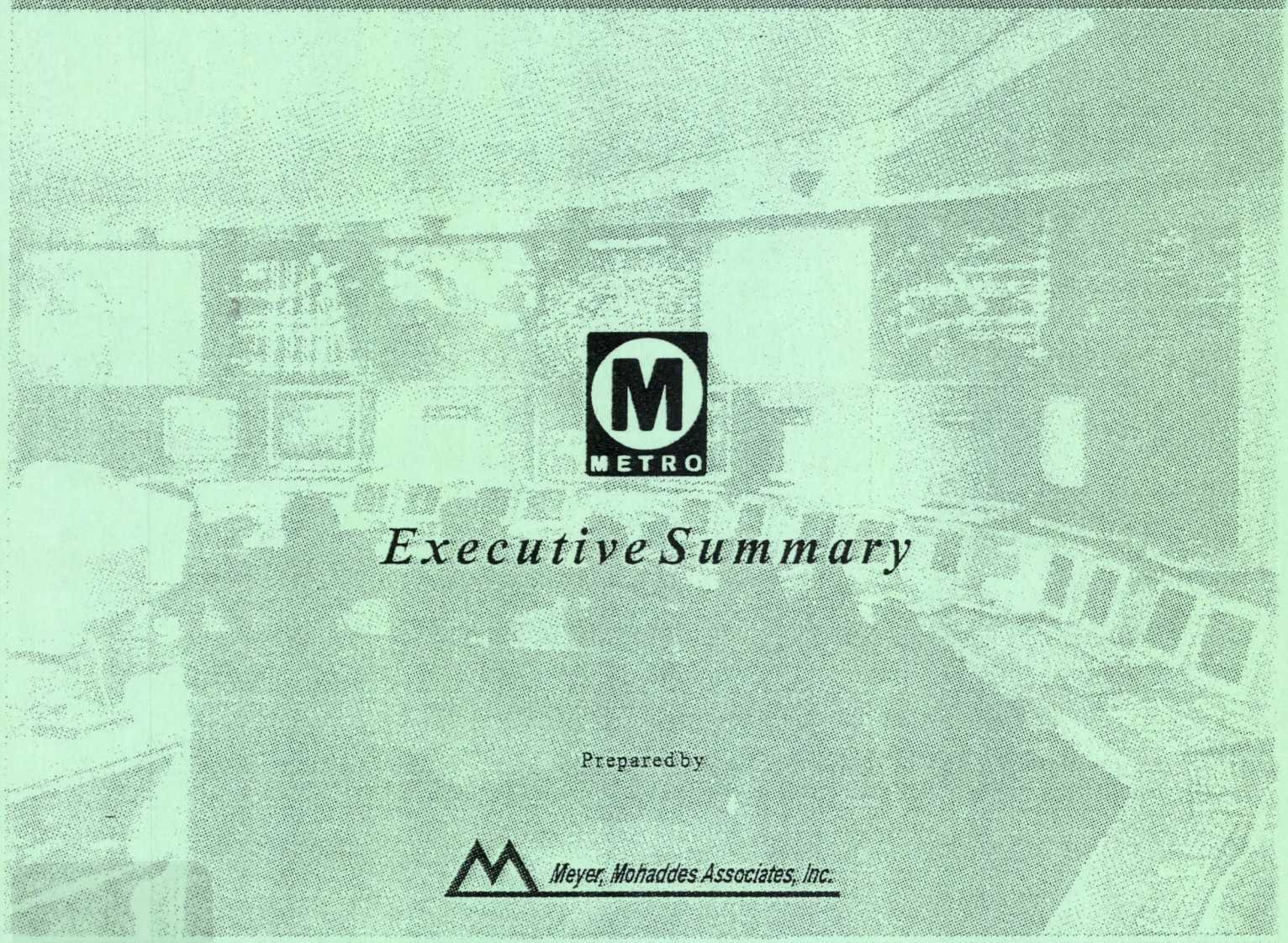
TRANSPORTATION MANAGEMENT CENTER COORDINATION STUDY



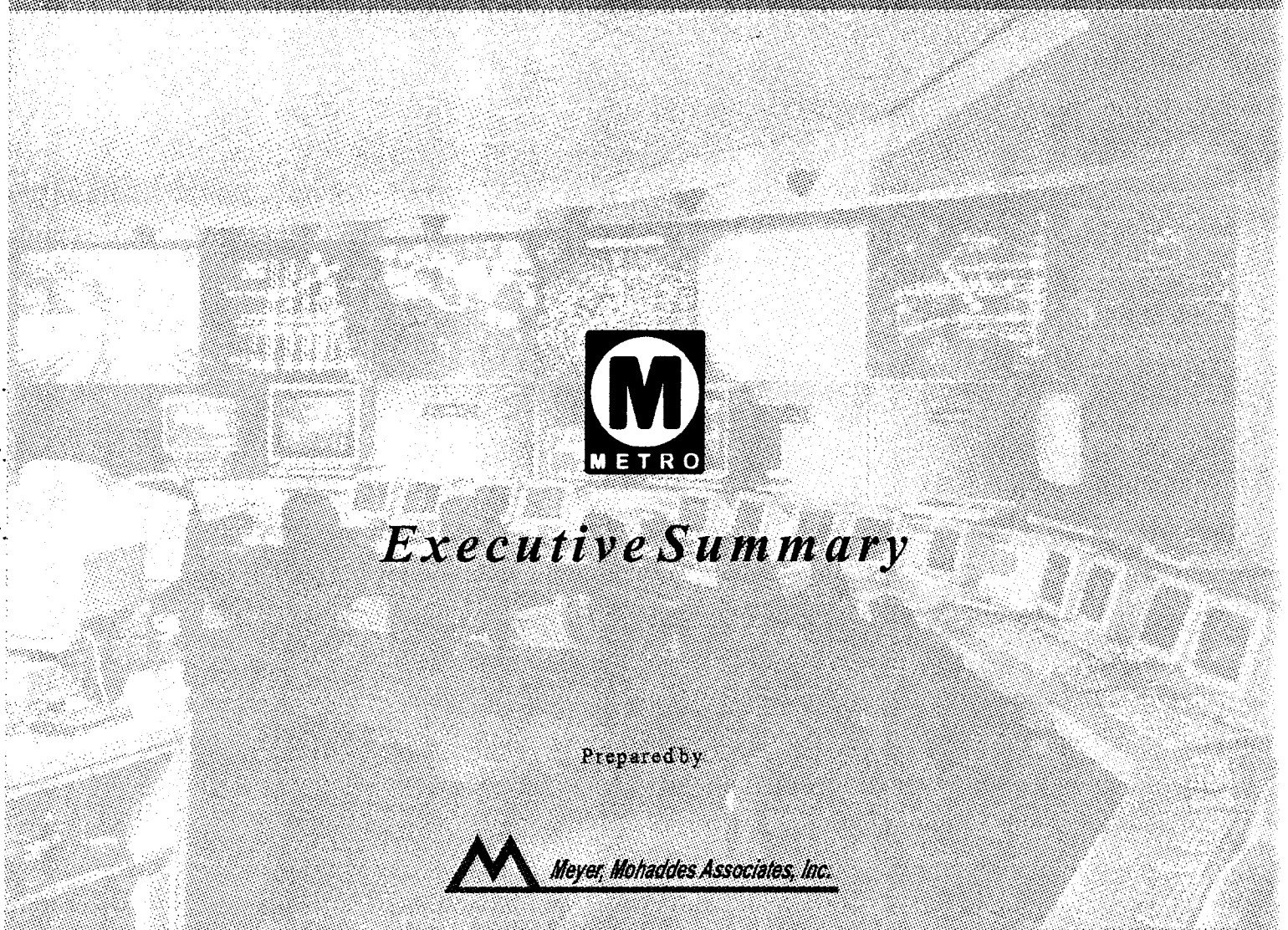
Executive Summary

Prepared by

Meyer, Mohaddes Associates, Inc.

July 31, 1997

TRANSPORTATION MANAGEMENT CENTER COORDINATION STUDY



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1. INTRODUCTION

For Fiscal Years 1991-1999, the Los Angeles County Metropolitan Transportation Authority (MTA) programmed $212 million in capital costs to local agencies for Transportation Systems Management (TSM) projects. This funding includes costs for the design and implementation of signal systems infrastructure, as well as Transportation Management Centers (TMCs). TMCs will provide for the operations and information management for safe and efficient movement of people, goods and information throughout Los Angeles County. Given the substantial amount of funds allocated to local agencies during this eight year period, MTA aims to establish objectives for defining a formal investment strategy for TMCs through this study to identify whether it should allocate funds towards establishing: (1) a regional TMC; (2) a network of regional and subregional TMCs or (3) a network composed of regional, subregional and local TMCs.

MTA has retained the services of the Meyer, Mohaddes, Associates, Inc. (MMA) Team to assist in conducting the Transportation Management Center Coordination Study. This study focuses on completing the following five tasks:

Task 1: Collection of Existing Data and Inventory
Task 2: Analysis of Existing Data
Task 3: Additional Analysis: Emergency Services
Task 4: Operations and Maintenance Issues of the TMC Facility
Task 5: Recommended Plan

The study was conducted in Spring 1997 under the direction of an "Oversight Committee" with representatives from the MTA, Los Angeles County DPW, Caltrans, and cities of Lancaster, Long Beach, Los Angeles, and Pasadena. Several meetings and discussion sessions were conducted addressing institutional and technical issues associated with various architectures. This Executive Summary provides an overview of the analysis and recommendations prepared for this project. Definition of terms has been provided in Appendix A.

