Agenda Item No. 3

METROPOLITAN
TRANSPORTATION
COMMISSION

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Memorandum

TO: Operations Committee

DATE: September 7, 2012

FR: Executive Director

W. I.: 6035

RE: Condition of Highway Operations Equipment

Bay Area highways are instrumented with Intelligent Transportation Systems technologies to maximize the effectiveness of the transportation system, enable Caltrans and CHP's real-time monitoring and management of the region's highway system; enhance incident response and management; reduce impacts due to recurrent congestion, highway construction and maintenance activities, or major special events; and help disseminate traveler information.

The San Francisco Bay Area Traffic Operations System (TOS) is comprised of the regional Transportation Management Center (TMC), 2,334 vehicle detection or traffic monitoring stations with 7,533 sensors; 353 CCTV cameras used for incident verification and monitoring; 128 Changeable Message Signs (CMSs); and 347 Ramp Metering Systems. Unfortunately, and in spite of considerable capital investment of regional discretionary funds, the State has failed to fully fund and staff necessary maintenance and operations of the system. Accordingly, key functions of the system are performing at unacceptable levels of service.

Reported Condition of Highway Infrastructure

Recent media coverage reported that a high percentage of the Caltrans traffic monitoring station highway sensors (primarily inductive loops and wireless detectors) were non-operational and implied that as a result the travel times displayed on the changeable message signs were inaccurate. The media also reported that only 151 out of a total inventory of 353 cameras were properly functioning which represented a 57% operational failure rate.

Clearly, the traffic monitoring system is not operating as well as either MTC or Caltrans would like. Caltrans has reported that there are several contributing factors that can lead to a malfunctioning sensor. Reasons for delay of repairs can range from an issue with the field equipment (detector, roadside controller cabinet, modem switch, or communication equipment) to a lack of maintenance staff resources and funding; additionally, Caltrans reports operability challenges due to an unprecedented amount of active highway construction, increasing vandalism and copper wire theft, and a back log of operation and maintenance needs. None of these problems are insurmountable, however, especially if adequate staffing and resources are secured to address them.

Contrary to the media report, travel times on the changeable message signs have not been adversely affected, largely because MTC has built a parallel data collection system for 511's needs. The media coverage focused exclusively on the Caltrans-owned network of roadway sensors. The majority of the data for the travel times on the message signs is provided by 511. The following data sources are used by 511:

1) anonymized data based on Fastrak® tags using special 511 roadside detectors (30%); 2) purchased radar data (26%); and, 3) Caltrans sensor data (9%). In places where no data is available, 511 estimates traffic speed by interpolating data based upon neighboring roadway sections or using historical data (35%). To ensure accuracy, 511 staff regularly monitors the travel times on message signs using probe vehicle runs and through observations of traffic map patterns.

Recent & Planned Highway Infrastructure Investments

MTC continues to work in partnership with Caltrans and the CHP to complete and maintain the region's highway infrastructure. Recent investments (see Attachment A and the attached Powerpoint for details) included implementation of:

Infrastructure	10-Year Capital Investment ($M)
TMC Upgrade (ATMS & Video Wall)	$ 3.1
Center to Center - Smart Corridor Data Exchange System	$ 3.6
CCTV Camera Upgrade	$ 8.0
Asset Management Database	$ 0.6
Total	**$15.3**

Additionally, in the past ten years, MTC has invested $7 million in the 511 data collection system and $127 million in ramp metering implementation as part of the Freeway Performance Initiative (FPI). Operating the freeway system efficiently will continue to be a high priority into the future, especially as we advance new enterprises that depend upon effective operations of freeway management systems, such as the Express Lanes Network.

