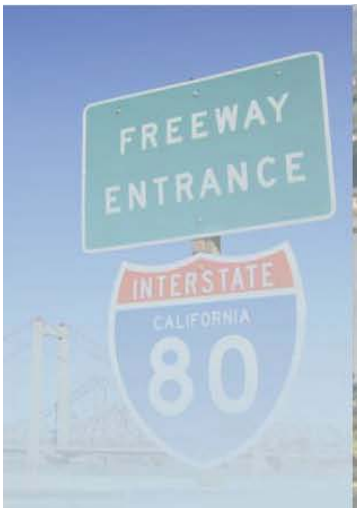
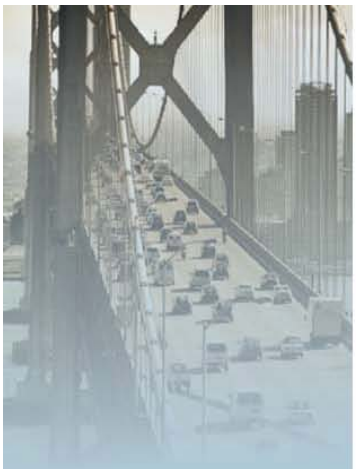
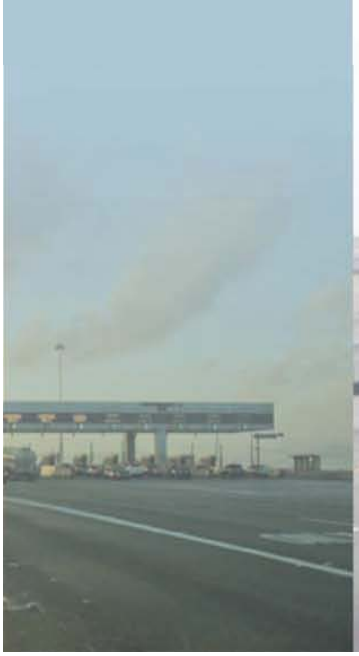


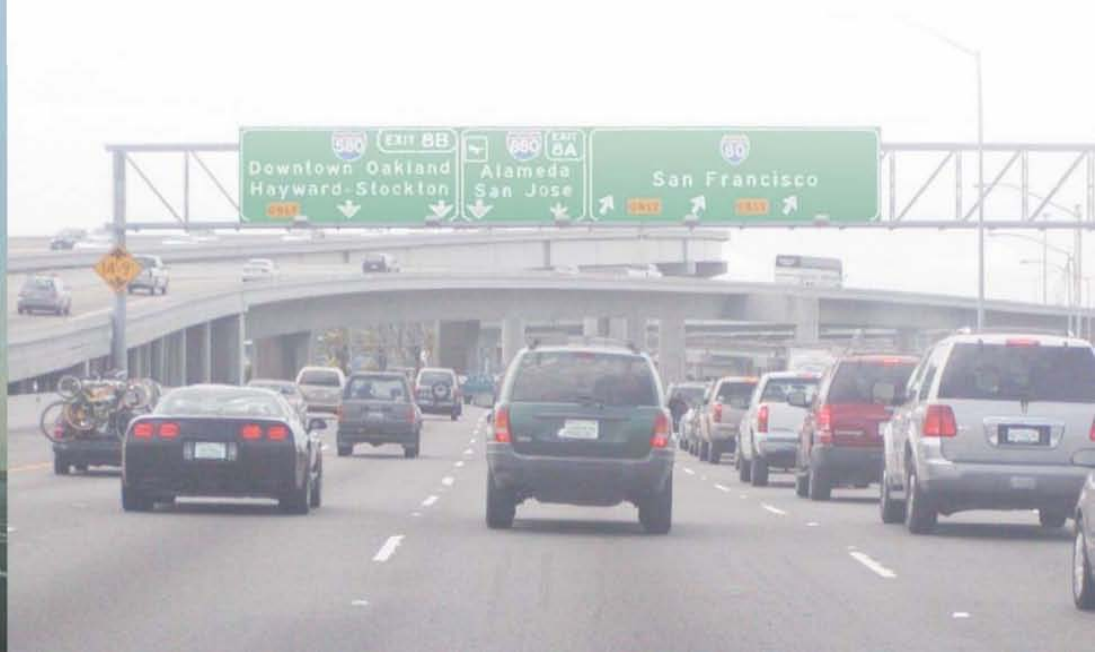
smart corridor
INTERSTATE 80
INTEGRATED CORRIDOR MOBILITY

I-80 ICM



MEMORANDUM OF UNDERSTANDING





INTERSTATE 80 CORRIDOR
MEMORANDUM OF UNDERSTANDING (MOU)

CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS)
&
LOCAL AND REGIONAL AGENCIES

FOR INTEGRATED CORRIDOR MOBILITY STRATEGIES IN ALAMEDA AND CONTRA COSTA COUNTIES

This MOU is a compilation of the goals, policies, and procedures intended to be followed by the parties working together in a coordinated manner to enhance traffic operations along the Interstate 80 (I-80) corridor in Alameda and Contra Costa Counties. This MOU is intended to identify the overall commitment and responsibilities regarding ownership, operations, and maintenance of the various equipments installed as part of the I-80 Integrated Corridor Mobility (ICM) Project. The following entities are parties to this MOU:
California Department of Transportation (Caltrans), Alameda County Transportation Commission (ACTC), Contra Costa Transportation Authority (CCTA), West Contra Costa Transportation Advisory Committee (WCCTAC), Contra Costa County, AC Transit, WestCAT, Cities of Oakland, Emeryville, Albany, Berkeley, El Cerrito, Richmond, San Pablo, Pinole, and Hercules.

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I. BACKGROUND

Interstate 80, between the Carquinez Bridge and the San Francisco Oakland Bay Bridge, is one of the most congested corridors in the San Francisco Bay Area. Traffic demands on the freeway far exceed the roadway capacity, causing severe congestion, unreliable travel times, and traffic diversion to the local arterials. During the peak periods, the majority of the corridor operates with significant congestion and delays. The congestion on the roadway network contributes to an increase in incident rates, including rear-end collisions on both the freeway and local arterials.
Congestion and associated incidents in this corridor are expected to increase over the next 20 years. By 2015, delay for westbound I-80 will increase by 50% in the AM peak, while delay for eastbound I-80 will increase by 100% in the PM peak.

