



METROPOLITAN
TRANSPORTATION
COMMISSION

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Memorandum

TO: Operations Committee

DATE: May 3, 2013

FR: Steve Heminger, Executive Director

W. I. 6037

RE: Proposed MTC Traffic Operations System (TOS) Policy Update – MTC Resolution No. 4104

In March 2004, the Commission adopted a Traffic Operations System (TOS) and Major New Freeway Projects Policy to require the inclusion of TOS elements in major, new freeway projects. This policy was only partially effective because TOS elements were being installed but not necessarily activated. MTC staff proposes to revamp the TOS Policy to: 1) establish a more action-oriented approach to installing and operationalizing the freeway TOS elements and 2) encourage compliance by conditioning MTC discretionary funding based on meeting the requirements of the TOS Policy. Staff recommends this policy be adopted by the Commission as MTC Resolution No. 4104.

Background

The 2004 TOS Policy was incorporated into the Transportation 2030 Plan and subsequent regional transportation plans as well as the Regional Transportation Improvement Program (RTIP) policies and procedures. TOS elements include changeable message signs, closed-circuit television cameras, traffic monitoring systems, highway advisory radio, traffic detectors, and ramp meters. Installing TOS equipment during the construction phase, rather than after a project is completed, is significantly more cost-effective. Further, a complete system of TOS installed and operated on the Bay Area's freeway system allows for the effective management of traffic within a corridor. It may also be coordinated with local transportation management systems to maximize overall effectiveness.

TOS Policy in Practice

Since 2004, the TOS Policy enabled MTC and Caltrans to make significant progress in installing TOS elements as part of major, new freeway projects. The MTC Freeway Performance Initiative (FPI) further expanded the number of freeway locations equipped with TOS/ramp metering equipment. While the region has realized some tangible success with the 2004 TOS Policy, the policy is limited by the following factors:

- **Limitations of the 2004 TOS Policy:** The TOS Policy focuses on the installation but not the activation of the TOS elements. For ramp meters in particular, has been a significant constraint. For example, ramp meters and other TOS equipment have been installed along various segments along SR-4 in Contra Costa County, I-80 in Solano County, and US-101 in Marin and Sonoma Counties but the meters have sat idle awaiting activation. They also become inoperable or subject to damage or copper theft, as exemplified by SR-4 equipment that is under repair at a cost of \$970,000.
- **Repetitive Consensus Building:** Through the FPI, MTC—in partnership with Caltrans, CMAs, and local agencies—has led ramp metering studies to assess existing traffic conditions, develop ramp metering timing plans, and foster consensus and support for metering. In addition, Caltrans

has a practice where the activation of ramp metering is contingent upon unanimous agreement with local agencies along the corridor. This agreement is memorialized by the execution of Memorandum of Understandings (MOUs). We have learned that execution of these MOUs is a voluntary practice of Caltrans District 4 and is not required by either District 4 or Headquarters' policy.

- **Excessive Caution in Planning Studies:** MTC and Caltrans have long relied on planning practices that slow activation. With each corridor, the process starts with a feasibility study to determine metering efficacy, initiate the design and construction, and then engage in the MOU discussion. Once the MOUs are executed, metering plans are developed to set timing rates and then finally activate the meters. At a minimum, the feasibility study is a paper exercise that has minimal impact, given the region's experience, as well as the widely documented safety and mobility benefits gained from metering.

New Recommended Approach to TOS Policy

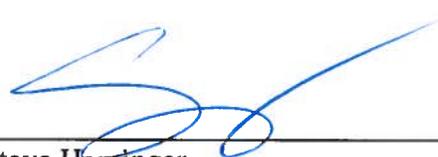
When a corridor has a usable segment, staff believes it is more effective to state the safety and mobility benefits of ramp metering to stakeholders up front, develop the ramp metering plan during the construction phase, and activate the meters immediately following the completion of a ramp metering plan. Issues such as queues from metered ramps impeding operations of local streets or near-term freeway congestion insufficient to warrant ramp metering can be addressed and mitigated on a case-by-case basis. In some instances, ramp meters can be set to green or at a demand rate for safety or incident management purposes. This approach will significantly accelerate metering activations.

