SMART Corridors Program

Project Requirements
Draft Technical Memorandum #1

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1. INTRODUCTION

The SMART Corridors program is a cooperative effort by the Alameda County Congestion Management Agency (CMA), Contra Costa County Transportation Authority (CCTA), and twenty-four other agencies to plan and implement a multi-modal advanced transportation management system along the San Pablo Avenue (I-80) corridor; and the I-880 corridor, which includes International Boulevard, East 14th Street, San Leandro Boulevard/Street, Hesperian Boulevard, and Union City Boulevard.

The goal of the project is to allow the participating agencies to better manage congestion and incidents along regional routes, to improve transportation mobility, efficiency and safety, and provide timely and multi-modal transportation information to agency transportation managers and to the public.

SMART Corridors use a variety of technologies to improve the performance of transportation systems, by promoting efficient use of the existing highway and transit systems, and reducing environmental costs to the public. The application of current and evolving technologies to transportation systems and the careful integration of these functions will provide more effective solutions to multi-modal and regional transportation requirements. The development and successful implementation of this project, and other similar SMART Corridors programs, will serve as a roadmap for long-term direction of Intelligent Transportation Systems (ITS) deployment in the region.

The participating agencies have selected Kimley-Horn and Associates, Inc. to plan, design, and implement the SMART Corridors program for the San Pablo Avenue and I-880 corridors. The project is divided into four phases:

- Phase I – Strategic Plan (Systems Engineering Study);
- Phase II – Design and Preparation of Plans, Specifications and Estimates;
- Phase III – Construction; and
- Phase IV – Integration, Testing and Systems Acceptance.

The current phase of the project will develop a Strategic Plan or Systems Engineering Report to identify and document project requirements and develop detailed design concepts. The Systems Engineering Report will review the current requirements, confirm agency needs, review alternatives, and develop requirements for project design, integration, and implementation. This Technical Memorandum identifies and outlines the overall Project Requirements.

2. PROJECT OVERVIEW

2.1 BACKGROUND

The SMART Corridors program has evolved into a multi-year, multi-phase program which started through cooperative efforts of the local agencies in the San Pablo Avenue and I-880 corridors. Since 1995 there has been a number of major efforts to implement various infrastructure improvements in the corridors and to strengthen the interagency coordination and
cooperation. Six major regional efforts have been undertaken to address the transportation requirements along these corridors, as listed below:

- East 14th Street Signal Interconnect Project;
- Hesperian Boulevard Signal Interconnect Project;
- San Pablo Avenue Signal Interconnect Project;
- Hesperian Boulevard Transit Priority Project;
- Data and Video Exchange Project; and
- San Pablo Avenue Transit Study.

The current project is the continuation of these efforts to further advance the transportation management solutions along the San Pablo Avenue and I-880 corridors.

2.2 PROJECT PARTICIPANTS

The SMART Corridors program has developed into a cooperative effort by a coalition of fifteen communities in Alameda and Contra Costa counties, along with congestion management, regional, state, federal, and transit agencies. There are a total of twenty-six participants in the current SMART Corridors program. The following are the current agencies involved with project:

- Alameda County Congestion Management Agency (CMA);
- Contra Costa Transportation Authority (CCTA);
- West Contra Costa Transportation Advisory Committee (WCCTAC);
- Metropolitan Transportation Commission (MTC);
- Federal Highway Administration (FHWA);
- Federal Transit Administration (FTA);
- California Department of Transportation (Caltrans);
- Port of Oakland;
- AC Transit;
- Western Contra Costa Transit (West CAT);
- Union City Transit;
- Alameda County;
- Contra Costa County;
- City of Alameda;
- City of Albany;
- City of Berkeley;
- City of El Cerrito;
- City of Emeryville;
- City of Hayward;
- City of Hercules;
- City of Pinole;
- City of Richmond;
2.3 GOALS AND OBJECTIVES

The goal of the SMART Corridors program is to allow local agencies to better manage congestion and improve transportation mobility, efficiency and safety along regional arterial routes. SMART Corridors permit efficient operation and management of existing roadway and transit resources through the integration and use of currently available technologies, combined with strengthened institutional ties and inter-jurisdictional coordination.

A draft Concept of Operations plan was prepared by the Metropolitan Transportation Commission (MTC) that identified the goals and objectives of the SMART Corridors program for the San Pablo Avenue and I-880 corridors. The following goals and objectives were identified by the project participants for the two corridors:

Local Arterial Operations

- Improve collection and dissemination of current travel conditions along the arterials.
- Provide accurate and timely information about the corridors to agency transportation managers and to the public.
- Implement traffic responsive signal timing to improve traffic signal coordination and reduce delays along major corridors.

Freeway/Arterial Operations

- Minimize the intrusion of freeway traffic to local streets due to freeway congestion and freeway incidents.
- Proactively manage traffic already diverted from the freeway to minimize its impact on local arterials, and return regional traffic back to the freeway as soon as possible.
- Provide for rapid response to and clearing of incidents on freeways and surface streets.

Transit Operations

- Improve on-time performance of transit service.
- Reduce the travel times for buses.
- Provide accurate and timely bus arrival information.

Interagency Coordination

- Improve sharing of resources between agencies for more unified transportation management operation along the corridors.
- Share traffic information between the agencies to improve coordination and management activities.
3. **CORRIDOR DESCRIPTION**

3.1 **SAN PABLO AVENUE CORRIDOR**

3.1.1 *Arterial Description*

San Pablo Avenue is one of the major travel corridors in the San Francisco Bay Area, and is included in MTC’s Routes of Regional Significance. The corridor is approximately 20 miles long and extends from 17th Street in downtown Oakland to the City of Hercules, through the cities of Emeryville, Berkeley and Albany in Alameda County; and cities of El Cerrito, Richmond, San Pablo, Pinole, Hercules, and unincorporated portions of Contra Costa County (See Figure 1). There are approximately 85 traffic signals along the project corridor. The current (1998) Average Daily Traffic (ADT) on San Pablo Avenue is between 25,000 and 35,000 vehicles per day. San Pablo Avenue is State Route 123 from McArthur Boulevard in Emeryville to Cutting Boulevard in Richmond.

3.1.2 *Transit Service*

San Pablo is a major regional transit route, serving the local and regional transportation systems (See figure 2). AC Transit serves this corridor from Richmond Parkway to downtown Oakland. The corridor also includes Bus Line 72 from Hilltop Mall in Richmond, and Bus Line 73 from Point Richmond to the Amtrak Station in Oakland. In the western portion of the corridor, WestCAT runs Bus Line J from Richmond Parkway to the Transit Center, near Highway 4. Current bus service in the corridor carries close to 14,000 daily riders.