The San Pablo Avenue corridor is approximately 20 miles long and is the major travel corridor parallel to I-80. This corridor extends from 17th Street in downtown Oakland to Hercules, through the cities of Emeryville, Berkeley and Albany in Alameda County; and the cities of El Cerrito, Richmond, San Pablo, Pinole, Hercules, and unincorporated portions of Contra Costa County. There are approximately 85 traffic signals along the project corridor. San Pablo Avenue is State Route 123 from West McArthur Boulevard in Emeryville to Cutting Boulevard in Richmond.

The East Bay SMART Corridor Program, which includes San Pablo Avenue, is an existing multi-modal Advanced Transportation Management System (ATMS) along the corridor. The program, which took effect in 2003, is a cooperative effort by the California Department of Transportation (Caltrans), the Metropolitan Transportation Commission (MTC), the Alameda County Transportation Commission (Alameda CTC), Contra Costa Transportation Authority (CCTA) and 15 local agencies.

Components of the SMART Corridor include Closed Circuit TV (CCTV), Vehicle Detection System (VDS), Emergency Vehicle Preemption (EVP), and Transit Signal Priority (TSP). These technologies are used to improve the performance of transportation systems, by promoting efficient use of the existing roadway and transit systems. The goal of the SMART Corridor is to allow local agencies to better manage congestion and incidents, improve transportation safety, mobility and efficiency along San Pablo Avenue, and efficiently operate and manage emergency services and transit resources.

In order to improve the efficiency of the entire transportation corridor, the I-80 ICM project will expand and integrate the San Pablo Avenue portion of the SMART Corridor with new elements on San Pablo Avenue, I-80 and crossing arterials. The primary goal of the I-80 ICM project is to enhance the effectiveness of the existing transportation network, including the freeway, ramps, parallel arterials, and the crossing arterials in Alameda and Contra Costa Counties, as well as the transit service.

The Project provides tools for Caltrans and local agencies to manage traffic, including:

- Monitoring/measuring devices such as cameras, video detection systems and loop detectors;
- Communication links to a central location: signal interconnect, wireless modems;
- Traffic control devices;
- Intelligence in form of software and algorithms to respond to changing traffic conditions on ramps and freeway; and
- Tools to communicate traffic/transit information back to drivers

The Project includes five major components:

- Adaptive ramp metering;
- Incident management;
- Information to motorists regarding transit and traffic travel time;
- Improvements along San Pablo Avenue and other arterials; and
- System Integration.

The Project benefits include:

- More reliable travel time within the existing transportation network by optimizing the use of existing capacity.
- Improved safety and operation of the transportation network.
- Reduced traffic congestion by expediting incident clearance and recovery.
- Improved air quality associated with reduced traffic congestion, and.
- Enhanced real-time traveler information.

The I-80 ICM project is a $93 million project that is primarily funded with Corridor Mobility Improvement Account (CMIA) and Traffic Light Synchronization Program (TLSP) funds secured in 2007. Contra Costa Measure J is a contributing fund for project development. Other local funds, including Alameda County 2000 Measure B funds, are also programmed for this project.

This project is developed through a partnership among Caltrans, the ten municipalities along the corridor (Oakland, Emeryville, Albany, Berkeley, El Cerrito, Richmond, San Pablo, Pinole, Hercules, and Contra Costa County), AC Transit, WestCAT, Alameda County Transportation Commission, Contra Costa Transportation Authority, West Contra Costa Transportation Advisory Committee, Metropolitan Transportation Commission, and the California Highway Patrol (CHP).

II. DEFINITION AND EXPLANATION OF TERMS

Active Traffic Management (ATM) – The use of technology for real-time management of traffic flow and communication of travel information to drivers in an effort to reduce congestion and to increase throughput along a corridor.

Adaptive Ramp Metering (ARM) – The use of freeway mainline, ramp, and local street traffic volumes to adjust metering rates for traffic entering the freeway on a real-time basis.

Closed Circuit Television (CCTV) Cameras – Fixed and pan-tilt-zoom cameras mounted on poles to monitor freeway, on-ramp, and local street traffic flow conditions as a way to confirm actual conditions and to implement appropriate traffic management strategies.

Changeable Message Signs (CMS) – Technology to provide advisory traveler information such as incidents, events, construction, maintenance, road closures, parking availability and travel times so that travelers can make informed choices of their travel mode or route.

Corridor Steering Committee (CSC) - The I-80 CSC will be comprised of executive staff or designees of all member agencies to address any issues not resolved by the I-80 Technical Coordinating Committee (I-80 TCC).

Emergency Vehicle Preemption (EVP) – Devices on emergency vehicles communicate with devices at traffic signals to provide a green traffic signal phase for emergency vehicles approaching an intersection.

End-of-Queue Detection – Detection at the entrance to the on-ramp to monitor the length of queued vehicles waiting for the ramp meter and alerts the ramp meter controller if the queue is approaching the adjacent local intersection. Monitoring could be in terms of occupancy (on the loop) or volume differential (vehicles in vs. vehicles out).

Highway Advisory Radio (HAR) – Radio system used to convey real-time traveler information to drivers during incidents or special events.

Incident Condition – An operational scenario as agreed upon by partnering agencies such as loss of fifty-percent of the through lanes on the freeway for 30 minutes or more.

Information Display Boards (IDB) – Large electronic signs used to display real-time traveler information with color and graphic capability to more efficiently communicate with drivers than is possible using traditional Changeable Message Signs.

Trailblazer Signs –Devices that are located at critical decision points along potential local routes to efficiently guide traffic that has left the freeway along a dedicated route past an incident.

