

CHAPTER 9

TRANSPORTATION SYSTEM MANAGEMENT

I. OVERVIEW

KCAG developed a Transportation System Management (TSM) Program in 1983. The intent of this Program is to apply various low cost transportation measures that can by themselves, or in association with other measures, help to increase the operational efficiency, safety, and utility of Kings County's existing regional transportation system. In conformance with State guidelines, it is intended to help accomplish the following:

1. Foster the safe and efficient flow of passenger vehicles and trucks along heavily traveled corridors;
2. Minimize the costs of improving the existing transportation system;
3. Reduce dependency on the automobile for individual commuting;
4. Minimize environmental impacts of the existing transportation system; and
5. Improve transit system ridership.

II. PURPOSE

The central themes of Transportation System Management (TSM) are conservation and efficiency. Persons conducting TSM studies are looking for ways to optimize the efficiency of the existing transportation system, while alleviating the need for costly construction projects. When these goals are realized, public tax dollars are conserved, as are natural resources such as energy, air quality, land, and materials. KCAG's TSM program provides a way to let decision-makers weigh lower-cost measures against more expensive options when transportation improvements are being considered.

TSM is an administrative process carried out to select improvements for the existing transportation system. Already in Kings County, TSM-like studies are routinely conducted as a part of local traffic and parking management programs, and by the Kings County Area Public Transit Agency (KCAPTA) to assess the performance of the Kings Area Rural Transit (KART) bus system. These agencies continually evaluate their transportation systems using various surveillance procedures, such as transit ridership counts, traffic counts, accident reports, field reconnaissance, etc.

KCAG's program was undertaken to foster countywide coordination and to define the extent that TSM should be formalized as a planning activity. In doing so, the program: 1) sets goals and objectives for countywide TSM planning; 2) assigns KCAG as coordinator of TSM planning for the regional system; 3) provides an "idea book" or "shopping list" describing alternative TSM measures; and 4) suggests methods to monitor the effectiveness of TSM implemented projects.

III. ASSUMPTIONS

- A. The physical transportation system in Kings County is largely in place, but the system has critical deficiencies, and improvements are needed if it is to fulfill its intended function.

- B. The existing system represents a very large investment of public money and natural resources. It should be maintained and upgraded.
- C. Transportation improvement revenues to state and local agencies are limited. Unless new monies are made available, there will probably not be enough to cover the expense of alleviating system deficiencies.
- D. Transportation improvements are not limited to road construction and parking projects. Public transit improvement measures, non-motorized facilities, carpooling, and strategies to manage travel demand can be considered transportation improvements.

IV. ROLES AND RESPONSIBILITIES

In order to have a coordinated TSM planning program in Kings County, the participation of individual entities in carrying out TSM should be understood.

- A. KCAG fills the most important TSM role as coordinator of the TSM review process in the region. KCAG is also responsible for setting region-wide TSM goals and policies, and for documenting the TSM process.
 - 1. Coordinator. KCAG will continue acting as regional forum for the exchange of information between the county and cities. In addition, KCAG will use its responsibility as preparer of the RTP, the Regional and Federal Transportation Improvement Programs, and the Overall Work Program to ensure that TSM considerations are given to projects and needs of regional significance. This can be easily carried out as KCAG biennially reviews the programs of individual entities to ensure conformance to the goals and objectives of the RTP.
- B. Caltrans should assure that TSM considerations are given to State Transportation System improvements in Kings County. They could train and make staff available to provide technical assistance to local agencies that wish to conduct TSM studies.
- C. Cities and the County have the best knowledge of their own transportation systems. Therefore, project evaluations can be carried out locally and scaled to the urgency of particular problems.
- D. Transit Operators oversee the operation of their transit system and is in the best position to carry out the roles listed above under "Cities and the County" in reference to transit operations.
- E. Private Businesses can initiate many TSM actions with their own employees and business associates.