3.1.3 *Freeway Description*

I-80 is a major regional freeway extending from downtown San Francisco to the City of Sacramento. I-80 is an eight-lane freeway in this section, with existing High Occupancy Vehicle (HOV) lanes in both directions. Currently there are no ramp meters on I-80 along this segment of the freeway. The existing (1998) ADT on I-80 is between 115,000 and 260,000 vehicles per day.

3.1.4 *Arterial to Freeway Connectors*

Arterial to freeway connectors are those roadways that connect San Pablo Avenue to I-80 and are suitable for regional traffic traveling between the two corridors. These roadways are listed as follows:

- John Muir Highway in Hercules;
- Richmond Parkway in Richmond;
- San Pablo Dam Road in San Pablo;
- Cutting Boulevard in Richmond;
- Portero Avenue in El Cerrito;
- Central Avenue in El Cerrito;
- Buchanan Street in Albany;
- Gilman Street in Berkeley;
- University Avenue in Berkeley;
- Ashby Avenue in Berkeley/Emeryville; and
- Grand Avenue in Oakland.

There are a total of 27 signalized intersections along these connector arterials between San Pablo Avenue and I-80, exclusive of the signalized intersections on San Pablo Avenue on each of the connectors. Depending on the budgetary considerations, the most important arterials that could serve the SMART Corridor transportation management plans should be identified and included in the current program.

There are several additional roadways in the corridor that serve local traffic including Pinole Valley Road, Appian Way, Road 20, and Powell Street. These roadways are not suitable for the SMART Corridor transportation management application, and are intended primarily to serve the local traffic patterns.
SEE FIGURE 1
SEE FIGURE 2
3.2 I-880 CORRIDOR

3.2.1 Arterial Description

The arterials along the I-880 corridor consist of International Boulevard, East 14th Street, San Leandro Boulevard/Street, Hesperian Boulevard, and Union City Boulevard. These arterials form a major regional route in the southern portion of Alameda County. The corridor is approximately 18 miles long and parallels Highway 880 from downtown Oakland to the City of Union City. The corridor begins in West Oakland near 14th Street, and extends south to the City of Union City (See Figure 3). In the City of San Leandro, the corridor changes name to East 14th Street. In addition, San Leandro Boulevard/Street connects to and extends parallel to East 14th Street from 42nd Street to 136th Avenue, serving the regional traffic to the I-880 freeway. East 14th Street extends to the City of Hayward, through unincorporated areas of Alameda County, to intersect Hesperian Boulevard. Hesperian Boulevard extends south to the City of Union City, where it changes name to Union City Boulevard. In addition, as a transit route for this project, East 14th Street extends to the Hayward BART station as described in the next section. East 14th Street is also State Route 185 from 14th Street to Jackson Street.

There are 102 traffic signals along the corridor, including 16 traffic signals south of Hesperian to Hayward BART station and 17 traffic signals along San Leandro Boulevard/Street. The current (1998) ADT on the I-880 arterials is between 15,000 and 40,000 vehicles per day.

3.2.2 Transit Service

International Boulevard/East 14th Street, and Hesperian Boulevard are major transit routes, serving the local and regional transportation systems (See Figure 4). AC Transit serves this corridor from West Oakland to the Hayward BART Station, along International Boulevard/East 14th Street, and from the Bay Fair BART Station to Alvarado Nile Road in Union City, along Hesperian Boulevard. Bus Line 82 follows the corridor along International Boulevard/East 14th Street and Route 97 along Hesperian Boulevard. The southern portion of the corridor is served by Union City Transit including Bus Line 3.

3.2.3 Freeway Description

I-880 is a major regional freeway extending from Santa Clara County to I-80. I-880 is an eight-lane freeway, with existing high-occupancy vehicle (HOV) lanes along portions of the freeway. Ramp meters have been installed and are operational along the entire length of I-880 in Alameda County. The ADT on I-880 is between 174,000 and 243,000 vehicles per day. I-880 is also a major intermodal and truck route, serving the Port of Oakland and the industrial areas in West Oakland.
SEE FIGURE 3
SEE FIGURE 4
3.2.4  Arterial to Freeway Connectors

Arterial to freeway connectors that connect International Boulevard/San Leandro Boulevard/Street, Hesperian Boulevard, Union City Boulevard and I-880 are listed as follows:

- 42nd Avenue in Oakland
- 66 Avenue in Oakland
- Hegenberger Road in Oakland
- 98th Avenue in Oakland
- Davis Street in San Leandro
- Marina Boulevard in San Leandro
- Washington Boulevard in San Leandro
- "A" Street in Hayward
- Winton Avenue in Hayward
- Highway/92 Jackson in Hayward
- Tennyson Road in Hayward
- Industrial Parkway in Hayward
- Whipple Road in Union City
- Alvarado-Niles/Smith Street Boulevard in Union City

There are a total of 45 signalized intersections along these connector arterials between I-880 and International Boulevard, East 14th Street, San Leandro Boulevard/Street, Hesperian Boulevard, and Union City Boulevard, exclusive of the signalized intersections on the regional arterial on each of the connectors. Depending on the budgetary considerations, the most important arterials that could serve the SMART Corridor transportation management plans should be identified and included in the current program.

4. Top Level Design

This report focuses on identifying requirements for major components or functions of the SMART Corridors described in the previous section. The discussion that follows will briefly describe each element and identify technologies that could be considered for implementation. As the project progresses through the detailed concept design, conceptual plan and design, additional details will be presented to further define the recommendations of each component. The emphasis here is to familiarize the reader with each component of the system, the interrelation between the different components to form a SMART Corridor system, to and present initial project requirements. The final design concept will be based on the available funding and the SMART Corridor transportation management capabilities desired by the agencies. During the detailed concept design phase, specific elements that are beyond the budgetary limitation of the current project will be identified and prioritized for the long-term Implementation Plan.
The focus of the current project will be placed in developing the initial framework for SMART Corridor management plans and installation of SMART Corridor field and central elements, rather than basic infrastructure improvements.

4.1 DATA COLLECTION

The SMART Corridors program requires the collection of volume and speed data for the arterials within the SMART Corridors. This data will give operators and other users complete information on the status of traffic congestion and traffic flow and serve as indicators as to the use of all the other devices and applications in the system.

Data will be collected in the form of numerical and visual information. Numerical information is gathered through vehicle detection equipment; visual information is gathered through video from the closed-circuit television (CCTV) cameras.

4.1.1 Vehicle Detection System

There are several different technologies that can be used to identify vehicles on the system. In-pavement loop detectors identify vehicles using an electrical current and identifying when an object breaks the magnetic field created by the electrical current. There is growing concern about the use of in-pavement, or intrusive, detection due to high maintenance requirements and low reliability over time; however, data collected from loops still seems to be the most accurate when compared to non-intrusive detection.

