

Los Angeles County  
Metropolitan Transportation Authority

Final Report  
*"Executive Summary"*

Conceptual Design Study of Traffic  
Signal System Improvements in the  
South Bay Area of Los Angeles County

*Prepared by*



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## **EXECUTIVE SUMMARY**

### **INTRODUCTION**

This Executive Summary provides the results of a study conducted for the Los Angeles County Metropolitan Transportation Authority to identify and evaluate the opportunities and constraints for the short-term and long-term improvements in the South Bay traffic signal system. The South Bay Traffic Signal System Improvement project is a Transportation Systems Management (TSM) element of MTA's 30-Year Plan, which will use TSM measures on the arterial highway system. These measures include such things as signal synchronization, peak hour parking restrictions, and automated traffic surveillance and control systems. By applying communications upgrade, traffic operations improvements and installation of closed circuit television (CCTV) and system loops to South Bay area intersections, the South Bay Traffic Signal System Improvement project will strive to meet the goals of the MTA and the South Bay Joint Power Authority (JPA).

The South Bay study area encompasses a wide urbanized area within Los Angeles County and includes the cities of Carson, Culver City, El Segundo, Gardena, Hawaiian Gardens, Hawthorne, Hermosa Beach, Inglewood, Lawndale, Lomita, Long Beach, Los Angeles, Manhattan Beach, Palos Verdes Estates, Santa Monica, Rancho Palos Verdes, Redondo Beach, Rolling Hills, Rolling Hills Estates, Signal Hill, Torrance, and the unincorporated areas of Los Angeles County. Caltrans maintains the traffic signals along the majority of state routes within the study area. Exhibit 1 shows the South Bay study area boundary and jurisdictions involved.

Implementation of these projects will improve mobility in the South Bay area resulting in significant reductions in stops, delays and vehicular emissions.

### **STUDY OBJECTIVES**

The overall objectives of the South Bay Signal System Improvement Study were to identify and evaluate the opportunities and constraints and to develop a conceptual plan for short and long-term signal system improvements. To accomplish these goals the following activities were specified:

1. Inventory of existing systems.
2. Analysis of traffic patterns, equipment, control systems and strategies and institutional issues.
3. Development of conceptual plan alternatives.
4. Development of an implementation program and schedule for the recommended conceptual plan.

