SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT

TASK 18 BAF, BAH, BAJ, AND BAL OUTPUTS

AIR QUALITY

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AIR QUALITY

INTRODUCTION

This report is a technical supplement to the EIS/EIR for the Metro Rail Project, and discusses the project's relationship to several aspects of air quality. The regional setting is the South Coast Air Basin (SOCAB) and more specifically an area in the western central portion of the SOCAB which periodically experiences severe air quality impairment. Mass regional transit is seen as one method to reduce pollutant emissions and improve basin air quality. It will be a principal task of this study to determine to what extent the Metro Rail Project fulfills that goal.

Objectives

The air quality analysis contained herein consists of several distinct subanalyses or tasks. These tasks relate to the objectives of the study, which are described below.

- Describe baseline air quality levels which will be affected by the Metro Rail Project.
- Prepare a burden analysis area-wide vehicular emissions associated with changes in the Metro Rail Network vehicle miles of travel (VMT) and trip-making characteristics. Consider the pollutants carbon monoxide (CO), reactive hydrocarbons (RHC), oxides of nitrogen (NO_x), sulfur dioxide (SO_2), and suspended particulates (TSP).
- Determine microscale CO and lead (Pb) impacts at Metro Rail park-'n-ride facilities and at selected intersections where level of service (LOS) suffers.
- Determine fugitive dust impacts from Metro Rail construction activities.

Study Approach

Determination of Ambient Conditions. The South Coast Air Quality Management District (SCAQMD) monitors air quality at 35 locations in the SOCAB. These stations are distributed to provide comprehensive coverage of the entire district. Monitoring data from three SCAQMD stations is used to depict air quality trends in the Metro Network and to establish ambient CO conditions for microscale analysis. Study shows that there is a high correlation among data from these three stations, that is, high CO concentrations at one station on any particular day are accompanied by high CO concentrations at the other two stations on the same day (and these levels were very nearly equal). Because of the wealth of long-term monitoring data available from SCAQMD and the variability of meteorological conditions which concentrate CO, it was decided that existing monitoring data would be more reliable than a special corridor monitoring program established specifically for the project. For purposes of this analysis, the assumed worst-case background condition is taken to be the second highest hourly and second highest 8-hour CO concentrations measured during the 1980 base year.

Areawide Burden Analysis. A 140-square-mile area called the Metro Network has been identified as the area within which the great majority of transit-related vehicular trips would either originate or terminate. Detailed traffic modeling has been undertaken in the area to determine project and no-project related arterial traffic volumes, VMT and trip length. Originally, it was intended to model vehicular emissions generation via use of a computer simulation program called DTIM (Direct Travel Impact Model). This program is used by the California Department of Transportation to model traffic conditions in the SOCAB as part of the Air Quality Maintenance Plan (AQMP) monitoring effort. The DTIM program includes a number of assumptions concerning emissions factors and operating modes of vehicles (i.e., hot start, cold start, hot stabilized, vehicular speed, etc.). The model would be potentially useful in predicting vehicular emissions from changes in trip length as well as changes in VMT. After analysis of preliminary traffic data, however, it was decided not to use the DTIM model. The principal reasons for this decision were: 1) the project traffic analysis network had been refined to a substantially greater level of detail than the network utilized by DTIM and would have resulted in substantially different models for calculating direct (VMT-related) and indirect (regional vehicle speed and distribution-related) air quality benefits and 2) project traffic modeling showed that the average length of auto transit trip in the Metro Network did not change significantly between project and no-project options, thus the level of modeling sophistication provided by DTIM would not be particularly revealing or useful.

Instead of using DTIM, regional vehicular emissions have been calculated manually using emissions factors from the EMFAC6C computer emissions model (a California-specific version of MOBIL 1) and using vehicle mix assumptions contained in ENV028 composite emissions routines. The emissions levels were calculated for the Metro Network area for the no-project and locally preferred alternatives.

Microscale Analyses. The focus of this analysis is to assess local air quality impacts due to changes in local traffic distributions which may cause increased traffic congestion around stations, on roadways leading to stations, and at park-'n-ride facilities. The pollutant of most concern is CO and analyses have been provided to estimate CO on both a 1-hour peak and 8-hour average basis. Impacts from airborne lead are also assessed. The CALINE3 line source model has been utilized to estimate CO production from traffic sources in the vicinity of stations and at a number of critical roadway network interactions. Parking structure CO production has been estimated using a technique developed for the Los Angeles Downtown People Mover project (U.S. DOT, 1979). CALINE3 line source dispersion characteristics have also been used to estimate atmospheric lead generation at several station sites.

Fugitive Dust Construction Impacts. This analysis describes the types of impacts which occur from fugitive dust, the general locations of such impacts, and their duration. Discussions are qualitative since reliable emissions factors for such activities as earth handling and building demolition have not been developed. In terms of mitigation, rules and regulations of the South Coast Air Quality Management District conceiving fugitive dust control are given.

EXISTING CONDITIONS

Regional Air Quality Setting

The Metro Rail Project is located within the South Coast Air Basin (SOCAB), which includes approximately 6580 square miles within the Los Angeles Metropolitan Complex. Included within the air basin are the highly urbanized portions of Los Angeles, San Bernardino and Riverside Counties, and all of Orange County.

For purposes of the air quality analysis, regional project-related air pollution emissions will be assessed for an approximately 140-square-mile study area called the Metro Network (regional core traffic impact area). The location of the study with respect to the SOCAB is shown on Figure 1. This study area represents the geographic extent of significant traffic effects resulting from project-provided improvement in public transit. Presently, it is estimated that approximately 10 percent of the air basin's VMT occurs within the study area.

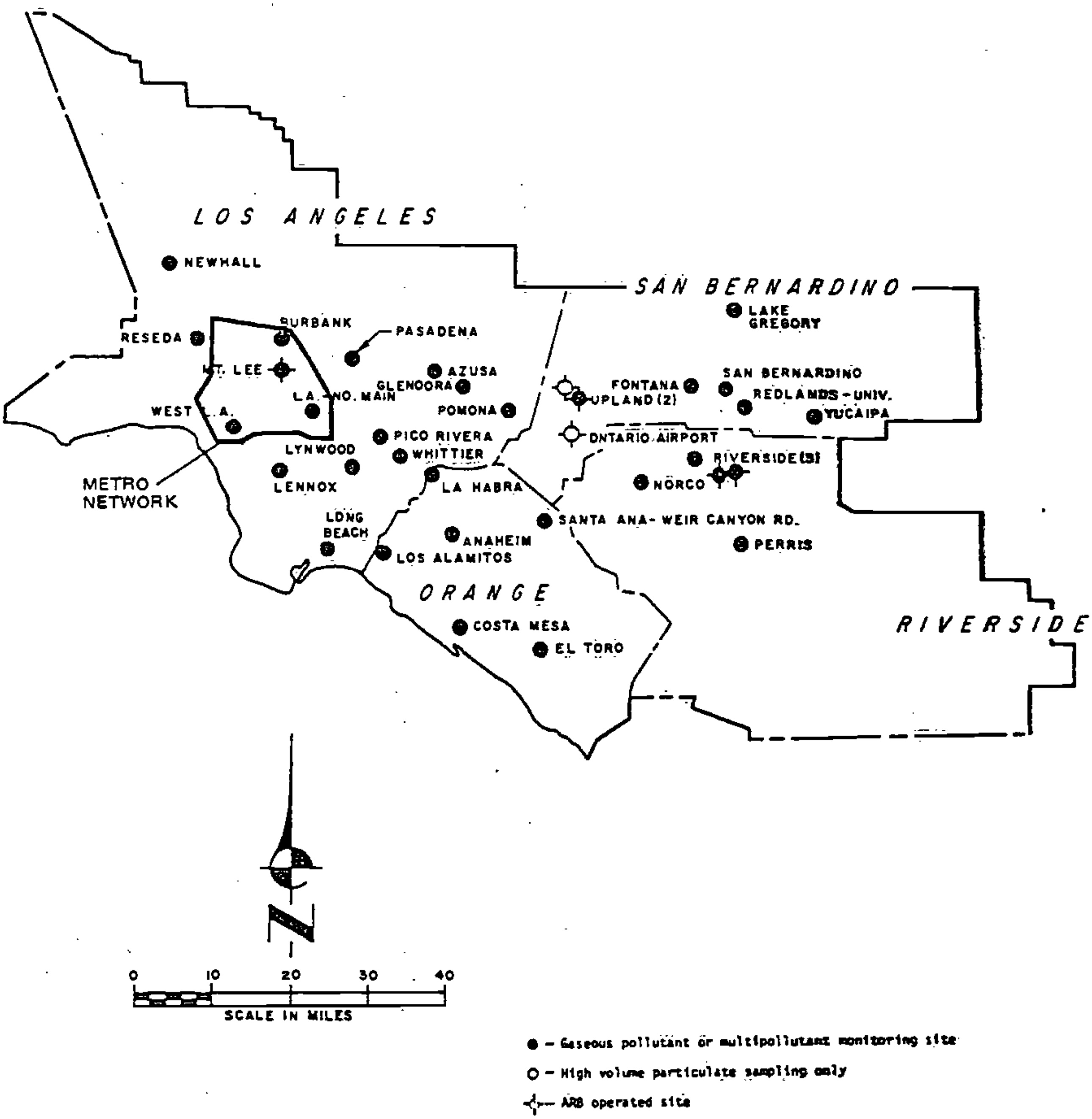
Air Pollution Meteorology. The South Coast Air Basin (SOCAB) may be characterized as an area of high air pollution potential, particularly during the period June through September. The poor ventilation afforded by the generally light winds (5.6 miles per hour average in the Downtown area) and shallow vertical mixing characteristic of the area is frequently insufficient to adequately disperse (dilute) SOCAB emissions before the air quality has been seriously impaired. Added to this is the plentiful sunshine, which provides the energy to convert emissions of the primary contaminants (nitrogen oxides and hydrocarbons) into ozone, photochemical aerosol, and other secondary products (SCAQMD, 1979).

In the atmosphere, an inversion (layer) is said to exist when a given layer of air exhibits an increase of temperature with altitude. The bottom of this layer is known as the inversion base while the top of the layer is referred to as the inversion top. The amount of warming in temperatures from base to top is known as the inversion strength. Inversions are critical to smog formation because they act as a hindrance to vertical mixing, thereby inhibiting the dilution of pollutant emissions (SCAQMD, 1979).

The inversion base height in the lower layers of the atmosphere (say below 5000 feet) may often be taken as an approximation of the depth of vertical mixing. In the coastal portions of SOCAB, early morning inversions based at 2500 feet or less (above sea level) occur on an average of 257 days per year (SCAQMD, 1979). There is a pronounced seasonal variation in inversion characteristics.

During winter (December-February), early morning inversion bases are initially at the surface on an average of two out of three mornings but with vertical mixing extending to about 4000 feet by early afternoon. The relatively weak inversion layers are lifted or eroded entirely by convective currents caused by surface heating. This situation typically allows a buildup of primary contaminants such as carbon monoxide, nitrogen oxides, and lead during the early morning hours, with rapid improvement in air quality by early afternoon as the trapped pollutants are allowed to escape (SCAQMD, 1979).

During summer (June-September), early morning inversion bases average near 1400 feet; but afternoon mixing only improves to about 2800 feet, as the summer inversion layers are stronger, more persistent, and less prone to being entirely eroded by surface



OPERATING STATIONS, DEC. 1980

SOURCE: CARB, 1980

South Coast Air Basin

FIGURE 1

heating. This means that summertime values of most primary contaminants are usually lower than those of winter, since these primary contaminants tend to peak in the early to mid-morning hours, and summer vertical mixing is greater than that of winter during these hours. Photochemical smog concentrations, however, are much higher in summer than in winter; not only is more solar radiation available to drive the photochemical reactions, but summertime afternoon vertical mixing is far less than that of winter, and it is during the afternoons that the photochemical smog typically peaks (SCAQMD, 1979).

As mentioned previously, the overall average wind speed in Downtown Los Angeles is 5.6 miles per hour (mph). Daytime winds are generally onshore while nighttime winds are generally offshore. The net transport of air onshore is usually greater in the summer while the net offshore transport, as a rule, is greater during the winter. Typical summer daytime winds (noon to 7:00 p.m.) average 8-12 mph while typical winter daytime winds (noon to 5:00 p.m.) average 7-9 mph in the downtown area. Typical summer nighttime winds (midnight to 5:00 a.m.) average 4-5 mph while typical winter nighttime winds (midnight to 7:00 a.m.) average 3-8 mph downtown. Whether there is air movement or air stagnation during the morning and evening hours, before these dominant air flow patterns take effect, is one of the critical factors in determining the smog situation of any given day (SCAQMD, 1979).

Air Quality Standards. The state and federal governments have each established air quality standards for various pollutants. Air quality standards are set at or below concentration levels at which air is defined as essentially clean and for which a sufficient margin exists to protect public health and welfare.

The Federal standards, established by the Environmental Protection Agency, are statutory requirements to be achieved and maintained as required by the Clean Air Act of 1970 (as amended). Provisions of the Clean Air Act stipulate that Federal funding of programs and projects may be withheld from the region if Federal standards are not achieved by 1987. State of California standards, established by the California Air Resources Board (CARB), are management objectives that represent goals of existing and planned air pollution control programs. Table 1 summarizes Federal and State air quality standards for various pollutants of interest. It should be noted that as of December 16, 1982, the state eliminated the 12-hour CO standard and adopted the Federal 8-hour CO standard.

Episode criteria have been established which identify pollutant concentrations at which short-term exposure may begin to affect the health of the population especially sensitive to air pollutants. The health effects are progressively more severe and widespread as pollutant concentrations increase from stage one to stage two and stage three episode levels. These episode levels require specific actions by industry, the public, and air pollution control agencies which range from curtailment of physical exercise to suspension of industrial and business activities.