Due to pavement management and lane closure issues associated with the installation of inductive loops, non-intrusive vehicle detection is rapidly becoming the detection method of choice. While non-intrusive detection can not currently match the accuracy of an inductive loop, they offer the advantage of relatively easy installation and maintenance. The reduced accuracy has minimal impact on traffic control.

The most common non-intrusive detectors use either radar (RTMS – Remote Traffic Microwave Sensor), sound (PADs – Passive Acoustical Detectors), or video (VIDs – Video Image Detectors), to detect and classify vehicles. The technologies are continually being refined in an effort to provide more accurate and reliable data. Each technology also has advantages and disadvantages related to the other but none has yet to emerge as the clearly superior technology. An application has to be carefully evaluated to determine the most appropriate technology.

4.1.2 Closed-Circuit Television Cameras

CCTV systems provide remote ability to visually confirm an incident and its impact, and monitor general traffic conditions. With this ability in place, agency staff can quickly determine the appropriate action needed to mitigate traffic impacts when an incident occurs as well as provide valuable information to appropriate emergency service providers and other agencies. CCTV can also provide verification of dynamic message sign (DMS) messages, improve roadway safety, and increase information sharing with the media and the public.
CCTV cameras can be standard color or Digital Signal Processing (DSP) format. The standard color camera provides basic functionality at an economical cost. A DSP camera is a more expensive option but offers additional functionality including digital zoom, low light sensitivity, and the ability to superimpose text over the video image. Either format is available with different types of lenses.

### 4.1.3 Recommended Data Collection Requirements

For the SMART Corridors being developed on this project, the use of non-intrusive detection is recommended. Speed and volume data will be collected at midblock, ramp, and cross street locations, with consideration to collect additional data at intersections. Existing loops will be integrated into the design, if feasible, and non-intrusive sites will be added to achieve an appropriate spacing between collection points.

CCTV cameras will be installed at major intersections along the corridors. To minimize maintenance needs and concerns over privacy issues, fixed cameras are more appropriate for arterial installation. These cameras will include built-in zoom functions to provide the required visibility and range of view, and would provide adequate coverage for the corridor. For fixed cameras, one camera would be needed for each leg of the intersection. In addition, the Video Image Detection camera unit can also be used for viewing functions. The appropriate camera functions will be determined as the design progresses.

Caltrans has existing CCTV cameras on I-80 and I-880 within the project limits. Some of those cameras can be used, to view portions of the arterials and provide information on the freeway conditions. The use of Caltrans CCTV will be explored during the detailed design phase of the project. The control and maintenance of the equipment will remain with Caltrans.

### 4.2 INFORMATION DISSEMINATION

Once the information is collected and processed, there is a requirement to disseminate the information back to drivers. If the information is critical and needs to be given to drivers immediately due to an incident, en-route information can be disseminated with Dynamic Message Signs (DMS), Highway Advisory Radio (HAR), and Highway Advisory Telephone (HAT) to inform drivers of the current conditions and suggest alternate routes. Information displayed on an Internet web site or kiosk can display the same traffic information to be used by drivers for pre-trip information. Other non-critical traffic information can also be displayed on a web site or kiosk.

#### 4.2.1 Dynamic Message Signs (DMS)

DMS will provide real-time advisory information such as incidents, special routing, construction and maintenance activities, and road closures to en-route travelers in advance of a traffic situation.

DMS sign technologies to be considered include:
- Blank-out;
- Two-state;
- Fiber optic shuttered;
- Light-emitting diode;
- LED flip-disk;
- Light-reflecting disk;
- Light bulb matrix;
- Fiber optic shutterless; and
- Fiber optic flip-disk.

DMS use a character, line or full matrix design as a basis for displaying a message. A character matrix has pixels grouped to display a single character, and a line matrix is a pixel matrix across a continuous line. A full matrix configuration has pixels continuously along rows and columns covering the entire sign display. The full matrix sign has the advantage of being able to display graphics.

DMS for use on arterials are considerably smaller than the freeway signs and are appropriately designed to consider the driver visibility and the aesthetic requirements for deployment along arterials.

4.2.2 Highway Advisory Radio

Highway Advisory Radio (HAR) provides traffic information, via AM radio, to travelers in their vehicles. Upstream of the HAR signal, users are instructed by Extinguishable Message Signs (EMS) or roadside signs to tune their vehicle radios to a specific frequency. Information is typically relayed to the users by a pre-recorded message, although live messages can also be broadcast.

Message transmissions can be controlled either on-site or from a remote location through telephone or radio interconnects. The majority of HAR systems operate at the 530 or 1,610 kHz frequency level; however; any available frequency can be used as long as a low power level is used. A license from the Federal Communications Commission (FCC) is required to operate an HAR system at high power levels (10 watts or greater).

With respect to traffic management, the types of information communicated via HAR are similar to those conveyed using DMS, including:

- Warning of roadway incidents or congestion;
- Warning of adverse weather conditions;
- Notification of roadway construction or maintenance;
- Alternate route information;
- Advisories within and regarding transportation terminals, such as Oakland Airport, and
- Advisories for special events, such as planned activities near the Coliseum.
4.2.3 Highway Advisory Telephone

Highway Advisory Telephone (HAT) provides essentially the same information as HAR, with the exception that prerecorded traveler information is made available by telephone. The existing regional advanced traveler information system, TravInfo® 817-1717, is an example of the HAT. In the future with the new Federal Communications Commission (FCC) ruling on the nationwide 511 traffic information number, this number will be available to provide traffic information. This service is anticipated to be provided by TravInfo®.

4.2.4 Web Access/Kiosks

An Internet web site should be developed to provide specific information on freeway and arterial conditions along these corridors. The site could be linked to regional traffic information, including TravInfo® and Caltrans. Potential information available on this web site could include real-time video feeds, traffic flow conditions, bus arrival information, and other pertinent information that would be useful at a kiosk. The TAC will determine the most appropriate domain name for the web site. The Internet web site will provide the information displayed on the kiosk.

Information kiosks should be installed at selected transit stations, BART stations, and in selected public areas. These kiosks will be similar to those installed elsewhere in the region but will contain additional information that may include transit schedules, arrival times, vanpool/carpool information, and bicycle information.

4.2.5 Video Streaming

Video streaming is a cost effective and bandwidth friendly approach to video dissemination. The project requirement is to use video to monitor traffic flow at selected sites along the corridors. Monitoring the flow and movement of cars at 30 frames per second (which is the NTSC standard) may not be required. In reality, 8 to 12 frames per second is more than adequate to monitor and sense the movement of vehicles along the corridors. Video streaming technology is based on software and hardware that compresses the video and senses the availability of bandwidth and streams the video at a variable number of frames per second to the users. The main advantage of video streaming is cost. Transfer of NTSC’s 30 frame per second over a Wide Area Network (WAN) requires several megabytes of bandwidth, which is very costly. The video streaming technology is emerging as the standard for the Internet-based video exchange.

