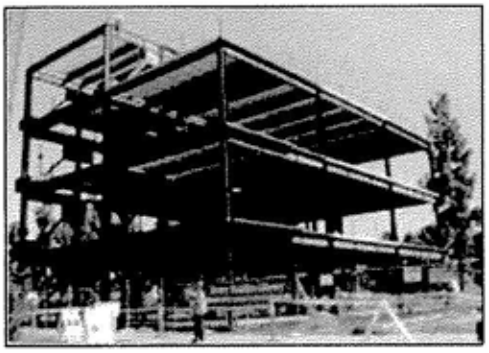
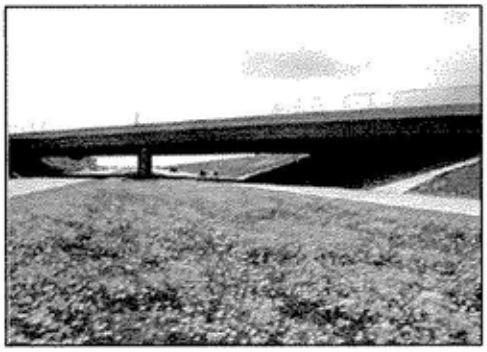
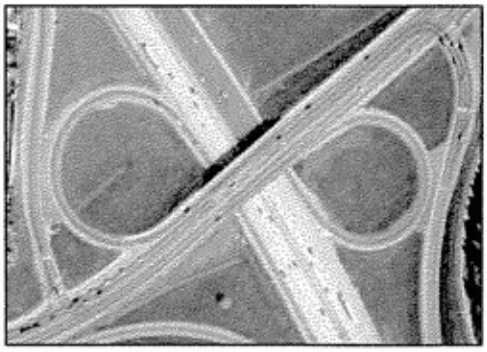
TRANSPORTATION TECHNICAL COMMITTEE/ POLICY ADVISORY COMMITTEE ACTION/DISCUSSION ITEM III. D.

Fresno Regional Traffic Mitigation Fee Technical Report
Draft Final Report

Submitted to:

Council of Fresno County Governments

City of Parlier

Submitted by: PB Americas, Inc.

June 2008

Fresno Regional Traffic Mitigation Fee

TECHNICAL MEMORANDUM

PROJECT IDENTIFICATION & COST ESTIMATE REVIEW

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List of Acronyms

AB	Assembly Bill
AC	Asphaltic Concrete
CCFI	Central California Future Institute
COG	Council of Governments
CTC	California Transportation Commission
FCOG	Council of Fresno County Governments
FDOT	Florida Department of Transportation
FIDS	Fresno Madera Freeway Interchange Deficiency Study
HBW	Home-Based Work
HBNW	Home-Based Non-Work
ITE	Institute of Transportation Engineers
LF	Linear Foot
NCHRP	National Cooperative Highway Research Program
LOS	Traffic Level-of-Service
NHB	Non-Home-Based
PB	Parsons Brinckerhoff
PDT	Project Development Team
PM	Post Meridian (after twelve noon)
ROW	Right-of-Way
SR	State Route
STIP	State Transportation Improvement Program
V/C	Volume-to-Capacity Ratio
VMT	Vehicle-Miles Traveled

1. INTRODUCTION

Regional Transportation Mitigation Fee Study

This report is one of a series of documents that were prepared as part of the Fresno County Regional Transportation Mitigation Fee (RTMF) Study. The implementation of the RTMF is part of the Measure "C" Extension approved by Fresno County voters in 2006. The RTMF is intended to ensure that future development contributes its fair share towards the costs of infrastructure to mitigate the cumulative indirect regional transportation impacts of new growth, in accordance with the Mitigation Fee Act[1]. The purpose of the RTMF Study is to develop the framework for the RTMF including developing criteria for project selection, estimating the fair share of costs attributable to new development, and recommending an appropriate level of fee to be charged to each unit of new development.

The overall structure of the RTMF Study is shown in Figure 1. The study was comprised of six major tasks as follows:

> ***Validate Traffic Model*** - The main analytical tool used in the deficiency analysis is the Council of Fresno County Governments' (Fresno COG's) traffic model. The first step in the study was to perform a series of tests to ensure that the model functioned properly and could be used as a basis for the fee calculation.
>
> ***Determine Existing and Future Levels of Service (LOS)*** – The existing and future levels-of-service for the projects covered by the study were determined using the travel demand model.
>
> ***Estimate Project Costs*** – The estimated cost for each project was checked and updated using cost data from recent projects.
>
> ***Determine Funding Shortfall*** – Future levels of funding that could be available for funding the projects of interest were estimated for the twenty-year period of the RTMF.
>
> ***Attribute Demand to Sources*** – The extent to which the demand for each project stems from existing traffic or future development was determined.
>
> ***Compute RTMF Fees and Revenues*** – The final task was to compute the level of fee for different land uses and the total amount of funding that would be generated by the RTMF under several different sets of policy assumptions.

This report describes the methodology used for the analysis and presents the results of the study. Further details can be found in the three technical reports[2] produced in the course of this study.

Scope of the Analysis

Parsons Brinckerhoff's original proposal to Fresno COG was to make an open-ended analysis of roads of regional significance throughout the county to determine which segments are likely to be impacted by future development and whose improvements might be considered eligible for funding by the RTMF program. However, the Project Development Team (PDT) later concluded that the open-ended approach was not consistent with the original intent of the Measure "C" Extension. The PDT felt that the intent of the voters in passing Measure "C" Extension was that

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[1] Assembly Bill 1600, which forms the basis for Sections 66000-66008 of the California Government Code

[2] *Deficiency Analysis* dated December 2007, *Project Identification and Cost Review* dated May 2008, and *Fee Calculation* dated June 2008, all by Parsons Brinckerhoff.

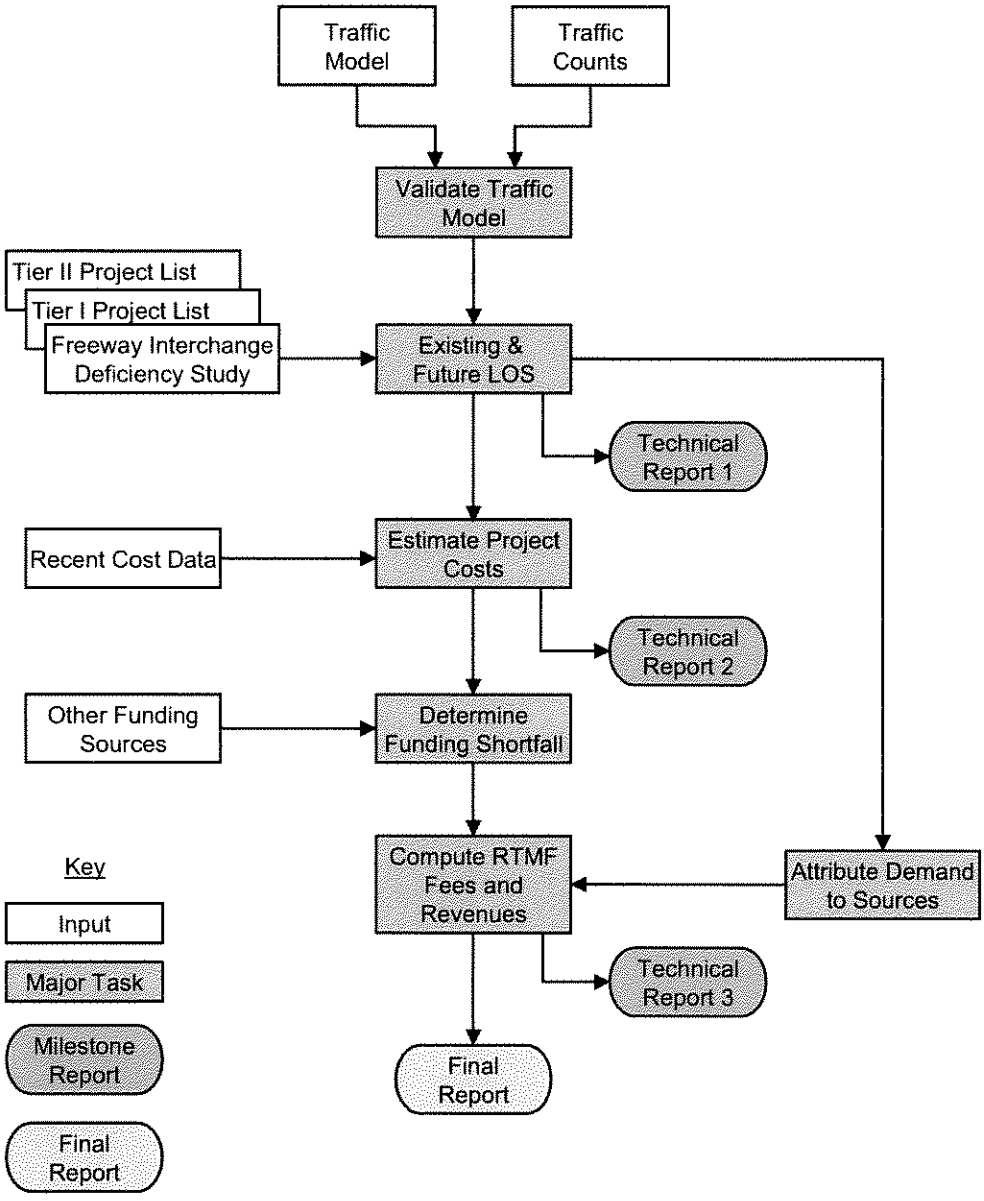

Figure 1: Overall Structure of the RTMF Study

the funds raised by the measure should be utilized for the projects specifically named in Tables 2 through 5 of the Measure "C" Extension brochure which covered, respectively, the Urban Tier 1, Rural Tier 1, Urban Tier 2, and Rural Tier 2 projects of the Measure "C" Extension Expenditure Plan. Appendix D of the Measure "C" Extension brochure also allows for consideration of projects identified in the Fresno-Madera County Freeway Interchange Deficiency Study (FIDS), and so those projects were also included in the analysis.

At the PDT's direction the scope of the current study was therefore limited to projects named in Tables 2 through 5 of the Measure "C" Extension brochure and those identified in the Fresno-Madera County Freeway Interchange Deficiency Study (the projects in Fresno County only). The consultants were directed to analyze these projects to determine the extent to which each was suitable for RTMF funding.

The reader should note that the RTMF was only one of several types of funding named in Measure "C" Extension. The suitability or unsuitability of any project for RTMF funding is not related to its suitability for funds from the Measure "C" Extension sales tax or other funding sources, but is dependent on the relative share of project need and the related cost attributable to the impacts of new development in Fresno County.

2. VALIDATING THE TRAFFIC MODEL

Because the Fresno COG traffic model is a key analytical tool in this study, it was important to verify that it is capable of producing reasonable forecasts before using it as the basis for the nexus calculation. Details of the model can be found in *Fresno County Traffic Model Calibration/Validation Report and Model Documentation*[3]. The tests used to validate the model and the adjustments made to the model are described in the sections below.

Tests of the Traffic Model – Forecasts of Daily Volumes

Fresno COG's traffic model produces both forecasts of daily traffic volumes and forecasts of evening peak-hour volumes. These were tested separately.

The study team selected a sample of recent traffic count data from twenty-five sites (a total of fifty counts, since each site was counted in both directions) and compared the model's forecast of traffic to the actual traffic volumes found in the counts. Figure 2 shows a comparison of the model forecast of daily traffic to the actual counted traffic. The shaded area shows the acceptable deviation set forth in Caltrans' model validation guidelines[4]. Figure 2 indicates that there is no apparent bias in the daily model (under-estimates and over-estimates occur about equally), that none of the errors is very large, and that more than three-quarters of the sites lie within Caltrans' allowable deviations.

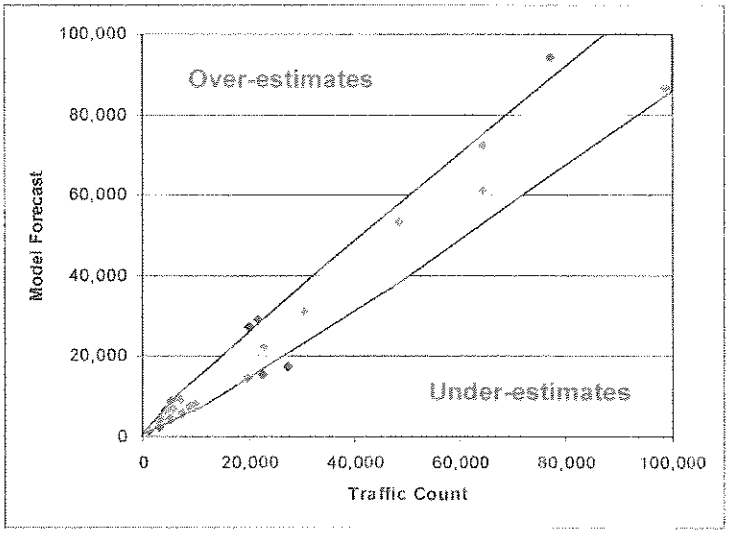

Figure 2: Model Forecast of Daily Traffic versus Traffic Counts

Table 1 shows the results of the tests of the daily forecasts with respect to Caltrans' validation guidelines. As can be seen in the table, the daily forecasts produced by the Fresno COG traffic model exceed every standard for acceptability.