Study Area Air Quality Trends. The SCAQMD monitors air quality at numerous locations in the SOCAB. Three SCAQMD monitoring stations are located within the Metro Network area as defined for the LPA system. These stations are the West Los Angeles station, the Los Angeles station, and the Burbank station. Only one of these, the Los Angeles station, is within the regional core area. Tables 2, 3, and 4 provide summaries of air quality monitoring data for the West Los Angeles, Los Angeles, and Burbank

Table 1
Ambient Air Quality Standards

POLLUTANT	AVERAGING TIME	CALIFORNIA STANDARDS		NATIONAL STANDARDS		
		CONCENTRATION	METHOD	PRIMARY	SECONDARY	METHOD
OXIDANT	1 HOUR	0.10 ppm (200 ug/m^3)	ULTRAVIOLET PHOTOMETRY	–	–	–
OZONE	1 HOUR	–	–	240 ug/m^3 (0.12 ppm)	SAME AS PRIMARY STANDARDS	CHEMILUMINESCENT METHOD
CARBON MONOXIDE	12 HOUR	10 ppm (11 mg/m^3)	NON-DISPERSIVE INFRARED SPECTROSCOPY	–	SAME AS PRIMARY STANDARDS	NON-DISPERSIVE INFRARED SPECTROSCOPY
	8 HOUR	–		10 mg/m^3 (9 ppm)		
	1 HOUR	40 ppm (46 mg/m^3)		40 mg/m^3 (35 ppm)		
NITROGEN DIOXIDE	ANNUAL AVERAGE	–	SALTZMAN METHOD	100 ug/m^3 (0.05 ppm)	SAME AS PRIMARY STANDARDS	GAS PHASE CHEMILUMINESCENCE
	1 HOUR	0.25 ppm (470 ug/m^3)		–		
SULFUR DIOXIDE	ANNUAL AVERAGE	–	CONDUCTIMETRIC METHOD	80 ug/m^3 (0.03 ppm)	–	PARAOSANILINE METHOD
	24 HOUR	0.05 ppm (131 ug/m^3)		365 ug/m^3 (0.14 ppm)	–	
	3 HOUR	–		–	1300 ug/m^3 (0.5 ppm)	
	1 HOUR	0.5 ppm (1310 ug/m^3)		–	–	
SUSPENDED PARTICULATE MATTER	ANNUAL GEOMETRIC MEAN	60 ug/m^3	HIGH VOLUME SAMPLING	75 ug/m^3	60 ug/m^3	HIGH VOLUME SAMPLING
	24 HOUR	100 ug/m^3		260 ug/m^3	150 ug/m^3	
SULFATES	24 HOUR	25 ug/m^3	AIHL METHOD NO. 61	–	–	–
LEAD	30 DAY AVERAGE	1.5 ug/m^3	AIHL METHOD NO. 54	–	–	–
	CALENDAR QUARTER	–	–	1.5 ug/m^3	1.5 ug/m^3	ATOMIC ABSORPTION
HYDROGEN SULFIDE	1 HOUR	0.03 ppm (42 ug/m^3)	CADMIUM HYDROXIDE STRACTAN METHOD	–	–	–
VINYL CHLORIDE (CHLOROETHENE)	24 HOUR	0.010 ppm (26 ug/m^3)	GAS CHROMATOGRAPHY	–	–	–
ETHYLENE	8 HOUR	0.1 ppm	–	–	–	–
	1 HOUR	0.5 ppm				
VISIBILITY REDUCING PARTICLES	ONE OBSERVATION	IN SUFFICIENT AMOUNT TO REDUCE THE PREVAILING VISIBILITY TO LESS THAN 10 MILES WHEN THE RELATIVE HUMIDITY IS LESS THAN 70%		–	–	–

ppm - PARTS PER MILLION
ug/m^3 - MICROGRAMS PER CUBIC METER
mg/m^3 - MILLIGRAMS PER CUBIC METER

Table 2

AIR QUALITY SUMMARY

West Los Angeles

Station 71 (86)[a]

Contaminant	Days (Percent Days) Exceeding State Standards in 19--					Annual Average of Air Contaminant Concentrations					Annual Average of Monthly 1-hr. Max. Air Contaminant Concentrations					Existing State Standards	1979 Federal Standards
	75	76	77	78	79	75	76	77	78	79	75	76	77	78	79		
A. Nitrogen Dioxide	36	55	42	20	42	.069	.076	.080	.064	.073	.343	.337	.364	.330	.320	.25 ppm/1 hr.	.05 ppm/Annual Arithmetic Mean
B. Carbon Monoxide	26	21	11	9	18	2.90	3.39	3.10	2.92	3.15	16.9	13.8	13.0	11.9	13.3	10 ppm/12 hr.	9 ppm/8 hr.
	0	0	0	0	0											40 ppm/1 hr.	35 ppm/1 hr.
C. Sulfur Dioxide	0	0	0	0	0	.015	.008	.009	.011	.009	.068	.039	.040	.043	.036	.05 ppm/24 hr.	.14 ppm/24 hr.
D. Photochemical Oxidants (Ozone)	44	75	40	75	90	.025	.023	.023	.029	.026	.133	.176	.125	.168	.153	.10 ppm/1 hr.	.12 ppm/1 hr.
E. Non-Methane Hydrocarbons	138[b]	211	215	140	215	.57[b]	.49	.36	--	.32	4.4[b]	3.5	2.7	--	2.5	______	.24 ppm/3 hr. (6-9 am)
F. Particulate Matter	27	12	16	13	11	78	64	70	72	67			N.A.			100 ug/m^3/24 hr.	260 ug/m^3/24 hr.
G. Visibility	197	160	145	140	183			N.A.					N.A.			10 miles/Relative Humidity less than 70%	

a) Station was relocated at end of 1977 (reactivated April, 1978).

b) HC monitering initiated June 9, 1975.

Table 3

AIR QUALITY SUMMARY

Los Angeles

Station 1 (87)[a]

Contaminant	Days (Percent Days) Exceeding State Standards in 19—					Annual Average of Air Contaminant Concentrations					Annual Average of Monthly 1-hr. Max. Air Contaminant Concentrations					Existing State Standards	1979 Federal Standards
	75	76	77	78	79	75	76	77	78	79	75	76	77	78	79		
A. Nitrogen Dioxide	30	27	65	26	14	.067	.073	.088	.076	.067	.353	.315	.388	.325	.265	.25 ppm/1 hr.	.05 ppm/Annual Arithmetic Mean
B. Carbon Monoxide	55 1	32 0	26 0	15 0	4 0	4.6	4.2	4.3	4.2	3.5	22.2	17.5	16.8	14.2	12.8	10 ppm/12 hr. 40 ppm/1 hr.	9 ppm/8 hr. 35 ppm/1 hr.
C. Sulfur Dioxide	3	2	0	0	0	.020	.019	.021	.017	.011	.069	.073	.063	.060	.041	.05 ppm/24 hr.[b]	.14 ppm/24 hr.
D. Photochemical Oxidants (Ozone)	129	125	118	113	114	.030	.030	.027	.026	.028	.176	.219	.167	.173	.180	.10 ppm/1 hr.	.12 ppm/1 hr.[c]
E. Non-Methane Hydrocarbons	271	213	215	135	123[d]	.41	.27	.25	.19	.15[d]	2.4	1.9	1.9	1.4	1.3[d]	———	.24 ppm/3 hr. (6-9 am)
F. Particulate Matter	59	57	70	42	51	106	102	127	98	105			N.A.			100 ug/m³/24 hr.	260 ug/m³/24 hr.
G. Visibility	185	166	187	186	117[e]			N.A.					N.A.			10 miles/Relative Humidity less than 70%	

a) Station was relocated September 14, 1979.
b) Standard effective June 29, 1977. 1975-79 exceedances based on this standard (see criteria in enclosed report).
c) Standard effective February 8, 1979.
d) Based on January-September (nine months) data only.
e) No data after September 14, 1979.

Table 4

AIR QUALITY SUMMARY

Burbank

Station 69

Contaminant	Days (Percent Days) Exceeding State Standards in 19--					Annual Average of Air Contaminant Concentrations					Annual Average of Monthly 1-hr. Max. Air Contaminant Concentrations					Existing State Standards	1979 Federal Standards
	75	76	77	78	79	75	76	77	78	79	75	76	77	78	79		
A. Nitrogen Dioxide	24	15	21	38	27	.074	.072	.075	.082	.078	.279	.261	.265	.298	.267	.25 ppm/1 hr.	.05 ppm/Annual Arithmetic Mean
B. Carbon Monoxide	97 0	93 0	36 0	28 0	36 0	5.78	4.97	4.38	4.03	3.86	19.3	14.9	14.6	14.4	13.9	10 ppm/12 hr. 40 ppm/1 hr.	9 ppm/8 hr. 35 ppm/1 hr.
C. Sulfur Dioxide	0	0	0	0	0	.015	.008	.014	.011	.010	.068	.053	.068	.042	.035	.05 ppm/24 hr.	.14 ppm/24 hr.
D. Photochemical Oxidants (Ozone)	143	187	137	156	137	.030	.038	.028	.033	.033	.183	.241	.181	.195	.185	.10 ppm/1 hr.	.12 ppm/1 hr.
E. Non-Methane Hydrocarbons	274	276	284	246	230	.66	.75	.72	.52	.42	5.3	4.4	5.1	3.0	2.6	———	.24 ppm/3 hr. (6-9 am)
F. Particulate Matter	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND			N.A.			100 ug/m^3/ 24 hr.	260 ug/m^3/24 hr.
G. Visibility	275	194	212	217	230			N.A.					N.A.			10 miles/ Relative Humidity less than 70%	

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stations for the years 1975 through 1979 (City of Los Angeles EIR Manual, latest revision). Available monitoring data for the three stations for the year 1980 is included in Table 5. A fourth air monitoring station is located on Mt. Lee in the study area and is operated by the California Air Resources Board (CARB). This station is used for monitoring air pollution episodes and does not have comprehensive or long-term data. Monitoring information from the station is not particularly useful to this study.

Ozone. Between 1976 and 1980 the number of days (percent days) exceeding the state standard of 10 ppm/hr at the Los Angeles station has steadily declined by a total of 13 percent. Still, the standard was exceeded on 109 days in 1980. Ozone concentrations at the West Los Angeles station showed a marked increase in 1979 and 1980 over the previous 3 years. At Burbank, no discernible trend is evident; however, ozone levels remain relatively high in comparison with other SOCAB monitoring stations.

Carbon Monoxide. From 1976 to 1980 there was a decrease by almost 50 percent in the number of SOCAB station days exceeding the Federal 8-hour CO standard. Also, the 1-hour 35 ppm standard has not been exceeded at any of the study area monitoring stations since 1975. In 1980, the 1-hour CO standard was not exceeded basin-wide. The 8-hour standard remains difficult to achieve, however, with the Burbank stations showing a marked increase in violations in 1979 and 1980. Levels at the Los Angeles station continued to decline in 1980, with West Los Angeles remaining about the same between 1976 and 1980.

Nitrogen Dioxide. In 1980, the State nitrogen dioxide standard of 0.25 ppm/hr was exceeded on 23 days at Burbank, the most of any SOCAB monitoring station. Annual arithmetic mean NO_2 concentrations at the Los Angeles station have been some 50 percent over the Federal standard since 1965 with little overall change during the period. The West Los Angeles station shares with Burbank and Los Angeles the distinction of recording some of the highest NO_2 levels in the SOCAB.

Sulfur Dioxide. During 1980, there were no violations of State or Federal SO_2 standards at any SOCAB monitoring stations.

Particulate Matter. The 100 micrograms/m^3 State standard continued to be exceeded with regularity at Los Angeles and West Los Angeles with no apparent tendency towards improvement. Particulate matter is not monitored at Burbank.

Lead. Violations of the lead standard occur in the SOCAB in areas with high traffic volumes. During 1980, the Los Angeles station recorded 5 months in violation of the State lead standard. West Los Angeles recorded 2 months in violation. Lead is not monitored at Burbank. Because of continued progress in reducing atmospheric lead concentrations in the SOCAB, it is believed that the Federal standard will be attained by the mid-1980s (SCAQMD, 1981).

Air Quality Management Plan. The project is related to the SOCAB AQMP through its ability to alter regional VMT and, hence, affect regional air quality. Such effects are monitored by the Southern California Association of Governments (SCAG), the results of which are published each year in a report entitled, "Air Quality Reasonable Further Progress Report."

Table 5

AIR QUALITY SUMMARY
YEAR 1980
FOR STUDY AREA MONITORING STATIONS

Contaminant/Station	Days Exceeding State Standards	Days Exceeding Federal Standards	Annual Average of Monthly 1-Hr Max. Air Contaminant Concentrations	State Standard	Federal Standard
NITROGEN DIOXIDE					
West Los Angeles	18	—	0.37	0.25 ppm/1-hr	0.05 ppm/annual avg
Los Angeles	16	—	0.44		
Burbank	23	—	0.35		
CARBON MONOXIDE					
West Los Angeles	19(1)	36	25	10 ppm/12-hr	9 ppm/8-hr
Los Angeles	7(1)	14	19	40 ppm/1-hr	
Burbank	39(1)	54	29		
SULFUR DIOXIDE					
West Los Angeles	0	0	0.017	0.05 ppm/24-hr	0.14 ppm/24-hr
Los Angeles	0	0	0.037		
Burbank	0	0	0.028		
OZONE					
West Los Angeles	89	35	0.21	0.10 ppm/1-hr	0.12 ppm/1-hr
Los Angeles	109	59	0.29		
Burbank	137	99	0.35		
PARTICULATE MATTER					
West Los Angeles	29	0	79(2)	100 $\mu g/m^3$/24-hr	260 $\mu g/m^3$/24-hr
Los Angeles	54	0	108(2)		
Burbank	NM	NM	NM		
LEAD					
West Los Angeles	2 months	1	2.02	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$
Los Angeles	5 months	1	2.68	30-day average	quarterly avg
Burbank	NM	NM	NM		

Source: SCAQMD, May 1981. SCAQMD, September 1981.
(1) = Data is for 12-hour standard; 1-hour standard was not exceeded.
ND = No data.
NM = Not monitored.
(2) = Single highest 24-hour average for year.

Specifically, this project constitutes one element of the Regional Transportation Plan (RTP) being developed for Southern California by SCAG. The RTP, in turn, provides the basis for projecting future growth and associated traffic patterns and for determining the emissions changes associated with that growth. The AQMP currently has a long-range target of emissions reductions associated with transportation system design of 50 tons per day of reactive organic gases (SCAQMD/SCAG, 1982). To the extent that the Metro Rail Project contributes to reductions in VMT or trip generation or reduces congestion by diverting automobile trips, it is consistent with the long-range tactics of the AQMP.

Consistency with regional plans is a requirement of projects like Metro Rail which are heavily funded by the federal government. Consistency in this case is not strictly applicable because the non-attainment plan for ozone and carbon monoxide developed in the 1979 AQMP was disapproved by the Environmental Protection Agency (EPA) on January 21, 1981. This proposed project is located in an area where there is not an approved State Implementation Plan (SIP) containing any enforceable Transportation Control Measures (TCMs). Because the 1982 SIP revisions containing TCMs do not predict the required ozone attainment by 1987, these revisions may not be approved by EPA either. If the AQMP update, as part of the SIP and containing a Regional Transportation Improvement Program (RTIP) including the Metro Rail Project, were to be approved, then the proposed project may be construed as conforming to the SIP.

