

HOW WILL REGIONAL CHANGES IN POPULATION  
IMPACT TRAFFIC MANAGEMENT STRATEGIES  
FOR LAW ENFORCEMENT BY 2010?

A project presented to  
California Commission on  
Peace Officer Standards and Training

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This Command College Project is a FUTURES study of a particular emerging issue in law enforcement. Its purpose is NOT to predict the future, but rather to project a number of possible scenarios for strategic planning consideration.

Defining the future differs from analyzing the past because the future has not yet happened. In this project, useful alternatives have been formulated systematically so that the planner can respond to a range of possible future environments.

Managing the future means influencing the future; creating it, constraining it, adapting to it. A futures study points the way.

The view and conclusions expressed in this Command College project are those of the author and are not necessarily those of the Commission on Peace Officer Standards and Training. (POST)

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## CHAPTER ONE

### ISSUE IDENTIFICATION

#### Introduction

More than 34 million people live in the state of California, representing 12.5 percent of the population of the entire United States. Although the state's growth rate has slowed during the decade of the 1990s, due mainly to declines in domestic migration, California's population is projected to increase by 16 percent to nearly 40 million people, as it approaches the year 2010.<sup>1</sup>

California is a nationally recognized transportation and traffic safety leader. California has approximately 15,000 miles of highways and freeways with approximately 250 miles of carpool lanes. Between 1990 and 1999 the number of miles traveled (VMT), by motor vehicles on California's roadways, increased 16 percent to over 300 billion miles. The number of registered vehicles in California has grown from 22.6 million in 1990 to 23.7 million by 1999.<sup>2</sup>

The purpose of this study is to look at some of the trends and events, which may influence regional changes in population, and the impact of the changes in population on traffic management strategies for law enforcement.

#### Statement of the Issue

How will regional changes in population impact traffic management strategies for law enforcement by 2010?

The San Bernardino and Riverside County region provides a good case study of the problems and possible solutions facing law enforcement with respect to traffic management. Encompassing over 20,160 square miles, San Bernardino County is the largest county in the United States. To the south and adjacent to San Bernardino County is Riverside County with

7,200 square miles. The two counties border on three large population centers: Los Angeles and Orange County to the west and San Diego County to the south.

The region is referred to in much of the historical literature review and research as the Inland Empire. The Inland Empire is defined as the San Bernardino and Riverside County metropolitan area. However, due to the growth in population many researchers now include the low desert area of the Coachella Valley in eastern Riverside County and the high desert area of the Mojave Desert in San Bernardino County when they refer to the Inland Empire.

The Inland Empire has almost every road challenge imaginable: major metropolitan areas, mountain roads, deserts, commuter suburbs far from many jobs, recreation destinations, heavy movement of goods on highways, and vast open spaces.

### Environmental Scan

The STEEP model, categorizing information as Social, Technological, Environmental, Economic and Political, was used over a twelve-month period to organize data from a variety of sources. A review of research publications, magazine and news articles and interviews with experts in various fields of transportation planning and traffic management reveals some of the social, technological, environmental, economic and political trends shaping population growth and the challenges this presents for traffic management in the Inland Empire.

## Literature Review

The Inland Empire has seen rapid population growth fueled in part by the availability of affordable housing, job growth and population migration from the neighboring urban areas of Los Angeles and Orange County. San Bernardino County and Riverside County are the 4<sup>th</sup> and 6<sup>th</sup> largest in population of California's fifty-eight counties.

The population of San Bernardino County is currently at a little more than 1.74 million people. It is projected to increase by nearly 500,000 persons by 2010. The population of Riverside County is approximately 1.57 million persons and is projected to increase by nearly 600,000 people by 2010. The population projections were done using the results of the 2000 census, which uses an equation that balances historical trends of births and deaths with foreign migration and domestic migration. Both counties are projected to have population increases of more than 50% by the year 2020.<sup>3</sup>

California has all but stopped building new freeways due to environmental restrictions, budget shortfalls and conflicts with sprawling urban development. In August of 2001, a groundbreaking ceremony took place in Rancho Cucamonga to signal the opening of the interchange of Interstate 15 and 210 in San Bernardino County. The 28 mile stretch of the Foothill freeway is the last major new freeway scheduled to be built in California. Instead, California Department of Transportation (Caltrans) will focus on improving the efficiency of existing freeways by widening existing roadways, maintenance projects and improving traffic capacity.<sup>4</sup>

## If You Build Them They Will Come

Building more freeways is not the answer. Traditionally, transportation agencies have responded to traffic congestion by trying to add more space to the road system. An analysis of the Texas Transportation Institute's Urban Mobility Study shows that places that have built the most roads haven't had much success in slowing the growth of traffic congestion. Travel delay was actually higher in the 23 metropolitan areas that built the most roads. Adding capacity to highways does not just meet the current travel demand, it actually spurs additional driving. When a road is widened, more people will choose to drive on it. New and wider roads encourage land development, often on the fringes of urban areas.<sup>5</sup>

One of the reasons for population growth in the Inland Empire is upward pressure of housing prices in the Los Angeles, Orange and San Diego County areas. A report prepared for the California Department of Housing and Community Development called "Raising the Roof, California Housing Development Projections and Constraints 1997 – 2020," highlights the housing needed to accommodate 45 million Californians by 2020. It contains research on housing supply shortages; local government land use regulation, the state's changing demographic characteristics, land availability, and the need for housing capital are also addressed by the report.

According to this report, several of the largest counties will not be able to accommodate additional growth. Even allowing for appropriate reserves, Los Angeles and Orange counties will lack sufficient vacant suburban land to accommodate projected household growth through 2010. Four other counties, Alameda, Contra Costa, San Diego, and Ventura, will start running low on vacant or raw land soon after 2020.<sup>6</sup>

According to the California Association of Realtors, the median price of a single family detached home in California was just over \$276,000 in September 2001. The cost of the same home in San Diego was over \$314,000; in Orange County it would be \$361,000 and in Los Angeles the median price was \$250,000. However, in the San Bernardino/Riverside area the median price was only \$162,000. In the high desert region of San Bernardino County, the median price of a home was only \$114,000.

The availability of affordable housing has forced people who cannot afford homes in Los Angeles and Orange County to move to the Inland Empire, especially the high desert region. The Riverside/San Bernardino County area leads the state with a housing affordability index of 51. The sub-region of San Bernardino County in the high desert has a housing affordability index of 67. The affordability index is the percentage of households who can afford to purchase a median-priced home.<sup>7</sup>

At the High Desert Economic Summit in September 2001, economists forecast the housing boom would make way for an increase in skilled laborers as more workers move inland. The economists also believe, as the pool of skilled workers increases, more companies will move to the area.<sup>8</sup>

### Urban Sprawl and Traffic Congestion

A study by the Texas Transportation Institute found that 87 percent of Americans use a car, truck or van to get to work, up 1 percent from 1990. Carpooling declined from 13 percent in 1990 to 11 percent in 2000. Commuters driving alone increased from 73 percent in 1990 to 76 percent in 2000.<sup>9</sup>

Meanwhile the time it takes to get to work for Inland Empire residents is getting longer. The Inland Empire Research Consortium published a survey of residents in San Bernardino and Riverside County, which was conducted in 2000. The purpose of the survey was to provide demographic research on issues important to the Inland Empire region while evaluating essential public and private sector activities such as health care, education and transportation. The results of the survey provide a view of changes occurring in the region over time and the public's perception of issues related to this project such as: quality of life, economy, commuting and traffic congestion.