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[3] Dowling Associates, September 2001

[4] *Travel Forecasting Guidelines*, Caltrans, November 1992

Table 1: Validation Test Results for Daily Forecasts		
Validation Item	**Criterion for Acceptance**	**Daily Model**
% of Links within Caltrans' Deviation Standard	At least 75%	76% ✓
Sum of 2-way Volume of All Counted Links	Within 10% of Actual	Within 2% ✓
Correlation between Counts and Model Forecast	At least 88%	98% ✓

Tests of the Traffic Model – Forecasts of PM Peak-Hour Volumes

A similar set of performance tests were run on the PM peak-hour forecasts produced by the COG traffic model. In this case, however, the results (see Figure 3) were not favorable. The errors are larger and there appears to be a definite tendency towards over-estimating traffic. The original PM peak hour model therefore did not meet the acceptance criteria for use in the study.

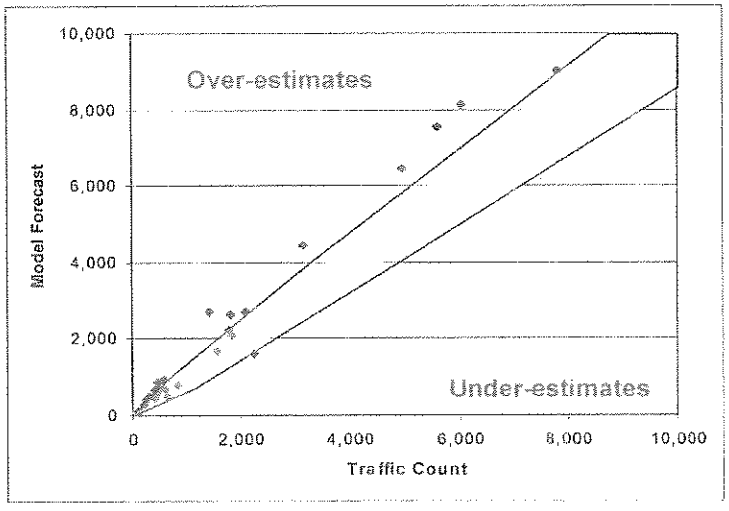


Figure 3: Original PM Peak Hour Forecasts versus Traffic Counts

In consultation with COG staff, it was determined that the most likely source of error in the peak-hour model was the peak-hour factor, which is a model parameter that distributes daily traffic among different hours of the day. It was found that by adjusting the peak-hour factor a version of the model could be created that more accurately reflected traffic use in peak-hour LOS calculations. This is shown in Figure 4, which compares the revised model forecast of peak hour traffic to the actual counted traffic. The shaded area shows the acceptable deviation found in Caltrans' validation guidelines. Figure 4 indicates that there is no apparent bias in the revised model (under-estimates and over-estimates occur about equally), that none of the errors are very large, and that ninety percent of the validation results lie within Caltrans' allowable deviations.

Table 2 shows the results of these tests with respect to Caltrans' validation guidelines. As can be seen in the table, the modified version of the model exceeds every standard for acceptability.

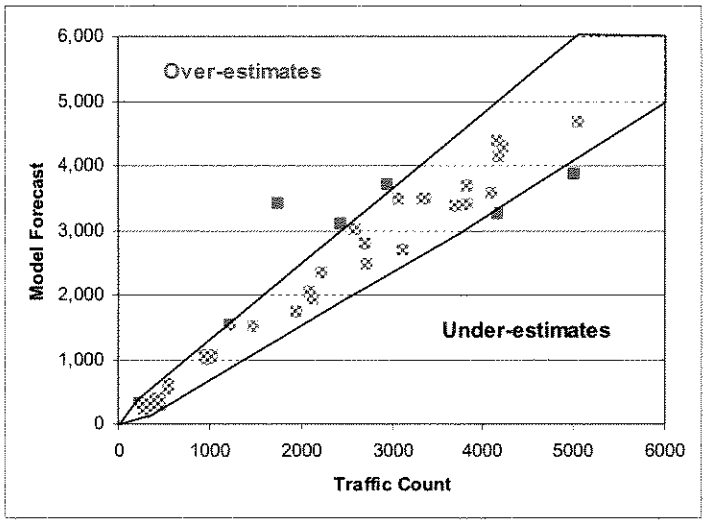


Figure 4: Adjusted PM Peak Hour Forecasts versus Traffic Counts

Table 2: Validation Test Results for PM Peak-Hour Model			
Validation Item	**Criterion for Acceptance**	**Original PM Peak Model**	**Revised PM Peak Model**
% of Links within Caltrans' Deviation Standard	At least 75%	52% **X**	90% ✓
Sum of 2-way Volume of All Counted Links	Within 10% of Actual	27% **X**	within 1% ✓
Correlation between Counts and Model Forecast	At least 88%	99% ✓	95% ✓

Source: Caltrans, Parsons Brinckerhoff

Once the traffic model had been independently tested and found to meet the acceptance criteria recommended by Caltrans it was accepted by the PDT as a reasonable basis for the RTMF nexus analysis.

3. DEFICIENCY ANALYSIS

The Mitigation Fee Act permits agencies to collect impact fees based on the degree that new development is expected to contribute to deficient traffic conditions. There are several key aspects to this, including the definition of what constitutes deficient conditions, the amount of traffic generated by new development, and the separation of the traffic associated with new development from the traffic associated with existing developments. The sections below describe how the deficiencies associated with new development were determined.

Traffic Level-of-Service

Traffic conditions are often described in terms of traffic level of service (LOS) which ranges from LOS "A" indicating that drivers experience little delay, to LOS "F" indicating that drivers are likely to encounter traffic congestion with low speeds and stop-and-go conditions. Like many agencies, Fresno COG has elected to use the LOS tables developed by the Florida Department of Transportation (FDOT) for general planning studies such as this one. The FDOT tables are documented in FDOT's *2002 Quality/Level of Service Handbook*[5] and were developed using the methodologies found in the most recent edition of the *Highway Capacity Manual*[6]. The RTMF study makes use of the tables that define the threshold volumes for the range LOS's for various types of roads. These are shown in Tables 3 through 12. The values shown in the tables are the maximum traffic volumes for each level of service (LOS). For example, the first value shown in Table 3 is "11,200", which means that an average 2-way daily volume of 11,100 would be LOS "C" while a 2-way volume of 11,300 would be LOS "D" since it exceeds the maximum volume of 11,200 for LOS "C".

Table 3: State Class II Urban Arterials (2.0-4.5 intersections per mile)

Number of Lanes	Divided Roadway?	Daily Volume (2-way)			Hourly Volume (1-way)		
		LOS "C"	LOS "D"	LOS "E"	LOS "C"	LOS "D"	LOS "E"
2	Undivided	11,200	15,400	16,300	590	810	850
4	Divided	26,000	32,700	34,500	1,360	1,710	1,800
6	Divided	40,300	49,200	51,800	2,110	2,570	2,710
8	Divided	53,300	63,800	67,000	2,790	3,330	3,500

[5] State of Florida Department of Transportation, 2002
[6] *Highway Capacity Manual 2000*, Transportation Research Board, 2000.

Table 4: State Class III Urban Arterials (more than 4.5 intersections per mile)							
Number of Lanes	Divided Roadway?	Daily Volume (2-way)			Hourly Volume (1-way)		
		LOS "C"	LOS "D"	LOS "E"	LOS "C"	LOS "D"	LOS "E"
2	Undivided	5,300	12,600	15,500	280	660	810
4	Divided	12,400	28,900	32,800	650	1,510	1,720
6	Divided	19,500	44,700	49,300	1,020	2,330	2,580
8	Divided	25,800	58,700	63,800	1,350	3,070	3,330

Table 5: Major City/County Urban Roads							
Number of Lanes	Divided Roadway?	Daily Volume (2-way)			Hourly Volume (1-way)		
		LOS "C"	LOS "D"	LOS "E"	LOS "C"	LOS "D"	LOS "E"
2	Undivided	9,100	14,600	15,600	480	760	810
4	Divided	21,400	31,100	32,900	1,120	1,620	1,720
6	Divided	33,400	46,800	49,300	1,740	2,450	2,580
8	Divided	*44,133*[7]	*61,250*	*63,800*	*2,310*	*3,200*	*3,330*

Table 6: Urban Freeways, Interchanges Less Than 2 Miles Apart							
Number of Lanes	Divided Roadway?	Daily Volume (2-way)			Hourly Volume (1-way)		
		LOS "C"	LOS "D"	LOS "E"	LOS "C"	LOS "D"	LOS "E"
4	Divided	52,000	67,200	76,500	2,660	3,440	3,910
6	Divided	81,700	105,800	120,200	4,180	5,410	6,150
8	Divided	111,400	144,300	163,900	5,700	7,380	8,380

[7] Italicized values are extrapolated from other figures in the Florida DOT tables.

Table 7: Urban Freeways, Interchanges More Than 2 Miles Apart							
Number of Lanes	Divided Roadway?	Daily Volume (2-way)			Hourly Volume (1-way)		
		LOS "C"	LOS "D"	LOS "E"	LOS "C"	LOS "D"	LOS "E"
4	Divided	55,200	67,100	74,600	2,940	3,580	3,980
6	Divided	85,300	103,600	115,300	4,550	5,530	6,150
8	Divided	115,300	140,200	156,000	6,150	7,480	8,320
10	Divided	175,500	213,500	237,100	7,760	9,440	10,480

Table 8: Uninterrupted Flow Rural Highways							
Number of Lanes	Divided Roadway?	Daily Volume (2-way)			Hourly Volume (1-way)		
		LOS "C"	LOS "D"	LOS "E"	LOS "C"	LOS "D"	LOS "E"
2	Undivided	7,900	13,700	27,500	420	730	1,470
4	Divided	40,800	52,400	58,300	2,200	2,830	3,140
6	Divided	61,200	78,600	87,400	3,330	4,240	4,710

Table 9: Rural Highways with Isolated Signalized Intersections							
Number of Lanes	Divided Roadway?	Daily Volume (2-way)			Hourly Volume (1-way)		
		LOS "C"	LOS "D"	LOS "E"	LOS "C"	LOS "D"	LOS "E"
2	Undivided	8,000	10,700	12,100	430	580	650
4	Divided	17,400	23,000	25,200	940	1,240	1,360
6	Divided	27,100	35,500	43,100	1,460	1,910	2,320

Table 10: Rural Interrupted Flow Arterials							
Number of Lanes	Divided Roadway?	Daily Volume (2-way)			Hourly Volume (1-way)		
		LOS "C"	LOS "D"	LOS "E"	LOS "C"	LOS "D"	LOS "E"
2	Undivided	11,000	13,900	14,900	590	740	800
4	Divided	25,500	29,400	31,200	1,360	1,570	1,660
6	Divided	39,400	44,200	46,800	2,100	2,360	2,500

Table 11: All Rural Freeways							
Number of Lanes	Divided Roadway?	Daily Volume (2-way)			Hourly Volume (1-way)		
		LOS "C"	LOS "D"	LOS "E"	LOS "C"	LOS "D"	LOS "E"
4	Divided	47,900	56,600	63,000	2,740	3,240	3,600
6	Divided	73,900	87,400	97,200	4,230	5,000	5,560
8	Divided	1,000	118,400	131,400	5,720	6,770	7,520

Table 12: Freeway Ramps[8]						
Ramp Type	Daily Volume (2-way)			Hourly Volume (1-way)		
	LOS "C"	LOS "D"	LOS "E"	LOS "C"	LOS "D"	LOS "E"
Loop Ramp	11,200	12,600	14,000	933	1,050	1,167
Diamond Ramp	13,600	15,300	17,000	1,133	1,275	1,417
Freeway-to-Fwy Loop	12,800	14,400	16,000	1,067	1,200	1,333
Freeway-to-Fwy Diamond	16,000	18,000	20,000	1,333	1,500	1,667

A key feature of these tables is that a distinction is made between rural and urban areas reflecting the fact that drivers' expectations vary depending on the type of area they are driving through. Fresno COG directed the RTMF study team to consider all road segments located within the sphere of influence of any incorporated city as "urban" and those located outside of the sphere of influence of an incorporated city as "rural".

The FDOT level-of-service tables do not cover freeway ramps. For projects in this functional class the LOS thresholds developed for Fresno COG's Regional Transportation Plan were used.

Existing and Future Deficiencies

For the purposes of the RTMF Study, a "capacity deficiency" is defined as a condition where a facility would not meet the level-of-service threshold mandated by Fresno COG, which is LOS "D". One of the first major steps in the RTMF Study is to identify where deficiencies are likely to occur in the regional road network if the expected level of future development were to take place.

Fees collected under the Mitigation Fee Act must be based on a nexus between the projects to be funded by mitigation fees and the impacts resulting from the development that is being assessed the fee. Mitigation fees cannot be used to correct existing deficiencies and therefore the analysis must distinguish between deficiencies that exist today and those that will arise only if development takes place.

[8] LOS thresholds for freeway ramps were provided by VRPA Technologies. These figures are consistent with those used to develop the Fresno COG Regional Transportation Plan.

Overview of the Deficiency Analysis Methodology

The methodology used in the deficiency analysis is outlined in Figure 5 below. The major steps include:

1) The main analytical tool used in the deficiency analysis is the Fresno COG traffic model. This model was first developed in 2001 and is frequently updated by the COG staff. Existing land uses are classified by type and location and stored in a data file as a major input to the model.