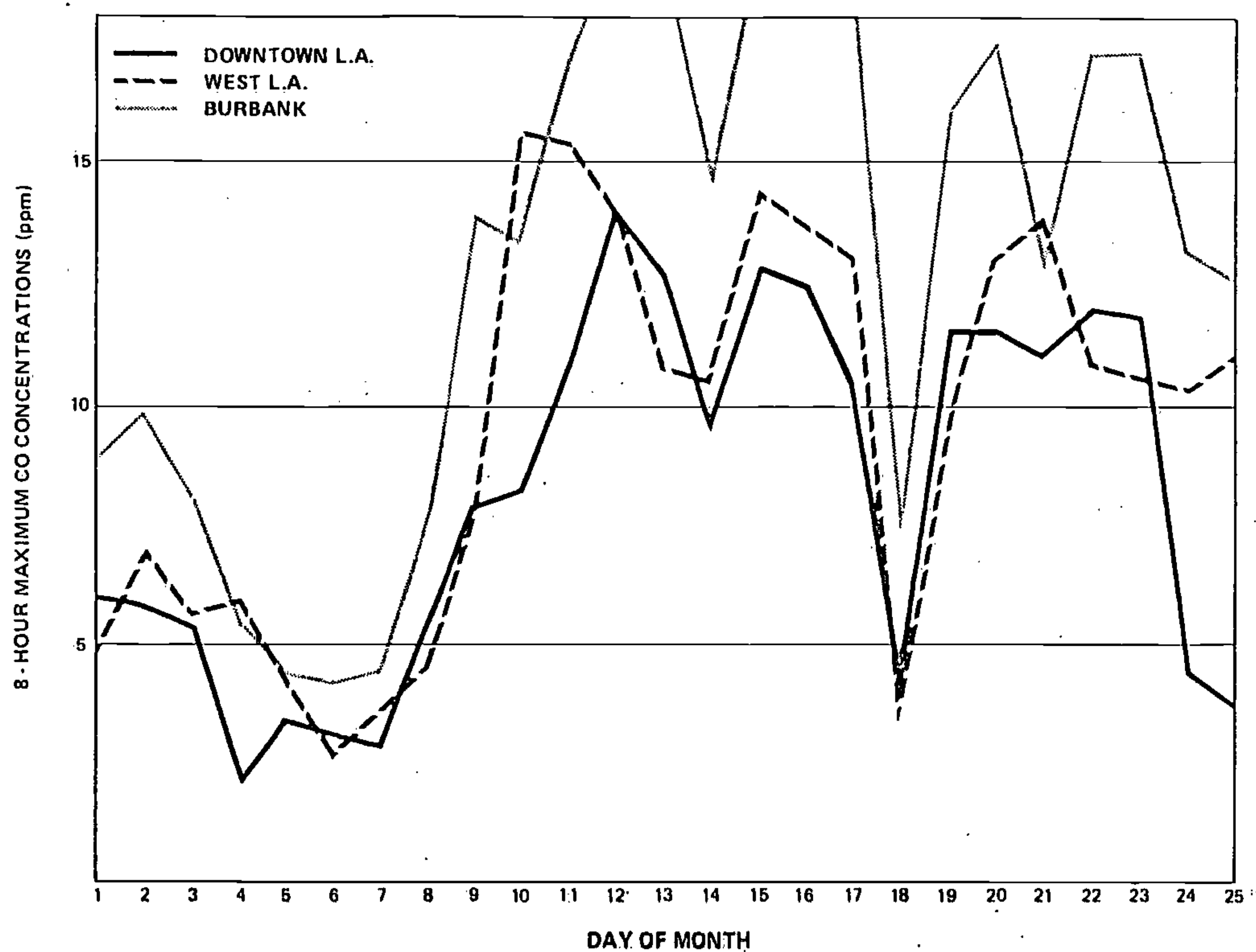
Local Air Quality Setting

While regional air quality within the Metro Rail Network is well defined by the air quality monitoring data resources from the SCAQMD stations at Burbank, West Los Angeles and Los Angeles, potential localized project air quality impacts may occur on a much smaller scale. Experience shows, however, that monitoring data tends to be conservative in depicting background concentrations. Thus, the regional data can be effectively used to reflect the temporal and spatial variations in baseline air quality around roadways or facilities potentially impacted by the proposed project.

Figure 2 shows a plot of the daily 8-hour CO maximum at all three stations for a random 25-day period. The CO levels at any one station are excellent predictors of the CO levels at the other two. The correlation coefficients for any two coupled stations are all close to 0.90, which is indicative that CO distributions follow a pronounced regional pattern. It means that these monitoring data are well representative of baseline levels at various network sites. It also means that when meteorological situations occur that are conducive to local stagnation and high CO levels, it is probably a period of high baseline levels throughout the network. In terms of a worst-case project-related impact, worst-case local conditions occur in conjunction with worst-case background levels.

For CO, the assumed worst-case background condition is taken to be the second highest hourly and second highest 8-hour CO concentrations measured during the base year. As older cars are retired from service and replaced by less polluting newer cars, baseline CO levels have slowly dropped and will continue to do so into the future. Table 6 summarizes the CO measurements from 1980 as a baseline year and then projects background levels for the year 2000 that will be used in CO microscale analyses.

As a further explanation of local CO distributions, the similar temporal patterns among the SCAQMD stations are shown in Figure 3. The morning rush hour is seen to be the



Interstation Correlation of Daily CO Distributions

FIGURE 2

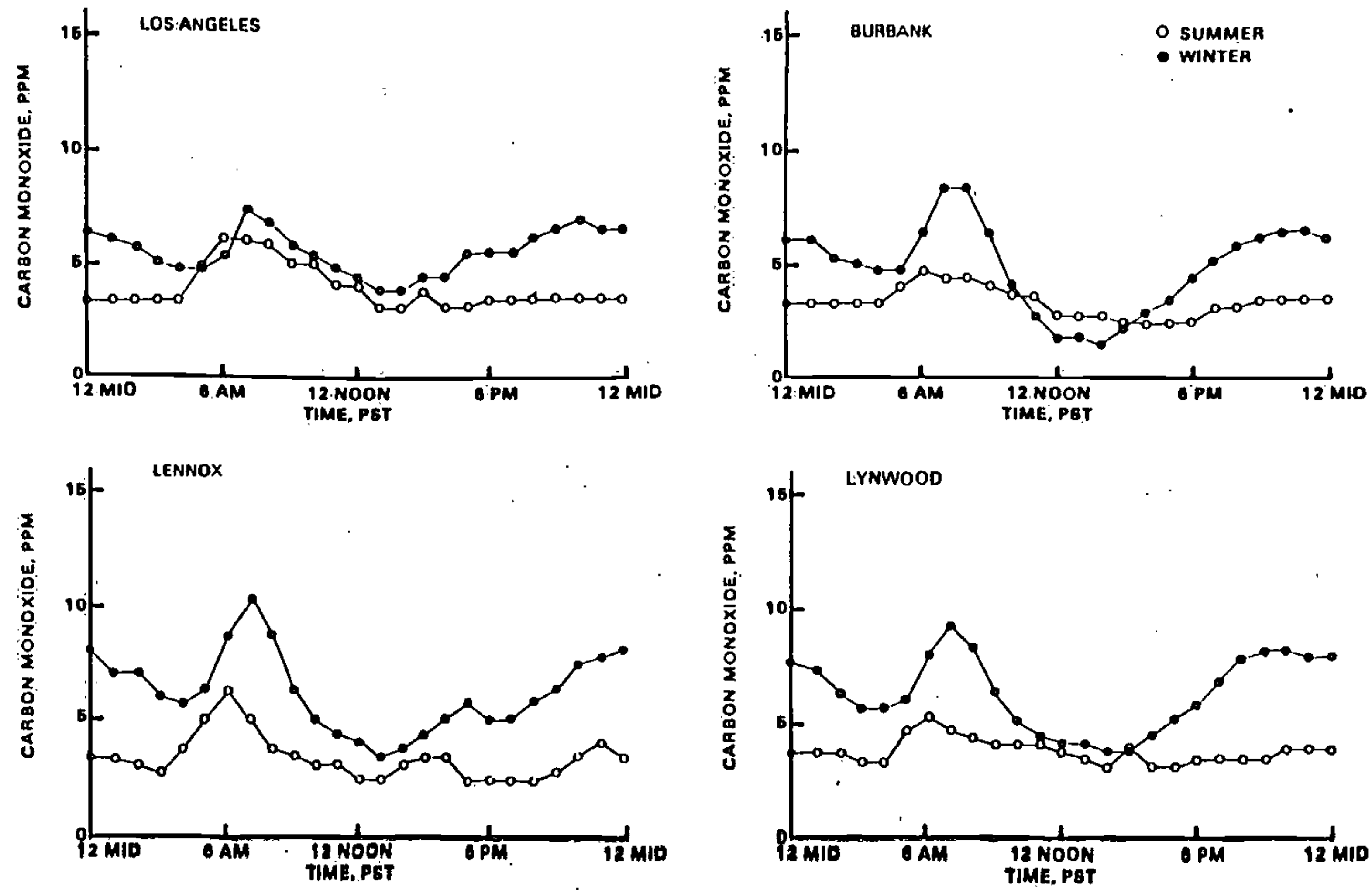
Table 6

EXISTING AND PROJECTED MAXIMUM BACKGROUND CO LEVELS

Location	1980 Baseline (Hourly)	2000 Projection* (Hourly)	1980 Baseline (8-Hourly)	2000 Projection* (8-Hourly)
Los Angeles (Union Station)	18.0	14.0	12.5	9.7
West Los Angeles (Hollywood)	18.0	14.0	12.9	10.0
Burbank (Universal City, North Hollywood)	24.0	18.7	19.3	15.0

*1982 AQMP Revision, Appendix No. V1-B.

Ratio of $\frac{\text{Year 2000 emissions}}{\text{Year 1982 emissions}}$ x 1980 CO levels



SOURCE: SCAQMD, 1982

Diurnal Variation in Carbon Monoxide Concentrations During Summer 1978 and Winter 1978-1979

FIGURE 3

WESTEC Services, Inc.

period of highest CO concentrations and is therefore the time period selected for detailed analysis in any microscale CO impact analyses.

IMPACT ASSESSMENT

Introduction

Impacts on air quality have been assessed from two principal perspectives: 1) a burden analysis of subregional on-road mobile emissions generated by transit users in the study area; and 2) a microscale analysis of carbon monoxide concentrations in the immediate vicinity of each of five proposed station parking structures and along selected arterials. The subregional burden analysis provides an estimate of emissions savings due to the project for the five primary pollutants. Emissions were calculated using project and no-project VMT from traffic modeling tasks. Trip characteristics, i.e., hot start/cold start emissions and trip speeds, were considered through use of current factors from Caltrans EMFAC6C and ENVO28 data. In general, emissions savings due to the project were found to be insignificant on a regional scale. Carbon monoxide concentrations at each of five proposed parking structures were assessed utilizing a combination of methodologies including CALINE3, Gaussian dispersion, and the Downtown People Mover parking structure methodology. Carbon monoxide concentrations pertinent to both the Federal 1-hour and 8-hour standards were assessed and show impacts to be minor to insignificant.

Regional Impact

The proposed Metro Rail Project is considered an important element in the regional transportation system as it relates to air quality planning. The project has the potential to divert a significant number of early morning automobile trips originating in the eastern San Fernando Valley and the Hollywood areas and terminating in the downtown central business district and then reversing in the evening. A secondary impact of the proposed project is that these diverted trips will reduce congestion on roadway links between these origins and destinations and will thus allow for more uncongested traffic flow for all non-project traffic.

AQMP Projected Project Air Quality Benefit. In order to assess the related regional air quality benefits from such trip diversion, the driving patterns and the vehicular emission characteristics of the diverted vehicles as well as those of the non-project vehicular population need to be known. An initial estimate of the project-related air quality benefit had been made in the SOCAB AQMP issued in January 1979. The AQMP had made the Metro Rail Project one of its significant emissions reduction tactics (H-86) planned for a 1986 implementation. Both the trip diversion estimates and the implementation date are now recognized to be overly optimistic. The AQMP had assumed a project ridership of 260,000 passengers, of which 50 percent were assumed diverted from single-passenger automobiles. The net vehicular emissions savings were expected to result from a basin-wide reduction of 1,000,000 VMT per day. Assuming that the most pollution inefficient portion of the diverted trips (when cars are first started) would occur if the car is driven to a park-'n-ride lot or all the way into downtown, the 1,000,000 VMT are basically "hot stabilized" emissions when cars are operating at their most efficient modes. By applying emission factors from the EMFAC5 computer emissions model (a California-specific version of the national emissions model, MOBIL1), the Southern California Association of Governments (SCAG) calculated the resulting Metro Rail Project air quality benefit. These results have been updated using the current EMFAC6C emissions model and the comparison of these two sets of calculations are shown in Table 7. Given that the AQMP anticipated a VMT benefit of about 1 million, a 0.5 percent reduction of the basinwide total of about 200 million VMT, the resulting pollution benefit in Table 7 is obviously significant and the Metro Rail Project would thus be an important air quality improvement measure.

Subregional Burden Analysis. Unfortunately, detailed ridership and traffic modeling completed in 1982 has not substantiated the optimistic projections of VMT reductions originally anticipated. The latest estimates of regional traffic generation predicts a VMT level within the Metro Network Area of 35,254,000 million in the year 2000 without the project and a VMT level of 35,054,000 with Metro Rail. The resulting VMT reduction of 200,000 VMT per average workday is only about 20 percent of the level originally anticipated in the AQMP and about 28 percent of the 710,000 VMT benefit calculated in the Final Alternatives Analysis/Environmental Impact Statement/Report (U.S. DOT, 1980). Table 8 shows that the resulting direct air quality benefit is small, particularly the savings of reactive hydrocarbons as one of the main ingredients in the regional formation of photochemical smog. The direct project-related air quality benefit is more than offset by the indirect air quality impacts of increased electrical power generation emissions necessary to run the rail system and associated facilities. Thus, the project by itself does not represent an effective strategy for reducing air pollution emissions in the basin.

