



**LOS ANGELES COUNTY  
METROPOLITAN  
TRANSPORTATION AUTHORITY**

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**TDM PHASE II PROGRAM  
PART I  
EXECUTIVE SUMMARY**

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**FEBRUARY 28, 1994**

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## **TRANSPORTATION DEMAND MANAGEMENT PROGRAM-PHASE II**

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## PREFACE

Transportation Demand Management (TDM) has become an accepted practice in transportation planning. The objective of TDM is to manage the use of existing transportation facilities, in contrast to constructing additional facilities in order to meet the demand on the transportation system. With travel demand far exceeding the transportation system capacity, it has become clear to transportation planners that cities and counties cannot merely build their way out of transportation problems. Through discouraging additional vehicles and trips, TDM also helps in reducing emissions from mobile sources and, hence, improves air quality.

TDM is practiced through a number of policies collectively referred to as Transportation Control Measures (TCM). TCMs include efforts to encourage ride sharing, telecommuting, and use of transit. Conventional wisdom suggests that there is plenty of variation amongst the TCMs with respect to their effectiveness in managing the demand for transportation facilities. Simultaneously, TCMs also differ in the impacts they have on lowering emissions from mobile sources. Finally, TCMs also differ with respect to the costs of implementation. The TDM program described in this Executive Summary is an innovative and groundbreaking exercise to understand the mobility, air quality and cost impacts of TCMs proposed in the 1991 Air Quality Management Plan (AQMP) for the South Coast Air Basin (SCAB).

In order to understand these impacts of TCMs, rigorous advanced models were developed by the staff of the Los Angeles County Metropolitan Transportation Authority (LACMTA), assuming that the measures will be implemented at the local government level. The 1990 travel characteristics in Los Angeles County were used as the baseline for the analysis. The analysis considers only the implementable measures, recognizing the short-term nature of the measures. Over the longer horizon, these measures will be less effective in managing demand and improving air quality in the County. Inherent in this understanding, the TDM program also recognizes that measures necessary to significantly reduce emissions in the years 2000 and 2010 will emphasize the application of advanced technology and market-based approaches.

The first section of the Executive Summary details the context underlying the development of this TDM/TCM program. This is followed by a brief description of the methodology and the models developed to understand the mobility, air quality and cost impacts of the proposed transportation control measures. More details on the data, models, and the results are provided in the Technical Appendices.



## **TRANSPORTATION DEMAND MANAGEMENT PROGRAM-PHASE II**

### **I OVERVIEW**

In April, 1992, the Los Angeles County Transportation Commission (LACTC), now the Los Angeles County Metropolitan Transportation Authority (LACMTA), adopted a two-phased program for the implementation of TDM/TCM<sup>1</sup> measures in Los Angeles County. The program included an Immediate Action element-Phase I, and the conceptual framework for a long-term TCM/TDM program--Phase II.

The Phase I Immediate Action program was designed to test the effectiveness of a range of TDM/TCM measures by implementing a group of demonstration projects throughout the county, evaluating the effectiveness of each project based on a number of criteria, and then using the results of the Phase I demonstrations to assist in the development of the LACMTA policy toward longer term implementation of TDM/TCM measures. The LACTC approved 100 projects during 1992-1993 as part of Phase I. These projects are underway or soon to be underway and are funded with a combination of private, local, state and federal funds. The mobility and air quality benefits of these projects will be evaluated both during project implementation and at the conclusion of each project.

Development of Phase II proceeded concurrently with the implementation of Phase I in order to meet various mandatory air quality and transportation requirements faced by the LACMTA and cities in Los Angeles county. Mandates include: the California legislative requirement to develop a Congestion Management Program (CMP); State Clean Air Act trip reduction requirements; and Federal Clean Air Act requirements to reduce emissions from mobile sources, including the timely implementation of all reasonably available TCMs in the region. Further, the 1991 Air Quality Management Plan (AQMP) for the region contains implementation dates for TCMs in local jurisdictions which continue to slip and are a primary cause for receiving only a conditional approval of the AQMP from the California Air Resources Board (CARB).

Additionally, the broad array of TCMs contained in the 1991 AQMP and a proposal to include them in the November 1992 CO Plan which was submitted to the CARB and the US Environmental Protection Agency (EPA) have presented vexing problems to cities with respect to implementation, funding, reasonableness of expectations regarding emission impacts of the measures, conflicts and duplication with other mandatory programs, and political feasibility. The ensuing debate over the issue of TCMs in the region has continued throughout the development of the 1994 AQMP.

It was in this context that the LACMTA adopted the conceptual framework for the Phase II TDM program. The Phase II program is designed to allow cities the opportunity to comply with the CMP Deficiency Plan requirements as well as Federal, State and Regional

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<sup>1</sup> Throughout this document, TDM and TCM are used interchangeably.

air quality mandates by implementing a comprehensive TCM/TDM program. As this approach is designed to substitute for regulatory measures in cities, approval will be required by federal, state and regional environmental agencies and the Southern California Association of Governments (SCAG). The approval process of these programs from the above mentioned agencies is underway.

To incorporate these requirements into one comprehensive program requires that the features of the Phase II TDM Program, which is also an element of the CMP Deficiency Plan, address several programmatic, legal and technical issues that require integration for both plans to work together. The relationships between the California Congestion Management Program (CMP) requirements and the Phase II program are discussed below.

#### **A. Relationship of the Congestion Management Program to Air Plan Goals**

The CMP legislation requires that urbanized counties identify future "deficiencies" on the CMP network and adopt a plan to mitigate these deficiencies. The so called "congestion gap" is that amount of traffic which would require mitigation if levels of service (LOS) on the CMP system were to be maintained at current levels or not to exceed LOS E, whichever is worse.

The CMP Deficiency Plan for Los Angeles County forecasts traffic growth up to 2010 on the CMP network. It is assumed that approximately 3% of the projected growth in trips will be due to new development. Moreover, the CMP includes a number of statutory exclusions of trips which reduces the total scope of the "congestion gap" to those deficiencies unmitigated by new development less statutory exclusions.

The Air Quality Management Plan and the Regional Mobility Plan call for a reduction of 10% of all vehicle trips by the year 2010 in order to attain National Ambient Air Quality Standards (NAAQS). Thus, the trip reduction requirements under the AQMP are significantly greater than those which would be necessary to comply with the CMP Deficiency Plan requirements. The Phase II TDM program must hence address the need to reduce 10% of all trips in order to meet the requirements of both the CMP and AQMP.

#### **B. Relationship of the Deficiency Plan Toolbox to Phase II TDM Program Design**

Net SOV vehicle trips reduced is the goal for Regional Mobility Plan and the AQMP. In line with this goal, through the Phase II TDM program, credits provided to cities would be in net single occupant vehicle (SOV) trips reduced. In order to earn credits, cities would select from a menu of approaches the strategies they will implement in order to achieve CMP and air quality goals.

Some strategies which accommodate additional person miles travelled are credited for air quality benefits as long as speed improves on the transportation network. Further, to quantify the emissions impacts of the program, vehicle trips reduced can be converted into emission reductions. In addition, some strategies will cause a mode shift (i.e., from a bus to a carpool, from a carpool to SOV), but may actually increase trips and thus, not provide

any mobility or air quality improvement. Therefore, net vehicle trip reduction, VMT reduction, and speed improvement will be used as mobility and air quality measures of Phase II TDM strategies to be implemented for both CMP and air quality compliance purposes. In all cases, implementation of Phase II TDM measures that achieve AQMP goals will meet the CMP Deficiency Plan requirements.

Because of different travel characteristics in each city and the desire to offer a flexible program to cities, LACMTA staff will assist cities, groups of cities, or cities representing major corridors, in arriving at trip reduction goals based on a disaggregation of the countywide trip reduction goal less the actions which are being implemented countywide (e.g., Freeway Service Patrol) and which have not already been counted in the countywide baseline for transportation and air quality modeling purposes. The countywide trip reduction goal is derived from the regional trip reduction goal to attain the NAAQS.

**C. Relationship of Phase II TDM Schedule to CMP Deficiency Plan:**

According to the CMP deadlines, by June 1994 cities would have to adopt local implementation reports which commit them to track new development activity. In August 1995, cities would begin reporting on implementation of trip mitigation activities in the previous year, and would report to the LACMTA every other year thereafter. Thus, cities can begin CMP Deficiency Plan compliance efforts early if they opt into the Phase II TDM Program.

The AQMP deadlines have changed a number of times. According to the current requirements, cities have to identify the TCM/TDM measures that they will implement by July 1994. The current schedule for implementation of these measures is assumed to be immediate.

**D. Monitoring Standards:**

In order to comply with the air quality mandates, monitoring requirements for air quality compliance/purposes may be somewhat different from CMP compliance reporting. LACMTA staff would like input from cities on this issue so as to minimize paperwork as much as possible, and yet be able to ensure that the Phase II TDM program can be approved by environmental agencies as an acceptable substitute for regulatory TCM measures in cities. This issue has not been resolved at this juncture and a consensus will have to be negotiated by all parties.

**E. Funding Availability:**

Limited funding is available through the LACMTA for the implementation of TCM/TDM measures which are part of the Phase II TDM program. In addition, cities can use AB2766 funds, and Prop A and Prop C local return funds. Regardless of funding source, 100% of the credit for implementing these measures will be attributed to the city/cities which implement these measures. This credit system is proposed because of the largely localized nature of TDM/TCM actions and their effectiveness in localized environments, and due to



the fact that the benefits of these measures have not been incorporated into baseline modeling scenarios.

**F. Overall Schedule for Phase II TDM Implementation:**

The components of the Phase II TDM program have been fully developed. Input from cities about the overall structure, management, implementation, and mechanics of the program and other issues related to environmental agency approval must be negotiated over the coming months.

The summer of 1993 was spent refining the assumptions, quantification methodology and estimation of emissions reductions and cost-benefit analysis, and working with cities and other agencies on the issues noted above. The preliminary schedule assumes LACMTA adoption of the program in Spring, 1994.

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|----------------|--|
| May 13, 1993   | Conduct All Cities Workshops on the Phase II TDM Program and distribute air plan trip reduction goals to local jurisdictions (Completed) |
| June-Aug. 1993 | Quantification assumptions and methodology for strategies (Completed)  |
| October 1993   | Regional Modeling Task Force reviews and accepts LACMTA quantification methodology (Completed)   |
| Nov.-Dec.      | 1993 Final draft of Phase II TDM Program (Completed)   |
| February 1994  | All cities workshop on Phase II program (Completed)  |
| March 1994     | Present Phase II TDM Program for adoption by the LACMTA Board.   |
| April-June '94 | Assist participating jurisdictions in developing draft Phase II TDM Programs.  |
| 1994           | Participating jurisdictions begin implementation of Phase II TDM Programs.   |

## II. DESCRIPTION OF APPROACH

### A. Los Angeles 1990 Baseline Travel Characteristics-1990

The travel characteristics in Los Angeles County are summarized below. For a definition and explanation of the variables please refer to the Glossary.

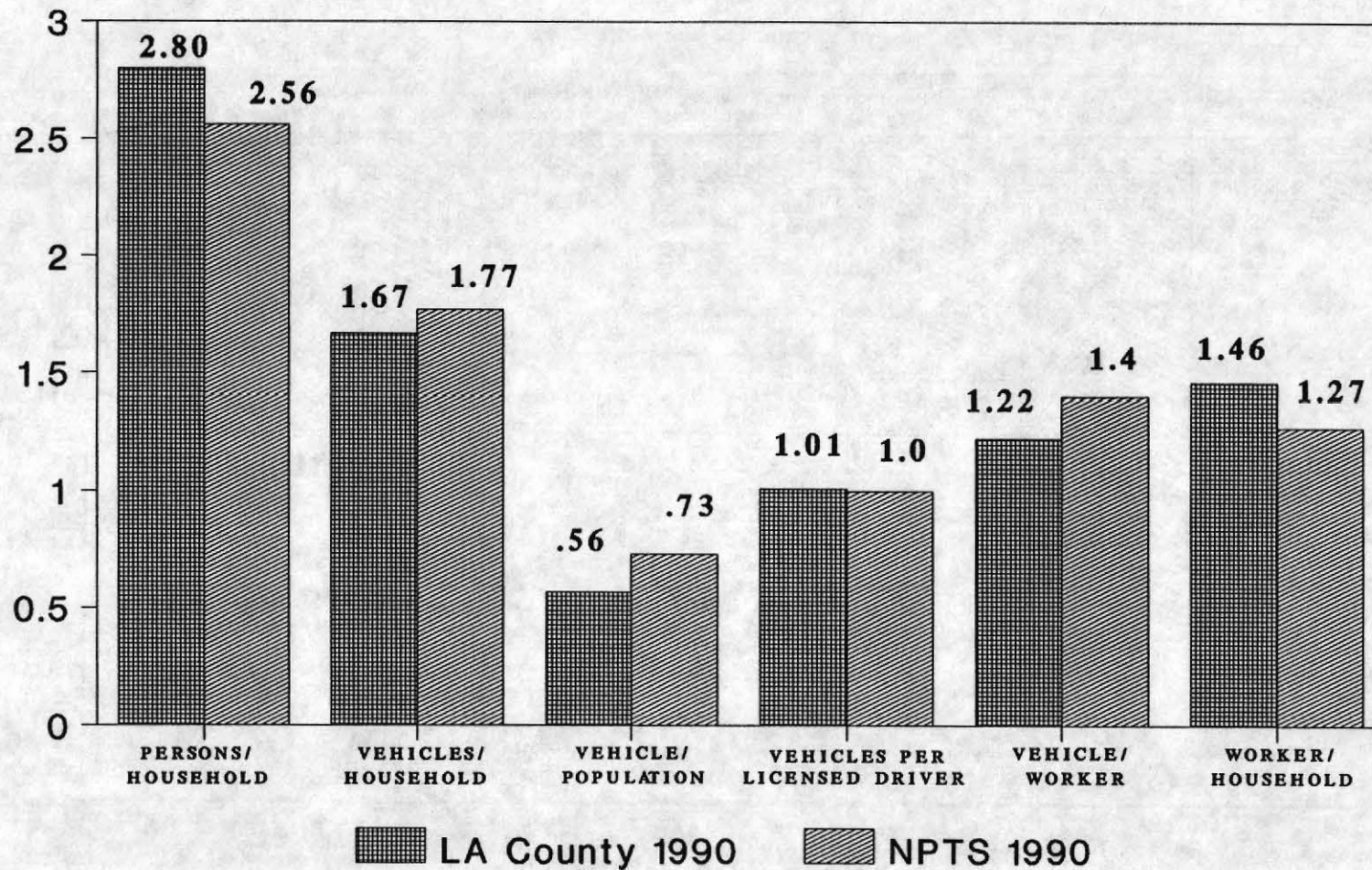
1) TOTAL PERSON TRIPS	29,582,281
2) TOTAL COMMUTE PERSON TRIPS	7,940,220
3) TOTAL COMMUTE VEHICLE TRIPS	6,655,681
4) TOTAL NON-COMMUTE VEHICLE TRIPS	13,909,441
5) TOTAL OFF-PEAK PERIOD VMT	69,449,075
6) TOTAL OFF-PEAK PERIOD VMT	97,613,559
7) DRIVE ALONE SHARE OF COMMUTE PERSON TRIPS	72.20%
8) PERCENT OF ALL TRIPS IN PEAK PERIOD	40.00%
9) PERCENT OF ALL TRIPS THAT ARE COMMUTE TRIPS	32.40%
10) PERCENT OF ALL TRIPS THAT ARE NON-COMMUTE TRIPS	67.60%
11) PERCENT OF COMMUTE TRIPS IN PEAK PERIOD	62.50%
12) PERCENT OF NON-COMMUTE TRIPS IN PEAK PERIOD	37.50%
13) PERCENT OF PEAK TRIPS THAT ARE COMMUTE TRIPS	52.00%
14) PERCENT OF OFF-PEAK TRIPS THAT ARE COMMUTE TRIPS	22.00%
15) AVERAGE COMMUTE TRIP LENGTH	11.40
16) AVERAGE NON-COMMUTE TRIP LENGTH	6
17) TOTAL PERSON TRIPS THAT ARE TRANSIT	996,823
18) PERCENT OF ALL TRIPS THAT ARE TRANSIT	3.40%
19) TOTAL COMMUTE PERSON TRIPS THAT ARE TRANSIT	506,200
20) TOTAL NON-COMMUTE TRIPS THAT ARE TRANSIT	490,623
21) COMMUTE TRIP SHARE OF TRANSIT	50.00%
22) TOTAL TRANSIT VEHICLE MILES	241,747
23) PERCENT OF COMMUTE TRIPS LESS THAN 6 MILES	44.00%
24) PERCENT OF COMMUTE TRIPS LESS THAN 5 MILES	37.00%
25) AVERAGE DAILY COMMUTE OUT-OF-POCKET COST PER VEHICLE	10.00
26) AVERAGE COST OF GAS PER GALLON	\$1.44
27) AVERAGE COST PER MILE TO DRIVE	\$0.48
28) AVERAGE COMMUTE OUT-OF-POCKET COST PER VEHICLE PER TRIP	\$5.00
29) AVERAGE NON-COMMUTE OUT-OF-POCKET COST PER VEHICLE PER TRIP	\$1.00
30) PERCENT OF VMT ON FREEWAYS	50%
31) AVERAGE TRIP LENGTH FOR TRUCKS	10.70
32) ELASTICITY OF PARKING DEMAND WITH RESPECT TO COMMUTING COST	TBD
33) ELASTICITY OF AUTO USE WITH RESPECT TO COST OF GASOLINE	TBD
34) ELASTICITY OF AUTO USE WITH RESPECT TO AUTO OPERATING COST	TBD
35) 1990 LOS ANGELES COUNTY POPULATION	8,859,716
36) 1990 LOS ANGELES COUNTY EMPLOYMENT	4,612,814
37) 1990 LOS ANGELES COUNTY LICENSED DRIVERS	5,659,065
38) 1990 LOS ANGELES COUNTY REGISTERED VEHICLES	5,650,717

Table 1, and Charts 1 and 2 compare Los Angeles County travel characteristics to the National Personal Transportation Survey (NPTS) of 1990. It is interesting to note that the figures for Los Angeles County are lower than the national averages in the crucial categories of vehicle per worker, vehicle per population, and vehicles per household.

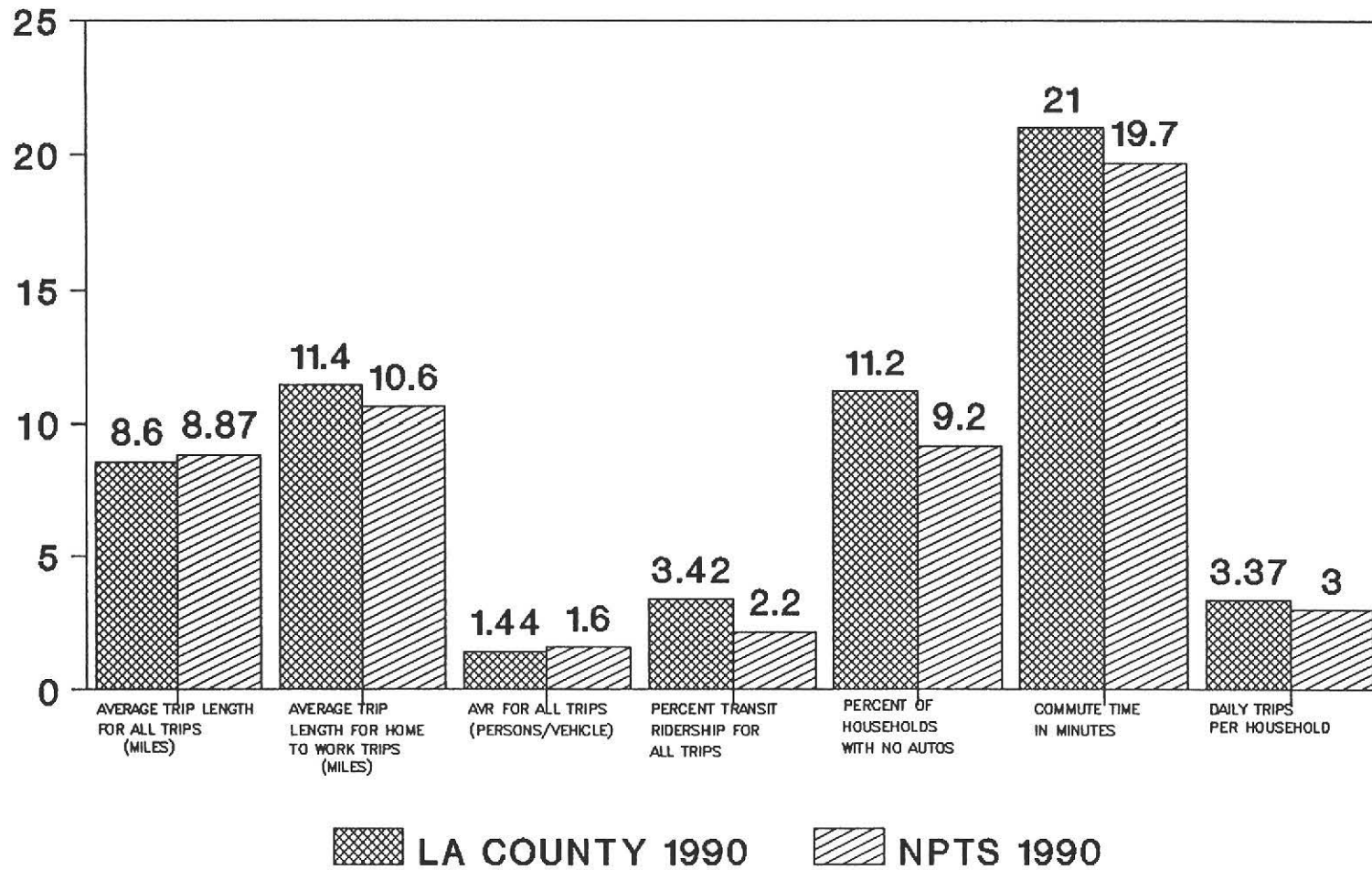
**TABLE 1**  
**Los Angeles County Trends Compared to NPTS**

(CHART 1)	LA COUNTY 1990	NPTS 1990
Persons Per Household	2.80	2.56
Vehicles Per Household	1.67	1.77
Vehicle/Population	.56	.73
Vehicle/License Driver	1.01	1.0
Vehicle/Worker	1.22	1.4
Worker/Household	1.46	1.27
(CHART 2)		
Average Trip Length For All Trips	8.6	8.87
Average Trip Length For Home-To-Work Trips	11.4	10.6
AVR For All Trips	1.438	1.60
Percent Transit Ridership For All Trips	3.4%	2.2%
Households with No Autos	11.2%	9.2%
Commute Time In Minutes	21 Minutes	19.7 Minutes
Daily trips Per Household	3.37	3.0

**CHART 1**  
**L.A. COUNTY TRENDS COMPARED TO NPTS**



## CHART 2 L.A. COUNTY TRENDS COMPARED TO NPTS



## **B. Disaggregation of Regional Trip Reduction Targets for 1994**

The Air Quality Management Plan and the Regional Mobility Plan call for a reduction of 10% of all vehicle trips by the year 2010 in order to attain National Ambient Air Quality Standards (NAAQS). The 2010 trip reduction target for the five-county SCAG region, based on the SCAG travel forecast model, is estimated to be 3,905,000 daily vehicle trips. This 2010 target for the SCAG region was then disaggregated to each county, using a weighting factor of 50% for employment and population for each county.