MTC staff proposes to revamp the TOS Policy to reflect a more action-oriented approach to activating ramp meters/TOS elements and to encourage compliance by conditioning MTC discretionary funding on meeting the requirements of the TOS Policy (see **Attachment A**). The new policy elements are as follows:

- **TOS Activation:** All major new freeway projects must include the installation and *activation* of TOS/ramp metering to effectively manage and operate the region's freeway system and coordinate with local transportation management systems.
- **Ramp Metering Operating Principles:** Operating principles for ramp metering are added to the TOS Policy to guide the operations of ramp meters and provide assurances to local agencies about how potential impacts are to be addressed and mitigated. Note that the inclusion of these operating principles into the TOS Policy would negate the need for Caltrans to execute MOUs.
- **Funding Conditions:** For any jurisdiction in which MTC finds that ramp meters are installed but not in operation, MTC will consider suspending fund programming actions for federal and state discretionary programs until the Ramp Metering Plan is implemented and activated.

Recommendation

Staff recommends that this Committee refer MTC Resolution No. 4104 to the Commission for approval.



Steve Heminger

SH:AN

Attachment A
MTC Traffic Operations System (TOS) Policy¹

~~It is the Commission's policy that~~ All major, new freeway projects included in the Transportation 2030 Plan and subsequent regional transportation plans shall include *the installation and activation of freeway* traffic operations system (TOS) elements to effectively operate the region's freeway system and coordinate with local transportation management systems. For purposes of this policy, a "major freeway project" is a project that adds lanes to a freeway, constructs a new segment of freeway, modifies a freeway interchange, or reconstructs an existing freeway. A project is considered "new" if it does not have an approved Project Study Report (PSR) by December 2004 *or applicable scoping document. TOS elements may include, but are not limited to, changeable message signs, closed-circuit television cameras, traffic monitoring stations & detections, highway advisory radio, and ramp meters.* ~~Caltrans shall operate, manage, maintain and replace the TOS elements installed within its right of way.~~

Policy Implementation:

To effectively implement this policy, the Commission requests that Caltrans:

- Work with MTC and the CMAs to develop guidelines to determine which TOS elements are appropriate for specific major new freeway projects, considering local conditions, congestion level and other factors;
- Work with the CMAs to identify the proposed major new freeway projects that are subject to this policy, and to define the number, types and costs of TOS elements to be included in these projects;
- Develop and implement an on-going process to review major new freeway projects for appropriate TOS elements *in applicable scoping documents such as Project Study Reports (PSRs) and Project Initiation Documents (PIDs)* and design documents; and
- Develop and maintain an inventory of existing TOS elements installed in the region's freeway system, and their operational status to ensure ongoing system maintenance.

Specifically, ramp meters shall be activated upon completion of a Ramp Metering Plan. To guide the operations of ramp meters, Caltrans, in consultation with MTC, the Congestion Management Agency and local agencies, shall, to the extent feasible, apply the following operating principles:

1. *Ensure that queues from metered ramps do not impede operation of local streets and intersections or block access to private property. Should this occur, each location should be examined on a case-by-case basis by Caltrans and local agency. Operational problems that cannot be corrected by existing equipment could be candidates for future operational and/or capital improvements.*
2. *Ensure that no communities are burdened with ramp delays that are disproportionate or excessive.*
3. *Ensure that if queues at metered ramps cannot be accommodated within the constraints defined in items 1 and 2 above, metering rates will be set to green or at the demand rate during the time period necessary to eliminate the negative impact the metering light is having on the adjoining local roadway or intersections. In these instances, each location should be examined on a case-by-case basis by Caltrans and local agency.*
4. *Coordinate freeway and arterial operations to ensure efficient operation of both facilities.*
5. *Promote high occupancy vehicles (HOV) preferential lanes at on-ramps where needed and if feasible.*

¹ Text shown in bold italics is new to the 2004 MTC TOS Policy. Text shown in strikethrough is deleted from policy.

Funding Conditions:

Any jurisdiction in which MTC finds that ramp metering and TOS elements are installed but not activated or in operation, MTC will consider suspending fund programming actions for federal and state discretionary funds until the Ramp Metering Plan is implemented and the ramp meters and related TOS elements are activated and remain operational and MTC deems the requirements of the regional TOS policy have been met. Furthermore, in any county in which a jurisdiction fails to include the installation and activation of TOS elements in an applicable freeway project, including ramp metering as identified in the Ramp Metering Plan, projects to install and activate the appropriate ramp meters and TOS elements omitted from the project shall have priority for programming of new future discretionary funding for that county.