2. EXISTING CONDITIONS

There are several management centers throughout the LA County region, which focus on different aspects of vehicular traffic including traffic management, transit and rail management, and emergency management. Of these centers, MMA surveyed 14 agencies consisting of multi-modal centers, regional, subregional and local management centers.

The survey requested information in four main categories: General, Physical System Aspects, Operations and Maintenance Issues and Costs, and Institutional Issues. Table 1 illustrates general information relative to surveyed agencies.

TABLE 1

TMC LOCATIONS

	Agency	Location	Date Established	Main Function
1	City of Arcadia	240 W. Huntington Dr.	1978	Traffic Management
2	Caltrans, District 7	120 S. Spring St.	1971	Freeway Mgmt
3	CHP Response Center	Vermont Ave./US 101	1971	Emergency Mgmt
4	City of Downey	11111 Brookshire Ave.	N/A	N/A
5	City of Gardena	1717 W. 162nd St.	1992	Traffic Management
6	City of Glendora	116 E. Foothill Blvd.	1985	Traffic Management
7	City of Inglewood	1 Manchester Blvd.	1988	Traffic Management
8	City of Lancaster	44933 N. Fern Ave.	1994 (upgraded)	Traffic Management
9	City of Long Beach	1601 San Francisco St.	1995 (upgraded)	Traffic Management
10	LA Co. Emergency Operations	1275 N. Eastern Ave.	1995	Emergency Mgmt
11	City of Los Angeles (ATSAC)	200 N. Main	1994 (upgraded)	Traffic Management
12	MTA Bus Operations	One Gateway Plaza		Transit/Emergency Mgmt
13	MTA Rail Transit Operations	Imperial/I-105	1990	Rail Operations
14	City of Pasadena	100 N. Garfield, 2nd Flr.	1991	Traffic Management

In summary, the survey results revealed that each TMC operates differently depending upon their local, subregional or regional orientation. Regional management centers operate 24 hours a day, seven days a week, while subregional and local TMCs tend to operate Monday through Friday from 8:00 AM to 5:00 PM. Their operating hardware/software vary. Some agencies have deployed advanced technologies in traffic management such as CCTV cameras while others have focused on signal synchronization using time-of-day plans.

Operation and maintenance cost varies among TMCs depending upon their function, size and operational requirements. Table 2 illustrates the annual facility center cost per 100 traffic signals of those who responded.

TABLE 2

ANNUAL COST PER 100 SIGNALS

Agency	Annual Cost	Number of Signals	Annual cost/100 signals
City of Arcadia	$21,600	40	$59,000
Caltrans, District 7	$6,600,000 [1]	1200 (ramp)	N/A
CHP Response Center	n/a	N/A	N/A
City of Downey [2]	n/a	80	n/a
City of Gardena	$2,900	55	$5,270
City of Glendora	n/a	36	n/a
City of Inglewood	$68,500	104	$68,500
City of Lancaster	$24,350	94	$25,900
City of Long Beach	$116,529	284	$41,031
LA Co. Emergency Operations	n/a	N/A	N/A
City of Los Angeles (ATSAC)	$980,682	2000	$49,034
MTA Bus Operations	$725,197	N/A	N/A
MTA Rail Transit Operations	n/a	N/A	N/A
City of Pasadena	$145,800	286	$51,000

Notes: [1] Operations and Maintenance costs only - this includes both TOC and field maintenance cost.
[2] Although the City of Downey does not have a TMC/TOC, they were interviewed since they are geographically located at the heart of SELAC cities. Meeting notes of this interview are included in Appendix A.
N/A = Not Applicable n/a = not available

Several institutional arrangements and issues were addressed, ranging from multi-jurisdictional traffic signal operations to Caltrans and CHP co-location and Santa Monica "Smart Corridor" arrangements between the City of Los Angeles, Caltrans, as well as the cities of Culver City and Beverly Hills. Some operations centers consider liability issues associated with the TMC as a major issue such as risk management and joint operation.

Significant high capacity communication is currently underway throughout the region. Many agencies have already implemented fiber optic trunk cable such as Caltrans and the City of Los Angeles and many other agencies are planning to implement wide-band communication infrastructure.

Several TMC configurations have been recommended as a result of studies performed for the five areas of Los Angeles County. These studies included: Pomona Valley Forum Signal Synchronization Study; Southeast Sub-regional Traffic Signal Systems Coordination Study; South Bay Traffic Signal System

Improvement Project; East San Gabriel Valley Pilot Project; and Arroyo Verdugo Traffic Forum Study. Table 3 provides a summary of the Forum's recommended architecture.