2) A second major input into the model is a file containing details of the location, capacity, and free-flow speed of the existing roads in the Fresno County. The model also has other input parameters, such as trip generation rates, that were left unchanged during the deficiency analysis.

3) The existing land use file, the existing road network file, and several other parameters were used as inputs to the model to generate an estimate of existing traffic volumes on each road section in Fresno County.

4) Fresno COG provided the study team with the results of recent traffic counts taken in throughout the county

5) The traffic counts were compared to the traffic estimates from the Fresno COG traffic model to determine whether the model was sufficiently accurate for use in the RTMF study. This was described in the previous chapter.

6) The PM peak-hour component of the model was revised to correct for a tendency to over-forecast traffic volumes prior to use in the study.

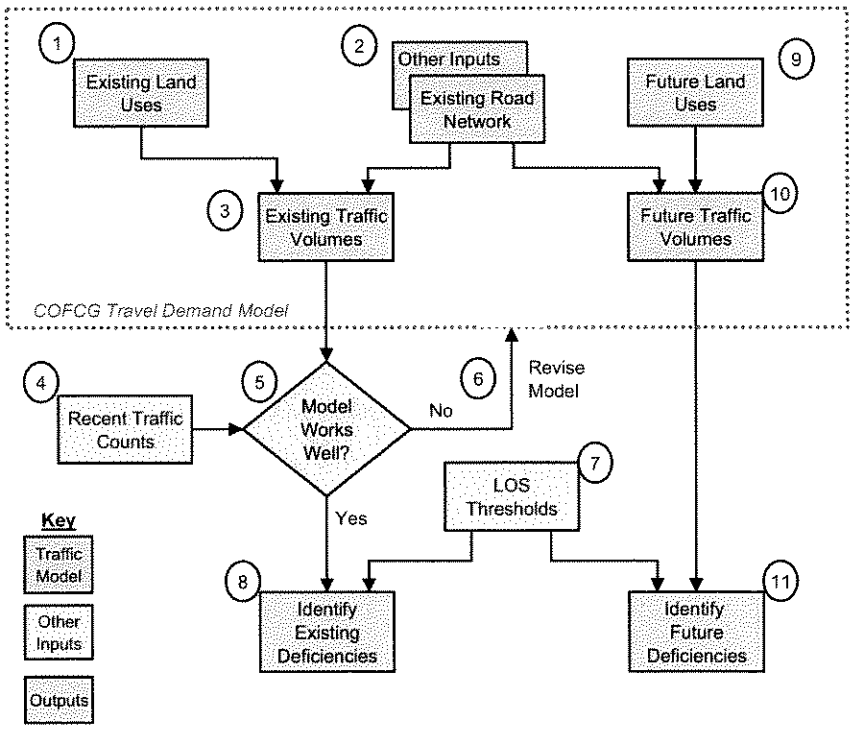


Figure 5: Steps in the Deficiency Analysis

7) Fresno COG established its level-of-service (LOS) thresholds based on the threshold tables developed by the Florida Department of Transportation. The Florida DOT tables are widely used throughout the country as a transparent and easily-administered version of the *Highway Capacity Manual* LOS methodology.

8) The existing traffic volumes were then compared to the LOS thresholds to determine where deficiencies already exist.

9) Fresno COG's assumptions regarding future development were then entered into the traffic model.

10) The model was run assuming future land uses (existing land uses plus future development) but no changes to the existing road network. The output was a forecast of future traffic volumes under these conditions.

11) The traffic volumes were then compared to the LOS tables to determine where future roadway capacity deficiencies were likely to occur.

The next section describes the future year land use assumptions used in this analysis.

Land Use Assumptions

Fresno COG's responsibilities for long-term planning entail the use of population and employment forecasts. The forecasts currently used by Fresno COG were prepared for the 2000-2025 period by the Central California Future Institute (CCFI) and were later extrapolated to 2030 by Fresno COG staff[9]. These forecasts are summarized in Table 13 below.

Table 13: Summary of Development Assumptions

Forecast Item	2005	2015	2025	Total Growth	Average Annual Growth Rate
Population	899,288	1,086,432	1,290,264	43.5%	1.8%
Households	302,621	370,089	443,195	46.5%	1.9%
Total Employment	373,494	461,541	557,364	49.2%	2.0%
Retail	56,041	69,454	83,868	49.7%	2.0%
Service	81,760	115,412	151,442	85.2%	3.1%
Government	36,152	44,370	53,636	48.4%	2.0%
Educational	36,246	48,189	61,252	69.0%	2.7%
Other	163,288	184,548	207,166	26.9%	1.2%

[9] See *2006 Fresno COG Conformity Analysis Model Documentation*

The CCFI forecasts project an overall long-term rate of population growth of 1.8% which is the same as the growth actually measured between the 1990 and 2000 U.S. Census for Fresno County. These forecasts also predict a slightly higher rate of growth for employment than for households, which is a continuation of an existing trend in California.

Other forecasts of population and employment are available from the State Department of Finance and the State Department of Transportation Office of Transportation Economics. The CCFI growth forecasts fall between the forecasts of these two agencies.

In terms of spatial distribution, the forecasts assume that most population growth will be concentrated within the spheres of influence of the cities of Fresno and Clovis. However, moderate population growth is expected in a wide swath on both sides of Highway 99 (see Figure 6 below). The fastest growth in employment is expected to occur along the eastern edges of the cities of Fresno and Clovis (see Figure 7 below). Outside of the metropolitan area the growth of employment is distributed more evenly than the growth in population.

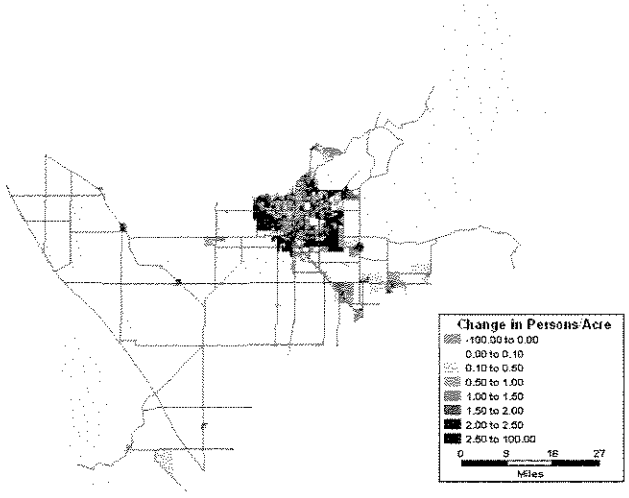


Figure 6: Spatial Distribution of Anticipated Population Growth, 2005-2030

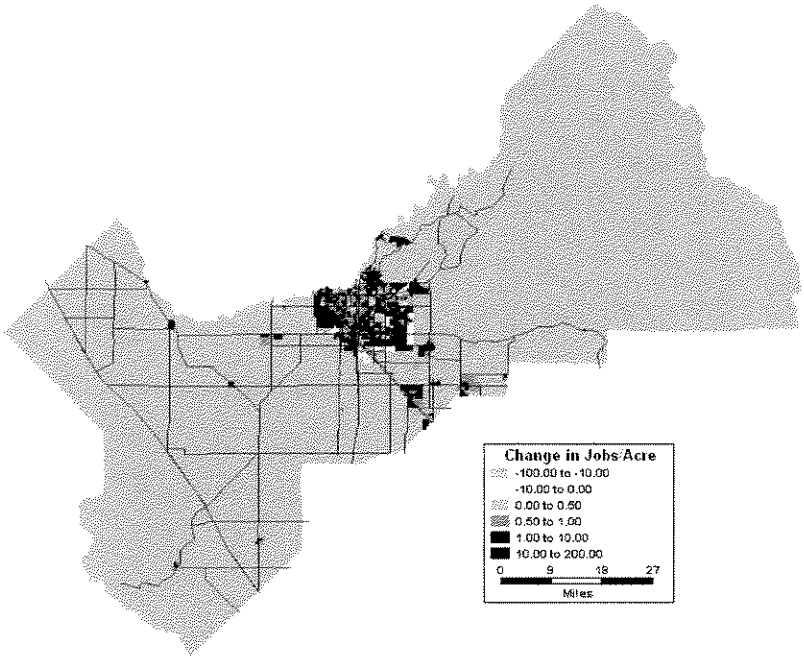


Figure 7: Spatial Distribution of Anticipated Employment Growth, 2005-2030

Determining Average Daily Volume and Volume-to-Capacity (V/C) Ratio

As stated earlier, the average daily volumes for each project were taken from model runs of the Fresno COG traffic model. Most projects consisted of more than one link in the model which raised the issue of which link or links should be used to represent the project in the analysis. For the purposes of this analysis the most congested link, as measured by the V/C ratio, was used to represent the facility, based on the reasoning that the congested portion of the facility represents the primary deficiency and therefore prompts consideration of an improvement project.

There were several special cases that required a somewhat different approach. The traffic signal synchronization project and the traffic management center (Urban Tier 2 Projects EE and NN) are not associated with identifiable links and so cannot be analyzed through an LOS test. They were therefore excluded from the analysis. Certain other projects involve entirely new facilities and so there is no existing traffic or V/C ratio. In such cases the volumes, capacities and V/C ratios of the existing alternate routes that most closely serve the same function as the proposed project were substituted. For example, for the SR-180 eastward extension (Urban Tier 1 Project A) the traffic conditions on Olive Avenue and Belmont Avenue were used since those would be the alternate routes if SR-180 was not extended.

Results to the Deficiency Analysis

The results of the deficiency analysis are shown in Tables 14, 15, and 16. The key results from the point of view of levying a traffic mitigation fee are shown in the shaded cells in the tables. The yellow-shaded cells in these tables indicate facilities that currently meet the Fresno COG's LOS standard of "D", but will not meet that standard in the future if land development occurs as

expected and additional road capacity is not provided. This combination of conditions indicates a nexus between land development and a capacity deficiency and therefore indicates a project that would meet the legal requirement for eligibility for funding through mitigation fees.

The green-shaded cells indicate facilities that already fail to meet Fresno COG's LOS standard of "D" and whose V/C ratio would worsen in the future if land development proceeds as expected and additional road capacity is not provided. For such projects, a distinction will need to be made between the portion of the future deficiency that is attributable to existing traffic and the portion attributable to future land development. Only the latter portion has a nexus to mitigating the impact of new development and therefore would be eligible for funding through a mitigation fee.

Projects with no shading are expected to meet Fresno COG's LOS standard of "D" even without capacity improvements. By definition there is no deficiency requiring correction, so these projects would not be eligible for funding through a traffic mitigation fee. However, this does not mean that the project may not be justified under some other criteria used for a different funding source.

Table 14: V/C ratio and LOS for Tier 1 Projects

Project ID		Project Name	Existing		Future	
			V/C Ratio	LOS	V/C Ratio	LOS
URBAN TIER 1	A	SR-180 East Seg II *	1.79	F	2.62	F
	B	SR-180 West Seg II *	1.59	F	2.11	F
	C	SR-41/SR-168/SR-180	0.90	D	1.42	F
	D	Willow Avenue	0.77	D	1.80	F
	E	Temperance Avenue	0.79	D	1.54	F
	F	Ventura Boulevard	0.67	C or better	1.03	E
	G	SR-99 Monterey Bridge Retrofit	0.61	C or better	1.01	E
	H	California Ave Widening	0.54	D	1.28	F
	I	Peach Ave Widening	1.40	F	1.76	F
	J	SR-41 Auxiliary Lane	0.51	C or better	0.70	C or better
	K	Herndon Ave Widening	0.66	D	1.09	E
	L	Shaw Ave Upgrades	1.28	F	2.29	F
	M	SR-99 North & Cedar Interchanges	0.17	C or better	0.65	C or better
	N	Veteran's Boulevard	1.91	F	3.17	F
RURAL TIER 1	A	SR-180 West	0.62	D	0.99	D
	B	SR-180 East Seg III	0.95	D	2.62	F
	C	SR-180 East Seg IV	1.00	E	1.34	E
	D	SR-180 East Seg V	0.96	D	1.31	E
	E	Friant Road Widening	0.24	C or better	0.39	C or better
	F	Golden State Boulevard	0.18	C or better	0.47	C or better
	G	SR-269 Bridge Improvement	0.57	C or better	0.90	D
	H	SR-180 West I5 Extension	0.35	C or better	0.57	C or better
	I	Mountain View Ave Widening	0.68	D	1.26	E
	J	Mendocino Ave Widening	0.22	C or better	0.30	C or better
	K	SR-99 American Ave Interchange	0.15	C or better	0.50	C or better
	L	I-5/SR-198 Interchange Improvement	0.17	C or better	0.28	C or better