Although this methodology was accepted for regional disaggregation, it has some shortcomings.

- It does not factor in auto ownership. It is estimated that households with no autos make 60% fewer person trips than households with autos. According to 1990 census data, in Los Angeles County, over 11.2% of all households do not own an automobile.
- It does not factor in the existing mode split (i.e. share of non-drive alone mode).

As a result, Los Angeles County's share of the 2010 trip reduction target is 61% of the regional trips, which is 2,382,050 vehicle trips. The South Coast Air Quality Management District (SCAQMD) used the 1991 AQMP TCM expected emission reductions to obtain the 1994 target for Los Angeles County of 246,590 vehicle trips. This target will be updated annually but with all SOV trip reductions credited toward the 2010 goal.

## **C. Disaggregation of County Trip Reduction Targets for 1994**

The Los Angeles County trip reduction target was disaggregated at the city level after accounting for auto ownership and existing mode split for each city in the county. The disaggregation of county trips was performed by using a weighting factor for employment, population, auto ownership and mode split for each city. Table 2 provides 1994 trip reduction goals for each city in Los Angeles County.

The approach proposed in Phase II is to work with each city which opts into the Phase II TDM Program and to identify those measures which would be most effective in reaching the 1994 trip reduction goal taking into consideration city-specific factors such as: available resources, administrative issues and political feasibility.

## **D. County And Cities 1994 Trip Reduction Targets Adjusted for Measures Not Counted In The County-wide Baseline**

The County Baseline trips for 1990 and 2010 were estimated taking into account all existing plus funded elements of the transportation network (highway, rail, transit) and the effect of Regulation XV. The four-step travel forecast model is limited in its ability to estimate the impacts of the county freeway service patrol as well as some individual TDM measures

which have been implemented in various cities since 1990. MTA staff will assist cities in quantifying these measures to allow cities to receive credit for actions taken from 1990 onward. Such credits will reduce the 1994 goal accordingly.

**TABLE 2**  
**1994 DAILY TRIP REDUCTION TARGETS**  
**FOR CITIES IN LOS ANGELES COUNTY**

CITY	POP- ULATION	HOUSE- HOLDS	EMPLOY- MENT	DRIVE ALONE SHARE	HOUSE- HOLDS WITH NO AUTOS	HOUSE- HOLDS WITH 1 AUTO	HOUSE- HOLDS WITH 2+ AUTOS	PERCENT OF HOUSEHOLDS WITH NO AUT	PERCENT OF HOUSEHOLDS WITH 1 AUTO	PERCENT OF HOUSEHOLDS WITH 2+ AUTS	MODE SPLIT FACTOR	PERCENT OF COUNTY TARGET	1994 TRIPS TARGET
AGOURA HILLS	20,390	6,626	11,831	0.82	82	1,150	5,378	1.24%	17.40%	81.36%	1.12	0.281%	692
ALHAMBRA	82,106	28,362	30,066	0.72	3,012	10,756	14,471	10.67%	38.09%	51.24%	1.02	0.801%	1,975
ARCADIA	48,290	18,336	25,784	0.82	912	5,522	11,918	4.97%	30.09%	64.94%	1.12	0.658%	1,623
ARTESIA	15,464	4,368	8,784	0.75	349	1,256	2,789	7.94%	28.58%	63.47%	1.05	0.179%	441
AVALON	2,918	1,215	2,812	0.17	506	500	204	41.82%	41.32%	16.86%	0.47	0.036%	90
AZUSA	41,333	12,525	20,641	0.69	990	4,708	6,953	7.83%	37.21%	54.96%	0.99	0.438%	1,080
BALDWIN PARK	69,330	16,606	18,933	0.65	1,031	4,904	10,679	6.21%	29.52%	64.28%	0.95	0.493%	1,216
BELL	34,365	8,974	7,512	0.55	1,346	3,746	3,921	14.93%	41.56%	43.50%	0.85	0.199%	491
BELL GARDENS	42,355	9,300	11,559	0.57	1,034	3,843	4,367	11.19%	41.57%	47.24%	0.87	0.254%	627
BELLFLOWER	61,815	22,921	23,872	0.77	1,708	8,920	12,277	7.46%	38.94%	53.60%	1.07	0.676%	1,667
BEVERLY HILLS	31,971	14,518	56,582	0.71	1,569	5,838	7,157	10.77%	40.09%	49.14%	1.01	0.853%	2,103
BRADBURY	832	254	192	0.76	4	16	251	1.48%	5.90%	92.62%	1.06	0.008%	21
BURBANK	93,643	39,315	91,108	0.77	2,859	15,754	20,662	7.28%	40.11%	52.61%	1.07	1.698%	4,186
CALABASAS	17,350	5,861	12,600	0.7	654	2,095	3,112	11.15%	35.75%	53.10%	1.00	0.234%	578
CARSON	83,995	23,786	64,055	0.77	999	5,505	17,304	4.20%	23.12%	72.68%	1.07	1.188%	2,928
CERRITOS	53,240	15,060	30,328	0.83	213	1,860	12,953	1.42%	12.38%	86.20%	1.13	0.687%	1,693
CLAREMONT	32,503	10,466	11,514	0.71	371	2,757	7,344	3.54%	26.33%	70.13%	1.01	0.328%	810
COMMERCE	12,141	3,251	57,193	0.67	495	994	1,762	15.23%	30.58%	54.20%	0.97	0.672%	1,657
COMPTON	90,454	22,330	49,190	0.66	3,413	8,124	10,786	15.29%	36.39%	48.32%	0.96	0.874%	2,154
COVINA	43,207	15,488	30,143	0.79	914	5,202	9,415	5.89%	33.49%	60.62%	1.09	0.629%	1,551
CUDAHY	22,817	5,265	3,516	0.56	753	2,197	2,311	14.31%	41.76%	43.93%	0.86	0.108%	266
CULVER CITY	38,793	16,149	56,604	0.77	996	6,422	8,748	6.16%	39.73%	54.11%	1.07	0.911%	2,246
DIAMOND BAR	53,672	16,886	14,032	0.81	217	2,752	13,932	1.28%	16.28%	82.43%	1.10	0.538%	1,328
DOWNEY	91,444	33,003	60,914	0.79	1,721	11,395	19,897	5.21%	34.52%	60.27%	1.09	1.307%	3,224
DUARTE	20,725	6,582	6,969	0.73	402	2,088	4,262	5.95%	30.92%	63.12%	1.03	0.202%	497
EL MONTE	106,209	26,218	46,445	0.61	2,886	9,203	14,042	11.04%	35.22%	53.74%	0.91	0.901%	2,222
EL SEGUNDO	15,223	6,835	49,931	0.81	352	2,370	4,051	5.20%	34.99%	59.81%	1.11	0.676%	1,666
GARDENA	49,847	18,078	32,898	0.78	1,445	7,031	9,650	7.97%	38.79%	53.24%	1.08	0.688%	1,697
GLENDALE	180,038	68,694	88,240	0.73	7,234	26,647	34,723	10.54%	38.84%	50.61%	1.03	2.123%	5,235
GLENDORA	47,828	16,343	18,800	0.80	562	3,902	11,863	3.44%	23.90%	72.66%	1.10	0.554%	1,367



**TABLE 2  
1994 DAILY TRIP REDUCTION TARGETS  
FOR CITIES IN LOS ANGELES COUNTY**

CITY	POP- ULATION	HOUSE- HOLDS	EMPLOY- MENT	DRIVE ALONE SHARE	HOUSE- HOLDS WITH NO AUTOS	HOUSE- HOLDS WITH 1 AUTO	HOUSE- HOLDS WITH 2+ AUTOS	PERCENT OF HOUSEHOLDS WITH NO AUT	PERCENT OF HOUSEHOLDS WITH 1 AUTO	PERCENT OF HOUSEHOLDS WITH 2+ AUTO	MODE SPLIT FACTOR	PERCENT OF COUNTY TARGET	1994 TRIPS TARGET
HAWAIIAN GARDENS	13,639	3,463	3,591	0.65	249	1,334	1,812	7.33%	39.29%	53.37%	0.95	0.094%	231
HAWTHORNE	71,349	27,158	45,296	0.73	2,905	12,200	12,032	10.70%	44.96%	44.34%	1.03	0.930%	2,294
HERMOSA BEACH	18,219	9,213	7,756	0.83	403	3,210	5,559	4.39%	35.00%	60.61%	1.13	0.272%	670
HIDDEN HILLS	1,729	502	355	0.79	0	32	477	0.00%	6.29%	93.71%	1.09	0.016%	40
HUNTINGTON PARK	56,065	14,048	19,109	0.52	2,846	5,614	5,443	20.47%	40.38%	39.15%	0.82	0.372%	918
INDUSTRY	580	97	61,815	0.67	6	36	54	6.25%	37.50%	56.25%	0.97	0.671%	1,655
INGLEWOOD	109,602	36,399	48,547	0.71	4,626	15,791	15,685	12.81%	43.74%	43.45%	1.00	1.089%	2,686
IRWINDALE	1,050	266	12,757	0.67	17	70	183	6.30%	25.93%	67.78%	0.97	0.143%	353
LA CANADA FLINTRIDGE	19,378	6,713	6,310	0.85	74	1,044	5,576	1.11%	15.60%	83.30%	1.15	0.229%	565
LA HABRA HEIGHTS	6,226	2,096	933	0.85	6	171	1,914	0.29%	8.18%	91.54%	1.15	0.062%	154
LA MIRADA	40,452	12,811	18,294	0.83	307	2,754	9,670	2.41%	21.63%	75.96%	1.13	0.484%	1,193
LA PUENTE	36,955	9,075	10,339	0.65	754	2,675	5,590	8.36%	29.66%	61.98%	0.95	0.265%	653
LA VERNE	30,897	10,843	9,230	0.80	489	3,088	7,163	4.55%	28.75%	66.69%	1.10	0.322%	793
LAKEWOOD	73,557	26,202	20,140	0.82	1,160	6,734	18,208	4.44%	25.80%	69.76%	1.12	0.774%	1,909
LANCASTER	97,291	33,112	45,545	0.73	1,775	9,934	21,192	5.39%	30.19%	64.41%	1.03	1.119%	2,760
LAWDALE	27,331	9,353	8,206	0.73	578	3,433	5,216	6.26%	37.21%	56.53%	1.03	0.255%	629
LOMITA	19,382	7,859	7,188	0.78	640	2,657	4,574	8.13%	33.76%	58.11%	1.08	0.227%	559
LONG BEACH	429,433	159,234	235,027	0.70	22,196	64,763	72,016	13.96%	40.74%	45.30%	1.00	5.031%	12,407
LOS ANGELES	3,485,398	1,219,770	1,907,756	0.65	185,737	477,989	553,679	15.26%	39.26%	45.48%	0.95	38.690%	95,407
LYNWOOD	61,945	14,348	15,542	0.63	1,528	5,356	7,274	10.79%	37.83%	51.38%	0.93	0.386%	952
MALIBU	11,800	3,986	9,250	0.7	444	1,425	2,117	11.15%	35.75%	53.10%	1.00	0.167%	411
MANHATTAN BEACH	32,063	13,981	14,178	0.86	197	3,924	9,871	1.41%	28.04%	70.55%	1.16	0.469%	1,157
MAYWOOD	27,850	6,522	6,362	0.53	859	2,652	2,985	13.22%	40.83%	45.95%	0.82	0.153%	378
MONROVIA	35,758	13,153	22,025	0.74	972	4,833	7,432	7.34%	36.51%	56.15%	1.04	0.477%	1,177
MONTEBELLO	59,564	18,564	28,516	0.71	2,214	6,312	10,092	11.89%	33.90%	54.21%	1.01	0.626%	1,543
MONTEREY PARK	60,738	19,664	25,167	0.74	2,041	5,992	11,472	10.46%	30.72%	58.82%	1.04	0.625%	1,541
NORWALK	94,279	26,279	26,205	0.76	1,581	7,041	17,724	6.00%	26.73%	67.27%	1.06	0.804%	1,984
PALMDALE	68,917	22,010	26,422	0.70	876	5,622	15,470	3.99%	25.59%	70.42%	1.00	0.709%	1,748
PALOS VERDES ESTATES	13,512	4,908	3,781	0.85	55	606	4,285	1.11%	12.25%	86.64%	1.15	0.161%	398
PARAMOUNT	47,669	13,015	22,457	0.68	974	4,807	7,212	7.50%	37.00%	55.51%	0.98	0.463%	1,142

**TABLE 2  
1994 DAILY TRIP REDUCTION TARGETS  
FOR CITIES IN LOS ANGELES COUNTY**

CITY	POP- ULATION	HOUSE- HOLDS	EMPLOY- MENT	DRIVE ALONE SHARE	HOUSE- HOLDS WITH NO AUTOS	HOUSE- HOLDS WITH 1 AUTO	HOUSE- HOLDS WITH 2+ AUTOS	PERCENT OF HOUSEHOLDS WITH NO AUT	PERCENT OF HOUSEHOLDS WITH 1 AUTO	PERCENT OF HOUSEHOLDS WITH 2+ AUT	MODE SPLIT FACTOR	PERCENT OF COUNTY TARGET	1994 TRIPS TARGET
PASADENA	131,591	50,409	114,585	0.67	5,874	20,459	23,866	11.70%	40.76%	47.54%	0.97	2.024%	4,991
PICO RIVERA	59,177	16,003	19,199	0.71	1,158	4,453	10,391	7.24%	27.83%	64.94%	1.01	0.503%	1,240
POMONA	131,723	36,566	52,384	0.68	3,354	11,675	21,414	9.20%	32.04%	58.76%	0.98	1.191%	2,936
RANCHO PALOS VERDES	41,659	14,940	6,007	0.85	218	2,523	12,202	1.46%	16.88%	81.66%	1.15	0.418%	1,032
REDONDO BEACH	60,167	26,804	23,177	0.83	1,288	8,254	17,175	4.82%	30.89%	64.28%	1.13	0.809%	1,995
ROLLING HILLS	1,871	637	340	0.83	9	38	589	1.42%	5.97%	92.61%	1.13	0.019%	48
ROLLING HILLS ESTATES	7,789	2,779	5,985	0.85	25	340	2,432	0.89%	12.16%	86.95%	1.14	0.133%	326
ROSEMEAD	51,638	13,874	19,993	0.69	1,309	4,389	8,003	9.55%	32.03%	58.41%	0.98	0.452%	1,114
SAN DIMAS	32,397	11,099	15,410	0.79	430	2,431	8,087	3.93%	22.20%	73.87%	1.09	0.401%	988
SAN FERNANDO	22,580	5,600	15,632	0.59	682	1,955	2,996	12.11%	34.71%	53.19%	0.89	0.253%	623
SAN GABRIEL	37,120	12,238	14,316	0.74	965	4,291	6,960	7.90%	35.13%	56.97%	1.04	0.375%	925
SAN MARINO	12,959	4,357	4,385	0.82	73	670	3,560	1.70%	15.57%	82.73%	1.12	0.147%	363
SANTA CLARITA	110,642	38,362	44,980	0.80	1,100	9,018	28,356	2.86%	23.44%	73.70%	1.10	1.319%	3,252
SANTA FE SPRINGS	15,520	4,651	59,351	0.76	433	1,411	2,812	9.30%	30.30%	60.40%	1.06	0.730%	1,800
SANTA MONICA	86,905	45,125	76,188	0.74	5,698	21,961	17,201	12.70%	48.95%	38.34%	1.04	1.524%	3,757
SIERRA MARDE	10,762	4,659	3,376	0.80	198	1,484	2,947	4.28%	32.06%	63.66%	1.10	0.131%	322
SIGNAL HILL	8,371	3,358	14,266	0.77	198	1,375	1,802	5.87%	40.74%	53.39%	1.07	0.216%	533
SOUTH EL MONTE	20,850	4,754	25,208	0.59	489	1,661	2,624	10.24%	34.79%	54.96%	0.89	0.345%	852
SOUTH GATE	86,284	22,194	24,037	0.63	2,592	8,083	11,753	11.56%	36.04%	52.40%	0.93	0.606%	1,495
SOUTH PASADENA	23,936	10,265	8,719	0.81	401	4,145	5,686	3.92%	40.51%	55.57%	1.11	0.294%	725
TEMPLE CITY	31,100	11,029	7,307	0.79	543	3,410	7,102	4.91%	30.85%	64.24%	1.08	0.300%	740
TORRANCE	133,107	52,831	106,997	0.82	2,519	16,575	33,521	4.79%	31.50%	63.71%	1.12	2.245%	5,536
UNINCORPORATED AREAS	941,546	272,552	183,089	0.72	21,223	76,988	174,650	7.78%	28.21%	64.01%	1.02	7.032%	17,340
VERNON	146	61	41,822	0.54	18	15	14	38.30%	31.91%	29.79%	0.84	0.454%	1,118
WALNUT	29,105	7,869	7,191	0.77	85	857	6,904	1.08%	10.92%	87.99%	1.07	0.258%	635
WEST COVINA	96,086	30,105	29,262	0.77	1,419	7,498	21,179	4.71%	24.91%	70.37%	1.07	0.933%	2,301
WEST HOLLYWOOD	36,118	22,502	30,248	0.73	3,866	13,154	5,548	17.13%	58.29%	24.58%	1.03	0.634%	1,562
WESTLAKE VILLAGE	7,455	2,886	10,184	0.84	35	677	2,118	1.24%	23.92%	74.84%	1.14	0.175%	431
WHITTIER	77,671	27,612	40,920	0.79	1,859	9,174	16,604	6.73%	33.19%	60.08%	1.09	0.979%	2,414
<b>TOTAL</b>	<b>8,863,201</b>	<b>2,994,380</b>	<b>4,615,705</b>	<b>0.70</b>	<b>333,599</b>	<b>1,068,520</b>	<b>1,587,655</b>	<b>11.16%</b>	<b>35.74%</b>	<b>53.10%</b>	<b>1</b>	<b>100.00%</b>	<b>246,590</b>

## **E. Menu of Measures To Meet Goals**

A menu of possible actions was carefully selected based on the Clean Air Act Amendments of 1990-Section 108(f)(1)(a). This menu of actions offer a variety of individual TCM's as well as packages of more than one TCM implemented concurrently. Many of these actions have been discussed in the SCAQMD Draft Local Government Ordinance Handbook, the 1991 AQMP, and the 1992 CO Plan.

### **TRANSPORTATION DEMAND MANAGEMENT STRATEGIES**

#### ***I. TRANSIT IMPROVEMENTS***

1. Feeder services to or from fixed route or rail transit
2. New or expanded transit services
3. Subscription vanpool, buspool, or shuttles
4. Reduced transit fares
5. Private charter services for regular commute trips
6. Marketing programs targeted to non-transit users
7. Accommodation of bicycles on transit vehicles

#### ***II. RIDESHARING INCENTIVES***

1. Transit subsidies
2. Vanpool subsidies
3. Carpool subsidies
4. Alternative work schedules for non-SOV users
5. Bicycling subsidies
6. Walking subsidies
7. Transportation allowance with increased parking cost

#### ***III. RIDESHARING SUPPORT FACILITIES***

1. Ridesharing passenger loading area
2. Accommodation of vanpools in parking facility
3. Transportation information areas at developments
4. Accommodation of bicyclists and walkers
5. Childcare centers at multi-model transit facilities or park and ride locations

#### ***IV. RIDESHARING OPERATIONS***

1. Trip reduction programs for multi-tenant work sites not subject to Reg. XV
2. Trip reduction programs for companies with less than 100 employees
3. Employer-based alternative work schedules
4. Employer-based telecommuting program (work at home, or at satellite work center)
5. Employer-based flexible work hours  
Employer-based staggered work hours
6. Transportation management organization/associations  
(TMO/TMA)
7. Video conferencing at commercial development
8. Aggressive marketing for SOV users to encourage alternative modes

V. *PARKING MANAGEMENT & PRICING*

1. Preferential parking for rideshare vehicle
2. Use of private parking areas for Park-n-Ride lots
3. Special Event Center parking strategies to induce mode shift or travel to remote drop-off/pick-up points
4. Reduced parking requirements or limits at developments
5. Surcharge on parking fees or other pricing mechanisms
6. Parking discounts for carpools and vanpools
7. Increased parking cost in concentrated areas for SOV users
8. Fringe parking facilities with effective feeder services to destination points
9. Restriction on vehicle use in CBD or other areas of emissions concentrations by creation of pedestrian zones, bicycling facilities, etc.
10. Gas tax
11. VMT tax

VI. *BICYCLE & PEDESTRIAN SUPPORT*

1. Bicycle parking facilities
2. Showers and lockers for bicyclists
3. Bicycle education and marketing programs
4. Creation of bicycle paths, rights-of-way, to enable and encourage bicycling
5. Provision of security for bicycle paths, rights-of-way
6. Accommodation of bicyclists on transit

VII. *TELECOMMUNICATIONS - BASED APPROACHES*

1. Employer - based telecommuting
2. Government or non-profit telework center or facilities sharing
3. Residential neighborhood/development telework center
4. Video conferencing center in commercial district/development
5. Video conference remote education sites
6. Government information/transaction machine at residential and commercial development
7. Government investment in remote access to information/transactions

VIII. *REMOTE SENSING PROGRAMS TO FACILITATE IDENTIFICATION AND CLEAN-UP OF HIGH-POLLUTING VEHICLES*

IX. *SMOG-BASED EMISSION FEES*

### III. DESCRIPTION OF MOBILITY IMPACTS OF MEASURES

The impact of TCM/TDM measures is highly dependent on travel, employment, demographic characteristics, and cost of driving and, therefore, differs from region to region. A tool tailored to the South Coast Air Basin (SCAB) in general, and to Los Angeles county in particular, was deemed necessary in assessing impacts of measures on trip reduction. Further, if the LACMTA is to fund the implementation of these measures, policy boards and city councils must be provided with realistic assessments of the trip reduction impacts of the investments and the relationship to attaining mobility and air quality goals. The MTA methodology was developed in-house to evaluate a variety of TCM/TDM measures that the agency might consider implementing countywide as well as assist individual jurisdictions to be knowledgeable about the impacts of specific TCM/TDM measures they might choose to implement.

#### A. Methodology

The first component of this methodology measures the net reduction in vehicle trips and vehicle miles traveled for both the peak and off-peak periods as a result of the implementation of individual TCMs or TCM packages. To perform the quantification, baseline trip characteristics (daily person trips, daily vehicle trips, commute and non-commute vehicle trips, peak trips, off peak trips, drive alone mode share and transit mode share) are needed. Travel characteristics for 1990 and 2010 were obtained from the four-step travel demand forecast model, which was downloaded from the SCAG/LARTS regional model. The SCAG/LARTS model was developed to simulate travel patterns throughout the five counties of the Southern California region.

In addition, databases including the 1990 Census, SCAQMD's Regulation XV database, the Statewide O-D survey, the 1990 NPTS, the SCAG 1987 O-D survey, and data from numerous studies on travel behavior and impacts of demand management and transportation control measures have been incorporated into the quantification methodology. In the baseline travel characteristics, commute trips are referred to as work related travel, mainly, home-to-work trips and work-to-other trips (i.e., work to lunch, work to childcare center etc...). All other trips are referred to as non-commute trips, including other-to-work (i.e., childcare center to work etc.), other-to-other (i.e., lunch to shopping etc.), and home-to-other (i.e., home to shopping center, home to childcare center etc.)