Regional Emissions Relationships-DTIM Simulations. While the direct project benefit is minimal, this conclusion ignores the fact that the diversion of 200,000 VMT will make the entire subregional transportation system function a little better with the project than without it. Because there is a complicated shift in driving patterns (freeway mileage reductions versus arterial increases near Metro Rail stations) and marked differences in vehicle driving modes (cold starts, hot starts, hot stabilized) between park-'n-rides, kiss-'n-rides and commuters driving downtown and back, no simple calculation of shifts in driving speeds or modes can uniquely account for this secondary regional air quality benefit from project implementation. Such an assessment requires a complete regional summation of all mobile emission sources with and without the project, especially for minor speed modifications introduced by the project summed over a very large number of non-project vehicles benefiting from the Metro Rail Project. A model such as the Direct Travel Impact Model (DTIM) can incorporate these changes and therefore represents a suitable methodology to address such secondary project-related air quality benefits. The DTIM model was run for the year 2000 by the LARTS branch at Caltrans with and without transit improvement assumptions during the AQMP update process. The transit improvements considered included all transit improvements anticipated within the next two decades without specifically identifying the project portion of the overall regional emissions improvements. Since the DTIM model uses somewhat different traffic assignment and ridership assumptions than the detailed VMT and ridership calculations prepared by the Los Angeles Department of Transportation (LADOT) and the RTD, it was not considered strictly valid to run DTIM specifically for the Metro Rail Project. Such a procedure would have resulted in different models for calculating direct (VMT-related) and indirect (regional vehicle speed and distribution-related) air quality benefits.

Table 7

ANTICIPATED METRO RAIL PROJECT REGIONAL AIR QUALITY BENEFIT -- DAILY REDUCTION IN TONS/DAY YEAR 2000

Pollutant	Predicted Emissions Reduction (1979 AQMP)	Revised Emissions Reduction (EMFAC6C)*
Carbon Monoxide	3.4	7.1
Reactive Hydrocarbons	0.4	0.5
Oxides of Nitrogen	0.6	0.9
Sulfur Dioxide	—	0.1
Suspended Particulates	—	0.3

*1,000,000 VMT, 100 percent hot stabilized, 60°F average temperature;
86 percent light duty auto
13 percent light duty truck
1 percent motorcycles

Table 8

UPDATED METRO RAIL PROJECT (MRP) DIRECT AND INDIRECT REGIONAL AIR QUALITY RELATIONSHIPS

	Baseline Regional Vehicular Emissions[1] (tons/day)	With MRP Regional Vehicular Emissions[1] (tons/day)	Direct Regional Emissions Reduction (tons/day)	MRP Emissions From Power Generation[2] (tons/day)	Indirect Regional Emissions Increase (tons/day)
CO	461.3	459.9	1.4	3.9	2.5
RHC	37.7	37.6	0.1	3.5	3.4
NO_x	57.9	57.7	0.2	44.8	44.6
SO_2	8.9	8.9	negl.	52.6	52.6
TSP	12.4	12.4	negl.	7.8	7.8

[1] In Metro Network area.

[2] In SOCAB; assumes that 17 percent of project power supply in Year 2000 will be produced by oil-fired power plants in the SOCAB. This is assumed to be a conservative estimate. Project energy use for purposes of the air quality analysis is 38,930,000 kilowatt-hours per year (17% x 229,000,000 kWh/year). Emissions factors used to determine power plant emissions are as follows:

CO	- 0.2	lbs/1000 kWh
NO_x	- 2.3	lbs/1000 kWh
SO_x	- 2.7	lbs/1000 kWh
Particulates	- 0.401	lbs/1000 kWh
Hydrocarbons	- 0.18	lbs/1000 kWh

The source of these emissions factors is the Air Quality Handbook, SCAQMD, 1980.

While it is not possible to isolate the secondary air quality benefits from project development, it is nevertheless instructive to compare regional and local air pollution emission levels under various transit assumptions to define transit's overall role in contributing to basin-wide air quality improvement. In its comparison of regional emissions from an improved versus existing transit system, DTIM assumed construction of the Metro Rail Project as well as free-flow guideways on the Harbor, Santa Ana and Century Freeways. Premium fare and non-premium transit service in heavy use corridors was also considered. The differences between the resulting two transit assumptions are summarized in Table 9 for the regional statistical areas (RSAs) encompassing the Metro Network Area and surrounding areas. Metro Rail Project's role in reducing overall emissions is especially evident in RSA 13, where an emissions reduction in reactive hydrocarbons from vehicular sources of 4 percent in an area served by the project is much higher than other areas of the valley not served by the project. When Table 9, comparing Los Angeles City emissions, is compared to Table 10, depicting County, air basin and all of Southern California emissions reductions from an improved transit system, the local benefit within the city is far more pronounced than the 2 percent regional benefit within the larger analysis areas. In particular, the improvements in RSAs 13, 17 and 23 encompassing the Metro Network Area, in addition to the Santa Ana Transportation Corridor in RSA 21, appear to be the most critical transit impacts within the entire transportation system. While the direct VMT reduction from the project is not overly encouraging, the secondary benefits involving the interaction of all basin transportation systems appear substantial.

Microscale Air Quality Impact Analysis

Microscale air quality impacts have been estimated focusing on assessment of local carbon monoxide hot spot potential and roadside atmosphere lead potential.

The analysis of microscale CO air quality impacts involved several components. Firstly, an arterial roadway screening procedure was undertaken to determine whether project-related traffic changes cause significant changes in CO concentrations adjacent to roadways. The focus of attention for this analysis was an assessment of 98 separate intersection legs around the 5 stations with parking facilities. Secondly, in-structure air quality was estimated at parking facilities using a modified box model methodology. Thirdly, CO concentrations from arterials and parking structures were added to other emissions sources at or near sites (such as kiss-n'-ride areas and adjacent freeways), and contours were developed reflecting the summation and dispersion of all local air pollution sources identified. Local source levels were then added to background levels to determine total CO exposure at receptor sites around stations.

The analysis of microscale atmospheric lead impacts was accomplished by utilizing standard lead emissions rates and adapting emission to CALINE3 dispersion characteristics.

Arterial Impact Analysis. While CALINE3 is a very useful tool by which to assess the microscale dispersion patterns around vehicular sources, it is obviously not practical to exercise the computer model along every roadway segment where automotive emissions patterns may change as a result of the Metro Rail Project. In order to prepare a viable air quality impact analysis along potentially impacted roadways while overcoming the burden of complexity of the model itself, a screening procedure based on the CALINE3 model output was developed. This screening procedure is outlined in the recently released Caltrans draft guidelines on roadway project impact assessment.

Table 9

SUBREGIONAL BENEFITS FROM AN IMPROVED TRANSIT SYSTEM IN LOS ANGELES PERCENT REDUCTION IN EMISSIONS, FUEL CONSUMPTION, AND VMT

	RSA					
Factor	12	13*	14	17*	21	23*
Emissions						
HC	2.35	3.86	1.10	4.37	6.10	5.21
NO_x	1.15	1.90	0.85	2.34	2.50	3.12
CO	1.25	2.30	1.05	2.75	3.35	3.65
SO_x	0.65	0.85	0.15	1.25	1.20	1.61
PT	0.57	0.95	0.35	1.15	1.25	1.26
Fuel Consumption	1.40	3.45	0.75	3.20	5.85	3.36
VMT	1.33	3.40	0.80	3.36	5.75	3.26

NOTES:

*Only portions of these RSAs are within the Metro Network.

HC - hydrocarbons
NO_x - nitrogen oxides
CO - carbon monoxide
SO_x - sulfur oxides
PT - particulate matter
RSA 12 - Southwest San Fernando Valley
RSA 13 - Burbank
RSA 14 - Northeast San Fernando Valley
RSA 17 - West Central Los Angeles
RSA 21 - East Central Los Angeles
RSA 23 - Downtown CBD

Source: California Department of Transportation, LARTS Branch, 1982 DTIM simulation runs, SCAG 82A and SCAG 82B Assumptions.

Table 10

REGIONAL AIR QUALITY BENEFITS ATTRIBUTABLE
TO AN IMPROVED REGIONAL TRANSIT SYTEM
PERCENT REDUCTION IN EMISSIONS,
FUEL CONSUMPTION, AND VMT

Factor	Los Angeles County	South Coast Air Basin	LARTS Study Area
Emissions			
HC	2.86	3.97	3.76
NO_x	0.80	1.06	1.05
CO	2.84	4.07	3.86
SO_x	0.72	0.77	0.75
PT	1.55	1.63	1.60
Fuel Consumption	3.06	3.40	3.24
VMT	1.98	2.07	2.02

NOTES:

*Only portions of these RSAs are within the Metro Network.

HC - hydrocarbons

NO_x - nitrogen oxides

CO - carbon monoxide

SO_x - sulfur oxides

PT - particulate matter

LARTS - Los Angeles Regional Transportation Systems; the LARTS Area is very close to the same size as the SOCAB.

Source: California Department of Transportation, LARTS Branch, 1982 DTIM simulation runs, SCAG 82A and SCAG 82B Assumptions.

Conceptually, the screening procedure is based on assigning certain threshold increase in CO concentrations attributable to traffic changes and then determining if predicted increases in traffic volumes or decreases in vehicle speed (causing higher CO emissions) cause the threshold to be exceeded. CALINE3 calculates CO levels by:

$$CO_1 = \frac{E_1}{D} + B_1$$

Where:

CO_1 = the 1-hour CO concentration in ppm
E_1 = the hourly emission factor (VPH x EMFAC) in grams/mile/hour
B_1 = the dispersion factor calculated from CALINE3

If traffic emissions change slightly, then the new CO concentration ($CO + \Delta CO$) is expressed by:

$$CO + \Delta CO = \frac{E_1 + \Delta E}{D} + B_1$$

or

$$\Delta CO = \frac{\Delta E}{D}$$

Under worst-case dispersion conditions (Pasquill "F" Stability and very light winds), the approximate expression for D is:

$$D = 12{,}500 \text{ gram/mile/hour/ppm}$$

For purposes of analysis, a change in local CO concentrations of 2 ppm for 1 hour was considered significant. As noted elsewhere, the local 8-hour CO concentration roughly equals about one-half the local hourly level. Thus, a threshold increase of 2 ppm is approximately equivalent to an 8-hour change of 1 ppm.

To carry out this screening analysis, changes in traffic volumes and vehicle speeds related to the level of service (LOS) during the a.m. rush hour were derived from Los Angeles Department of Transportation (LADOT) traffic analyses and projections. Changes and congestion were assumed to mainly affect the inbound traffic leg into a given intersection while the outbound leg usually has free-flowing traffic. Ninety-eight separate intersection legs around the five stations with parking facilities were analyzed. Input data details and results are tabulated in Attachment 1. Pertinent conclusions are summarized in Table 11.

The locations where CO levels exceed the threshold and merit a more detailed analysis include:

1. Macy - westbound - at Vignes
2. Lankershim - southbound - at Tour Center Drive
3. Lankershim - southbound - at Burbank
4. Burbank - eastbound - at Lankershim

Table 11

NUMBER OF INTERSECTION LEGS AFFECTED BY HOURLY CO CHANGES DURING THE MAXIMUM CO PERIOD (MORNING RUSH HOUR) YEAR 2000 LOCALLY PREFERRED ALTERNATIVE

Hourly CO Changes (ppm)	Union Station	Fairfax/Wilshire	Beverly/Fairfax	Universal City	North Hollywood	Total
Potentially Significant (more than 2 ppm)	1			1	2	4
Slightly Worse (1-2 ppm)	3	2		1	3	9
Negligibly Worse (0-1 ppm)	7	5	4	6	11	33
Negligibly Better (0-1 ppm)	1	16	17	7	9	50
Slightly Better (1-2 ppm)	—	2	—	—	—	2
TOTAL:	12	25	21	15	25	98

Those roadway segments where there may be a slight project-related air quality degradation include:

1.	Macy	-	eastbound	-	at Vignes
2.	Vignes	-	southbound	-	at Macy
3.	Mission	-	southbound	-	at Macy
4.	Olympic	-	eastbound	-	at Fairfax
5.	San Vicente	-	southeastbound	-	at Fairfax
6.	Lankershim	-	northbound	-	at Tour Center Drive
7.	Lankershim	-	northbound	-	at Burbank
8.	Burbank	-	westbound	-	at Lankershim
9.	Tujunga	-	southbound	-	at Chandler

Slight improvement resulting from lower traffic volumes and less congestion may occur at the following intersection legs:

1.	Wilshire	-	westbound	-	at Crescent Heights
2.	Crescent Heights	-	southbound	-	at Wilshire

In order to better quantify the impact from those intersection areas where the threshold was exceeded, detailed CALINE3 calculations were carried out. The Macy/Vignes intersection was included in the microscale impact analysis of the Union Station terminal/parking structure, the Lankershim/Tour Center intersection was included with the Universal City Station analysis, and the Burbank/Lankershim/Tujunga intersection was modeled separately. Except for these intersections (which account for all the threshold exceedances and most of the slight degradation cases), there appears to be no significant air quality impacts on the arterial roadway system from the proposed Metro Rail Project operations.

In-Structure Air Quality. Parking structures represent vehicular source areas where the combination of stagnant air and cars that have been sitting for many hours before being restarted (cold-start vehicles) may create elevated localized levels of unhealthful air quality. To test for this possibility, the uniformly mixed box model assumptions developed in the Downtown People Mover EIR (1979) for parking structure air quality were applied to the five proposed structures for the MRP. Since parking structures typically are not populated for 8 hours, only the 1-hour CO exposure was considered as a significant pollution level.

The parking structure box model assumes the vehicular emissions are uniformly distributed throughout the structure with natural ventilation diluting any automotive exhaust. If there are enclosed portions of a structure, fan-assisted ventilation is assumed to be used. If the pollutants are uniformly mixed, the hourly CO concentration is expressed by:

$$C = \frac{Q}{V \cdot ACPH}$$

Where:

C = the hourly concentration
Q = the mass of pollutants released per hour
V = the structure volume
ACPH = (air changes per hour), the ventilation rate

Assuming a mean running time per auto of 90 seconds to enter or leave the structure at 12 miles per hour mean travel speed, the resulting morning and evening rush hour CO levels within the structure are as shown in Table 12. During both the morning and evening, CO levels remain well below any levels of concern, particularly since most receptors remain within the structure for only a few minutes in parking or retrieving their car. For approximately similar parking lot activity levels during the morning or evening peak, the similarity of structure CO concentrations between morning and evening is due to the fact that evening rush hour vehicles are primarily cold-start vehicles (causing higher emissions) offset by warmer air temperatures and stronger winds (causing lower emissions and better ventilation). Unless CO levels around the structure approach the ambient air quality standard, the addition of any background CO levels to in-structure concentrations will not threaten the maintenance of healthful air quality in and around the proposed Metro Rail stations with large parking structures.

Table 12

IN-STRUCTURE HOURLY CO CONCENTRATIONS*

Location	A.M. CO Level (ppm)	P.M. CO Level (ppm)
Union Station	2.1	1.9
Wilshire/Fairfax	2.4	2.1
Beverly/Fairfax	1.8	1.6
Universal City	2.4	3.2
North Hollywood	1.8	2.5

*Above any existing background levels.