The majority of people surveyed rated their county as a good place to live. However, they ranked traffic congestion as the single worst aspect of living in the region. Commuting times for both counties have remained nearly the same over the past 3 years with 58.9% of respondents reporting a commute time of less than one hour and 23% reporting commute times of 1-2 hours. However, there was a slight increase of 2-3 hour commutes with 11.3% reporting commute times of 2-3 hours.

Three out of every 10 people commute outside their own county to work. More than a third of respondents indicate freeway traffic is a large problem. The Research Consortium believes answers such as these should be taken seriously and that there needs to be immediate action to handle the increasingly severe problem of freeway congestion.<sup>10</sup>

Traffic congestion is made up of two components: recurring and non-recurring traffic congestion. Recurring traffic congestion occurs when demand exceeds capacity. On recurring days of the week, and hours of the day the volume of traffic due to commuters and the transportation of goods exceeds the capacity of the freeway and choke points develop. Traffic

slows to a crawl and long back ups occur. Non-recurring traffic congestion is due to traffic collisions, stalled vehicles and other emergency incidents such as spilled loads of materials.

In 1999 the San Bernardino/Riverside area ranked 17<sup>th</sup> out of 68 areas nationwide and 4<sup>th</sup> highest of California's large counties in the annual delay experienced by motorists due to traffic congestion. The average annual per capita delay per motorist in the region was 38 hours. The cost of such delays translates into 59 extra gallons of fuel consumed, and \$685 dollars in increased vehicle maintenance per motorist per year. Clearly, the economic costs of traffic congestion are significant.<sup>11</sup>

#### Truck Traffic and Goods Movement

In 1989, the United States and Canada signed a free trade agreement. This agreement was expanded to include Mexico in the North American Free Trade Agreement (NAFTA) in 1993. International trade related transportation in the United States accounts for approximately ten percent of total tonnage moved on the domestic transportation system today. Trends suggest that international trade as a result of trade agreements will continue to grow in the future.<sup>12</sup>

California is an economic powerhouse, fueled by production, movement and consumption of goods and services. The trend of smaller, higher value shipments is leading the way in which goods are moved. This trend is shaped by the emergence of just in time business practices, which eliminate the need for large warehouse inventories.

In the 1996 California Trade and Goods Movement Study, trends in population growth, manufacturing activity and foreign trade all point to a considerable growth in the movement of goods. The increase in population will require more food, clothing, and household goods; more homes, stores, and other buildings will have to be built; and waste products have to be collected

and transported to disposal points. All of this involves an increased movement of goods, especially to and from urban areas. From 1992 to 2012, the volume of goods transported by trucks on California highways is estimated to increase 31% from 586 million tons to 769 million tons.<sup>13</sup>

The Inland Empire is in the middle of one of the largest concentrations of goods movement in the US. A large amount of trade goods move through the Los Angeles and Long Beach area and head east to the rest of the US. The high desert area of Barstow is also a major rail and truck concentration point for the shipment of goods in and out of the southern California region.

#### Travel and Tourism

The travel industry is a major component of California's economy and the primary industry in many local communities. In 2000, California was the destination of an estimated 293 million domestic and international travelers. Travel by car is the most popular mode of travel for California travelers, followed by air travel, with bus and train use third. Travel and tourism accounted for an estimated 75.4 billion dollars, which was 6% of California's gross state product. The San Bernardino/Riverside and desert area accounts for approximately 11% of California's total travel volume.<sup>14</sup>

The Las Vegas Convention and Visitors Authority (LVCVA) estimates 35 million people visited the Las Vegas area in 2000. Approximately 26% of the visitors come from Southern California and an estimated 84% of these visitors from Southern California drove automobiles. Travel to and from Las Vegas affects traffic along the I-15 corridor, which is one of the major traffic corridors in the Inland Empire region. In the high desert, congestion on I-15 is worse on

weekends and holidays, generated by recreational travelers going from Los Angeles, Orange and San Diego counties to Las Vegas and back. As an example of this, the traffic volume on I-15 has increased from 3.7 million vehicles in 1990 to 5.9 million in 2000.<sup>15</sup>

### The Role of Transportation Commissions

The San Bernardino Association of Governments (SANBAG) and Riverside County Transportation Commission (RCTC) are the two transportation commissions, which serve the Inland Empire. In 1976, the California Legislature created special transportation commissions in Riverside, Orange, Los Angeles, and San Bernardino Counties. The Commission's functions are to: coordinate transit service, adopt short range transit plans, allocate Transportation Development Act funds, coordinate state highway planning, supervise applications for federal grant funds, coordinate county highway and transit plans with regional and state agencies, and identify projects for state and federal grant funds.

### Technology

Computers, electronics and information systems are influencing the movement of people and goods on our transportation system. Because traffic congestion is projected to become worse and because Transportation Departments will not be able to build more highways or widen existing highways fast enough, advanced transportation technologies known as Intelligent Transportation Systems (ITS) are being developed to improve mobility and the safety of travel throughout the world.

SANBAG and RCTC have published a strategic plan for Intelligent Transportation Systems (ITS). The strategic plan is a joint effort of these transportation agencies to develop a

single plan to maximize joint opportunities. The main objectives of ITS are to obtain maximum use of the transportation infrastructure, make travel safer and more convenient, and improve the productivity of the day to day management of the transportation system.<sup>16</sup>

Intelligent Transportation Systems technology is in use all over the world. Types of technologies range from: closed circuit TV cameras (CCTV) to monitor roadways, electronic sensors to calculate traffic volume and speeds, traveler information systems, changeable message signs (CMS), freeway call boxes for disabled motorists to summon help, environmental sensing units for weather information, pre-pass programs for commercial vehicles to bypass truck weigh in stations, coordinated and synchronized traffic signals, metered ramps, High Occupancy Vehicle (HOV) lanes, and toll roads with electronic payment features.

The California Highway Patrol and California Department of Transportation jointly staff and operate Transportation Management Centers (TMC's). The TMC's are regionally located throughout southern California and are used to coordinate ITS and traffic management by use of a computer aided dispatch (CAD) system to handle responses to traffic collisions, emergency incidents and to mitigate traffic congestion.

Freeway Service Patrol is a California state program that provides a basic level of road service during peak commute hours on certain designated high congestion corridors. Tow trucks are assigned to patrol these corridors and rapidly respond to assist and remove disabled motorists to clear traffic congestion. Caltrans and local transportation commissions share the costs of Freeway Service Patrols.