#### Key Features of the MTA methodology

Effectiveness of TCMs is critically dependent upon the size of the market segment affected (number of employees targeted). Many TCMs may be directed only at peak period or work trips, or to a particular geographic area. Such measures may be highly effective within their target market, but have only a limited impact when expressed in overall regional terms. For example, work trips constitute 32% of all total travel in Los Angeles County. However, work trips are the most predictable set of trips. In addition, employers can exert influence over work trip modes through management of parking supply, incentives to use transit, and locational decisions.

The MTA methodology estimates a high and low range of net trip reduction impacts if each measure were implemented countywide. For each TCM or package of TCMs, the net trip reduction impacts are estimated based on specific parameters. Thus, the estimates are a snapshot of the trip reduction impacts given a set of specific parameters. It should be noted here that if values of the parameters were changed, the estimated effectiveness of the particular TCM will not change by the same ratio. For instance, doubling the number of vans from 1000 to 2000 will not bring about a corresponding doubling of the trip reductions.

The non-linearity of impacts is especially important for measures that deal with elasticities. For example, a TCM that requires a parking surcharge of \$0.50 per day is estimated to reduce trips by 17,284 to 25,927. However, if the parking charge were increased sixfold to \$3.00 per day, the impacts are far greater than a corresponding sixfold reduction in daily trips. With a \$3 parking charge, it is estimated that 207,417 to 290,384 trips will be reduced countywide. Therefore, great care should be taken when specific parameters of TCMs or TCM packages change.

Another distinguishing factor of the LACMTA approach in quantifying TCM/TDM measures is that the methodology for determining the trip reduction impacts of measures is very realistic. The program focuses on net trip reduction as a result of measures and does not provide credit for trips reduced by persons who currently use transit or other rideshare modes. Thus, the number of trips reduced and vehicle miles traveled reduced is exclusively attributed to those who switch from the SOV mode for their travel.

Further, the methodology accounts for automobile travel to park and ride locations or to locations designated as ridesharing meeting points which create a significant portion of automobile emissions on an average trip. In addition, the vehicle miles traveled (VMT) impacts reflect the reduction in VMT after accounting for park and ride travel and carpool circulation.

The potential transportation impacts of TCMs include changes in vehicle miles of travel, number of trips, vehicle speed and the time of day in which a trip occurs. LACMTA has carefully designed the TDM Phase II program ensuring that the following were considered:

- Issues of equity
- Provide area-wide measures such as transportation management associations that can reinforce more localized measures
- Enhance the non-drive alone options (transit, carpool, vanpool, bicycling, walking) rather than merely restricting or discouraging the use of drive alone travel
- Incorporate elements of pricing and market-based incentives
- Include marketing, education, and public awareness

The effectiveness of TCMs can be enhanced through a consideration of their synergistic effects. In general, an integrated program of TCMs should be implemented so as to achieve the full travel and emission reduction potential of the individual strategies. Where packages of measures are quantified, the packages were chosen with individual components which are believed to work in concert with each other and not in a counterproductive fashion. It is important to understand that some TCMs are mutually supportive while others are potentially counterproductive. For example, trip reduction ordinances can be enhanced by improved transit services and parking management strategies, whereas flexible workhour programs and incentives to carpool may work counterproductively.

Where elasticities are used in both individual measures and packages of measures, high and low point elasticities were chosen. In the methodology, elasticities for the primary measure were adjusted to reflect added features that the other components of the package would provide. The multinomial logit model was used to determine the mode-split impacts of the TCM packages.

The multinomial logit model differs by trip purpose (i.e., home-based work, mode choice model, home-based shop, etc.), and for the time of day the trip occurs (peak versus off-peak hours). In the multinomial logit model, it is assumed that each alternative presented to an individual can be represented by a single number  $U_i(s)$ , where the subscript (i) is a label identifying the alternative and the (s) indicate that the value ( $U_i$ ) may vary from individual to individual. The  $U_i$  are further assumed to be linear functions of the variables that determine individual choice of each alternative. The probability that alternative (i) will be chosen is given by:

$$P_m = \frac{\text{EXP}(U_m)}{\sum_{a,s,t} (\text{EXP}(U_i))}$$

where;

- $P_m$  is the probability of choosing mode (m)
- $(U_m)$  is the traveler's utility of mode (m)
- (i) represent the set of available modes;
- (i) = (a) for drive alone
- (s) for shared ride
- (t) for transit

Finally, the MTA methodology accounts for mode specific information concerning trip length. When estimating the potential market for each TCM, the number of employees affected is adjusted to reflect the trip length by mode. For example, in assessing the impacts of a bicycle subsidy program, persons affected are only those who commute 3 miles or less.

Similarly, in assessing the impacts of a vanpool program, persons affected are only those who commute 11.4 miles or more each direction. For a more detailed description of the methodology and the assumptions used please refer to the technical appendix.

## B. Summary Table

The estimated mobility impacts of each TCM measure and packages of measures (if implemented countywide) are presented in Table 3.

**TABLE 3  
MOBILITY IMPACTS SUMMARY**

TDM/TCM STRATEGIES	RANK BY TRIPS REDUCED	DESCRIPTION	PERSONS AFFECTED	RANGE OF TRIPS REDUCED		RANGE OF VMT REDUCED	
				STANDARD	HIGH	STANDARD	HIGH
<b>I) RIDESHARING OPERATION</b>							
TCM #1 TRIP REDUCTION PROGRAM FOR EMPLOYERS WITH 25-99 EMPLOYEES	8	FORMAL TRIP REDUCTION PROGRAM INCLUDING MARKETING AND PROMOTIONAL INCENTIVES FOR COMMUTERS WORKING FOR EMPLOYERS WITH 25-99 EMPLOYEES	922,562	17,044	33,270	233,165	455,139
TCM #2 EMPLOYER-BASED ALTERNATIVE WORK SCHEDULES	19	IMPLEMENTATION OF A COMPRESSED WORK WEEK WHERE AN EMPLOYEE WORKS FEWER DAYS IN EACH WEEK BUT MORE HOURS EACH WORKING DAY	691,922	3,065	6,133	34,963	69,926
TCM #3 EMPLOYER-BASED TELECOMMUTING PROGRAM	22	TELECOMMUTING PROGRAM WHERE EMPLOYEES WORK AT HOME OR AT A SATELLITE WORK CENTER NEAR HOME	691,922	1,777	3,555	15,200	30,401
TCM #4 EMPLOYER-BASED FLEXIBLE AND STAGGERED WORK HOURS	25	PART OF EMPLOYEES ARE ASSIGNED OR SELECT ARRIVAL AND DEPARTURE TIMES AT WORK BY THEIR EMPLOYERS THAT ARE OUTSIDE THE PEAK PERIODS. THIS MEASURE AFFECTS PEAK PERIOD SPEEDS	230,640	0		0	
TCM #5 TRANSPORTATION MANAGEMENT ASSOCIATION AND ORGANIZATIONS (TMA/TMO)	12	FORMING A NEW TMA/TMOs OR EXPANDING THE REPRESENTATION OF THE EXISTING ONES TO ENCOURAGE NON-DRIVE ALONE MODE	300,000	7,227	11,563	95,984	153,574
TCM #6 COUNTY-WIDE VANPOOL PROGRAM	14	VANPOOL PROGRAM PROMOTING AND PROVIDING MATCHLIST FOR COMMUTERS TO VANPOOL	867,209	5,232	15,698	185,595	556,786
TCM #7 INFORMAL RIDESHARING PROGRAM-CARPOOL AND VANPOOL ONLY	9	Informal ridesharing programs (carpool and vanpool) for commuters employed by employers with 25-99 employees (922,562)	922,562	13,827	27,655	178,213	356,426
<b>II) RIDESHARING FACILITIES</b>							
TCM #8 RIDESHARING PASSENGER LOADING AREA	17	PROVIDE RIDESHARING LOADING AREA CLOSE TO THE BUILDING ENTRANCE TO PROVIDE SAFE AND CONVENIENT ACCESS TO RIDESHARERS	922,562	3,318	6,637	44,075	88,150
TCM #9 CHILDCARE CENTER AT MULTI-MODAL TRANSIT FACILITIES OR PARK-AND-RIDE LOCATIONS	24	PROVIDE A CHILDCARE CENTERS AT MULTI-MODAL TRANSIT FACILITIES AND PARK-AND-RIDE LOTS. THIS MEASURE DOES NOT REDUCE TRIPS, INSTEAD IT REDUCES VMT.	1,014,819	0	0	44,632	59,510
TCM #10 ACCOMODATION OF BICYCLISTS AND WALKERS	15	PROVIDE BICYCLE AND PEDESTRIAN IMPROVEMENTS SUCH AS BIKE LOCKERS, BIKE LANES AND SHOWER FACILITIES TO ENCOURAGE MORE PEOPLE TO USE WALKING AND BICYCLING AS THEIR MODE OF TRAVEL	405,927	4,345	8,691	4,980	9,960
<b>III) RIDESHARING INCENTIVES</b>							
TCM #11 TRANSIT SUBSIDIES	3	EMPLOYEE TRANSIT SUBSIDY EQUAL TO 50% OF THE COST OF A MONTHLY TRANSIT PASS	461,281	50,023	75,035	684,319	1,026,479
TCM #12 VANPOOL SUBSIDIES	5	A \$1 PER COMMUTE TRIP PER DAY SUBSIDY FOR VANPOOLERS	839,532	32,357	48,535	1,203,686	1,805,529
TCM #13 CARPOOL SUBSIDIES	4	A \$1 PER COMMUTE TRIP PER DAY SUBSIDY FOR CARPOOLERS	922,562	44,446	66,668	577,806	866,709
TCM #14 BICYCLING SUBSIDIES	10	A \$1 PER COMMUTE TRIP PER DAY SUBSIDY FOR BICYCLISTS	405,927	8,691	17,383	26,075	52,150
TCM #15 WALKING SUBSIDIES	11	A \$1 PER COMMUTE TRIP PER DAY SUBSIDY FOR WALKERS	405,927	8,691	17,383	17,384	34,767
TCM #16 BUSPOOL SUBSIDY	6	A \$1 PER COMMUTE TRIP PER DAY SUBSIDY FOR BUSPOOLERS	690,000	20,965	31,448	488,494	732,741



**TABLE 3  
MOBILITY IMPACTS SUMMARY**

TDM/TCM STRATEGIES	RANK BY TRIPS REDUCED	DESCRIPTION	PERSONS AFFECTED	RANGE OF TRIPS REDUCED		RANGE OF VMT REDUCED		
				STANDARD	HIGH	STANDARD	HIGH	
<b>IV) TRANSIT IMPROVEMENTS</b>								
TCM # 17 NEW OR EXPANDED TRANSIT SERVICES	18	A 10% DECREASE IN TRANSIT SERVICES HEADWAYS COUNTYWIDE	1,383,844	3,801	7,603	47,544	95,089	
TCM # 18 FEEDER SERVICES TO OR FROM FIXED ROUTE RAIL OR TRANSIT	21	FEEDER SERVICES TO MAJOR RAIL AND TRANSIT STATIONS WHERE PARK-AND-RIDE LOTS ARE LIMITED	230,000	1,852	3,704	9,260	18,819	
TCM # 19 SUBSCRIPTION VANPOOL, BUSPOOL OR SHUTTLES	16	BUSPOOL PROGRAM PROMOTING AND PROVIDING MATCHLIST FOR BUSPOOLERS, VANPOOLERS AND SHUTTLE USERS	690,000	3,494	6,988	70,023	140,046	
<b>V) PARKING MANAGEMENT &amp; PRICING</b>								
TCM # 20 PARK-AND-RIDE LOTS	23	PROVIDE PARK-AND-RIDE LOTS TO ACCOMMODATE CARPOOLERS, VANPOOLERS TRANSIT AND RAIL RIDERS.	3,000 SPACES	1,215	1,620	25,650	34,200	
TCM # 21 PREFERENTIAL PARKING FOR RIDESHARE VEHICLES	19	PROVIDE PREFERENTIAL PARKING SPACES FOR CARPOOLERS AND VANPOOLERS THAT IS CLOSE TO THE BUILDING ENTRANCE	922,562	2,222	4,444	25,331	50,662	
TCM # 22 PARKING DISCOUNT FOR CARPOOLERS AND VANPOOLERS	13	PROVIDE FREE PREFERENTIAL PARKING FOR CARPOOLERS AND VANPOOLERS	784,178	5,885	7,847	76,510	102,013	
TCM # 23.1 INCREASED PARKING COST FOR SOV USERS (SCENARIO 1)	7	A \$.5 PARKING COST INCREASE FOR SOV USERS	4,612,814	17,284	25,927	229,553	344,339	
TCM # 23.2 INCREASED PARKING COST FOR SOV USERS (SCENARIO 2)	2	A \$1 PARKING COST INCREASE FOR SOV USERS	4,612,814	51,854	69,139	688,676	918,237	
TCM # 23.3 INCREASED PARKING COST FOR SOV USERS (SCENARIO 3)	1	A \$3 PARKING COST INCREASE FOR SOV USERS	4,612,814	207,417	290,384	2,760,000	3,860,000	
<b>VI) MEASURES REQUIRING LEGISLATIVE ACTION PRESENTED FOR ILLUSTRATIVE PURPOSES ONLY</b>								
TCM # 24 RESTRICTIONS ON VEHICLE USE (NO DRIVE DAYS)		100% OF EMPLOYMENT ARE NOT PERMITTED TO DRIVE ONCE A WEEK	4,612,814	691,392		9,064,000		
TCM # 25 GAS TAX		\$.50 PER GALLON GAS TAX	5,659,065	529,837	662,296	4,151,000	5,189,000	
TCM # 26 VMT TAX		1 CENT PER MILE CHARGE	5,659,065	219,553	329,330	1,483,000	2,224,000	
TCM # 27 PEAK AND OFF-PEAK TRAVEL CHARGE		\$5 PEAK AND \$1 OFF-PEAK TRAVEL CHARGE	5,659,065	253,473	337,965	2,316,000	3,088,000	
<b>TCM PACKAGES</b>								
TCM PACKAGE # 1	15	IMPROVEMENT TO THE TRANSIT SYSTEMS IN TERMS OF REDUCED HEADWAYS IN CONCERT WITH CHILDCARE FACILITIES AT MAJOR TRANSIT STATIONS AND FEEDER SERVICES TO AND FROM THESE STATIONS	461,281	14,770	16,001	173,120	187,546	
TCM PACKAGE # 2	13	RIDESHARING (CARPOOLING AND VANPOOLING) FOR SMALL EMPLOYERS IN CONCERT WITH PREFERENTIAL PARKING FOR CARPOOLERS AND VANPOOLERS, AND A PASSENGER LOADING AREAS TO IMPROVE ACCESSIBILITY	922,562	23,922	29,902	554,339	680,424	
TCM PACKAGE # 3	16	BICYCLE AND PEDESTRIAN IMPROVEMENTS IN CONCERT WITH BICYCLE RACKS AND LOCKERS AT PARK-AND-RIDE LOTS AND AT MAJOR TRANSIT STATIONS AND AGGRESSIVE MARKETING FOR BICYCLING AND WALKING	405,927	10,864	21,729	32,594	65,188	

**TABLE 3  
MOBILITY IMPACTS SUMMARY**

TDM/TCM STRATEGIES	RANK BY TRIPS REDUCED	DESCRIPTION	PERSONS AFFECTED	RANGE OF TRIPS REDUCED		RANGE OF VMT REDUCED	
				STANDARD	HIGH	STANDARD	HIGH
TCM PACKAGE # 4	7	TRIP REDUCTION ORDINANCE FOR SMALL EMPLOYERS IN CONCERT WITH PREFERENTIAL PARKING FOR CARPOOLERS AND VANPOOLERS, FEEDER SERVICES TO AND FROM MAJOR RAIL AND TRANSIT STATIONS, AND A TRANSPORTATION MANAGEMENT ASSOCIATION AND/OR ORGANIZATION.	922,562	60,246	80,328	766,091	1,024,121
TCM PACKAGE # 5.1	8	10% INCREASE IN TRANSIT ROUTE MILES IN CONCERT WITH TRANSIT SUBSIDY EQUALS 50% OF MONTHLY PASS COST AND A PARKING PRICING INCREASE OF \$0.50 PER DAY PER SPACE	461,281	64,196	96,264	869,599	1,304,399
TCM PACKAGE # 5.2	5	10% INCREASE IN TRANSIT ROUTE MILES IN CONCERT WITH TRANSIT SUBSIDY EQUALS 50% OF MONTHLY PASS COST AND A PARKING PRICING INCREASE OF \$1 PER DAY PER SPACE	461,281	93,908	140,862	1,267,049	1,900,574
TCM PACKAGE # 5.3	3	10% INCREASE IN TRANSIT ROUTE MILES IN CONCERT WITH TRANSIT SUBSIDY EQUALS 50% OF MONTHLY PASS COST AND A PARKING PRICING INCREASE OF \$3 PER DAY PER SPACE	461,281	144,864	217,296	1,830,000	2,746,000
TCM PACKAGE # 6.1	11	RIDESHARING FOR SMALL EMPLOYERS (25-99) IN CONCERT WITH RIDE SHARE SUBSIDY OF \$1/TRIP/DAY, PREFERENTIAL FREE PARKING FOR CARPOOLERS AND VANPOOLERS AND A PARKING CHARGE OF \$5/DAY/SPACE	922,562	55,310	57,040	747,889	980,110
TCM PACKAGE # 6.2	6	RIDESHARING FOR SMALL EMPLOYERS (25-99) IN CONCERT WITH RIDE SHARE SUBSIDY OF \$1/TRIP/DAY, PREFERENTIAL FREE PARKING FOR CARPOOLERS AND VANPOOLERS AND A PARKING CHARGE OF \$1/DAY/SPACE	922,562	103,707	131,363	1,393,316	1,763,271
TCM PACKAGE # 6.3	2	RIDESHARING FOR SMALL EMPLOYERS (25-99) IN CONCERT WITH RIDE SHARE SUBSIDY OF \$1/TRIP/DAY, PREFERENTIAL FREE PARKING FOR CARPOOLERS AND VANPOOLERS AND A PARKING CHARGE OF \$3/DAY/SPACE	922,562	189,675	258,091	2,311,000	3,133,000
TCM PACKAGE # 7.1	14	BICYCLE AND PEDESTRIAN IMPROVEMENTS IN CONCERT WITH \$/DAY/TRIP WALKING AND BICYCLING SUBSIDY AND A \$0.50/DAY/SPACE PARKING CHARGE	405,927	20,111	22,984	48,832	55,808
TCM PACKAGE # 7.2	12	BICYCLE AND PEDESTRIAN IMPROVEMENTS IN CONCERT WITH \$/DAY/TRIP WALKING AND BICYCLING SUBSIDY AND A \$1/DAY/SPACE PARKING CHARGE	405,927	29,690	33,932	75,727	86,545
TCM PACKAGE # 7.3	10	BICYCLE AND PEDESTRIAN IMPROVEMENTS IN CONCERT WITH \$/DAY/TRIP WALKING AND BICYCLING SUBSIDY AND A \$3/DAY/SPACE PARKING CHARGE	405,927	64,201	128,401	175,218	350,437
TCM PACKAGE # 8.1	9	TRIP REDUCTION ORDINANCE FOR SMALL EMPLOYERS (25-99) IN CONCERT WITH FREE PREFERENTIAL PARKING FOR RIDESHARERS AND A \$0.50/DAY/SPACE PARKING CHARGE	922,562	65,889	106,710	887,140	1,437,718
TCM PACKAGE # 8.2	4	TRIP REDUCTION ORDINANCE FOR SMALL EMPLOYERS (25-99) IN CONCERT WITH FREE PREFERENTIAL PARKING FOR RIDESHARERS AND A \$1/DAY/SPACE PARKING CHARGE	922,562	150,689	208,750	2,008,390	2,799,097
TCM PACKAGE # 8.3	1	TRIP REDUCTION ORDINANCE FOR SMALL EMPLOYERS (25-99) IN CONCERT WITH FREE PREFERENTIAL PARKING FOR RIDESHARERS AND A \$3/DAY/SPACE PARKING CHARGE	922,562	293,549	415,667	3,933,000	5,570,000

#### IV. DESCRIPTION OF MEASURES: AIR QUALITY

##### A. Methodology

The emission model component of the Phase II Program combines estimates of mobility impacts (net vehicle trip reduction) of each TCM measure and package of measures with the emission factor data contained in the latest US EPA approved emissions model for California (ARB EMFAC7F), and develops an estimate of pollutant reductions for each TCM measure and package of measures.

The MTA emission methodology was designed to compute emission impacts at the most disaggregated levels possible. This model acknowledges the fact that air quality analysis should include estimates using speeds, vehicle miles traveled, daily trips, number of vehicles, type of fuels, temperatures, time of day travel occurs, year of analysis, area under consideration, and type of start. Emission impacts for individual TCMs and packages of TCMs were estimated for the main pollutants, mainly, for reactive organic gases (ROG), carbon monoxide (CO), nitrogen oxides (NOx), particulate matters (PM), and tire wear. Following is a discussion of how the Phase II program addresses these issues.

**Vehicle class:** Due to substantial differences in emissions among vehicle classes and modes of operation, the emission methodology was also designed to account for vehicle class. Emission factors associated with gasoline vehicles equipped with and without catalytic converters were combined. These combined factors were added to the diesel-fueled vehicles emission factors to estimate a weighted average between three fuels. This was carefully considered because of the fact that there are substantial differences in emissions among vehicle classes and modes of operation.

**Temperature:** The emission methodology was designed to account for temperatures in LA County. The temperature for each pollutant was selected using worst-case scenarios. The ten highest exceedance days experienced in the county were obtained to determine the worst-case temperature. Each exceedance day had six two-hour time periods in which high levels were observed. Temperature readings between four time periods were selected. Morning temperatures in LA County were averaged for time periods between 6 a.m. to 8 a.m., and 9 a.m. to 11 a.m. For the rest of the exceedance day, temperatures between 12 p.m. to 2 p.m., and 3 p.m. to 5 p.m. were averaged.

The lowest temperatures were selected for carbon monoxide (CO) and oxides of nitrogen (NOx), because lower temperatures lead to incomplete combustion that result in high CO and NOx emissions. Thus, CO emission factors for LA County were adjusted to 60°F and NOx emission factors for LA County were adjusted to 75°F. Temperature estimates for ROG are based on the 10 worst ozone exceedance days. Ozone is formed at high temperatures from reactions between the Reactive Organic Compounds (ROC) and NOx in the presence of sunlight. ROC emissions are high during high temperatures due to evaporative and combustive emissions, with minimal evaporative emissions during cooler weather. For LA County ROC emission factors were adjusted to 85°F. A factor of 0.92 was used to convert ROC to Reactive Organic Gases (ROG). Because emissions impacts are

not linearly related to each variable, the effect of each variable on the accuracy of emissions benefits may be significant.

**Vehicle activity:** The determination of the emission factors for each pollutant takes into account all the elements of vehicle activity. **Starting Emissions** are a function of the number of starts that a vehicle makes per day. Two separate start conditions are considered: cold and hot. The determination of whether a vehicle is cold or hot is based on the amount of time the vehicle has been idle with the engine turned off, and the type of emission control system with which the vehicle is equipped (catalyst vs. non-catalyst). Emissions are significantly higher under cold start conditions because the emission control system (i.e., the catalyst) takes time to reach a temperature at which it reduces emissions. To determine the exact percentage of cold vs. hot start is almost impossible with the existing data. Therefore, the following were assumed: for commute home-to-work trips cold starts were assumed to be 100%, and for commute work-to-other trips the percent of cold starts were assumed to be 75% and the hot starts 25%.