Ramp Metering Status April 2013

Legend

RAMP STATUS

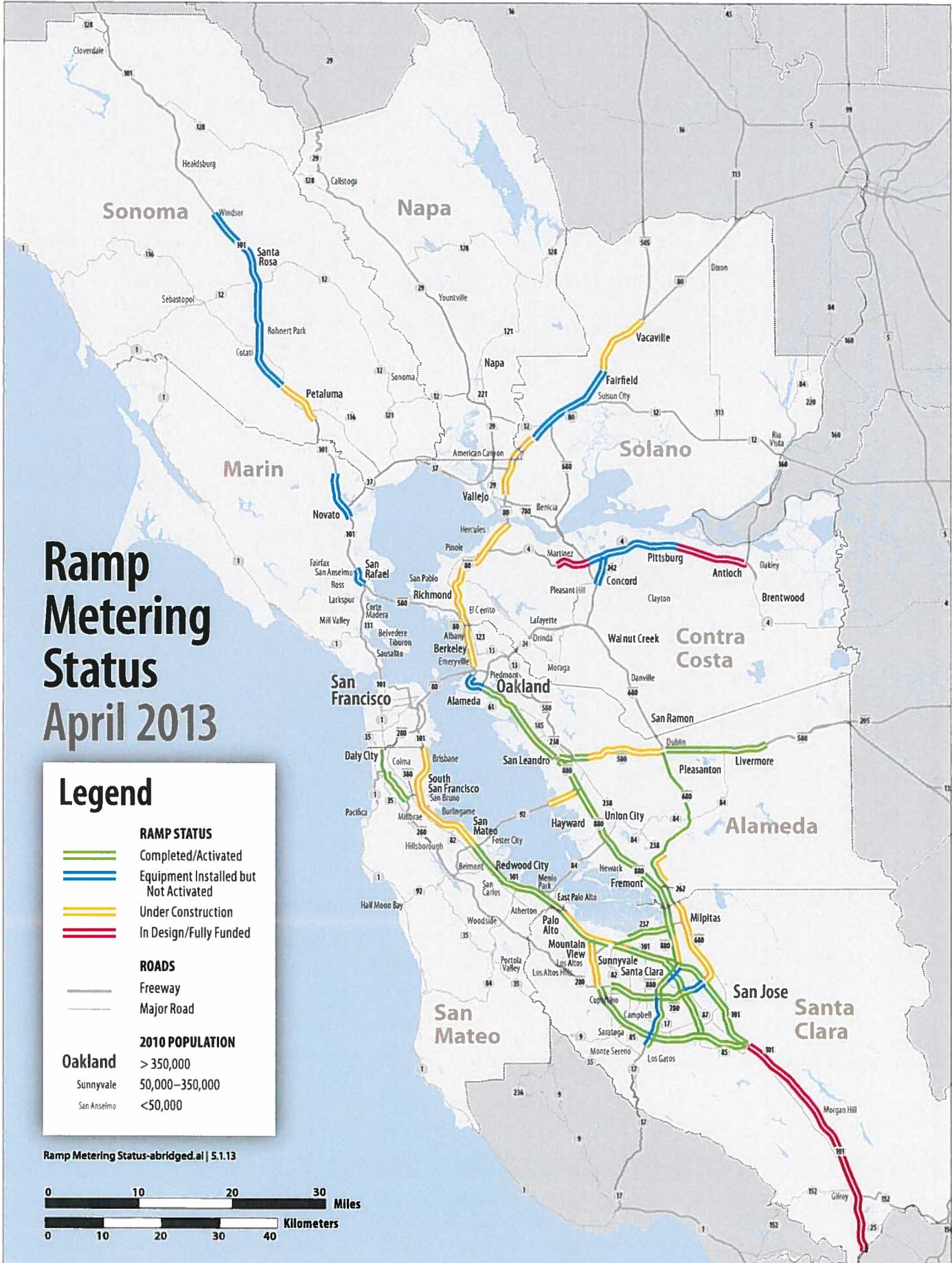
- Completed/Activated
- Equipment Installed but Not Activated
- Under Construction
- In Design/Fully Funded

ROADS

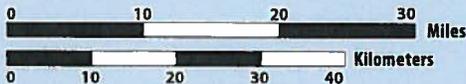
- Freeway
- Major Road

Oakland 2010 POPULATION

- Oakland > 350,000
- Sunnyvale 50,000–350,000
- San Anselmo < 50,000



Ramp Metering Status-abridged.ai | 5.1.13



Date: May 22, 2013
W.I.: 6037
Referred by: Operations

ABSTRACT

Resolution No. 4104

This resolution adopts the updated MTC Traffic Operations System (TOS) Policy for the San Francisco Bay Area.

Further discussion of these actions is contained in the MTC Executive Director's Memorandum to the MTC Operations Committee dated May 3, 2013.