The US Department of Transportation is developing a national ITS architecture to coordinate different modes of travel and different geographic regions. This system when fully implemented will promote the use of ITS technologies that will work in conjunction with the

technology eventually available in cars and will work no matter what the location of the car is in the US.

In June of 2001, the Orange County Transportation Authority (OCTA) implemented a driver information service called "TravelTip." Travel Tip provides real time traffic information to assist motorists. The service can be accessed by web site or telephone and provides links to other transportation web sites. Travel TIP data is collected from local TMC's, local closed circuit television cameras along transportation corridors, CHP incident reports, freeway and roadway sensors, city traffic engineers, and motorists who call in reports. The service provides traffic speeds and estimated travel times on Orange County freeways and surface streets with data that is updated every 30 seconds. "OCTA's Travel TIP system is one of the first of its kind in the entire nation," said Gloria Stoppenhagen, ITS manager for the Federal Highway Administration. "...And it's only the beginning. The Federal Highway Administration sees this technology as a model for using real-time traveler information to improve the efficiency of our regional highways and arterial roads."<sup>17</sup>

### Commercialization of Highways

The Republic of Singapore has tackled the problem of traffic congestion in a unique way. Singapore has a population of just over 4.5 million people living on just 250 square miles. Singapore has limited land availability and has chosen to implement vehicle regulations that would seem severe to most Americans. In Singapore, the Land Transport Authority coordinates

traffic management, road construction, traveler information systems and vehicle licensing and regulation.

Only a certain number of vehicles are allowed in the country. People must wait their turn and pay a large sum to register a vehicle and then be subject to user fees on roads. People are limited as to what time of day and day of the week that they can travel to the most crowded inner city regions if they choose to use their own car. Cars are equipped with electronic devices, which automatically charge the owner a toll and register fines for unauthorized travel into crowded urban areas. Public transportation is plentiful and the severe use tax and regulations of automobiles encourages people to use it.

Some people in the United States believe Americans should also implement such regulation and user fees for transportation. Robert Poole of the Reason Public Policy Institute believes the US highway system is suffering from funding shortfalls and the anti-highway politics of environmental groups and urban planning organizations which oppose expansion of highways.

According to Poole, the US highway system is failing to satisfy its customers. He proposes a new highway paradigm for the 21<sup>st</sup> Century, which would change the highway system into a road utility similar to telecommunications systems. If Robert Poole had his way, private companies would buy existing roadways from public agencies. The private companies would then be responsible for building and maintaining highways. Traffic congestion would be tamed by variable pricing. Users would pay higher prices during peak commute hours.<sup>18</sup>

On two busy commuter freeways in Southern California, SR91 in Orange County and Interstate 15 in San Diego, the cost for using tolled express lanes varies by hour of the day and day of the week, ensuring free-flowing traffic next to stop-and-go traffic in the regular lanes. A

private-sector team developed the fully automated toll road, using both electronic transponders and video license-plate imaging. This technology eliminates the need for tollbooths.

There are political obstacles to this new idea of a road-utility paradigm. One is people's innate dislike of paying tolls. Part of their dislike stems from their unhappiness with tollbooths, the lines caused by congestion and fumbling for coins. However, as electronic toll technology makes tollbooths obsolete, these problems will disappear.

The other part of their dislike is opposition to perceived double taxation. Since most US gas taxes have historically been highway-user fees, trucking and automobile organizations oppose paying both fuel taxes and tolls for the same roadway. Rebates of fuel taxes for miles driven on toll roads could address this problem. Another price-related concern is that tolls are unfair to low-income people. Without the availability of public transit, low income Americans who drive but cannot afford tolls, are unable to have access to jobs, health care or education.<sup>19</sup>

Researchers at City University of New York undertook a study to determine which factors were most important in promoting self-sufficiency among the poor. The study, which surveyed 400 households, was published in the Journal of Urban Affairs. The research found the two most important factors in promoting self-sufficiency were whether the adults in the household had work experience and whether they had a car. Just 28 percent of households with no work experience or car were economically self-sufficient. Having a car boosted the chances of self-sufficiency to 74 percent. Having a car and work experience boosted their chances to 94 percent. The City University researchers also cite a study done by the Brookings Institute, which seemed to show the automobile as the most economical, efficient, adaptable and flexible form of transportation for low income people with the spread out pattern of most urban development.<sup>20</sup>

In conclusion, the research conducted clearly shows the Inland Empire region is poised for a large increase in population. The increase in population will be fueled in large part by domestic migration due to affordable housing and the availability of undeveloped land. Population increases also means more need for goods and services and more commercial vehicle traffic associated with the movement of goods. The increased traffic and need for people to travel to large urban centers in Los Angeles and Orange Counties for higher paying jobs means longer commutes and increased traffic congestion. Clearly, there is a need for new and better strategies for law enforcement to manage the traffic congestion associated with this population increase.

The following chapter will explore some futures studies and will be used to identify emerging trends and events which may impact the issue of traffic management.

## CHAPTER TWO

### FUTURES STUDY

#### Introduction

The intent of this study is to evaluate the trends and events emerging in 2001 that will impact traffic management strategies for law enforcement by 2010. In order to develop a strategic plan and transition management plan for the implementation of traffic management strategies, the Nominal Group Technique (NGT) was utilized.

#### Nominal Group Technique

The NGT is a structured process of group participation for generating ideas or forecasting trends and events, which may affect the issue. It is also effective in obtaining a consensus of the major trends and events, which could affect the issue being studied.

A panel of eight people representing diverse backgrounds was brought together for a one day NGT session to develop a list of trends and events. The panel was comprised of a university professor with public administration and strategic planning background; a director of operations for Caltrans; a Captain and a Lieutenant from two local law enforcement agencies; a city economic development coordinator; two members of the California Highway Patrol one of whom is an employee of a transportation management center; and, a representative of the San Bernardino County Association of Governments (SANBAG) with regional transportation planning background (Appendix A).

Before the group meeting, the participants were mailed a copy of the issue statement and a description of the NGT process and overview of the STEEP process. The participants were asked to reflect on some of the research of trends and events, which may affect the issue from the

context of developing law enforcement strategies for dealing with population growth and traffic management.

### Trends

Trends are estimations or measurements of social, technological, environmental, economic or political characteristics over time. They are gradual and long term.<sup>21</sup>

The NGT panel began with panel members participating in a round table session identifying trends that they believed could affect the issue. The panel was asked to list the trends they believed could impact traffic management strategies for law enforcement by 2010. The group identified a list of 43 trends (Appendix B).

Following the development of the list of trends, each participant was asked to privately list the top 7 trends, which they believed, could most impact (either positively or negatively) the issue. The panel members then voted independently on those top trends. They then forecast the direction they believed these trends were moving and the level of concern for each trend.

The current level of each trend was given a subjective value of 100. The panel was asked to give the trend direction from 5 years ago to 5 years and 10 years from now. The level of concern was given with 1 being the least amount of concern and 10 having the most concern with respect to the issue statement. A chart of the selected trends is shown in Table 1.