Lane Use Signs (LUS) – An ATM device used to display graphic or text information relative to each specific lane, facilitating clear communication with motorists and dynamic lane management as needed for incident management or planned highway work.

Microwave Vehicle Detection System (MVDS) – Uses microwave motion sensor to detect a moving vehicle.

I-80 Policy Advisory Committee (I-80 PAC) – A committee formed to provide guidance and direction on any issues that may arise that require additional input from communities within the I-80 corridor.

Signal Coordination – A traffic operations strategy of setting traffic signal timing plans and offsets such that a platoon of vehicles can travel along a corridor under a green phase as they approach each intersection. (See alos Signal Flush Plans)

Signal Flush Plans – Special traffic signal timing plans that would be implemented at local intersections during freeway incidents in which a large amount of traffic would be expected to leave the freeway and use local streets to bypass an incident. Flush plans provide a long green phase for major traffic route during an incident. Plans are stored in the local traffic signal controller and called out by a plan number. These could be a series of timing plans used for different incident severity, are triggered under specified traffic volume thresholds, and will only be in effect until congestion dissipates on the local streets. (See also Signal Coordination)

Signal Interconnect – Connecting traffic signals along a corridor using copper, fiber, or wireless media to enable data transfer and communication.
Signal Timing Plans – Parameters for allowing green timing for each movement.

I-80 Technical Coordinating Committee (I-80 TCC) – Committee comprising of technical staff from agencies in the I-80 ICM Corridor, responsible for day-to-day transportation service, operations and management of their respective systems within the I-80 corridor.

Transit Signal Priority (TSP) – Equipment installed on transit vehicles that communicates with equipment at the traffic signal to grant an early green or green extension.

Transportation Management Center (TMC) – Central facility at Caltrans or local agencies that houses software, workstations, and staff to operate the system.

Variable Advisory Speed Signs (VASS) – Device that provides timely information to motorists on suggested reduced speeds in advance of downstream congestion or changing conditions. Also used for End of Queue Warning on the freeway. VASS could also be used for speed harmonization. Speed harmonization is a strategy of dynamically and automatically adjusting speed limits approaching areas of traffic congestion, collision, or special events to help maintain traffic flow and reduce risk of collisions due to speed differentials.

III. PURPOSE OF MOU, PROJECT DESCRIPTION, AND PROJECT GOVERNANCE

PURPOSE OF MOU

This MOU serves the following purposes:

- Confirm support from all project partners, particularly local support for ramp metering and other freeway elements;
- Articulate key operations and maintenance (O&M) principles for continuing project development;
- Clarify ownership, O&M, and management responsibilities;
- Clarify the distribution of costs and funding sources;
- Outline the framework for multi-agency cooperation, collaboration, and conflict resolution;
- Identify which Smart Corridor devices will be made part of the I-80 ICM project; and
- Signify the ongoing commitment of the project partners to deliver the project and make it a success.

PROJECT DESCRIPTION

The I-80 ICM Project is located in Alameda and Contra Costa Counties, on a segment of I-80 approximately 20 miles long, from just north of the I-80/580/880 Interchange to just south of the Carquinez Bridge, on San Pablo Avenue from MacArthur Blvd. in Oakland to Cummings Skyway in Contra Costa County (portions of which are also designated as State Route 123), and on other local arterials along the corridor that connect I-80 and San Pablo Avenue. The I-80 ICM Project consists of five major components, as described below:

a. Adaptive Ramp Metering

Adaptive ramp metering (ARM) will be implemented at 44 on-ramps for both directions of the freeway during the weekday peak periods and weekends as needed (refer to Attachment A). ARM manages traffic volumes at the freeway on-ramps during recurring congestion and freeway incidents. Incident-related congestion can be managed through the use of more restrictive metering upstream and less restrictive metering downstream of the incident. The ARM algorithm can adjust metering rates at each on-ramp based on the prevailing or real-time corridor traffic conditions, both on the freeway and the adjacent local arterial.

b. Incident Management

During an incident, Active Traffic Management (ATM) strategies will be deployed to reduce delay and to prevent secondary incidents on the freeway, and to also manage incident traffic on local arterials. This will be accomplished through specific incident response plans (IRP), to be developed in coordination with the local agencies, that employ the I-80 ICM project elements (i.e. CMS, CCTV, LUS, VASS) and San Pablo Avenue East Bay SMART Corridor devices (i.e. CCTV and MVDS) to expedite incident detection, response, and clearance while also minimizing incident impacts via enhanced motorist information.

c. Transit and Traffic Motorist Information

Real-time information for the transportation network, including travel speeds, travel time and transit options, will be provided to motorists and transit passengers via IDBs, CMS, HAR, and 511. This will assist motorists to make timely, informed, and personal decisions earlier in their journey through the corridor, thus, enhancing motorists' trip quality and convenience. This can also at times reduce traffic demand within the corridor by encouraging travelers to use available transit options or to postpone their travel to times when congestion is lower.

d. Improvements along San Pablo Avenue Corridor and Other Arterials

The I-80 ICM Project includes upgraded traffic signal hardware, software and interconnect enhancements, and installation of arterial management components such as closed-circuit television (CCTV) cameras, trailblazer signs, CMS and communication and detection equipment on San Pablo Avenue from MacArthur Boulevard in Oakland to Cummings Skyway in Contra Costa County and local arterials. Other improvements include: extended transit signal priority along San Pablo Avenue Corridor and crossing arterials; extended emergency vehicle preemption; and installation of pedestrian push buttons and countdown signal heads at traffic signals in Pinole, minor traffic signal modification in El Cerrito, intersection striping improvements for transit near El Cerrito del Norte BART Station, and installation of two new traffic signals in Richmond.

e. System Integration

System integration provides for coordinated operations between all of the above project components and sharing of corridor traffic and transit

information among various agencies relative to I-80, San Pablo Avenue and other key local arterials.