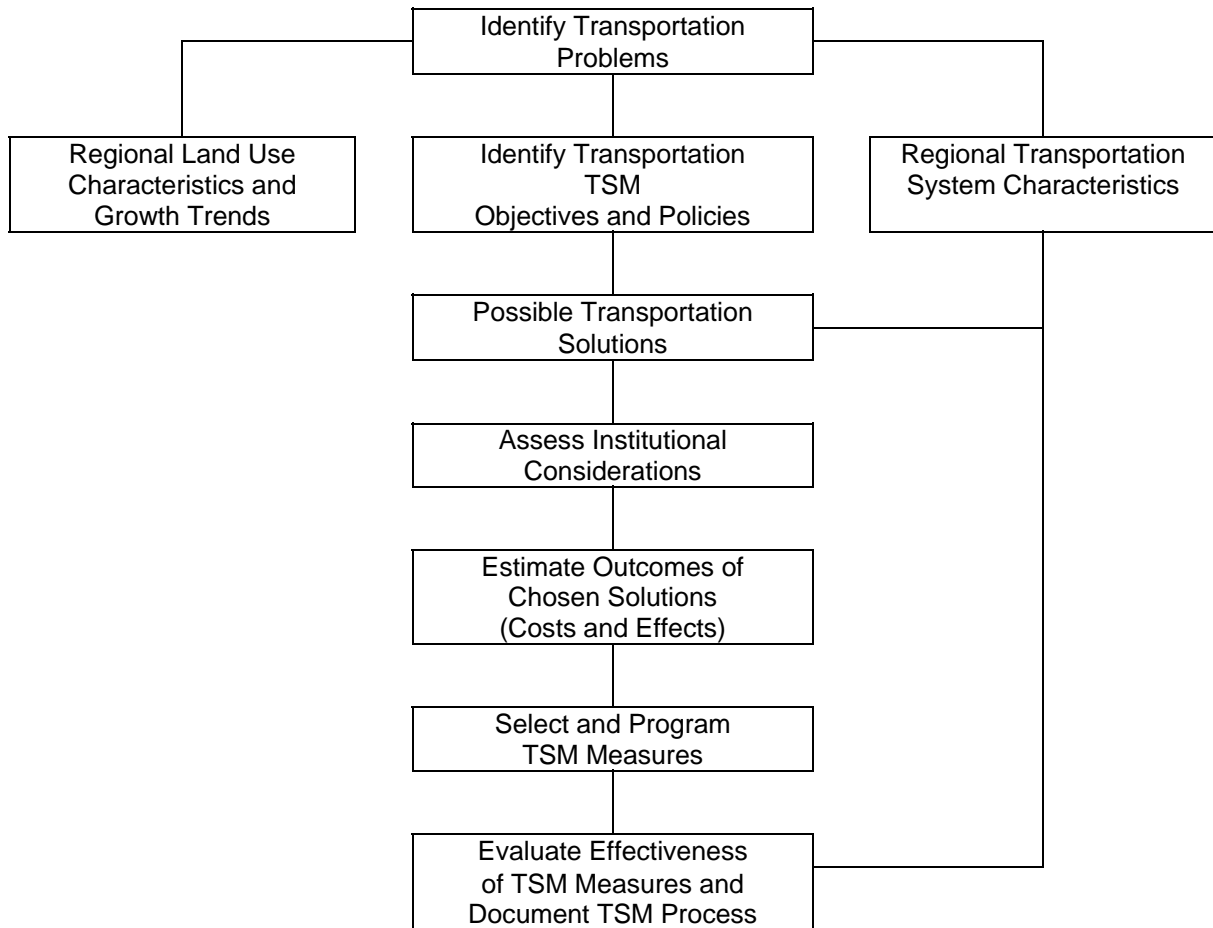
V. TSM PROGRAM DESIGN

- A. Set Goals and Objectives. The Federal Highway Administration suggests several goals and objectives for TSM efforts. Many of these are examined for their applicability to the problems and needs in Kings County.
- B. Identify Problems and Issues. Each local agency is asked to list and rank specific problems that hinder the efficient transportation of people and goods in their areas. Such lists can be used in addition to other regional system data compiled by KCAG.

- C. Select and Evaluate Alternative Measures. Many different actions can be taken to meet the transportation needs of an area. These can be either low or high cost alternatives. Fifty-eight measures are reviewed, and a method to evaluate their relationship to TSM goals and objectives, as well as their impacts and effectiveness, is developed.
- D. Document TSM Actions in the RTP.