<b>TRENDS</b>	<b>-5</b>	<b>Today</b>	<b>+5</b>	<b>+10</b>	<b>Impact 1-10</b>
Level of Intelligent Transportation Systems and Automated Transportation Management Systems	60	100	155	275	8
Level of population	75	100	160	235	9
Level of change in demographics	77	100	150	190	6
Level of number of vehicles used for transportation	77	100	132	250	8
Public Policy trend for transportation funding	70	100	120	200	8
Transportation revenue sources	90	100	150	237	8
Urban development patterns	77	100	155	282	9

Table 1

Further analysis of the panel's understanding and definition of each of these trends are as follows:

- Level of Intelligent Transportation Systems and Automated Transportation Management Systems – ITS and ATMS are defined as technology used for regulating and monitoring the flow of traffic. It includes roadway sensors and closed circuit video monitoring. It also includes making information of traffic incidents and alternative routes available to motorists and law enforcement via video, radio messages, and changeable message signs or on board computers. It also includes smart highways with sensors capable of automatically routing vehicles to their destinations. The panel believed there would be significant growth in the level of intelligent transportation systems within the next 10 years.

- Level of population – Level of population is defined as the increase or decrease of people living within the San Bernardino/Riverside County region. The panel believed there would be a significant increase in the population of the Inland Empire region in the next 10 years. This trend was identified as having the most impact on the issue of traffic management.
- Level of change in demographics – The trend in demographics was defined as the change in age, income, education and occupation of residents in the San Bernardino/Riverside region. Less emphasis was placed on the change in ethnicity. This trend is really a compound trend and the panel had difficulty defining it. However, it is included in the list of top trends because the panel felt it would have impact on the issue statement due to the economic and social effects of these changing demographics. The panel believed there would be more of a change in demographics in the next 5-10 years and it would be more as a result of the change in income, education and occupation.
- Number of vehicles used for transportation – This is defined as the total number of vehicles used for transportation including passenger and commercial vehicles. The panel believed there would be significant growth in the number of vehicles used for transportation over the next 10 years.
- Public Policy trend toward transportation funding – This trend is defined as the direction public policy is taking toward providing money for transportation projects. This includes legislative efforts and local lobbying efforts. This trend is similar to the following trend in transportation funding sources. The panel believed the change in public policy toward transportation funding would be slow and gradual. They also believed the current economic situation of the state's economy being in a recession would cause economic priorities to be short term and not look at long term needs in transportation infrastructure.

- Level of transportation revenue sources – The different types of funding sources such as taxation of vehicles and fuel, toll roads and other use fees, development fees and federal funds for building and improving roads. The panel believed there would be a slow increase in transportation funding sources and more significant as it got closer to 10 years in the future.
- Urban development patterns – This trend is defined as new housing developments, commercial buildings and urban sprawl. The panel believed urban development patterns would show significant growth as people moved to the rural and high desert regions of the Inland Empire in search of affordable housing. The panel also believed this trend and the level of population would have the largest impact on traffic management.

#### Events

Events are unambiguous and confirmable. When they occur the future is different. Following the development of trends, the panel was asked to list events, which they believed could influence (either positively or negatively), the issue. The panel came up with a list of thirty-six events (Appendix C).

Once the list was developed, the panel members were asked to privately rank the top events that they believed would affect the issue. Panel members then voted for the top 6 events. The panel was asked to estimate the soonest an event could happen and the probability of an event happening 5 years and 10 years in the future. Then the panel gave a numerical ranking of the impact such an event could have on the issue of the effect of population growth on traffic management strategies for law enforcement. The top 6 events are shown in Table 2.

<b>EVENTS</b>	<b>Year &gt; 0</b>	<b>+5</b>	<b>+10</b>	<b>Impact -10 to +10</b>
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Major Earthquake on San Andreas Fault in Inland Empire	1.5	40	78	-7
Freeways Reach their Maximum Capacity	8	0	85	-8
Federal Government allocates major increase in funding for transportation	9	0	43	+9
OPEC oil embargo	1	23	28	-2
Significant tax incentive for alternate fuel vehicles	6	0	73	0
Major commuter train expansion to urban areas	11	0	0	+5

Table 2

Further analysis of the panel’s understanding and definition of each of these events are as follows:

- Major Earthquake on San Andreas Fault in Inland Empire – The San Andreas earthquake fault is a major fault in California. It runs through the San Bernardino and Riverside region. It crosses Interstate 15 north of the city of San Bernardino. The panel believed a major earthquake on the fault could effect traffic moving in and out of the region for a long period of time.
- Freeways Reach their Maximum Capacity – With no new freeways being built the panel believed that the number of vehicles would increase to the level that the freeways could not handle any more capacity. The panel believed this would significantly increase the amount of time to travel throughout the region and cause delays in the movement of people and goods.
- Federal Government allocates major increase in funding for transportation – Some transportation funding for interstate highways is provided by the federal government in the

form of appropriations and grants. A large increase in federal funding could be beneficial for regional transportation issues. The two representatives from Caltrans and SANBAG, having had more experience with transportation projects, believed funding was a major factor in the ability for transportation agencies to build, improve and maintain highways.

- OPEC oil embargo – OPEC is the Organization of Petroleum Exporting Countries. A severe reduction in the amount of oil being produced by OPEC nations could cause the cost of gasoline and diesel to rise significantly. The panel believed this would cause a reduction in the number of miles being driven and the number of vehicles using the highways.
- Significant tax incentive for alternate fuel vehicles – Alternative fuel vehicles are vehicles that do not use petroleum products for powering internal combustion engines. Some alternative fuel vehicles are using electricity or fuel cells for power. The panel believed if there was a significant cost benefit in the way of a tax incentive for alternative fuel vehicles this would cause the number of vehicle to rise and would offset any reduction in usage due to the high cost of gasoline.
- Expansion of commuter train to urban areas – The Southern California Regional Rail Authority (Metrolink) is made up of transportation commissions from San Diego, Ventura, Los Angeles, Orange, Riverside and San Bernardino counties. There are currently 416 miles of commuter train rails in use in these counties. There are no commuter trains to service the outlying desert regions. Motorists who live in these areas must rely on driving in order to reach the major metropolitan areas.

The panel believed that freeways would reach their maximum capacities due to the trends in urban growth patterns and population growth. This would have a serious negative effect on traffic management. The only two events that the panel believed would help with traffic

management were an increase in federal funding for transportation and the expansion of a commuter train to urban areas.

### Cross Impact Analysis

A cross impact analysis of the trends and events was completed at a later date with input from several members of the NGT panel. The cross impact analysis looked at each event and made an analysis of what effect it would have (either positive or negative) on the direction of each of the trends. Values ranged from -5 to +5. The cross impact analysis is shown in table 3. A legend for trends and events follows the cross impact table.