**Running Emissions** measure the tailpipe emissions which are a function of the length of a trip. CARB and EPA measure the tailpipe emissions produced by vehicles operated on a 7.5 mile test cycle known as the Federal Test Procedure (FTP). The FTP is designed to represent a typical commute trip and has many standardized test conditions (i.e., temperature, speed, etc.). A series of correction factors were developed in this methodology based on EMFAC7F to correct for differences between test conditions (speed and temperature) and conditions experienced by vehicles operating under in-use conditions.

**Evaporative Running Emissions** measure the evaporative hydrocarbon (HC) emissions produced while a vehicle is operating. In general, these emissions are produced by the heat build-up in the fuel caused by the operation of the vehicle. The longer the vehicle is operated, the warmer the engine and fuel system become and the higher the resultant evaporative emissions. For this methodology the evaporative and running emissions were combined as both are expressed in gm/mile. **Evaporative Hot Soak Emissions** measure the evaporative emissions produced immediately after a vehicle is stopped and the engine is turned off. **Diurnal Breathing Emissions** measure the evaporative emissions cause by the change in ambient temperature over the course of the day.

It is apparent that there are many elements of vehicle activity that influence the amount of pollutants emitted in the air. Those TCMs that eliminate trips have emission impacts different from those that improve the speed or shorten the trip length.

Emission factors for each pollutant were determined based on the above discussion. These were then applied to the mobility output from the transportation model to get emission reductions from each individual TCM and packages of TCMs. For a more detailed description of the methodology and the assumptions please refer to the technical appendix of this program.

**B. Summary Table**

Emission impacts, in tons/day, of individual TCMS and packages of TCMS can be found in Table 4.

**TABLE 4  
EMISSION IMPACTS SUMMARY**

TDM/TCM STRATEGIES	RANK ACCORDING TO REDUCTIONS IN					RANGE OF CO REDUCED	RANGE OF NO <sub>x</sub> REDUCED	RANGE OF ROG REDUCED	RANGE OF PM REDUCED	RANGE OF TIRE WEAR REDUCED
	CO	NO <sub>x</sub>	ROG	PM	TW	TONS/DAY	TONS/DAY	TONS/DAY	TONS/DAY	TONS/DAY
<b>I) RIDESHARING OPERATION</b>										
TCM #1 TRIP REDUCTION PROGRAM FOR EMPLOYERS WITH 25-99 EMPLOYEES	25	22	23	22	22	5.082-9.921	0.285-0.555	0.51-0.996	0.005-0.01	0.051-0.1
TCM #2 EMPLOYER-BASED ALTERNATIVE WORK SCHEDULES	38	32	38	31	36	0.847-1.693	0.045-0.09	0.082-0.163	0.001-0.002	0.008-0.015
TCM #3 EMPLOYER-BASED TELECOMMUTING PROGRAM	43	36	44	41	42	0.442-0.883	0.021-0.043	0.04-0.08	0-0.001	0.003-0.007
TCM #4 EMPLOYER-BASED FLEXIBLE AND STAGGERED WORK HOURS	31	38	30	44	45	1.985-3.309	0	0.245-0.408	0	0
TCM #5 TRANSPORTATION MANAGEMENT ASSOCIATION AND ORGNIZATIONS (TMA/TMO)	29	27	31	28	28	2.217-3.403	0.118-0.189	0.212-0.339	0.002-0.003	0.021-0.034
TCM #6 COUNTY-WIDE VANPOOL PROGRAM	28	26	28	24	24	2.667-8.002	0.191-0.573	0.324-0.972	0.004-0.012	0.041-0.123
TCM #7 INFORMAL RIDESHARING PROGRAM-CARPOL AND VANPOOL ONLY	27	24	26	25	25	4.017-8.034	0.221-0.442	0.398-0.795	0.004-0.008	0.039-0.079
<b>II) RIDESHARING FACILITIES</b>										
TCM #8 RIDESHARING PASSENGER LOADING AREA	37	31	37	31	34	0.977-1.953	0.054-0.108	0.097-0.195	0.001-0.002	0.01-0.019
TCM #9 CHILDCARE CENTER AT MULTI MODAL TRANSIT FACILITIES OR PARK-AND-RIDE LOCATIONS	42	33	39	35	35	0.433-0.578	0.041-0.054	0.066-0.087	0.001-0.001	0.01-0.013
TCM #10 ACCOMODATION OF BICYCLISTS AND WALKERS	39	35	40	41	43	0.799-1.597	0.031-0.061	0.06-0.12	0-0.001	0.003-0.006
<b>III) RIDESHARING INCENTIVES</b>										
TCM #11 TRANSIT SUBSIDIES	18	17	18	17	18	14.917-22.375	0.835-1.253	1.497-2.245	0.015-0.023	0.151-0.226
TCM #12 VANPOOL SUBSIDIES	15	11	12	12	12	17.038-25.557	1.231-1.847	2.086-3.129	0.027-0.04	0.265-0.398
TCM #13 CARPOOL SUBSIDIES	19	18	19	19	19	12.96-19.44	0.715-1.072	1.286-1.929	0.013-0.019	0.127-0.191
TCM #14 BICYCLING SUBSIDIES	33	30	45	35	17	1.69-3.381	0.061-0.122	0.001-0.001	0.001-0.001	0.006-0.011
TCM #15 WALKING SUBSIDIES	34	32	35	41	41	1.606-3.212	0.053-0.106	0.111-0.222	0-0.001	0.004-0.008
TCM #16 BUSPOOL SUBSIDY	22	20	21	21	21	8.210-12.315	0.533-0.8	0.924-1.385	0.011-0.016	0.108-0.162

**TABLE 4  
EMISSION IMPACTS SUMMARY**

TDM/TCM STRATEGIES	RANK ACCORDING TO REDUCTIONS IN					RANGE OF CO REDUCED	RANGE OF NOx REDUCED	RANGE OF ROG REDUCED	RANGE OF PM REDUCED	RANGE OF TIRE WEAR REDUCED
	CO	NOx	ROG	PM	TW	TONS/DAY	TONS/DAY	TONS/DAY	TONS/DAY	TONS/DAY
<b>IV) TRANSIT IMPROVEMENTS</b>										
TCM # 17 NEW OR EXPANDED TRANSIT SERVICES	36	30	36	31	32	1.039-2.078	0.061-0.122	0.103-0.207	0.001-0.002	0.01-0.021
TCM # 18 FEEDER SERVICES TO OR FROM FIXED ROUTE RAIL OR TRANSIT	43	37	43	44	44	0.396-0.792	0.016-0.033	0.032-0.064	0	0.002-0.004
TCM # 19 SUBSCRIPTION VANPOOL, BUSPOOL OR SHUTTLES	35	29	34	28	31	1.258-2.515	0.079-0.157	0.137-0.274	0.002-0.003	0.015-0.031
<b>V) PARKING MANAGEMENT &amp; PRICING</b>										
TCM # 20 PARK-AND-RIDE LOTS	41	35	42	35	40	0.45-0.6	0.028-0.038	0.05-0.066	0.001-0.001	0.006-0.008
TCM # 21 PREFERENTIAL PARKING FOR RIDESHARE VEHICLES	40	34	41	35	38	0.614-1.228	0.032-0.065	0.059-0.11	0.001-0.001	0.006-0.011
TCM # 22 PARKING DISCOUNT FOR CARPOOLERS AND VANPOOLERS	32	28	32	30	30	1.716-2.288	0.095-0.126	0.17-0.227	0.002-0.002	0.017-0.022
TCM # 23.1 INCREASED PARKING COST FOR SOV USERS (SCENARIO 1)	24	23	24	23	23	5.087-7.631	0.282-0.423	0.507-0.761	0.005-0.008	0.051-0.076
TCM # 23.2 INCREASED PARKING COST FOR SOV USERS (SCENARIO 2)	17	16	17	18	17	15.262-20.349	0.847-1.129	1.521-2.029	0.015-0.02	0.152-0.202
TCM # 23.3 INCREASED PARKING COST FOR SOV USERS (SCENARIO 3)	5	4	4	4	4	61.047-85.465	3.388-4.743	6.086-8.52	0.061-0.085	0.607-0.85
<b>VI) MEASURES REQUIRING LEGISLATIVE ACTION PRESENTED FOR ILLUSTRATIVE PURPOSES ONLY</b>										
TCM # 24 RESTRICTIONS ON VEHICLE USE (NO DRIVE DAYS)	1	1	1	1	1	202.341	11.186	20.1112	0.2	1.998
TCM # 25 GAS TAX	2	2	2	2	2	121.383-151.729	6.135-7.669	10.962-13.073	0.092-0.114	0.915-1.144
TCM # 26 VMT TAX	7	7	8	9	9	48.341-72.511	2.299-3.449	4.237-6.355	0.033-0.049	0.327-0.491
TCM # 27 PEAK AND OFF-PEAK TRAVEL CHARGE	4	5	5	5	5	61.775-82.367	3.225-4.299	5.759-7.769	0.051-0.068	0.511-0.681
<b>TCM PACKAGES</b>										
TCM PACKAGE # 1 TRANSIT, FEEDER SERVICES, AND CHILDCARE	26	23	28	25	27	4.074-4.414	0.224-0.243	0.393-0.426	0.004-0.004	0.038-0.041
TCM PACKAGE # 2 RIDESHARING, PREFERENTIAL PARKING, LOADING AREA AND GRH	21	19	20	20	20	8.928-11.159	0.622-0.777	0.996-1.245	0.012-0.015	0.12-0.15

**TABLE 4  
EMISSION IMPACTS SUMMARY**

TDM/TCM STRATEGIES	RANK ACCORDING TO REDUCTIONS IN					RANGE OF CO REDUCED	RANGE OF NO <sub>x</sub> REDUCED	RANGE OF ROG REDUCED	RANGE OF PM REDUCED	RANGE OF TIRE WEAR REDUCED
	CO	NO <sub>x</sub>	ROG	PM	TW	TONS/DAY	TONS/DAY	TONS/DAY	TONS/DAY	TONS/DAY
TCM PACKAGE # 3 BICYCLE AND PEDESTRIAN FOCUS	30	30	33	35	37	2.113-4.226	0.076-0.152	0.155-0.309	0.001-0.001	0.007-0.014
TCM PACKAGE # 4 TRO, PREFERENTIAL PARKING, FEEDERS, AND TMA/TMO	14	14	15	15	15	17.435- 23.147	0.954-1.272	1.722-2.296	0.017-0.023	0.169-0.226
TCM PACKAGE # 5.1 TRANSIT INCREASE, SUBSIDY, AND PARKING MANAGEMENT (SCENARIO 1)	13	13	14	14	14	19.008- 28.512	1.066-1.599	1.905-2.857	0.019-0.029	0.192-0.288
TCM PACKAGE # 5.2 TRANSIT INCREASE, SUBSIDY, AND PARKING MANAGEMENT (SCENARIO 2)	11	10	11	11	11	27.772- 41.658	1.554-2.331	2.78-4.17	0.028-0.042	0.279-0.419
TCM PACKAGE # 5.3 TRANSIT INCREASE, SUBSIDY, AND PARKING MANAGEMENT (SCENARIO 3)	9	8	9	8	8	41.630- 62.446	2.285-3.248	4.106-6.159	0.04-0.061	0.404-0.605
TCM PACKAGE # 6.1 RIDESHARING, PREFERENTIAL PARKING, AND SOV CHARGE (SCENARIO 1)	16	15	16	16	16	16.408- 18.948	0.916-1.134	1.642-2	0.016-0.022	0.165-0.216
TCM PACKAGE # 6.2 RIDESHARING, PREFERENTIAL PARKING, AND SOV CHARGE (SCENARIO 2)	10	9	10	10	10	30.678- 38.843	1.708-2.163	3.066-3.881	0.031-0.039	0.307-0.389
TCM PACKAGE # 6.3 RIDESHARING, PREFERENTIAL PARKING, AND SOV CHARGE (SCENARIO 3)	6	6	6	6	6	53.805- 73.104	2.909-3.948	5.259-7.14	0.051-0.069	0.509-0.691
TCM PACKAGE # 7.1 BICYCLE AND WALKING SUBSIDY, AND PARKING CHARGES (SCENARIO 1)	27	24	29	40	33	3.759-4.296	0.13-0.149	0.268-0.307	0.001	0.011-0.012
TCM PACKAGE # 7.2 BICYCLE AND WALKING SUBSIDY, AND PARKING CHARGES (SCENARIO 2)	22	25	25	31	29	5.598-6.397	0.195-0.223	0.402-0.459	0.001-0.002	0.017-0.019
TCM PACKAGE # 7.3 BICYCLE AND WALKING SUBSIDY, AND PARKING CHARGES (SCENARIO 3)	20	21	22	25	25	12.224- 24.449	0.434-0.868	0.885-1.769	0.004-0.008	0.039-0.077
TCM PACKAGE # 8.1 TRIP REDUCTION ORDINANCES, PARKING FEE, AND PREFERENTIAL PARKING (SCENARIO 1)	12	12	13	13	13	19.509- 31.605	1.087-1.762	1.951-3.161	0.02-0.032	0.196-0.317
TCM PACKAGE # 8.2 TRIP REDUCTION ORDINANCES, PARKING FEE, AND PREFERENTIAL PARKING (SCENARIO 2)	8	5	7	7	7	44.435- 61.697	2.467-3.434	4.433-6.164	0.044-0.062	0.443-0.617
TCM PACKAGE # 8.3 TRIP REDUCTION ORDINANCES, PARKING FEE, AND PREFERENTIAL PARKING (SCENARIO 3)	3	3	3	3	3	86.731- 122.824	4.826-6.835	8.663- 12.269	0.087-0.123	0.867-1.228



## V. DESCRIPTION OF MEASURES: COST-BENEFITS AND COST-EFFECTIVENESS

### A. Methodology

The LACMTA methodology also estimates the cost-benefits and the cost-effectiveness of every TCM measure and package. The difference between cost-benefit and cost-effectiveness is that the cost-benefit methodology includes all direct and indirect costs and benefits which can be quantified. This methodology includes: 1) cost to the private sector, 2) cost to the public sector, 3) cost to individuals, and 4) cost to society, such as delay costs and health costs associated with air pollution. Benefits to each of the above sectors are also included--such as savings from not having to add new infrastructure to accommodate growth in demand and health care costs avoided. Cost-effectiveness calculations include only the costs to implement a given measure and do not account for benefits derived from implementation of each measure.

In computing the costs and benefits, a number of assumptions were made regarding the cost of driving, costs associated with the construction of facilities such as roads, parking, sidewalks, showers, and transit facilities and equipment. All assumptions were developed in consultation with SCAG, CalTrans, SCAQMD, and LACMTA staff. The Technical Appendix lists the assumptions and their sources for every TCM and package. Below is a summary of the key assumptions:

**Congestion cost:** For this methodology, congestion is defined to be additional daily (i.e., weekday) travel time arising from reduced operating speeds caused by traffic volume surges. Estimates of the total daily hours of congestion were generated using the SCAG and LACMTA CMP regional transportation model. Using the total daily hours of delay as a baseline, the hours of delay savings from each TCM were then calculated based on a VT/VMT speed curve. For commute and personal trips, time costs were conservatively priced at \$5.39/hour, which is half of the 1987 statewide manufacturing wage rate.

**Value of time cost:** For commute trips, the lost-time cost is applied to the occupants of all vehicles whereas for personal trips, lost-time costs are assumed to apply only to the driver. This method best represents lost economic opportunities due to time spent in travel rather than in a productive fashion. It also accounts for the presumed discretionary nature of personal trips and non-discretionary nature of commute trips.

**Vehicle cost:** Vehicle costs include expenditures for vehicle operations (gas and oil), wear and tear (for tires and vehicle maintenance), and vehicle depreciation. The vehicle cost were then divided into two categories. First the variable cost, which is a function of commute miles driven, is estimated to account for 21.5% of the total cost. The second category is the fixed cost, which is the cost of owning a vehicle (independent of driving for commute trips) and is estimated to account for the remaining 78.5% of the total cost of owning, operating, and maintaining a vehicle. The vehicle cost data were based on 1993 Southern California Automobile Club (AAA) and the 1990 HPMS.

**Air quality cost:** The air quality costs were based on estimated health cost of air pollution. The air quality costs are calculated per mile driven. For each TCM, the air quality cost savings are a function of daily vehicle miles traveled reduced.

**Capital versus operating costs:** The costs and benefits for TCMs and packages of TCMs includes capital and operating costs and benefits for all sectors. After the estimation of costs and benefits were calculated for each sector, the total societal costs were then obtained by adding the costs and benefits to all sectors. For the cost-benefit calculations, all capital costs have been discounted over the design life of the project. The total costs and benefits are the sum of costs and benefits for the individual, society, and public and private sectors.

**Cost-benefit summary:** For every TCM, total cost-benefit =  $[(\sum_{p,i,pr,s} \text{total costs}) - (\sum_{p,i,pr,s} \text{total benefits})]$ ; where p=public, i=individual, pr=private, and s=society. These costs and benefits were then calculated per unit of emissions reduced and mobility improvement (reductions in VMT and vehicle trips). Thus, costs and benefits were estimated for trips and VMT reduced, and reductions per Ton of CO, NO<sub>x</sub>, ROG, and PM.

**Build, no-build scenarios:** For a comparison of TCM investments to other transportation investments (highway, transit, HOV), two different scenarios were presented: Scenario 1 (the build scenario) assumes that trips and vehicle miles traveled reduced by each TCM need to be accommodated by increasing capacities on the highway system. The capital and operation cost of highways to accommodate the trip reductions, which would otherwise occur through TCM implementation, were then estimated and applied to the total societal costs and benefits. Because of the fact that building new highway capacity to accommodate excessive travel would work only for the short-term, Scenario 1 considers the costs and benefits over the short and long term. Short term is roughly defined as the period immediately after new capacity is added.

In the long term, congestion levels might re-appear as a result of building highways as people shift their routes from the more congested corridors to less congested ones until all corridors become equally congested: "the equilibrium phenomenon". Scenario 2 (the no-build scenario), on the other hand, assumes that trips and VMT reduced for each TCM will be taken off the network through demand management strategies. The capital and operation costs and benefits for each TCM were then estimated and applied to estimate the total costs and benefits for Scenario 2.

Costs and benefits under the build and no-build scenarios are summarized in Table 5 of this Executive Summary.

## **B. Summary Table**

For a complete description of the methodology, the assumptions, costs per mobility unit, cost per air quality unit, and costs and benefits of individual measures, please refer to the Technical Appendix, Part III C. The Appendix includes tables listing individual costs and benefits for all sectors, as well as for society as a whole.

**SCENARIO #1 (THE BUILD SCENARIO)  
SHORT-TERM COSTS SUMMARY**

TDM/TCM STRATEGIES	TOTAL DAILY COST		NET DAILY COST PER TRIP REDUCED		NET DAILY COST PER VMT REDUCED		DAILY COST PER TON OF CO REDUCED		DAILY COST PER TON OF ROG REDUCED		DAILY COST PER TON OF NOx REDUCED		DAILY COST PER TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
<b>I) RIDESHARING OPERATION</b>														
TCM #1 TRIP REDUCTION PROGRAM FOR EMPLOYERS WITH 25-99 EMPLOYEES	\$118,190	\$230,708	\$6.93	\$6.93	\$0.51	\$0.51	\$23,257	\$23,254	\$231,745	\$231,634	\$414,702	\$414,942	\$23,638,010	\$23,070,764
TCM #2 EMPLOYER-BASED ALTERNATIVE WORK SCHEDULES	\$11,132	\$22,267	\$3.63	\$3.63	\$0.32	\$0.32	\$13,159	\$13,153	\$137,438	\$136,609	\$247,389	\$250,194	ERR	\$11,133,645
TCM #3 EMPLOYER-BASED TELECOMMUTING PROGRAM	\$5,865	\$11,732	\$3.30	\$3.30	\$0.39	\$0.39	\$13,298	\$13,286	\$150,374	\$146,645	\$266,572	\$272,827	ERR	ERR
TCM #4 EMPLOYER-BASED FLEXIBLE AND STAGGERED WORK HOURS	\$686,688	\$1,144,488	\$9.17	\$9.17	\$0.80	\$0.80	\$345,938	\$345,871	\$2,802,808	\$2,805,112	ERR	ERR	ERR	ERR
TCM #5 TRANSPORTATION MANAGEMENT ASSOCIATION AND ORGNIZATIONS (TMA/TMO)	\$69,305	\$110,886	\$9.59	\$9.59	\$0.72	\$0.72	\$32,583	\$32,585	\$326,909	\$327,097	\$587,329	\$586,698	\$34,652,383	\$36,961,960
TCM #6 COUNTY-WIDE VANPOOL PROGRAM	\$59,072	\$189,327	\$11.29	\$12.06	\$0.32	\$0.34	\$22,149	\$23,657	\$182,321	\$194,781	\$200,244	\$213,447	\$518,174	\$556,845
TCM #7 INFORMAL RIDESHARING PROGRAM-CARPOOL AND VANPOOL ONLY	\$112,285	\$224,577	\$8.12	\$8.12	\$0.63	\$0.63	\$27,952	\$27,953	\$282,834	\$282,132	\$508,077	\$509,245	\$37,428,342	\$28,072,150
<b>II) RIDESHARING FACILITIES</b>														
TCM #8 RIDESHARING PASSENGER LOADING AREA	\$27,057	\$54,121	\$8.15	\$8.15	\$0.61	\$0.61	\$27,694	\$27,712	\$276,092	\$278,975	\$501,555	\$79,124	\$27,056,980	\$27,060,555
TCM #9 CHILDCARE CENTER AT MULTI MODAL TRANSIT FACILITIES OR PARK-AND-RIDE LOCATIONS	\$165,396	\$220,647	N/A	N/A	\$3.72	\$3.71	\$383,225	\$381,743	\$2,514,187	\$2,507,355	\$4,148,409	\$4,086,060	\$165,936,357	\$220,647,262
TCM #10 ACCOMODATION OF BICYCLISTS AND WALKERS	\$36,033	\$72,074	\$8.29	\$8.29	\$2.76	\$2.76	\$45,098	\$45,131	\$600,554	\$600,619	\$1,162,362	\$1,181,548	ERR	ERR
<b>III) RIDESHARING INCENTIVES</b>														
TCM #11 TRANSIT SUBSIDIES	\$511,394	\$767,092	\$10.22	\$10.22	\$0.75	\$0.75	\$34,263	\$34,285	\$341,612	\$341,538	\$612,448	\$612,207	\$34,092,923	\$34,867,961