FIGURE 9-1

TSM PROGRAM DESIGN



VI. ACTION ELEMENT

A. TSM STRATEGIES

State planning guidelines suggest that TSM objectives be time-specific and quantified. This is to allow year-by-year analysis of progress toward TSM targets. Contrary to this suggestion, the objectives in KCAG's program are not themselves quantified or time-specific. Staff acknowledges that Kings County is very rural, and its transportation improvements are small in scale compared to those of urbanized areas. While Kings County's size does not preclude TSM planning, it does make it hard to set realistic or meaningful target figures. The attainment of TSM objectives can be documented by periodic studies of the effectiveness of TSM measures in future RTPs.

FIGURE 9-2

TSM STRATEGIES AND ACTIONS

STRATEGY	ACTION
Improve Traffic Flow through Road Improvements	Pavement Management Techniques Road Reconstruction Intersection / Street Widening Install Turn Lanes Turning Movement and Lane Use Restrictions One-Way Streets Speed Restrictions
Improve Traffic Flow through Traffic Signalization	Signal Installation Left Turn Signal Installation Signal Timing/Computerized Signal Controls Eliminate Unnecessary Traffic Control Signs Install Traffic Control Signs
Improve Traffic Flow through Parking Management	Curb Parking Restrictions Off-Street Parking Areas Parking Duration Restrictions Residential Parking Controls Carpool Preferential Parking
Facilitate Active Transportation Projects	Pedestrian Activated Traffic Signals Install / Widen Sidewalks Shoulder Area for Bicycles Provide Bicycle Lanes and Routes Install Secure Bicycle Parking Transit Connectivity
Divert Traffic Away from Sensitive or Congested Areas	Auto-Restricted Zones Residential Traffic Controls
Improve Transit Patronage	Route and Schedule Modification Express Bus Service Park-and-Ride and Express Bus Service Subscription Bus Service Dial-a-Ride Service Substitute Dial-a-Ride Service for Fixed Route Service in Selected Time Periods Transit Marketing Program Operations Monitoring Program Maintenance Improvements Vehicle Fleet Improvements

FIGURE 9-2
(Continued)

TSM STRATEGIES AND ACTIONS

STRATEGY	ACTION
Increase Car and Van Occupancy (Paratransit)	Carpool Matching Service Vanpool Programs (Employer) Jitney Service Paratransit Subsidies Youth, Elderly and Handicapped Van Services
Encourage Transit, Active Transportation and Paratransit Use by Providing Intermodal Facilities	Park-and-Ride Lots Covered Bus Stops Bus Stop Benches Bus Loading Bays Bicycle Racks at Bus Stops and Park-and-Ride Lots Bicycle Racks on Buses
Reduce the Need to Travel	Flex Time / Staggered Work Hours (Employer) Compressed Work Week (Employer) Use Telecommunications Instead of Travel Land Use Planning Policies
Transportation Pricing Measures	Gasoline Tax Parking Fees Reduce Transit Fares
Information Services	Widespread Distribution of Transit Schedules Install Road Signs Bearing Rideshare Phone Number Carpool / Non-Motorized / Transit Promotional Campaigns Bicycle Safety / Education Seminars RTPA to Inform Local Employers of Paratransit Subsidies

B. TSM STUDY PROJECTS

Several problem areas on the state highway system have been subjected to TSM review. The process used to evaluate these areas is generally the same as that process used to develop projects for the STIP: identify problems; coordinate among governmental entities; consider solutions; recommend and seek to implement projects. The product of this research is the highway inventory presented in the Appendix. TSM review adds two additional tasks: relating TSM objectives and policies to alternative solutions; and project monitoring.

The adopted TSM program suggests a way to document the TSM evaluation process. The method is encapsulated in the following project evaluation worksheets. The worksheets briefly described problems and needs, and weigh TSM objectives and policies against selected improvement strategies. The sheets are most helpful in organizing one's thinking about the trade-offs in benefits and costs associated with alternative actions.