GOVERNANCE

It is the intent that all technical and operational matters be resolved among the partnering agencies at the lowest working level. In general, the I-80 integrated corridor management activities will be directed through three bodies of governance, in the following order of hierarchy, from low to high:

Technical Coordinating Committee (I-80 TCC):

The I-80 TCC will be comprised of technical staff responsible for day-to-day transportation service, operations and management of their respective systems within the I-80 corridor. The I-80 TCC will consist of representatives from Caltrans/District 4, the California Highway Patrol (CHP), Metropolitan Transportation Commission (MTC), Alameda County Transportation Commission (Alameda CTC), AC Transit, Contra Costa Transportation Authority (CCTA), Contra Costa County (CCC), the West Contra Costa Transportation Advisory Committee (WCCTAC), WestCAT, and the Cities of Hercules, Pinole, San Pablo, Richmond, El Cerrito, Albany, Berkeley, Emeryville, and Oakland. The I-80 TCC will develop operational strategies needed for integrated corridor system management, ultimately to be adopted by the I-80 Corridor Steering Committee (CSC) as appropriate.

The I-80 TCC will ensure efficient monitoring and enhanced day-to-day freeway and arterial operations, incident management, and timely dissemination of real-time multimodal traffic data to travelers.

The I-80 TCC will directly interact, communicate, and exchange information and cooperatively assist in resolving issues. In the course of these activities, operational protocols will be developed to best serve ramp metering, incident management, signal operations, and transit service.

While Caltrans will be responsible for 24/7 emergency deployment of the ICM components, The I-80 TCC members will, on an ongoing basis, provide input and concurrence on operational strategies such as ramp metering rates or operational periods, flush plans, traffic signal modifications & coordination, and activation of trailblazer signs on local arterials during incidents or major events that affect transportation.

The I-80 TCC will meet monthly or as needed. At these meetings, the I-80 TCC will review available traffic data and recommend solutions to issues relating to the integrated corridor management, including ramp metering and incident response. For example, Caltrans' representative(s) will provide a status report on the operations of ramp metering in both counties. The status report will include a list of operational issues that were reported by the local agencies and how these issues were resolved. If needed, the Caltrans I-80 TCC representative will lead the I-80 TCC meetings and help formulate recommended changes to the daily operations of the system within the I-80 Corridor.

Corridor Steering Committee (I-80 CSC):
The I-80 CSC will be comprised of executive staff or designees from all member agencies. The I-80 CSC will meet as needed, to address issues unresolved by the I-80 TCC.

Policy Advisory Committee (I-80 PAC):
A Policy Advisory Committee (I-80 PAC) will provide guidance and direction on any issues that may arise that require additional input from communities within the corridor. The I-80 PAC will be comprised of three members: the Caltrans District 4 Director, one elected official from an Alameda County jurisdiction within the corridor appointed by the Alameda CTC, and one elected official appointed by WCCTAC. The I-80 PAC meetings will be held on an as-needed basis.

Table 1 below shows all of the partner agencies that will be represented by the three bodies.

Table 1: I-80 ICM Member Agencies

Member Agencies
California Department of Transportation (Caltrans)
California Highway Patrol (CHP)
Metropolitan Transportation Commission (MTC)
Alameda County Transportation Commission (Alameda CTC)
Contra Costa County
Contra Costa Transportation Authority (CCTA)
Western Contra Costa Transportation Advisory Committee (WCCTAC)
AC Transit
WestCAT
City of Albany
City of Berkeley
City of El Cerrito
City of Emeryville
City of Hercules
City of Oakland
City of Pinole
City of Richmond
City of San Pablo

IV. PROJECT GOALS & OBJECTIVES

The ICM strategies pursued herein shall:

1. Provide traffic operation on the corridor that is equitable and balanced for both the freeway and arterials.

2. Integrate transportation system management activities to enhance safety and mobility for all travel modes within the corridor.

3. Enhance overall transit travel time along corridor routes during normal operations.

4. Enhance trip reliability by providing consistent and predictable travel times on the freeway and local arterials.

5. Avoid impacts on local arterials while managing access at on-ramps during peak periods on weekdays and weekends.

6. Efficiently guide traffic naturally diverted to local arterials during major freeway incidents back to the freeway.

7. Cooperatively operate, manage and maintain all elements installed as part of the I-80 ICM project in an integrated and coordinated manner.

8. Cooperatively develop, implement, evaluate and revise strategies to ensure balanced benefits to local, regional, and inter-regional travelers.

9. Cooperatively identify and address any adverse impacts in a timely fashion.

10. Ensure on-going communication among partnering agencies for timely review and adjustment of activities as needed.

11. Ensure timely and appropriate communication with the public, media, and elected officials.

12. Monitor, evaluate, and report on project performance to ensure compliance with goals and objectives.

13. Facilitate cooperative activities that ensure the sustainability of benefits from the project.

V. OPERATIONS STRATEGIES AND PRINCIPLES

a. OPERATIONAL SCENARIOS & LEAD AGENCIES

Table 2 below illustrates the operational strategies that will initially be deployed as part of the I-80 ICM Project and the agencies that will take the lead in implementing the strategies.

Table 2 – Operational Strategies

Facility	Operational Strategy (Lead Agency or Agencies)	
	Normal Operations	*Incident Management / Special Events*
Freeway & Ramps	Adaptive Ramp Metering (Caltrans) Transit Priority (AC Transit & WestCAT)	Adaptive Ramp Metering (Caltrans) Lane Use Signals (Caltrans) Variable Advisory Speed Signs/ End-of-Queue Warning (Caltrans) Transit Priority (AC Transit & WestCAT)
San Pablo Avenue	Signal Coordination (Local & Caltrans) Transit Priority (AC Transit & WestCAT) Emergency Vehicle Preemption (1st Resp.)*	Flush Plans (Caltrans) Trailblazers (Caltrans) Transit Priority (AC Transit & WestCAT) Emergency Vehicle Preemption (1st Resp.)*
Crossing Arterials	Signal Coordination (Local & Caltrans) Transit Priority (AC Transit & WestCAT) Emergency Vehicle Preemption (1st Resp.)*	Flush Plans (Caltrans) Trailblazers (Caltrans) Transit Priority (AC Transit & WestCAT) Emergency Vehicle Preemption (1st Resp.)*

Note: The project will add and upgrade Emergency Vehicle Preemption (EVP) receivers along San Pablo Avenue and crossing arterials connecting to I-80, as shown in Attachment B, for use by first responders. Emergency vehicle response will continue to be operated by the first responders.

