Analysis Year = 2005 Temperature = 75
EMFAC7 VERSION : EMFAC7D ...11/88

Unit Type	Trip Rate	Size	Tot Trips	Days Op.
al Light Industry	60.0/Acre	97	5844	1
al Heavy Industry	60.0/Acre	49	2928	1
al Heavy Industry	950.0/Plant	1	950	1
al Heavy Industry	650.0/Plant	1	650	1

	Residential			Commercial	
	Home-Work	Home-Shop	Home-Other	Work	Non-Work
Length	8.8	3.2	5.2	8.1	5.5
rted Cold	88.4	40.3	58.6	77.6	27.4
Speed	35	35	35	30	30
nt Trip	27.3	21.2	51.5		

Vehicle Fleetmix

cle Type	Percent Type	Leaded	Unleaded	Diesel
t Duty Autos	72.8	0.0	97.5	2.5
t Duty Trucks	14.3	0.0	97.4	2.6
um Duty Trucks	4.3	0.0	100.0	0.0
y Duty Trucks	3.9	13.6	86.4	N/A
y Duty Trucks	3.9	N/A	N/A	100.0
cycles	0.9	100.0	N/A	N/A

Project Emissions Report in Lb/Day

Unit Type	TOG	CO	NOx
eral Light Industry	74.4	780.8	124.6
eral Heavy Industry	43.6	469.4	71.6
eral Heavy Industry	14.1	152.3	23.2
eral Heavy Industry	9.7	104.2	15.9

Project Emissions Report in Lb/Day

Unit Type	FUEL USE	PM10	SOx
eral Light Industry	1546.9	379.9	14.6
eral Heavy Industry	896.7	68.1	8.4
eral Heavy Industry	290.9	22.1	2.7
eral Heavy Industry	199.1	15.1	1.9

Project Name : LONG TERM Date : 05-02-1991

Analysis Year = 2010 Temperature = 75
EMFAC7 VERSION : EMFAC7D ...11/88

Unit Type	Trip Rate	Size	Tot Trips	Days Op.
al Light Industry	60.0/Acre	154	9234	1
al Heavy Industry	60.0/Acre	130	7788	1
al Heavy Industry	950.0/Plant	1	950	1
ouse	10.0/Acre	30	304	1
ge Yard	5.0/Acre	228	1140	1

	Residential			Commercial	
	Home-Work	Home-Shop	Home-Other	Work	Non-Work
ength	8.8	3.2	5.2	8.1	5.5
ted Cold	88.6	40.4	58.8	77.8	27.6
speed	35	35	35	30	30
it Trip	27.3	21.2	51.5		

Vehicle Fleetmix

cle Type	Percent Type	Leaded	Unleaded	Diesel
. Duty Autos	72.8	0.0	97.5	2.5
. Duty Trucks	14.3	0.0	97.4	2.6
im Duty Trucks	4.3	0.0	100.0	0.0
Duty Trucks	3.9	11.4	88.6	N/A
Duty Trucks	3.9	N/A	N/A	100.0
cycles	0.9	100.0	N/A	N/A

Project Emissions Report in Lb/Day

Unit Type	TOG	CO	NOx
ral Light Industry	115.8	1212.4	196.2
ral Heavy Industry	114.2	1226.7	189.9
ral Heavy Industry	13.9	149.6	23.2
house	4.3	45.9	7.2
age Yard	16.1	172.1	26.9

Project Emissions Report in Lb/Day

Unit Type	FUEL USE	PM10	SOx
ral Light Industry	2390.4	583.8	22.6
ral Heavy Industry	2332.5	176.2	22.1
ral Heavy Industry	284.5	21.5	2.7
house	88.0	12.2	0.8
age Yard	329.8	45.9	3.1

APPENDIX C

SUMMARY OF FINDINGS RELATIVE TO SILICOSIS AND LUNG CANCER RISK NEAR AGGREGATE FACILITIES

P&D Technologies
972 Town & Country Road
Orange, CA 92668
P.O. Box 5367
Orange, CA 92613-5367
714-835-4447

An Ashland Technology Company

Planning
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Transportation
Environmental
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Landscape Architecture

January 23, 1989

Mr. Joe Bellandi
Land Management Department
County of San Bernardino
385 North Arrowhead Avenue, 3rd Floor
San Bernardino, CA 92415-0182

Subject: Old Webster Quarry - Silica Issue

Dear Joe:

This is to convey our findings relative to potential health hazards posed by airborne crystalline silica originating from the proposed sand and gravel project at the Old Webster Quarry site. These concerns were first raised in December 1988 after completion of the Final EIR in October 1988 and the conduct of two County Planning Commission hearings in November 1988.