Another project requirement is to have the ability to make the video available to the public over the Internet. Streaming video is the standard for video exchange; therefore, the effort required to meet the final requirement of dissemination of video to the public would be minimized.
4.2.6 Recommended Information Dissemination Requirements

Video streaming is recommended as the means to deliver real-time traffic information to the transportation managers and to the public. The video speed for both the agency participants and the public will be established based on detailed communications cost estimates.

DMS should be designed for the SMART Corridors to provide real-time traffic information to the public. However, it is recommended that the current plan include only a limited deployment of DMS on the arterials (potentially two DMS per corridor) to evaluate the impacts and effectiveness of having traffic information available on the arterials. Caltrans has existing DMS on the freeways along these corridors that are currently providing real-time freeway information to drivers. These existing dynamic message signs can potentially be used for the SMART Corridors application through project agreements. Operations and maintenance of the DMS will remain with Caltrans.

New Highway Advisory Radios are not recommended with the current program. Broadcast messages can be handled by the existing Caltrans HAR through procedures developed by project participants. After an evaluation of the effectiveness of HAR operation, additional HARs can be considered along the arterials for future phases of the project.

New Highway Advisory Radios are not recommended for the current project. This service should be provided by TravInfo through the existing 817-1717 and future 511 program.

Kiosks should be installed at selected transit stations and public areas and will contain information related to bus schedules, transit schedules, and other traffic information. The kiosk display will be an Internet web site format. The same information will be provided on a public Internet web site for pre-trip planning. Video streaming will also be displayed on the web site with video from the CCTV cameras in the SMART Corridor.

Other methods of information dissemination may be applicable. Development of the SMART Corridor program will include an evaluation of other communication media including radio or cable television. The agencies should consider developing agreements with the media to provide real-time traffic information for public use.

In addition, the agencies should consider developing a Logo and an Identity Name for the program to promote the use of the information by the public as the system is implemented and becomes operational.

4.3 SIGNAL COORDINATION

Improved signal coordination is another requirement for the project. Signal coordination will be used to improve flow along these arterial corridors during heavy traffic periods and will be used for traffic management during incidents. To accomplish signal coordination, traffic signals along the corridors and the signals on the arterial to freeway connectors should be interconnected so all signals can be controlled and the optimal timing plan for the corridors can be used. Signal timing at each intersection can be modified to accommodate the traffic demand during recurring congestion and incidents.
4.3.1 **Signal Interconnect**

Traffic signals should be interconnected using either wireline or wireless communication. A wireline interconnect can be accomplished with copper (twisted wire pair); a wireless system could be microwave, spread spectrum, or cellular telephone. Spread spectrum is a cost effective method to complete any existing gaps in the interconnect system. The interconnected system of traffic signals will allow an agency, or agencies, to monitor the conditions at multiple signals, and modify the timing plans to improve overall traffic flow along the corridor.

4.3.2 **Signal Control Systems**

Through prior or currently on-going projects, new signal control systems have been installed for all agencies in the corridor. Each agency will retain the existing signal control system and maintain its own traffic management activities. Data from each system will be shared through the common data exchange platform to other participating agencies. This effort is currently underway and will be completed soon. Additional signal control systems are not anticipated with the current project.

4.3.3 **Signal Timing**

Once the traffic signals are interconnected, the timing plans for each intersection will be modified to optimize the traffic flow along the entire corridor. When traffic diverts off the freeway to the arterial corridor, modified timing plans can allow for longer turning movement green time or longer through green time in an attempt to build a larger platoon of vehicles that progress along the arterial route, and return the traffic to the freeway at the earliest possible connector arterial. If the progression of vehicles improves along the arterial route, the delay along this corridor can be reduced.

4.3.4 **Recommendation Signal Coordination Requirements**

Most of the traffic signals within the SMART Corridors are already interconnected. The focus of this project will be to review the condition and operation of the existing signal interconnect infrastructure, and evaluate and modify the current signal timing parameters for incident management operations. New equipment and interconnect will be added where needed, using spread spectrum technology, whenever possible, to minimize infrastructure construction costs.

Since new timing plans have recently been installed on San Pablo Avenue, more emphasis should be placed on the Hesperian Boulevard, San Leandro Blvd/Street, East 14th Street, and the connector arterials to the freeways. New timing plans will be required for the incident management functions along the connector arterials to the freeways.
4.4 INCIDENT DETECTION AND MANAGEMENT

Another project requirement is incident management. Using information collected by the vehicle detection and CCTV cameras, the information can be processed to identify if an incident has occurred. An agency can use information about the incident to determine what actions need to be taken to respond to and manage an incident, as well as manage the congestion that results from traffic diverting around an incident on the freeway to the arterial system.

4.4.1 Detection and Verification

Using one of the vehicle detection technologies described earlier in this report, collection of volume and speed data is required at key locations along the freeway and arterials. Using an incident detection algorithm, which will be defined at a later date, speeds and volumes can be compared against historical figures to identify a change in flow pattern in the existing traffic. This change in flow could represent a potential incident.

Operators responsible for monitoring potential incidents will use the CCTV cameras in the vicinity to verify and confirm whether an incident has occurred. If there is an incident, predetermined incident management strategies can be employed to redirect and advise drivers to keep them informed of anticipated delays and alternate route conditions.

4.4.2 Management and Coordination

When an incident has occurred, the incident management strategies will help advise drivers of the anticipated delays using DMS, HAR, or HAT. The messages can tell drivers where an incident is, how long the delays may be, and what routes serve as the best alternates. Drivers can then make informed decisions on which route they take.

Another management technique, as described earlier, is modifying the signal timing along the corridors and the arterial to freeway connectors to improve the traffic flow during incidents. The revised signal timing should give priority to the alternate traffic route that is most impacted when an incident occurs. Signal progression should be modified along the corridor in an effort to clear more vehicles and not allow the arterial service to break down due to increased traffic.

4.4.2 Emergency Pre-emption System

Emergency Pre-emption system includes the transmitter and detection units on emergency response vehicles and traffic signals to request and authorize priority treatment for emergency vehicles. The traffic signal will provide a priority treatment in the direction of the emergency vehicle when a request has been validated. Pre-emption systems will allow the emergency service providers to respond faster to incidents, saving lives, and minimizing congestion.