Normal Operations

Under normal conditions, ramp metering will function under adaptive control. This means that traffic conditions along the entire corridor (freeway, ramps, and local streets) will be considered when determining metering rates at each ramp. Each ramp will have an end-of-queue detector to monitor the queue length of vehicles waiting on the on-ramp using either occupancy or volume differential between end-of-queue detector and ramp output loop. If the end of queue approaches the cross street, the ramp meter controller will increase the metering rate up to the maximum rate in order to reduce the queue. If the queue is not dissipating, the ramp meter controller will change the meter to rest on green until the queue is dissipated. At ramp HOV bypass lanes, TSP will allow equipped buses to obtain priority by expediting or flushing out any queue ahead of the bus. Ramp metering will be operated by Caltrans.

On San Pablo Avenue and crossing arterials (connecting San Pablo Avenue to I-80), signal coordination and transit signal priority will be used to improve traffic flow throughout the corridor during normal operating conditions. Much of San Pablo Avenue already has traffic signal interconnect that allows for efficient signal timing coordination and progression. Additional signal interconnect on several crossing arterials will improve the flow of traffic between San Pablo Avenue and I-80. The I-80 ICM project will provide an update to the signal timing along the corridor for normal operating conditions. In the future, signal timing updates will be achieved through other programs, such as those administered by MTC. Local traffic signals will be controlled by the local agency during normal operations. As discussed below, Caltrans will have the ability to control certain signals if required during a special event or following an incident.

TSP exists along much of San Pablo Avenue and serves routes such as AC Transit 72 Rapid. This equipment is also used for emergency vehicle preemption. The I-80 ICM project will add TSP for San Pablo Avenue in the WestCAT service area, and for crossing arterials for AC Transit and WestCAT service areas.

Incident / Special Events Management

Incident conditions will be defined by the I-80 Technical Coordinating Committee (TCC) (e.g. blockage of 50% of freeway lanes for 30 minutes or more). Under incident conditions, ramp metering will continue to operate under an adaptive control as described above. Since freeway conditions rapidly change following an incident, the ramp meter rates could frequently adjust in reaction to the changes. Ramp metering at on-ramps will still be operated such that spillbacks onto the crossing arterials are avoided.

LUS will be turned on based on specific incident conditions. Red X's, yellow diagonal arrows, or text messages will be displayed to convey downstream conditions and guide traffic through the incident scene. Lane use signs will be operated by Caltrans.

VASS will display an advisory reduced speed to reflect downstream congestion or end-of-queue. Initially these signs will only be used for end-of-queue warning; however, the signs could be used for speed harmonization in the future. Speed harmonization is a strategy of dynamically and automatically adjusting speed limits approaching areas of traffic congestion, collision, or special events to help maintain traffic flow and reduce risk of collisions due to speed differentials. Variable advisory speed signs will be operated by Caltrans.

During incident conditions, San Pablo Avenue and crossing arterials may become congested due to traffic that (naturally) leaves the freeway to use the local streets to bypass the incident. The project will not actively divert freeway traffic on to local streets. Trailblazer signs placed on San Pablo Avenue and local arterials will advise drivers where to return back to the freeway after passing the incident location. These signs are

meant to discourage the use of other local streets that could lead to more severe congestion on the local network.

Traffic signal timing along a relevant incident route will be modified during an incident to help increase the throughput of traffic along that route, and to reduce recovery time to normal conditions. The incident timing is referred to as a "signal flush plan". Caltrans will be responsible for executing the appropriate flush plans on affected traffic signals (Caltrans and local agency owned) when an incident occurs. Caltrans and local agencies will develop the Incident Response Plan to help formulate acceptable timing plans that increases the throughput without adverse delays to local traffic including bicycles, pedestrians and transit. The timing plans will be preapproved so activation of them during incidents will be efficient.TSP and emergency vehicle preemption will still be operational during an incident.

The Incident Response Plan will identify a specific subset of devices (ramp metering, VASS, CMS, LUS, Trailblazer signs, IDB, and traffic signals) that will be used to manage the network during an incident. Each scenario will be dependent on many different parameters including time of day, location, incident severity, and expected incident duration. Local agencies will review and approve the use of each strategy. When an incident occurs, Caltrans will determine the scenario that is most appropriate for the incident and deploy the appropriate strategy.

b. OPERATING PRINCIPLES

The following primary guidelines will be used in directing day-to-day transportation management and operational activities along the corridor:

1. General

a. The project will not actively divert freeway traffic onto local streets in the event of an incident on the freeway.

b. The I-80 Technical Coordinating Committee (I-80 TCC) members shall actively participate in monitoring operations within their jurisdictions and in on-going communication relative to the corridor management operations.

c. Caltrans shall be responsible for 24/7 monitoring of ICM devices on the arterials and freeway, and during incidents, selecting and executing the appropriate pre-determined plans, protocols, and parameters in accordance with the IRP. Such activities will be undertaken from the Transportation Management Center (TMC) jointly operated by Caltrans and the California Highway Patrol (available via telephone at 510-286-

6915), located at 111 Grand Avenue, Oakland, and staffed on a 24/7 basis.

d. During normal conditions, each local agency shall have primary control and will be responsible for operating all the project devices within their jurisdiction. Refer to Attachment B for the project devices. Local agencies may also operate signals on San Pablo Avenue within Caltrans jurisdiction upon prior agreements and protocols developed for local needs.

e. Local jurisdictions shall provide contact information for a 24/7 dispatch and/or on-call personnel to be contacted for emergency activities or notification purposes.

f. For safety reasons, only under exigent and unforeseen circumstances such as being directed by law enforcement or in reaction to secondary accidents, Caltrans may be required to make short-term, spot decisions without first consulting with local agencies. Under such circumstances, Caltrans shall promptly notify the local jurisdictions of the actions taken as soon as possible and practicable.