Worksheet documentation is provided for the following project areas:

- SR 43 between 10th Avenue and Fresno County
- SR 198 at 19th Avenue
- SR 41 near Lemoore
- SR 198 from SR 43 to Tulare County
- SR 198 at 9th Avenue

Of these project areas, the SR 41 project near Lemoore, the SR 198 project from SR 43 to the Tulare County line, and the SR 198 at 19th Avenue Interchange have been completed.

FIGURE 9-3

TSM EVALUATION WORKSHEET

Area: SR 43 North of Hanford
 Location: 10th Avenue to Fresno County Line

Objective	Problem Description	Policies	Possible TSM Projects			
			Do nothing	Park and Ride Lot Rideshare Program	Add passing lanes	Widen to 4 lanes
	Rapidly increasing traffic loads on 2-lane road. Operates at LOS C					
Quality	High percentage of trucks limits capacity	Shorten travel time. Increase safety. Comfort and convenience. Enhance reliability.	- - - -	0 0 0 0	+ + + +	+ + + +
Efficiency	Large number of commuters in a.m. and p.m.	Reduce auto dependency. Increase transit use. Facilitates active transportation.	0 0 0	+ + +	0 0 +	0 0 +
Environmental	Commuter traffic uses excess fuel and causes air and noise pollution	Reduce noise. Improve air quality. Reduce energy use.	0 0 0	+ + +	0 0 +	+ 0 +
Social / Economic	Is main road from Corcoran and Hanford to Fresno area	Complement general plans.	-	0	0	+
	Cost to implement		\$0	Unknown	Unknown	Unknown
	Overall Recommendation		Not recommended	Recommended	Implement for short term	Implement for long term

Code: + Positive Impact
 0 No Impact
 - Negative Impact

FIGURE 9-4

TSM EVALUATION WORKSHEET

Area: 19th Avenue at SR 198
 Location: In Lemoore

Objective	Problem Description	Policies	Possible TSM Projects				
			Do nothing	Restrict access	Install traffic signals	Step up ridesharing	Construct interchange
	At-grade intersection. Serves rapidly growing sector of Lemoore.						
Quality	High accident rate. Long wait / idle periods for cross-traffic.	Shorten travel time. Increase safety. Comfort and convenience. Enhance reliability.	- - - -	- + - -	- + + +	0 0 + 0	+ + + +
Efficiency	Major access point on SR 198 for LNAS commuters.	Reduce auto dependency. Increase transit use. Facilitates active transportation.	0 0 0	0 0 0	0 0 +	+ 0 -	0 + 0
Environmental	Excess idle time uses fuel and causes air pollution.	Improve air quality. Reduce energy use.	- -	0 0	- -	+ +	+ +
Social / Economic	General plans show vicinity for residential and commercial development.	Complement general plans.	-	-	-	0	+
	Cost to implement		\$0	Unknown	Unknown	Unknown	\$38.4 mil.
	Overall Recommendation		Not recommended	Not recommended	Not recommended	Recommended	Implement

Code: + Positive Impact
 0 No Impact
 - Negative Impact

FIGURE 9-5

TSM EVALUATION WORKSHEET

Area: SR 41 near Lemoore
 Location: SR 198 to Hanford-Armona Road

Objective	Problem Description	Policies	Possible TSM Projects			
			Step up Ridesharing	Increase transit use	Widen lanes, add shoulders	Construct 4-lane expressway
	Major state highway; congested 2-lane road.					
Quality	Traffic delays. Low operating speeds. High percentage of trucks.	Shorten travel time. Lower travel costs. Increase safety. Comfort and convenience.	- - - -	0 0 0 0	+ + + +	+ + + +
Efficiency	Major commuter corridor for LNAS and statewide traffic.	Reduce auto dependency. Facilitates active transportation. Use transit system.	0 0 0	+ 0 0	0 0 +	0 0 +
Environmental	Idling vehicles use gas; generate noise on acceleration.	Reduce noise. Improve air quality. Reduce energy use.	0 0 0	+ + +	0 0 +	+ + +
Social / Economic	Limits Lemoore area traffic flow.	Minimize neighborhood impacts. Complement general plans.	-	0	0	+
	Cost to implement		\$0	Unknown	Unknown	Unknown
	Overall Recommendation		Recommended	Recommended	Recommended; short term only	Implement