**SCENARIO #1 (THE BUILD SCENARIO)  
SHORT-TERM COSTS SUMMARY**

TDM/TCM STRATEGIES	TOTAL DAILY COST		NET DAILY COST PER TRIP REDUCED		NET DAILY COST PER VMT REDUCED		DAILY COST PER TON OF CO REDUCED		DAILY COST PER TON OF ROG REDUCED		DAILY COST PER TON OF NOx REDUCED		DAILY COST PER TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
TCM # 12 VANPOOL SUBSIDIES	\$516,173	\$774,254	\$15.95	\$15.95	\$0.43	\$0.43	\$30,294	\$30,295	\$247,446	\$247,445	\$419,312	\$419,423	\$19,117,526	\$19,356,352
TCM # 13 CARPOOL SUBSIDIES	\$405,753	\$480,180	\$9.13	\$7.20	\$0.70	\$0.55	\$31,308	\$24,699	\$315,761	\$249,056	\$568,282	\$447,929	\$31,211,804	\$25,272,616
TCM # 14 BICYCLING SUBSIDIES	\$74,066	\$148,144	\$8.52	\$8.52	\$2.84	\$2.84	\$43,801	\$43,816	\$602,716	\$597,353	\$1,234,462	\$1,214,292	err	\$148,143,576
TCM # 15 WALKING SUBSIDIES	\$73,059	\$146,126	\$8.41	\$8.41	\$4.20	\$4.20	\$45,491	\$45,494	\$658,191	\$658,227	\$1,378,475	\$1,378,551	err	err
TCM # 16 BUSPOOL SUBSIDY	\$276,686	\$415,035	\$13.20	\$13.20	\$0.57	\$0.57	\$33,697	\$33,702	\$299,444	\$299,448	\$519,111	\$518,794	\$25,153,309	\$25,939,678

**IV) TRANSIT IMPROVEMENTS**

TCM # 17 NEW OR EXPANDED TRANSIT SERVICES	\$34,213	\$68,433	\$9.00	\$9.00	\$0.72	\$0.72	\$32,926	\$32,930	\$330,879	\$328,057	\$558,123	\$559,091	err	\$32,586,995
TCM # 18 FEEDER SERVICES TO OR FROM FIXED ROUTE RAIL OR TRANSIT	\$12,084	\$24,023	\$6.52	\$6.52	\$1.30	\$1.30	\$30,516	\$30,521	\$377,633	\$378,175	\$755,266	\$733,431	err	err
TCM # 19 SUBSCRIPTION VANPOOL, BUSPOOL, OR SHUTTLES	\$56,084	\$112,168	\$16.05	\$16.05	\$0.80	\$0.80	\$44,582	\$44,599	\$409,371	\$407,883	\$719,024	\$714,444	\$28,041,931	\$37,389,241

**V) PARKING MANAGEMENT & PRICING**

TCM # 20 PARK-AND-RIDE LOTS	\$62,056	\$83,633	\$13.95	\$13.94	\$1.22	\$1.22	\$137,903	\$139,389	\$1,241,125	\$1,267,169	\$2,139,871	\$2,200,872	ERR	ERR
TCM # 21 PREFERENTIAL PARKING FOR RIDESHARE VEHICLES	\$17,794	\$35,588	\$8.01	\$8.01	\$0.70	\$0.70	\$28,981	\$28,957	\$296,568	\$301,594	\$539,214	\$547,510	ERR	\$35,588,120
TCM # 22 PARKING DISCOUNT FOR CARPOOLERS AND VANPOOLERS	\$48,383	\$64,514	\$8.22	\$8.22	\$0.63	\$0.63	\$28,195	\$28,184	\$284,609	\$284,201	\$514,718	\$512,013	\$24,191,739	\$32,256,845

**COSTS FOR TCMS 23.1 THROUGH 27 AND ALL THE PACKAGES ARE YET TO BE DETERMINED**

**SCENARIO #1 (THE BUILD SCENARIO)  
SHORT-TERM BENEFITS SUMMARY TABLE**

TDM/TCM STRATEGIES	TOTAL DAILY BENEFIT		NET DAILY BENEFIT PER TRIP REDUCED		NET DAILY BENEFIT PER VMT REDUCED		DAILY BENEFIT PER TON OF CO REDUCED		DAILY BENEFIT PER TON OF ROG REDUCED		DAILY BENEFIT PER TON OF NOx REDUCED		DAILY BENEFIT PER TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
<b>I) RIDESHARING OPERATION</b>														
TCM #1 TRIP REDUCTION PROGRAM FOR EMPLOYERS WITH 25-99 EMPLOYEES	\$7,006	\$13,676	\$0.41	\$0.41	\$0.03	\$0.03	\$1,379	\$1,379	\$13,738	\$13,731	\$24,584	\$24,598	\$1,401,270	\$1,367,635
TCM #2 EMPLOYER-BASED ALTERNATIVE WORK SCHEDULES	\$1,051	\$2,101	\$0.34	\$0.34	\$0.03	\$0.03	\$1,242	\$1,241	\$12,970	\$12,890	\$23,346	\$23,608	ERR	\$1,050,575
TCM #3 EMPLOYER-BASED TELECOMMUTING PROGRAM	\$457	\$913	\$0.26	\$0.26	\$0.03	\$0.03	\$1,036	\$1,035	\$11,711	\$11,419	\$20,761	\$21,244	ERR	ERR
TCM #4 EMPLOYER-BASED FLEXIBLE AND STAGGERED WORK HOURS	\$41,039	\$68,398	\$0.55	\$0.55	\$0.05	\$0.05	\$20,675	\$20,670	\$167,506	\$167,642	ERR	ERR	ERR	ERR
TCM #5 TRANSPORTATION MANAGEMENT ASSOCIATION AND ORGNIZATIONS (TMA/TMO)	\$2,884	\$4,615	\$0.40	\$0.40	\$0.03	\$0.03	\$1,356	\$1,356	\$13,605	\$13,603	\$24,442	\$24,416	\$1,442,098	\$1,538,238
TCM #6 COUNTY-WIDE VANPOOL PROGRAM	\$5,577	\$16,731	\$1.07	\$1.07	\$0.03	\$0.03	\$2,091	\$2,091	\$17,213	\$17,213	\$18,905	\$18,862	\$48,920	\$49,208
TCM #7 INFORMAL RIDESHARING PROGRAM-CARPOOL AND VANPOOL ONLY	\$5,355	\$10,710	\$0.39	\$0.39	\$0.03	\$0.03	\$1,333	\$1,333	\$13,489	\$13,455	\$24,231	\$24,286	\$1,785,022	\$1,338,766
<b>II) RIDESHARING FACILITIES</b>														
TCM #8 RIDESHARING PASSENGER LOADING AREA	\$1,324	\$2,649	\$0.40	\$0.40	\$0.03	\$0.03	\$1,356	\$1,356	\$13,514	\$13,654	\$24,526	\$3,873	\$1,324,403	\$1,324,403
TCM #9 CHILDCARE CENTER AT MULTI MODAL TRANSIT FACILITIES OR PARK-AND-RIDE LOCATIONS	\$1,341	\$1,788	N/A	N/A	\$0.03	\$0.03	\$3,097	\$3,094	\$20,320	\$20,321	\$33,528	\$33,115	\$1,341,134	\$1,788,211
TCM #10 ACCOMODATION OF BICYCLISTS AND WALKERS	\$251	\$501	\$0.06	\$0.06	\$0.02	\$0.02	\$314	\$314	\$4,179	\$4,179	\$8,088	\$8,224	ERR	ERR
<b>III) RIDESHARING INCENTIVES</b>														
TCM #11 TRANSIT SUBSIDIES	\$20,563	\$30,847	\$0.41	\$0.41	\$0.03	\$0.03	\$1,378	\$1,379	\$13,736	\$13,733	\$24,626	\$24,616	\$1,370,859	\$1,402,016

**SCENARIO #1 (THE BUILD SCENARIO)  
SHORT-TERM BENEFITS SUMMARY TABLE**

TDM/TCM STRATEGIES	TOTAL DAILY BENEFIT		NET DAILY BENEFIT PER TRIP REDUCED		NET DAILY BENEFIT PER VMT REDUCED		DAILY BENEFIT PER TON OF CO REDUCED		DAILY BENEFIT PER TON OF ROG REDUCED		DAILY BENEFIT PER TON OF NOx REDUCED		DAILY BENEFIT PER TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
TCM # 12 VANPOOL SUBSIDIES	\$36,169	\$54,254	\$1.12	\$1.12	\$0.03	\$0.03	\$2,123	\$2,123	\$17,339	\$17,339	\$29,382	\$29,390	\$1,339,599	\$1,356,346
TCM # 13 CARPOOL SUBSIDIES	\$17,362	\$26,043	\$0.39	\$0.39	\$0.03	\$0.03	\$1,340	\$1,340	\$13,512	\$13,508	\$24,317	\$24,294	\$1,335,561	\$1,370,710
TCM # 14 BICYCLING SUBSIDIES	\$784	\$1,567	\$0.09	\$0.09	\$0.03	\$0.03	\$463	\$463	\$6,370	\$6,319	\$13,059	\$12,845	ERR	\$1,567,052
TCM # 15 WALKING SUBSIDIES	\$522	\$1,024	\$0.06	\$0.06	\$0.03	\$0.03	\$325	\$325	\$4,706	\$4,706	\$9,856	\$9,856	ERR	ERR
TCM # 16 BUSPOOL SUBSIDY	\$14,679	\$22,015	\$0.70	\$0.70	\$0.24	\$0.24	\$1,788	\$1,788	\$15,886	\$15,886	\$27,540	\$27,522	\$1,334,421	\$1,376,120

**IV) TRANSIT IMPROVEMENTS**

TCM # 17 NEW OR EXPANDED TRANSIT SERVICES	\$306	\$612	\$0.08	\$0.08	\$0.01	\$0.01	\$295	\$295	\$2,960	\$2,935	\$4,994	\$5,002	\$306,112	\$291,543
TCM # 18 FEEDER SERVICES TO OR FROM FIXED ROUTE RAIL OR TRANSIT	\$278	\$555	\$0.15	\$0.15	\$0.03	\$0.03	\$703	\$702	\$8,695	\$8,695	\$17,389	\$16,864	ERR	ERR
TCM # 19 SUBSCRIPTION VANPOOL, BUSPOOL, OR SHUTTLES	\$2,104	\$4,208	\$0.60	\$0.60	\$0.03	\$0.03	\$1,673	\$1,673	\$15,358	\$15,303	\$26,975	\$26,804	\$1,052,042	\$1,402,738

**V) PARKING MANAGEMENT & PRICING**

TCM # 20 PARK-AND-RIDE LOTS	\$1,707	\$2,302	\$0.38	\$0.38	\$0.03	\$0.03	\$3,794	\$3,837	\$34,146	\$34,878	\$58,872	\$60,578	ERR	ERR
TCM # 21 PREFERENTIAL PARKING FOR RIDESHARE VEHICLES	\$767	\$1,535	\$0.35	\$0.35	\$0.03	\$0.03	\$1,250	\$1,249	\$12,789	\$13,005	\$23,252	\$23,610	ERR	\$1,534,648
TCM # 22 PARKING DISCOUNT FOR CARPOOLERS AND VANPOOLERS	\$2,299	\$3,065	\$0.39	\$0.39	\$0.03	\$0.03	\$1,340	\$1,339	\$13,523	\$13,504	\$24,457	\$24,328	\$1,149,496	\$1,532,677

**BENEFITS FOR TCMS 23.1 THROUGH 27, AND ALL THE PACKAGES, ARE YET TO BE DETERMINED**

**SCENARIO #1 (THE BUILD SCENARIO)  
SHORT-TERM COSTS-BENEFITS SUMMARY**

TDM/TCM STRATEGIES	TOTAL DAILY COST-BENEFIT		DAILY COST-BENEFIT PER TRIP REDUCED		DAILY COST-BENEFIT PER VMT REDUCED		DAILY COST-BENEFIT /TON OF CO REDUCED		DAILY COST-BENEFIT /TON OF ROG REDUCED		DAILY COST-BENEFIT /TON OF NOX REDUCED		DAILY COST-BENEFIT /TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
	<b>I) RIDESHARING OPERATION</b>													
TCM #1 TRIP REDUCTION PROGRAM FOR EMPLOYERS WITH 25-99 EMPLOYEES	\$111,184	\$217,032	\$6.52	\$6.52	\$0.48	\$0.48	\$21,878	\$21,875	\$218,007	\$217,903	\$390,118	\$390,344	\$22,236,740	\$21,703,129
TCM #2 EMPLOYER-BASED ALTERNATIVE WORK SCHEDULES	\$10,081	\$20,166	\$3.29	\$3.29	\$0.29	\$0.29	\$11,917	\$11,912	\$124,468	\$123,719	\$224,043	\$226,566	ERR	\$10,083,070
TCM #3 EMPLOYER-BASED TELECOMMUTING PROGRAM	\$5,408	\$10,819	\$3.04	\$3.04	\$0.36	\$0.36	\$12,262	\$12,251	\$138,663	\$135,226	\$245,811	\$251,583	ERR	ERR
TCM #4 EMPLOYER-BASED FLEXIBLE AND STAGGERED WORK HOURS	\$645,649	\$1,076,088	\$8.62	\$8.62	\$0.75	\$0.75	\$325,263	\$325,201	\$2,635,302	\$2,637,470	ERR	ERR	ERR	ERR
TCM #5 TRANSPORTATION MANAGEMENT ASSOCIATION AND ORGANIZATIONS (TMA/TMO)	\$66,421	\$106,271	\$9.19	\$9.19	\$0.69	\$0.69	\$31,227	\$31,229	\$313,304	\$313,494	\$562,887	\$562,282	\$33,210,285	\$35,423,722
TCM #6 COUNTY-WIDE VANPOOL PROGRAM	\$53,495	\$172,596	\$10.22	\$10.99	\$0.29	\$0.31	\$20,058	\$21,566	\$165,108	\$177,568	\$181,339	\$194,585	\$469,254	\$507,637
TCM #7 INFORMAL RIDESHARING PROGRAM-CARPOOL AND VANPOOL ONLY	\$108,930	\$213,867	\$7.73	\$7.73	\$0.60	\$0.60	\$28,619	\$26,620	\$269,345	\$268,677	\$483,846	\$484,959	\$35,643,320	\$28,733,384
<b>II) RIDESHARING FACILITIES</b>														
TCM #8 RIDESHARING PASSENGER LOADING AREA	\$25,733	\$51,472	\$7.75	\$7.75	\$0.58	\$0.58	\$26,338	\$26,356	\$262,578	\$265,321	\$477,029	\$75,251	\$25,732,577	\$25,736,152
TCM #9 CHILDCARE CENTER AT MULTI MODAL TRANSIT FACILITIES OR PARK-AND-RIDE LOCATIONS	\$164,055	\$218,859	N/A	N/A	\$3.69	\$3.68	\$380,128	\$378,649	\$2,493,867	\$2,487,034	\$4,114,881	\$4,052,945	\$164,595,223	\$218,859,051
TCM #10 ACCOMMODATION OF BICYCLISTS AND WALKERS	\$35,782	\$71,573	\$8.23	\$8.23	\$2.74	\$2.74	\$44,784	\$44,817	\$596,375	\$596,440	\$1,154,274	\$1,173,324	ERR	ERR
<b>III) RIDESHARING INCENTIVES</b>														
TCM #11 TRANSIT SUBSIDIES	\$490,831	\$736,245	\$9.81	\$9.81	\$0.72	\$0.72	\$32,905	\$32,906	\$327,876	\$327,805	\$587,822	\$587,591	\$32,722,064	\$33,465,945

**SCENARIO #1 (THE BUILD SCENARIO)  
SHORT-TERM COSTS-BENEFITS SUMMARY**

TDM/TCM STRATEGIES	TOTAL DAILY COST-BENEFIT		DAILY COST-BENEFIT PER TRIP REDUCED		DAILY COST-BENEFIT PER VMT REDUCED		DAILY COST-BENEFIT /TON OF CO REDUCED		DAILY COST-BENEFIT /TON OF ROG REDUCED		DAILY COST-BENEFIT /TON OF NOX REDUCED		DAILY COST-BENEFIT /TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
	TCM # 12 VANPOOL SUBSIDIES	\$480,004	\$720,000	\$14.83	\$14.83	\$0.40	\$0.40	\$28,171	\$28,172	\$230,107	\$230,106	\$389,930	\$390,033	\$17,777,929
TCM # 13 CARPOOL SUBSIDIES	\$388,391	\$454,137	\$8.74	\$6.81	\$0.67	\$0.52	\$29,968	\$23,359	\$302,249	\$235,548	\$543,965	\$423,635	\$29,876,243	\$23,901,906
TCM # 14 BICYCLING SUBSIDIES	\$73,284	\$146,577	\$8.43	\$8.43	\$2.81	\$2.81	\$43,338	\$43,353	\$596,346	\$591,034	\$1,221,403	\$1,201,447	err	\$146,576,524
TCM # 15 WALKING SUBSIDIES	\$72,537	\$145,102	\$8.35	\$8.35	\$4.17	\$4.17	\$45,166	\$45,169	\$653,485	\$653,521	\$1,368,619	\$1,368,695	err	err
TCM # 16 BUSPOOL SUBSIDY	\$262,007	\$393,020	\$12.50	\$12.50	\$0.33	\$0.33	\$31,909	\$31,914	\$283,558	\$283,562	\$491,571	\$491,272	\$23,818,888	\$24,563,558

**IV) TRANSIT IMPROVEMENTS**

TCM # 17 NEW OR EXPANDED TRANSIT SERVICES	\$33,907	\$67,821	\$8.92	\$8.92	\$0.71	\$0.71	\$32,631	\$32,635	\$327,919	\$325,122	\$553,129	\$554,089	err	\$32,295,452
TCM # 18 FEEDER SERVICES TO OR FROM FIXED ROUTE RAIL OR TRANSIT	\$11,806	\$23,468	\$6.37	\$6.37	\$1.27	\$1.27	\$29,813	\$29,819	\$368,938	\$369,480	\$737,877	\$716,567	err	err
TCM # 19 SUBSCRIPTION VANPOOL, BUSPOOL, OR SHUTTLES	\$53,980	\$107,960	\$15.45	\$15.45	\$0.77	\$0.77	\$42,909	\$42,928	\$394,013	\$392,580	\$692,049	\$687,640	\$26,989,889	\$35,986,503

**V) PARKING MANAGEMENT & PRICING**

TCM # 20 PARK-AND-RIDE LOTS	\$60,349	\$81,331	\$13.57	\$13.56	\$1.19	\$1.19	\$134,109	\$135,552	\$1,206,979	\$1,232,291	\$2,080,999	\$2,140,294	ERR	ERR
TCM # 21 PREFERENTIAL PARKING FOR RIDESHARE VEHICLES	\$17,027	\$34,053	\$7.66	\$7.66	\$0.67	\$0.67	\$27,731	\$27,708	\$283,779	\$288,589	\$515,962	\$523,900	ERR	\$34,053,472
TCM # 22 PARKING DISCOUNT FOR CARPOOLERS AND VANPOOLERS	\$46,084	\$61,449	\$7.83	\$7.83	\$0.60	\$0.60	\$26,855	\$26,845	\$271,086	\$270,697	\$490,281	\$487,685	\$23,042,243	\$30,724,168

**COSTS AND BENEFITS FOR TCMS 23.1 THROUGH 27 AND ALL THE PACKAGES ARE YET TO BE DETERMINED**



**SCENARIO #1 (THE BUILD SCENARIO)  
LONG-TERM COSTS SUMMARY TABLE**

TDM/TCM STRATEGIES	TOTAL DAILY COST		NET DAILY COST PER TRIP REDUCED		NET DAILY COST PER VMT REDUCED		DAILY COST PER TON OF CO REDUCED		DAILY COST PER TON OF ROG REDUCED		DAILY COST PER TON OF NOx REDUCED		DAILY COST PER TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
<b>I) RIDESHARING OPERATION</b>														
TCM #1 TRIP REDUCTION PROGRAM FOR EMPLOYERS WITH 25-99 EMPLOYEES	\$125,196	\$244,384	\$7.35	\$7.35	\$0.54	\$0.54	\$24,635	\$24,633	\$245,483	\$245,365	\$439,286	\$439,540	\$25,039,280	\$24,438,399
TCM # 2 EMPLOYER-BASED ALTERNATIVE WORK SCHEDULES	\$12,183	\$24,368	\$3.97	\$3.97	\$0.35	\$0.35	\$14,401	\$14,394	\$150,408	\$149,500	\$270,734	\$273,803	ERR	\$12,184,220
TCM # 3 EMPLOYER-BASED TELECOMMUTING PROGRAM	\$6,321	\$12,645	\$3.56	\$3.56	\$0.42	\$0.42	\$14,334	\$14,321	\$162,085	\$158,063	\$287,333	\$294,071	ERR	ERR
TCM # 4 EMPLOYER-BASED FLEXIBLE AND STAGGERED WORK HOURS	\$727,727	\$1,212,884	\$9.72	\$9.72	\$0.85	\$0.85	\$366,613	\$366,541	\$2,970,313	\$2,972,755	ERR	ERR	ERR	ERR
TCM # 5 TRANSPORTATION MANAGEMENT ASSOCIATION AND ORGANIZATIONS (TMA/TMO)	\$72,189	\$115,501	\$9.99	\$9.99	\$0.75	\$0.75	\$33,939	\$33,941	\$340,514	\$340,710	\$611,711	\$611,114	\$36,094,481	\$38,500,198
TCM # 6 COUNTY-WIDE VANPOOL PROGRAM	\$64,649	\$206,058	\$12.36	\$13.13	\$0.35	\$0.37	\$24,240	\$25,748	\$199,533	\$211,994	\$219,148	\$232,309	\$587,094	\$606,053
TCM # 7 INFORMAL RIDESHARING PROGRAM-CARPOOL AND VANPOOL ONLY	\$117,640	\$235,287	\$8.51	\$8.51	\$0.66	\$0.66	\$29,286	\$29,286	\$296,323	\$295,587	\$532,208	\$533,531	\$39,213,364	\$29,410,916
<b>II) RIDESHARING FACILITIES</b>														
TCM # 8 RIDESHARING PASSENGER LOADING AREA	\$28,381	\$56,770	\$8.55	\$8.55	\$0.64	\$0.64	\$29,050	\$29,068	\$289,606	\$292,628	\$525,581	\$82,997	\$28,381,383	\$28,384,958
TCM # 9 CHILDCARE CENTER AT MULTI MODAL TRANSIT FACILITIES OR PARK-AND-RIDE LOCATIONS	\$167,277	\$222,435	N/A	N/A	\$3.75	\$3.74	\$386,322	\$384,836	\$2,534,507	\$2,527,676	\$4,181,937	\$4,119,175	\$167,277,489	\$222,435,473
TCM # 10 ACCOMMODATION OF BICYCLISTS AND WALKERS	\$36,284	\$72,576	\$8.35	\$8.35	\$2.78	\$2.78	\$45,412	\$45,445	\$604,733	\$604,793	\$1,170,450	\$1,189,767	ERR	ERR
<b>III) RIDESHARING INCENTIVES</b>														
TCM # 11 TRANSIT SUBSIDIES	\$531,957	\$797,935	\$10.63	\$10.63	\$0.78	\$0.78	\$35,661	\$35,664	\$355,349	\$355,271	\$637,074	\$636,823	\$35,463,782	\$36,629,977