2. Adaptive Ramp Metering

a. Ramp meters will be operating at the freeway on-ramps in both directions, during weekday and weekend peak periods. In addition, ramp meters may be activated during non-peak conditions, as needed, in response to prevailing traffic demand for special events or major incidents.

b. Ramp metering will be operated in adaptive fashion, considering traffic demands and capacity on both the freeway and local arterials. During the metering periods, the implemented system will automatically adjust metering rates to ensure that queues at on-ramps do not extend beyond local agency-specified maximum end-of-queue locations, or shall rest on green for as long a time as necessary.

c. End of queue detection will be used to monitor and contain the queues within the on-ramps, and when absolutely needed on the appropriate turn-lanes, as approved by local jurisdictions, on the local arterials specifically dedicated for freeway entry. Once queues extend beyond the end of queue detector, the ramp meter rate will increase or rest on green to avoid queuing that obstructs local traffic flow.

d. Ramp metering rates will be based on the Adaptive Ramp Metering Algorithm which will consider parameters such as end of queue detection, communication failures, etc.

e. If the ramp metering implementation or ramp metering plan modification does not perform as expected so that there would be excessive delays and queues impacting traffic operations on the local arterial, or results in excessive complaints, Caltrans will consider other options, such as, changing ramp metering rates or operating on-ramps on temporary "rest on green".

f. Caltrans shall promptly respond to requests to modify ramp metering rates from local agencies for initial diagnosis of the issue. If the response times are not met or the operational issue results in significant or adverse impacts, the matter shall be referred to the I-80 TCC for immediate resolution.

g. The metering rates will be developed to avoid delays to buses either at on-ramps or crossing arterials. For buses that are bound for the freeway, transit signal priority will be provided for the HOV by-pass lane ramp metering signal.

3. Local Arterials

a. Under normal conditions, local agencies will have, within their jurisdictions, control of the ICM devices and traffic signals which will be coordinated upon project implementation.

b. Under incident conditions, pre-approved Incident Response Plans (IRPs) will be implemented by Caltrans. Caltrans will assume control of the ICM devices until the incident is cleared. Typical daily signal operations will be resumed immediately upon incident clearance and stabilization of traffic conditions.

c. The IRPs will be evaluated periodically to assess their effectiveness and need for adjustments. Any adjustments to the IRPs will be subject to approval by the TCC.

d. Trailblazer signs installed on local arterials will direct motorists that have naturally diverted to the local streets, due to an incident on I-80, back to the freeway at appropriate location(s) downstream of the incident. Trailblazer signs will be activated only at locations where signal flush plans are turned on.

e. TSP will be utilized at crossing arterials adjacent to on-ramps to provide priority for transit vehicles along those routes.

4. Public Outreach, Response to Inquiries and Complaints

a. Caltrans shall address any and all public inquiries, complaints, and concerns in a timely manner via telephone hotline, e-mail, or correspondence, on an on-going basis, related to freeway operations or related to IRP.

b. On local streets, the local jurisdiction will address any and all public inquiries, complaints, and concerns in a timely manner via telephone hotline, e-mail, or correspondence, on an on-going basis.

c. Caltrans and local agencies will coordinate responses, as appropriate.

VI. EQUIPMENT OWNERSHIP & MAINTENANCE

The I-80 ICM project utilizes various equipment installed throughout the corridor, which are located within different jurisdictional rights-of-way. Table 5 in Section VIII provides a summary of ownership and maintenance responsibilities by type of equipment and right-of-way. Attachment B provides the location of each type of equipment to be utilized, grouped by operational strategy. Attachment B also delineates the ownership and operations responsibilities.

VII. PROJECT DEVELOPMENT PRINCIPLES

a. Project Documents

The following documents have been prepared to design the project:

Project Report:
Defines the purpose and need for the project, identifies the alternative selected, describes how that alternative was decided upon, and describes how consensus was reached among stakeholders.

Environmental Document:
For a capital project to proceed, it must receive official federal, state, and environmental approvals as well as consensus from all the stakeholders and the public.

Corridor Systems Management Plan (CSMP):
Overall corridor operational conditions, existing and future conditions, list of future projects, and recommendations.

Concept of Operations Report (Con Ops):
Concept for proposed system, user-oriented operational description, operational needs, system overview, operational and support environment, operational scenarios, summary of impacts.

Ramp Metering Plan (RMP):
Ramp Meeting operational plans, including metering rates.

Traffic Operations Analysis Report (TOAR):
Existing traffic conditions, proposed alternatives, traffic forecasts, modeling results.

The following documents will govern the implementation of the project:

Project Implementation Plan
Document identifying the staging and commissioning of each I-80 ICM project element (TOS, TLSP, ARM, and ATM).

Operations and Maintenance (O&M) Plan:
Operational scenarios and cost of operations, maintenance and management for each city along the corridor.

Incident Response Plan (IRP):
Overall incident response plan that defines various incident scenarios and procedures for managing traffic congestion during incidents, including signal flush plans.

System Integration Plan:
Specifies the procedures, methods and strategies to implement the required project elements based on project documents and system requirements.

Configuration Management Plan:
Details the process to establish and maintain the integrity and control of software and hardware products.

Outreach Plan:
Outlines strategies to disseminate periodic project information and updates to various stakeholders.

b. Construction

The project will be constructed in six contracts – four construction contracts, one material procurement contract, and one systems integration contract. While local business preference is not allowed for State-funded construction contracts, such as these, outreach will be conducted to encourage local participation.

PHASING AND IMPLEMENTATION SCHEDULE
For delivery purposes, the I-80 ICM project has been split into six contracts as shown in Table 3 below.