TABLE 3

SUMMARY OF FORUM'S ARCHITECTURE RECOMMENDATIONS

Forum	Recommendations
Pomona Valley	• Four alternatives are suggested • The ultimate vision leans toward a centralized system with a Regional Traffic Management Center (RTMC) • RTMC will interface with Caltrans, County, and Pomona Valley Cities
SELAC	• A distributed system • Interfaces to the traffic control equipment at municipal, regional, and State • Municipal level access via workstations • Regional level via a new TMC • State level via District 7 and District 12
South Bay	• A distributed architecture is proposed • Each jurisdiction individually or jointly will have a TMC for its own signals • Subregional TMCs to share information with other subregional TMCs or with the regional TMC • Regional TMCs may include Caltrans, LACDPW, CHP, MTA, and others
San Gabriel	• A distributed architecture is proposed • A regional system will have interface with other regional systems as well as with - LA County - Caltrans - Other subregional TMCs
Arroyo Verdugo	• LA County TMC will serve as a focal point • Cities will have links to their field units • Subregional TMCs will be linked together through County TMC

3. ARCHITECTURE ANALYSIS

Several meetings were held with the ITS Oversight Committee discussing several architectures, their characteristics and features, technical and institutional issues associated with each alternative and their capital/operation and maintenance cost. Eight options were included in the analysis, ranging from a fully centralized TMC where the total control of the field units would reside, to several subregional TMCs linked with each other and to a distributed system where local, subregional and regional TMCs would be linked as appropriate.

Two of the eight alternatives (Option 1, Scenario B and Option 3, Scenario B_2) are described below in comparison: one centralized with flexibility in control and sensitive to legacy TMCs, and the other fully distributed.

Option 1, Scenario B (Figure 1) provides flexibility in several features for this option, including flexibility in types of function. In other words, certain functions such as ATMS and ATIS may reside at the regional TMC, however, functions such as bus operations, Metrolink and rail operation could be at other physical locations. In addition, this scenario is sensitive to legacy TMCs which can be retained, operated and controlled in their field units. Although this scenario provides partial flexibility, it does suggest that local field unit control will be relinquished by those agencies that currently do not have any TMC. The following diagram is an example of this scenario relative to Los Angeles metropolitan agencies.

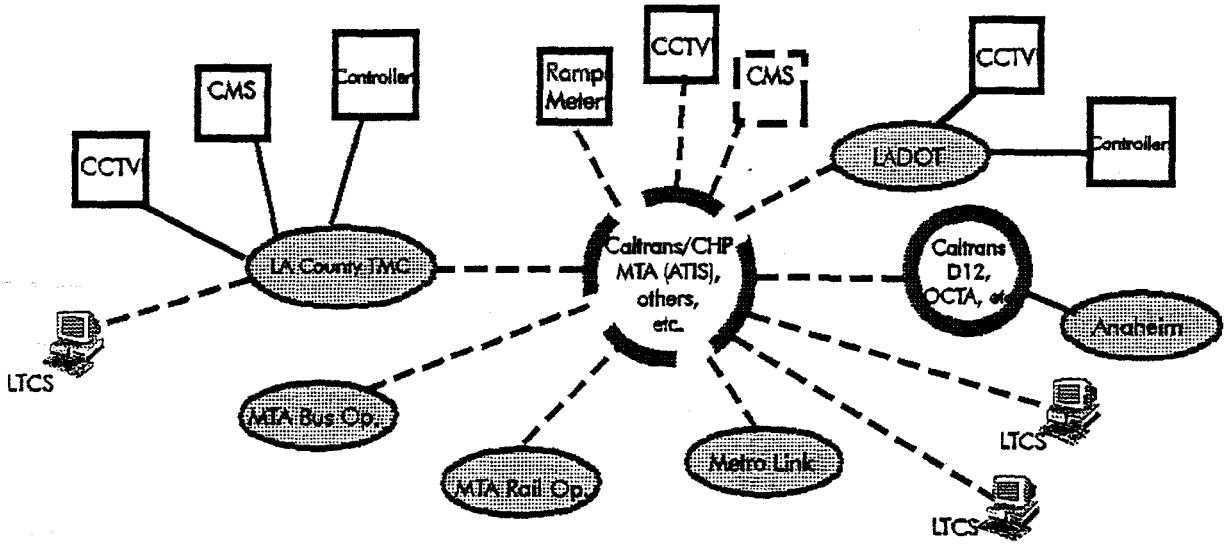

Figure 1. Option 1, Scenario B Architecture

Option 3, Scenario B_2 provides flexibility in terms of function and control where existing legacy TMCs would continue to function, a regional TMC would be constructed for Caltrans/CHP and other entities as they make appropriate arrangements. New regional, subregional and local TMCs will be constructed as necessary and will be linked. The diagram below is an example of such an architecture.