**SCENARIO #1 (THE BUILD SCENARIO)  
LONG-TERM COSTS SUMMARY TABLE**

TDM/TCM STRATEGIES	TOTAL DAILY COST		NET DAILY COST PER TRIP REDUCED		NET DAILY COST PER VMT REDUCED		DAILY COST PER TON OF CO REDUCED		DAILY COST PER TON OF ROG REDUCED		DAILY COST PER TON OF NOx REDUCED		DAILY COST PER TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
TCM # 12 VANPOOL SUBSIDIES	\$552,342	\$828,508	\$17.07	\$17.07	\$0.46	\$0.46	\$32,416	\$32,418	\$264,785	\$264,784	\$448,694	\$448,613	\$20,457,127	\$20,712,698
TCM # 13 CARPOOL SUBSIDIES	\$423,116	\$506,223	\$9.52	\$7.59	\$0.73	\$0.58	\$32,647	\$26,039	\$329,273	\$262,564	\$592,599	\$472,223	\$32,547,365	\$26,643,326
TCM # 14 BICYCLING SUBSIDIES	\$74,851	\$149,771	\$8.61	\$8.61	\$2.87	\$2.87	\$44,264	\$44,280	\$608,547	\$603,672	\$1,227,136	\$1,431,744	\$149,710,628	ERR
TCM # 15 WALKING SUBSIDIES	\$73,582	\$147,171	\$8.47	\$8.47	\$4.23	\$4.23	\$45,817	\$45,819	\$662,897	\$662,933	\$1,388,331	\$1,338,407	ERR	ERR
TCM # 16 BUSPOOL SUBSIDY	\$291,365	\$437,053	\$13.90	\$13.90	\$0.60	\$0.60	\$35,485	\$35,489	\$315,330	\$315,334	\$546,651	\$546,316	\$26,487,730	\$27,315,798

**IV) TRANSIT IMPROVEMENTS**

TCM # 17 NEW OR EXPANDED TRANSIT SERVICES	\$34,519	\$69,045	\$9.08	\$9.08	\$0.73	\$0.73	\$33,220	\$33,225	\$333,840	\$330,992	\$563,116	\$564,093	ERR	\$32,878,536
TCM # 18 FEEDER SERVICES TO OR FROM FIXED ROUTE RAIL OR TRANSIT	\$12,362	\$24,760	\$6.68	\$6.68	\$1.34	\$1.32	\$31,218	\$31,223	\$386,328	\$386,871	\$772,656	\$750,295	ERR	ERR
TCM # 19 SUBSCRIPTION VANPOOL, BUSPOOL, OR SHUTTLES	\$58,188	\$116,376	\$16.65	\$16.65	\$0.83	\$0.83	\$46,254	\$46,273	\$424,730	\$423,185	\$745,999	\$741,248	\$29,093,972	\$38,791,979

**V) PARKING MANAGEMENT & PRICING**

TCM # 20 PARK-AND-RIDE LOTS	\$63,764	\$85,935	\$14.33	\$14.32	\$1.26	\$1.26	\$141,697	\$143,225	\$1,275,221	\$1,302,047	\$2,198,743	\$2,261,450		
TCM # 21 PREFERENTIAL PARKING FOR RIDESHARE VEHICLES	\$18,561	\$37,123	\$8.35	\$8.35	\$0.73	\$0.73	\$30,230	\$30,206	\$309,356	\$314,600	\$562,466	\$571,120		\$37,122,768
TCM # 22 PARKING DISCOUNT FOR CARPOOLERS AND VANPOOLERS	\$50,682	\$67,759	\$8.61	\$8.61	\$0.66	\$0.66	\$29,535	\$29,523	\$298,132	\$297,705	\$539,175	\$536,342	\$25,341,234	\$33,789,522

**COSTS FOR TCMS 23.1 THROUGH 27 AND ALL THE PACKAGES ARE YET TO BE DETERMINED**

**SCENARIO #1 (THE BUILD SCENARIO)  
LONG-TERM BENEFITS SUMMARY TABLE**

TDM/TCM STRATEGIES	TOTAL DAILY BENEFIT		NET DAILY BENEFIT PER TRIP REDUCED		NET DAILY BENEFIT PER VMT REDUCED		DAILY BENEFIT PER TON OF CO REDUCED		DAILY BENEFIT PER TON OF ROG REDUCED		DAILY BENEFIT PER TON OF NOx REDUCED		DAILY BENEFIT PER TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
<b>I) RIDESHARING OPERATION</b>														
TCM #1 TRIP REDUCTION PROGRAM FOR EMPLOYERS WITH 25-99 EMPLOYEES	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM #2 EMPLOYER-BASED ALTERNATIVE WORKSCHEDULES	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM #3 EMPLOYER-BASED TELECOMMUTING PROGRAM	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM #4 EMPLOYER-BASED FLEXIBLE AND STAGGERED WORK HOURS	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM #5 TRANSPORTATION MANAGEMENT ASSOCIATION AND ORGNIZATIONS (TMA/TMO)	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM #6 COUNTY-WIDE VANPOOL PROGRAM	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM #7 INFORMAL RIDESHARING PROGRAM-CARPOOL AND VANPOOL ONLY	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>II) RIDESHARING FACILITIES</b>														
TCM #8 RIDESHARING PASSENGER LOADING AREA	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM #9 CHILDCARE CENTER AT MULTI MODAL TRANSIT FACILITIES OR PARK-AND-RIDE LOCATIONS	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM #10 ACCOMODATION OF BICYCLISTS AND WALKERS	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>III) RIDESHARING INCENTIVES</b>														
TCM #11 TRANSIT SUBSIDIES	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

**SCENARIO #1 (THE BUILD SCENARIO)  
LONG-TERM BENEFITS SUMMARY TABLE**

TDM/TCM STRATEGIES	TOTAL DAILY BENEFIT		NET DAILY BENEFIT PER TRIP REDUCED		NET DAILY BENEFIT PER VMT REDUCED		DAILY BENEFIT PER TON OF CO REDUCED		DAILY BENEFIT PER TON OF ROG REDUCED		DAILY BENEFIT PER TON OF NOx REDUCED		DAILY BENEFIT PER TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
TCM # 12 VANPOOL SUBSIDIES	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM # 13 CARPOOL SUBSIDIES	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM # 14 BICYCLING SUBSIDIES	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM # 15 WALKING SUBSIDIES	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM # 16 BUSPOOL SUBSIDY	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

**IV) TRANSIT IMPROVEMENTS**

TCM # 17 NEW OR EXPANDED TRANSIT SERVICES	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM # 18 FEEDER SERVICES TO OR FROM FIXED ROUTE RAIL OR TRANSIT	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM # 19 SUBSCRIPTION VANPOOL, BUSPOOL, OR SHUTTLES	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

**V) PARKING MANAGEMENT & PRICING**

TCM # 20 PARK-AND-RIDE LOTS	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM # 21 PREFERENTIAL PARKING FOR RIDESHARE VEHICLES	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
TCM # 22 PARKING DISCOUNT FOR CARPOOLERS AND VANPOOLERS	\$0	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

**COSTS AND BENEFITS FOR TCMS 23.1 THROUGH 27, AND ALL THE PACKAGES, ARE YET TO BE DETERMINED**

**SCENARIO #1 (THE BUILD SCENARIO)  
LONG-TERM COSTS-BENEFITS SUMMARY TABLE**

TDM/TCM STRATEGIES	TOTAL DAILY COST-BENEFIT		DAILY COST-BENEFIT PER TRIP REDUCED		DAILY COST-BENEFIT PER VMT REDUCED		DAILY COST-BENEFIT /TON OF CO REDUCED		DAILY COST-BENEFIT /TON OF ROG REDUCED		DAILY COST-BENEFIT /TON OF NOx REDUCED		DAILY COST-BENEFIT /TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
	<b>I) RIDESHARING OPERATION</b>													
TCM # 1 TRIP REDUCTION PROGRAM FOR EMPLOYERS WITH 25-99 EMPLOYEES	\$125,196	\$244,384	\$7.35	\$7.35	\$0.54	\$0.54	\$24,635	\$24,633	\$245,483	\$245,365	\$439,286	\$439,540	\$25,039,280	\$24,438,399
TCM # 2 EMPLOYER-BASED ALTERNATIVE WORK SCHEDULES	\$12,183	\$24,368	\$3.97	\$3.97	\$0.35	\$0.35	\$14,401	\$14,394	\$150,408	\$149,500	\$270,734	\$273,803	ERR	\$12,184,220
TCM # 3 EMPLOYER-BASED TELECOMMUTING PROGRAM	\$6,321	\$12,645	\$3.56	\$3.56	\$0.42	\$0.42	\$14,334	\$14,321	\$162,085	\$158,063	\$287,333	\$294,071	ERR	ERR
TCM # 4 EMPLOYER-BASED FLEXIBLE AND STAGGERED WORK HOURS	\$727,727	\$1,212,884	\$9.72	\$9.72	\$0.85	\$0.85	\$366,613	\$366,541	\$2,970,313	\$2,972,755	ERR	ERR	ERR	ERR
TCM # 5 TRANSPORTATION MANAGEMENT ASSOCIATION AND ORGNIZATIONS (TMA/TMO)	\$72,189	\$115,501	\$9.99	\$9.99	\$0.75	\$0.75	\$33,939	\$33,941	\$340,514	\$340,710	\$611,711	\$611,114	\$36,094,481	\$38,500,198
TCM # 6 COUNTY-WIDE VANPOOL PROGRAM	\$64,649	\$206,058	\$12.36	\$13.13	\$0.35	\$0.37	\$24,240	\$25,748	\$199,533	\$211,994	\$219,148	\$232,309	\$567,094	\$606,053
TCM # 7 INFORMAL RIDESHARING PROGRAM-CARPOOL AND VANPOOL ONLY	\$117,640	\$235,287	\$8.51	\$8.51	\$0.66	\$0.66	\$29,286	\$29,266	\$296,323	\$295,587	\$532,208	\$533,531	\$39,213,364	\$29,410,916
<b>II) RIDESHARING FACILITIES</b>														
TCM # 8 RIDESHARING PASSENGER LOADING AREA	\$28,381	\$56,770	\$8.55	\$8.55	\$0.64	\$0.64	\$29,050	\$29,068	\$289,606	\$292,628	\$525,581	\$82,997	\$28,381,383	\$28,384,958
TCM # 9 CHILDCARE CENTER AT MULTI MODAL TRANSIT FACILITIES OR PARK-AND-RIDE LOCATIONS	\$167,277	\$222,435	N/A	N/A	\$3.75	\$3.74	\$386,322	\$384,836	\$2,534,507	\$2,527,676	\$4,181,937	\$4,119,175	\$187,277,489	\$222,435,473
TCM # 10 ACCOMMODATION OF BICYCLISTS AND WALKERS	\$36,284	\$72,576	\$8.35	\$8.35	\$2.78	\$2.78	\$45,412	\$45,445	\$604,733	\$604,793	\$1,170,450	\$1,189,767	ERR	ERR
<b>III) RIDESHARING INCENTIVES</b>														
TCM # 11 TRANSIT SUBSIDIES	\$531,957	\$797,935	\$10.63	\$10.63	\$0.78	\$0.78	\$35,661	\$35,664	\$355,349	\$355,271	\$637,074	\$636,823	\$35,463,782	\$36,629,977
TCM # 12 VANPOOL SUBSIDIES	\$552,342	\$828,508	\$17.07	\$17.07	\$0.46	\$0.46	\$32,416	\$32,418	\$264,785	\$264,784	\$448,694	\$448,613	\$20,457,127	\$20,712,698

**SCENARIO #1 (THE BUILD SCENARIO)  
LONG-TERM COSTS-BENEFITS SUMMARY TABLE**

TDM/TCM STRATEGIES	TOTAL DAILY COST-BENEFIT		DAILY COST-BENEFIT PER TRIP REDUCED		DAILY COST-BENEFIT PER VMT REDUCED		DAILY COST-BENEFIT /TON OF CO. REDUCED		DAILY COST-BENEFIT /TON OF ROG REDUCED		DAILY COST-BENEFIT /TON OF NO. REDUCED		DAILY COST-BENEFIT /TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
TCM # 13 CARPOOL SUBSIDIES	\$423,116	\$506,223	\$9.52	\$7.59	\$0.73	\$0.58	\$32,647	\$26,039	\$329,273	\$262,564	\$592,599	\$472,223	\$32,547,365	\$26,643,326
TCM # 14 BICYCLING SUBSIDIES	\$74,851	\$149,771	\$8.61	\$8.61	\$2.87	\$2.87	\$44,264	\$44,280	\$608,547	\$603,672	\$1,227,136	\$1,431,744	\$149,710,628	ERR
TCM # 15 WALKING SUBSIDIES	\$73,582	\$147,171	\$8.47	\$8.47	\$4.23	\$4.23	\$45,817	\$45,819	\$662,897	\$662,933	\$1,388,331	\$1,338,407	ERR	ERR
TCM # 16 BUSPOOL SUBSIDY	\$291,365	\$437,053	\$13.90	\$13.90	\$0.60	\$0.60	\$35,485	\$35,489	\$315,330	\$315,334	\$546,651	\$546,316	\$26,487,730	\$27,315,798

**IV) TRANSIT IMPROVEMENTS**

TCM # 17 NEW OR EXPANDED TRANSIT SERVICES	\$34,519	\$69,045	\$9.08	\$9.08	\$0.73	\$0.73	\$33,220	\$33,225	\$333,840	\$330,992	\$563,116	\$564,093	ERR	\$32,878,536
TCM # 18 FEEDER SERVICES TO OR FROM FIXED ROUTE RAIL OR TRANSIT	\$12,362	\$24,760	\$6.68	\$6.68	\$1.34	\$1.32	\$31,218	\$31,223	\$386,328	\$386,871	\$772,656	\$750,295	ERR	ERR
TCM # 19 SUBSCRIPTION VANPOOL, BUSPOOL, OR SHUTTLES	\$58,188	\$116,376	\$16.65	\$16.65	\$0.83	\$0.83	\$46,254	\$46,273	\$424,730	\$423,185	\$745,999	\$741,248	\$29,093,972	\$38,791,979

**V) PARKING MANAGEMENT & PRICING**

TCM # 20 PARK-AND-RIDE LOTS	\$63,764	\$85,935	\$14.33	\$14.32	\$1.26	\$1.26	\$141,697	\$143,225	\$1,275,221	\$1,302,047	\$2,198,743	\$2,261,450	ERR	ERR
TCM # 21 PREFERENTIAL PARKING FOR RIDESHARE VEHICLES	\$18,561	\$37,123	\$8.35	\$8.35	\$0.73	\$0.73	\$30,230	\$30,206	\$309,356	\$314,600	\$562,466	\$571,120	ERR	\$37,122,768
TCM # 22 PARKING DISCOUNT FOR CARPOOLERS AND VANPOOLERS	\$50,882	\$67,759	\$8.61	\$8.61	\$0.66	\$0.66	\$29,535	\$29,523	\$298,132	\$297,705	\$539,175	\$536,342	\$25,341,234	\$33,789,522

COSTS AND BENEFITS ARE YET TO BE DETERMINED FOR TCMS 23.1 THROUGH 27 AND ALL THE PACKAGES

**SCENARIO #2 (NO BUILD SCENARIO)  
COST SUMMARY TABLE**

TDM/TCM STRATEGIES	TOTAL DAILY COST		NET DAILY COST PER TRIP REDUCED		NET DAILY COST PER VMT REDUCED		DAILY COST PER TON OF CO REDUCED		DAILY COST PER TON OF ROG REDUCED		DAILY COST PER TON OF NOx REDUCED		DAILY COST PER TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
<b>I) RIDESHARING OPERATION</b>														
TCM #1 TRIP REDUCTION PROGRAM FOR EMPLOYERS WITH 25-99 EMPLOYEES	\$794,806	\$355,201	\$46.63	\$25.22	\$3.41	\$1.84	\$156,396	\$84,574	\$1,558,443	\$842,428	\$2,788,792	\$1,509,098	\$158,961,151	\$83,905,862
TCM #2 EMPLOYER-BASED ALTERNATIVE WORK SCHEDULES	\$3,059	\$3,118	\$1.00	\$0.51	\$0.09	\$0.04	\$3,616	\$1,842	\$37,766	\$19,128	\$67,977	\$35,033	ERR	\$1,558,971
TCM #3 EMPLOYER-BASED TELECOMMUTING PROGRAM	\$3,743	\$5,487	\$2.11	\$1.54	\$0.25	\$0.18	\$8,487	\$6,214	\$95,970	\$65,583	\$170,128	\$127,596	ERR	ERR
TCM #4 EMPLOYER-BASED FLEXIBLE AND STAGGERED WORK HOURS	\$9,756	\$13,304	\$0.13	\$0.11	\$0.01	\$0.01	\$4,915	\$4,021	\$39,821	\$32,607	ERR	ERR	ERR	ERR
TCM #5 TRANSPORTATION MANAGEMENT ASSOCIATION AND ORGANIZATIONS (TMA/TMO)	\$61,365	\$68,664	\$8.49	\$5.94	\$0.64	\$0.45	\$28,850	\$20,177	\$289,457	\$202,548	\$520,041	\$363,300	\$30,682,427	\$22,887,886
TCM #6 COUNTY-WIDE VANPOOL PROGRAM	\$85,736	\$121,965	\$16.39	\$7.77	\$0.46	\$0.23	\$32,147	\$15,240	\$264,617	\$125,478	\$290,631	\$137,502	\$752,072	\$358,720
TCM #7 INFORMAL RIDESHARING PROGRAM-CARPOOL AND VANPOOL ONLY	\$219,260	\$243,486	\$15.86	\$8.80	\$1.23	\$0.68	\$54,583	\$30,306	\$552,293	\$305,887	\$992,128	\$552,122	\$73,086,791	\$30,435,763
<b>II) RIDESHARING FACILITIES</b>														
TCM #8 RIDESHARING PASSENGER LOADING AREA	\$17,308	\$23,100	\$5.22	\$3.48	\$0.39	\$0.26	\$17,714	\$11,828	\$176,593	\$119,070	\$320,484	\$33,771	\$17,306,115	\$11,549,823
TCM #9 CHILDCARE CENTER AT MULTI MODAL TRANSIT FACILITIES OR PARK-AND-RIDE LOCATIONS	\$219,900	\$267,141	N/A	N/A	\$4.93	\$4.49	\$507,853	\$462,182	\$3,331,823	\$3,035,698	\$5,497,508	\$4,947,063	\$219,900,319	\$267,141,385
TCM #10 ACCOMODATION OF BICYCLISTS AND WALKERS	\$68,046	\$79,351	\$15.66	\$9.13	\$5.22	\$3.04	\$85,164	\$49,687	\$1,134,102	\$661,263	\$2,195,037	\$1,300,845	ERR	ERR
<b>III) RIDESHARING INCENTIVES</b>														
TCM #11 TRANSIT SUBSIDIES	\$145,470	\$218,205	\$2.91	\$2.91	\$0.21	\$0.21	\$9,752	\$9,753	\$97,175	\$97,254	\$174,216	\$174,418	\$9,698,020	\$9,918,496

**SCENARIO #2 (NO BUILD SCENARIO)  
COST SUMMARY TABLE**

TDM/TCM STRATEGIES	TOTAL DAILY COST		NET DAILY COST PER TRIP REDUCED		NET DAILY COST PER VMT REDUCED		DAILY COST PER TON OF CO REDUCED		DAILY COST PER TON OF ROG REDUCED		DAILY COST PER TON OF NOX REDUCED		DAILY COST PER TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
TCM # 12 VANPOOL SUBSIDIES	\$265,249	\$339,045	\$8.20	\$6.99	\$0.22	\$0.19	\$15,567	\$13,266	\$127,157	\$108,356	\$215,474	\$183,665	\$9,824,019	\$8,476,127
TCM # 13 CARPOOL SUBSIDIES	\$117,529	\$73,335	\$2.64	\$1.10	\$0.20	\$0.08	\$9,069	\$3,772	\$91,462	\$38,037	\$164,606	\$68,409	\$9,040,684	\$3,859,726
TCM # 14 BICYCLING SUBSIDIES	\$85,905	\$114,505	\$9.88	\$6.50	\$3.29	\$2.20	\$50,801	\$33,867	\$698,412	\$461,712	\$1,431,744	\$938,563	ERR	\$114,504,677
TCM # 15 WALKING SUBSIDIES	\$59,437	\$73,308	\$6.84	\$4.22	\$3.42	\$2.11	\$37,009	\$22,823	\$535,470	\$330,218	\$1,121,457	\$691,589	ERR	ERR
TCM # 16 BUSPOOL SUBSIDY	\$164,374	\$212,194	\$7.84	\$6.70	\$0.34	\$0.29	\$20,019	\$17,230	\$177,893	\$153,097	\$308,393	\$265,240	\$14,943,054	\$13,262,013

**IV) TRANSIT IMPROVEMENTS**

TCM # 17 NEW OR EXPANDED TRANSIT SERVICES	\$245,266	\$247,639	\$64.53	\$32.57	\$5.16	\$2.60	\$236,037	\$119,166	\$2,372,015	\$1,187,147	\$4,001,083	\$2,023,194		\$117,923,299
TCM # 18 FEEDER SERVICES TO OR FROM FIXED ROUTE RAIL OR TRANSIT	\$13,892	\$13,892	\$7.50	\$3.75	\$1.50	\$0.75	\$35,081	\$17,518	\$434,127	\$217,064	\$866,254	\$420,972	ERR	ERR
TCM # 19 SUBSCRIPTION VANPOOL, BUSPOOL, OR SHUTTLES	\$32,517	\$44,613	\$9.31	\$6.38	\$0.46	\$0.32	\$25,848	\$17,738	\$237,348	\$162,223	\$416,881	\$284,149	\$16,258,353	\$14,870,440

**V) PARKING MANAGEMENT & PRICING**

TCM # 20 PARK-AND-RIDE LOTS	\$29,479	\$36,141	\$6.62	\$6.02	\$0.58	\$0.53	\$65,509	\$60,235	\$589,584	\$547,591	\$1,016,524	\$951,078	ERR	ERR
TCM # 21 PREFERENTIAL PARKING FOR RIDESHARE VEHICLES	\$3,534	\$7,067	\$1.59	\$1.59	\$0.14	\$0.14	\$5,755	\$5,751	\$58,895	\$59,893	\$107,082	\$108,729	ERR	\$706,412
TCM # 22 PARKING DISCOUNT FOR CARPOOLERS AND VANPOOLERS	\$10,311	\$13,748	\$1.75	\$1.75	\$0.13	\$0.13	\$6,009	\$6,006	\$60,852	\$60,564	\$109,691	\$109,111	\$5,155,458	\$6,874,001