The pre-emption equipment also includes functional capabilities for transit priority and transit vehicle identification systems that can be utilized as described in the Transit Enhancement Section.
4.4.3 Recommended Incident Detection and Management Requirements

In the initial deployment of the SMART Corridors, there will not be an extensive incident detection and management program. There will, however, be a strategic plan developed for an incident detection system for the arterials, and for developing a program for coordinated incident management between agencies. Agencies including CHP, emergency response, local enforcement, and each jurisdiction should consider developing a unified program for incident management operations along the corridor in the future.

CMA has recently awarded a contract to install new pre-emption equipment along San Pablo Avenue. With this project, most of the traffic signals in the corridor will be equipped with the emergency pre-emption system. However existing gaps in the system should be completed to provide a continuous emergency response operation along the corridor arterials. In addition, the existing pre-emption equipment should be upgraded to provide both the transit priority and transit vehicle tracking capabilities, as discussed in the Transit Enhancement Section.

4.5 FREEWAY/ARTERIAL OPERATIONS

Once the field devices and communications network are in place, the freeway and arterial system should operate as a single coordinated system. Even though the freeway and arterial systems may be individual systems, it is desirable that both systems communicate current conditions and management strategies. Neither system will be effective if a strategy is implemented on one part of the system that causes congestion on the other part of the system.

4.5.1 Ramp Metering

Ramp metering is an operational technique for restricting freeway access and is proven to improve freeway speeds and reduce accidents at merge sections by regulating the number of vehicles entering the freeway. By essentially breaking up a platoon of vehicles entering the freeway, a ramp metering system appropriately limits the demand to prevent capacity reduction on the freeway. Ramp metering has been effective in reducing the number drivers using the freeway for short trips (less than three miles).

Ramp metering can be set to fixed-time or traffic-responsive operation. Under fixed-time operation, the metering rates are predetermined based on a warrant analysis using guidelines published by Caltrans. During operation, the metering rate does not change unless adjusted by an operator. For traffic-responsive operation, the metering rate can change according to current traffic conditions on the freeway. Heavy traffic will slow down the metering rate, while free flow traffic will increase the rate or turn off the meter. Studies have shown that metering rates are most effective when the ramp meter cycle is operating between 4 and 15 vehicles per minute for a single lane ramp meter.

4.5.2 Freeway Operations

Although the focus of this project is on the arterial corridors, monitoring freeway flow conditions is an important function of managing the overall system. When an incident occurs on the freeway, vehicles will naturally exit the freeway and use the arterial system.
It is essential to be informed when an incident has occurred, and have a strategy ready for accommodating the increased demand on the arterial. The following discussion identifies some key operational components related to the interaction between freeway and arterial operations.

4.5.2.1 Incident Detection

As discussed previously, incident detection is a crucial function of SMART Corridors. When an incident occurs on the freeway, traffic will naturally divert to the arterial system. Freeway management operators will use CCTV cameras to judge incident severity and determine impacts to traffic.

As traffic diverts off the freeway and onto the arterial system, it is important for every agency impacted by an incident to be aware of the changing traffic patterns and take necessary measures to participate in monitoring and managing the incident through their jurisdiction. Using the components and devices to be implemented along the SMART Corridors, delays along the arterials can be minimized as drivers bypass the incident.

MTC's TravInfo® program is in the process of expanding the data coverage on the freeways to develop a comprehensive speed and incident data on the freeways, including the I-80 and I-880 corridors.

4.5.2.2 Motorist Assistance Program

A motorist assistance program, or Freeway Service Patrol (FSP), currently patrols the freeways and responds to various types of incidents. The FSP assists in clearing incidents, determining roadway repair needs, assisting disabled motorists, and coordinating response efforts with other agencies. One of the potential measures will include an expansion of the program to the arterials as a part of the SMART Corridors program.

Another motorist assistance program could include expansion of the roadside call boxes along the arterial corridors to provide better access to the public. MTC already operates freeway call boxes along the I-80 and I-880 corridor. This project could expand the service to the arterials.

4.5.2.3 Local Coordination

All jurisdictions and agencies that fall within this corridor need to have some participation in operating, managing, and maintaining components of the SMART Corridors. Each agency needs to monitor traffic conditions along the corridor to implement, support, and utilize the enhanced components of the system. Considering the local agencies staffing limitation, it is important that the operations and management of the system does not place additional burdens on the agencies. The operational plans for the project will be developed during the next phase of project delivery.
4.5.3 Recommended Freeway/Arterial Operations Requirements

In order to provide comprehensive information on the freeways as well as the arterials in the corridor, it is recommended that the SMART Corridor program explore the possibility of obtaining freeway speed and congestion information from the TravInfo® program. Since the TravInfo® program will be developing freeway speed information, this information can be shared with the SMART Corridor project participants.

Ramp metering on freeway entrance ramps exists on I-880 as part of Caltrans’ Freeway Operations System, but there will be no interfaces to Caltrans Ramp Metering system as part of the SMART Corridors program. The ultimate plan for the SMART Corridors program will address the future needs for integration with the ramp metering system.

To address motorist assistance, the SMART Corridors program could include a plan for expanding the Freeway Service Patrol and Call Box program to the arterials. Call boxes on the arterials would likely be located at transit stations. The expansion of the Freeway Service Patrol and Call Box programs should be explored with MTC.

A strategy for coordinating local agency involvement will be outlined in this project. Many functions of the system including operations and maintenance will overlap to several jurisdictions, and the responsibilities of each agency will be formalized as part of this project.

4.6 TRANSIT ENHANCEMENTS

Accommodating multiple modes of travel along these SMART Corridors is important to the overall project objectives. There are several transit routes along the corridors. Priority needs to be given to these routes to improve the transit service in the corridor. The following discussion identifies methods or applications that can help maintain and enhance the transit services within the SMART Corridors.

4.6.1 Transit Routes

The following transit routes service portions of the SMART Corridors:

- Routes 72 and 73 from Richmond to Downtown Oakland;
- Route J from El Cerrito/Del Norte BART Station to Hercules Transit Center;
- Route 82 from West Oakland (14th Street and Broadway) to Hayward BART Station;
- Route 97 from Bay Fair Mall/BART Station to Alvarado Niles; and
- Route 3 from Union Landing to Union City BART Station in Almaden.

4.6.2 Transit Priority

Transit priority systems are methods to request an early green phase of an extension of green phase by a transit vehicle. Transit priority requests can be issued based on simple request or pre-established criteria, such as schedule adherence and real-time transit vehicle ridership information. With the schedule adherence criteria, the location of buses can be
established through the Automatic Vehicle Locating (AVL) or Automatic Vehicle Identification (AVI) technologies. With the transit vehicle ridership criteria, the level of ridership can be established with on-board Automatic Passenger Counter (APC) units. The combination of the schedule adherence and ridership information can then be used to determine if the green phase should be extended or adjusted to give preference to the transit vehicle. The transit priority request will be processed through the pre-emption equipment.