Table 15: V/C Ratio and LOS for Tier 2 Projects						
Project ID		Project Name	Existing		Future	
			V/C Ratio	LOS	V/C Ratio	LOS
URBAN TIER 2	AA	SR-99 Ramp Improvement	0.63	C or better	1.10	E
	BB	SR-41 O Street Auxiliary Lanes	0.24	C or better	0.31	C or better
	CC	Friant Road Widening	0.83	D	1.11	F
	DD	SR-99 Shaw Ave Interchange	0.49	D	0.97	D
	EE	Traffic Synchronization		-		-
	FF	Herndon Ave Widening	0.39	C or better	0.87	D
	GG	SR-99 Auxiliary Lanes	0.61	D	0.86	D
	HH	Blackstone Ave Turn Lanes	1.35	F	1.47	F
	II	SR-99 Shields Ave Overcrossing*	0.22	C or better	0.45	C or better
	JJ	McCall Widening	0.12	C or better	0.30	C or better
	KK	Shepherd Ave Widening	0.26	C or better	0.61	C or better
	LL	SR-41 Auxiliary Lanes	0.69	C or better	0.82	D
	MM	SR-99 Widening	0.53	C or better	0.84	D
	NN	Traffic Management Center	-	-	-	-
	OO	Minnewawa 4-Lane Project	0.71	C or better	1.61	F
RURAL TIER 2	AA	SR-99 Interchange Improvement	0.84	D	1.42	F
	BB	SR-145 Widening	0.60	C or better	0.84	D
	CC	SR-33 Widening	0.44	C or better	0.72	C or better
	DD	Academy Parkway*	0.41	C or better	0.69	C or better
	EE	SR-41 Central & American Interchange	0.45	D	1.41	F
	FF	Millerton Road Widening	0.63	D	0.79	D
	GG	Manning Ave Widening	0.68	D	0.94	D
	HH	SR-43 Widening	0.96	D	1.41	E
	II	McCall Ave Connection*	0.17	C or better	0.73	C or better
	JJ	SR-180 E Seg VI	0.94	D	1.28	E

Table 16: V/C Ratio and LOS for FIDS Projects						
Project ID		Project Name	Existing		Future	
			V/C Ratio	LOS	V/C Ratio	LOS
PROJECTS IN THE FREEWAY INTERCHANGE DEFICIENCY STUDY	1	SR-99/Mountain View	0.34	C or better	0.47	C or better
	2	SR-99/Floral	0.23	C or better	0.24	C or better
	3	SR-99/Manning	0.27	C or better	0.49	C or better
	4	SR-99/Central	0.43	C or better	0.32	C or better
	5	SR99/Ventura	0.44	C or better	0.86	C or better
	6	SR99/Fresno	0.56	C or better	0.91	D
	7	SR99/Stanislaus	0.21	C or better	0.71	C or better
	8	SR99/Belmont	0.72	C or better	1.14	F
	9	SR99/Olive	0.12	C or better	0.78	C or better
	10	SR99/Clinton	0.59	C or better	0.88	C or better
	11	SR99/Ashlan	0.81	C or better	0.91	D
	12	SR99/Shaw	0.44	C or better	0.71	C or better
	13	SR99/Herndon	0.26	C or better	0.57	C or better
	14	SR41/Van Ness	0.36	C or better	0.67	C or better
	15	SR41/Tulare&Divisadero	0.77	C or better	1.16	F
	16	SR41/McKinley	0.65	C or better	0.77	C or better
	17	SR41/Shields	0.59	C or better	0.84	C or better
	18	SR41/Ashlan	0.65	C or better	1.06	E
	19	SR41/Shaw	0.57	C or better	1.00	D
	20	SR41/Bullard	0.64	C or better	1.19	F
	21	SR41/Friant	1.04	E	1.27	F
	22	SR180/N. Fulton & Van Ness	0.68	C or better	1.04	E
	23	SR168/Bullard	0.19	C or better	0.78	C or better
	24	SR168/Shaw	0.53	C or better	1.02	E

4. COST REVIEW METHODOLOGY

Purpose of the Cost Estimate Review

The cost estimate review undertaken as part of this study is intended to serve several purposes:

- To provide agencies an opportunity to update project cost estimates in light of situations that may have changed since the Measure "C" Extension brochure was developed
- To provide an independent check on the reasonableness of the estimates. This will lessen the risk that the cost estimates are outside of reasonable parameters resulting in the RTMF either over- or under-charging new development for required mitigations
- To ensure that project cost components meet the legal eligibility requirements set forth in the Mitigation Fee Act and were handled in a reasonably consistent manner for projects from different jurisdictions, taking into consideration the differences in settings

The cost estimate review was undertaken in the knowledge that Measure "C" Extension is a twenty-year program with projects in different stages of preparation ranging from little more than a vague concept all the way to final designs ready for construction. In many cases detailed information was not available because projects are still in the concept stage. Nevertheless, an effort was made to accomplish the three goals described above to the extent possible. The RTMF program is expected to incorporate a mechanism for regular periodic reviews of the project list that will enable further refinement of project cost estimates as projects progress through the various stages of design

An overview of the methodology used to develop the forecasts is provided in the section below.

Overview of the Cost Review Methodology

The methodology used in the deficiency analysis is outlined in Figure 8 below. The major steps include:

1) The first step was to contact each project's lead to request their most recent information on the cost of Measure "C" Extension projects. This request was made either through the agency representatives on the PDT, direct contact by telephone, or at meetings at the agencies' offices.
2) Two types of information were requested; namely cross-sections and layouts showing what the project entailed and the cost estimates prepared by the agency
3) The consultants used the project layouts and cross-sections to estimate the quantities of various components of the project, such as cubic feet of earth moved, square feet of pavement constructed, and linear feet of curb and gutter to be provided. These quantities were compared to the quantities used in the agency cost estimates and discrepancies were identified.
4) Next, the various components of the project were reviewed to determine if any were clearly ineligible under the Mitigation Fee Act. For example, an otherwise eligible capacity expansion project might include a beautification component whose costs are not allowable under the RTMF.

   The agency budgets were also checked to determine if any allowable cost was omitted, such as environmental mitigations during construction or the cost of relocating utilities.

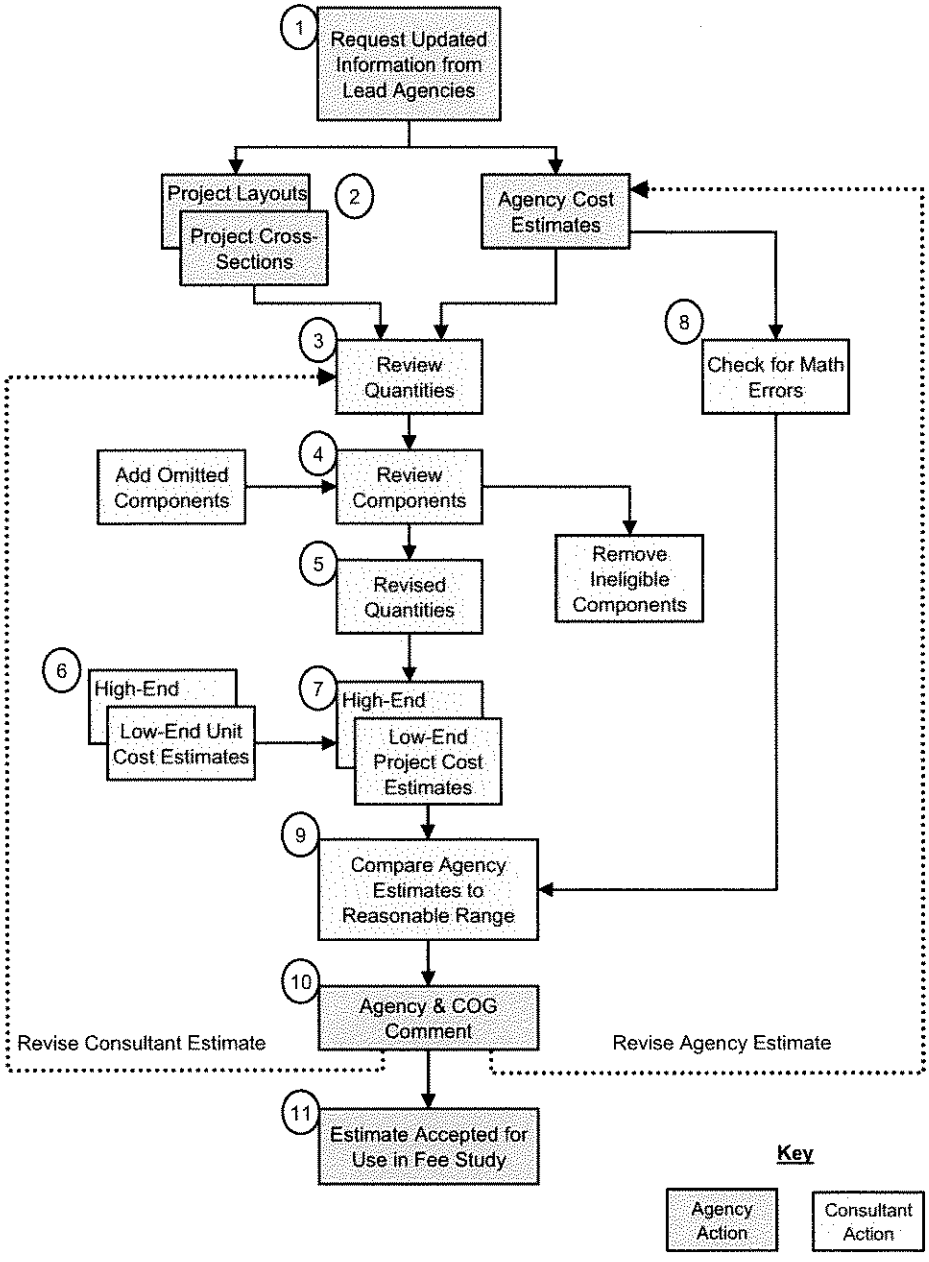


Figure 8: Steps in the Project Cost Review

5) The product of the review of quantities and components was a revised estimate of quantities.

6) Unit costs for such things as asphaltic concrete, storm drainage, and lane striping were taken from a variety of sources, and high- and low-end unit costs were determined for each.

7) The high- and low-end unit costs were then multiplied by the revised quantities to produce high- and low-end cost estimates for each project. The high- and low-end costs defined the "expected range" of cost estimates for each project.

8) The agency cost estimates were checked for math errors.

9) The agency project cost estimates were then compared to the "expected range" to gauge whether the agency estimates could be considered reasonable.

10) The draft cost review analysis for each project was sent to the lead agency and to the COG for comment. In some cases the cost reviews were revised in light of agency comments while in other cases the agency estimates were revised in light of the reviewing engineers' comments.

11) Once a project cost estimate was considered reasonable by all three parties (the COG, the agency, and the reviewing consultants) it was considered complete and acceptable as the basis for the fee analysis.

The next sections provide additional detail regarding some of the key steps in the cost review process.

Review of Quantities

Each lead agency was asked to provide project information, including preliminary cost estimates, a complete project description and typical section. The information provided for each project ranged greatly, from nothing more than the project description listed in the Measure "C" Extension brochure to detailed tables using the Basic Engineering Estimate System. The information provided for each project dictated the method of approach used to generate a project cost estimate.

Little or no detailed information was available for about half of the projects beyond the project description in the Measure "C" Extension document. In such cases independent cost estimates were generated by the reviewing engineer using this project description and generic unit cost information for similar facilities (e.g. $4.7 million per mile for new 2-lane roads).

The baseline conditions for each project were determined using aerial photographs. In some cases this task was complicated by the fact that the landscape had changed or was changing due to development activities. In some images, construction equipment could be seen and so the extent of existing improvements was not clear. A limited number of field checks were made to supplement the aerial imagery. In cases where construction seemed to be occurring in Measure "C" Extension project locations, that portion of the project was assumed complete, or at least funded, and was removed from the revised cost estimates and noted in the project assumptions. Roadway standards for each jurisdiction were used to determine the typical section of the proposed improvement for the purpose of establishing roadway quantities and associated costs. The typical sections were also determined by examining adjacent roadway segments that have already been improved and assuming that the roadway would have a consistent geometric design. Agency design standards were used when available, otherwise Caltrans standards were assumed. If no specific project information was provided, the typical section used to generate pavement costs was assumed to be 6.5" of asphaltic concrete over 23" of aggregate base.

The aerial imagery programs were also used to determine other potential impacts, such as utility relocations, structure widening, signal improvements, full right-of-way takes, and potential retaining and sound wall locations.

Review of Components

The cost estimates provided by the lead agencies were also checked to verify that the cost of all major items were included such as erosion control, traffic control, environmental mitigation, and right of way. In addition, 31% was added to construction budgets to account for "soft" costs such as design, environmental clearance, and construction management. A contingency factor of 20%-35% was used depending on the quality of the available data, with higher contingencies for projects where the data was less complete. The cost for all roadway items includes clearing and grubbing, roadway excavation and placement of improvement, unless otherwise noted.

High- and Low-End Unit Costs

An independent reveiwer's cost estimate was generated using this information with a range of costs associated with specific improvements. This range of costs was developed using standard industry unit pricing. In some instances, the improvement costs were dependent on whether the project was in a rural or urban area. For example, utility adjustments for rural locations tend to cost less in urban areas because underground utilities are more common in urban areas than rural areas. Table 17 illustrates the improvement line items that were typically used in estimating the Measure "C" Extension projects and the costs associated with each.