Composite CO Concentrations at Metro Rail Stations with Parking Facilities. The screening analysis for the arterial roadway systems within the Metro Network near any of the proposed stations with significant changes in traffic volumes (due to parking structures or major bus access) identified Union Station and Universal City as traffic impacted areas with sections of Fairfax also experiencing some degradation in intersection LOS. In North Hollywood, the area around the proposed transit parking structures experiences minimal traffic changes easily accommodated by the roadway system, but the Lankershim/Burbank intersection is of some concern because of increased intersection congestion. Based on the screening analysis, the four stations at Union Station, Wilshire/Fairfax, Beverly/Fairfax and University City, and the Lankershim/Burbank intersection were accordingly selected for a detailed analysis.

Microscale air quality impacts are important from the standpoint of exposure of sensitive receptor populations. However, because most of the transit stations are located in developed areas with commercial office or similar uses, there are few receptor sites in the immediate area which could be deemed sensitive. The land uses associated with potential sensitive receptors, such as residential dwellings, parks, hospitals or schools, are sufficiently separated from areas of increased station-related vehicular activity such that microscale impacts do not constitute a significant contribution.

CALINE3 calculations were carried out for the morning rush hour at the five locations using traffic conditions specified in LADOT's traffic analysis and/or conservative estimates of hourly parking structure and kiss-'n-ride system access. Emission factors for various traffic elements were prepared by Caltrans LARTS staff based on the ENVO28 composite emission factor routines which utilize the EMFAC6C vehicular emissions model. Several classes of emissions sources were examined for this analysis because traffic patterns on freeways and arterials and within the lots/structures at these facilities were all different. For example, the vehicle mix from parking structure users is significantly different from the general California vehicle population because it contains no trucks. There is similarly a marked difference between the hot start/cold start/hot stabilized modes of cars arriving at the station, and the population leaving the station near the end of the day. The incoming traffic is mainly "hot stabilized" while the exit traffic is mainly "cold start."

The primary concern of traffic-related air quality impact is the 8-hour CO standard of 9 ppm. However, traffic data have only been prepared for 1-hour increments during the morning and afternoon peaks and for the total daily traffic. In order to develop an 8-hour impact estimate, it is therefore necessary to extrapolate the hourly data into a corresponding 8-hour CO concentration. Functionally, CALINE3 calculates CO levels by:

$$C = \frac{VPH_1 * EMFAC_1}{D_1} + \frac{VPH_2 * EMFAC_2}{D_2} + \ldots + B$$

Where:

CO	=	the total CO level from all sources plus background
VPH_n	=	the hourly traffic volume from the nth source
$EMFAC_n$	=	the hourly emission rate from the nth source
D_n	=	the dispersion factor between the nth source and a given receptor
B	=	the background level

Since VPH changes between rush hour and the rest of the day, and since EMFAC generally decreases as traffic speeds increase during off-peak hours, and since the meteorology that governs D_n also changes from hour to hour, the 8-hour local impact is considerably less than the hourly impact. Even allowing for only nominal changes in meteorology over 8 hours, the emissions reductions alone reduce the 8-hour level to about one-half their hourly level. For purposes of interpreting the hourly CO data and extrapolation to 8 hours, a 50 percent reduction between 1 and 8 hours was assumed. Even 50 percent is probably high, but without any definite data upon which to base a correlation factor, a reasonably conservative (over-predictive) factor was used.

Calculations at each location were carried out first for winds aligned parallel to the most significant emissions source near the five analysis sites and then for winds perpendicular to the major roadway at the transit station and/or parking structure. The parallel winds tend to maximize CO concentration adjacent to the roadway while the perpendicular winds tend to create higher CO concentrations further from the source near potential sensitive receptor sites. Detailed CO patterns around the four stations modeled in this analysis are shown in Figures 4 to 7. It should be noted that the CO concentrations included in the figures are local source emissions only; background concentrations are not included. The maximum hourly and extrapolated 8-hourly CO concentrations at those sites where a significant population exposure may exist are summarized in Table 13. Inspection of this table and the associated figures supports the following conclusions:

Carbon Monoxide Levels at Union Station

(1)——(1) CO CONCENTRATION IN PARTS PER MILLION WINDS PARALLEL TO SANTA ANA FREEWAY (DASHED WHERE INFERRED)

(1)——(1) CO CONCENTRATION IN PARTS PER MILLION WINDS SEMI PERPENDICULAR TO SANTA ANA FREEWAY (DASHED WHERE INFERRED)