Attachment A – MTC Traffic Operations System (TOS) Policy

Date: May 22, 2013
W.I.: 6037
Referred by: Operations

RE: Adoption of the MTC Traffic Operations System (TOS) Policy

METROPOLITAN TRANSPORTATION COMMISSION
RESOLUTION NO. 4104

WHEREAS, the Metropolitan Transportation Commission (MTC) is the regional transportation planning agency for the San Francisco Bay Area pursuant to Government Code Section 66500 *et seq.*; and

WHEREAS, MTC has adopted and periodically revises, pursuant to Government Code Sections 66508 and 65080, a Regional Transportation Plan (RTP); and

WHEREAS, MTC adopted the MTC Traffic Operations System (TOS) and Major New Freeway Projects Policy as part of the Transportation 2030 Plan in March 2004; and

WHEREAS, MTC has assessed the implementation of the 2004 MTC Traffic Operations System and Major New Freeway Policy and determined that a major update of that policy was warranted to reflect shortcomings in policy implementation and changing circumstances; and

WHEREAS, MTC has prepared a new MTC Traffic Operations System (TOS) Policy for inclusion in Plan Bay Area and subsequent regional transportation plans; now, therefore, be it

RESOLVED, that MTC adopts the new MTC Traffic Operations System (TOS) Policy, as set forth in Attachment A of this resolution, and rescinds the 2004 TOS and Major New Freeway Projects Policy.

METROPOLITAN TRANSPORTATION COMMISSION

Amy Rein Worth, Chair

The above resolution was entered into by the Metropolitan Transportation Commission at a regular meeting of the Commission held in Oakland, California, on May 22, 2013

Date: May 22, 2013
W.I.: 6037
Referred by: Operations

Attachment A
MTC Resolution No. 4104
Page 1 of 2

Attachment A MTC Traffic Operations System (TOS) Policy

All major, new freeway projects included in the Transportation 2030 Plan and subsequent regional transportation plans shall include the installation and activation of freeway traffic operations system (TOS) elements to effectively operate the region's freeway system and coordinate with local transportation management systems. For purposes of this policy, a "major freeway project" is a project that adds lanes to a freeway, constructs a new segment of freeway, modifies a freeway interchange, or reconstructs an existing freeway. A project is considered "new" if it does not have an approved Project Study Report (PSR) by December 2004 or applicable scoping document. TOS elements may include, but are not limited to, changeable message signs, closed-circuit television cameras, traffic monitoring stations & detections, highway advisory radio, and ramp meters.

Policy Implementation:

To effectively implement this policy, the Commission requests that Caltrans:

- Work with MTC and the CMAs to develop guidelines to determine which TOS elements are appropriate for specific major new freeway projects, considering local conditions, congestion level and other factors;
- Work with the CMAs to identify the proposed major new freeway projects that are subject to this policy, and to define the number, types and costs of TOS elements to be included in these projects;
- Develop and implement an on-going process to review major new freeway projects for appropriate TOS elements in applicable scoping documents such as Project Study Reports (PSRs) and Project Initiation Documents (PIDs) and design documents; and
- Develop and maintain an inventory of existing TOS elements installed in the region's freeway system, and their operational status to ensure ongoing system maintenance.

Specifically, ramp meters shall be activated upon completion of a Ramp Metering Plan. To guide the operations of ramp meters, Caltrans, in consultation with MTC, the Congestion Management Agency and local agencies, shall, to the extent feasible, apply the following operating principles:

1. Ensure that queues from metered ramps do not impede operation of local streets and intersections or block access to private property. Should this occur, each location should be examined on a case-by-case basis by Caltrans and local agency. Operational problems that cannot be corrected by existing equipment could be candidates for future operational and/or capital improvements.