Table 17: Summary of Per-Unit Cost Assumptions

Typical Costs	Urban		Rural	
	Low	High	Low	High
12' Lane (AC) (Per additional Lane)	$90/LF	$120/LF	$90/LF	$120/LF
12' Lane (PCCP) (Per additional Lane)	$120/LF	$150/LF	$120/LF	$150/LF
Curb, Gutter and Sidewalk (Both sides)	$120/LF		$120/LF (If required)	
Storm Drainage (Both Side)	$34/LF	$40/LF	-	-
Drainage (Ditch Excavation)	-	-	$12.50/LF	$15/LF
Signing and Striping	$7/LF	$20/LF*	$7/LF	$20/LF*
Traffic Control	5%	10%	2%	5%
Erosion Control	1%	3%	1%	3%
Shoulder (/ft Shoulder Width/LF of Project)	$15		$15	
14' Landscaped Median (w/ curb & irrigation)	$60/LF		$60/LF	
Signal Interconnect	$10/LF		$10/LF	
Utility Adjustment	$15/LF	$60/LF	$15/LF	$20/LF
Lighting	$40/LF	$60/LF	120,000/Intersection	

Note: * The high end for signing and striping is typically used for freeways and expressways.

A direct comparison was made to the cost estimate provided by the lead agency along with a check of the quantities using an assumed typical section if more detailed information was not provided. The Caltrans 2006 Contract Cost Data was used to determine unit costs for specific line items. Both statewide and district averages were compared to give a range of costs, for those items where such data was available. This check provided guidance on items that may be under- or over-estimated. For example, some projects' original cost estimates used $60/ton for asphalt concrete when this item typically costs $80/ton. If the $60/ton estimate was used in funding the project and the bids came at $80/ton, then these projects could potentially have substantial budget shortfalls.

Selecting Which Cost to Use

Once the expected range of costs was defined, the next step was to determine a single cost figure for use in the computation of the RTMF. It should be stressed that the only purpose of these cost estimates was to provide a reasonable basis for collecting an impact fee; the estimates do not imply official approval, nor are they meant to preclude future revisions as each project's situation evolves.

The method used for selecting the cost estimate is outlined in the form of a decision tree in Figure 9 below:

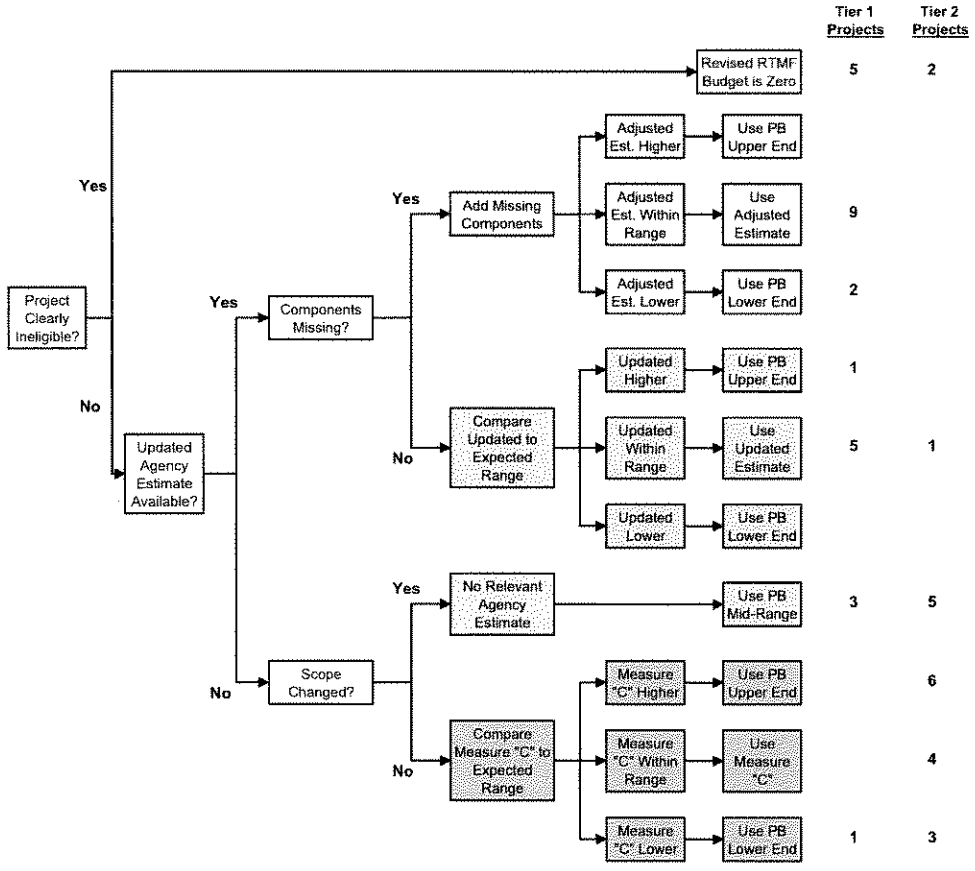


Figure 9: Decision Tree for Selecting Cost Estimate

The first branch in the decision tree is whether the project was clearly ineligible for funding under the Mitigation Fee Act. If the project was clearly ineligible then no cost review was performed. Then next question was whether or not the sponsoring agency provided an updated project cost estimate. If an updated estimate was available, the next question was whether the updated estimate covered all project components whether some were missing. For example, in some cases agencies estimated construction costs but did not include soft costs such as environmental clearance and design, while in other cases a project was to be implemented in stages and estimates were made only for the initial stages. If components were missing, then PB estimated the costs of the missing components and used these to produce an adjusted estimated. In either case the estimate was then compared to the expected range to see whether it fell within the range and, if not, whether it was higher or lower. If the agency estimate fell within the expected range then the agency estimate was used. If not, then if the agency estimate was above the range then the upper limit of the expected range was used, and if it was below the range then lower limit of the expected range was used.

In cases where the lead agency did not provide an updated cost estimate then the cost review centered on the cost estimate in the original Measure "C" Extension material. If the scope of the project had changed since Measure "C" Extension was passed but the agency had not yet updated its cost estimate, then the middle of the range of the PB estimate was used. If there were no changes to the project scope then the Measure "C" Extension estimate was compared to the expected range to see whether it fell within the range and, if not, whether it was higher or lower. If the Measure "C" Extension estimate fell within the expected range then the Measure "C" Extension estimate was used. If not, then if the Measure "C" Extension estimate was above the range then the upper limit of the range was used, and if it was below the range then lower limit of the range was used.

Updated Costs for Each Project

The updated costs produced through the cost review process described in the previous section are shown in Tables 18 through 21 below.

Table 18: Updated Costs for Urban Tier 1 Projects

Project ID	Project Name	Measure "C" Cost Estimate	Updated Cost Estimate
A	SR 180 East Segment II	$33,479,701	$0
B	SR 180 West Segment II	$6,995,758	$1,967,000
C	SR41/168/180	$29,981,821	$114,000,000
D	Willow Avenue	$13,991,517	$19,656,767
E	Temperance Avenue	$5,996,364	$4,098,477
F	Ventura Boulevard	$5,000,000	$5,000,000
G	SR99 Monterey Bridge Retrofit	$1,000,000	$1,000,000
H	California Ave Widening	$7,995,152	$12,548,738
I	Peach Ave Widening	$24,984,851	$17,300,000
J	SR41 Auxiliary Lane	$3,000,000	$11,400,000
K	Herndon Ave Widening	$30,000,000	$42,200,000
L	Shaw Ave Upgrades	$31,580,852	$17,500,000
M	SR 99 North & Cedar Interchanges	$24,984,851	$81,220,000
N	Veteran's Boulevard	$60,000,000	$117,978,600
Total for Urban Tier 1		$278,990,867	$449,352,582

Table 19: Updated Costs for Rural Tier 1 Projects			
Project ID	**Project Name**	**Measure "C" Cost Estimate**	**Updated Cost Estimate**
A	SR 180 West	$9,993,940	$8,614,915
B	SR 180 East Segment III	$14,491,214	$42,600,000
C	SR 180 East Segment IV	$38,976,368	$46,460,819
D	SR 180 East Segment V	$42,674,126	$59,915,560
E	Friant Road Widening	$16,490,002	$5,900,000
F	Golden State Boulevard	$34,978,792	$34,978,792
G	SR 269 Bridge Improvement	$16,989,699	$16,989,699
H	SR 180 West I5 Extension	$39,975,762	$183,000,000
I	Mountain View Ave Widening	$5,496,667	$25,632,000
J	Mendocino Ave Widening	$1,998,788	$3,350,000
K	SR99 American Ave Interchange	$24,984,851	$24,300,000
L	I-5 Interchange Improvement	$7,995,152	$12,012,000
Total for Rural Tier 1		$255,045,361	$463,753,785

Table 20: Updated Costs for Urban Tier 2 Projects			
Project ID	**Project Name**	**Measure "C" Cost Estimate**	**Updated Cost Estimate**
AA	SR-99 Ramp Improvement	$7,995,152	$45,000,000
BB	SR-41 O Street Ramps	$162,000,000	$63,500,000
CC	Friant Road Widening	$9,993,940	$8,100,000
DD	SR-99 Shaw Ave Interchange	$34,978,792	$34,978,792
EE	Traffic Synchronization	$24,984,851	$24,984,851
FF	Herndon Ave Widening	$5,796,485	$16,411,238
GG	SR-99 Auxiliary Lanes	$59,963,643	$59,963,643
HH	Blackstone Ave Turn Lanes	$1,998,788	$2,200,000
II	SR-99 Shields Ave Overcrossing	$59,963,643	$59,963,643
JJ	McCall Widening	$10,993,334	$10,993,334
KK	Shepherd Ave Widening	$15,490,608	$37,500,000
LL	SR-41 Auxiliary Lanes	$9,993,940	$0
MM	SR-99 Widening	$29,981,821	$0
NN	Traffic Management Center	$993,940	$993,940
OO	Minnewawa 4-Lane Project	$34,978,792	$17,900,000
Total for Urban Tier 2		$470,107,729	$382,489,441

Table 21: Updated Costs for Rural Tier 2 Projects			
Project ID	**Project Name**	**Measure "C" Cost Estimate**	**Updated Cost Estimate**
AA	SR99 Interchange Improvement	$24,984,851	$50,000,000
BB	SR 145 Widening	$22,986,063	$12,800,000
CC	SR 33 Widening	$8,245,001	$9,069,501
DD	Academy Parkway	$23,386,250	$6,100,000
EE	SR 41 Interchange Upgrade	$49,969,702	$32,000,000
FF	Millerton Road Widening	$11,992,729	$29,034,327
GG	Manning Ave Widening	$3,697,758	$15,200,000
HH	SR 43 Widening	$89,945,464	$47,500,000
II	McCall Ave Connection	$34,978,792	$19,100,000
JJ	SR 180 E Segment VI	$40,975,156	$53,267,703
Total for Rural Tier 2		$311,161,766	$274,071,531

The results are shown in a different format in Figures 10 and 11. In the figures the X-axis is the original cost estimate used in the Measure "C" Extension brochure and the Y-axis is the updated cost. An "equal cost line" is shown to indicate where the updated cost equals the cost in the Measure "C" Extension ballot materials. Dots shown above the equal cost line are cases where the updated costs are higher than the original estimates while dots below the equal cost line are cases where the updated costs are lower. As can be seen in the figure, project cost estimates were revised in both directions since the passage of Measure "C" Extension. However, for Tier 1 projects in particular, the magnitude of the upward revisions for projects with cost increases tends to be larger than the magnitude of the downward revisions for projects with cost decreases.

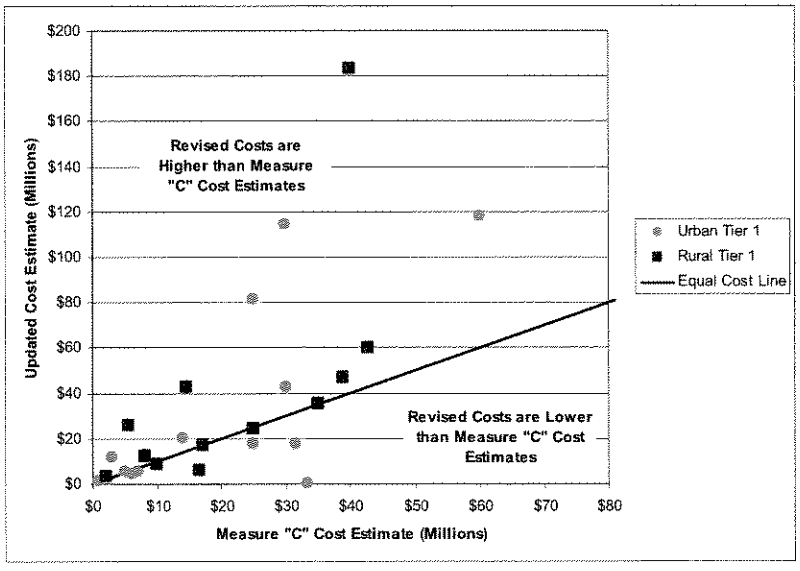


Figure 10: Comparison of Measure "C' and Updated Cost Estimates, Tier 1 Projects

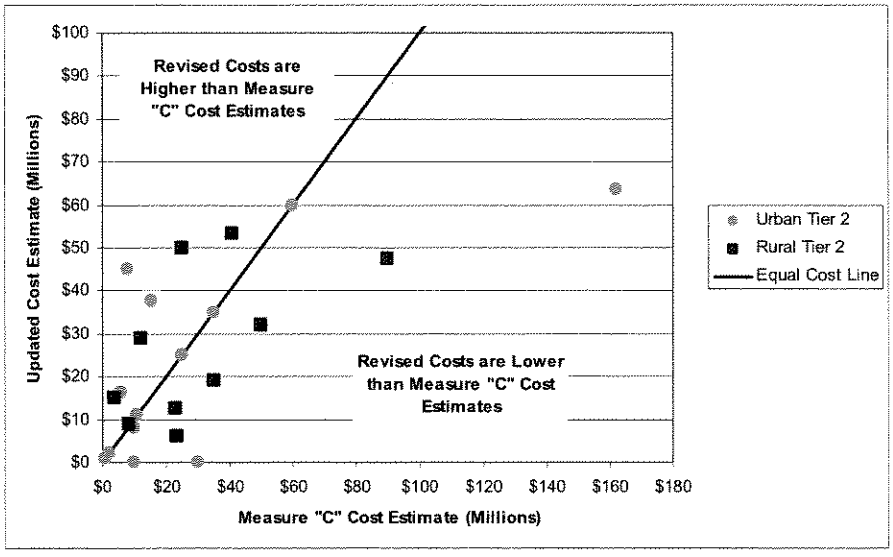


Figure 11: Comparison of Measure "C" and Updated Cost Estimates, Tier 2 Projects

There were many reasons why the costs changed significantly between the time the Measure "C" Extension ballot materials were being prepared and today. Some of the reasons include:

- The cost of construction materials has escalated rapidly in recent years as China switched from being a major exporter of cement, steel, and plywood to being an importer of such goods. The weakening U.S. dollar caused the price increases for other imported construction inputs, particularly gasoline. This can be seen in Figure 12, which shows Caltrans' construction price index for the every year since 1990. Note that prices rose more in 2004 than they did in the previous twenty years *combined*, followed the next year by a second similarly large price increase. Although prices have since fallen slightly, they are still about double what they were when the original cost estimates were made for most Measure "C" Extension projects.