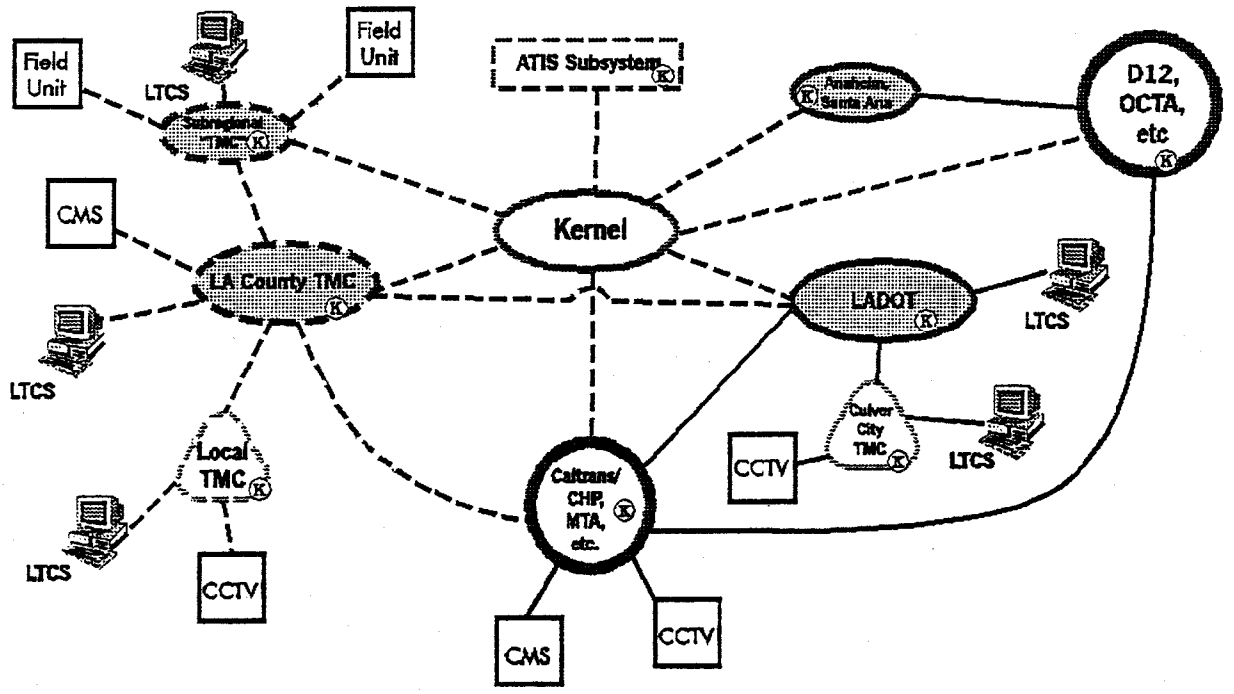

Figure 2. Option 3, Scenario B_2 Architecture

Communication requirements for each architecture was estimated as well as emergency services interfaces and O&M requirements. In general, O&M costs tend to increase as TMCs become more distributed. However, the notion of distribution and residing control of the field units with local agencies is more acceptable institutionally at this time. Under Option 3 architecture, the legacy TMCs are not intended to be eliminated, although the opportunity exists for consolidation if and when agreed upon by the involved agencies to avoid a proliferation of TMCs.

4. RECOMMENDATIONS

Based upon the performed analysis and several discussion sessions with the ITS Oversight Committee, Option 3, Scenario B_2 is recommended at this time, as discussed briefly earlier. Institutionally, this architecture is the easiest to implement at this time. However, the flexibility of evolving to an option such as Option 1, Scenario B is included in this configuration. It is also important to note that O&M costs are higher for the recommended scenario, while experiencing potentially a lower front-end capital cost due to incremental investment in the various elements rather than a single regional facility. This would also minimize the risk of technological obsolescence requiring complete replacement of a single regional system. This architecture has the following features and characteristics:

1. **Hybrid Architecture, Distributed Kernel Interface**, where it allows both hierarchical and peer-to-peer interface, such as a regional center interfacing with subregional TMCs and local agencies as appropriate. In addition, the "Kernel" interface is distributed where much of the processing will reside at each TMC as appropriate.

2. **Flexibility of Link to Others through Subregional or Regional TMC.** This would provide the opportunity, as an example, for "Gateway Cities" subregional TMC to interface directly with cities of Santa Ana or Anaheim without necessarily going through a regional TMC.

3. **Flexibility in Multi-Modal ATMS/ATIS/CHP Subsystems.** This provides the opportunity for a new regional TMC which could include several functions depending upon the arrangement between the involved entities. In fact, it may begin with an ATMS/ATIS/CHP center and evolve to add transit as well as other agencies such as larger local agencies especially for the purpose of incident management. This approach will also provide system management redundancy as well.

4. **Subregional Receives Data through Field "Kernel" or Peer Connection.** This opportunity will allow the interface flexibility for each TMC.