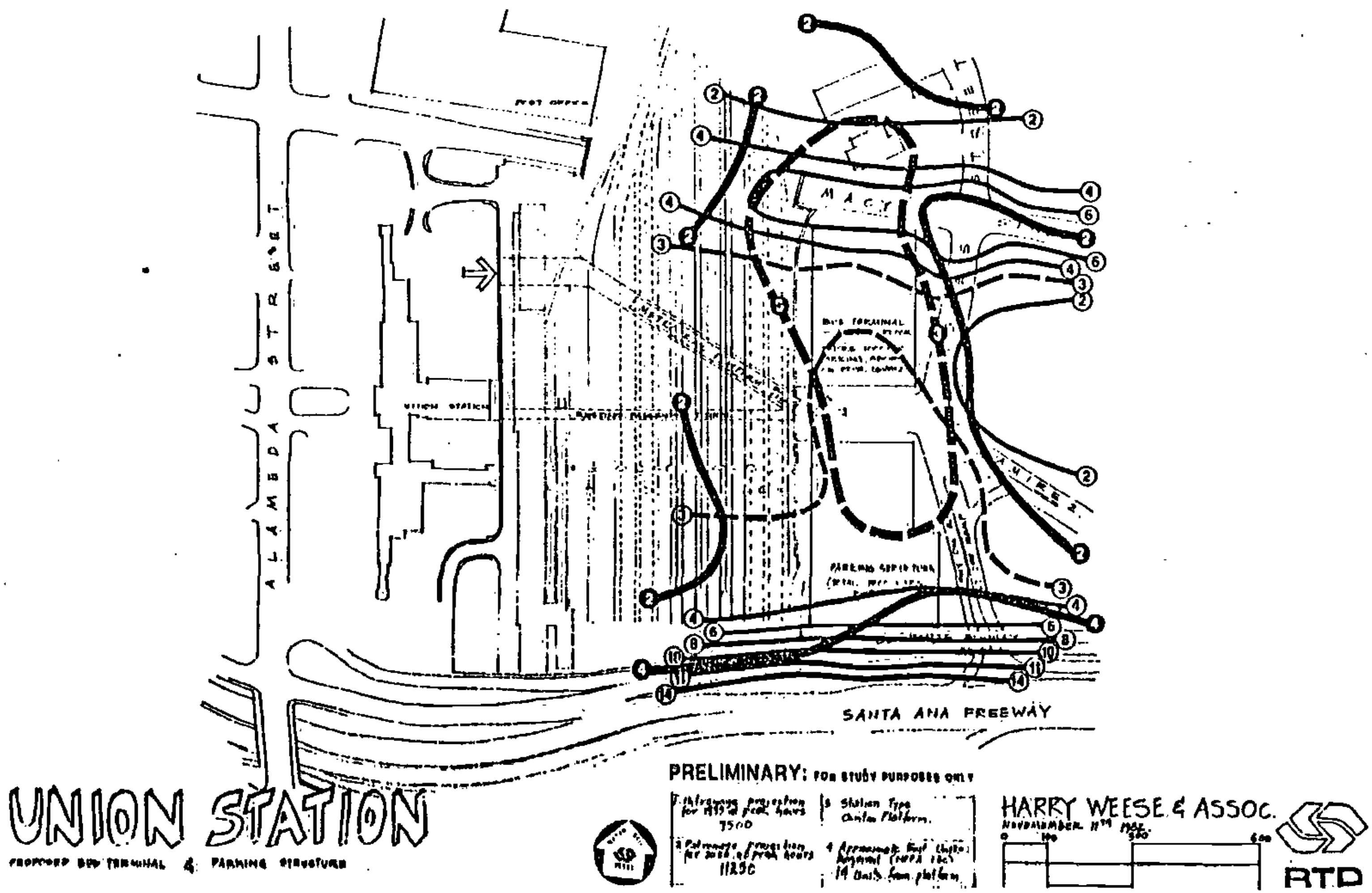


Figure 4

Carbon Monoxide Levels at Fairfax-Wilshire Station

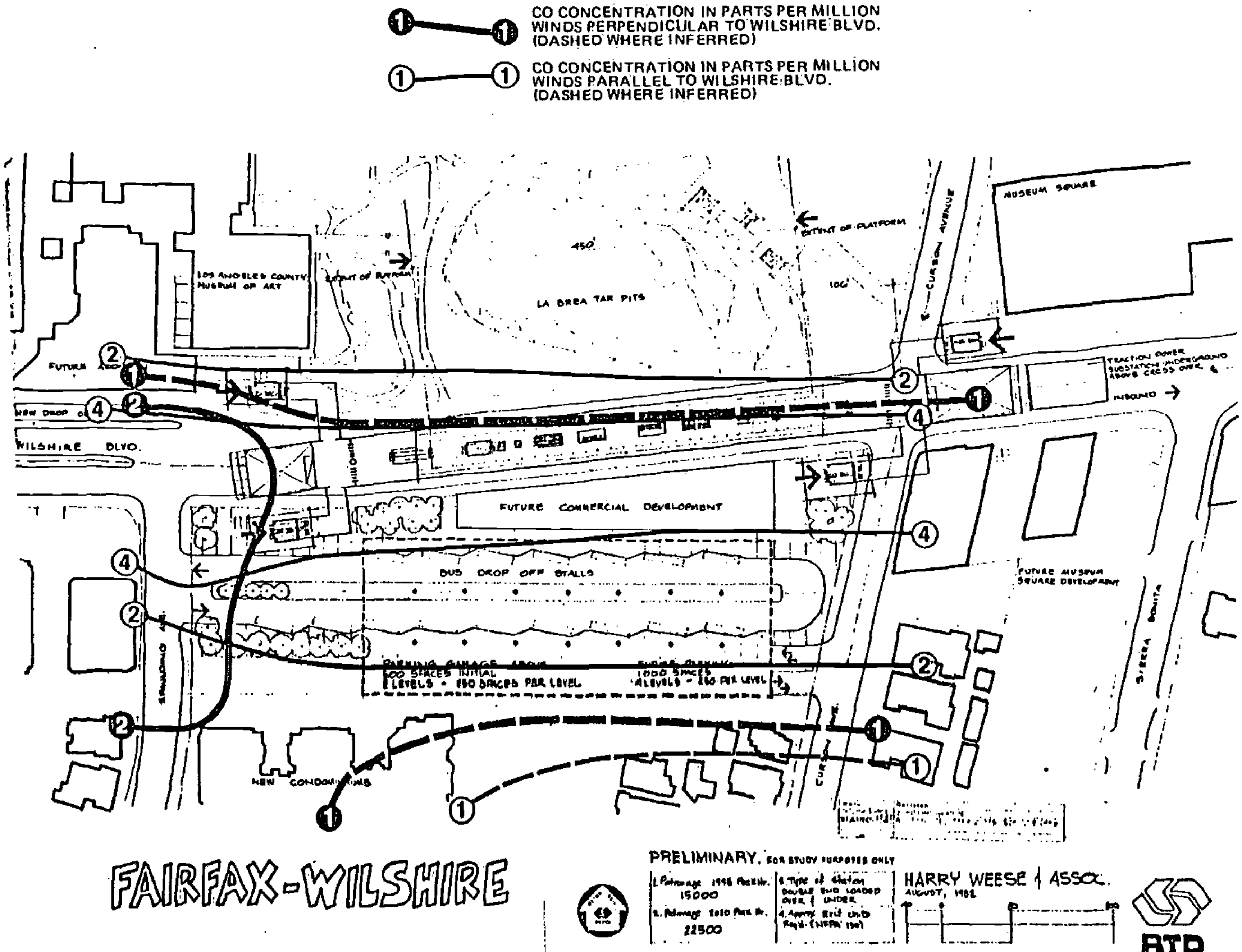


Figure 5

Carbon Monoxide Levels at Beverly-Fairfax Station

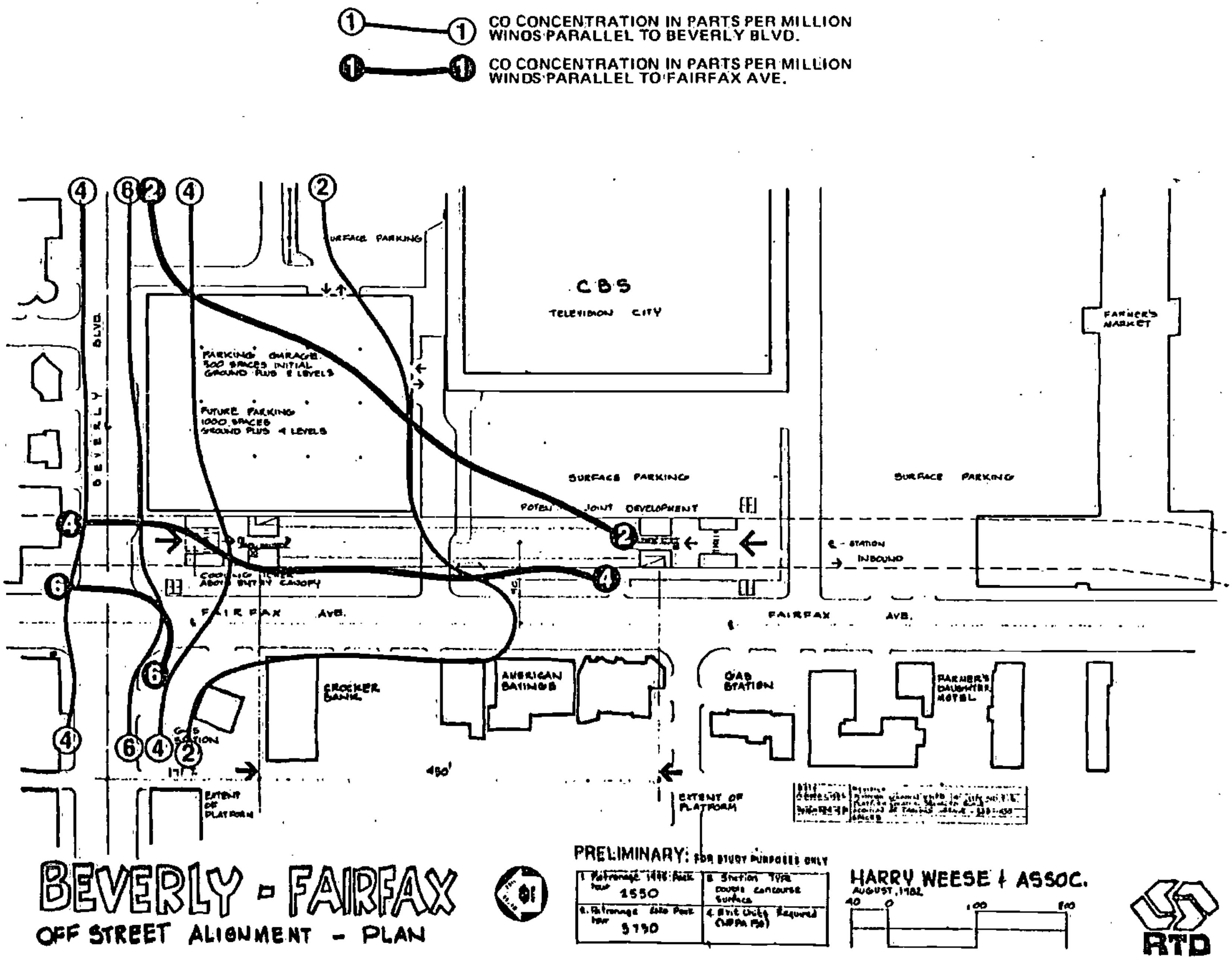


Figure 6

Carbon Monoxide Levels at Universal City Station

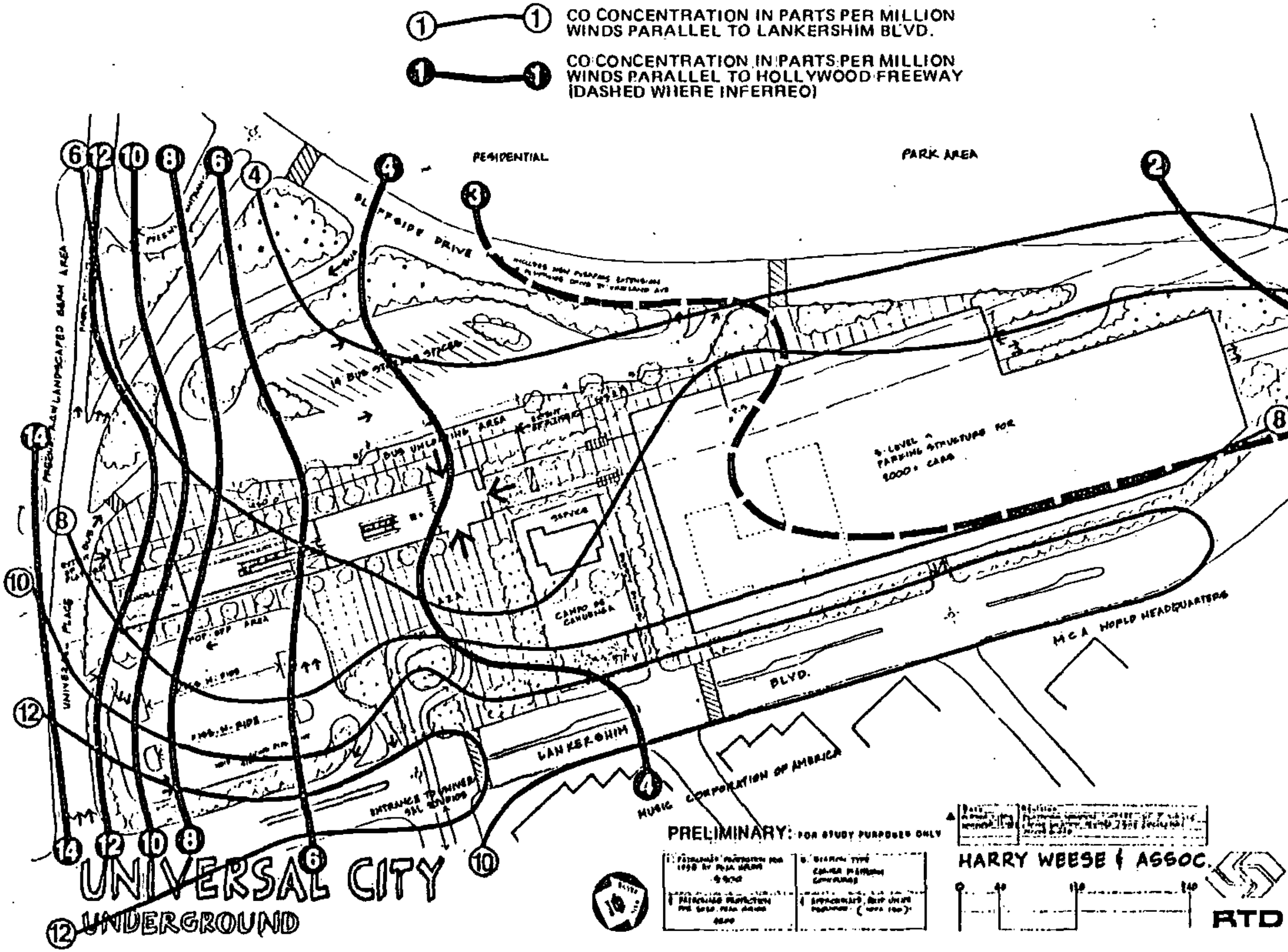


Figure 7

Table 13

CO LEVELS AT POINTS OF INTEREST AROUND FACILITIES IMPACTED BY MRP-RELATED TRAFFIC

Receptor Site	1-Hour Concentration			8-Hour Concentration		
	Local +	Back-ground	= Total	Local	+ Back-ground	= Total
UNION STATION:						
Macy/Vignes Intersection	6.6	14.0	20.6	3.3	9.7	13.0
Metro Rail Entrance	3.4	14.0	17.4	1.7	9.7	11.4
WILSHIRE/ FAIRFAX:						
W. Entry Canopy	4.4	14.0	18.4	2.2	10.0	12.2
Museum Bus Drop-off	4.0	14.0	18.0	2.0	10.0	12.0
Parking Structure Bus Bays	3.8	14.0	17.8	1.9	10.0	11.9
Curson Condos	2.2	14.0	16.2	1.1	10.0	11.1
Tar Pits	1.8	14.0	15.8	0.9	10.0	10.9
Museum Steps	1.8	14.0	15.8	0.9	10.0	10.9
Spaulding Condos	1.2	14.0	15.2	0.6	10.0	10.6
BEVERLY/ FAIRFAX:						
Corner, Beverly/ Fairfax	6.0	14.0	20.0	3.0	10.0	13.0
N. Platform Entry Canopy	3.8	14.0	17.8	1.9	10.0	11.9
CBS TV City	1.6	14.0	15.6	0.8	10.0	10.8
UNIVERSAL CITY:						
Kiss-'n-Ride Lot	10.0	18.7	28.7	5.0	15.0	20.0
Tram Pickup	7.0	18.7	25.7	3.5	15.0	18.5
Campo de Cahuenga	6.0	18.7	24.7	3.0	15.0	18.0
Station Entrance	5.4	18.7	24.1	2.7	15.0	17.7
Bus Unloading Area	4.8	18.7	23.5	2.4	15.0	17.4
Bluffside Residential Area	4.0	18.7	22.7	2.0	15.0	17.0
Weddington Park	4.0	18.7	22.7	2.0	15.0	17.0
LANKERSHIM/ BURBANK INT:						
SW Corner	8.8	18.7	27.5	4.4	15.0	19.4
50' SW on Burbank	7.4	18.7	26.1	3.7	15.0	18.7
50' SE on Lankershim	6.8	18.7	25.5	3.4	15.0	18.4
100' W on Burbank	6.0	18.7	24.7	3.0	15.0	18.0
100' SE on Lankershim	5.2	18.7	23.9	2.6	15.0	17.6

- Microscale CO impacts from MRP-related traffic, in conjunction with baseline traffic levels, are highly localized.

- Violations of the national ambient air quality standards for CO for 8-hour exposures will continue throughout the next several decades with or without the project. Within the Metro Network Area, such violations are due to elevated background levels above the standard and are little affected by project development.

- Local elevations of CO levels above the ambient air quality standards are primarily due to non-project traffic sources such as freeways or non-project traffic on arterials. Project-related sources do little to modify impact patterns above baseline traffic emissions.

Atmospheric Lead Analysis. With the introduction of unleaded gasoline for new cars, atmospheric lead levels have dropped significantly and will continue to do so in the future. Studies by FHWA on lead distributions using the CALINE3 model have shown that there is no satisfactory lead impact assessment methodology but CALINE3 can be marginally used for an order of magnitude estimate. By correlating lead emissions with the CALINE3 CO results and extrapolating the hourly CO values to monthly means to correspond to the lead standard, the following monthly lead levels (above ambient) are predicted at various Metro Rail Project station entrances.

Union Station Metro Rail Entrance	- 0.07	$\mu g/m^3$
Wilshire/Fairfax Station Entrance	- 0.05	$\mu g/m^3$
Beverly/Fairfax Station Entrance	- 0.04	$\mu g/m^3$
Universal City Station Entrance	- 0.06	$\mu g/m^3$

These values represent an order of magnitude estimate and demonstrate the nominal impact of vehicular traffic on local lead distributions.

Because lead impact assessment is difficult to perform and lead levels are rapidly decreasing to healthful levels, some agencies, such as the Federal Highway Administration (FHWA), have concluded that lead analysis is no longer necessary in FHWA documents. An FHWA bulletin of June 29, 1981, signed by Leon H. Larson, Director, FHWA Office of Environmental Policy, states: "...it is concluded that there is no need or justification for requiring microscale lead analyses in future highway environmental impact statements and environmental assessments." This policy is pertinent to the Metro Rail Project since lead impacts are generated by vehicular sources on roadways.

Special Studies Air Quality Analysis

As part of the development and evaluation of the Fairfax Extended and La Brea Bend alternatives, an assessment of CO potential in the Year 2000 at various intersections in the Hollywood area was conducted. The analysis was based on net changes in peak hour and peak 8-hour traffic at selected intersections and included qualitative assumptions concerning existing air quality and expected improvement in automobile CO emissions. The results of this special study are published in Attachment 2 of this study. The information was considered in the Special Analysis Task Force Report entitled, "Preliminary Draft Report, Special Alternatives Analysis Hollywood Area," December 1982.

MITIGATION OPTIONS

The Metro Rail Project neither constitutes a significant air quality benefit nor creates any significant adverse air quality impacts. The project contributes incrementally to local CO concentrations at several intersections by increasing congestion and reducing the intersection LOS. Because CO standards will be exceeded at these locations with or without the project, the project does not of itself create unhealthful air quality. However, because it exacerbates an existing problem, any traffic mitigation measures to improve the LOS at Macy/Vignes, Lankershim/Tour Center and Lankershim/Burbank will generate a corresponding air quality benefit. By preventing the degradation of intersection capacity to LOS "F," any project-induced air quality impacts that presently exceed the 2 ppm significance threshold will be rendered insignificant.

On a subregional basis, the project has proven to be somewhat ineffective in reducing air pollutant emissions from commuter vehicular sources. The principal factor that causes this characteristic is that projected transit-related vehicular travel air pollution savings are completely erased by emissions from power generation needed to run the Metro Rail system. Any success at improving access to the Metro Rail system by modes of travel other than automobiles will improve the project's potential for regional air quality improvement. Also, promoting the use of car-pools and van-pools will have positive air quality results. Several possible means to accomplish these reductions are listed below. The feasibility of implementing these measures requires further study.

- Offer transit fare reductions for car-pools or non-auto access transit users
- Offer parking cost benefits to car-poolers
- Provide secure facilities at stations for bicycle and motorcycle parking
- Improve feeder bus service to the transit stations
- Conduct public information program to promote voluntary trip reductions, publicize feeder line possibilities

AIR QUALITY CONSTRUCTION IMPACTS

Fugitive Dust

Dust generated from construction projects is commonly termed fugitive dust, and is produced by the interaction of construction machinery with earth and by the forces of wind acting on the former. During project construction there is significant potential for fugitive dust generation. Types of activities which will generate fugitive dust include cut-and-cover and open-cut excavations; spoil loading, hauling and disposal; construction of surface facilities such as stations and aerial guideways; and building demolitions. Dust impacts will be most severe at station construction sites which also serve as locations for subway tunnel muck removal.

It is estimated that fugitive dust emissions exceed other particulate matter emissions from stationary sources in many of the areas in the State which exceed the federal particulate standard. Fugitive sources are considered less of a problem, however, because the particle size tends to be larger, allowing a large percentage of the material settle out a short distance from the source (CARB, 1982). However, considerable amounts of fine particles are also emitted and do contribute to the ambient suspended particulate concentrations over much larger areas.

Dust emissions are generally proportional to the volume of earth moved. However, a large portion of emissions result from heavy equipment traffic travelling in and out of construction areas. A reliable emissions factor for particulate dust generation from construction operations similar to Metro Rail has not been developed.

Station construction sites involving excavation from the surface have a high potential for fugitive dust emissions. A typical station will result in about 112,000 cubic yards of excavation. Station locations will also be points of removal of tunnel muck which will add another approximately 50,000 cubic yards to the excavation. Construction durations of a year or more will protract the period over which dust generation will be apparent to surrounding land uses. Cut-and-cover techniques as opposed to open cut will have a mitigating effect on fugitive dust, since the construction site exposure to wind will be minimized.

The type of material excavated has an effect on the quantity of fugitive dust generated. Fine-grained silts and sands tend to become airborne more easily and remain entrained longer than do larger-grained sands and sandy gravels. Of the materials to be encountered along the project corridor, the Young Alluvium (fine-grained) and the Fernando and Puente Formations have a slightly higher potential for generation of fine particulates (if in the case of the Young Alluvium, it is allowed to dry out) than do coarser Young and Old Alluvium. The difference, however, is probably not significant and is not quantifiable in any event.

Tunnel spoil removal will occur at two locations other than proposed station sites, thus fugitive dust will affect the immediately surrounding land uses. These areas include the portal location in North Hollywood near Fredonnia Drive and Regal Place, and a fan shaft vent at Wilshire and Windsor.

Another source of fugitive dust emissions comes from building demolition. Again, reliable emissions factors for particulate generation have not been established by air pollution control agencies. Dust generation, however, will vary dramatically from building to building as a function of size, materials of construction, and whether mechanical or blasting methods are used. It is assumed that station locations are where the bulk of the demolitions will occur for the LPA. Such demolitions are needed to make way for appurtenant facilities including parking, ancillary equipment, feeder bus bays and station access structures. Along the MCA aerial segment, fee takes will be required for right-of-way acquisition especially near the portal location in the North Hollywood Hills.