Code: + Positive Impact
 0 No Impact
 - Negative Impact

FIGURE 9-6

TSM EVALUATION WORKSHEET

Area: SR 198
 Location: SR 43 to Tulare County Line

Objective	Problem Description	Policies	Possible TSM Projects			
	Conventional 2-lane highway; gap between freeway segments in Kings and Tulare Counties.		Step up Ridesharing	Consider Kings / Tulare transit service	Add passing lane	Widen to 4-lane expressway
Quality	Congestion at commute hours. High truck traffic. Safety problem.	Shorten travel time. Lower travel costs. Increase safety. Comfort and convenience. Enhance reliability.	0 + 0 + 0	0 + 0 + 0	+ + + + +	+ + + + +
Efficiency	Carries more commuters than any road in Kings County.	Reduce auto dependency. Facilitates active transportation. Use transit system.	+ 0 0	+ 0 +	0 + 0	0 + 0
Environmental	Single-occupant commuting uses excess gas and causes noise and air pollution.	Reduce noise. Improve air quality. Reduce energy use.	+ + +	+ + +	0 0 0	0 0 0
Social / Economic	2-lane road hinders social / economic interchange with Tulare County.	Complement general plans.	0	0	0	+
	Cost to implement		Unknown	\$85,000/yr.	Unknown	\$80 mil.
	Overall Recommendation		Recommended	Recommended	Temporary measure	Implement

Code: + Positive Impact
 0 No Impact
 - Negative Impact

FIGURE 9-7

TSM EVALUATION WORKSHEET

Area: 9th Avenue at SR 198
 Location: In Hanford

Objective	Problem Description	Policies	Possible TSM Projects				
			Do nothing	Restrict access	Install traffic signals	Step up ridesharing	Construct interchange
	At-grade intersection. Serves rapidly growing sector of Hanford.						
Quality	High accident rate. Long wait / idle periods for cross-traffic.	Shorten travel time. Increase safety. Comfort and convenience. Enhance reliability.	- - - -	- + - -	- + + +	0 0 + 0	+ + + +
Efficiency	Major access point on SR 198 for Costco shopping center, meat facility and Swap Meet.	Reduce auto dependency. Increase transit use. Facilitates active transportation.	0 0 0	0 0 0	0 0 +	+ 0 -	0 + +
Environmental	Excess idle time uses fuel and causes air pollution.	Improve air quality. Reduce energy use.	- -	0 0	- -	+ +	+ +
Social / Economic	General plan shows vicinity for corridor mixed use and commercial.	Complement general plans.	-	-	-	0	+
	Cost to implement		\$0	Unknown	Unknown	Unknown	\$38.4 mil.
	Overall Recommendation		Not recommended	Not recommended	Not recommended	Recommended	Implement

Code: + Positive Impact
 0 No Impact
 - Negative Impact

C. MEASURING THE EFFECTIVENESS OF TSM ACTIONS

Once a project has been selected and implemented, it should be periodically evaluated to ensure that it is fulfilling its intended purpose. The following is a listing of research and monitoring projects that are now or could be used to assess the effectiveness of TSM projects. Such assessments could be done by formal evaluations, with the aid of specially designed evaluation worksheets or through various analyses using a microcomputer and appropriate software.

The KCAG regional travel demand model uses Citilabs Cube modeling software and was revalidated to a base year of 2015 in November 2017. The KCAG regional travel demand model is a trip-based "four-step" travel model. It uses land use, socioeconomic, and road network data to estimate trips by mode and facility-specific roadway traffic volumes. The study area for the KCAG model covers all of Kings County including the cities of Armona, Avenal, Corcoran, Hanford, Kettleman City, Lemoore, Rancheria, and Stratford. The county is divided up into approximately 1,300 traffic analysis zones. Link types include freeway, freeway ramp, other state route, expressway, arterial, collector, and local. Current and future-year road networks were developed considering local agency circulation elements of their general plans, traffic impact studies, capital improvement programs, and the State Transportation Improvement Program.

Several possible methods for measuring the effectiveness of TSM actions are listed below under individual TSM objectives.