5. **Flexibility of TMC Control of Field Equipment.** Depending upon the pre-arranged opportunities relative to "control" of field units, each TMC may arrange different types of "control" scenarios with various agencies, if any at all. There might be an arrangement (as an example) where during major catastrophes, certain TMCs would provide regional and subregional traffic management.

6. **Flexibility of Dissemination Sensitive to Information Type.** This feature allows different TMCs to focus on various types of information dissemination. For example, a transit TMC may want to disseminate bus schedule information and an ATMS TMC may focus on traffic congestion information. This may be combined and "fused" at a single motorist's ATIS access location (as an example).

7. **Subregional Legacy TMCs Retained. New ones constructed as required. Flexibility for local TMCs. New ones constructed as required. Remaining local agencies will have LTCS.**

8. **Emergency Situation Management.** In the event of an emergency situation, an incident command system (ICS) has been recommended. Incident notification, verification, and coordination/response architecture is provided and harmonized with this overall system architecture.

9. **Redundancy.** This architecture minimizes the likelihood of "regional control" loss due to any individual natural or man-made disaster. The opportunity for redundant communication routes to various TMCs will exist where another TMC can temporarily assume the functions of a disabled TMC.

TMC Implementation

Implementation of this architecture is an evolving process which would build upon the legacy systems. From the "Investment Strategies" certain criteria needs to be established as to when do we respond to a TMC construction funding application? Table 4 illustrates a recommended TMC cost framework where the three TMC levels (local, subregional and regional) as well as LTCS capital cost, number of signals, O&M cost, ATIS, major communication links, multi-modal function, multi-jurisdictional and major activity facility are identified as measures of effectiveness.

Furthermore, the following recommendations are made for MTA's consideration relative to strategic investment for TMCs and associated funding criteria.

A. As part of the existing "Call for Projects" criteria, the applicant should be required to provide an "implementation plan" for TMC capital application, discussing:

   1. Needs assessment for local/subregional/regional TMC
   2. Compatibility with the County-wide architecture
   3. Staffing plan for operation and maintenance of the Center
   4. Initial and "ongoing" training program for O&M staff
   5. System and performance evaluation plan for the Center
   6. Ongoing operations and maintenance cost for the Center
   7. Identify sources for ongoing O&M costs
   8. TMC "start-up" cost, including hardware/software, equipment, design, implementation, integration and training
   9. Institutional and liability arrangements

B. MTA should continue considering funding "core infrastructure" improvements, such as high speed communications and system detection as they have done in the past, however, requiring applicant agencies to comply with area-wide "interface protocols" such as NTCIP and other standards.

C. The procurement strategies should focus on "cost sharing" approach between the MTA and local agencies similar to FHWA, etc., such as the 80/20 formula for capital projects. It should also take into account the prior existing agency involvement.

D. A balanced approach in types of improvements should continue between Tier 1 (basic infrastructure) and Tier 2, 3 and 4 (advanced traffic management and information systems) so that the basic infrastructure would continue to improve while sophisticated systems would be implemented for those agencies that have mature "core infrastructure."

E. There is a need for a comprehensive master plan of communication throughout the County (perhaps through the "Forum Projects" as is already underway) so that careful consideration is given to communication "leased line" vs. "agency owned" for their case-by-case effectiveness. In addition, MTA should consider funding of "high speed communication lines" between local/subregional and regional TMCs for the approved TMCs with communication between subregional TMCs as a high priority.

F. The current MTA O&M policy should be carefully reviewed. Estimated O&M costs for TMCs (such as regional TMC costs estimated at over $1 million dollars per year), constitute significant additional expenditures for an agency operating a new TMC.

G. MTA should consider providing County-wide "technology" upgrades through ATMS/ATIS R&D program conducted by FHWA and perhaps MTA. This should include LTCS, TMC and field unit interfaces as necessary to provide consistency and easy interface area-wide.

H. MTA should plan for integration and data interface of transit information with ATMS/ATIS TMCs.

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TMC COST FRAMEWORK

1. Local TMC	$50,000 to $250,000	up to 400	$50,000 to $150,000	Usually No	• Local TMC to Field Unit • Local TMC to LTCS • Local TMC to Local TMC • Local TMC to Maintenance Yard	Usually No	No	Should exist
2. Subregional TMC	$150,000 to $500,000	over 400	up to $1,000,000	Usually Yes	• Subregional TMC to Field Unit • Subregional TMC to LTCS • Subregional TMC to Local TMC • Subregional TMC to Subregional TMC • Subregional TMC to Regional TMC	Possible	Yes	Usually Yes
3. Regional TMC	over $500,000	Many signals	over $1,000,000	Usually Yes	• Regional TMC to Field Units • Regional TMC to Regional TMC • Regional TMC to other Systems	Usually Yes	Yes	Usually Yes
LTCS	$20,000 to $50,000	up to 200 may control traffic signals and/or may function as an interface between local agency and Kernel	$25,000 to $75,000	No	• LTCS to Field Unit • LTCS to Local TMC • LTCS to LA County Server	No	No	Usually No

APPENDIX A
Definition of Terms

DEFINITION OF TERMS

Field Unit: Devices located at the roadside and used directly or indirectly for transportation management purposes. Examples are: Signal controllers, changeable message signs, CCTV, ramp metering systems, and vehicle detectors.