## CROSS IMPACT ANALYSIS

	E1	E2	E3	E4	E5	E6
T1	-3	4	-1	0	0	1
T2	-1	-5	3	-2	3	1
T3	-3	2	2	-2	2	3
T4	2	-5	-4	-3	4	-1
T5	4	4	4	-4	4	5
T6	-5	-4	4	-3	3	4
T7	-4	-4	-3	-1	0	4

Table 3

### Legend

TRENDS
T1 - Level of Intelligent Transportation Systems and Automated Transportation Management Systems
T2- Level of population
T3 - Level of change in demographics (education, income, occupation)
T4- Number of vehicles used for transportation
T5 - Public Policy trend toward transportation funding
T6 - Level of transportation revenue sources
T7- Urban development patterns

EVENTS
E1 - Major Earthquake on San Andreas Fault in Inland Empire
E2 - Freeways Reach their Maximum Capacity
E3 - Federal Government allocates major increase in funding for transportation
E4 - OPEC oil embargo
E5 - Significant tax incentive for alternate fuel vehicles
E6 - Expansion of commuter train to urban and desert areas

Panel members believed certain events would have a negative impact on the direction of some trends and a positive impact on others. For example: If freeways reached their maximum capacity, it would have a positive effect on direction of the trend of the level of Intelligent Transportation Systems or Automated Traffic Management Systems. However, this same event would have a negative effect on urban development patterns trend. The panel believed the expansion of a commuter train to the urban and desert areas would have a negative effect on the number of vehicles used for transportation but a positive effect on urban development patterns.

The panel members all believed an OPEC oil embargo would have negative effects on population increase, change in demographics, number of vehicles used for transportation, funding and urban development patterns. This was due to their belief that the automobile is such a major part of people's way of life that much of that way of life would be negatively impacted by a shortage of fuel. They also believed the expansion of a commuter train as an alternative to automobile transportation, would be beneficial for transportation funding and urban development patterns.

### Alternative Scenarios

The trends and events selected by the panel, and the cross impact analyses were used to construct three future scenarios. The scenarios depict an optimistic future, a pessimistic future and a surprise free or neutral scenario. The scenarios were used to develop traffic management strategies for law enforcement in the future.

### Optimistic Scenario

Javier maneuvered his truck through traffic. His on board navigation aid beeped to let him know the screen had been updated. He saw the flashing red light on his screen, which indicated a collision or other obstruction was blocking a lane. With voice commands, Javier ordered the computer to find an alternate route. He was conscious of his delivery schedule and preferred to work staggered hours since it allowed him to avoid the peak traffic periods. It was the year 2010 and the companies he delivered to had little room to store inventory. The companies preferred "just in time shipping", even if it meant having orders arrive during the middle of the night.

Javier knew he had to deliver this load of medical supplies today. The boss told him the hospitals had run out of medical supplies for the injured and now trucks with medical supplies were on the way to southern California from all over the western United States and Mexico. Javier's company was one of the many companies to benefit from the full implementation of the North American Free Trade Agreement (NAFTA) in 2002.

Javier had been delivering goods to the US from his home base in Tijuana, Mexico since he started with the company in 2004. He preferred to live in his home town of Tijuana since the cost of living was so much lower there than anywhere in California. With the full implementation of NAFTA, Javier and millions of others had better opportunities to raise their standard of living and little reason to immigrate to the US.

The new truck lanes, which had just been completed in 2008, were the only lanes that survived the shaking in the 8.0 magnitude earthquake which struck near San Bernardino on the morning of January 14, 2010. Although martial law had been imposed, and only trucks delivering critical supplies were allowed on the freeways, it was still an agonizingly slow process.

A Freeway Service Patrol Remote Controlled Rig was up ahead with its lights flashing. As Javier approached, he saw the rig moving a stalled truck out of the road. Personnel at the Transportation Management Center in San Bernardino were using closed circuit TV and remotely operating the rig to clear traffic obstructions.

Now things began to move a little faster. He was in luck and if his luck held out he would be able to drop his load and spend the night in Pomona at his cousin's house. He had not heard from them since the earthquake but his sister had sent him a message on his personal

digital assistant (PDA) letting him know they were all OK. At least the massive earthquake did not affect the wireless systems.

### Pessimistic Scenario

Pete maneuvered his truck around the construction debris and cursed the slowness of traffic. It was January of 2010 and the San Bernardino Freeway had been re-opened only one week after the earthquake which devastated much of southern California. Pete knew he had to deliver this load of medical supplies today. The boss told him the hospitals had run out of medical supplies for the injured and now trucks with medical supplies were converging on Southern California from all over the western US.

The new truck lanes, which had just been completed in 2008, were the only lanes that survived the shaking in the 8.0 magnitude earthquake, which struck near San Bernardino on the morning of January 14, 2010. Although martial law had been imposed, and only trucks delivering critical supplies were allowed on the freeways, it was still an agonizingly slow process, and Pete was used to it.

Traffic was frequently heavily congested on all of the routes leading in and out of the Southern California metropolitan area. There was no such thing as “rush hour” as it was commonly referred to. The rush hour had been getting longer and longer as more people bought homes in the suburbs and commuted long distances to their jobs in the cities. The rush hour now lasted all day. Many of the large employers were forced to provide alternative living arrangements for their workers. Good workers were hard to come by and even harder to retain. The salaries they made were not enough to afford them the opportunity to own a home reasonably close to where they worked.

The employers now provided small cubicles for their workers to sleep in. The cubicles were similar to those found at international airports and provided the workers with a place to sleep and shower between work shifts. The workers used these as an alternative to driving long hours commuting back and forth from the suburbs to their jobs. It was becoming increasingly common to find workers staying in their cubicles all week long and then driving home on weekends to be with their families.

As Pete approached, he saw the officer and another man hooking up a chain from one truck to another and then pulling a stalled truck out of the road. Now things began to move a little faster. He sighed and waved at the truckers who were now on the side of the road as he went past them. There really ought to be a better solution he thought. What a waste of time and money.

### Surprise Free Scenario

Ed maneuvered his truck through traffic on the San Bernardino Freeway. Traffic was always slow at this time of day with the amount of commuters and there was always the possibility of a collision or some construction project blocking a lane. It was 2010 and the new truck lanes had still not been completed. It was becoming apparent that they would not be finished any time soon.

Ed was on his way to deliver a load of commercial goods to a Walmart in Pomona. He wished there was a way to stagger the deliveries for the off peak hours so he could avoid the heavy traffic. A CHP car was up ahead with its flashing lights on. As Ed approached he saw the officer and a Freeway Service Patrol tow truck moving a stalled truck out of the road.

It was becoming harder to meet the delivery schedules his company imposed. Each day became a guessing game on what delays he would encounter. If only there was a way to update drivers with real time information, so they could take alternate routes. All he had to rely upon was the traffic report on the radio. Even that was not up to date and frequently gave out erroneous information. If he had known about this delay, he would have made different plans.