In summary, fugitive dust emissions will be generated from construction activities, principally earth excavation and handling. Land uses immediately surrounding construction sites are expected to receive impact from nuisance dust for the duration of construction activities. The impact includes dust particles settling out on surrounding properties and the inhalation by pedestrians and other inhabitants of the area of increased quantities of generally inert silicates.

Fugitive Dust Impact Mitigation

South Coast Air Quality Management District Rules and Regulations are applicable to the proposed project and will govern construction operations for Metro Rail. Rule 402 essentially states that no person shall discharge air contaminants which endanger the health and welfare of the public or create an annoyance or nuisance. Rule 403 gives specific criteria for limitations on fugitive dust emissions. Key provisions of Rule 403 applicable to the project are as follows:

- A person shall not cause or allow the emission of fugitive dust from any transport, handling, construction or storage activity so that the presence of such dust remains visible in the atmosphere beyond the property line of the emission source. (Does not apply to emissions emanating from unpaved roadways open to public travel or farm roads. This exclusion shall not apply to industrial or commercial facilities.)

- A person shall take every reasonable precaution to minimize fugitive dust emissions from wrecking, excavation, grading, clearing of land and solid waste disposal operations.

- A person shall not cause or allow particulate matter to exceed 100 micrograms per cubic meter when determined as the difference between upwind and downwind samples collected on high volume samplers at the property line for a minimum of 5 hours.

- A person shall take every reasonable precaution to prevent visible particulate matter from being deposited upon public roadways as a direct result of their operations. Reasonable precautions shall include, but are not limited to, the removal of particulate matter from equipment prior to movement on paved streets or the prompt removal of any material from paved streets onto which such material has been deposited.

By way of mitigation, site watering is most commonly utilized to suppress dust because it is effective if done frequently and water is generally available at construction sites. Site watering can achieve up to a 50 percent reduction in construction site dust emissions. Watering should be done particularly for materials handling associated with spoil removal and disposal.

Responsibility for mitigation of dust impacts identified above rests with the construction contractor through adherance to provisions of project construction specifications. The South Coast Air Quality Management District has enforcement responsibilities with respect to fugitive dust impact.

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ATTACHMENT 1

ARTERIAL IMPACT ANALYSIS
CO SCREENING PROCEDURES

ARTERIAL IMPACT ANALYSIS - CO-SCREENING PROCEDURES

Key: DOT = Direction of Travel

With Project
AM VOL(LOS) = a.m. peak hourly volume on inbound leg with a.m. peak level of service - with Metro Rail, Year 2000

No Project
AM VOL(LOS) = same as above without Metro Rail, Year 2000

1980 Traffic
AM VOL(LOS) = same as above, existing traffic levels, Year 2000

VPH*EMFAC = emissions density in 1000s of grams/mile/hour

ΔP(P-NP) = emissions density change, project versus no-project. A ΔP of +25 may increase hourly CO levels adjacent to the roadway by 2 ppm, 8-hour levels by 1 ppm

ΔP(P-1980) = same as above, future with project versus existing conditions

Table 1-1

ARTERIAL IMPACT, UNION STATION, DATA INPUT

Inbound Leg	Dot	Cross-Street	With Project AM VOL (LOS)		No Project AM VOL (LOS)		1980 Traffic AM VOL (LOS)	
Alameda	N	Macy	660	(E)	600	(D)	500	(C)
Alameda	S	Macy	1,750	(E)	1,590	(D)	1,310	(C)
Macy	W	Mission	1,290	(E)	1,290	(D)	970	(D)
Macy	W	Vignes	2,530	(F)	2,100	(E)	1,920	(D)
Macy	W	Alameda	1,770	(E)	1,670	(D)	1,450	(C)
Macy	W	Main	1,480	(X)	1,530	(A)	1,290	(A)
Macy	E	Alameda	910	(E)	820	(D)	970	(C)
Macy	E	Vignes	840	(F)	600	(E)	520	(D)
Macy	E	Mission	630	(E)	610	(D)	530	(D)
Vignes	S	Macy	750	(F)	490	(E)	430	(D)
Vignes	N	Macy	650	(F)	480	(E)	400	(D)
Mission	S	Macy	1,820	(E)	1,560	(D)	1,410	(D)

Table 1-2

ARTERIAL IMPACT, UNION STATION, RESULTS

Inbound Leg	Dot	Cross-Street	VPH*EMFAC	Δ(P-NP)	Δ(P-1980)
Alameda	N	Macy	17.1	+4	0
Alameda	S	Macy	45.3	+12	+1
Macy	W	Mission	33.4	+6	-6
Macy	W	Vignes	91.5	+37	+15
Macy	W	Alameda	45.8	+10	-3
Macy	W	Main	19.4	-1	-13
Macy	E	Alameda	23.5	+6	-9
Macy	E	Vignes	30.4	+14	+9
Macy	E	Mission	16.3	+3	-5
Vignes	S	Macy	27.1	+14	+10
Vignes	N	Macy	23.5	+11	+7
Mission	S	Macy	47.1	+14	-9

Table 1-3

ARTERIAL IMPACT, BEVERLY/FAIRFAX, DATA INPUT

Inbound Leg	Dot	Cross-Street	With Project AM VOL (LOS)		No Project AM VOL (LOS)		1980 Traffic AM VOL (LOS)	
Fairfax	N	3rd	1,240	(F)	1,340	(F)	930	(E)
Fairfax	N	Beverly	1,100	(E)	1,170	(E)	930	(D)
Fairfax	N	Melrose	750	(D)	780	(D)	530	(B)
Fairfax	S	Melrose	1,350	(D)	1,410	(D)	1,010	(B)
Fairfax	S	3rd	1,280	(F)	1,300	(F)	910	(E)
Beverly	W	Gardner	1,600	(D)	1,690	(C)	1,230	(A)
Beverly	W	Fairfax	1,780	(E)	1,610	(E)	1,220	(D)
Beverly	E	Crescent Hts	1,580	(D)	1,570	(E)	1,220	(D)
Beverly	E	Crescent Hts	1,450	(D)	1,420	(E)	1,100	(D)
Beverly	E	Fairfax	1,510	(E)	1,480	(E)	1,150	(D)
Beverly	E	Gardner	1,490	(D)	1,410	(C)	1,070	(A)
Crescent Hts	N	Beverly	530	(D)	620	(E)	400	(D)
Crescent Hts	S	Beverly	1,420	(D)	1,510	(E)	1,090	(D)
Crescent Hts	S	3rd	1,310	(X)	1,400	(E)	990	(C)
Melrose	E	Fairfax	1,020	(D)	1,030	(D)	800	(B)
Melrose	W	Fairfax	1,400	(D)	1,390	(D)	1,050	(B)
3rd	W	Fairfax	1,460	(F)	1,490	(D)	1,080	(E)
3rd	W	Crescent Hts	1,220	(X)	1,220	(E)	910	(C)
3rd	E	Fairfax	1,210	(F)	1,210	(F)	900	(E)
3rd	E	Gardner	1,220	(X)	1,240	(D)	900	(A)

Table 1-4

ARTERIAL IMPACT, BEVERLY/FAIRFAX, RESULTS

Inbound Leg	Dot	Cross-Street	VPH*EMFAC	Δ(P-NP)	Δ(P-1980)
Fairfax	N	3rd	44.8	-4	-2
Fairfax	N	Beverly	28.5	-2	-9
Fairfax	N	Melrose	15.7	-1	0
Fairfax	S	Melrose	28.3	-2	-1
Fairfax	S	Beverly	37.3	+1	-3
Fairfax	S	3rd	46.3	-1	+1
Beverly	W	Gardner	33.5	+3	+3
Beverly	W	Fairfax	46.1	+4	-3
Beverly	W	Crescent Hts	33.1	-8	-16
Beverly	E	Crescent Hts	30.4	-7	-14
Beverly	E	Fairfax	39.1	0	-7
Beverly	E	Gardner	31.2	+6	+5
Crescent Hts	N	Beverly	11.1	-5	-5
Crescent Hts	S	Beverly	29.7	-10	-14
Crescent Hts	S	3rd	27.4	-9	-6
Melrose	E	Fairfax	21.3	-1	-2
Melrose	W	Fairfax	29.3	0	-1
3rd	W	Fairfax	52.8	-2	-1
3rd	W	Crescent Hts	31.6	0	+1
3rd	E	Fairfax	43.8	0	+1
3rd	E	Gardner	25.5	-1	+3

Table 1-5

ARTERIAL IMPACT, FAIRFAX/WILSHIRE, DATA INPUT

Inbound Leg	Dot	Cross-Street	With Project AM VOL (LOS)		No Project AM VOL (LOS)		1980 Traffic AM VOL (LOS)	
Wilshire	W	Hauser	1,320	(C)	1,400	(D)	940	(A)
Wilshire	W	Fairfax	1,450	(D)	1,430	(D)	1,000	(A)
Wilshire	W	Crescent Hts	1,330	(E)	1,310	(F)	1,000	(C)
Wilshire	E	Crescent Hts	1,300	(E)	1,230	(F)	880	(C)
Wilshire	E	Fairfax	1,300	(D)	1,230	(D)	800	(A)
Wilshire	E	Hauser	1,420	(C)	1,250	(D)	900	(A)
Hauser	N	Wilshire	630	(C)	540	(D)	330	(A)
Hauser	S	Olympic	500	(F)	570	(F)	360	(D)
San Vicente	NW	Olympic	1,850	(E)	1,880	(E)	1,340	(B)
San Vicente	SE	Fairfax	1,890	(F)	1,900	(E)	860	(C)
Olympic	W	San Vicente	1,850	(E)	1,850	(E)	1,300	(B)
Olympic	E	Fairfax	2,090	(F)	XXXX	(F)	1,450	(C)
Olympic	E	Hauser	2,640	(X)	2,580	(F)	1,820	(D)
Fairfax	N	Olympic	1,670	(F)	1,520	(F)	1,130	(C)
Fairfax	N	Wilshire	1,450	(D)	1,370	(D)	930	(A)
Fairfax	N	6th	1,010	(C)	1,120	(D)	770	(A)
Fairfax	S	6th	1,120	(C)	1,210	(D)	840	(A)
Fairfax	S	Wilshire	1,110	(D)	1,200	(D)	830	(A)
Fairfax	S	San Vicente	1,180	(F)	1,220	(E)	830	(C)
Crescent Hts	N	Wilshire	680	(E)	780	(F)	500	(C)
Crescent Hts	N	6th	680	(X)	760	(X)	500	(X)
Crescent Hts	S	Wilshire	1,490	(E)	1,590	(F)	1,120	(C)
6th	W	Fairfax	1,120	(C)	1,150	(D)	830	(A)
6th	W	Crescent Hts	960	(X)	970	(X)	720	(X)
6th	E	Fairfax	770	(C)	770	(D)	580	(A)

Table 1-6

ARTERIAL IMPACT, FAIRFAX/WILSHIRE, RESULTS

Inbound Leg	Dot	Cross-Street	VPH*EMFAC	Δ(P-NP)	Δ(P-1980)
Wilshire	W	Hauser	23.3	-7	0
Wilshire	W	Fairfax	30.4	0	+5
Wilshire	W	Crescent Hts	34.4	-13	+1
Wilshire	E	Crescent Hts	33.6	-11	+4
Wilshire	E	Fairfax	27.2	+1	+5
Wilshire	E	Hauser	25.0	-2	+3
Hauser	N	Wilshire	11.0	-1	+3
Hauser	S	Olympic	18.1	-3	+3
San Vicente	NW	Olympic	38.7	-1	0
San Vicente	SE	Fairfax	68.4	+19	+39
Olympic	W	San Vicente	47.9	0	+11
Olympic	E	Fairfax	75.6	+18	+27
Olympic	E	Hauser	95.5	+2	+23
Fairfax	N	Olympic	60.4	+5	+22
Fairfax	N	Wilshire	30.4	+1	+7
Fairfax	N	6th	17.8	-6	-5
Fairfax	S	6th	19.7	-6	-1
Fairfax	S	Wilshire	23.2	-2	+2
Fairfax	S	San Vicente	42.7	+11	+15
Crescent Hts	N	Wilshire	17.6	-11	+1
Crescent Hts	N	6th	12.0	-2	-5
Crescent Hts	S	Wilshire	38.6	-19	+1
6th	W	Fairfax	19.7	-5	-1
6th	W	Crescent Hts	20.1	-1	-4
6th	E	Fairfax	13.6	-3	-1

Table 1-7

ARTERIAL IMPACT, UNIVERSAL CITY, DATA INPUT

Inbound Leg	Dot	Cross-Street	With Project AM VOL (LOS)		No Project AM VOL (LOS)		1980 Traffic AM VOL (LOS)	
Lankershim	N	Freeway Off-Ramps	820	(E)	740	(D)	500	(C)
Lankershim	N	Tour Center Drive	1,700	(F)	1,660	(E)	XXX	(A)
Lankershim	N	Cahuenga	1,070	(E)	1,090	(D)	800	(A)
Lankershim	S	Cahuenga	1,640	(E)	1,580	(D)	900	(A)
Lankershim	S	Tour Center Drive	2,630	(F)	2,440	(E)	1,400	(A)
Lankershim	S	Ventura	1,510	(D)	1,570	(E)	1,400	(E)
Ventura	E	Vineland	1,740	(D)	1,590	(D)	1,350	(B)
Ventura	E	Lankershim	1,960	(D)	1,990	(E)	1,680	(E)
Ventura	W	Lankershim	660	(D)	640	(E)	440	(E)
Ventura	W	Vineland	500	(D)	540	(D)	460	(B)
Cahuenga	S	Lankershim	1,250	(E)	1,000	(D)	650	(A)
Vineland	N	Moorpark	870	(D)	890	(D)	750	(C)
Moorpark	E	Vineland	1,090	(D)	1,070	(D)	930	(C)
Vineland	S	Moorpark	1,000	(D)	1,050	(D)	870	(C)
Vineland	S	Ventura	1,060	(D)	890	(D)	830	(B)

Table 1-8

ARTERIAL IMPACT, UNIVERSAL CITY, RESULTS

Inbound Leg	Dot	Cross-Street	VPH*EMFAC	Δ(P-NP)	Δ(P-1980)
Lankershim	N	Freeway Off-Ramps	21.2	+6	+5
Lankershim	N	Tour Center Drive	61.5	+19	+32
Lankershim	N	Cahuenga	27.7	+5	+8
Lankershim	S	Cahuenga	42.5	+9	+20
Lankershim	S	Tour Center Drive	95.2	+32	+61
Lankershim	S	Ventura	31.6	-10	-38
Ventura	E	Vineland	36.4	+3	-2
Ventura	E	Lankershim	41.1	-11	-43
Ventura	W	Lankershim	13.8	-3	-9
Ventura	W	Vineland	10.4	-1	-3
Cahuenga	S	Lankershim	32.3	+11	+16
Vineland	N	Moorpark	18.2	-1	-7
Moorpark	E	Vineland	22.8	0	-8
Vineland	S	Moorpark	20.9	-2	-8
Vineland	S	Ventura	22.2	+3	-2