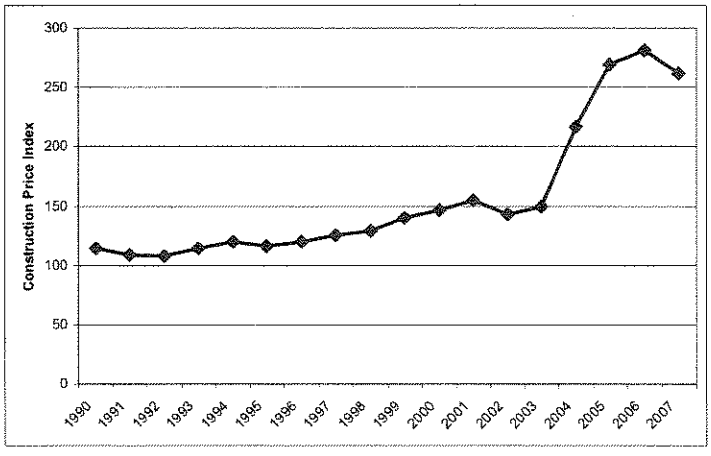


Figure 12: Caltrans Construction Price Index (1987 prices = 100)

- Some of the cost estimates used in the Measure "C" Extension materials appear to have been used by mistake. For example three totally unrelated projects (California Avenue widening, the replacement of the North and Cedar Avenue interchanges, and improvements to the American Avenue interchange) are all listed as having identical costs of $24,984,851. In another example, the $3 million estimate given for the SR-41 auxiliary lanes between Tulare Street and O Street appears to have been the budget for a much smaller project to improve the O Street off-ramp that had a similar-sounding name.
- Some projects have moved forward using other funding sources since the Measure "C" Extension materials were prepared, and so the remaining budget request is for less than the original request. For example, the City of Clovis used funds from its own impact fees to implement most of the Shaw Avenue widening project, reducing the funding needed from Measure "C" Extension from $31.5 million to $17 million.
- In several cases additional information has come to light that resulted in changes to the project scope. For example, the City of Parlier found that the plan to widen Mendocino Avenue would have been considerably more expensive than originally thought due to the need to remove several commercial gas storage tanks. The City is therefore revising their plan to widen a parallel road, Academy Avenue, to serve the same purpose as the original project. Similarly, for the case of the extension of SR-180 to I-5, the original alignment along Nees Avenue has been dropped in favor of a new alignment with different cost characteristics.
- In other cases the lead agency changed the phasing of a project with consequent changes to costs. For example, SR-180 East Segments IV and V were originally scoped to be 2-lanes expressways within a right-of-way capable of accommodating later expansion to a 4-lane facility. Upon reconsideration Caltrans believes that the rapid growth of demand in the area justifies implementing the extension as 4-lanes from the start, especially as the additional cost of doing so is relatively low.

In all cases the approach used in this study was that it is the role of the sponsoring agency, not the consultant, to define or redefine the project. For example, if the lead agency's concept for the project has evolved away from the concept originally used to prepare Measure "C" then there would be little point in basing the costs used for the RTMF on superseded information. Note, however, that this does not mean that the updated costs will be automatically approved for implementation; such a step could only be taken by the Measure "C" Extension oversight committee.

Conclusions Regarding Project Costs

Measure "C" Extension is a long-term program that will require periodic adjustments as the situation evolves over time. The original Measure "C" Extension materials incorporated the best cost information available at the time. However since that time some projects have dropped out of Measure "C" Extension as funds became available from other sources, other projects have changed in scope, and prices for construction materials and right-of-way have escalated rapidly. The overall estimated cost for the Tier 1 program has risen from about $534 million in uninflated 2006 dollars to about $913 million; an increase of 71%. Sixty percent of the 71% increase can be attributed to two projects, namely:

- 38% of the net increase is attributable to the extension of SR-180 west to I-5. The original alignment followed an existing road so much of the ROW had already been purchased; while the new alignment would require the purchase of entirely new ROW.

- Another 22% of the increase is attributable to the SR-41/168/180 braided ramps project. As this project moves through its design stages it is becoming clear both that the project will require more structure than was originally thought and that the materials to be used in these structures have increased in price.

The estimated costs for most Tier 2 projects had a net reduction of 16% due to the fact that several projects have already been fully or partially implemented using other funding sources. The net reduction is also due in part to the fact that few Tier 2 projects have reached the design stage, where unexpected cost items are most likely to come to light.

5. OTHER (NON-RTMF) SOURCES OF FUNDING

Measure "C" cites three sources of funding for projects, namely the Measure "C" sales tax, the State Transportation Improvement Program (STIP), and the RTMF. This section describes the levels of funding that can be expected from the first two sources so that the size of the expected unfunded portion can be determined. The figures used in this section are all expressed in uninflated 2008 dollars.

Measure "C" Sales Tax

The most important effect of the original Measure "C" was to establish a sales tax that could be used to fund improvements to the transportation system. The sales tax raised $671 million over the life of the original Measure "C", $480 million (71.6%) of which was used for capital projects[10].

Sales tax revenues grew steadily over the course of the original Measure "C" and are expected to continue to grow during the period of the extension, though a short downturn is expected in the near term due to the current weak condition of the economy. The key difference between the sales tax revenues in the original Measure "C" and the extension, from the perspective of road improvement programs, is that 71.6% of sales tax revenues were available for capital projects during the original measure compared to only 29.4% being made available for road improvements during the period of the measure extension[11]. The overall effect is shown in Figure 13 below.

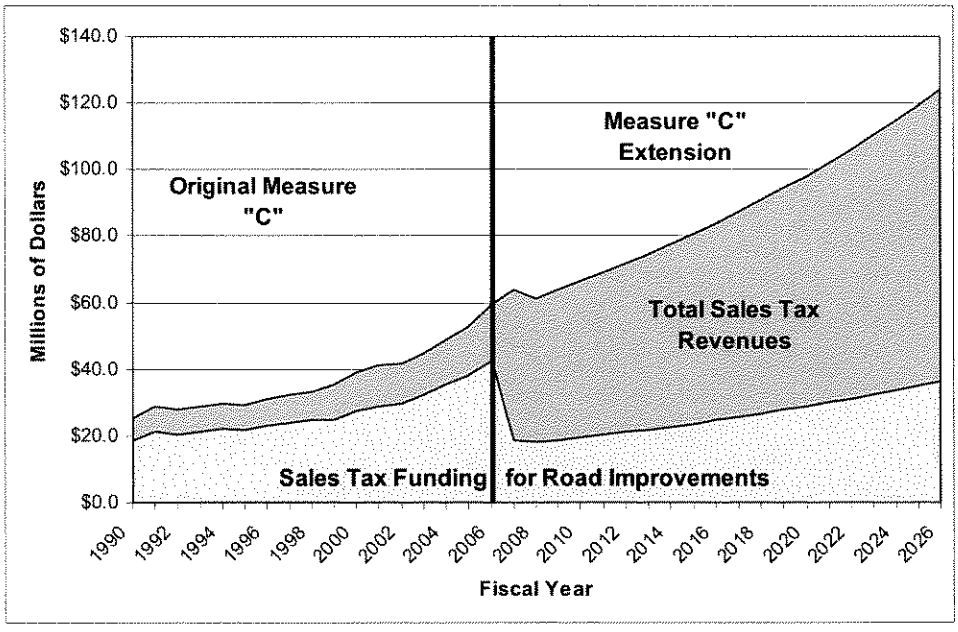


Figure 13: Measure "C" Sale Tax Revenue

[10] Another 25.0% was used to support local transportation and the remaining 3.4% was used to cover administrative costs.

[11] The Measure "C" Extension also includes funding for public transit and transit-supportive measures, local street maintenance and improvement, bicycle and pedestrian trails, and rail consolidation, among other things.

Based on the most recent estimates it appears that the Measure "C" sales tax will raise approximately $517 million for road improvements over the life of the extension. In nominal terms this is slightly more than was raised during the original Measure "C", but when the doubling of construction costs are considered the real level of sales tax support for road improvements will be about half of what it was under the original measure.

State Transportation Improvement Program (STIP)

State and federal funds for transportation improvements are channeled through the STIP, which is administered by the California Transportation Commission (CTC). For the purposes of this study there are two key features of the STIP; namely that the CTC allocates a share of statewide funding to Fresno County which the Fresno COG then allocates among individual projects, subject to later review by the CTC, and that STIP funding is difficult to predict and varies widely from year to year depending on the budget situation on the state level.

Table 22 below shows the STIP funds for projects analogous to those in the Tier 1 and Tier 2 lists for the period of the original Measure "C".

Table 22: Original Measure "C" STIP Funding for Road Projects

Year	Project	STIP Funds (millions)
1990	SR 180 - SR 99 to SR 41	$72.4
1990	SR 180 - SR 41 to Chestnut	$75.9
1992	SR 168 - SR 180 to Bullard	$53.2
1992	SR 41 - Audubon to Madera Co. Line	$18.2
1998	SR 180 - Chestnut to Clovis	$90.2
1999	SR 180 - SR 99 to Hughes/West Diagonal	$39.3
2007	SR 180 - Clovis to Temperance	$11.9
Projected	SR 180 - Temperance to Academy	$25.1
	Total for 20-Year Measure Period =	$386.1
	Average STIP Funding Per Year =	$19.3

The CTC's current estimate for STIP funding for the first half of the Measure "C" Extension period[12] is $16.8 million per year. The Measure "C" Extension ballot materials state that 75% of STIP funds will be made available for Tier 1 projects, which would mean that $12.6 million per year[13] would be available for the projects relevant to the RTMF study. STIP funding would thus be about 35% less during the Measure "C" Extension period than it was during the period of the original Measure "C"[14] in nominal terms. Moreover, since project costs have approximately doubled in recent years, in terms of purchasing power for road construction the STIP will only provide about one-third of the funding support that it did during the period of the original Measure "C".

[12] Estimates are not yet available for the second half of the period
[13] 75% of $16.8 million is $12.6 million
[14] $12.6 million is approximately 65% of $19.3 million

Comparing Project Costs to Funding Available

Taken together, the STIP and the Measure "C" sale tax are expected to generate approximately $769 million over the course of the Measure "C" extension period[15]. This figure is compared to the estimated costs of projects in Table 23 below.

Table 23: STIP and Sales Tax Revenues Compared to Project Costs

Projects Included	Project Costs	STIP & Sales Tax Revenues	Funding Shortfall
Tier 1 Only	$947	$769	$178
Tier 1 and FIDS	$1,066	$769	$297
Tier 1, Tier 2, and FIDS	$1,753	$769	$984

The table shows that the STIP and sales tax allocations would cover approximately 80% of the costs of the Tier 1 projects, leaving a shortfall of approximately $178 million to be funded from other sources. Fresno COG believes this to be a very conservative estimate of the shortfall since it does not include an allowance for further inflation of project costs; if construction prices continue to rise, the shortfall for Tier 1 projects could be as much as $500-$600 million. The clear conclusion is that there will be no surplus of STIP and sales tax allocations for Tier 2 and FIDS projects; if they are to be implemented they would have to be funded entirely from other sources that could include RTMF.

This calculation is intended to provide readers with a context for judging the role of the RTMF as a source of funds for roadway improvements in Fresno County. Readers should note, however, that the maximum fee that can be charged under the RTMF is based solely on the traffic impacts attributable to new development and thus is unrelated to the size of the funding shortfall. In other words, if the maximum revenues from the RTMF are insufficient to cover the funding shortfall then the fees cannot be simply factored up to the desired level; by state law the fees cannot go beyond the constraints stipulated in the Mitigation Fee Act.