Ed wondered why the law enforcement agencies and Caltrans could not coordinate better. What were the politicians thinking of when they delayed the funding for the truck lanes? With the huge migration of people from Los Angeles and Orange County moving east in search of affordable housing, it was only a matter of time before the traffic congestion got to the unbearable point. Ed knew of several of his fellow drivers who left the state of California in search of jobs in Arizona and New Mexico where the traffic congestion was not as bad. It was becoming harder and harder to retain workers and his company was forced to raise its drivers' salaries in order to attract drivers who were willing to stay in southern California and put up with the long commutes to work.

The scenarios depicted above involve a combination of the trends and events the NGT panel developed. Each of the scenarios has the potential for developing based on what is known about the factors that influence population increases and the effect on traffic congestion. The strategies we develop to mitigate some of these trends are discussed in the next two chapters.

## CHAPTER THREE

### STRATEGIC PLAN

#### Introduction

Strategic planning is managing for results. It is defined as a long term, future oriented process of assessment, goal setting, and strategy building that charts a path between the present and a vision of the future. It relies on an organizational analysis of an organization's strengths and weaknesses relative to dealing with the issue in the future. Strategic planning takes into consideration the organization's capabilities and the internal and external environment. This leads to decision making and recommendations about priorities, resource allocation including human resources and technology, skills and funding.<sup>22</sup>

Traffic management strategies for the future are a strategic planning issue. Strategic planning is planning for change in an increasingly complex environment. The purpose of strategic planning is to improve an agency's chances of reaching a possible future outcome.

The future is not certain nor can it be predicted. In fact, there are any number of possible futures. Research and the input from the Nominal Group Technique shows there are a number of possible future events which may impact either positively or negatively the issue of how regional changes in population will impact traffic management strategies for law enforcement.

In developing a strategic plan for transitioning from the present day model of traffic law enforcement, to the future, the optimistic scenario was used. The transition management plan used in this project is for the California Highway Patrol. However, the lessons learned and strategies developed can be used for any law enforcement agency that has traffic management responsibilities.

## Organizational Description

The California Highway Patrol (CHP) is a Department within the State of California Business, Transportation and Housing Agency. Its primary purpose is to provide safety and service to the motoring public as they use the highway transportation system. The CHP has primary traffic management and enforcement on all state highways, which are full freeways in both the incorporated and unincorporated areas of the state. The CHP also has traffic law enforcement responsibilities on all streets and highways in unincorporated areas of the state.

## Vision Goals and Objectives

The difference between where we are (current status) and where we want to be (vision and goals) is what we do (target objectives and action plans). As this statement shows, setting goals and objectives builds on the previous steps of visioning and taking stock. Goals are simply a clearer statement of the visions, specifying the accomplishments to be achieved if the vision is to become real. The target objectives are clearer statements of the specific activities required to achieve the goals, starting from the current status. To address the issue of how regional changes in population will affect law enforcement strategies for traffic management the following vision, goals and objectives were established.

- Vision statement - Increase the efficiency of the transportation system and management of traffic incidents through the use of new technology and the appropriate assignment of human resources.
- Goals - Better coordination, communication and use of resources for incident management through implementation of ITS technology.

- Objective – Increased safety and efficiency in the transportation of people and goods as they use the highway system.

### Organizational Analysis

Because of its mission, the CHP is uniquely suited to address the traffic management issues identified in this project. The CHP Vision Statement taken from the 2001-2003 Strategic Plan:

*“Through the dedication and commitment of its personnel the application of appropriate technology and a constant eye toward an evolving future the California Highway Patrol will stand ready to meet the changing expectations and demands of the public it serves – making the CHP synonymous with safety and service”.*<sup>23</sup>

In conducting an organizational analysis, an agency must first analyze external factors, which can affect an agency’s ability to accomplish its mission. The external analysis used in this project follows the STEEP model. An analysis is done of social, technological, environmental, economic, and political trends as was done in chapters one and two. In order for a transition to be effective, an internal analysis of the CHP was done using the SWOT model. SWOT is an acronym which stands for Strengths, Weaknesses, Opportunities, and Threats. Two of the elements in SWOT were used.

- Strength - Flexibility and ability to quickly adapt and respond to emergency incidents and provide mitigation efforts to restore efficiency of the transportation system.

- Weakness – Difficulty in forecasting future trends and their potential impact on CHP operations. This leads to dealing with issues in an operational short-term mode rather than a strategic long-term mode.

### Stakeholder Analysis

An analysis was done of the key stakeholders needed to implement the transition.

Stakeholders are groups or individuals or agencies that may be impacted by what you do or who may impact what you do. They can provide support, oppose or be indifferent to change. The following is a list of key stakeholders:

- California Department of Transportation (Caltrans)
- Transportation Commissions (SANBAG and RTC)
- State Legislature
- California Highway Patrol (CHP)
- City and County law enforcement agencies
- Environmental groups
- Community groups
- Private enterprise

### Snaildarters

Snaildarters are individuals or groups who may impact a decision or disrupt any change because their input or concerns were not originally addressed or considered by the group making the changes. For this stakeholder analysis, community groups were considered as a possible “snaildarter”. Community groups may become involved after a project is planned but before it

can be implemented. An environmental impact report (EIR) is required by law, specifically the California Environmental Quality Act, for most development projects. The purpose of the EIR is:

- To analyze the environmental effects of a proposed project.
- To identify ways to reduce or avoid potential adverse environmental impacts resulting from the project
- To identify and assess alternatives to the proposed action.

EIR's are required of any roadway construction, commercial or residential development if there is the possibility that the development may impact the environment. During the production of the EIR, public and stakeholder comments are solicited. Often times the unintentional impacts of any urban planning or mass transit or technology program may not be realized until many years after a policy or change is implemented.

The changes may adversely impact groups with a small voice in community affairs. If their interests are adversely affected these small groups may be given a larger voice as they gain support. These groups may temporarily derail a project while their concerns are being addressed. For this reason, it is important to include as many stakeholders as possible in conducting an analysis for strategic planning and transition management.

## Strategy Development

Making better use of technology and human resources through better coordination and communication of law enforcement agencies will provide increased efficiency of the transportation system and increased effectiveness of management of traffic incidents. The key to this is collaboration among agencies. In order to accomplish this several strategies are proposed. Each agency involved will have to analyze their internal and external environment in order to know if their agency is willing and able to make the changes necessary.

One strategy is to improve the communication and coordination of law enforcement agencies to manage traffic incidents and congestion by use of ITS and a Computer Aided Dispatch (CAD) that can link with other agencies to provide better information and coordination of incident management. Regional Transportation Management Centers can be the vital link in this.

Another strategy could be to use public/private partnerships in technology to provide access to ITS driver information systems via the Internet, radio stations, onboard information systems, changeable message signs and closed circuit TV. Some of these technologies are already available. However, they are not all linked together. The future development of these driver information systems could be interfaced with future automobile technology.

A third strategy would be for law enforcement agencies to become involved during the preparation of an Environmental Impact Report (EIR) for development within their community or adjacent communities. Law enforcement agencies, state, city and county governments and the public have an opportunity to provide comment on the proposed development and possible negative consequences. Some considerations for law enforcement agencies may be:

- How will this proposed development impact land use planning and growth including transportation corridors?
- How will this proposed development impact traffic congestion?
- How will this proposed development impact traffic safety including pedestrian and bicycle safety?
- How will this proposed development impact emergency services?