TABLE 3 – SCHEDULE OF CONSTRUCTION CONTRACT DELIVERY

I-80 ICM Construction Contracts	Tentative Construction Schedule		Implementing Agency for Construction & Procurement Contracts
	Start	End	
Project 1: Software Development / System Integration	March 2012	January 2015*	Alameda CTC
Project 2: Specialty Materials Procurement	October 2012	April 2014	Alameda CTC
Project 3: Traffic Operation Systems	April 2011	May 2012	Alameda CTC
Project 4: Adaptive Ramp Metering	May 2012	December 2013	Caltrans
Project 5: Active Traffic Management	May 2012	April 2014	Caltrans
Project 6: San Pablo Corridor Arterial and Transit Improvement Project	May 2011	December 2013	Alameda CTC

* Includes a 1-year rollout, implementation and commissioning period

The public will be notified as appropriate of imminent construction activities.

c. System Integration

The Project deploys a number of components and equipment that need to communicate with each other and with the TMC. In order to achieve such automated data flow, various components of the project are linked via a data network. The disaggregate components will be controlled and communicated utilizing a custom application (software) that will be developed by the System Integrator. The System Integrator working with the I-80 TCC will be responsible for developing a System Integration Plan for automated communications and interaction between the various devices and the TMC.

Phase I of System Integration integrates devices on San Pablo Avenue (existing devices from East Bay SMART Corridor and new devices installed under the project) and Phase II will address the I-80 devices and the interaction with San Pablo Avenue components system. System Integration provides for coordinated operations and sharing of corridor traffic and transit information among various agencies relative to I-80, San Pablo Avenue Corridor and other key local arterials. Software is provided to enable operations of all I-80 project elements from Caltrans TMC and share information with local agency TMC.

d. Implementation & Initial System Evaluation

Project Implementation is outlined in the Project Implementation Plan with input provided by the I-80 TCC. It is expected that Adaptive Ramp Metering and Active Traffic Management components of the projects listed on Table 3 will be activated at the same time, in early 2014.

After the devices are installed, system components will be tested individually and then collectively prior to performing a full rollout. Following full roll-out, driver behavior is expected to adjust and eventually settle into a repetitive, predictive pattern. The system will then be monitored extensively and minor fine tuning of signal timing and ramp metering algorithms will be performed as appropriate. The monitoring activities will include evaluating impacts of the project on transit operations and the magnitude of traffic diversion to local streets. Strategic transit enhancements, such as relocation of bus stops, etc., changes to the signal flush plans, and use of the trailblazer signs may be implemented to address such impacts. A study will be done to document conditions before and after the project is implemented, recommend changes, if necessary, and report on the project benefits.

e. Regular Operations & Maintenance

The regular operations and maintenance will be in accordance with the Project Operations and Maintenance Plan (O&M) developed for the project with input provided by the I-80 TCC. The O&M Plan addresses staffing, training, performance monitoring and reporting, and data ownership.

f. Configuration and Change Management

The configuration and change management will be in accordance with the Project Configuration Management Plan developed for the project with input provided by the I-80 TCC. The Configuration Management Plan details the process to establish and maintain the integrity and control of software and hardware products.

VIII. COSTS & FUNDING

The project is funded by various fund sources for the different phases of the project – Project Development, Construction, and Operation & Maintenance phases. Funding for each phase is outlined as follows:

a. Project Development Phase:

The following table (Table 4) breaks down funding for the project development phase:

Table 4 – Project Development Funding Sources

Fund Source	Funding Agency	Amount
CMAQ (Fed)	Federal	$ 3,243,000
STIP (CCC)	State	$ 954,000
CMA TIP	Alameda CTC	$ 1,080,000
Measure J	CCTA	$ 4,876,000
WCCTAC	WCCTAC	$ 47,000
2000 Measure B	Alameda CTC	$ 1,800,000
TFCA	BAAQMD	$ 1,155,000
Total		**$ 13,155,000**

b. Construction Phase:

The construction of freeway portion of I-80 ICM project is funded by $55.3 million from California State Proposition 1B Bond funds - Corridor Mobility Improvement Account (CMIA). The construction of San Pablo Avenue components is funded by $21.4 million from California State Proposition 1B Bond funds - Traffic Light Synchronization Program (TLSP) Account.

c. Operations & Maintenance (O&M) Phase:

Caltrans is responsible for funding, operating and maintaining the equipment in State right-of-way, except for traffic signals subject to other maintenance agreements and EVP receivers at Caltrans-maintained traffic signals. Caltrans shall maintain TSP receivers at HOV ramp meter bypass lanes.

- Caltrans is responsible for funding the 24/7 monitoring of the I-80 ICM from the TMC.

- Within Alameda County outside of State right-of-way, cities will be responsible for operations and maintenance of the equipment. Alameda CTC will provide funding for operating and maintaining ICM equipment.
- Within Contra Costa County outside of State right-of-way, local jurisdictions will be responsible for operations and maintenance of ICM equipment, and may choose to contract with Contra Costa County for maintenance. Local jurisdictions will not be responsible for funding the operations and maintenance of ICM equipment in perpetuity. CCTA will secure $2,000,000 in funding for operating and maintaining ICM equipment. This amount is estimated to fund about 15 years of operations and maintenance. CCTA will seek additional funding beyond the $2 million from regional and other sources.
- Funding for East Bay SMART Corridor devices that are not used for deploying I-80 ICM strategies will continue to be funded under the terms of the existing O&M Agreement between Alameda CTC and the local agencies.
- Cities / Contra Costa County will be responsible for funding, operating and maintaining existing and upgraded traffic signals within their right-of-way.
- Cities / Contra Costa County will be responsible for funding, operating and maintaining non-ICM equipment requested by local agencies within their right-of-way. This includes speed feedback signs (Pinole) and Changeable Message Signs on local arterials (Oakland).
- Funding for the TSP equipment in transit vehicles will be provided as part of the I-80 ICM project. Installation, Operation and maintenance of TSP equipment in the transit vehicles, and funding for installation, operations and maintenance of such equipment, will be the responsibility of the respective transit agency.