# SOUTH BAY TRAFFIC SIGNAL SYSTEM IMPROVEMENTS

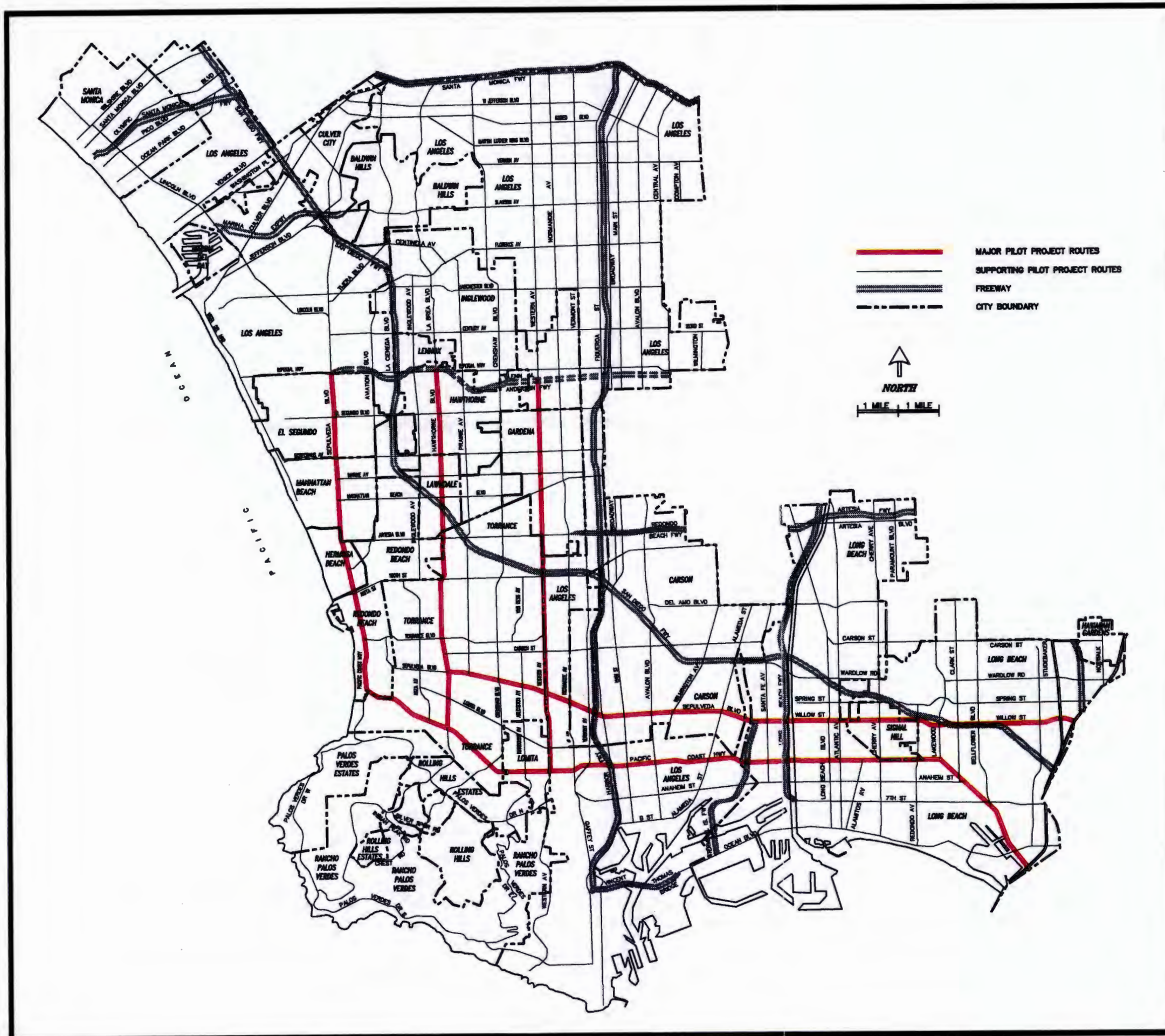
## LACMTA

Los Angeles County  
Metropolitan Transportation  
Authority

South Bay  
Study Area

Exhibit 1

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Several meetings/workshops were held to discuss various elements of the project. Representatives from the 23 involved agencies participated in these meetings. A consensus building approach was employed, identifying types and location of improvements.

## **PRIORITY CORRIDORS**

As determined by the participating agencies, the focus of the study was to identify improvements for the following priority routes and their supporting roadway facilities:

- Pacific Coast Highway/Sepulveda Boulevard (SR 1) between the eastern city limits of Long Beach and Los Angeles International Airport.
- Willow Street/Sepulveda Boulevard between the eastern city limits of Long Beach and Hawthorne Boulevard.
- Western Avenue between Pacific Coast Highway and the future Glenn M. Anderson Freeway (I 105).
- Hawthorne Boulevard between Pacific Coast Highway and the future Glenn M. Anderson Freeway (I 105).

These corridors represent major east-west and north-south corridors paralleling the San Diego Freeway. A Concept Plan was prepared describing improvements for the next 10 years for the area. In addition, a detailed implementation plan for the first two years (Pilot Project 1) was prepared focusing on the above priority routes.

## **EXISTING CONDITIONS**

A wide range of traffic signal controller types, systems and communications equipment exist within the South Bay area. The report includes discussion of existing conditions with respect to traffic signals, traffic control systems, communications and operating and maintenance procedures. The major tasks include:

- Jurisdictional and intersection inventory
- Overview of the existing traffic signal operations
- Development of GIS database system
- Signalized intersections
- Controllers
- Existing traffic control systems
- Surveillance elements
- Signal operation/maintenance procedures



- Planned jurisdictional improvements

The existing conditions inventory revealed that the South Bay study area is both large and complex in that many jurisdictions have responsibilities for funding, designing, improving, constructing and maintaining the traffic signal system. Most of the agencies have their own ongoing signal timing and coordination improvement programs, equipment upgrade and routine maintenance programs. Each agency focuses on their own network, although coordination between traffic signals already exists at some intersections which share jurisdictional boundaries.

Approximately 2,500 traffic signals exist in the study area with a mixture of traffic control systems (such as BiTrans QuicNet, VMS 220, UTCS Enhanced and Econolite Closed Loop), traffic controllers (such as Type 170, NEMA, and electromechanical) and communication systems (such as twisted pair, fiber optics, and wireless).