Next Steps

Over the next several months, MTC staff intends to work with Caltrans and the CHP to develop a Corridor Management Concept of Operations that will prioritize operational and capital strategies to support the sustainability of the existing and future infrastructure. Recognizing that it is unlikely that existing state resources can fully address this need, staff proposes exploring alternative arrangements to enhance management and operation of the region's freeway network. These may include: 1) working with Caltrans District 4, Caltrans Headquarters, and the Governor's Transportation Agency to define an alternative institutional arrangement to correct this serious problem; or, 2) redirecting future regional investments until a sustainable maintenance structure is in place from the state. MTC staff will provide a status report to this Committee on these issues early next year. In the meantime, we welcome your comments and suggestions at your meeting next week.

Steve Heminger

SH:RTV

Attachment A

- **TMC Upgrade-ATMS and Video Wall ($3.1M):** Caltrans and MTC partnered to replace and integrate multiple legacy systems used at the Transportation Management Center to remotely activate, monitor, and diagnose its traffic control and monitoring devices or "field elements" through an Advanced Traffic Management System (ATMS). The ATMS is used in other California urban Districts and helps operators manage incidents more efficiently. The ATMS includes automated response plans for freeway incidents. In the next few years, functionality will be added, including integration of the arterial traffic signals with the ATMS to allow remote operations of signals, modification of signal timing plans and efficient coordination between the freeway and arterial systems during major emergencies or major special events.

  Both the video wall and the uninterruptable power supply (UPS) system at the TMC reached the end of their service life in 2011. MTC and Caltrans partnered to replace and upgrade the UPS and video wall, resulting in significant efficiencies and including a six year maintenance and warranty plan.

- **Center to Center - Smart Corridor Data Exchange System ($3.6M):** The intent of this program is to provide a means to share video, sensor and incident data amongst various city, regional and Smart Corridor Traffic Management Centers.

- **CCTV Camera Upgrade ($8.0M):** Under a project called Bay Area Video Upgrade or "BAVU", MTC has upgraded and/or replaced approximately 300 CCTV camera field sites. Functionality of cameras would be improved through upgrades of the current communication infrastructure.

- **Asset Management Database ($0.6M):** Under a project called TOS Equipment Management System or "TEMS," MTC and Caltrans have developed a comprehensive relational database to serve as a baseline inventory of field assets (geocoding location, recording age and overall health). An accurate inventory is an essential first step to effective maintenance and management. Caltrans is currently verifying field elements for inclusion in the database; however, this effort could be accelerated with increased staffing and resources.

Management and Funding of TMC and Freeway Operations

MTC Operations Committee
September 14, 2012

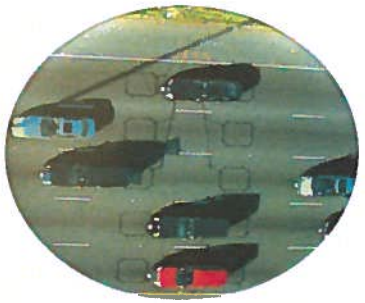
Regional Highway Infrastructure

Ramp Metering Systems

Regional TMC

Benefits of Highway Infrastructure

- Maximize effectiveness of the Transportation system
- Enable real-time monitoring and management
- Enhance incident response & management
- Disseminate Traveler Info