The foregoing is summarized in Table 5 below:

Table 5 - O&M and Funding Responsibility Table

Grouping	ROW	Equipment	O&M Responsibility	Funding Responsibility
East Bay SMART Corridor Equipment - Used for ICM Strategy	Caltrans	CCTV	Caltrans	Caltrans
		MVDS	Caltrans	Caltrans
		TSP	Caltrans	Caltrans
	Non-Caltrans	CCTV	Cities/County *	Alameda CTC or CCTA
		MVDS	Cities/County *	Alameda CTC or CCTA
		TSP	Cities/County *	CCTA/Alameda CTC*
East Bay SMART Corridor Equipment - NOT used for ICM Strategy	Caltrans	CCTV	NONE	NONE
		MVDS	NONE	NONE
		TSP	NONE	NONE
	Non-Caltrans	CCTV	Cities/County	Cities/County
		MVDS	NONE	NONE
		TSP	Cities**	Cities**
I-80 ICM Equipment - Used for ICM Strategy	Caltrans	CCTV	Caltrans	Caltrans
		MVDS	NONE	NONE
		TRAILBLAZERS	Caltrans	Caltrans
		TRAFFIC SIGNAL	Caltrans	Caltrans
		TSP	Caltrans	Caltrans
		EVP	Caltrans	Caltrans
	Non-Caltrans	CCTV	Cities/County (CC only) *	CCTA***
		MVDS	Cities/County (CC only) *	CCTA***
		TRAILBLAZERS	Cities/County	Alameda CTC or CCTA
		TRAFFIC SIGNAL	Cities/County	Cities/County
		TSP	Cities/County	Alameda CTC or CCTA
		EVP	Cities/County	Cities/County

I-80 ICM Equipment - Other/ Requested by Cities	Caltrans	Ramp Meter HOV TSP	Caltrans	Caltrans
	Non-Caltrans	OAKLAND: PTZ cameras Arterial CMS Intersection Detection (VID, Magnetometer), Video Encoders	Oakland	Oakland
		BERKELEY: Intersection Video Detection	Berkeley	Berkeley
		RICHMOND: Intersection Video Detection	Richmond	Richmond
		PINOLE: Speed feedback signs	Pinole	Pinole

NOTES:
* Contra Costa cities may contract with Contra Costa County for maintenance of these devices.
** No TSPs in Contra Costa County that are not used for I-80 ICM Strategy.
*** No new CCTV or MVDS in Alameda County.

Refer to Attachment C for detailed estimates of operations and maintenance costs in each jurisdiction. Responsibility for funding O&M costs is detailed in Table 5 above. The estimates are provided to document assumptions on how the O&M costs are derived.

IX. FUTURE MOU MODIFICATIONS

This MOU is a legally non-binding document. However, revisions to this MOU may be requested by the I-80 TCC and approved by the CSC. Revisions may also be recommended by the CSC. In either case, implementation of changes to the MOU would require a written amendment by all the partnering agencies that are signatories of this MOU. This MOU expires after ten years from the date of its execution, unless extended by partnering agencies pursuant to an approved amendment.

X. NEED FOR ADDITIONAL AGREEMENTS

New maintenance agreements or amendments to existing maintenance agreements between Caltrans and affected jurisdictions will be developed and executed as necessary to address maintenance arrangements, liabilities, or any other legal issues.

The parties to this MOU specifically repudiate the division of liability and indemnification outlined in Government Code section 895.2, and will address these topics in a future agreements.

Signature Page to include signature lines for the following partnering agencies:

Caltrans	City of Emeryville
Alameda CTC	City of Oakland
CCTA	City of San Pablo
WCCTAC	City of Richmond
Contra Costa County	City of Pinole
City of Albany	City of Hercules
City of El Cerrito	AC Transit
WestCAT	City of Berkeley

ATTACHMENT A

Ramp Metering Locations

Location	Lane Configuration		City
EASTBOUND			
Powell St.	2		Emeryville
Ashby Ave./Potter St.	2		Berkeley
University Ave.	2		Berkeley
Gilman St.	2		Berkeley
Buchanan St.	1		Albany
Central Ave.	2		Richmond
Carlson Blvd.	2		Richmond
Cutting Blvd. (loop ramp)	1		Richmond
Cutting Blvd.	2		Richmond
San Pablo Ave.	2		Richmond
San Pablo Dam Rd.	1		San Pablo
El Portal Dr.	2		Richmond
Eastbound Hilltop Dr. (loop ramp)	1		Richmond
Westbound Hilltop Dr.	1+1*		Richmond
Eastbound Fitzgerald/ Richmond Pkwy. (loop ramp)	2		Pinole
Westbound Fitzgerald/Richmond Parkway	1		Richmond
Southbound Appian Way (loop ramp)	1		Pinole
Northbound Appian Way	2		Pinole
Pinole Valley Rd.	1		Pinole
John Muir Pkwy. (SR-4)	By another project		
Willow Ave.	By another project		
Cummings Skyway	By another project		

Note: * Denotes TSP for HOV By-pass Lane

Ramp Metering Locations

Location	Configuration		City
WESTBOUND			
San Pablo Ave. / Pomona St.	1		CC County
Cummings Skyway	1		CC County
Willow Ave.	By another project		
John Muir Parkway (SR-4)	2+1*		Hercules
Pinole Valley Rd.	2		Pinole
Appian Way	2		Pinole
Fitzgerald Dr./Richmond Parkway	1		Richmond
Westbound Hilltop Dr. (loop ramp)	1+1*		Richmond
Hilltop Dr.	1+1*		Richmond
El Portal Dr.	2		CC County
San Pablo Dam Rd.	2		San Pablo
Solano Ave.	1		Richmond
Barrett Ave.	2		Richmond
Potrero Ave.	2		Richmond
Carlson Blvd.	2		Richmond
Central Ave.	1		Richmond
Buchanan St.	2		Albany
Gilman St.	1+1*		Berkeley
University Ave. (loop)	1+1*		Berkeley
Ashby Ave. & Frontage Rd.	2+1*		Berkeley
Powell St./Frontage Rd.	2		Emeryville
Powell St.	1		Emeryville

Note: * Denotes TSP for HOV By-pass Lane

ATTACHMENT B

ATTACHMENT C