Shorten Travel Time

- Total point-to-point travel time in person minutes.
- Total point-to-point average speed per mode.
- Total point-to-point time delay during rush vs. non-rush hours.

Lower Travel Costs

- Estimated travel costs per person mile.
- Estimated travel costs per person trip.
- Annual user costs per capita.
- Average annual user costs.

Safety

- Total number of motor vehicle accidents.
- Total number of injuries and fatalities.
- Accidents, injuries, and fatalities per million vehicle miles.
- Total number of pedestrian and bicycle injuries or fatalities.

Security

- Total number of crimes (by classification) for each type of mode or facility.

Reliability

- Variance of individual travel times between selected points.
- Percentage of scheduled travel times (transit) within "on-time" tolerance limits.

Reduce Auto Dependency, Increase Transit and Paratransit Ridership

- Total number of transit riders.
- Mode-split percentages (people who use both automobiles and transit or paratransit on their journeys).
- Estimated number of seat miles of transit or paratransit in service.
- Percentage of population within walking distance of scheduled transit service.
- Total number of "matched" carpools.

Active Transportation

- Total miles of improved, shared-use bike routes.
- Total miles of bike lanes.
- Number of bicyclists using bike routes and lanes.
- Total number of secure bicycle parking racks at public buildings and other destinations.

Capacity/Productivity/Freight Movement

- Vehicle capacity (passenger car/bicycle/truck, etc.) on facilities in units per hour.
- Passenger capacity on facilities in persons per hour.
- Freight capacity on facilities in tons per hour.

Cost Effectiveness

- Specialized cost/benefit studies on case-by-case basis.
- Transit system self-support ratio (operating costs vs. farebox return).
- Net annual cost to provide transportation facilities (by mode).
- Percentage of LTF expenditures on transit versus streets and roads.
- Transit system cost per vehicle mile/hour.
- Transit system passengers per vehicle mile/hour.

Noise and Vibration

- Noise and vibration measurements at different distances from transportation source.
- Number of residents exposed to noise levels exceeding tolerance limits.

Air Pollution

- Grams of carbon monoxide, hydrocarbons, lead, and nitrogen oxide in air samples taken at different distances from transportation facilities.
- Areawide air pollution concentrations.

Energy Use

- Gas and diesel sold in county per month/year.
- Estimated average fuel economy in vehicle miles per gallon.
- Estimated average fuel economy in person miles per gallon.

Service to Disadvantaged/Affordability

- Percentage of special group population to who transit services are available.
- Percentage of special group disposable income devoted to public transit services.
- Routing and scheduling through low-income areas.

VII. FINANCIAL ELEMENT

In earlier chapters of the 2018 RTP, funds available through federal, state, regional, and local sources for street and road, transit, non-motorized, and air quality are discussed. Many of these funding sources may be used for TSM projects.

A. CONGESTION MITIGATION AND AIR QUALITY

Congestion Mitigation and Air Quality (CMAQ) program funds are allocated to Metropolitan Planning Organizations (MPO) in designated non-attainment areas such as the San Joaquin Valley Air Basin. These funds are to be directed toward transportation projects that will contribute to meeting air quality standards in non-attainment areas for ozone, carbon monoxide, PM-10 and PM-2.5. Priority is to be given to implementing those projects that have documented emissions reductions associated with them and are included in the approved State Implementation Plan (SIP) for air quality as a TCM.

B. REGIONAL SURFACE TRANSPORTATION PROGRAM

The Regional Surface Transportation Program (RSTP) funds are the most flexible funds that are provided through the federal government. They can be used for a wide variety of transportation related projects, including TSM projects. As a small county, we are permitted to exchange our federal funding on a dollar-for-dollar basis for State Highway Account funds, which expedites the use of the funding for the local agencies by avoiding the federal aid process.

C. REGIONAL IMPROVEMENT PROGRAM

Transportation System Management projects are eligible for funding through the Regional Improvement Program (RIP) in the State Transportation Improvement Program (STIP) process. All STIP transportation system management projects are to be capital projects, except that non-capital projects are eligible if they are a cost-effective substitute for capital expenditures.