**COSTS ARE YET TO BE DETERMINED FOR TCMS 23.1 THROUGH 27 AND ALL THE PACKAGES**



**SCENARIO #2 (THE NO BUILD SCENARIO)  
BENEFITS SUMMARY TABLE**

TDM/TCM STRATEGIES	TOTAL DAILY BENEFIT		NET DAILY BENEFIT PER TRIP REDUCED		NET DAILY BENEFIT PER VMT REDUCED		DAILY BENEFIT PER TON OF CO REDUCED		DAILY BENEFIT PER TON OF ROG REDUCED		DAILY BENEFIT PER TON OF NOx REDUCED		DAILY BENEFIT PER TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
<b>I) RIDESHARING OPERATION</b>														
TCM # 1 TRIP REDUCTION PROGRAM FOR EMPLOYERS WITH 25-99 EMPLOYEES	\$146,618	\$268,824	\$8.60	\$8.08	\$0.63	\$0.59	\$28,851	\$27,098	\$287,487	\$269,904	\$514,450	\$483,496	\$29,323,667	\$26,882,395
TCM # 2 EMPLOYER-BASED ALTERNATIVE WORK SCHEDULES	\$12,183	\$24,368	\$3.97	\$3.97	\$0.35	\$0.35	\$14,401	\$14,394	\$150,408	\$149,500	\$270,734	\$273,803	ERR	\$12,184,220
TCM # 3 EMPLOYER-BASED TELECOMMUTING PROGRAM	\$8,321	\$12,645	\$3.56	\$3.56	\$0.42	\$0.42	\$14,334	\$14,321	\$162,085	\$158,063	\$287,333	\$294,071	ERR	ERR
TCM # 4 EMPLOYER-BASED FLEXIBLE AND STAGGERED WORK HOURS	\$53,843	\$89,738	\$0.72	\$0.72	\$0.06	\$0.06	\$27,125	\$27,119	\$219,766	\$219,946	ERR	ERR	ERR	ERR
TCM # 5 TRANSPORTATION MANAGEMENT ASSOCIATION AND ORGNIZATIONS (TMA/TMO)	\$72,189	\$115,501	\$9.99	\$9.99	\$0.75	\$0.75	\$33,939	\$33,940	\$340,514	\$340,710	\$611,771	\$611,114	\$36,094,481	\$38,500,198
TCM # 6 COUNTY-WIDE VANPOOL PROGRAM	\$82,760	\$260,397	\$15.82	\$16.59	\$0.45	\$0.47	\$31,031	\$32,537	\$255,430	\$267,899	\$280,540	\$293,571	\$725,961	\$765,875
TCM # 7 INFORMAL RIDESHARING PROGRAM-CARPOOL AND VANPOOL ONLY	\$117,640	\$235,287	\$8.51	\$8.51	\$0.66	\$0.66	\$29,285	\$29,286	\$296,322	\$295,587	\$532,308	\$533,531	\$39,213,363	\$29,410,916
<b>II) RIDESHARING FACILITIES</b>														
TCM # 8 RIDESHARING PASSENGER LOADING AREA	\$28,381	\$56,770	\$8.55	\$8.55	\$0.64	\$0.64	\$29,050	\$29,068	\$289,606	\$292,628	\$525,581	\$82,997	\$28,381,383	\$28,384,958
TCM # 9 CHILDCARE CENTER AT MULTI MODAL TRANSIT FACILITIES OR PARK-AND-RIDE LOCATIONS	\$167,277	\$222,435	N/A	N/A	\$3.75	\$3.74	\$386,322	\$384,836	\$2,534,507	\$2,527,675	\$4,181,937	\$4,119,175	\$167,277,489	\$222,435,473
TCM # 10 ACCOMODATION OF BICYCLISTS AND WALKERS	\$36,284	\$72,576	\$8.35	\$8.35	\$2.78	\$2.78	\$45,412	\$45,445	\$604,733	\$604,793	\$1,170,450	\$1,189,767	ERR	ERR
<b>III) RIDESHARING INCENTIVES</b>														
TCM # 11 TRANSIT SUBSIDIES	\$547,564	\$821,351	\$10.95	\$10.95	\$0.80	\$0.80	\$36,707	\$36,710	\$365,775	\$365,695	\$655,766	\$655,508	\$36,504,298	\$37,334,148
TCM # 12 VANPOOL SUBSIDIES	\$552,342	\$828,508	\$17.07	\$17.07	\$0.46	\$0.46	\$32,416	\$32,418	\$264,785	\$264,784	\$448,694	\$448,813	\$20,457,127	\$20,712,698

**SCENARIO #2 (THE NO BUILD SCENARIO)  
BENEFITS SUMMARY TABLE**

TDM/TCM STRATEGIES	TOTAL DAILY BENEFIT		NET DAILY BENEFIT PER TRIP REDUCED		NET DAILY BENEFIT PER VMT REDUCED		DAILY BENEFIT PER TON OF CO REDUCED		DAILY BENEFIT PER TON OF ROG REDUCED		DAILY BENEFIT PER TON OF NOx REDUCED		DAILY BENEFIT PER TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
	TCM # 13 CARPOOL SUBSIDIES	\$371,057	\$428,135	\$8.35	\$6.42	\$0.64	\$0.49	\$28,631	\$22,022	\$288,760	\$222,062	\$519,688	\$399,380	\$28,542,845
TCM # 14 BICYCLING SUBSIDIES	\$74,851	\$149,711	\$8.61	\$8.61	\$0.13	\$0.17	\$44,624	\$44,280	\$608,547	\$603,672	\$1,247,520	\$1,227,138	ERR	\$149,710,628
TCM # 15 WALKING SUBSIDIES	\$73,581	\$147,171	\$8.47	\$8.47	\$4.23	\$4.23	\$45,817	\$45,819	\$662,897	\$662,933	\$1,388,331	\$1,388,407	ERR	ERR
TCM # 16 BUSPOOL SUBSIDY	\$291,365	\$437,053	\$13.90	\$13.90	\$0.60	\$0.60	\$35,485	\$35,489	\$315,330	\$315,334	\$546,651	\$546,316	\$26,487,730	\$27,315,798

**IV) TRANSIT IMPROVEMENTS**

TCM # 17 NEW OR EXPANDED TRANSIT SERVICES	\$36,891	\$71,650	\$9.71	\$99.42	\$0.78	\$0.75	\$35,503	\$34,479	\$356,779	\$343,480	\$601,810	\$585,375		\$34,118,976
TCM # 18 FEEDER SERVICES TO OR FROM FIXED ROUTE RAIL OR TRANSIT	\$16,992	\$34,020	\$9.18	\$9.18	\$1.84	\$1.84	\$42,910	\$42,900	\$531,015	\$531,558	\$1,062,031	\$1,030,901	ERR	ERR
TCM # 19 SUBSCRIPTION VANPOOL, BUSPOOL, OR SHUTTLES	\$58,188	\$117,376	\$16.65	\$16.65	\$0.83	\$0.83	\$46,254	\$46,273	\$424,730	\$423,185	\$745,999	\$741,248	\$29,093,972	\$38,791,979

**V) PARKING MANAGEMENT & PRICING**

TCM # 20 PARK-AND-RIDE LOTS	\$74,889	\$100,935	\$16.83	\$16.82	\$1.48	\$1.48	\$166,419	\$168,225	\$1,497,771	\$1,529,320	\$2,582,364	\$2,656,187	ERR	ERR
TCM # 21 PREFERENTIAL PARKING FOR RIDESHARE VEHICLES	\$18,561	\$37,123	\$8.35	\$8.35	\$0.73	\$0.73	\$30,230	\$30,206	\$309,956	\$314,560	\$562,466	\$571,120	ERR	\$37,122,768
TCM # 22 PARKING DISCOUNT FOR CARPOOLERS AND VANPOOLERS	\$50,682	\$67,579	\$8.61	\$8.61	\$0.66	\$0.66	\$29,535	\$29,523	\$298,132	\$297,705	\$539,175	\$536,642	\$25,341,234	\$33,789,522

BENEFITS ARE YET TO BE DETERMINED FOR TCMS 23.1 THROUGH 27 AND ALL THE PACKAGES

**SCENARIO #2 (NO BUILD SCENARIO)  
COST-BENEFIT SUMMARY TABLE**

TDM/TCM STRATEGIES	TOTAL DAILY COST-BENEFIT		NET DAILY COST-BENEFIT/TRIP REDUCED		NET DAILY COST-BENEFIT/VMT REDUCED		DAILY COST-BENEFIT /TON OF CO REDUCED		DAILY COST-BENEFIT /TON OF ROG REDUCED		DAILY COST-BENEFIT /TON OF NOx REDUCED		DAILY COST-BENEFIT /TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
	<b>I) RIDESHARING OPERATION</b>													
TCM # 1 TRIP REDUCTION PROGRAM FOR EMPLOYERS WITH 25-99 EMPLOYEES	\$648,187	\$570,235	\$38.03	\$17.14	\$2.78	\$1.25	\$127,548	\$57,478	\$1,270,956	\$572,525	\$2,274,342	\$1,025,602	\$129,637,484	\$57,023,467
TCM # 2 EMPLOYER-BASED ALTERNATIVE WORK SCHEDULES	(\$9,124)	(\$21,250)	(\$2.97)	(\$3.46)	(\$0.26)	(\$0.31)	(\$10,785)	(\$12,552)	(\$112,643)	(\$130,372)	(\$202,757)	(\$238,770)	ERR	(\$10,625,249)
TCM # 3 EMPLOYER-BASED TELECOMMUTING PROGRAM	(\$2,578)	(\$7,158)	(\$1.45)	(\$2.02)	(\$0.17)	(\$0.24)	(\$5,847)	(\$8,107)	(\$68,115)	(\$92,480)	(\$117,205)	(\$166,475)	ERR	ERR
TCM # 4 EMPLOYER-BASED FLEXIBLE AND STAGGERED WORK HOURS	(\$44,087)	(\$78,434)	(\$0.59)	(\$0.61)	(\$0.05)	(\$0.05)	(\$22,210)	(\$23,098)	(\$179,945)	(\$187,339)	ERR	ERR	ERR	ERR
TCM # 5 TRANSPORTATION MANAGEMENT ASSOCIATION AND ORGNIZATIONS (TMA/TMO)	(\$10,824)	(\$46,837)	(\$1.50)	(\$4.05)	(\$0.11)	(\$0.30)	(\$5,089)	(\$13,763)	(\$51,057)	(\$138,162)	(\$91,730)	(\$247,814)	(\$5,412,054)	(\$15,812,312)
TCM # 6 COUNTY-WIDE VANPOOL PROGRAM	\$2,976	(\$138,432)	\$0.57	(\$6.82)	\$0.01	(\$0.24)	\$1,116	(\$17,297)	\$9,187	(\$142,421)	\$10,091	(\$156,069)	\$26,111	(\$407,155)
TCM # 7 INFORMAL RIDESHARING PROGRAM-CARPOOL AND VANPOOL ONLY	\$101,620	\$8,199	\$7.35	\$0.29	\$0.57	\$0.02	\$25,298	\$1,020	\$255,971	\$10,300	\$459,820	\$18,591	\$33,873,428	\$1,024,847
<b>II) RIDESHARING FACILITIES</b>														
TCM # 8 RIDESHARING PASSENGER LOADING AREA	(\$11,075)	(\$33,670)	(\$3.33)	(\$5.07)	(\$0.25)	(\$0.38)	(\$11,336)	(\$17,240)	(\$113,013)	(\$173,558)	(\$205,097)	(\$49,226)	(\$11,075,268)	(\$16,835,135)
TCM # 9 CHILDCARE CENTER AT MULTI MODAL TRANSIT FACILITIES OR PARK-AND-RIDE LOCATIONS	\$52,623	\$44,706	N/A	N/A	\$1.18	\$0.75	\$121,531	\$77,346	\$797,316	\$508,023	\$1,315,571	\$827,888	\$52,622,830	\$44,705,912
TCM # 10 ACCOMODATION OF BICYCLISTS AND WALKERS	\$31,762	\$6,775	\$7.31	\$0.78	\$2.44	\$0.26	\$39,752	\$4,242	\$529,369	\$56,470	\$1,024,587	\$111,078	ERR	ERR
<b>III) RIDESHARING INCENTIVES</b>														
TCM # 11 TRANSIT SUBSIDIES	(\$402,094)	(\$603,146)	(\$8.04)	(\$8.04)	(\$0.59)	(\$0.59)	(\$26,955)	(\$26,957)	(\$268,600)	(\$268,441)	(\$481,550)	(\$481,090)	(\$26,806,278)	(\$27,415,652)
TCM # 12 VANPOOL SUBSIDIES	(\$287,093)	(\$489,463)	(\$8.87)	(\$10.08)	(\$0.24)	(\$0.27)	(\$16,849)	(\$19,152)	(\$137,628)	(\$156,428)	(\$233,220)	(\$265,148)	(\$10,633,108)	(\$12,236,571)

**SCENARIO #2 (NO BUILD SCENARIO)  
COST-BENEFIT SUMMARY TABLE**

TDM/TCM STRATEGIES	TOTAL DAILY COST-BENEFIT		NET DAILY COST-BENEFIT/TRIP REDUCED		NET DAILY COST-BENEFIT/MT REDUCED		DAILY COST-BENEFIT /TON OF CO REDUCED		DAILY COST-BENEFIT /TON OF ROG REDUCED		DAILY COST-BENEFIT /TON OF NOx REDUCED		DAILY COST-BENEFIT /TON OF PM REDUCED	
	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH	STANDARD	HIGH
	TCM # 13 CARPOOL SUBSIDIES	(\$253,528)	(\$354,800)	(\$5.71)	(\$5.32)	(\$0.44)	(\$0.41)	(\$19,562)	(\$18,250)	(\$197,298)	(\$184,025)	(\$355,082)	(\$330,971)	(\$19,502,161)
TCM # 14 BICYCLING SUBSIDIES	\$11,054	(\$35,206)	\$1.27	(\$2.11)	\$3.16	\$2.03	\$6,177	(\$10,413)	\$89,865	(\$141,960)	\$184,224	(\$288,573)	ERR	(\$35,205,951)
TCM # 15 WALKING SUBSIDIES	(\$14,144)	(\$73,863)	(\$1.63)	(\$4.25)	(\$0.81)	(\$2.12)	(\$8,808)	(\$22,996)	(\$127,427)	(\$332,715)	(\$266,874)	(\$696,818)	ERR	ERR
TCM # 16 BUSPOOL SUBSIDY	(\$126,991)	(\$224,859)	(\$6.06)	(\$7.20)	(\$0.26)	(\$0.31)	(\$15,466)	(\$18,259)	(\$137,437)	(\$162,237)	(\$238,258)	(\$281,076)	(\$11,544,676)	(\$14,053,785)

**IV) TRANSIT IMPROVEMENTS**

TCM # 17 NEW OR EXPANDED TRANSIT SERVICES	\$208,375	\$175,989	\$54.82	(\$66.85)	\$4.38	\$1.85	\$200,534	\$84,687	\$2,015,236	\$843,667	\$3,399,273	\$1,437,819		\$83,804,323
TCM # 18 FEEDER SERVICES TO OR FROM FIXED ROUTE RAIL OR TRANSIT	(\$3,100)	(\$20,128)	(\$1.68)	(\$5.43)	(\$0.34)	(\$1.09)	(\$7,829)	(\$25,382)	(\$96,888)	(\$314,494)	(\$195,777)	(\$609,929)	ERR	ERR
TCM # 19 SUBSCRIPTION VANPOOL, BUSPOOL, OR SHUTTLES	(\$25,671)	(\$72,763)	(\$7.34)	(\$10.27)	(\$0.37)	(\$0.51)	(\$20,406)	(\$28,535)	(\$187,382)	(\$260,962)	(\$329,118)	(\$457,099)	(\$12,835,619)	(\$23,921,539)

**V) PARKING MANAGEMENT & PRICING**

TCM # 20 PARK-AND-RIDE LOTS	(\$45,410)	(\$64,794)	(\$10.21)	(\$10.80)	(\$0.90)	(\$0.95)	(\$100,910)	(\$107,990)	(\$908,187)	(\$981,729)	(\$1,565,840)	(\$1,705,109)	ERR	ERR
TCM # 21 PREFERENTIAL PARKING FOR RIDESHARE VEHICLES	(\$15,027)	(\$30,056)	(\$6.76)	(\$6.76)	(\$0.59)	(\$0.59)	(\$24,475)	(\$24,455)	(\$251,061)	(\$254,667)	(\$455,384)	(\$462,391)	ERR	(\$36,416,356)
TCM # 22 PARKING DISCOUNT FOR CARPOOLERS AND VANPOOLERS	(\$40,371)	(\$53,831)	(\$6.86)	(\$6.86)	(\$0.53)	(\$0.53)	(\$23,526)	(\$23,517)	(\$237,480)	(\$237,141)	(\$429,484)	(\$427,531)	(\$20,185,776)	(\$26,915,521)

**COSTS AND BENEFITS ARE YET TO BE DETERMINED FOR TCMS 23.1 THROUGH 27 AND ALL THE PACKAGES**

## VI. CONCLUSIONS AND OUTLOOK FOR THE FUTURE

As suggested in the Preface, this TDM program is a pioneering approach, and one of the first efforts in the United States to realistically estimate potential improvements in mobility and air quality conditions through transportation demand management and transportation control measures. This study also assesses the potential costs and benefits--to the public and private sectors, individuals, and the society as a whole--if TCM/TDM were implemented throughout Los Angeles County.

The results of the study confirm the widely held opinion that measures differ extensively in the impacts they could have on mobility and air quality. The study also shows that while some measures cause very little improvements in the transportation and air quality condition in Los Angeles County, they are also much more expensive to implement than other measures that cause similar levels of improvement.

Results of the analysis show that implementation of all the traditional transportation control measures combined can cause a reduction of 64,000 to 128,000 daily vehicle trips in the County, which is approximately 0.3 to 0.6 percent of the 21 million daily vehicle trips in the baseline year of 1990. These same measures would also reduce 2.4 to 2.9 tons of combined daily NOx and ROC emissions (approximately 0.1 to 0.2 percent of daily regional NOx and ROC emissions). Implementation of these traditional measures would cost about 1.5 million dollars per day. Thus, cost per daily trip reduced ranges from \$11 to \$23, and the daily cost per reduction of a ton of ROC and NOx ranges from \$650,000 to \$1,200,000. In contrast, increasing the gasoline tax by 50 cents a gallon alone can reduce about 600,000 daily trips, and 17 to 21 tons of ROC and NOx emissions.

These estimates of emission reductions and mobility improvements will give planners and elected officials in the County a better picture of the options available through TDM/TCM to realize the goal of significant improvements in air quality and mobility conditions. Local governments in the County will also be better informed about the potential costs and benefits of implementing transportation control measures in their jurisdictions as they develop their trip reduction programs.

It should be reminded here that because of the limited effectiveness of the proposed short-term transportation control measures, the impacts would diminish over time. That is, a measure will be more effective in 1995 than it would be after 10 years of implementation. This, combined with the results of the study, suggests that greater improvements to the air quality and mobility conditions in Los Angeles County could be achieved, at potentially lower costs, through advanced technology and market-based approaches where a fee would be charged for the use of a particular road or bridge during peak travel periods or for entering a congested area. Combined with the traditional measures, such market-based strategies could provide an excellent approach to reducing emissions and improving transportation conditions in Los Angeles County.

## Los Angeles County Travel Characteristics--1990, 2000 & 2010

#	Characteristic	1990	2000	2010
1	TOTAL PERSON TRIPS	29,582,281	32,694,765	35,807,249
2	TOTAL COMMUTE PERSON TRIPS	7,940,220	8,639,255	9,338,290
3	TOTAL COMMUTE VEHICLE TRIPS	6,655,681	7,135,762	7,605,844
4	TOTAL NON-COMMUTE VEHICLE TRIPS	13,909,441	15,318,195	16,726,950
5	TOTAL PEAK PERIOD VMT	69,449,075	76,279,279	83,109,483
6	TOTAL OFF-PEAK PERIOD VMT	97,613,559	108,708,023	119,802,488
7	DRIVE ALONE SHARE OF COMMUTE PERSON TRIPS	72.20%	71.2%	70.2%
8	PERCENT OF ALL TRIPS IN PEAK PERIOD	40%	40%	40%
9	COMMUTE TRIPS AS A PERCENT OF ALL TRIPS	32.4%	31.8%	31.3%
10	NON-COMMUTE TRIPS AS A PERCENT OF ALL TRIPS	67.6%	68.1%	68.7%
11	PERCENT OF COMMUTE TRIPS IN PEAK PERIOD	62.5%	62.7%	63%
12	PERCENT OF NON-COMMUTE TRIPS IN PEAK PERIOD	37.5%	37.7%	38%
13	PERCENT OF PEAK TRIPS THAT ARE COMMUTE TRIPS	52%	46.6%	41.2%
14	PERCENT OF OFF-PEAK TRIPS THAT ARE COMMUTE TRIPS	22%	23.03%	24.06%
15	AVERAGE COMMUTE TRIP LENGTH	11.4	11.6	11.9
16	AVERAGE NON-COMMUTE TRIP LENGTH	6	6	6
17	TOTAL PERSON TRIPS IN TRANSIT	996,823	1,357,785	1,718,747
18	PERCENT OF ALL TRIPS THAT ARE TRANSIT	3.4%	4.1%	4.8%
19	TOTAL COMMUTE PERSON TRIPS THAT ARE TRANSIT	506,200	628,413	750,627
20	TOTAL NON COMMUTE PERSON TRIPS THAT ARE TRANSIT	490,623	729,374	968,125
21	COMMUTE TRIP SHARE OF TRANSIT	50.0%	47%	44%
22	TOTAL TRANSIT VEHICLE MILES	241,747	TBD	TBD
23	PERCENT OF COMMUTE TRIPS LESS THAN 6 MILES	40.0%	37.2%	34.2%
24	PERCENT OF COMMUTE TRIPS LESS THAN 5 MILES	37.0%	31.4%	25.8%
25	AVERAGE DAILY COMMUTE OUT-OF-POCKET COST PER VEHICLE	\$10	TBD	TBD
26	AVERAGE COST OF GAS PER GALLON	\$1.44	TBD	TBD
27	AVERAGE COST PER MILE TO DRIVE	\$0.48	TBD	TBD
28	AVERAGE OUT-OF-POCKET COST PER DAILY COMMUTE PER VEHICLE	\$5.00	TBD	TBD
29	AVERAGE OUT-OF-POCKET COST PER DAILY NON-COMMUTE PER VEHICLE	\$1.00	TBD	TBD
30	PERCENT OF VMT ON FREEWAYS	50%	TBD	TBD
31	AVERAGE TRIP LENGTH FOR TRUCKS	10.70	TBD	TBD
32	ELASTICITY OF PARKING DEMAND WITH RESPECT TO COMMUTING COST	TBD	TBD	TBD
33	ELASTICITY OF AUTO USE WITH RESPECT TO COST OF GASOLINE	TBD	TBD	TBD
34	ELASTICITY OF AUTO USE WITH RESPECT TO AUTO OPERATING COST	TBD	TBD	TBD
35	POPULATION IN LOS ANGELES COUNTY	8,859,716	10,199,853	11,539,000
36	EMPLOYMENT IN LOS ANGELES COUNTY	4,612,814	5,274,407	5,936,000
37	LICENSED DRIVERS IN LOS ANGELES COUNTY	5,659,065	TBD	TBD
38	REGISTERED VEHICLES IN LOS ANGELES COUNTY	5,650,717	TBD	TBD

**Activity Center**

A geographic area characterized by significant levels of residential, commercial, industrial, or other land uses or activity.

**Air Quality Management Plan (AQMP)**

A document describing how the SCAQMD plans to achieve federal and state air quality standards. Recently adopted by SCAG and the District in 1991, the Plan contains an aggressive implementation schedule for adoption of over a hundred new District rules. In addition, the Plan contains proposals for regulations from the state Air Resources Board, the federal government, and local government.

**Air Quality Standard**

The specified average concentration of an air pollutant in ambient air during a specified time period at or above which unhealthful effects may result. The two sets of air quality standards with which the District is concerned are the National Ambient Air Quality Standards and the California State Air Quality Standards.

**Alternative Transportation**

The use of modes of transportation other than the single passenger motor vehicle, including but not limited to carpools, vanpools, buspools, public transit, walking and bicycling.

**Average Daily Trips (ADT)**

The average number of vehicle trips generated during a 24-hour period from a specific site or area.

**Average Daily Trips per Unit of Measurement (ADT/U)**

The average number of vehicle trips generated during a 24-hour period for a particular unit of measurement (i.e., 1,000 gross square feet of floor area, employee) in a particular site or area.

**Average Vehicle Occupancy (AVO)**

The average number of persons occupying a passenger vehicle along a roadway segment intersection, or area, as typically monitored during a specified time period. For the purpose of the California Clean Air Act, passenger vehicles include autos, light duty trucks, passenger vans, buses, passenger rail vehicles and motorcycles.