Information gained from the evaluation portion of the EIR can be used for long range strategic planning decisions to deal with future growth. Adjacent cities or counties can also use this information to form regional collaboration for dealing with population growth and transportation patterns as a result of planned residential and commercial development.

### Implementation Plan

In order to implement these strategies, a plan that would involve all the stakeholders and the strategies previously discussed will have to be developed. The California Highway Patrol and the California Department of Transportation are already working on a Transportation Management Center Master Plan. State, local and regional transportation planners, law enforcement (specifically CHP) and public/private partnerships in technology are involved in developing a statewide consolidated plan for implementing transportation management strategies discussed in this project.

The California Department of Transportation is the lead agency in the development of the TMC master plan. The CHP is a partner in staffing and operating the TMC's. Additional local and regional agencies involved are transportation commissions. Representation by allied law enforcement agencies is needed. Allied law enforcement agencies need to be involved in

transportation planning since freeway and surface street congestion patterns affect multiple jurisdictions.

Coordinating the traffic flow of freeway incidents often involves diverting traffic to surface streets. Special events such as concerts or races involves surface street congestion and freeway congestion. Coordinating or synchronizing traffic signals can mitigate some of this congestion. As it is now, traffic signals on surface streets in some jurisdictions may or may not be linked to or synchronized with freeway on and off ramps or even with signal systems in adjacent cities. Housing or commercial developments can impact traffic congestion in adjacent communities. Coordinating traffic signals on roadways that traverse multiple cities can affect traffic flow patterns. Allied agency involvement would enhance the ability to handle traffic congestion.

### Cost Analysis

It is difficult to forecast the cost of these strategies. With advances in technology coming at such a rapid pace, the costs associated with ITS and ATMS may actually go down in the future. However, with the challenges recently facing California, such as the energy crisis and terrorism response, there may be a shift in priorities to deal with present issues which can cause reallocation of future funding for transportation issues.

The cost of land to build additional TMC's will in all likelihood increase in the future. An alternative is to use state land that is already owned by Caltrans to build the TMC's and build upon existing partnerships with regional transportation commissions for actual construction costs. Additional funding mechanism such as gasoline taxes, local voter measures and Federal Highway Administration funds may be available.

Some of the funding for technology can be provided in part by public/private technology partnerships. Law enforcement agencies will have to update their communication systems in the future and if the strategies developed in this project are considered beneficial then they may want to build into the pre-planned upgrades the ability to link communication systems. The federal government is developing a national ITS architecture. Using this model could be a cost saving measure since it will avoid parallel spending on systems that cannot be linked.

In the following chapter transition management techniques are discussed for planning and implementing the strategies developed in this chapter. Transition management involves the leadership of an organization and implementing the changes within an organization's mission, goals and objectives.

## CHAPTER FOUR

### TRANSITION MANAGEMENT

#### Introduction

Transition management is planning and implementing change. In the previous chapter, we examined the issues by looking at the internal and external environment. The organization's readiness for change was also analyzed by looking at its strengths and weaknesses. In this chapter, we will consider the process of change by examining what is needed for commitment, management and leadership in order to accomplish a change in the organization's mission and strategies.

#### Commitment Plan

In the previous chapter, key stakeholders were identified for the implementation plan. Using those key individuals and their roles, a commitment chart was developed to identify the current positions and desired positions of those individuals, which would constitute the path of the transition management. Some key players have more of a role in implementing the change than others. For example, city and county law enforcement agencies have in the past let the regional changes in traffic management be developed by Caltrans and the CHP. In order for the strategies for the future to be implemented, the local agencies will need to assist in developing the regional strategies for traffic management. In the following chart an X is used to designate the current position of each member and an O to designate the desired position in order to accomplish this transition. The members and their positions are depicted in table 4.

Key Players	No Commitment	Let it happen	Help it happen	Make it happen
Caltrans			X	O
CHP			X	O
City and County law enforcement agencies		X	O	
Transportation Commissions			X	O
State Legislators			X	O
Community groups		X	O	
Public		X	O	
Cities and County Government			X	O
Private enterprise			X - O	
Environmental groups		X - O		

Table 4

### Management Structure

The state, city and county government structure is vital for the transition to full implementation of transportation management strategies. However, the law enforcement agencies themselves are responsible for the utilization of the ITS as a strategy for managing resources and improving response to incidents. The head of each law enforcement agency is the person who can communicate a vision and provide direction and specifics on goal setting. Therefore, it is recommended that the head of the agency be designated as the transition manager.

## Transition Techniques

The critical part of persuading people that a regional approach to traffic management with full implementation of ITS and ATMS to effectively deal with the challenges of population growth and traffic management in the future, is to create a sense of urgency. The trends and research developed in the previous chapters does create a real sense of urgency. Simply stated, law enforcement will be in a bad place in ten to twenty years if we do not plan for those changes and implement strategies that are long term.

In order to overcome organizational resistance to change, leaders need to provide people with an understanding of what is in it for their organization's success and the benefits to society as a whole. In order to overcome personal resistance, leaders need to provide people with an understanding of what is in it for them.

Political sponsorship is also important. Politicians will support plans that are supported by their constituents. Clearly, the research from the Inland Empire Survey and Texas Transportation Institute shows that residents of metropolitan areas are fed up with traffic congestion and see it as the single worst issue affecting their quality of life. The sense of urgency is there and the public can help change to happen by letting their elected representatives know of their desires. This can be accomplished by opinion surveys or ballot initiatives or contact with their legislators.

Support by state and local agencies is also necessary. The benefits of ITS and ATMS are better communication and better use of resources. Transportation management means planning for the future needs of the motorists. Taking a regional approach to traffic management strategies will involve collaboration among agencies, coordination of resources, communication and flexibility for law enforcement agencies to fully implement this change.

In the following chapter the project concludes with evaluation activities and some recommendations for the future.

## CHAPTER FIVE

### CONCLUSION

#### Project Summary

The San Bernardino/Riverside region was selected for this study because it posed so many different challenges due to rapid growth. The lessons learned from this study can be applied to any region that is experiencing similar trends in population growth, traffic management and transportation planning.

#### Evaluation Activities

The evaluation of the success in planning for the future will be accomplished by understanding the needs of the communities and whether those needs are being met. The focus should be on the outcomes or the impact of our transportation policies. This can be accomplished by community surveys, town hall meetings, community advisory groups and our community outreach efforts. ITS itself can also be used as an evaluation of the success of the transportation strategies outlined in this project. ITS can be used as a measurement of traffic volume, speeds and recurrent traffic delays to evaluate whether traffic congestion is improving.