Local Traffic Control System (LTCS) : A PC-based desktop computer system, including hardware and software, that is capable of remotely controlling and/or monitoring field units. The LTCS could be linked to transportation management centers (TMC), directly or through the Kernel for data/information exchange.

LTCS requires minimal space and operating staff and usually has minimal annual operating and maintenance cost. Capital cost of LTCS, includes hardware and software with a cost of $20,000 to $50,000.

Transportation Management Center (TMC): A central location designed and equipped with transportation management tools including computers, monitors, projectors, etc. TMC serves as a focal point for transportation management and information/data exchange with other agencies. TMC has three levels of sophistication and functionality.

1. *Local TMC:* Local TMC is a center which houses various traffic management systems for controlling the signals and communicating with other agencies within a single jurisdiction or within a number of neighboring jurisdictions as a shared local TMC. Local TMC requires a physical location (approximately 200-300 square feet) and would be linked with subregional TMC's in the area. It requires dedicated time of traffic staff for operating and maintaining the center's equipment.

2. *Sub-Regional TMC:* Sub-regional TMC is a center which functions as a subregional location for controlling/maintaining and data/information gathering and disseminating between local agencies and regional TMC. The subregional TMC's functionality is more comprehensive and requires more operating and staffing time than that of the local TMC. Because of its sub-regionally significant nature, the center could house various systems including ATMS and ATIS, and therefore requires upgrading as technology evolves.

3. *Regional TMC:* Regional TMC is a larger center including the operating room, conference room, equipment room and visitors area and has normally multi-modal functionality. The center is a focal point for information exchange between the subregional TMC's, either directly or through the Kernel. Regional TMC may control and/or monitor traffic on a regional basis such as freeways.

Legacy TMC: TMC's which currently exist, either as a local, subregional or regional.

Kernel: a linkage/processing system which provides integration of new systems into the network and facilitates exchange of data and information between various systems. Kernel could be centralized device with all communication and processing to take place at a single location or distributed interface with various components at various locations.

Advanced Traffic Management System (ATMS): an intelligent system which utilizes advanced technologies for real-time traffic management. It includes real time traffic signal control and may include other ITS functions, such as incident management, changeable message signs, and highway advisory radio.

Advanced Travelers Information System (ATIS): an intelligent system which gathers traffic related information from field elements, other TMC's, and other systems and disseminates information to the public through various devices such as radio/TV media, and in-vehicle devices.

Operation and Maintenance Cost of TMC & LTCS: Operation cost and maintenance cost associated with the TMC and LTCS only. Any cost related to infrastructure, such as communication is not included. However, it does include the cost for staff time and any contract/in-house maintenance expenses for the equipment and devices of LTCS or inside the TMC.

Major Activity Facility: This would be a location which attracts travelers from both local and outside jurisdictions. Examples would include major shopping centers (e.g., Del Amo Mall), sporting event facilities (e.g., Dodger Stadium, Rose Bowl), and major transportation centers (e.g., Los Angeles International Airport, Union Station).

Emergency Services: Include police, fire, ambulance, etc. Emergency services will coordinate with TMCs for both day-to-day emergency responses as well as for major emergencies such as a catastrophic earthquake.

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June 23, 1997

TO: BOARD OF DIRECTORS

FROM: LINDA BOHLINGER
INTERIM CHIEF EXECUTIVE OFFICER

SUBJECT: TRANSPORTATION MANAGEMENT CENTER COORDINATION STUDY

RECOMMENDATION

Approve in concept the Transportation Management Center (TMC) Coordination Study report which provides guidelines including criteria for a capital investment policy and system plan for Los Angeles County TMCs.

ORGANIZATIONAL IMPACT

This action will give local agencies a clear vision of the MTA's direction and assist local jurisdictions when applying for MTA funds for TMCs.

BUDGET IMPACT

There is no budget impact.

ALTERNATIVES CONSIDERED

The alternative considered is to not develop an investment policy and system plan for Los Angeles County TMCs. This alternative is not recommended. This study is the first-ever Los Angeles County plan which provides MTA with specific guidelines for funding multi-modal TMCs, including bus and rail transit, freeways, streets and goods movement. Without this study, MTA would not have a clear vision on how to fund requests made by local agencies for TMCs.