Table 1-9

ARTERIAL IMPACT, NORTH HOLLYWOOD, DATA INPUT

Inbound Leg	Dot	Cross-Street	With Project AM VOL (LOS)		No Project AM VOL (LOS)		1980 Traffic AM VOL (LOS)	
Lankershim	N	Magnolia	830	(B)	890	(B)	670	(A)
Lankershim	N	Chandler	960	(C)	970	(B)	650	(A)
Lankershim	N	Burbank	1,010	(F)	790	(D)	630	(B)
Lankershim	S	Burbank	1,350	(F)	1,070	(D)	820	(B)
Lankershim	S	Chandler	1,030	(C)	860	(B)	630	(A)
Lankershim	S	Magnolia	930	(B)	980	(B)	650	(A)
Magnolia	W	Lankershim	960	(B)	890	(B)	560	(A)
Magnolia	W	Tujunga	710	(X)	660	(B)	520	(A)
Magnolia	E	Lankershim	900	(B)	940	(B)	580	(A)
Magnolia	E	Vineland	740	(X)	780	(A)	450	(B)
Tujunga	N	Chandler	430	(A)	370	(A)	280	(A)
Tujunga	N	Burbank	40	(F)	70	(D)	40	(B)
Tujunga	S	Chandler	1,120	(E)	560	(A)	450	(A)
Tujunga	S	Magnolia	570	(X)	630	(A)	520	(B)
Chandler	E	Tujunga	1,060	(A)	840	(A)	630	(A)
Chandler	E	Lankershim	640	(C)	470	(B)	290	(A)
Chandler	E	Vineland	590	(A)	340	(A)	200	(A)
Chandler	W	Lankershim	360	(C)	210	(B)	90	(A)
Burbank	E	Lankershim	1,660	(F)	1,450	(D)	1,230	(B)
Burbank	E	Vineland	1,200	(X)	1,240	(C)	1,030	(C)
Burbank	W	Lankershim	1,270	(F)	1,070	(D)	880	(B)
Vineland	N	Chandler	820	(A)	850	(A)	XXX	(A)
Vineland	N	Burbank	640	(X)	610	(C)	470	(C)
Vineland	S	Chandler	1,210	(A)	1,190	(A)	940	(A)
Vineland	S	Magnolia	1,050	(X)	1,090	(B)	760	(A)

Table 1-10

ARTERIAL IMPACT, NORTH HOLLYWOOD, RESULTS

Inbound Leg	Dot	Cross-Street	VPH*EMFAC	Δ(P-NP)	Δ(P-1980)
Lankershim	N	Magnolia	12.5	-1	-4
Lankershim	N	Chandler	17.0	+2	+1
Lankershim	N	Burbank	36.6	+20	+19
Lankershim	S	Burbank	48.9	+26	+26
Lankershim	S	Chandler	18.2	+5	+3
Lankershim	S	Magnolia	14.0	-1	-2
Magnolia	W	Lankershim	14.5	+1	+1
Magnolia	W	Tujunga	12.5	+3	0
Magnolia	E	Lankershim	13.6	-1	-1
Magnolia	E	Vineland	9.7	-1	-3
Tujunga	N	Chandler	5.6	+1	+1
Tujunga	N	Burbank	1.5	0	0
Tujunga	S	Chandler	29.0	+22	+18
Tujunga	S	Magnolia	7.5	-1	-7
Chandler	E	Tujunga	13.9	+3	+2
Chandler	E	Lankershim	11.3	+4	+4
Chandler	E	Vineland	7.7	+3	+3
Chandler	W	Lankershim	6.4	+3	+4
Burbank	E	Lankershim	60.1	+30	+25
Burbank	E	Vineland	21.2	-1	-13
Burbank	W	Lankershim	46.0	+24	+21
Vineland	N	Chandler	10.8	0	+1
Vineland	N	Burbank	11.3	+1	-4
Vineland	S	Chandler	15.9	0	-7
Vineland	S	Magnolia	15.8	+1	+3

ATTACHMENT 2

SPECIAL STUDIES AIR
QUALITY ANALYSIS

SUMMARY OF BACKGROUND ANALYSIS FOR HOLLYWOOD GOAL 2, OBJECTIVE 8 -- MAINTAIN OR IMPROVE AIR QUALITY

I. MEASURE

The measures of air quality impact for the parametric analysis, developed by the Special Analysis Task Force with public input through community meetings, are as follows:

a) Difference in CO (carbon monoxide) levels at selected locations in proximity of stations measured in particles per million (ppm), based on changes in automobile VMT, determined for peak hour and peak 8-hour periods.

b) Differences in THC, NO_x and CO for the Caltrans 5 KM GRIDS in Hollywood.

The measures approximate the levels of analysis to be provided in the Metro Rail EIS/EIR for all alternatives, however, a significant simulation modeling effort is involved. Inasmuch as some significant traffic data inputs are still not available, these models cannot be used for the parametric analysis.

Instead, a more qualitative methodology has been used which considers some very basic relationships between traffic generation and air emissions. The overall purpose of the analysis is to depict the project's impact on overall air quality in the Hollywood area, and to assess the potential for development of carbon monoxide hot spots at Hollywood station locations. The revised impact measures for Hollywood Goal 2, Objective 8 are as follows:

a) Assessment of carbon monoxide (CO) hot spot potential for Year 2000 at various sites in the Hollywood area based on net changes in peak hour and peak 8-hour traffic at adjacent intersections and including qualitative assumptions concerning existing air quality and expected improvement in automobile emissions.

b) Qualitative assessment of the effect on overall emissions in the Hollywood area due to VMT reduction.

II. ALTERNATIVES

The comparative analysis of air quality impact of alternatives is provided on the Alternative table. Section V further explains the analysis results.

III. ASSUMPTIONS

a) Existing Carbon Monoxide Air Quality (local)

Over 75 percent of CO emissions in South Coast Air Basin (SOCAB) derive from motor vehicles, which favors the buildup of CO concentrations in the vicinity of areas of dense vehicular traffic. CO levels tend to be highest in winter and during night and early morning hours, because the concentration of CO emissions is favored by the high incidence of surface inversions during these periods.

Achieving the National Ambient Air Quality Standards is predicated upon meeting a federal 1-hour standard of 35 parts per million (ppm) and a federal 8-hour standard of 9 ppm. It is believed that the 8-hour standard requires the most CO emissions reduction to achieve the standard. For the years 1978, 1979 and 1980, no air basin monitoring station recorded a violation of the 1-hour standard, although the 8-hour standard was exceeded frequently.

During 1978, the South Coast Air Quality Management District monitored CO concentrations at some of the busiest intersections in Los Angeles. One of these intersections was Highland and Franklin Avenues in Hollywood. The total volume of contributing traffic was 83,000 ADT. Peak hour concentrations reached 20 ppm, but the average of maximum 1-hour concentrations was about 10 ppm. While the 1-hour standard was not exceeded, the data showed several 8-hour standard exceedances.

The extent to which these existing conditions will project to the future is a function of changes in local traffic levels and changes in automobile engine emissions characteristics. A forecast of emissions for the AQMP baseline scenario has been made for the years 1987 and 2000 (SCAQMD). The on-road motor vehicle CO emissions in Los Angeles County are expected to decrease significantly (33 percent) from 1979 to 1987, and then decrease more slowly (15 percent) from 1987 to 2000.

Net changes in traffic at selected intersections due to the project is shown in Table 1 for each alternative.

Table 1

NET CHANGES IN TRAFFIC DUE TO PROJECT
(Year 2000 with vs. without)[1]

Intersection At Or Near Station	A 1-Hour	A 8-Hour	B1 1-Hour	B1 8-Hour	B2 1-Hour	B2 8-Hour	C1/C2 1-Hour	C1/C2 8-Hour
Fairfax/ Santa Monica	60	-580	365	1465	530	2140	60	-370
La Brea/ Santa Monica	180	-365	-60	-945	-10	-880	175	-205
La Brea/ Sunset	670	1790	25	-545	90	-340	1275	4070
Highland/ Sunset	35	-2000	-15	-1190	35	-1090	510	300
Cahuenga/ Sunset	80	-935	20	-465	85	-265	510	875
Cahuenga/ Hollywood	870	3005	40	-840	5	-805	345	515
Gower/ Sunset	95	-670	-95	-1075	-15	-555	150	-395

[1] Traffic growth on local streets between 1980 and 2000 without project is generally expected to range from 20 to 30 percent (based on ADT).

Source: PBQ and D, October 20, 1982

With Alternative A the most substantial increases in traffic volumes as generated by station patrons would occur at Sunset/La Brea and Hollywood/Cahuenga. With Alternatives B1 and B2, increases would be concentrated at the Fairfax/Santa Monica intersection. Alternative C traffic increase would be greatest at Sunset/La Brea as well as at several major intersections to the east of Sunset.

The traffic study also evaluated specific intersections in the Hollywood area for congestion potential. The data shows that a high level of traffic congestion will exist in the Hollywood area for all of the alternatives. It is important to note, however, that the projected congestion is a result of anticipated increases in background traffic, not Metro Rail traffic.

Despite the high growth in traffic during the study period of 20 to 30 percent, improvements in Countywide automobile emissions of almost 50 percent are projected to result in reduced CO emissions in future years (carbon monoxide analysis for the 1982 AQMP Revision South Coast Air Basin (SCAQMD)). It is assumed that peak period levels of CO would be similarly reduced. The simple analysis leads to the conclusion that CO air quality levels will improve in the future.

More specifically, there should be no exceedances of the federal 1-hour CO standard due to implementation of any Hollywood alternatives (based on the SCAQMD monitoring at Highland and Franklin). It is probable that the 8-hour standard will be exceeded, however, the number of exceedances in the future should be reduced over the present level. It is noted that there has been some discussion concerning a relaxation of the 8-hour CO standard to allow five exceedances per year before the standard has been violated. For purposes of the analysis, therefore, the amount of improvement in air quality is relative to the expected reduction in local traffic.

2. Regional Emissions Estimate

Regional emissions in the Hollywood area are tied to the changes in vehicle miles travelled (VMT) as a result of the implementation of rapid transit alternatives. All Hollywood alternatives will result in reduced VMT on a daily basis, and will also result in substantially shorter transit-related automobile trips. Emissions are assumed to reduce as VMT is reduced. However, the reduction is far from proportional; there are a number of complicating variables such as vehicle fleet mix, hot start/cold start assumptions, average traffic speed, trip length and transportation system congestion which interact to negate a proportionality between emissions and VMT. Qualitatively, however, the most air quality improvement can be expected from those alternatives which have the greatest ability to reduce auto travel.

IV. SUMMARY OF ANALYTICAL METHOD

The analysis method is largely qualitative. It is based on general assumptions concerning automobile/air pollution relationships and considers air quality trends in the South Coast Air Basin.

V. RESULTS

Traffic data produced for the Hollywood alternatives indicates that the various alternatives will have the following traffic reduction/increase characteristics.

Table 2

SUMMARY OF TRAFFIC CHARACTERISTICS
HOLLYWOOD ALTERNATIVES

Characteristics	A	B1	B2	C1/C2
Maximum Peak Hour Traffic Increase by Alternative (vehicles)	870	365	530	1,275
Maximum 8-Hour Traffic Increase by Alternative (vehicles)	3,005	1,465	2,140	4,070
VMT reduction Year 2000 (peak 8-hour period)	60,590	31,370	23,590	43,540

Source: Table 1.
PBQ and D, October 20, 1982.

Alternative B1 results in the lowest peak hour and peak 8-hour traffic increase at any specific intersection within the Hollywood area. No distinction is made between specific intersections since all Hollywood intersections now have and in the future will have capacities reflecting highly congested conditions. Alternative B2 has only slightly higher levels of traffic than does Alternative B1. Alternative A is moderate in its level of peak hour and 8-hour traffic increase, while Alternatives C1 and C2 would result in the highest increase in traffic on a site-specific basis. From this traffic data it is assumed that Alternative B1 contributes least to the future exceedance of the 8-hour CO standard, followed by Alternatives B2, A and C1/C2. Once again it is emphasized that traffic growth in Hollywood is attributable to population and employment factors and not the Metro Rail project.

Alternative A has the greatest potential to reduce VMT in the Hollywood regional area, followed by Alternatives C1 and C2, B1 and B2. This is nearly opposite the results of the local traffic analysis. Because of the variable proportionality between VMT reduction and emissions reduction, a ranking of Hollywood alternatives should be based more on local traffic conditions than VMT.

It is pointed out that air quality levels, both local and regional, generally are expected to improve in the future. Implementation of rapid transit is one of the basic parameters underlying this assumption.

VI. LEVEL OF CONFIDENCE/RANGE OF UNCERTAINTY

Study results have been based on published reports on air quality trends and broad based assumptions of vehicle emission relationships. This material has a confidence level of about 70 percent.

HOLLYWOOD

GOAL/ OBJECTIVE

2

NUMBER: 8

DESCRIPTION:

Maintain or improve air quality.

A	B1	B2	C1	C2	
CAHUENGA BEND/ NO AUXILLARY RAILSYSTEM	FAIRFAX DIRECT/ ICTS IN AERIAL	FAIRFAX DIRECT/ LRT ON GRADE	LA BREA BEND/ ICTS IN AERIAL	LA BREA BEND/ LRT ON GRADE	
1) Contributes only moderately towards attainment of 8-hour CO standard at local sites. 2) Achieves greatest improvement in air pollution emissions in greater Hollywood area.	1) Contributes most toward attainment of 8-hour CO standard at local sites. 2) Achieves relatively low level of improvement in air pollution emissions in greater Hollywood area.	1) Contributes much toward attainment of 8-hour CO standard at local sites (although less than Alternative B1). 2) Achieves smallest improvement in air pollution emissions in greater Hollywood area.	1) Contributes least toward attainment of 8-hour CO standard at local sites. 2) Achieves moderate improvement in air pollution emissions in greater Hollywood area.	No distinction is made between Alternatives C1 and C2, thus, refer to C1.	

EVALUATION

MEASURES:

1) Assessment of carbon monoxide (CO) hot spot potential for Year 2000 at various sites in the Hollywood area based on net changes in peak hour and peak 8-hour traffic at adjacent intersections and including qualitative assumptions concerning existing air quality and expected improvement in automobile CO emissions.

2) Assessment of the effect on overall automobile emissions in Hollywood area due to VMT reduction.

EXPLANATION

OF ANALYSIS PROCEDURE

"SEE ATTACHED SHEETS"