#### Recommendations for the Future

State, county and local law enforcement agencies will need to establish better coordination of existing ITS. They will need to collaborate by working together towards incorporating future up grades into a system that everyone has access to and can be used to coordinate traffic management across city and county jurisdictions. The ability to access information and coordinate traffic management techniques such as signal light timing, traffic

diversion and use of alternate routes can be done if there is regional cooperation. The following are some additional recommendations for enhancing traffic safety and traffic management.

- Better Regional Planning – Local land use issues such as residential and commercial development need to be coordinated with regional transportation planning. Land use issues have always been local decisions. Transportation planning requires a regional approach and collaboration among cities, counties and state agencies.
- Better Coordination of Resources - Transportation Management Centers- TMCs should be used to coordinate state, county and city traffic engineering and emergency response resources to improve traffic safety and efficiency.
- Better Response to Incidents - Better incident management through rapid response to traffic incidents. Better coordination of information available through technology and better coordination among traffic and law enforcement agencies to quickly detect and respond to emergency incidents and provide rapid mitigation of congestion causing incidents.
- Better Use of Technology - Better efficiency can be achieved through improved traffic signal functions. This includes coordinating freeway and surface street signals to optimize the flow of traffic and coordination of metered freeway ramps to deliver just in time flow of traffic to avoid bottlenecks. The traffic management engineers at TMCs should have the technology available to make direct commands to signal functions when necessary to mitigate traffic congestion.
- Increased driver information – Information from law enforcement, traffic engineers, highway sensors, changeable message signs, closed circuit video cameras, and on board information systems can be used to provide drivers with real time information and alternate choices to avoid traffic incidents and better plan their trips. Driver information should be made

available through various mediums such as radio, on board vehicle computers, hand held computers, television and desktop computers.

### Implications for Leadership

As was previously discussed in the beginning of this chapter, law enforcement agencies and transportation management agencies will need to better coordinate resources. The implications for leadership are many. Leaders will need to be committed to change, strive for collaboration, communication, and flexibility and have the persistence and stamina to go at it for the long run. The vitality of the communities we serve in both quality of life and economic prosperity is dependent on meeting the transportation challenges of the future.

### Conclusions

There is a saying in business, “Think global, act local.” When it comes to transportation planning and management the saying should be, “Think regional, act regional.” Clearly, there are many unanswered questions with respect to which direction should be taken with respect to urban planning and growth. Technology alone cannot solve all of the problems associated with population growth and the strain on the transportation system. Sustainable growth means taking into consideration the social, environmental and economic issues which affect a region, and anticipating and planning for the future needs of that region. Making decisions which are strategic means focusing on future outcomes, the prevention of problems and looking at the long-range implications.

The full impact of the decisions made today may not be realized for 20-30 years. Some decisions may have unintended consequences. Limiting the use of automobiles or requiring

motorists to pay as you go on highways, toll roads or imposing higher registration or impact fees may have the unintended consequence of negatively impacting people with lower incomes. It may have the impact of depriving people with lower incomes of the ability to seek out higher paying jobs and the flexibility to move from crowded urban centers to suburban areas which may improve their quality of life or at least the choices they have.

Hopefully, the research done on this project may provoke more research on smart growth policies, urban planning and land use issues. The answer to the question is that local law enforcement agencies need to adopt a collaborative regional approach to traffic management. They will need to use Transportation Management Centers with Intelligent Transportation Systems and Automated Traffic Management Systems to coordinate regional transportation planning if they are going to be able to manage the growth in population and the growth in traffic that will go along with it.

## Appendix A

### NOMINAL GROUP TECHNIQUE PANEL

Date of NGT: October 3, 2001      Location of NGT: San Bernardino

#### Participants

Name: Bob Hill

Agency: Adjunct Professor University of La Verne Public Administration Program

Name: Captain Lecia Elzig

Agency: California Highway Patrol Capistrano Area

Name: Diana Barich

Agency: Director of Operations Caltrans District 8

Name: Ron Rector

Agency: City of Barstow Economic Development Coordinator

Name: Kim Schultz

Agency: San Bernardino County Association of Governments (SANBAG)

Name: Officer Lance Higgins

Agency: California Highway Patrol Transportation Management Center

Name: Captain Larry Clark

Agency: Fontana Police Department

Name: Lieutenant Tony Farrar

Agency: Rialto Police Department

## Appendix B

### LIST OF TRENDS

Level of recurrent congestion  
Level of employment  
State economic conditions  
Level of substance abuse  
Cost of environmental mitigation  
Insurance rates for vehicles  
Rate of vehicle ownership  
Number of or level of traffic enforcement programs  
Number of recreation or vacation destination  
Number of trucks with triple trailers  
Number of different types of transportation # of vehicles  
Level of crime associated with movement of goods  
Level of use of higher technology by law enforcement  
Level of capacity of state highways and arteries  
Level of collision rates per number of vehicles miles traveled  
Number of arterial upgrades/improvements in capacity  
Level of incident response time of law enforcement  
Level of affordable housing availability  
Change in demographics as it relates to ethnicity, gender, age and income  
Level of public awareness and acceptance of cultural diversity  
Level of use of traffic flow diversions  
Trend toward public policy changes for transportation funding  
Level of availability of commercial vehicle parking  
Reformulation of diesel fuel  
Number of alternative fuel vehicles  
Cost of vehicle maintenance  
Level of use of ITS and ATMS  
Level of transportation revenues  
Number of governmental agencies  
Availability of fuel for vehicles  
Level of law enforcement personnel  
Commute patterns time of day and length of commute  
Level of additional demand for law enforcement services  
Pattern in development of urban lands  
Number or level of industry (all types)  
Costs of law enforcement services  
Type of industry (professional, manufacturing, service)

Availability of water  
Level of air quality  
Climate patterns  
Level of telecommuting  
Level of population

## Appendix C

### LIST OF EVENTS

Major earthquake on San Andreas fault  
Global war  
Biological attack  
Railway hazardous materials incident  
CHP hiring freeze  
Federal funds rate lowered to 1%  
OPEC fuel embargo  
Peak in worldwide petroleum production  
Split between the US military and US politicians  
Epidemic of disease  
Failure of the electrical grid  
El Nino winter flooding  
Closure of US borders  
Increase in Federal funding for transportation  
Widespread labor dispute or strikes  
300% increase in goods movement at LA ports  
Freeway's reach their maximum capacity  
Major breakthrough in cold fusion and fuel cell design  
Metrolink commuter train expansion to the hi desert  
Collapse of US stock market  
Redirection of commercial cargo to SCLA  
Implementation of photo enforcement on freeways  
Los Angeles International Airport closes to international travel  
Prolonged drought  
Health benefits eliminated for retirees  
Nationwide trucking industry strike  
Rebellion against truck traffic  
State blood alcohol limit raised  
Opening of high speed rail system  
Development of state mass transit strategy  
Reduction in work week hours  
Minimum age for obtaining driver's license raised to 18 years  
Significant tax incentive for alternative fuel vehicles  
Los Angeles airport master plan not approved  
NAFTA fully implemented  
US implements policy of allowing work visa for Mexican nationals to enter US legally

## NOTES

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