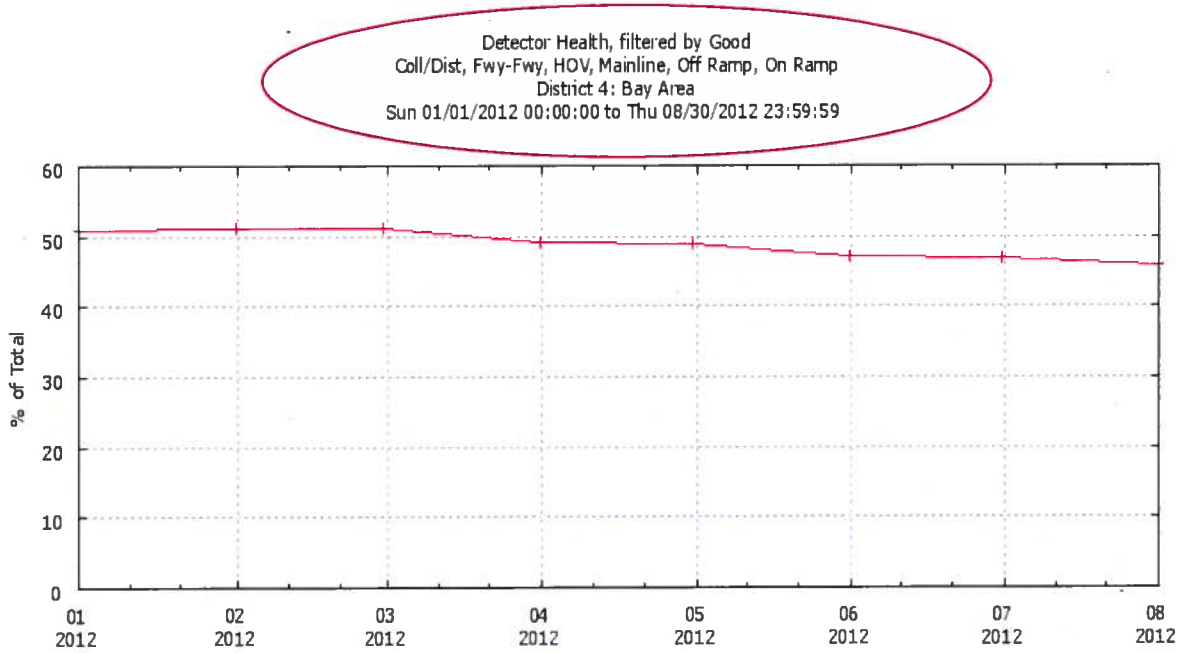
Existing Condition of Highway Infrastructure

Highway Infrastructure	Total	Operational
Freeway Sensors (Caltrans)	7,533	49%
511 Sensors (MTC)	446	97%
Changeable Message Signs	128	90%
Cameras- Traffic Monitoring & Incident Management	353	60%
Ramp Metering Systems	347	Unknown

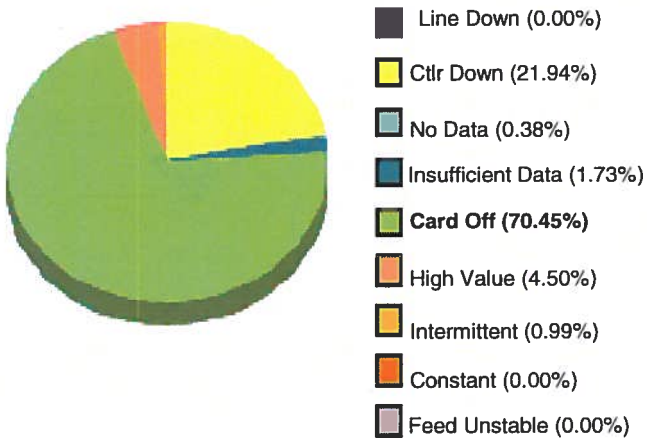
Freeway Sensor Performance

Performance Evaluation Monitoring System (PeMS)

- Statewide Sensors Reliability Goal: 70%
- During the past 8 months, roughly 50% of Caltrans' sensors installed in the roadway are functional.