The County of Los Angeles and Caltrans primarily provide coordination between traffic signals along major routes including Pacific Coast Highway (SR 1), Artesia Boulevard (SR 91), County-maintained arterials and other major arterials within the South Bay area. This coordination is all arterial signal coordination which synchronizes the offsets through a common time reference, typically WWV radio receivers. The County of Los Angeles has played an active role in these coordination activities.

This inventory formulated the basis for analysis of opportunities and constraints, identifying the types of improvements necessary for the area.

## **ANALYSIS OF OPPORTUNITIES AND CONSTRAINTS**

Upon completion of the existing conditions inventory, detailed analyses of the following elements were performed:

- Primary traffic flow patterns
- Controller analysis
- Communications
- System boundary analysis
- Institutional issues and signal coordination

Results of these analyses suggested that while many facilities may require the same types of improvements, due to their diversity of characteristics, different types of improvements may be warranted in certain areas. For example, the core area of the South Bay needs areawide coordination plans while communication improvements may be necessary elsewhere. It was also found that a phased implementation plan is necessary to achieve efficiency in implementation. This analysis formulated the 10-Year Concept Plan and specific recommendations for improvement plans.



## **CONCEPTUAL PLAN ANALYSIS AND RECOMMENDATIONS**

A 10-year Conceptual Improvement Plan was developed as a result of inventory, analysis of opportunities and constraints and jurisdictional needs and desires.

The Concept Plan introduces the short-term and long-term conceptual improvement plans recommended for the first two years and the following years 3 through 10, respectively. Multi-level computer interface, jurisdictional, areawide and regional improvement strategies, and description of Pilot Project 1 which was recommended as part of the South Bay Conceptual Plan for the funding of the first two years improvement program, are discussed.

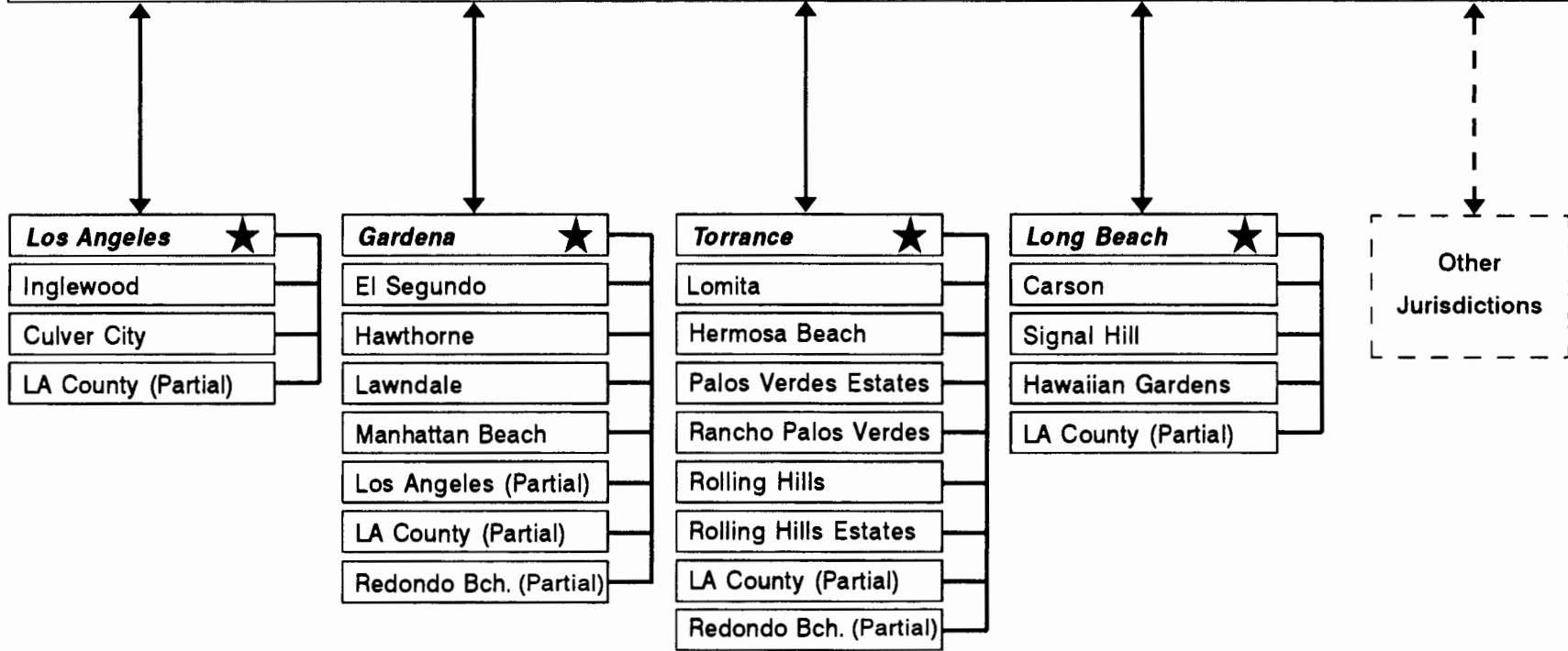
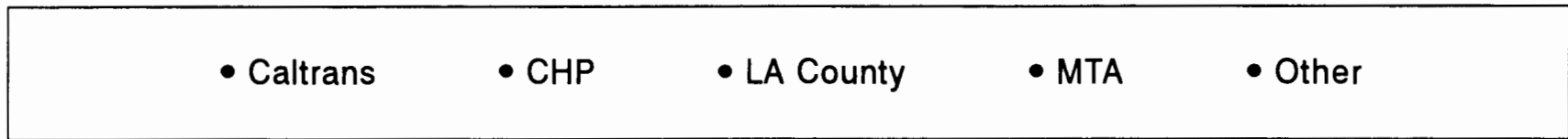
Three levels of improvements are identified as part of the South Bay Concept Plan of improvements—jurisdictional, areawide and regional improvements. Jurisdictional improvements refer to the improvements within each jurisdiction at either isolated intersections or along major arterials. Operational improvements and signal upgrade, controller replacement and communication upgrade along arterials are the jurisdictional improvements included in the conceptual plan. Areawide improvements are those that benefit a wider area such as several jurisdictions. These improvements include systemwide coordination (timing), areawide surveillance, multi-jurisdictional coordination and traffic control centers. Regional improvements refer to the improvements which benefit the entire South Bay area, such as regional surveillance and data interface. A summary of the types of improvements are presented below:

- A. Traffic operational improvements
- B. Controller replacement
- C. Communications upgrade
- D. Systemwide coordination
- E. Surveillance
- F. Common time reference
- G. Computer interface
- H. Traffic control center
- I. Data, graphics and video intertie
- J. Travellers information system
- K. "Smart Corridors"

A detailed list of various types of improvements, their cost and schedule has been prepared. In addition, several exhibits are presented illustrating the recommended improvements. Exhibit 2 provides a summary of the 10-Year Plan improvements and associated budget.

An important element of the Concept Plan was the consensus building process, developing a mechanism by which various jurisdictions could implement the improvements together. Analysis of the institutional issues together with the types of improvements and geographical characteristics of the South Bay area resulted in recommendations relative to working groups, implementation of data sharing techniques at both multi-jurisdictional and regional level. Exhibits 3 and 4 illustrate this concept. In each working group, a host computer will contain data relative to each of the jurisdictions involved. Individual

Improvements	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
A. Traffic Operational Improvements	\$627K	\$1,253K			\$1,000K	\$1,000K	\$1,000K	\$1,000K			\$5,880K
B. Controller Replacement	\$131K	\$263K			\$282K	\$282K	\$282K	\$281K			\$1,521K
C. Communication Upgrade	\$383K	\$767K	\$1,150K	\$2,300K	\$1,006K	\$1,006K	\$1,006K	\$1,007K			\$8,625K
D. Systemwide Coordination	\$134K	\$267K	\$401K		\$670K	\$670K			\$670K	\$670K	\$3,482K
E. Surveillance		\$917K		\$1,079K							\$1,996K
F. Common Time Reference	\$242K										\$242K
G. Computer Interface			\$281K	\$561K	\$150K	\$150K					\$1,142K
H. Traffic Control Center	\$126K	\$252K			\$250K	\$250K					\$878K
I. Data, Graphics and Video Intertie					\$1,500K	\$1,500K	\$1,500K				\$4,500K
J. Travellers Info. System					\$738K	\$738K	\$738K	\$736K			\$2,950K
K. "Smart Corridors"					\$3,000K	\$5,000K	\$8,000K	\$10,516K	\$10,516K	\$10,518K	\$47,550K
<b>Budget</b>	<b>\$1,643K</b>	<b>\$3,719K</b>	<b>\$1,832K</b>	<b>\$3,940K</b>	<b>\$8,596K</b>	<b>\$10,596K</b>	<b>\$12,526K</b>	<b>\$13,540K</b>	<b>\$11,186K</b>	<b>\$11,188K</b>	<b>\$78,766K</b>
<b>Cumulative Budget</b>	<b>\$1,643K</b>	<b>\$5,362K</b>	<b>\$7,194K</b>	<b>\$11,134K</b>	<b>\$19,730K</b>	<b>\$30,326K</b>	<b>\$42,852K</b>	<b>\$56,392K</b>	<b>\$67,578K</b>	<b>\$78,766K</b>	