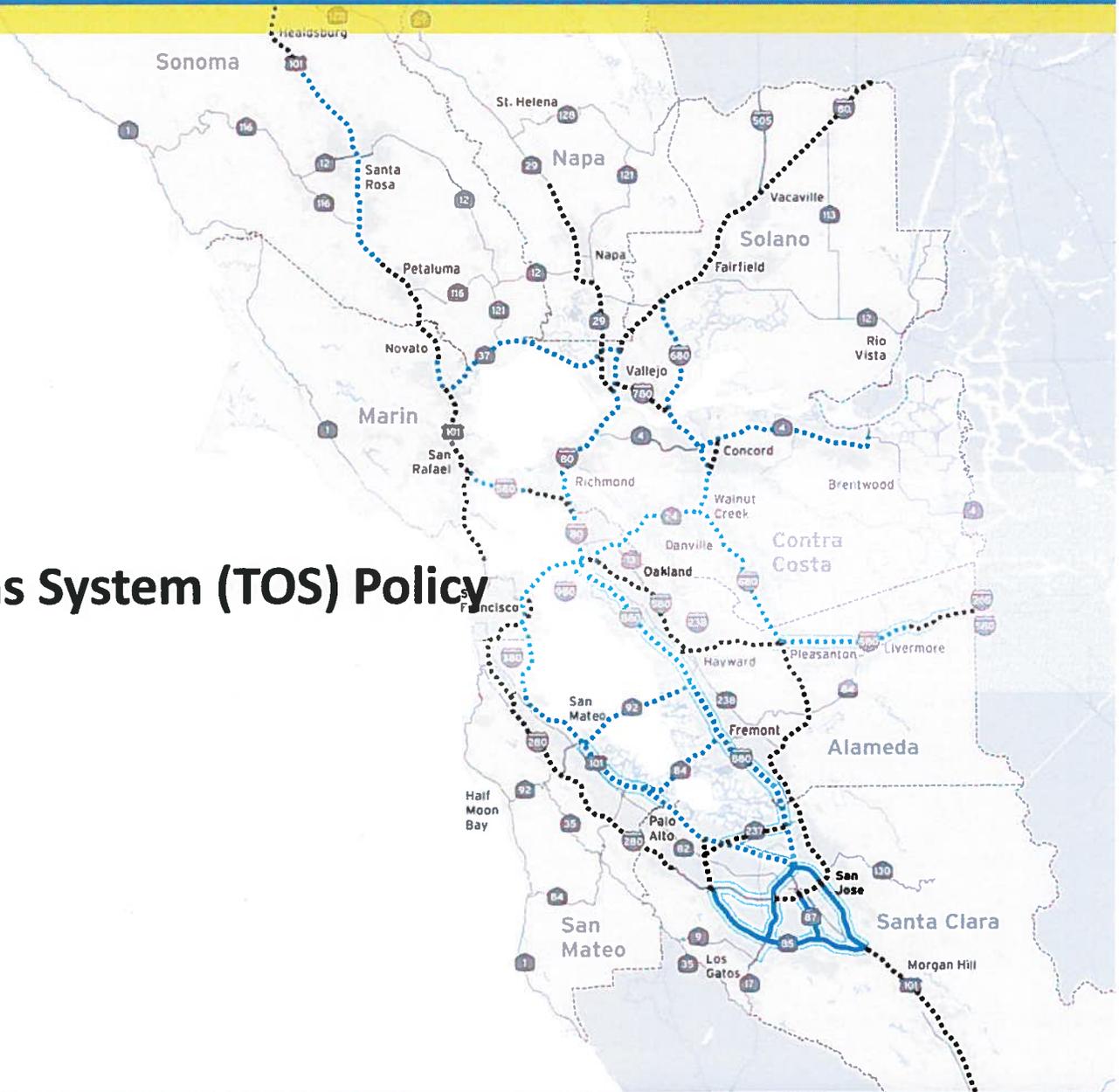
2. Ensure that no communities are burdened with ramp delays that are disproportionate or excessive.
3. Ensure that if queues at metered ramps cannot be accommodated within the constraints defined in items 1 and 2 above, metering rates will be set to green or at the demand rate during the time period necessary to eliminate the negative impact the metering light is having on the adjoining local roadway or intersections. In these instances, each location should be examined on a case-by-case basis by Caltrans and local agency.
4. Coordinate freeway and arterial operations to ensure efficient operation of both facilities.
5. Promote high occupancy vehicles (HOV) preferential lanes at on-ramps where needed and if feasible.

Funding Conditions:

Any jurisdiction in which MTC finds that ramp metering and TOS elements are installed but not activated or in operation, MTC will consider suspending fund programming actions for federal and state discretionary funds until the Ramp Metering Plan is implemented and the ramp meters and related TOS elements are activated and remain operational and MTC deems the requirements of the regional TOS policy have been met. Furthermore, in any county in which a jurisdiction fails to include the installation and activation of TOS elements in an applicable freeway project, including ramp metering as identified in the Ramp Metering Plan, projects to install and activate the appropriate ramp meters and TOS elements omitted from the project shall have priority for programming of new future discretionary funding for that county.

