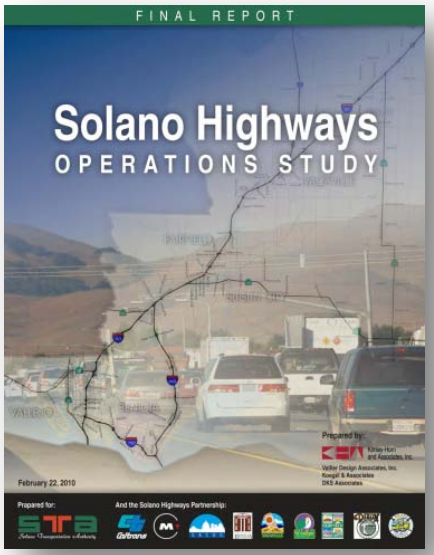
# Operation Improvements including Ramp Metering in Solano County

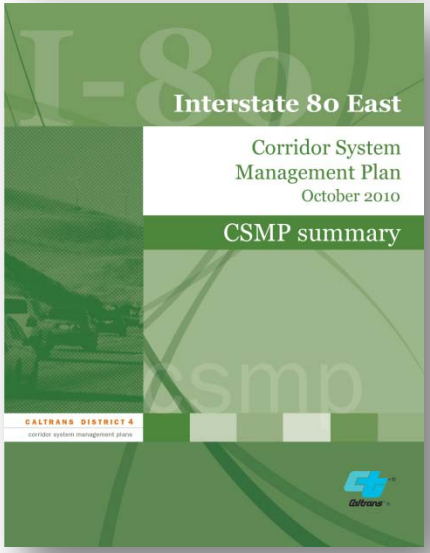

*I-80 EB at North Texas St. in Fairfield*

# Study Overview


- Solano Highways Partnership (SoHIP)

- STA Board Adopted Solano Highways Operations Study, February 2010
  - Operations Improvement Analysis & Implementation Plan
  - Landscape and Hardscape Recommendations
  - Public Outreach Toolbox
- Incorporated into Caltrans Corridor System Management Plan, October 2010
- Maximize current infrastructure with operations investments, such as ramp metering and other traffic operations system elements



# Ramp Metering is One Part

of a Complete Traffic Operations System Strategy


- Ramp Management
- High-Occupancy Vehicle (Carpool) Lanes
- Changeable Message Signs (CMS)
- Closed-Circuit Television Cameras (CCTV)
- Incident Management

I-80 WB at West Texas St. in Fairfield

# Traffic Operations System


- Traffic Monitoring Stations – Used to monitor traffic flow and detect incidents.
- Closed-Circuit Television Cameras (CCTV) – Used to identify/verify incidents & aid in response activities.
- Changeable Message Signs (CMS) – Are used to provide critical real-time traffic advisories to the motorist.

*Traffic Monitoring Stations*

*Freeway Service Patrol*


*CCTV Cameras*


*Changeable Message Signs*

# What is Ramp Metering?


- Ramp meters are traffic signals on freeway onramps that manage ramp flow rate, thus reducing demand for section of freeway mainline downstream and minimizing the possibility of exceeding freeway capacity