[15] Assuming that 75% of the STIP and 29.4% of the sale tax revenues are devoted to road improvements, as stated in the Measure "C" Extension ballot materials.

6. POLICY ISSUES CONSIDERED BY THE PDT

The Project Development Team (PDT) considered a variety of issues in monthly meetings held over the course of the project. These discussions provided guidance to the consultants on how these issues should be handled within the context of calculating the fee. The issues that generated the greatest amount of discussion are described in the sections below.

Commitments Made in the Measure "C" Extension Ballot Materials

Perhaps the most important issue raised at the PDT meetings was the fact that the Measure "C" Extension ballot materials included items that may have been consistent at the time the materials were prepared, but now apparently contradict each other. Most pertinent to this study is the fact that the RTMF is described in one section as providing, "*Approximately $102 million from developer fees*" while another section says that, "*Funds collected through the RTMF will provide an anticipated 20% of Urban and Rural Measure "C" funds to deliver Tier 1 Projects over the Measure "C" period*". The contradiction occurs because construction costs have since risen to the point where $102 million now represents about 10% of Tier 1 costs instead of the 20% originally anticipated. Some PDT members believe that the ballot materials imply a commitment to the $102 million figure, while other members believe that they imply a commitment to see that new development bears 20% of Tier project costs.

Some PDT members also raised the issue of whether there was an implied commitment to maintain an acceptable degree of mobility in the county. The COG has a policy of maintaining at least LOS "D" on the regional road system, and the projects listed in the Measure "C" Extension materials were intended to ensure that congestion does not exceed this threshold. If the RTMF failed to raise sufficient revenues to fund these projects, then portions of the system would operate at lower levels of service than current policy allows.

A consensus could not be reached on which of these commitments should take precedence. Instead, the PDT chose to submit several options to the Fresno County Transportation Commission so that the commission could make the determination as to which target level of funding is most appropriate.

Conflicts with Existing Fee Programs

Several of the jurisdictions in Fresno County already collect fees from developers that are used to mitigate impacts on the major street system. To the extent that these programs cover the same projects that would be funded under the RTMF there would be an overlap that would need to be resolved, because the Mitigation Fee Act does not allow the cost of any particular mitigation measure to be charged twice.

The extent of the potential overlap varies by jurisdiction. The City of Fresno's Major Street Impact Fee was purposefully designed not to include funding for any Measure "C" Extension projects, so there would be no overlap. In contrast, the City of Clovis's impact fee program includes several projects on the Measure "C" Extension list that would either have to be dropped from the city's fee program, dropped from the RTMF, or dealt with in some other way to eliminate the overlap. Fresno County represents a third situation, in that it does not have a formal traffic fee program in place, but instead analyzes each project's impacts separately and then negotiates a settlement for traffic impact mitigations. In some cases this could lead to an overlap, but not in all cases.

The PDT dealt with this issue by recommending that the RTMF be applied only to state facilities and exclude local roads, which would still be eligible for other Measure "C" Extension funds (sales tax revenues, etc.). Local impact fee programs could then be applied to local road projects with

no overlap. Limiting the RTMF to state facilities would also remove any questions about whether the proposed improvement was regional in impact as opposed to purely local.

Affordability

Another issue raised at PDT meetings was the extent to which the market could accept the cost of a new fee program, especially given the recent downturn in the housing market. The PDT could not reach a consensus on this issue, with some members citing anecdotal examples of houses being sold below cost, while others questioned whether current market conditions will be representative of the 20-year life of the program.

This issue was ultimately resolved through a PDT decision not to recommend a single plan to the Fresno COG board but instead to present several options to the board allowing the board to consider different levels of fees.

Comparability with Other Counties

An issue closely related to affordability was whether the proposed RTMF would be higher or lower than analogous fees in other counties. This was viewed as an indicator of what the market will bear and also address the specific issue of whether a fee in Fresno County would cause investment to shift to a lower-priced location.

Figure 14 below compares mitigation fees for regional traffic impacts in eight other counties in California. The fees vary significantly, depending on how ambitious the construction program is, and also by how long the fee has been in place. There has been a definite trend towards increasing impact fees as other potential sources of project funds appear to be in a long-term decline. Nevada County, for example, is replacing its $576 traffic mitigation fee per single family home with a new fee structure that charges $4,205 per single family home.

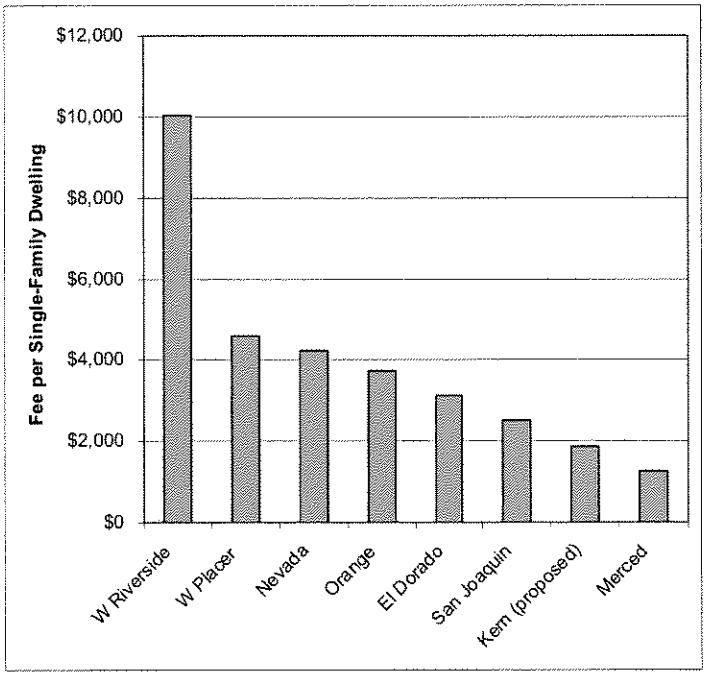


Figure 14: Comparison of Regional Traffic Impact Fees

Based on Figure 14 it appears that county-level traffic mitigation fees are typically in the range of $2,000-$4,000 per single-family dwelling.

Return-to-Source Issues

Some members of the PDT expressed a concern that RTMF monies would be collected in certain parts of the county but spent in other parts, which would be politically unacceptable to the donor areas. Concern over this issue diminished over time as the analysis revealed that the imbalance was much smaller in magnitude than originally supposed. Moreover the imbalance (namely that more RTMF money would be collected in the metropolitan area than would be spent on projects there) would be offset to some degree by other parts of Measure "C" Extension that disproportionately favor projects in the metropolitan area (airport improvements, transit improvements, etc.).

This issue was dealt with by conducting an analysis of where RTMF funds would be collected and spent and, when the program was found to be reasonably balanced, not pursuing the issue further.

Administrative Complexity and Administrative Costs

The costs involved in administering the RTMF program were the subject of debate in three or four PDT meetings. There are several facets to this issue, including:

- The Fresno County Transportation Commission has no funds to administer this program other than whatever funds are raised within the program itself.
- Programs in other counties in California have established a precedent that administrative costs for a fee program can be recovered as part of the fee. Administrative costs are typically on the order of 3% of project revenues. For example, 3.4% of the revenues for the original Measure "C" was used to cover the cost of administering the program.
- Most PDT members felt that the RTMF should be collected by the local jurisdiction as part of their regular development approval process, thus saving the developers the need to go through a separate process at the transportation commission.
- The cost to the local jurisdiction to process the fee will vary from jurisdiction to jurisdiction. The cost would be low for agencies that already collect fees (it would just be one more fee on the list along with fees for fire protection, libraries, parks, etc.) but could be substantial for local agencies that do not currently administer fee programs.
- There is a trade-off between accuracy (in the immediate term) and administrative costs. The most accurate system for computing the fee would be to categorize the proposed development to the most detailed land use sub-category for which a trip generation rate existed; for example, distinguishing "Convenience Mart with Gas Pumps (ITE code 853)" from "Gasoline/Service Station with Convenience Mart (ITE code 945)". The difficulty is that such categorizations are open to debate and challenge and, moreover, might only be accurate for the building's first tenant. Aggregating land use categories into major groups such as "retail", "service", and "other commercial" would reduce administrative complexity, preclude disputes for minor changes in building use, and lower the overhead costs for everyone.
- In addition to at-the-counter administrative costs, the program would also incur costs for consultants involved in periodic updates, possibly banking fees for financial transactions, and auditing costs.

The consensus of the PDT was to set the administrative fee initially at 2%, and then subsequently review the appropriateness of this level during the program's first update after the first two years of operation. The 2% would be used to cover the transportation commission's costs to administer the program; local jurisdictions could choose to add a transaction fee if they felt it was needed to cover their own costs of administering the program.

Pass-By Trips

The issue of pass-by trips was raised a number of times in the PDT meetings because of its importance to developers of retail properties. Most jurisdictions allow retail uses to have some reduction in the computed traffic impacts, either because they accept the theoretical justification for such a reduction or because, as a practical matter, failing to provide some relief may cause retail uses to locate out of the jurisdiction which would reduce future sales tax revenues.

This issue is complicated by the fact that some retail uses, for example fast food restaurants or video rentals, have a much higher rate of pass-by trips than other retail uses, such as appliance stores. Given that retail space has a much faster turnover than other land uses, it is difficult to determine what pass-by rate to use for a long-term calculation even if the first tenant can be correctly identified, which is not always the case.

The PDT recommended including a flat-rate pass-by reduction of 43% for retail uses. The 43% figure is the median recommended pass-by reduction for the retail land uses in ITE *Trip Generation* for which a pass-by rate is given.

Exempt and Favored Land Uses

The terms of the Measure "C" Extension stipulate that essential public services will be exempt from the fee. The PDT therefore exempted education and government developments from payment of the RTMF. The terms of the Measure "C" Extension also stipulate that affordable housing will pay only half of the fee collected from higher-priced housing of a similar type. This is included in the calculations shown in the next chapter.

Vested Maps

Another issue raised in the PDT meetings was the fact that approximately ten thousand residential lots have already been approved for development and are thus unlikely to be paying the RTMF (since their project approvals predate the enactment of the fee). The term "unlikely" is used because development approval for some of these lots may expire before anything is constructed on them, in which case subsequent proposals for new development would be subject to the RTMF. The PDT concluded that there was not much that could be done about this issue other than to take it into account when computing the amount of revenue likely to be raised by the RTMF program.

Period Used to Determine Level-of-Service

Traffic impact fees can be based either on traffic conditions throughout the day or limited to traffic conditions during the peak period. The PDT decided early in the study that daily traffic volumes were the appropriate measure of traffic conditions on most roads in Fresno County, and made a decision to use daily traffic volumes as the basis for the level-of-service calculations.

As the study progressed, more attention came to be focused on the freeway ramps as critical bottlenecks in the regional road system. Congestion on this type of facility tends to be limited to peak periods, so LOS calculations based on daily conditions tend to under-state the impact that congestion at interchanges has on the overall traffic situation in the county. For this reason the

PDT ultimately recommended using daily traffic volumes to determine the LOS for most types of facilities and using PM peak hour traffic volumes to determine LOS specifically for freeway interchanges.

Selection of Scenarios for Testing

Based on the considerations described above, the PDT recommended that three options move forward for further consideration, namely:

> Option 1: The RTMF would be used to fund whatever portion of the cost of improvements to state facilities (only) on the Measure "C" Extension Tier 1 and Tier 2 lists, and those projects recommended in the Freeway Interchange Deficiency Study, that could be attributed to new development. Educational and governmental developments would be exempt from the RTMF, and a flat 43% reduction would be allowed for retail developments to account for pass-by trips. The rationale behind this option is that it represents the best chance for funding all of the projects listed in Measure "C" Extension within the constraints of political acceptability.
>
> Option 2: This is the same as Option 1, but projects on the Tier 2 list would not be considered in computing the fee and would not be eligible for RTMF funding. The rationale for this scenario is that the RTMF collections are unlikely to be sufficient over the life of the program to cover the full cost of some projects on the Tier 2 list and that no alternate source of funding has been identified that could make up the unfunded portion. Proponents of Option 2 feel that they cannot justify collecting money that is earmarked for a project that has little apparent prospect of being built.
>
> Option 3: This is the same as the Option 2, except that the RTMF would be phased in over three years. The rationale for this option would be to reduce any negative impacts that the RTMF might have on real estate development during the current weak market.

The results for these three scenarios are described in the next chapter.

7. COMPUTING THE RTMF FEES AND REVENUES

An overview of the methodology used to compute the RTMF is provided in the section below, followed by sections describing the resulting fees and the revenues that would be raised by the RTMF under the three sets of policy options described in the previous chapter.

Overview of the Fee Computation Methodology

The methodology used in the fee computation is outlined in Figure 15 below.