Currently, AC Transit is in the process of deploying the AVL system through a contract with Orbital Sciences. Depending on the schedule for completion of this contract, it may not be feasible to interface with the Orbital Sciences system. Alternate methodologies, such as those available with the pre-emption vehicle tracking system could be explored for an intelligent transit priority application.

4.6.3 Schedule Adherence

Transit vehicles must maintain a relatively consistent schedule to be a reliable source of transportation. Using transit priority or other measures to ensure that transit vehicles maintain a consistent schedule will improve transit service within the SMART Corridors. By using Automatic Vehicle Locating (AVL) technology, transit vehicles can be tracked along a scheduled route and given priority at the traffic signals to reduce delay. Information collected from the AVL device can give a vehicle’s location with respect to its scheduled location; and identify an approximate arrival time to any given transit station.

4.6.4 Bus Arrival Information System

A Bus Arrival Information System (BAIS) utilizes information gathered from the AVL or bus identification system, and displays location and arrival time information on small message boards, kiosks, or web sites. Riders can modify their trip based on information displayed at a transit station or on a kiosk or web site. BAIS system can also include prediction models to estimate the arrival time of the buses, based on historical information and real-time arterial congestion information.

4.6.5 Recommended Transit Enhancement Requirements

Design of the SMART Corridors will include provisions for installing equipment that will make it possible to provide transit priority, vehicle identification, and equipment for a Bus Arrival Information System (BAIS).

The strategy for this project is to address the desire to expand this technology beyond emergency service and apply it to transit vehicles. The objective on this project is to gain concurrence with all stakeholder agencies to use priority technology. In addition, the project should consider Caltrans transit priority requirements and software capabilities for intersections along the State routes.

An arrival prediction model will be required to develop the BAIS system. The arrival information could be made available to the transit users at the transit stops and at home, through project web site and kiosks.
The AVL and Schedule Adherence interface should be explored with transit agencies to determine if these components can be incorporated in the current design or should be included in the future Implementation Plan.

5. **INSTITUTIONAL ISSUES**

Multi-agency SMART corridor programs need to successfully address a variety of institutional barriers to strengthen the inter-agency coordination and cooperation. The key to the success of these programs is in developing strong and effective working relationships between the participating agencies. Through prior efforts by the Metropolitan Transportation Commission (MTC), Alameda County Congestion Management Agency (CMA), Contra Costa Transportation Authority (CCTA), and West Contra Costa Transportation Advisory Committee (WCCTAC), Concept of Operations reports have been prepared and approved for both the San Pablo Avenue and I-880 Smart corridors. The Concept of Operations reports have addressed the institutional and the operational issues involved with the project.

5.1 **PROGRAM DEVELOPMENT**

The current SMART Corridors program is sponsored by the joint effort between the CMA, CCTA, and WCCTAC. The three regional transportation management agencies have worked cooperatively to obtain $8.65 million in federal, TFCA, STIP, and ITS Integration Earmark funding for design, deployment, and integration of the SMART Corridors program. An additional $1.8 million has also been secured for operations and management of the SMART Corridors program. As the lead agency, the CMA is providing the project management and project coordination.

5.2 **PLANNING AND OVERSIGHT REVIEWS**

All of the planning and oversight aspects of the project are expected to be managed and approved by the SMART Corridor Technical Advisory Committee (TAC), consisting of staff members for all participating agencies, with oversight by the I-880 Policy Oversight Committee (POC) and the San Pablo Avenue Policy Advisory Committee (PAC), consisting of elected officials for the agencies along the I-880 and San Pablo Avenue corridors. In addition, the project is expected to be coordinated with the existing I-880 Technical Working Group (TWG) and the San Pablo Avenue Technical Advisory Committee. The Policy Oversight and Advisory Committees are responsible for formulating the policy and institutional issues pertaining to the SMART Corridor projects and specifically approve policy issues and update the members’ governing boards on the status and issues of the project. The Policy Oversight and Advisory Committees will also direct the SMART Corridor Technical Advisory Committee. The Technical Advisory, Policy Oversight, and Policy Advisory Committees will meet on an as-needed basis to fulfill their responsibilities. Figure 5 shows the relationships of the committees.
FIGURE 5
SMART Corridors Technical and Policy Committees

CMA Board,
Local Agencies and
Board of Directors

I-880
Policy Oversight
Committee

SMART Corridors
Technical Advisory
Committee (TAC)

San Pablo Avenue
Policy Advisory Committee

San Pablo Avenue
Technical Advisory
Committee

I-880 Technical
Working Group

Alameda County Congestion Management Agency
Contra Costa Transportation Authority
West Contra Costa Transportation Advisory Committee
Metropolitan Transportation Commission
Federal Highway Administration
Federal Transit Administration
California Department of Transportation
AC Transit
West Contra Costa Transit
Alameda County
Contra Costa County

City of Albany
City of Berkeley
City of El Cerrito
City of Emeryville
City of Hayward
City of Hercules
City of Pinole
City of Richmond
City of Oakland
City of San Leandro
City of San Pablo
City of Union City
5.3 DESIGN, CONSTRUCTION AND IMPLEMENTATION

The SMART Corridors program will require an integrated approach to the design, deployment and integration of the system components. For this reason, the CMA, on the behalf of project participants, is coordinating the preparation of the contract documents. The CMA should also lead the effort to provide construction administration for the project, with the oversight of the local agencies. The integration and implementation of the system components is planned through the current contract with Kimley-Horn and Associates.

5.4 PROJECT AGREEMENTS

A Memorandum of Understanding (MOU) has been adopted for the San Pablo Avenue corridor, which has strengthened the institutional ties and cooperative effort for this corridor. A copy of the MOU is included in the Addendum. The San Pablo Avenue MOU has demonstrated the success of the regional transportation management vision for collaborative programs. The current MOU is comprehensive to address the overall transportation management plans for the corridor and no changes are needed.

A similar MOU was drafted for the I-880 corridor, which was circulated with the I-880 Concept of Operations report. A copy of the I-880 Smart Corridor MOU is included in the Addendum. Similar to the San Pablo Avenue, this MOU should solidify the goals of the agencies for effective and cooperative transportation management activities in the corridor.

The current project should develop an Agreement for Construction and Management (Maintenance) of the SMART Corridor components. This agreement will delegate the responsibility for construction of the current SMART Corridor elements to the Alameda County CMA. Similar to the planning and design contract, the Alameda County CMA will provide project management services and administer the construction of the improvements. The agreement should also consider future operational costs, and develop a cost-sharing plan to consider these requirements.