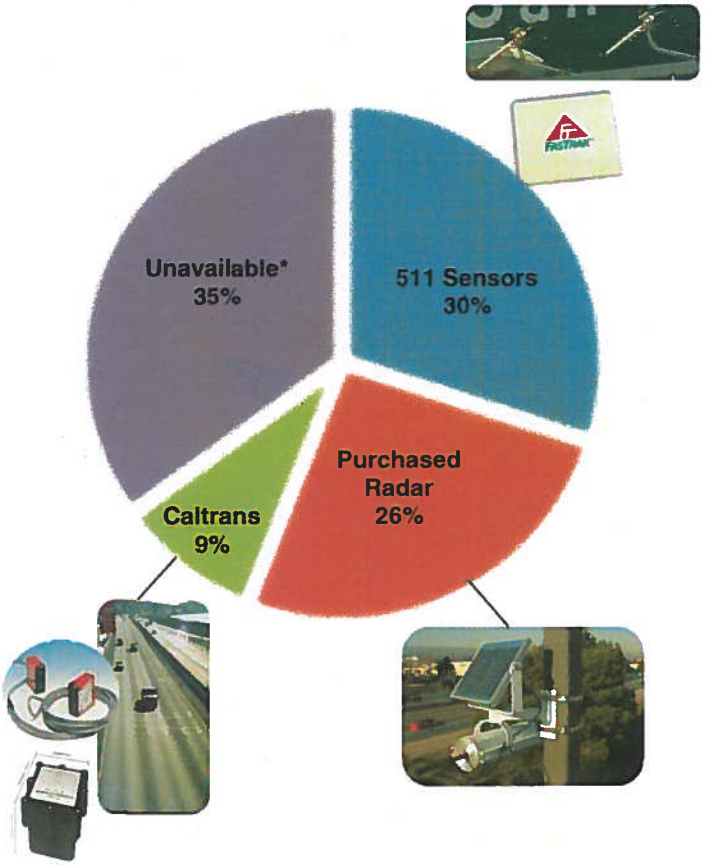
Suspected Errors



Travel Times on CMS

- 128 CMS - 33 with Travel Times
- 511 provides raw data used by Caltrans on CMSs
- Caltrans calculates the CMS travel times
- 511 conducts performance monitoring of CMS travel times
- Due to advances in technology, 511 will begin using GPS probe-based data at lower cost and greater coverage

511 Data Sources



*When a data source is unavailable, 511 uses interpolated or historical data.