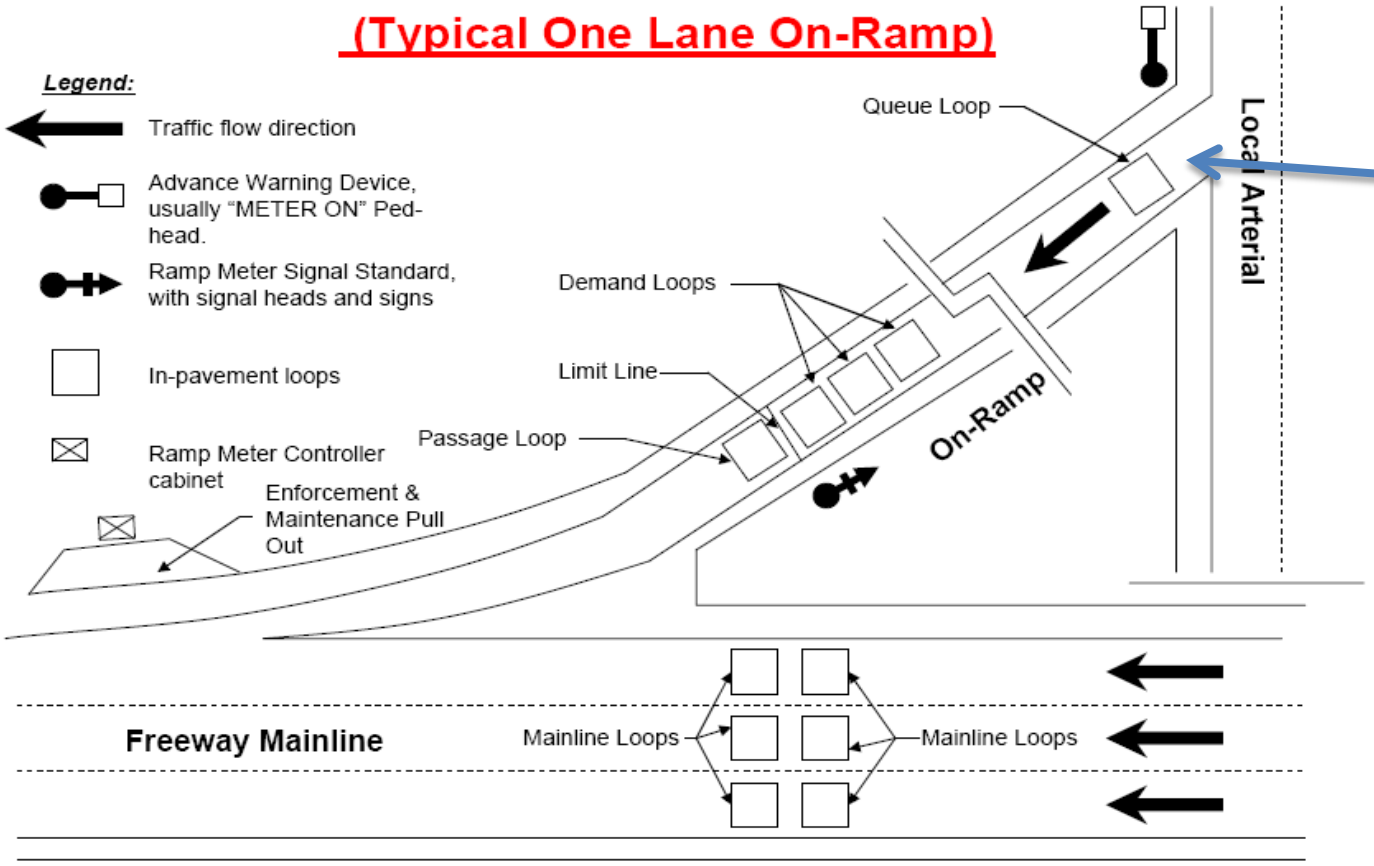
# Why Ramp Metering?


- Helps maintain the freeway at maximum performance
- Reduces total travel delay for a driver's entire commute
- Provides consistent travel times for travelers
- Provides Carpool Incentives with Bypass Lanes.
- Breaks up concentrated "Platoons" of cars making merging safer

# Typical Ramp Meter Design


## Ramp Metering Hardware Example

## (Typical One Lane On-Ramp)




End-of-Queue Loop Detector at Entrance of on-ramp

"Spill Back" loops prevent local street congestion by releasing ramp traffic if covered by cars for too long.

# Highway-to-Highway Connector Meter Design


- 17 existing connector metering locations in the Bay Area, with most installed during the mid 1990s and as early as 1977.
  - I-880 in Alameda County
  - SR 17, SR 85, SR 87, SR 101, and I-880 in Santa Clara County
- Caltrans installs advanced warning signs based on projected highway congestion (e.g., three signs for NB 85 to NB 101 in San Jose)