The investigation of this issue included consultation with the Proposition 65 Division of the State Health and Welfare Agency, the South Coast Air Quality Management District (SCAQMD), the National Stone Association, the Mine Safety and Health Administration (MSHA), the San Bernardino County Health Department, the Department of Community and Environmental Medicine at the University of California, Irvine, and the Air Pollutant Health Effects Department at the U.S. Environmental Protection Agency (EPA).

Summary

None of the organizations we consulted indicated any concern with potential adverse health effects resulting form general environmental exposure to crystalline silica. Cases of silicosis have been associated with individuals who have had steady occupational exposure to crystalline silica over an extended period of time (i.e., decades). As stated by John Howard, M.D., Assistant Clinical Professor of Environmental Medicine at the University of California, Irvine, there are "...no (known) cases of silicosis which arose in individuals who have not had some direct, occupational exposure to crystalline silica." (see attached correspondence dated January 19, 1989.) In a telephone interview on January 18, 1989, Dr. Howard indicated that silicosis is currently a fairly rare occupationally-related illness and requires a substantial degree of exposure (eg., sandblasters). Dr. Howard also indicated that he would not expect long-term operation of a sand and gravel quarry to pose a hazard for area residents because the concentration of airborne crystalline silica would be reduced as the particulates settle out from airborne dust.

Background

The Proposition 65 Division of the State Health and Welfare Agency added crystalline silica to the State's list of toxic materials in October 1988. This action was taken because of the association between silicosis and the inhalation of free crystalline silica. On the other hand, the Silicosis and Silicate Disease Committee of the National Institute of Occupational Safety and Health (NIOSH) concluded in a 1988 report that "the epidemiological evidence at present is

insufficient to permit conclusions regarding the role of silica in the pathogenesis of bronchogenic carcinoma in man." Based on this and other supporting evidence, the National Stone Association has petitioned the Occupational Safety and Health Administration (OSHA) to remove crystalline silica from its list of toxic substances.

Consultation with MSHA revealed that levels of health-threatening airborne crystalline silica are rarely found at sand and gravel operations except perhaps in the immediate vicinity of crusher equipment. If safe levels for workers are maintained within the processing plant site, MSHA feels that similarly safe levels for the general public would typically occur at the plant boundary and beyond.

Since silicosis is not a reportable disease, the San Bernardino County Health Department does not have any morbidity or mortality data related to silicosis. The County's Chief of Preventive Medical Services offered the opinion that airborne crystalline silica from a sand and gravel quarry is not a major health hazard for area residents and represents more of an occupational hazard. This is supported by the correspondence from the University of California, Irvine noted previously. (We also contacted the Pulmonary Medicine Department at Loma Linda in an effort to interview one of their experts. We were told that no one there is familiar with silica-related issues and were referred to the Scripps Hospital in La Jolla. The Scripps expert is unavailable through January 30th.)

Consultation with the EPA was less conclusive since EPA does not regulate airborne crystalline silica levels. However, the EPA staff focused on the issue as an occupational consideration and indicated that any available and relevant information would be forwarded.

Similarly, the SCAQMD sets forth general dust emission standards (Rule 403) and does not have any standards related specifically to crystalline silica. Measures to control dust emissions set forth in the EIR and in the Conditions of Approval are consistent with SCAQMD's Rule 403.

Conclusion

Our investigation has yet to reveal any credible evidence that airborne crystalline silica poses a significant health hazard to residents in the vicinity of the proposed Old Webster Quarry project. Further, we expect that the dust control measures set forth in the EIR and as Conditions of Approval will mitigate potential dust emissions to a level of non-significance. Potential concerns relative to occupational exposure to crystalline silica would be handled under the jurisdiction of MSHA.

Sincerely,

P&D TECHNOLOGIES

Tim Lattimer
Senior Project Manager

TL:la