### **Average Vehicle Ridership (AVR)**

The number of employees who report to a worksite divided by the number of vehicles driven by those employees, typically averaged over an established time period. This calculation includes crediting vehicle trip reductions from telecommuting, compressed work weeks and non-motorized transportation.

### **Backstop Rule**

A regional rule adopted by the SCAQMD to ensure that emission reductions estimated in the AQMP are attained to satisfy the requirements of the FCAA. With respect to transportation control measures, a backstop rule is required if regional emissions identified in the 1991 AQMP and CO Plan for a TCM are not attained.

### **Buspool**

A Vehicle carrying sixteen or more passengers commuting on a regular basis to and from work with a fixed route, according to a fixed schedule.

### **California Air Resources Board (CARB)**

The state agency responsible for setting allowable emission levels from new motor vehicles in California and adopting rules to reduce emissions from consumer products (along with the District). The ARB is also responsible for overseeing the efforts of local air pollution control districts and air quality management districts in reducing emissions from sources of air pollution. Also known as the California Air Resources Board (CARB), the Air Resources Board is the agency responsible for transmitting the State Implementation Plan to the federal Environmental Protection Agency for approval.

### **California Clean Air Act (CCAA)**

A law setting forth a comprehensive program to assure that all areas within the State of California will attain federal and state ambient air quality standards by the earliest practicable date. Also known as the Sher Bill or AB-2595, the law mandates comprehensive planning and implementation efforts, and empowers local air districts to adopt transportation control measures and indirect source control measures to achieve and maintain ambient air quality standards. The law provides annual emission reduction targets and regular review and evaluation of local programs by the Air Resources Board. The Act added and amended various sections in Division 26 of the Health and Safety Code.



## **Carbon Monoxide (CO)**

An invisible, odorless, tasteless and toxic gas; its chemical formula is CO. It is primarily generated by motor vehicles, but is found in trace quantities in the natural atmosphere.

## **Carbon Monoxide Plan (CO Plan)**

Also known as the Federal Attainment Plan for Carbon Monoxide, this plan was required by the 1990 Amendments to the Federal Clean Air Act to demonstrate how the region will attain the carbon monoxide air quality standard.

## **Carpool**

A Vehicle carrying two or more traveling together.

## **Citywide Share (CS)**

The percentage of all daily trips made in a jurisdiction by trip type that can be affected by a transportation control measure. This is an input assumption used in the quantification of TDM/TCM strategies. For example, if a TCM reduces work trips, and work-related travel constitute 32 percent of all daily trips in the jurisdiction, the Citywide Share of trips affected is 32 percent.

## **Commute Trips**

Any trip during a 24-hour day from home to work or vice versa, including those with intermediate trips from work sites (i.e. work to restaurant and work related travel during the day). In the travel forecast model it is referred to as home to work and work to other.

## **Congestion Management Program (CMP)**

A state mandated program that requires each county to prepare a plan to relieve congestion and reduce air pollution by maintaining certain levels of service (LOS) on the CMP roadway system. Elements of the CMP include a local trip reduction ordinance, capital improvement program, land use analysis procedure, transit performance standards, and the identification of a CMP network comprised of key highway and roadway segments and intersections.

## **Employer**

Any firm, person(s), business, educational institution, government agency, non-profit agency or corporation, or other entity.

### **Environmental Protection Agency (EPA)**

The federal agency responsible for coordinating pollution control activities at the federal level, for carrying out the terms of the federal Clean Air Act, and reducing emissions from federal sources of pollution. The EPA operates through regional offices located throughout the country. California is the responsibility of Region IX, which is headquartered in San Francisco.

### **Estimated Trip Reduction (ETR)**

The estimated percentage of vehicle trips reduced by implementing a TCM Action. This reduction rate refers to potential reduction of the trip type affected by an Action. For example, a vanpool program that has an ETR of 1% may reduce 1% of work trips.

### **Federal Clean Air Act Amendments of 1990 (CAAA)**

The federal statute which mandates a program to attain and maintain national ambient air quality standards (NAAQS) in all areas of the country. The Act establishes several programs. States are given primary authority to develop plans and regulations to attain the NAAQS by specific dates. These plans are called State Implementation Plans (SIPs). EPA also sets motor vehicle emission standards for all states except California, which adopted stricter emission standards.

### **General Plan**

A long-range, comprehensive set of policies and programs addressing specific elements which each California city and county is required by California Government Code (ss365300 et seq.) to prepare, adopt and implement. Some of the elements required include land use, circulation, housing, conservation, open space, seismic safety, noise scenic highway and safety.

### **Growth Management Plan (GMP)**

A plan developed by SCAG that contains demographic projections (i.e., housing units, employment and population) through the year 2010 for a six county region (i.e., L.A. County, Orange County, Riverside County, San Bernardino County, Ventura County and Imperial County). The plan also provides recommendations for local governments to better accommodate the growth projected to occur and reduce environmental impacts.

### **High Occupancy Vehicle (HOV)**

Motor vehicle occupied by two or more persons. Vehicles include automobiles, van, buses and taxis.

### **High Occupancy Vehicle Lane**

Lanes on a highway or freeway which are restricted for use by vehicles carrying two or more passengers.

### **Level of Service**

A measure (denoted by the letters A, B, C, D, E and F) of the congested level on a highway facility based primarily on the comparison between the facility's capacity and the traffic volume it carries.

### **Market Share (MS)**

The percentage of vehicle trips within a trip type (e.g., non-work trips, work-commute trips, or work-non commute trips) that can be affected by a transportation control measure. This is an input assumption used in the quantification of TDM/TCM strategies. For example, employers of 25-99 may constitute 26 percent of a jurisdiction's daily work trips. In this case, the Market Share of trips affected by an Action affecting these employers is 26 percent of work trips.

### **Mobility**

Mobility is a transportation system user characteristic. It refers to the ability of the user to take advantage of the available transportation services.

### **Mode**

A means or method of conveyance, e.g., auto, transit, airplane, bicycle, bus, etc.

### **Mode Split**

The proportion of total person-trips using various specified modes of transportation.

### **Neutral Actions**

The combined effects of these Actions equals the sum of the stand-alone effects of each measure; therefore, there is no change in the estimated rate of VT and VMT reduction when these Actions are combined.

### **Non-Commute Trips**

Vehicle trips made for purposes other than work-related reasons. These types of trips include home to day care, home-to-shopping, home-to-recreation, shopping to day care. In the travel forecast model they are known as Home to other and other to other.

### **Non-Complementary Actions**

The combination of these Actions reduces the effectiveness of one another. When implemented together, the benefit of adopting both measures is less than the sum of the benefit that can be achieved with each Action individually.

### **Non-Motorized**

Transportation that is not powered by a motor, e.g., horseback riding, bicycling, hiking, walking, etc.

### **Non-Quantifiable Actions**

Actions that can not be quantified given current quantitative methodologies or reported experience due to the nature of the Action.

### **Oxides of Nitrogen (NO<sub>x</sub>).**

A collective term for chemical compounds containing nitrogen and oxygen. The two most common oxides of nitrogen found in the atmosphere are nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>).

### **Packaging**

The combination of two or more Actions, the purpose of which is to optimize their aggregate effectiveness.

### **Paratransit**

Those types of public transportation whose characteristics are between those of the private automobile and conventional scheduled transit, e.g., taxis, jitneys, dial-a-ride, carpools, vanpools, subscription bus service.

### **Park-and-Ride**

A procedure that permits a patron to drive a car to a transit or rail station, park in the area provided for that purpose, and ride the transit or rail system to his or her destination.

### **Parking Management**

Planned procedures whereby automobile parking in metropolitan areas is controlled or managed for purposes of controlling traffic, access and mobility.

**Peak Direction**

The direction favored by the preponderance of traffic during the heaviest use periods of the day.

**Peak Period/Peak Hour Demand**

The time of most intensive use of a service or facility. In terms of travel, generally there is a morning and an afternoon peak on the region's streets and highways (the regional travel forecast model considers morning peak from 6:30 a.m. to 8:30 a.m. and afternoon peak from 3:00 p.m. to 6 p.m.).

**Preferential Parking**

Parking spaces designated or assigned, through use of a sign or painted space markings for Carpool and Vanpool Vehicles carrying commute passengers on a regular basis that are provided in a location more convenient to a place of employment than parking spaces provided for single occupant vehicles.

**Public Transportation**

Transportation service by bus, rail, paratransit, airplane and ship offered by an operator on a regular basis to the general public.

**Quantifiable Actions**

Actions that can be quantified in terms of VT and/or VMT reductions and speeds.

**Reactive Organic Compounds (ROC)**

A species of organic compounds that undergo photochemical reactions. There are numerous schemes for classifying the reactivity of various species of organic gases for air pollution control purposes. Also commonly referred to as Reactive Organic Gases (ROG), Reactive Hydrocarbons (RHC), Hydrocarbons (HC), etc. ROC in combination with  $\text{NO}_x$  are the primary precursors to smog.

**Region**

The SCAG region is composed of Imperial, Los Angeles, Orange, Riverside, San Bernardino and Ventura counties.

**Regional Mobility Plan (RMP)**

A plan developed by SCAG that contains a listing of infrastructure improvements, travel forecasts and other programs to regain 1984 levels of mobility for a six county

region (i.e., L.A. County, Orange County, Riverside County, San Bernardino County, Ventura County and Imperial County).

### **Regulation XV**

A regulation developed by the District that requires employers to achieve a specified AVR target. It is designed to reduce air pollution by reducing the number of commuter vehicle trips between home and work between the 6:00 AM to 10:00 AM period.

### **South Coast Air Basin (SCAB)**

A geographic area defined by the San Jacinto Mountains to the east, the San Bernardino Mountains to the north, and the Pacific Ocean to the west and south. The entire SCAB is under the jurisdiction of the South Coast Air Quality Management District.

### **Southern California Association of Governments (SCAG)**

The Metropolitan Planning Organization (MPO) for Ventura, Los Angeles, Orange, San Bernardino, Riverside and Imperial counties that is responsible for preparing the Regional Mobility Plan, and the Growth Management Plan. SCAG also prepared the land use and transportation control measures in the 1991 AQMP and 1992 CO Plan.

### **Subscription Bus Service**

Pre-arranged use of a regularly scheduled bus service, for which passengers generally agree to pay a weekly or monthly fee.

### **System Management**

Increasing the flow of travel on existing facilities through such improvements as ramp metering, signal synchronization, removal of on-street parking and others. Improvements typically have a low capital cost, do not call for major construction, and can be implemented in a relatively short time frame.

### **Telecommunications**

The conveyance of information by electronic means. Examples include the telephone, interactive cable facilities, computer networks and video conference centers. The sharing of information via these channels is being recognized as an alternative to personal, physical trip-making.

### **Transit Dependent**

Individual(s) dependent on public transit to meet private mobility needs, e.g., unable to drive, not a car owner, not licensed to drive, etc.

### **Transportation Centers**

Transportation terminals or locations where people can change their travel from one mode to another, i.e., auto to bus, bus to airline, etc

### **Transportation Control Measure**

Encompasses elements of both TSM and TDM.

### **Transportation Corridor**

A broad geographical band that follows a general directional flow connecting major sources of trips and that may contain a number of streets and highways and transit route alignments. The RTP identifies 27 corridors in the SCAG region.

### **Transportation Demand Management (TDM)**

Generally refer to policies, programs and actions that are directed towards increasing the use of high occupancy vehicles (transit, carpooling and vanpooling) and the use of bicycling and walking. TDM also includes activities that encourage telecommuting and compressed work week schedules as an alternative to driving.

### **Transportation Management Association/Organization (TMA/TMO)**

A proactive organization formed so that employers, developers, building owner, local government representatives and others can work together and collectively establish policies, programs, and services to address local transportation problems.

### **Transportation System Management (TSM)**

Generally refer to the use of low capital intensive transportation improvements to increase the efficiency of transportation facilities and services. These can include carpool and vanpool programs, parking management, traffic flow improvements, high occupancy vehicle lanes, and park-and-ride lots.

### **Vanpool**

A Vehicle carrying seven or more persons commuting together to and from work on a regular basis, usually in a vehicle with a seating arrangement designed to carry seven to fifteen adult passengers, and on a prepaid subscription basis.

**Vehicle**

Means any motorized form of transportation, including but not limited to automobiles, van, buses and motorcycles.

**Vehicle Miles Traveled (VMT)**

The total miles traveled by a vehicle or vehicles over a particular period, whether over a 24 hour period, over an average vehicle trip, etc.

**Vehicle Trip (VT)**

A one-way trip from any origin to any destination. Also referred to as a trip.



## VIII.

## REFERENCES

- Altshuler, A. How do We Price America's Highways? Challenge. May/June 1987.
- Association for Commuter Transportation. *Case Study Series*. February/March 1990 "ACT NOW" Journal. March 1990.
- Barton Aschman Associates, Inc. R.H. Pratt and Co. Division. Traveler Response to Transportation System Changes.
- Bay Area Air Quality Management District. Bay Area '91 Clean Air Plan. Appendix F. October 1991.
- Berglas, E; Freska, D. and Pines D. Right of Way and Congestion Toll. Journal of Transportation Economics and Policy. May 1984.
- California Air Resources Board. *Employer-Based Trip Reduction: A Reasonably Available Transportation Control Measure*. California Clean Air Act Transportation Guidance. May 1991.
- Cambridge Systematics, Inc. Transportation Control Measures Information Documents. Prepared for U.S. Environmental Protection Agency. Draft. October 1991.
- Carey, M. and Else, P. K. A Reformulation of the Theory of Optimal Congestion Taxes. Journal of Transportation Economics and Policy. January 1985 19(1).
- Chung, J. W. The Price of Gasoline, the Oil Crisis and the Choice of Transportation Mode. Quarterly Review of Economics and Business. 1981 21(3).
- Commuter Transportation Services Inc. Telecommuting: Moving the Work to the Workers. September 1991.
- Commuter Transportation Services, Inc. The State of the Commute 1992. June 1992.
- DeVany, A. and Saving, T. R. Competition and Highway Pricing for Stochastic Traffic. Journal of Business. January 1980 53(1).
- Deweese, D. N. Estimating the Time Costs of Highway Congestion. Econometrica. November 1979 47(6).
- Dorfman, R. On Optimal Congestion. Journal of Environmental Economics and Management. June 1984.
- Drinka, T. P. and Prescott, J. R. Optimal Roadway Tolls and Operating Costs in Urbanized Regions. Regional Science Perspectives. 1981 11(2).

- Dunne, J. P. Elasticity Measures and Desegregate Choice Models. Journal of Transportation Economics and Policy. May 1984.
- Else, P. K. A Reformulation of the Theory of Optimal Congestion Taxes. Journal of Transportation Economics and Policy. September 1981 15(3).
- Else, P. K. A Reformulation of the Theory of Optimal Congestion Taxes: A Rejoinder. Journal of Transportation Economics and Policy. 1982 16(3).
- Fong, P. K. W. An Evaluative Analysis of the Electronic Road Pricing System in Hong Kong. Hong Kong Economic Papers. 1986 (17).
- Glazer, A. Congestion Tolls and Consumer Welfare. Public Finance. 1981 36(1).
- Green, T. G. Specification Considerations for the Price Variable in Travel Cost Demand Models: Comment. Land Economics. November 1986.
- Guttman, J. M. Uncertainty, the Value of Time and Transportation Policy. Journal of Transportation Economics and Policy. May 1979 13(2).
- Hensher, D. A. and Truong, T. P. Valuation of Travel Time Savings: A Direct Experimental Approach. Journal of Transportation Economics and Policy. September 1985.
- Hensher, D. A. A Rejoinder [The Value of Commuter Travel Time Savings: Empirical Estimation Using an Alternative Valuation Model] Journal of Transportation Economics and Policy. May 1984.
- Higgins, T. J. Road Pricing: A Clash of Analysis and Politics. Policy Analysis. Winter 1981 15(2).
- Ho, L. S. On Electronic Road Pricing and Traffic Management in Hong Kong. Hong Kong Economic Papers. 1986 (17).
- Institute of Transportation Engineers. A Toolbox for Alleviating Traffic Congestion. 1989.
- Institute of Transportation Engineers. Automobile Travel Reduction Options for Urban Areas: An Informational Report. Pages 1-27. 1986.
- JHK & Associates. Review of TCM Impact Assessment Tools and Regional Travel Modeling Capabilities. Draft Technical Memorandum. Prepared for SCAG with COMSIS Corporation; Sierra Research, Inc.; Deakin/Harvey/Skabardonis. September 1992.

- Kitamura, Ryuichi/University of California Davis; Jack M. Nilles/JALA Associates, Inc.; Patrick Conroy/California Department of Transportation; David M. Fleming/California Department of General Services. *Telecommuting as a Transportation Planning Measure: Initial Results of California Pilot Project*. Published in "Transportation Research Record 1285." 1990.
- Kobrin, P. Fuel Switching, Gasoline Price Controls and the Leaded- Unleaded Gasoline Price Differential. Jeem. September 1981.
- Kraus, M. Highway Pricing and Capacity Choice Under Uncertain Demand. Journal of Urban Economics. July 1982 12(1).
- Lago, A. M.; Mayworm, P. and McEnroe, J. M. Transit Service Elasticities: Evidence from Demonstrations and Demand Models. Journal of Transportation and Economic Policy. May 1981 15(2).
- Layton, A. P. The Value of Commuter Travel Time Savings: Some Clarifications. Journal of Transportation Economics and Policy. May 1984.
- Lee, L. W. The Economics of Carpools. Economic Inquiry. December 1985.
- Loeb, P. D. and Gilad, B. The Efficacy and Cost Effectiveness of Vehicle Inspection: A State Specific Analysis Using Time Series Data. Journal of Transportation Economics and Policy. May 1984.
- Loeb, P. D. The Efficacy and cost Effectiveness of Motor Vehicle Inspection Using Cross - Sectional Analysis. Southern Economic Journal. October 1985.
- Lopez-Aqueres, Waldo/South Coast Air Quality Management District. *The Implementation of Regulation XV - Trip Reduction/Indirect Source*. February 1991.
- Mills, G. Road User Fees and Road Funding in Australia. Journal of Transportation Economics and Policy. September 1987.
- Mount, R. I. Williams, H. R. Energy Conservation, Motor Gasoline Demand and the OECD Countries. Rev. of Business Economics Research. Spring 1981 16(3).
- Nash, C. A. A Reformulation of the Theory of Optimal Congestion Taxes: A Rejoinder. Journal of Transportation Economics and Policy. September 1982 16(3).
- Newbery, D. M. Charging for Roads. World Bank Research Observer. July 1988.
- Newbery, D. M. Road User Charges in Britain. Economic Journal. Supplement 1987 98(390).

- Newbery, D. M. Pricing and Congestion: Economic Principles Relevant to Pricing Roads. Oxford Review of Economic Policy. Summer 1990.
- Newbery, D. M. Road Damage Externalities and Road User Charges. Econometrica. March 1988.
- Ohta, M. and Grilicheo, Z. Automobile Prices and Quality: Did the Gasoline Price Increases Change Consumer Tasks in the U.S. Journal of Business and Economics Statistics. April 1986.
- Orski, C. Kenneth. *Can Management of Transportation Demand Help Solve Our Growing Traffic Congestion and Air Pollution Problems?* Transportation Quarterly, Vol. 44, No. 4 pp. 483-498. October 1990.
- Oum, T. H. Alternative Demand Models and Their Elasticity Estimates. Journal of Transportation Economics and Policy. May 1988.
- Peat Marwick Main & Main & Co. *Status of Traffic Mitigation Ordinance*. Prepared for Urban Mass Transportation Administration. Final Report, DOT-T-90-06. August 1989.
- Reya, A. M. and Spiro, M. H. The Demand for Passenger Car Transport Services and for Gasoline. Journal of Transportation Economics and Policy. September 1979 13(3).
- Salomon, I. Telecommunications and Travel: Substitution or Modified Mobility? Journal of Transportation Economics and Policy. 1985 19(3).
- Schreffler, Eric N. and J. Richard Kuzmyak/COMSIS Corporation. *Trip Reduction Effectiveness of Employer-Based Transportation Control Measures: A Review of Empirical Findings and Analytical Tools*. Prepared for Air & Waste Management Association annual meeting June 16-21, 1991. June 1991.
- Shah, A. M. Optimal Pricing of Traffic Externalities: Theory and Measurement. Journal of Transportation Economics and Policy. February 1990.
- Sierra Research, Inc./JHK & Associates. Methodologies for Quantifying the Emission Reductions of Transportation Control Measures. Prepared for the San Diego Association of Governments. 1991.
- Smith, P. Controlling traffic Congestion by Regulating Car Ownership: Singapore's Recent Experience. Journal of Transportation Economics and Policy, Jan. 1992.
- South Coast Air Quality Management District. Final 1991 Air Quality Management Plan. September 1992.

- South Coast Air Quality Management District. Draft Handbook for Preparing a Local Government Trip Reduction Ordinance. February 2, 1993.
- South Coast Air Quality Management District. CEQA Air Quality Handbook. Final Draft. September 1992.
- Southern California Automobile Club/Al Bowser, Cost Data, 1993.
- Southern California Rapid Transit District. *Descriptive Summary of the Bus Express Employee Program: A Demonstration of Employment Center Bus Service*. Prepared for Urban Mass Transportation Administration. Final Report UMTA-Ca-06-0109-80-1. September 1980.
- Southern California Association of Governments. Report on the Telecommuting Project.
- Southern California Association of Governments. *An Alternative TCM Structure and Implementation Strategy*. Discussion Draft. March 1992.
- Starkie, D. The New Zealand Road Charging System. Journal of Transport Economics and Policy. May 1988.
- State of Washington Energy Office. *Puget Sound Telecommuting Demonstration Project News*. December 1991.
- Train, K. A Structured Logit Model of Auto Ownership and Mode Choice. Review of Economic Studies. January 1980 47(2).
- U.S. Department of Transportation. *National Transportation Statistics Annual Report 1987*. DOT-TSC-RSPA-87-6. August 1987.
- U.S. Department of Transportation. *National Transportation Strategic Planning Study*. Chapter 5. March 1990.
- Vitaliano, D. F. and Held, J. Marginal Cost Damage User Charges. Quarterly Review of Economics and Business. Summer 1990.
- Wachs, Martin/UCLA and Genevieve Giuliano/University of Southern California. *Regulation XV -- Beginning to Show*. Published in "Institute of Transportation Studies Review"; Vol. 15, No. 1. November 1991.
- Wachs, Martin/UCLA and Genevieve Giuliano/University of Southern California. *Telecommuting and Traffic: Studies Tackle Tough Question*. Published in "Institute of Transportation Studies Review"; Vol. 15, No. 1 November 1991.
- Ward, F. A. Specification Considerations for the Price Variable in Travel Cost Demand Models: Reply. Land Economics. November 1986.

Ward, F. A. Specification Considerations of for the Price Variable in Travel Cost Demand Models. Land Economics. August 1984.

Wheaton, W. C. The Long-Run Structure of Transportation and Gasoline Demand. Bell Journal of Economics. Autumn 1982 13(2).

Willson, Richard W. and Donald C. Shoup. Employer-Paid Parking: *The Problem and Proposed Solutions*. Published in "Transportation Quarterly." October 1991.

Willson, Richard W. and Donald C. Shoup. *The Effects of Employer-Paid Parking in Downtown Los Angeles: A Study of Office Workers and Their Employers*. Prepared for Southern California Association of Governments. May 1990.

Wilson, J. D. Optimal Road Capacity in the Presence of Unpriced Congestion. Journal of Urban Economics. May 1983 13(3).



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