In addition to the MOU and Agreement for Construction and Management, Operational Procedures will be required for the project. The Operational Procedures will include on-going activities, such as signal timing operations, messaging for dynamic message signs, transit priority operations, and incident management programs. These procedures are operational in nature and formal agreements are not necessary at this stage of the project. The Operational Procedures should be developed at the SMART Corridor TAC level with oversight from the Policy Committees.
5.5 DEPLOYMENT, OPERATIONS AND MANAGEMENT

The SMART Corridors program should strengthen the institutional ties and cooperation in order to fulfill the goals of the program. To accomplish this goal, the following operating principles are recommended:

- Each agency should continue to plan, develop, implement and operate its own transportation management systems.
- Each agency should retain control of the transportation management system in its own agency, including the SMART Corridor components.
- The SMART Corridors program should provide additional equipment and functionalities to enhance the effectiveness of each agency's transportation management program. The local agencies will own and operate the SMART Corridor components constructed in their jurisdiction.
- The SMART Corridors program should enable the agencies to share real-time information to better manage their transportation assets, and provide the capability for implementing unified operations, if desired.
- The participating agencies should develop a program to utilize existing and planned infrastructure, information and resources deployed by partner agencies to reduce regional transportation deployment costs and increase the effectiveness of the regional transportation management activities.
- The participating agencies should develop procedures for coordination and operation of their transportation management systems, including the SMART Corridor components. These components should include, but not be limited to, data collection, information dissemination, signal coordination, incident detection and management, freeway/arterial operation, transit service and transit priority systems and components.
- The participating agencies should develop a program to maintain and manage the SMART Corridor components in an acceptable operational condition. A cost-sharing plan should be developed to address the on-going maintenance and operations costs of the SMART Corridor system components.
- Where appropriate and based on the local agency's desire and interest, the participating agencies can delegate operations and maintenance of the SMART Corridor components to other agencies as appropriate. For example, the operations of the dynamic message signs (DMS) could be delegated to another agency.
- CMA, CCTA, and WCCTAC should continue to identify and secure additional funding for expansion and maintenance of the system components, including the communication costs.
- The participating agencies should develop a plan to inform the public about the program and encourage the use of the information for trip planning and other transportation activities.
Addendum
Memoranda of Understanding
This Memorandum of Understanding (MOU) recognizes that San Pablo Avenue is an important regional route, and provides important local access to commercial and other activities in each of the jurisdictions it serves. As a regional route, there is a need to provide efficient traffic operations across jurisdictional boundaries. Because of the importance of San Pablo Avenue to the local economies, each local jurisdiction will retain the authority to control its own transportation systems, including the operation of traffic signals.

The purpose of this MOU is to acknowledge the agreement of all participating agencies to commit to work cooperatively to improve the management and operation of the San Pablo Avenue Corridor’s transportation systems. This MOU is not a legally binding contract – it constitutes solely a guide to the intentions and policies of the participating agencies.

This MOU sets forth the roles and responsibilities of the participating agencies in the development, implementation and maintenance of intelligent transportation system projects. The MOU is not intended to authorize funding. Commitments providing for the payment of funds or authorizing specific work phases will be covered by one or more separate agreements.
Responsibilities

San Pablo Avenue Policy Advisory Committee: The Policy Advisory Committee consists of elected representatives of the cities and counties along the corridor and representatives of AC Transit, MTC, and Caltrans. The Policy Advisory Committee is responsible for formulating the policy and institutional issues pertaining to the San Pablo Avenue and specifically approved transportation projects and updating the members’ governing boards on the status and issues of the project. The Policy Advisory Committee will also direct the Technical Advisory Committee. The Policy Advisory Committee will meet on an as-needed basis to fulfill its responsibilities.

San Pablo Avenue Technical Advisory Committee (TAC): The TAC consists of staff members of the agencies listed above. The TAC will be responsible for providing advice on the design, implementation, and operation of the transportation facilities along the San Pablo Avenue Corridor. It is the responsibility of each agency represented on the TAC to ensure that the appropriate staff persons who can address the specific issues on the agenda attend the TAC meetings. Issues that are not resolved may be referred to the Policy Advisory Committee. The TAC will meet on an as-needed basis to fulfill its responsibilities.

Cities, Contra Costa County, and Caltrans: The participating agencies that operate and maintain traffic systems have the following responsibilities:

1. Design and engineering review,
2. Operations and maintenance of traffic systems within the agency’s own jurisdiction,
3. Review of timing plans and participation in timing plan development,
4. Construction management (when applicable),
5. Cooperate with all participating agencies to develop traffic operations strategies to efficiently move traffic in the corridor,
6. Implementing timing plans and periodically reviewing changes when updates are made,
7. Sharing the use of interconnect cable and communications equipment with nearby jurisdictions to provide cost-effective signal system communications,
8. Notify nearby jurisdictions when service interruptions occur that could affect system operations.
9. Responding to emergency traffic conditions.

CCTA and CMA: The CCTA and CMA will have the following responsibilities:

1. County-wide planning,
2. Pursuing funding for future phases,
3. Grant management,
4. Partnership agreement development,
5. Design and engineering review,
6. Developing necessary agreements,
7. Construction management (when applicable)
8. System operations and management, and
9. Providing funding to manage the program.
CMA: As the program manager and the lead design agency, the CMA will be responsible for the following additional functions:

1. Managing the delivery of capital project elements of the program,
2. Program administration and management,
3. Overall design, engineering, contract management,
4. Coordinating the Policy Advisory Committee and TAC meetings.

Roles of Others: AC Transit and MTC will assist with coordination issues, including providing advice and other assistance with multi-agency agreements, programming and funding issues, resolution of disagreements, and contracting issues.

Other Agreements

Two types of agreements have been used in the corridor to designate responsibilities for the maintenance of traffic systems. Caltrans has agreements with the local jurisdictions that identify maintenance responsibilities on the portions of San Pablo Avenue that are designated as State Route (SR) 123. In addition, some of the local jurisdictions have agreements with Contra Costa County for the maintenance of traffic systems. A summary of the agreements is provided below.

A. Agreements Between Caltrans and Local Jurisdictions

The following Cooperative Agreements have been executed between Caltrans and the cities along SR 123 (San Pablo Avenue):

- Agreement for Maintenance of State Highways in the City of Hercules (7/30/90) – delegates to the City of Hercules operation and maintenance responsibilities for the traffic signal at the SR 4/San Pablo Avenue/John Muir Parkway.
- Agreement for Maintenance of State Highways in the City of Richmond (7/1/73) – Caltrans retains operation and maintenance responsibilities for traffic systems on I-80, which includes the I-80 NB Ramps/San Pablo Avenue/Roosevelt Avenue intersection.
- Agreement for Maintenance of State Highways in the City of El Cerrito (7/21/92) – Caltrans retains operation and maintenance responsibilities for traffic systems on SR 123 from Cutting Boulevard to the South City Limits.
- Agreement for Sharing Cost of State Highway Electrical Facilities with the City of El Cerrito (7/21/92) – identifies cost sharing for state highway electrical facilities within the City of El Cerrito.
- Agreement for Maintenance of State Highways in the City of Albany (7/1/81) – Caltrans retains operation and maintenance responsibilities for traffic systems on SR 123.
- Agreement for Maintenance of State Highways in the City of Berkeley (12/1/88) – delegates operation and maintenance responsibilities for traffic systems on SR 123 to the City of Berkeley.
• Agreement for Maintenance of State Highways in the City of Oakland (8/23/91) – delegates operation and maintenance responsibilities for traffic systems on SR 123 to the City of Oakland (except for the 53rd Street intersection).