Level 1 - Individual Jurisdiction  
 Level 2 - Multijurisdictional Interface  
 Level 3 - Regional Interface  
 ★ - Host Computer Agency



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**South Bay Multi-Level Interface System**

*South Bay Traffic Signal Systems Improvement Plan*

EXHIBIT

3



# SOUTH BAY TRAFFIC SIGNAL SYSTEM IMPROVEMENTS

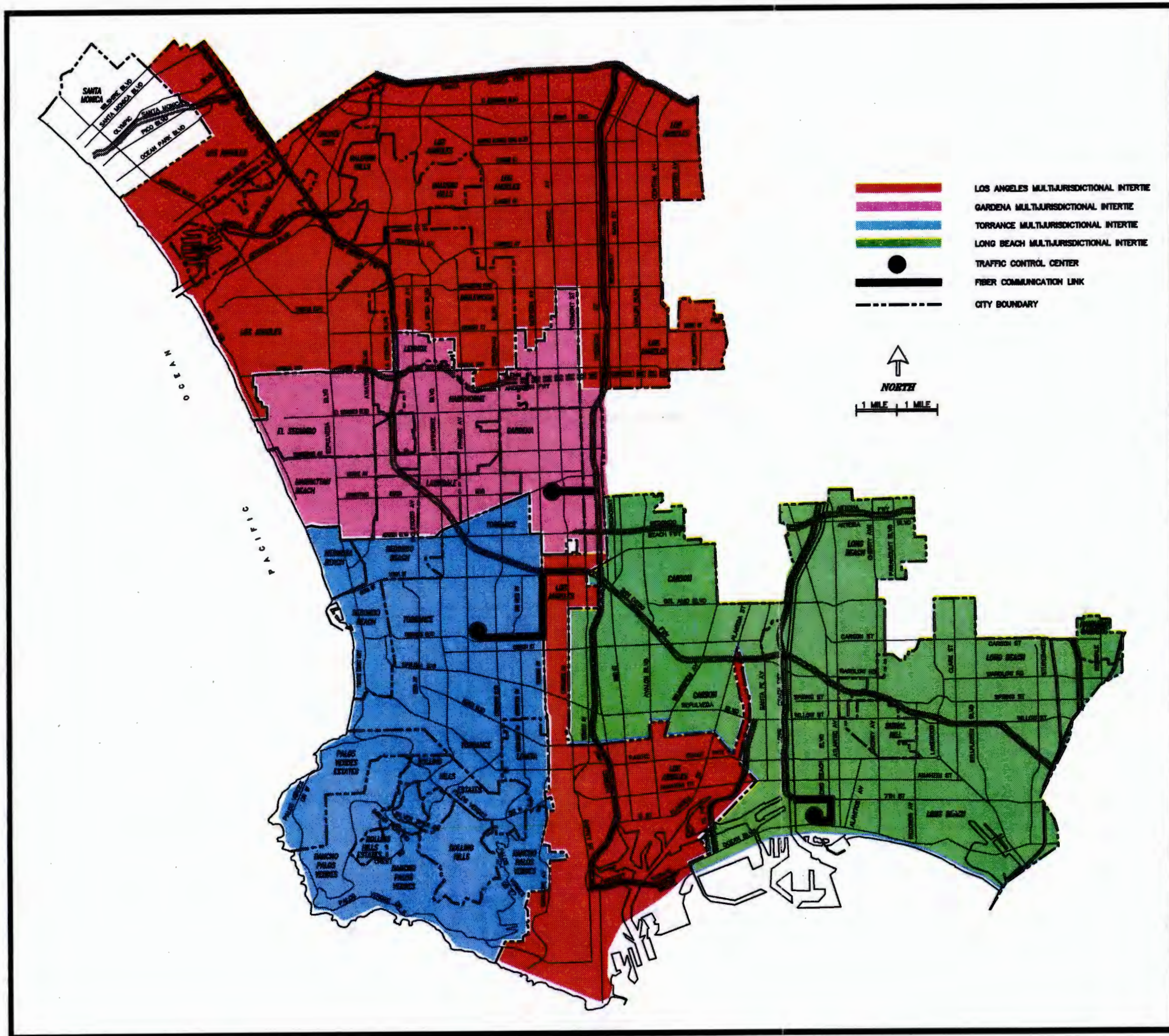
## LACMTA

*Los Angeles County  
Metropolitan Transportation  
Authority*

*Multi-Level Interface  
Concept Plan*

Exhibit 4

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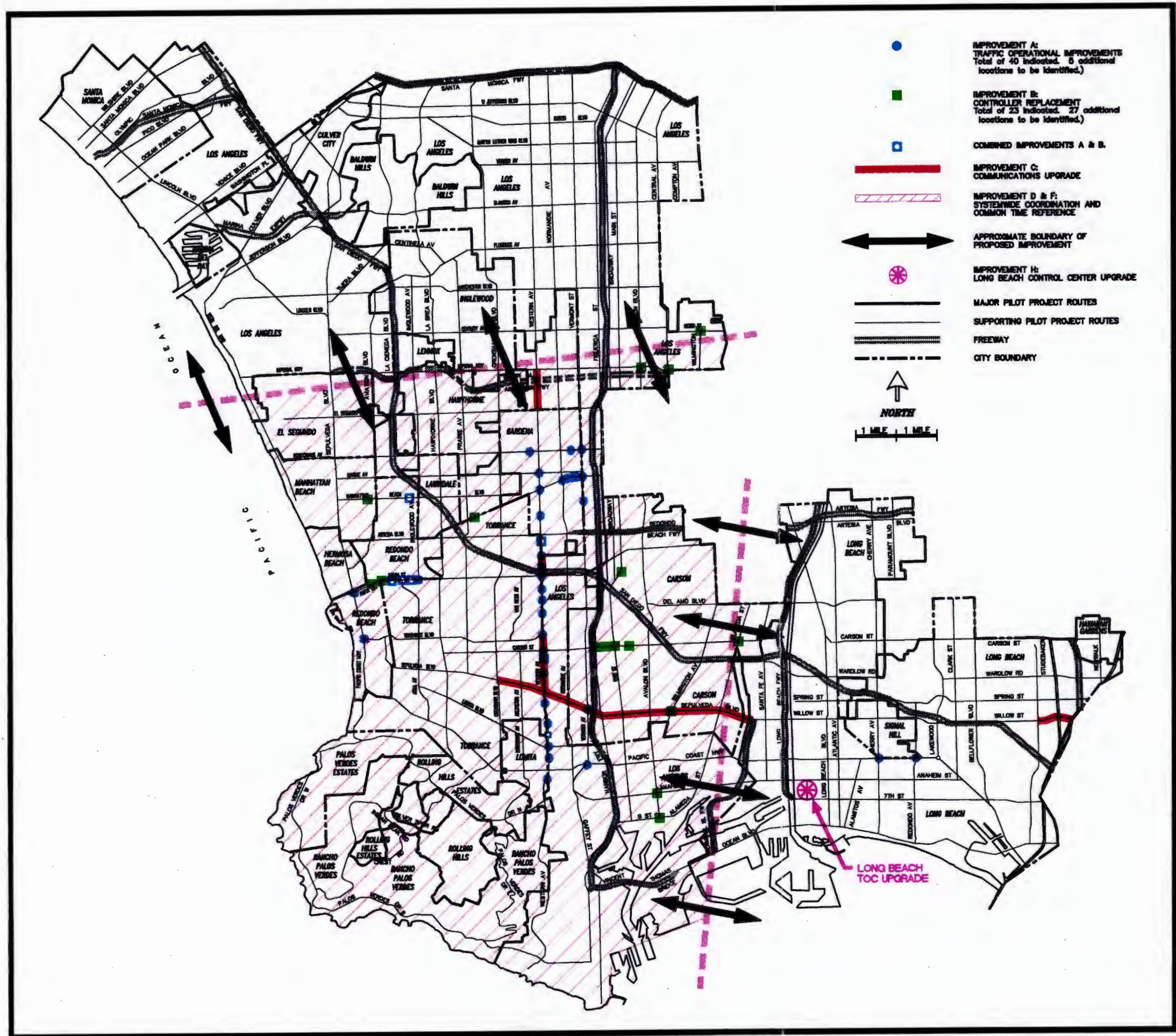
# SOUTH BAY TRAFFIC SIGNAL SYSTEM IMPROVEMENTS