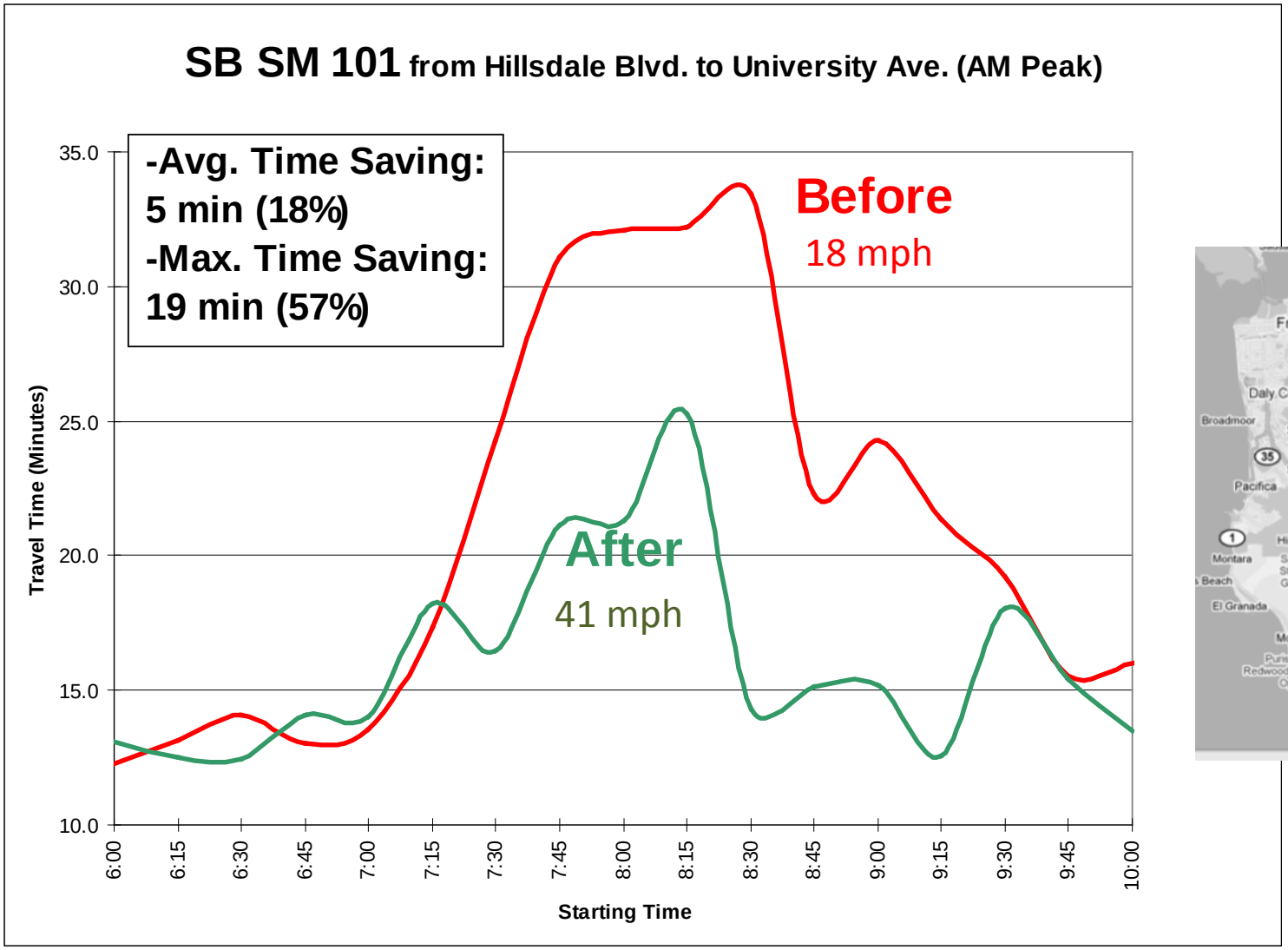

Approach to NB SCL 85 Fwy to Fwy Connector from NB SCL 101, South San Jose

First Advance Warning Sign "Meter On"


Third Advance Warning Sign "Prepare to Stop"

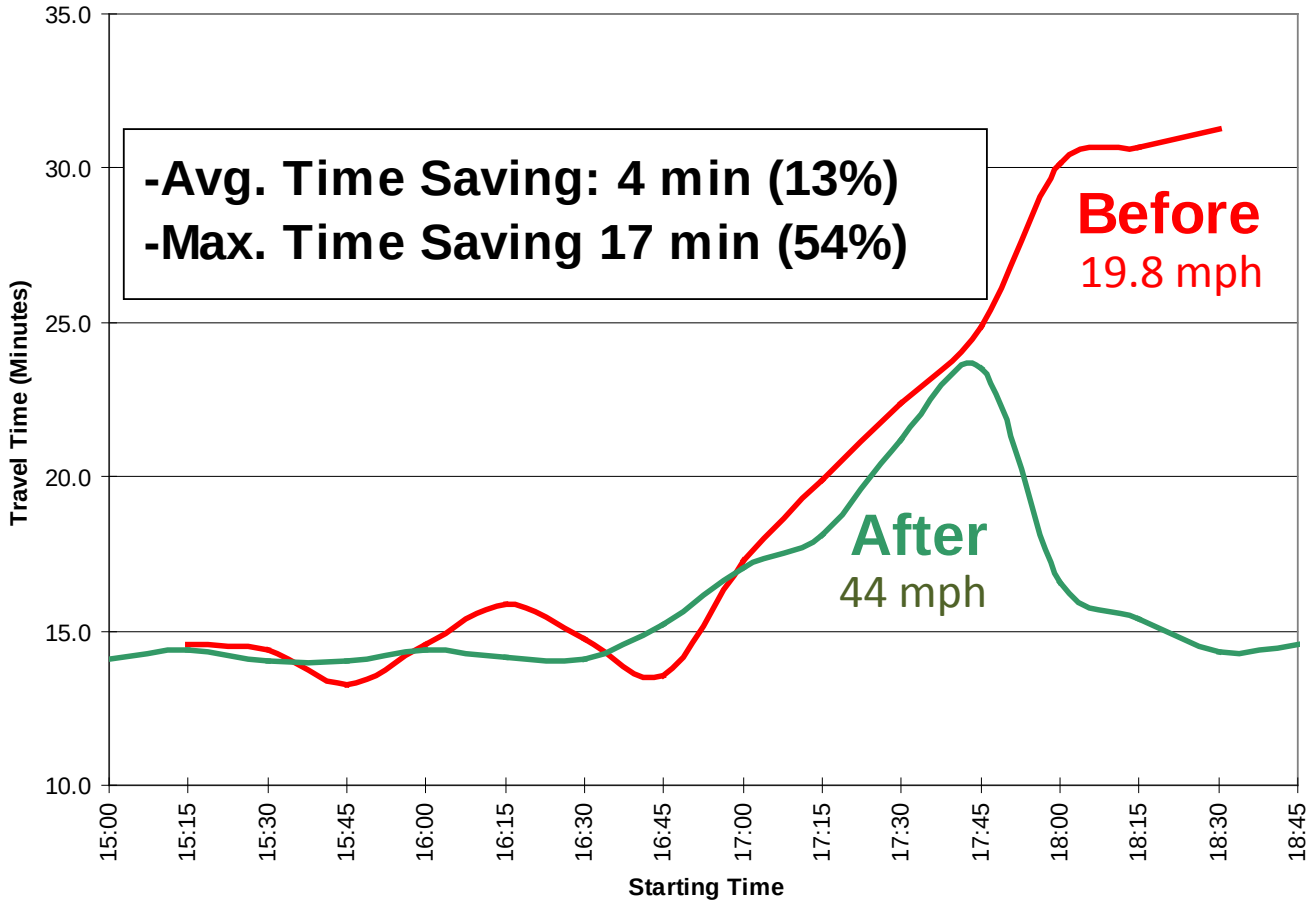
Approaching Metering Signals (Mast Arm)