• Agreement for Maintenance of State Highways in the City of Emeryville (12/20/89) – Caltrans retains operation and maintenance responsibilities for traffic systems on SR 123.

B. Agreements Between Contra Costa County and Local Jurisdictions

In Contra Costa County, the cities have the responsibility for the operation of traffic systems along the section of San Pablo Avenue that is not part of the state highway system. The following cities have agreements with Contra Costa County for traffic signal maintenance on San Pablo Avenue as described below:

• City of Hercules – Traffic Signal Maintenance Service Agreement (07/01/85) with Contra Costa County – assigns maintenance responsibilities to Contra Costa County for all signals on San Pablo Avenue.

• City of Pinole – currently, signals are maintained by a private signal maintenance contractor; the City has future plans to enter into an agreement with Contra Costa County for signal maintenance.

• City of San Pablo – Traffic Signal Maintenance Service Agreement (06/28/92) with Contra Costa County – assigns maintenance responsibilities to Contra Costa County for all signals on San Pablo Avenue.

• City of El Cerrito Annual Signal Maintenance (MSC NO. SM-98/99) Contract (02/16/99) – assigns maintenance responsibilities to Contra Costa County for the signal at the Conlon/Home Depot intersection.

Term

This MOU is in effect as of November 1, 1999 and will terminate on November 1, 2006, unless the term is modified by the Policy Advisory Committee, and respective participating City Councils or Governing Boards.
The following agencies support the Memorandum of Understanding for San Pablo Avenue Corridor Management:

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<td>Contra Costa Transportation Authority</td>
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*September 15, 1999*
DRAFT
Memorandum of Understanding for the I-880 Corridor Management Among

- City of Hayward
- City of San Leandro
- City of Oakland
- City of Union City
- Alameda County
- AC Transit
- Union City Transit
- Caltrans District 4
- Alameda County Congestion Management Agency (CMA)
- Metropolitan Transportation Commission (MTC)

This Memorandum of Understanding (MOU) recognizes that the I-880 Corridor, including Hesperian Boulevard, East 14th Street, San Leandro Street, International Boulevard, and Union City Boulevard are important regional routes, and provide important local access to commercial, industrial and other activities and transportation hubs in each of the jurisdictions they serve. As regional routes, there is a need to provide efficient traffic operations across jurisdictional boundaries. Because of the importance of the I-880 Corridor to the local and regional economies, each local jurisdiction will retain the authority to control its own transportation systems, including the operation of traffic signals.

The purpose of this MOU is to acknowledge the agreement of all participating agencies to work cooperatively to improve the management and operation of the parallel arterials along the I-880 corridor transportation system. This MOU is not a legally binding contract – it constitutes solely a guide to the intentions and policies of the participating agencies.

This MOU sets forth the roles and responsibilities of the participating agencies in the development, implementation, operations, and management of intelligent transportation system projects within the I-880 Corridor. The MOU is not intended to authorize funding. Commitments providing for the payment of funds or authorizing specific work phases will be covered by one or more separate agreements.
Responsibilities

I-880 Corridor Policy Oversight Committee: The Policy Oversight Committee consists of elected representatives of the cities and counties along the corridor and representatives of AC Transit, MTC, and Caltrans. The Policy Advisory Committee is responsible for formulating the policy and institutional issues pertaining to the I-880 Corridor, including the parallel arterials and connecting streets, and specifically to approve transportation projects and to update the members’ governing boards on the status and issues of the project. The Policy Oversight Committee will also provide direction to SMART Corridor Technical Advisory Committee and I-880 Working Group. The Policy Advisory Committee will meet on an as-needed basis to fulfill their responsibilities.

SMART Corridor Technical Advisory Committee (TAC) and the I-880 Technical Working Group (TWG): The TAC and TWG consist of staff members of the agencies listed above. The TAC and TWG will be responsible for providing advice on the design, implementation, and operation of the transportation facilities along the I-880 corridor and the associated arterials. It is the responsibility of each agency represented on the TAC and TWG to ensure that the appropriate staff persons who can address the specific issues on the agenda attend the TAC and TWG meetings. Issues that are not resolved may be referred to the Policy Advisory Committee. The TAC and TWG will meet on an as-needed basis to fulfill their responsibilities.

Cities, Alameda County, and Caltrans: The participating agencies that operate and manage traffic systems have the following responsibilities:

1. Design and engineering review;
2. Operations and maintenance of traffic systems within the agency’s own jurisdiction;
3. Review of timing plans and participation in timing plan development;
4. Construction management (when applicable);
5. Cooperate with all participating agencies to develop traffic operations strategies to efficiently move traffic in the corridor;
6. Implementing timing plans and periodically reviewing changes when updates are made;
7. Sharing the use of interconnect cable and communications equipment with nearby jurisdictions to provide cost-effective signal system communications;
8. Notify nearby jurisdictions when service interruptions occur that could affect system operations; and
9. Responding to emergency traffic conditions.

CMA: The CMA will have the following responsibilities:

1. County-wide planning;
2. Pursuing funding for future phases;
3. Grant management;
4. Partnership agreement development;
5. Developing necessary agreements;
6. Pursuing funding to manage the program;
7. Managing the delivery of capital project elements of the program;
8. Overall design, engineering, contract management;
9. Program administration and management; and
10. Coordinating the TAC and TWG meetings.

Roles of Others: MTC will assist with coordination issues, including providing advice and other assistance with multi-agency agreements, programming and funding issues, resolution of disagreements, and contracting issues.

Other Agreements

Other existing transportation related agreements (maintenance or otherwise) will remain in effect between the agencies in the corridor.

TO BE COMPLETED.

Term

This MOU is in effect as of March 2001 and will terminate on March 2006, unless the term is modified by the respective participating City Councils or Governing Boards. The I-880 Policy Oversight Committee, the I-880 Working Group and the SMART Corridor Technical Advisory Committee will make recommendation as to the changes in the terms of this agreement, as needed.
The following agencies support the Memorandum of Understanding for the I-880 Corridor Management:

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