Proposed MTC Traffic Operations System (TOS) Policy Resolution No. 4104

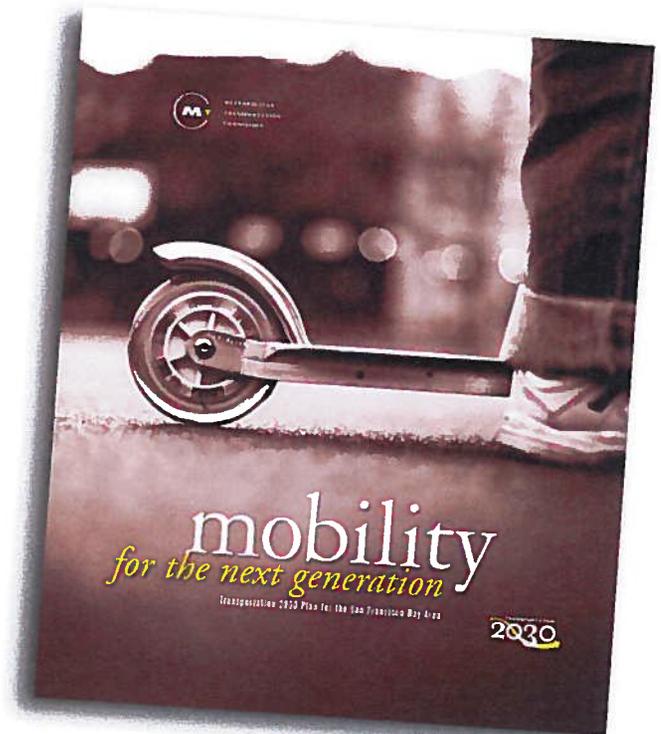
Operations Committee
May 10, 2013



MTC Traffic Operations System (TOS) Policy

Adopted March 2004

All major new freeway projects included in the Transportation 2030 Plan and subsequent regional transportation plans shall include traffic operations system (TOS) elements to effectively operate the region's freeway system and coordinate with local transportation management systems.



- **Major Freeway:** Adds lanes, constructs new segment, modifies interchange, or reconstructs an existing freeway
- **New Project:** Does not have approved Project Study Report by December 2004
- **TOS:** Includes changeable message signs, cameras, traffic monitoring stations & detections, advisory radio, and ramp meters

Ramp Metering Success Stories

San Mateo US 101

(Activated: 2007)



Alameda I-580

(Activated: 2008)



Santa Clara I-280

(Activated: 2012)



Freeway Performance Initiative:

Maximize System Performance Through Technology

Goals

- Deploy current technology to better manage the congestion on our freeway system
- Address recurrent congestion (bottlenecks) and non-recurrent congestion (incidents)

Key FPI Elements

- Traffic Operations System
- Ramp Metering
- Arterial Management
- Incident Management
- Traveler Information
- Performance Monitoring



Ramp Metering

- Managing the rate at which vehicles enter a freeway facility through traffic signals (i.e., meters)
- Ramp metering is intended to help ensure that the freeway is able to carry all the traffic it should be able to carry



Safety Effects of Ramp Metering

Smoothing of traffic on and entering the freeway significantly reduces accidents

Reduction in Accidents on Eastbound I-580, Alameda County

Before/After	Total Accidents	Fatal	Injury	Property damage Only	% Change in Total Accidents
Phase I: Hopyard On-ramp to Santa Rita On-ramp					
“Before” (6/1/02 to 5/30/03)	248	0	59	189	-21%
“After: (6/1/03 to 5/30/04)	205	1	58	146	
Phase II: Foothill On-ramp to Greenville On-ramp (including Phase I)					
“Before” (1/1/07 to 10/30/07)	197	0	58	138	-25%
“After: (1/1/08 to 10/30/08)	157	0	37	120	

Notes:

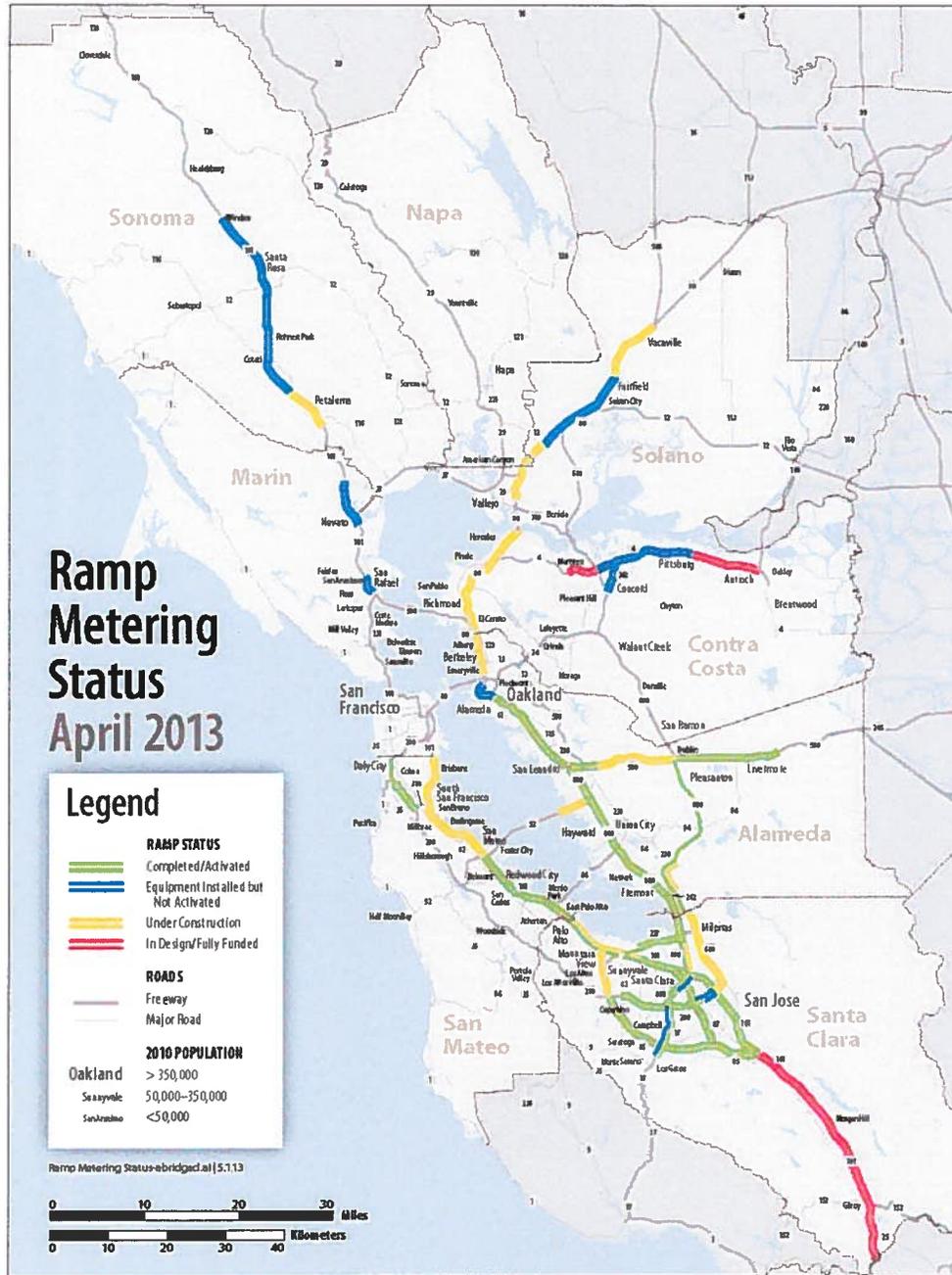
1. Source: Caltrans Traffic Surveillance and Analysis System (TASAS)
2. Metering Period (M - F 2-7 p.m.)

Mobility Effects of Ramp Metering

Increased freeway throughput of 2-5% results in measurable mobility benefits

County/ Route	Corridor	Reduction In Travel Time		Reduction In Duration of Peak Period, hours	Year of Metering Activation
		Minutes	%		
SM 101	SB Hillsdale to University	19	57	1	2007
ALA 580	EB Foothill to Greenville	11	33	2	2008
SM 280	NB Sneath to Serramonte	3	28	1	2008
SCL 85	SB Almaden to Cottle	4	52	1	2009
SCL 87	NB Route 85 to Skyport	4	30	2	2009
SCL 87	SB Charcot to Santa Teresa	9	41	1	2009
ALA 580	WB Interstate 205 to Foothill	7	24	1	2008
SCL 101	SB Embarcadero to De La Cruz	1	5	N/A	2009
SCL 880	SB Route 237 to Stevens Creek	11	38	1	2011

- **Travel Time:** Reduced 1 to 19 minutes (or 5 to 57%)
- **Duration of Peak Period:** Reduced 1 to 2 hours



2004 MTC TOS Policy Implementation

- **Limitations of 2004 TOS Policy**
 - TOS equipment are installed but not activated
 - TOS/ramp metering equipment in the field are not switched on and sit idly in state of disrepair
- **Repetitive Consensus Building**
 - Goal is to build local consensus and address local concerns
 - But, iterative discussions between locals and Caltrans about MOUs hinder activation
- **Excessive Caution in Planning Studies**
 - Linear, multi-step planning practice prolongs activation