Los Angeles County Metropolitan Transportation Authority

Constrained Improvements First 2-Years

Exhibit 6

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jurisdictions could view the data and appropriately utilize it for traffic improvements such as signal progression, incident response, etc.

## **IMPLEMENTATION PROGRAM AND SCHEDULE**

As illustrated in Exhibit 2, improvements are recommended for phasing implementation over a period of 10 years. The plan was prepared to provide a flexible approach correlated with funding availability.

The short-term plan improvements focus primarily on Pilot Project 1 along the identified four major corridors and supporting arterials submitted to the LACMTA for potential funding. The plan was evaluated by the MTA Board under the current budget constraints and was recommended for implementation with some modifications. Exhibit 5 shows the modified (constrained) two-year plan expenditure for implementation as approved by LACMTA.

It should be noted that the recommended budget for the first two years is \$3,185,000. Since this budget is less than the amount identified in the Concept Plan (\$5,362,000), some of the projects in part will be deferred to later years for implementation. Such improvements include portions of communications and CCTV cameras for surveillance. In this way, complete implementation of improvements could take place within the budget available. This "building block" approach provides flexibility in implementation as funding becomes available.

These improvements are illustrated in Exhibit 6 indicating the first two-year project and associated geographical area. Upon approval by MTA, the design and implementation of these projects will begin.

A total 10-Year budget of \$78,766,000 is proposed for the recommended improvements. This budget includes \$47,550,000 for "Smart Corridor" improvements plus \$31,216,000 for other improvements as illustrated in Exhibit 2. The plan is based on expected needs of the proposed improvements under an unconstrained budgetary assumption. A variety of local, state and federal funding sources should be explored to secure funds for implementation of the plan.

It should also be noted that some of the proposed projects, such as the "Smart Corridors", are already in process of preparation for funding application by some of the agencies, such as the City of Los Angeles and Caltrans.

**EXHIBIT 5**

**RECOMMENDED IMPLEMENTATION PROGRAM AND SCHEDULE  
FOR FIRST TWO YEARS (CONSTRAINED)**

<b>Task</b>	<b>Year 1 Recommended</b>	<b>Year 2 Recommended</b>	<b>Total 2-Year Recommended</b>	<b>Comments</b>
Tasks A and C				
A: Traffic Operational Improvements	410,000	815,000	1,225,000	Figure represents 45 of the intersections requested as part of the Conceptual Plan
C: Communications Upgrade	180,000	365,000	545,000	This budget will cover approximately 10 miles of communications upgrade
Total Tasks A and C	590,000	1,180,000	1,770,000	
Tasks B, D and F				
B: Controller Replacement	131,000	263,000	394,000	
D: Systemwide Coordination	134,000	267,000	401,000	Estimated \$1,200 per intersection
F: Common Time Reference	242,000	0	242,000	
Total Tasks B, D and F	507,000	530,000	1,037,000	
Task H				
H: Long Beach Control Center Upgrade	126,000	252,000	378,000	
Total Task H	126,000	252,000	378,000	
<b>TOTAL</b>	<b>1,223,000</b>	<b>1,962,000</b>	<b>3,185,000</b>	



## **SUMMARY**

The South Bay study area, encompassing 23 jurisdictions with over 2,500 traffic signals, requires a comprehensive approach to improving the overall mobility. A 10-Year Implementation Plan is provided with specific improvement recommendations. A "building block" approach has been employed to prepare the 10-Year Concept Plan allowing flexibility relative to both funding availability and the implementation schedule.

The key to success of this program is to maintain and increase communication and cooperation between agencies via consensus building techniques, frequent working group discussion under the JPA umbrella, and assistance from MTA to secure the necessary funding.

Implementation of the proposed communications, areawide signal timing progression, equipment upgrade, surveillance, areawide data interface and integration, and traffic operations improvements will indeed result in significant reduction in vehicular stops, delays and emissions, thus improving the overall mobility in the South Bay area.

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