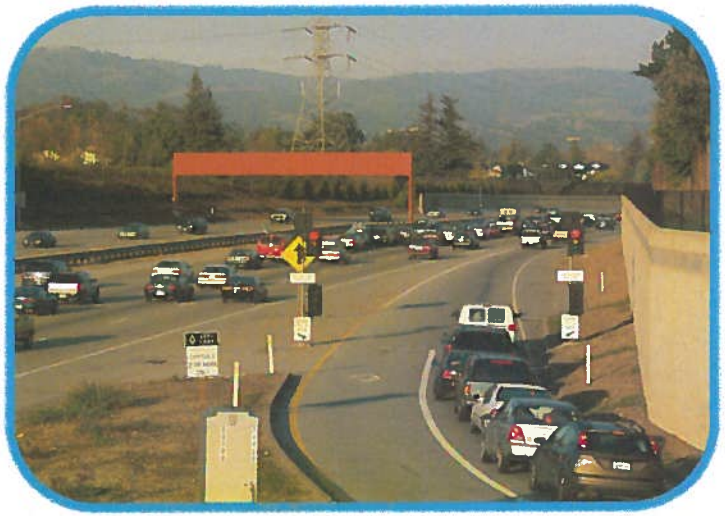
CCTV Cameras

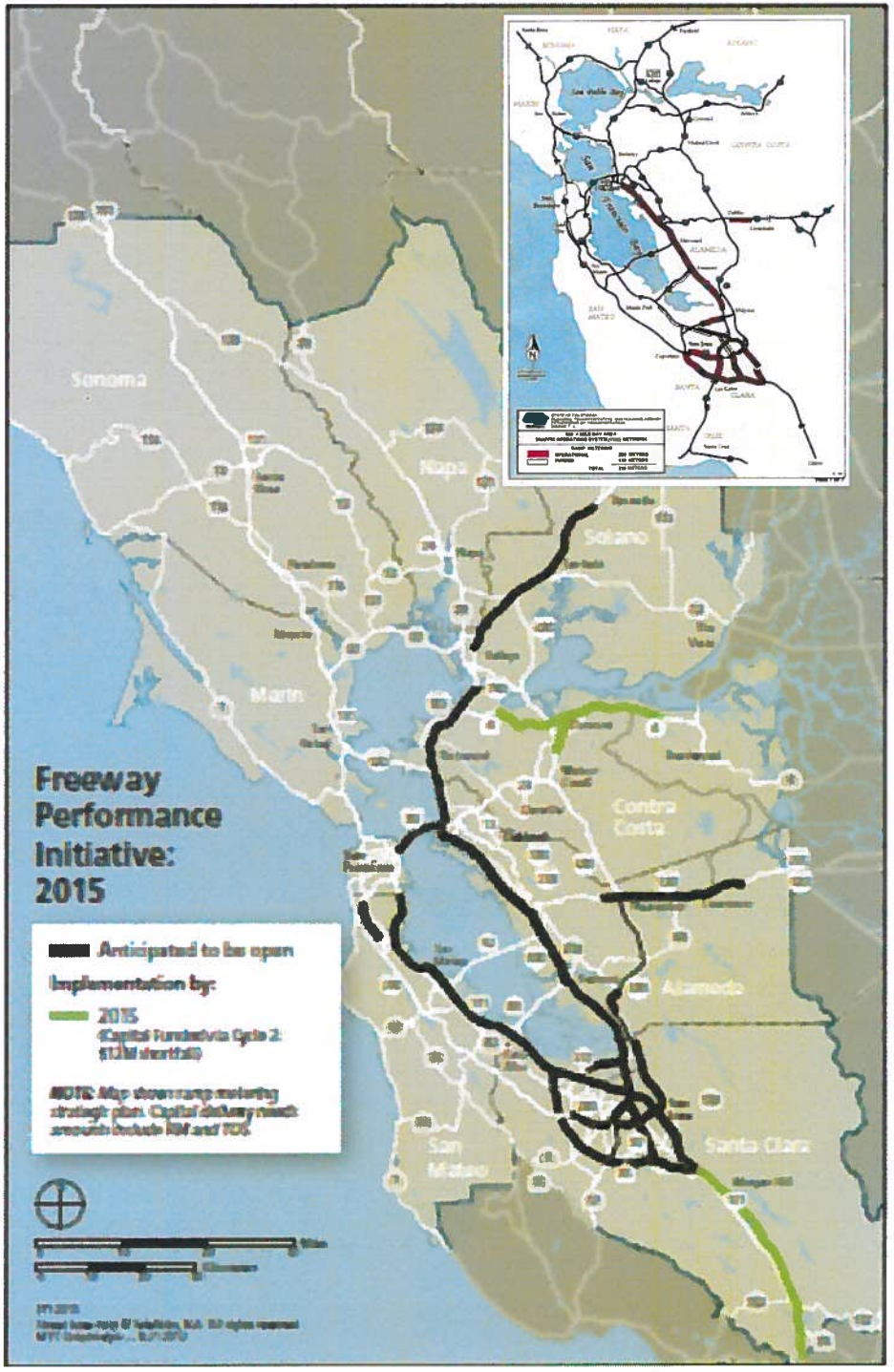
- Upgraded 353 CCTV cameras
- $8M in camera upgrades
- 186 are Operational
- Communication infrastructure needs investment

Communication Infrastructure	% of Cameras	Reliability
ISDN	93%	Poor
DSL	3%	Good
Fiber	2%	Excellent
T-1	1%	Good
Wireless	1%	Fair

Ramp Metering

To be expanded from 347 locations (28% of system) to 500 locations (44% of the system) by 2015





MTC's Current Contribution to ITS Infrastructure

- FPI capital -MTC $152M & Caltrans $27M in last 3 years
- 511 Data Collections – MTC $6.9M
- Freeway Concept of Operations- MTC $15.3M

2002 Freeway Concept of Operations	10-Year Capital Investment
TMC Upgrade (ATMS & Video Wall)	$3.1M
Center to Center	$3.6M
CCTV Upgrade	$8.0M
Asset Management Database	$0.6M
Total	**$15.3M**