Accelerating Metering Activation

Past Practice

Year 1

Year 2

Year 3

Year 4



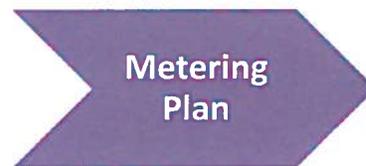
New Practice

Year 1

Year 2

Year 3

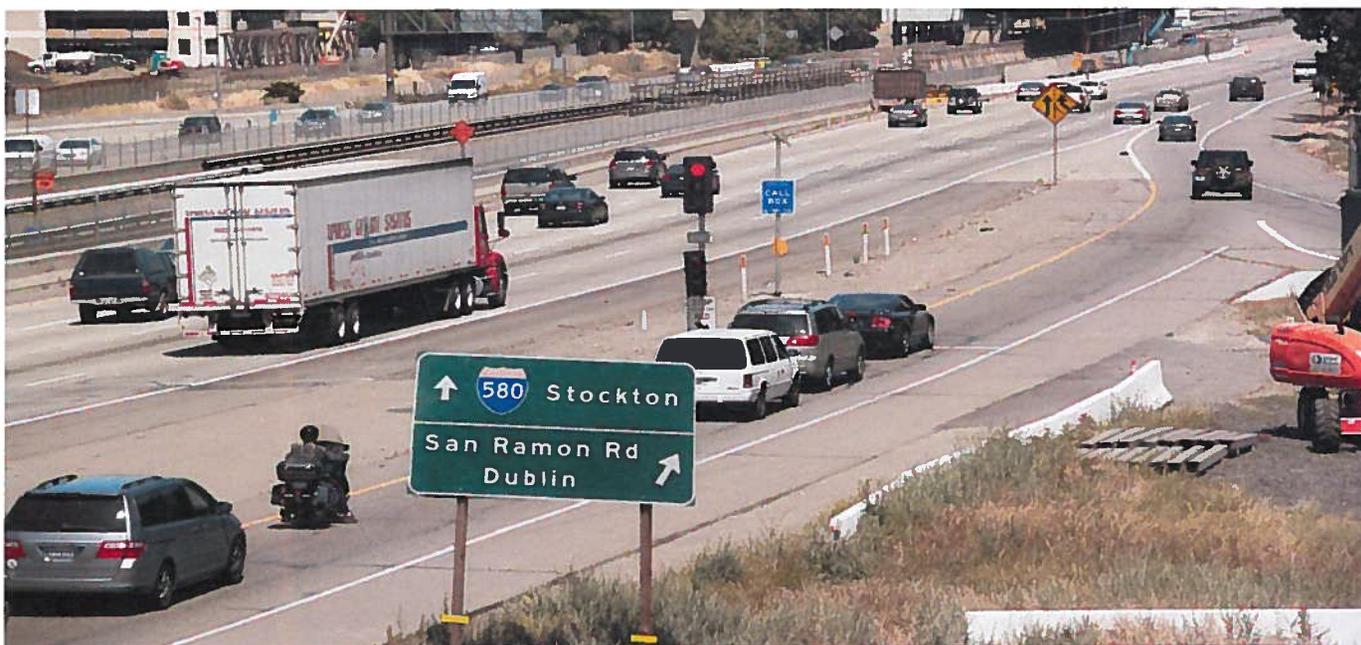
Year 4



New Recommended Approach: MTC TOS Policy (Resolution 4104)

- **TOS Installation and Activation**

- *All major, new freeway shall include the installation and **activation** of freeway traffic operations system (TOS) elements*
- *Activate ramp metering upon completion of a Ramp Metering Plan*



New Recommended Approach: MTC TOS Policy (Resolution 4104)

- **Work with CMAs and Local Agencies**
 - Build partnerships and consensus, and address and mitigate local concerns through Ramp Metering Plan effort
- **Ramp Metering Operating Principles**
 - *Queues from metered ramps do not impede operation of local streets*
 - *Communities are not disproportionately burdened with ramp delays*
 - *When queues at metered ramps cannot be accommodated, set metering rates to green or at demand rate*
 - *Coordinate freeway and arterial operations to ensure efficient operation of both facilities*
 - *Promote HOV preferential lanes at ramps where needed and if feasible*



New Recommended Approach: MTC TOS Policy (Resolution 4104)

- **Conditioning of MTC Discretionary Funds on Meeting TOS Policy Requirements**
 - *MTC will consider suspending fund programming actions for federal and state discretionary funds until the Ramp Metering Plan is implemented and ramp meters/TOS are activated*
 - *If jurisdiction fails to install and activate ramp meters/TOS, projects to install and activate the appropriate ramp meters and TOS elements omitted from the project shall have priority for programming of new future discretionary funds.*