# Hwy 101 in San Mateo, Time savings in AM

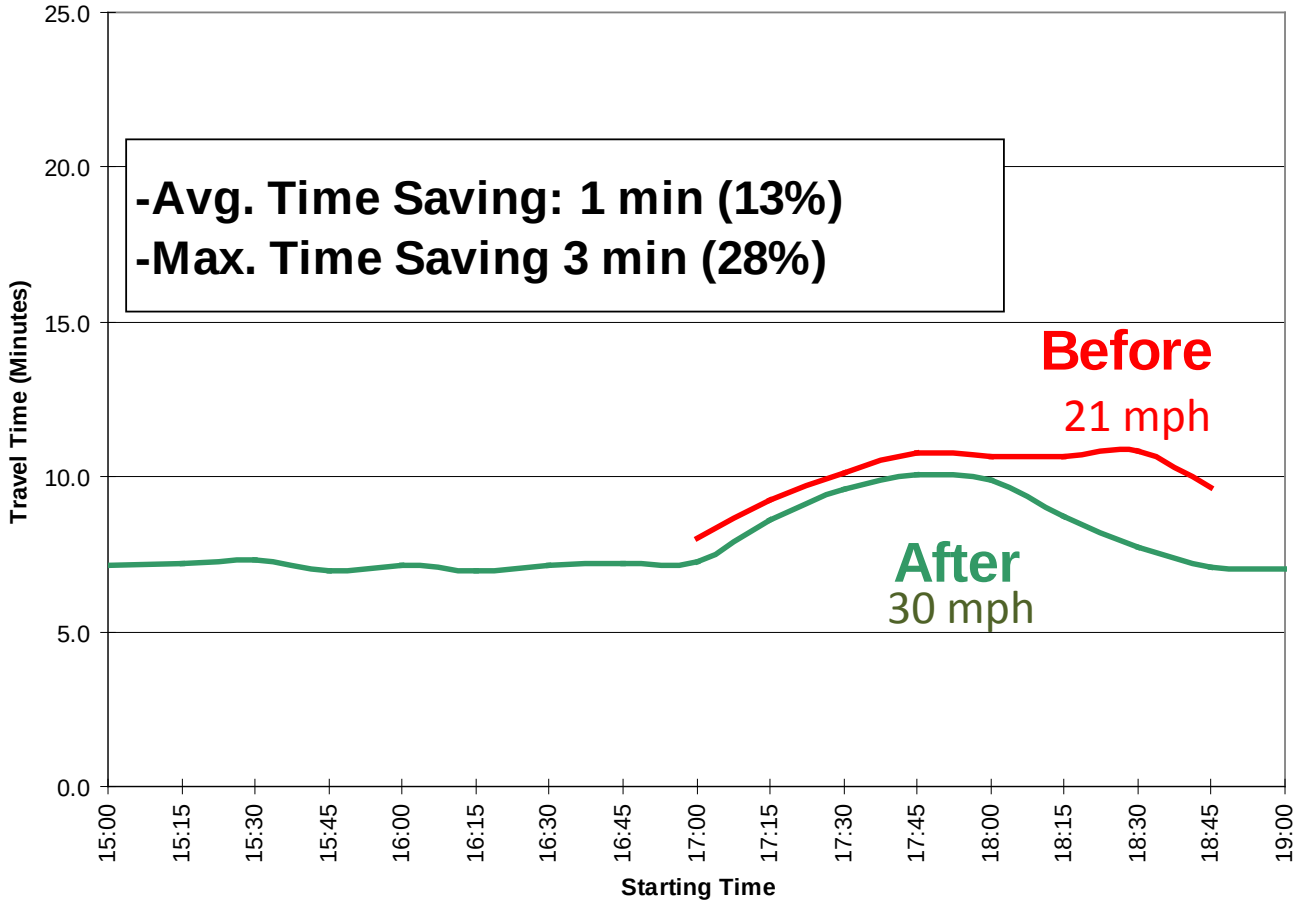

# Hwy 101 in San Mateo, Time savings in PM

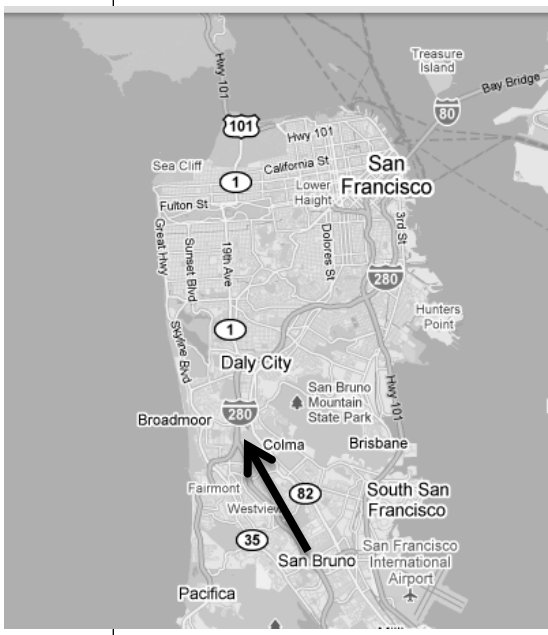

**SB SM 101 from Hillsdale Blvd. to University Ave. (PM Peak)**




# I-280 in San Bruno,
## Benefits for Low Volume Highways

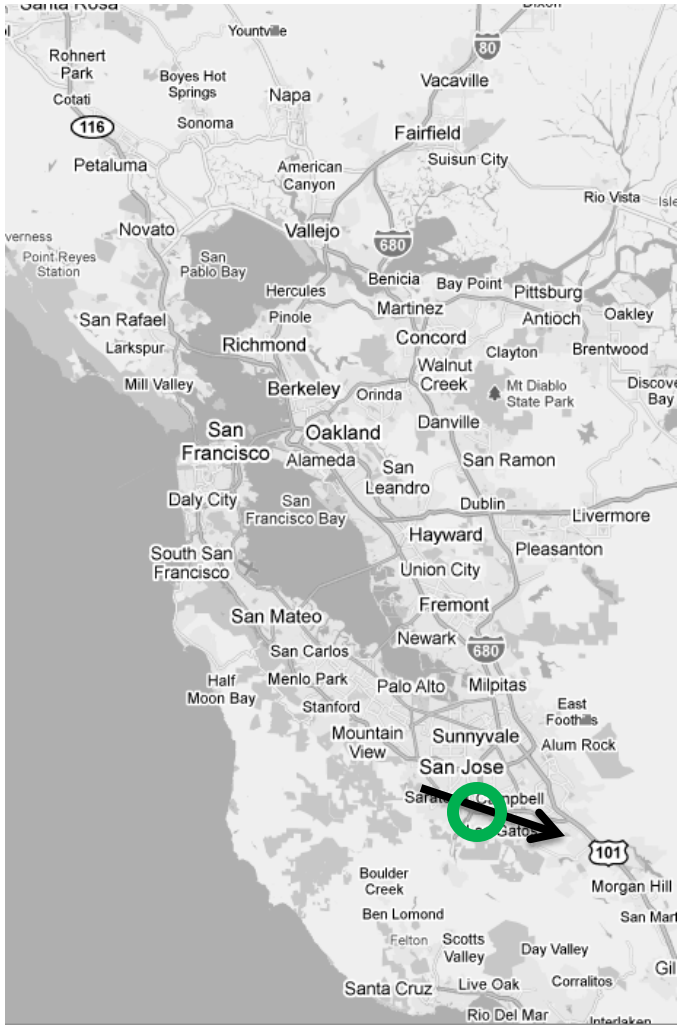

**NB SM 280 from Sneath Lane to Serramonte Blvd. (PM Peak)**



# SR-87 to SR-85 Connector
## in San Jose, 20 mph faster traffic


| Location | Before | After | Benefit |
|---|---|---|---|
| Near the connector 5-6pm | 30.2 | 50.6 | + 20.4 mph |
| SR 85 Corridor, 5-6pm | 45.0 | 57.9 | + 12.9 mph |
| SR 85 Corridor, 3-7pm | 53.3 | 61.8 | + 8.5 mph |