BACKGROUND

For FY 1991 through FY 1999, the MTA programmed over $212 million in capital costs to local agencies for Transportation System Management projects. This funding includes costs for design and implementation of signal systems infrastructure, as well as TMCs and Transportation Operations Centers (TOCs). TMCs and TOCs are centers equipped with the necessary traffic management tools such as computers,

monitors, cameras, etc. to control and/or exchange relevant traffic information between local jurisdictions and the public. TMCs and TOCS can be regional, subregional or local, as well as multi-modal.

The MTA retained Meyer, Mohaddes Associates, Inc. (MMA) to develop a rational basis for allocating its funds for TMCs and TOCs. This study was developed with the direct participation of an Intelligent Transportation System (ITS) Oversight Committee composed of the County of Los Angeles, Caltrans, Cities of Los Angeles, Lancaster, Long Beach and Pasadena.

After a careful review of institutional issues including liability for accidents, lawsuits, etc. and technical issues such as the coordination of agencies' existing traffic control types/systems, the study recommends that MTA allocate its funds towards a distributed network composed of regional, sub-regional and local TMCs along with a network of individual cities' local traffic control computer systems. MTA staff will continue to work interactively with the ITS Oversight Committee and local jurisdictions to implement the guidelines as part of the Call For Projects program.

Prepared by: Susan Jas
Raymond Maekawa

Attachment: Final Draft Executive Summary

JAMES L. de la LOZA
Executive Officer
Regional Transportation Planning & Development

TECHNICAL ADVISORY COMMITTEE

Wednesday, October 2, 1996

MINUTES

TMC COORDINATION STUDY

Sue Jas stated that comments were still being accepted on the scope for this study. The TOC/TMC oversight committee met and made the following recommendations:

- Incorporate language into the introduction of the scope to request that the consultant team consist of both management organizational experts and technical experts in the field of ITS and Traffic Operations,
- Provide a clearer definition of TMC and TOC on the first page, differentiating between functional responsibilities of each type of center,
- Ensure that the study includes an analysis of cities' operations and maintenance costs associated with ITS deployment.

Sue mentioned that Ray Maekawa relayed to the committee that this study focused on developing costs for TMCs and TOCs recommended by the consultant. Therefore, the requested analysis of local level costs would be undertaken in a future study. Sue also stated that the oversight committee was concerned about the communications network; specifically, whether a single or combination of technologies would be evaluated.

Ed Shikada added that the true concern with cost estimates has to do with the overall cost of establishing traffic management centers for the County. For example, the study may assume that by establishing a single traffic management center rather than a network of traffic management centers, there would be some cost savings. However, that premise may be incorrect if the TMCs require information facilities and additional operations costs at the local level to support regional operations. He felt this issue needs to be resolved, either through this effort or a parallel effort to be undertaken at this time. He stated that the TOC oversight committee felt that this is a critical issue that can not be shelved or dealt with later.

TECHNICAL ADVISORY COMMITTEE

July 2, 1997

Draft MINUTES

TMC Coordination Study: Sue Jas introduced the consultant team from Meyer Mohaddes. The TMC study was conducted in coordination with an oversight committee, including some TAC members and other agencies. The consultant reviewed the various alternatives evaluated in the study, which included three general options and eight scenarios. The options ranged from highly centralized to decentralized to hybrid architectures. The report had been sent to TAC previously, and additional background information was distributed.

The consultant reviewed the draft recommendations prepared by the consultant and the oversight committee, and requested that TAC make a recommendation for the Board's consideration, as the TMC report was going to the MTA Board next month.

The issue of maintenance costs was discussed for a centralized versus a dispersed system. A centralized concept would have lower costs, but no institutional/local support. Operations and maintenance costs could range from $50-to-100 million over 10 years for a dispersed system. This estimate included the costs for the centers, not for field elements. It was suggested that the costs for regional versus local expenses be separated. There was a strong consensus for local agencies to have control of their own jurisdictions and for communication and information sharing between systems.

Ed Shikada asked about the relationship of the TMC report to past and future Calls. MTA staff said that the report would provide a framework and criteria for the Traffic Forums, both for projects already funded and for projects to be funded in the future. MTA staff stressed that this was an evolving and developing process, which would continue to be discussed in the Signal Forums and at TAC. Carey Kalscheuer suggested that the MTA coordinate with the Council of Governments on this issue, which MTA staff indicated would happen.

Carey moved that TAC support the staff recommendation in concept and that the MTA involve the Council of Governments in the process. James Biery expressed concern that Downey did not know they were included in the report. Staff indicated that Downey was listed as a possible example, and that the exhibits would be more generic in the next draft. Mr. Biery noted that an endorsement of the staff position meant endorsing the current MTA policy that precludes funding operations and maintenance costs.

Ed Shikada indicated a concern regarding having these new criteria apply to projects already funded and urged flexibility for previously awarded grants. Ed offered an amendment to Carey's motion for the MTA to use flexibility in applying the criteria to previously awarded projects. The motion, as amended, was approved by TAC.