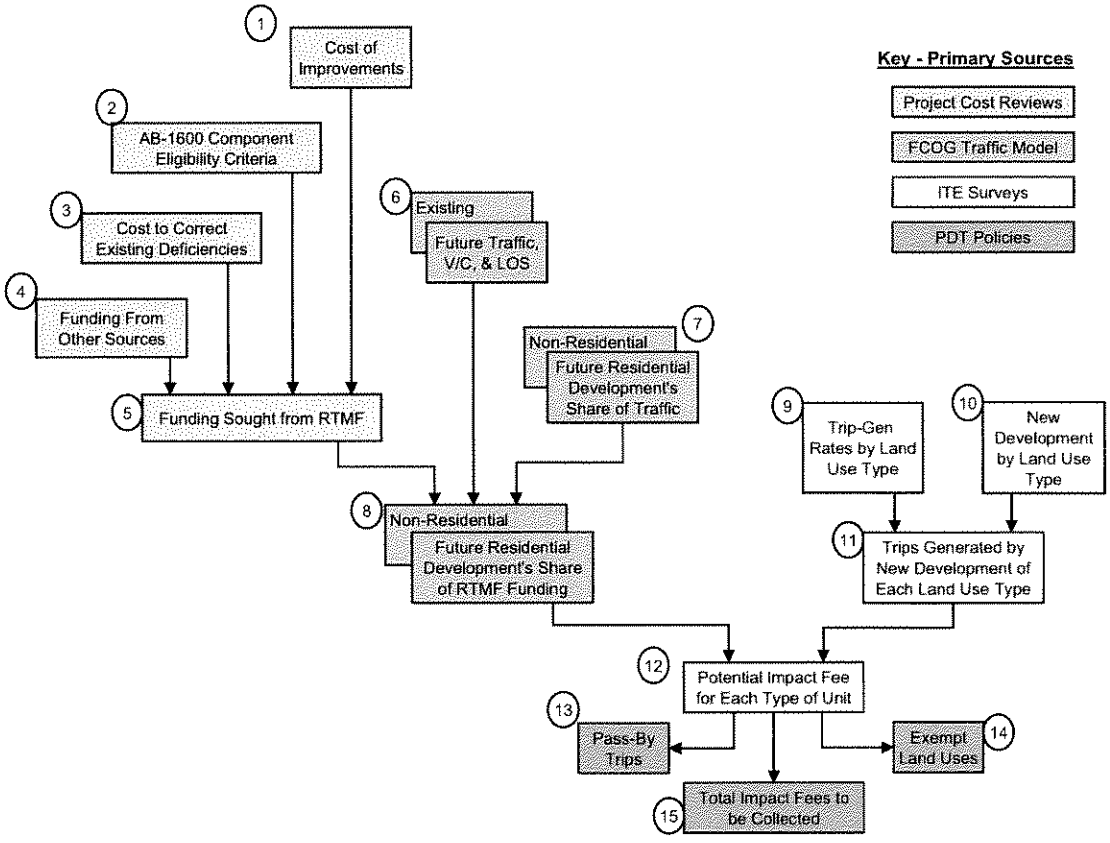


Figure 15: Steps in the Fee Computation

The major steps include:

1) The starting point was the set of revised cost estimates prepared for each project as described in Chapter 4.

2) The costs of certain project components such as beautification work were deducted because they are ineligible by law to receive impact fee revenue. There are only a few of such cases.

3) Next, certain items such as the cost to replace a flooded bridge or the cost to replace a structurally deficient bridge were deducted since the purpose of the project is to correct an existing deficiency. The Mitigation Fee Act does not permit the use of impact fees to correct existing deficiencies.

4) Next, funding from other sources that is expected to be available for the listed projects was deducted from the amount needed from the RTMF.

5) The product of the previous four steps was the interim maximum amount of funding that can be sought from the RTMF. This interim amount was later finalized in Step 8.

6) The outputs from the Fresno COG traffic model were used to determine the volume-to-capacity (V/C) ratio and level-of-service (LOS) for each project under existing and 2030 conditions.

7) The Fresno COG traffic model was also used to determine the growth in vehicle-miles traveled (VMT) that will be associated with residential and no-residential development.

8) The results of Steps 5, 6, and 7 were then combined to determine the portion of each project's budget that could be attributed to new residential and non-residential development. This is the maximum amount allowable by law that could potentially be collected using the RTMF.

9) Next, the trip generation rate was determined for each land use type. For residential land uses the unit of measurement was VMT per day per dwelling unit, while for non-residential uses, trip-generation was measured in terms of VMT per day per job.

10) The number of new units of each land use type was taken from the Fresno COG traffic model.

11) The number of new units for each development type was then multiplied by the trip generation rate to produce the total number of new trips associated with each type of land use development.

12) The project funding attributable to residential and non-residential developments (from Step 8) was then divided by the expected number of new trips (from Step 11) to produce the maximum potential impact fee for each type of unit.

13) A percentage of trips was deducted from the certain land use types to account for pass-by trips.

14) The PDT established a policy, based on language in Measure "C" Extension, that certain types of land uses would be exempt from the RTMF. The fees from these land uses types were therefore deducted from the expected RTMF revenues.

15) The total amount of RTMF revenues to be collected were then computed by multiplying the expected number of new units of each type of non-exempt development by the fee charged to each unit.

The next sections describe several key steps in the process in more detail.

Trip-Generation Rates by Land Use Type

Trip generation (trip-gen) rates are a key connection between future land development and its expected traffic impacts. Fresno COG's travel demand model bases its trip-gen equations for residential land uses on the vehicle ownership of the household, with different rates for

households with zero, one, and two vehicles. While this approach makes sense for a traffic model, it is impractical to use for an impact fee program because when a new development is proposed the only known quantities are the number of dwellings to be constructed; neither the developer nor the jurisdiction has any way of knowing what the vehicle ownership rates of the future residents will be. A similar situation occurs for non-residential development. The developer and the jurisdiction only know the floor area of the buildings proposed for construction; they have no way of knowing the number of employees who will work in the building (which is likely to vary from year to year regardless of the size of the building). The employee-based trip-gen rates used in the traffic model would be awkward to try to use for collecting an impact fee. For these reasons, a different source of information on trip-gen rates is required.

By far the most commonly used reference for trip generation rates in the U.S. is ITE's *Trip Generation*[16] handbook, which was chosen by the PDT as the reference to be used in this study.

Residential and Non-Residential Shares of New Traffic

The amount of traffic generated by a new development is a function of the number of new trips associated with the development and the average length of those trips. Together, these two produce the total vehicle-miles-traveled (VMT) associated with the development.

Outputs from the Fresno COG Travel Demand Model were used to forecast the growth in VMT for five different types of trips. The growth in VMT from new development was attributed to residential and non-residential developments based on trip type. In this case, the PDT chose to attribute all trips beginning or ending at the traveler's home to the residential trip purpose while all trips not involving a residential location were attributed to non-residential land uses. This approach is consistent with the state of the practice for estimating trip generation as described in NCHRP Report 187[17], which is a primary reference for travel estimation techniques used in travel demand modeling. Chapter 2 of the NCHRP report, which details trip generation estimation, states that "HBW (Home Based Work) and HBNW (Home Based Non Work) trips are generated at the households, whereas the NHB (Non-Home Based) trips are generated elsewhere."

The growth in VMT for residential and non-residential land uses are shown Table 24.

Table 24: Growth in VMT

Trip Purpose	VMT in 2007	VMT in 2030	Growth in VMT	
			Residential	Non-Res
Home-Work VMT	5,824,570	9,312,158	6,975,177	-
Home-Shop VMT	2,465,152	4,151,433	3,372,562	-
Home-Other VMT	6,702,090	11,038,334	8,672,487	-
Other-Work VMT	2,300,702	3,804,637	-	3,007,870
Other-Other VMT	6,409,288	10,709,570	-	8,600,565
Total Vehicle Trips	23,701,802	39,016,133	19,020,227	11,608,434
Percent of the Growth in VMT >			62%	38%

Source: Fresno COG Travel Demand Model, Parsons Brinckerhoff

[16] *Trip Generation 7th Edition*, Institute of Traffic Engineers, 2003

[17] *Quick Response Urban Travel Estimation Techniques and Transferable Parameters User's Guide*, Transportation Research Board, 1978

Based on this calculation, 62% of VMT growth was attributed to residential development and 38% was attributed to non-residential development.

Pass-By Trips

Some analyses of traffic impacts provide an allowance for what are termed "pass-by" trips. These are stops at intermediate destinations (coffee shops, gas stations, etc.) that occur in the course of a longer trip taken primarily for some other purpose, such as a home-to-work trip. It could be argued that such trips add little to the overall mileage driven and therefore have only a minor impact on traffic conditions. The PDT chose to use a flat reduction rate of 43% for all retail developments.

Revenues Raised by the RTMF Program

Table 25 below shows the estimated amount of revenue that would be generated under the three Options.

Table 25: Potential RTMF Revenues Under Different Options

Project or Cost Category	Total Project Costs	Costs Allowable Under Mitigation Fee Act	Potential RTMF Revenues		
			Option 1	Option 2	Option 3
Tier 1	$947 M	$458 M	$247 M	$247 M	$235 M
Tier 2	$687 M	$254 M	$170 M	$0 M	$0 M
FIDS	$125 M	$41 M	$31 M	$31 M	$29 M
Admin. Costs	-	$23 M	$9 M	$6 M	$5 M
Total	$1,758 M	$753 M	$447 M	$278 M	$264 M
As a % of Total Project Costs >			25%	16%	17%
As a % of Allowable Costs >			59%	37%	35%

Source: Parsons Brinckerhoff

As can be seen from the table, all three of the options under discussion could raise more revenue that the $102 million figure used in the Measure "C" Extension ballot materials. Option 1 would be above the 20% figure used in the Measure "C" Extension ballot materials for RTMF's contribution to project funding, while Options 2 and 3 would contribute less than 20%. In every case the amount collected would be well below the maximum amount that could theoretically be collected under the Mitigation Fee Act due to the effects of restricting funding to state projects, exemptions of some land use categories, and the pass-by trip reduction for retail developments.

Results in Terms of Fees Applied

Another way of comparing the options is by looking at the resulting fees for different land use categories. This information is provided in Table 26. The land use categories shown in Table 26 reflect the categories cited in Appendix D of the Measure "C" Extension ballot materials. The table includes a fifty percent discount for affordable housing, which is mandated in Appendix D. The fees charged under Options 2 and 3 would be the same, except that for Option 3 the fees in

the first year after the RTMF was enacted would be reduced by two-thirds, and in the second year would be reduced by one-third.

Table 26: RTM Fee Levels under Different Options		
Land Use Category	**Option 1**	**Options 2 & 3**
Residential Developments ($/dwelling unit)		
Single-Family Dwelling (market-rate)	$2,781	$1,727
Single-Family Dwelling (affordable)	$1,390	$863
Multi-Family Dwelling (market-rate)	$1,953	$1,212
Multi-Family Dwelling (affordable)	$976	$606
Non-Residential Developments ($/sq.ft.)		
Education	Exempt	Exempt
Government	Exempt	Exempt
Commercial/Retail	$3.16	$1.96
Commercial/Office/Service	$1.98	$1.23
Light Industrial	$0.79	$0.49
Heavy Industrial	$0.17	$0.10
Other Non-Residential	$0.67	$0.42

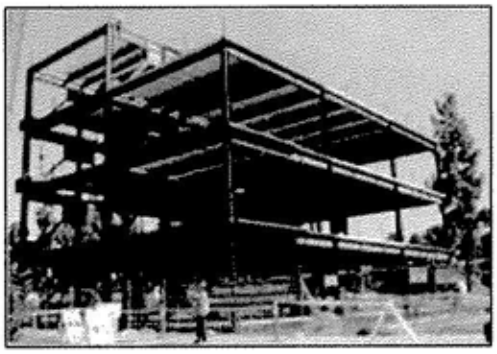
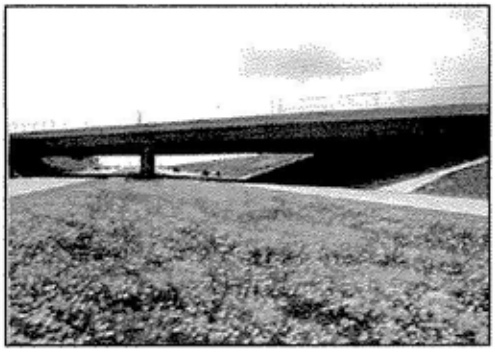
Source: Parsons Brinckerhoff

6. CONCLUSIONS

The amount of revenue raised by the RTMF will depend on certain key policy decisions to be made by the Fresno County Transportation Commission. The PDT was able to reach consensus on most policies, but was unable to reach consensus as to whether the RTMF should be used to raise funds for projects on the Tier 2 list. There was also a lack of consensus on the more minor issue of whether the fee should be fully applied from the start or if it should be phased in over several years. The PDT therefore decided to submit three options to the Fresno County Transportation Commission for their consideration.

Depending on the policy option selected, the RTMF has the potential to raise between $300 million and $580 million, which is far more money than the $102 million originally estimated in the Measure "C" Extension ballot materials. There are three reasons for the difference:

- The original figure was made in the absence of a detailed study and represents a placeholder for planning purposes rather than an estimate of what could actually be collected.
- Project costs have risen rapidly in recent years and new development's share of those costs have risen proportionately
- Some projects have changed in scope and will involve more construction than originally anticipated.

The Mitigation Fee Act imposes constraints on the maximum amount that can be charged for an impact mitigation fee, but does not impose a minimum (an agency is not required to charge any fee at all). Any of the three options described above would be permissible under the Mitigation Fee Act. However, if the RTMF is set at a level insufficient to fund projects that later prove to be necessary, the opportunity to have collected fees from early developments will have been lost, and the burden of funding these projects will be passed to others.

It is up to the Fresno Transportation Commission to determine which of the options is most likely to fulfill the goals of Measure "C" Extension.