# 25% Reduction in Accidents

## Before & After Studies on I-580 in Alameda


| BEFORE OR AFTER | TOTAL ACCIDENTS | FATAL | INJURY | Property Damage Only | % CHANGE IN TOTAL ACCIDENT |
|---|---|---|---|---|---|
| **Phase I: Hopyard On-ramp to Santa Rita On-ramp** | | | | | |
| "BEFORE" (6/1/2002 to 5/30/2003) | 248 | 0 | 59 | 189 | |
| "AFTER" (6/1/2003 to 5/30/2004) | 205 | 1 | 58 | 146 | **-21%** |
| **Phase II: Foothill On-ramp to Greenville On-ramp (Including Phase I)** | | | | | |
| "BEFORE" (1/1/2007 to 10/30/2007) | 197 | 0 | 58 | 138 | |
| "AFTER" (1/1/2008 to 10/30/2008) | 157 | 0 | 37 | 120 | **-25%** |

*DATA SOURCE: Caltrans – Traffic Accident Surveillance and Analysis Systems (TASAS) ALA 580 EB MAINLINE (FOOTHILL INTERCHANGE TO N. FLYNN) ACCIDENT DATA FOR THE PERIOD OF METERING OPERATION (MON TO FRI, 2:00 PM to 7:00 PM) FOR "BEFORE" & "AFTER" RAMP METERING OPERATION)

# Local City Street Benefits

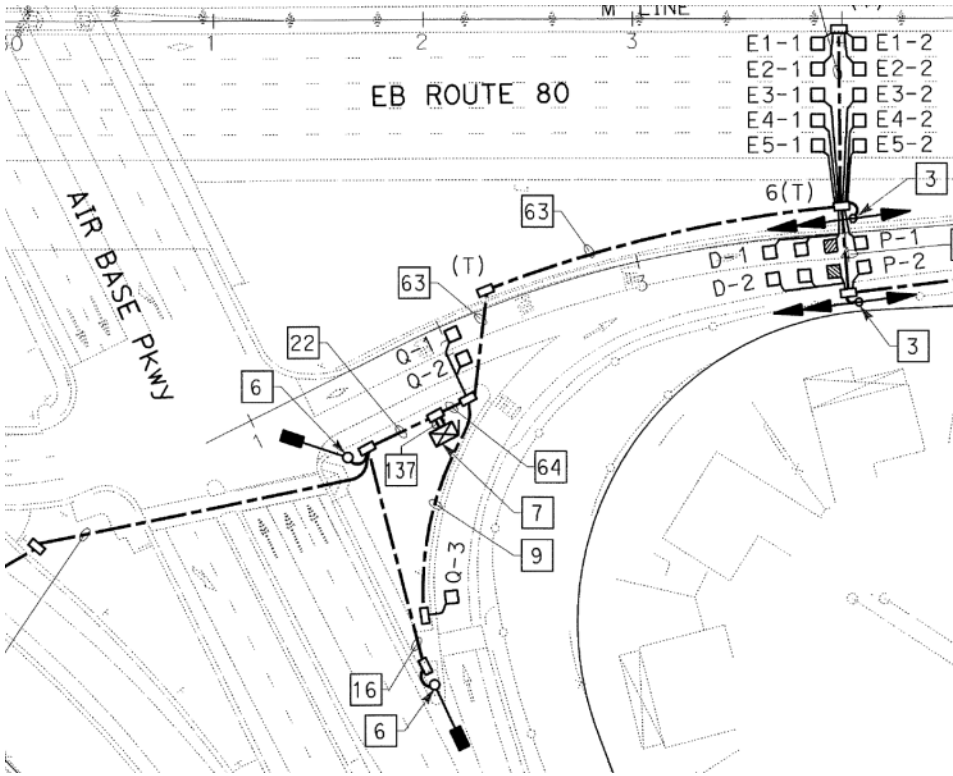

- When ramp metering increases freeway flow and breaks up merging car platoons:
  - Drivers stay on the flowing freeway instead of cutting through on local streets reducing local congestion.
  - On-ramp wait times decrease as less cut-through traffic attempts to reenter the freeway.

Results from EB I-580 in Livermore, Pleasanton and Dublin (2008)

- Ramp metering reduced cut-through traffic on local roads between 6% to 49% and reduced on-ramp volumes between 185 cars to 1375 cars during rush hour.

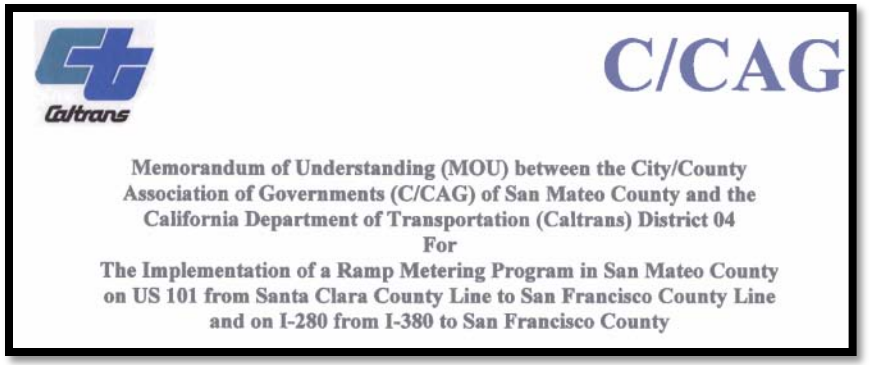
# In Design & Under Construction


- North Texas Interchange Ramp Metering
  - Ramp Meters in EB & WB directions (complete)
- $4.9 M, Fairfield I-80 Ramp Metering
  - 14 Ramp meters at ramps between Red Top Road & Air Base Parkway (under construction)
  - Highway-to-Highway connector meters (under construction)
    - EB SR 12 to EB I-80
    - WB SR 12 to WB I-80
    - NB I-680 to EB I-80
- $55 M, Future Ramp Metering projects (in design)
  - 61 ramp meters between SR 37 in Vallejo to Yolo County Line
  - Traffic Operations Systems Countywide



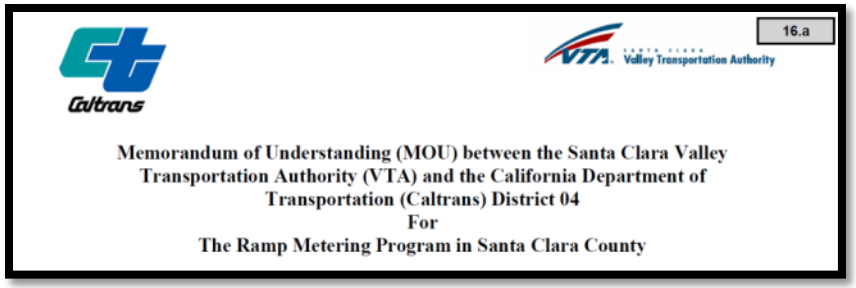
# How would meters be turned on?


- Caltrans has Authorization to Build Ramp Metering, <u>But Not</u> to Operate Ramp Metering
- Local cities or counties enter into agreements before Caltrans turns on ramp metering.
- Different examples of operating agreements/memorandums of understanding between Caltrans, local agencies, and transportation authorities:
  - Santa Clara County (Valley Transportation Authority)
  - San Mateo County (City/County Association of Counties)
- Ramp Metering Study
  - modeling data to understand the regional and local benefits of ramp meters prior to beginning ramp meter operations
- Ramp Metering Technical Advisory Committee
  - Public Works staff & Caltrans staff monitor and adjust ramp metering timing quarterly.


Caltrans

C/CAG

Memorandum of Understanding (MOU) between the City/County Association of Governments (C/CAG) of San Mateo County and the California Department of Transportation (Caltrans) District 04
For
The Implementation of a Ramp Metering Program in San Mateo County on US 101 from Santa Clara County Line to San Francisco County Line and on I-280 from I-380 to San Francisco County


Caltrans

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VTA Valley Transportation Authority

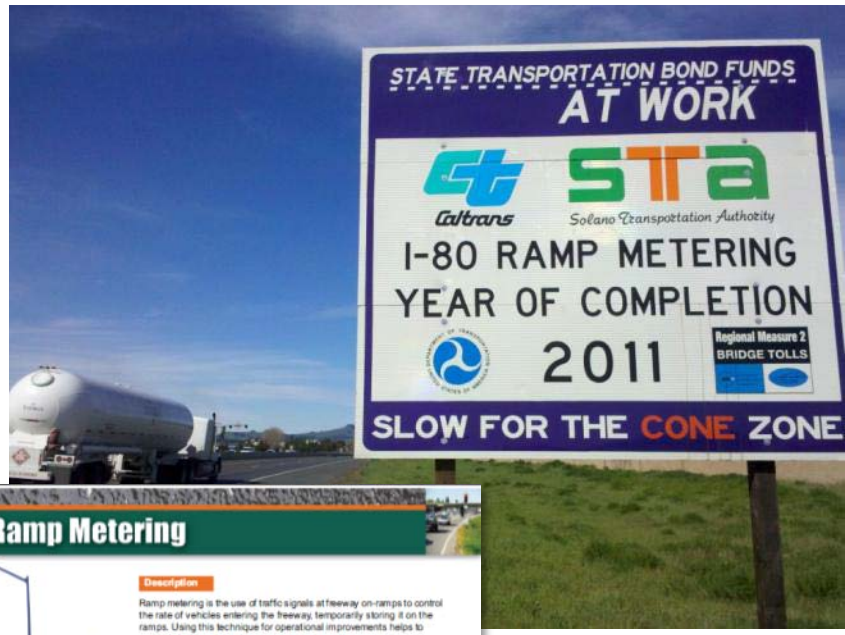
Memorandum of Understanding (MOU) between the Santa Clara Valley Transportation Authority (VTA) and the California Department of Transportation (Caltrans) District 04
For
The Ramp Metering Program in Santa Clara County

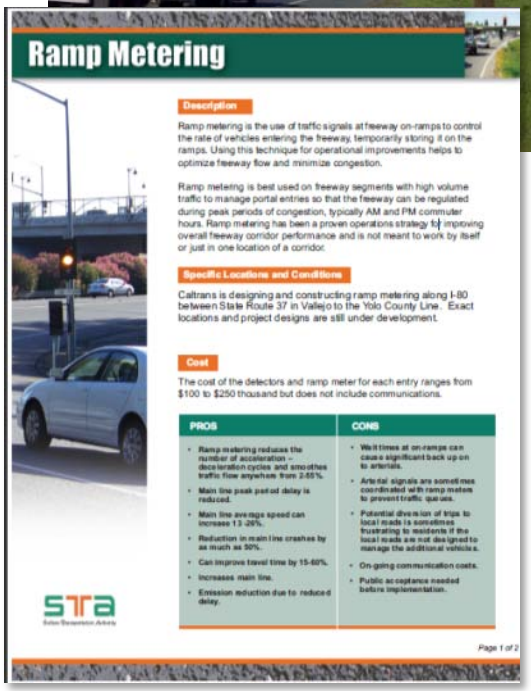
# Will Ramp Meters be turned on?


- If local agencies and/or the STA enter into an operating agreement (Memorandum of Understanding, MOU) about how to operate ramp metering, then Caltrans will turn on ramp metering.
- Ramp Metering Development Schedule:
  - Fall 2011, Draft MOU & Preliminary Ramp Metering study results
  - Spring 2012, Fairfield Ramp Metering Project Built
  - Spring 2012, Circulate MOUs and final Ramp Metering Study
  - Summer 2012, potentially begin ramp metering in **Fairfield area** as a first phase
  - Ramp metering in **Dixon, Vacaville, Vallejo, and other areas in Solano County** selected for later dates.

# How can the public find out more about ramp metering?


- Presentations for City Councils & Public Groups (e.g., Solano EDC, Service Clubs, Chambers of Commerce, etc.)
- Signs at Ramp Meter locations
- Highway Operations Webpage, including Ramp Metering, under development by STA in partnership with Caltrans
  - Project Maps
  - Fact Sheets
  - Videos
  - Presentations
- STA Coordination with Caltrans District 4 Public Affairs staff





Ramp Metering

Description

Ramp metering is the use of traffic signals at freeway on-ramps to control the rate of vehicles entering the freeway, temporarily storing it on the ramps. Using this technique for operational improvements helps to optimize freeway flow and minimize congestion.

Ramp metering is best used on freeway segments with high volume traffic to manage portal entries so that the freeway can be regulated during peak periods of congestion, typically AM and PM commuter hours. Ramp metering has been a proven operations strategy for improving overall freeway corridor performance and is not meant to work by itself or just in one location of a corridor.

Specific Locations and Conditions

Caltrans is designing and constructing ramp metering along I-80 between State Route 37 in Vallejo to the Yolo County Line. Exact locations and project designs are still under development.

Cost

The cost of the detectors and ramp meter for each entry ranges from $100 to $250 thousand but does not include communications.

| PROS | CONS |
|---|---|
| • Ramp metering reduces the number of acceleration – deceleration cycles and smoothes traffic flow anywhere from 2-65%. | • Wait times at on-ramps can cause significant back up on to arterials. |
| • Main line peak period delay is reduced. | • Arterial signals are sometimes coordinated with ramp meters to prevent traffic queues. |
| • Main line average speed can increase 13 -26%. | • Potential diversion of trips to local roads is sometimes frustrating to residents if the local roads are not designed to manage the additional vehicles. |
| • Reduction in main line crashes by as much as 50%. | • On-going communication costs. |
| • Can improve travel time by 15-60%. | • Public acceptance needed before implementation. |
| • Increases main line. | |
| • Emission reduction due to reduced delay. | |

STA

Page 1 of 2

# More Information


Download Fact Sheets & Presentations

www.sta.ca.gov

Video Presentation for

San Mateo Ramp Metering Project

http://www.mtc.ca.gov/about_mtc/awards/video/2010/01.htm

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