



Managing MRN US-101 Corridor TAM Workshop on Ramp Metering

Dan McElhinney, Chief Deputy District Director
November 20, 2014

CALTRANS...

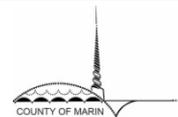


We're here to get you there.



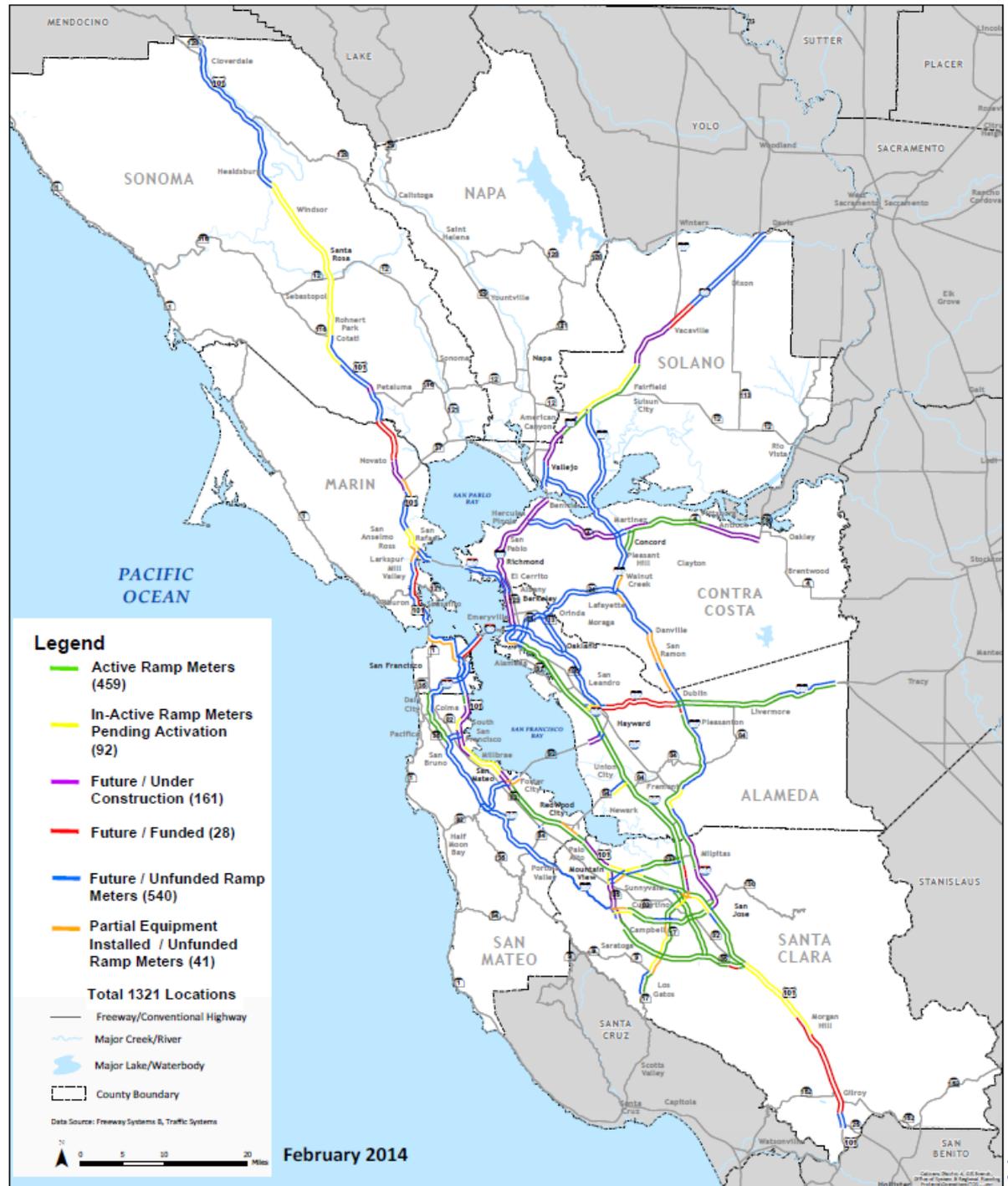
Presentation Overview

- **District Overview**
- Freeway Congestion Trends
- Vision for Mobility
- Ramp Metering Overview
- MRN 101 Ramp Metering





District 4 Ramp Metering Development Plan



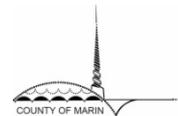


California State Highway System

Inventory	Statewide	Bay Area	Marin County
Lane Miles	50,000	6,468	342
Bridges	12,559	2,500	228
Acres of Landscape	29,000	4,600	100
Culverts	205,000	43,059	2,028
Roadside Rest Area	87	3	1
Park & Ride Lots	325	46	10
Vista Points	146	20	2

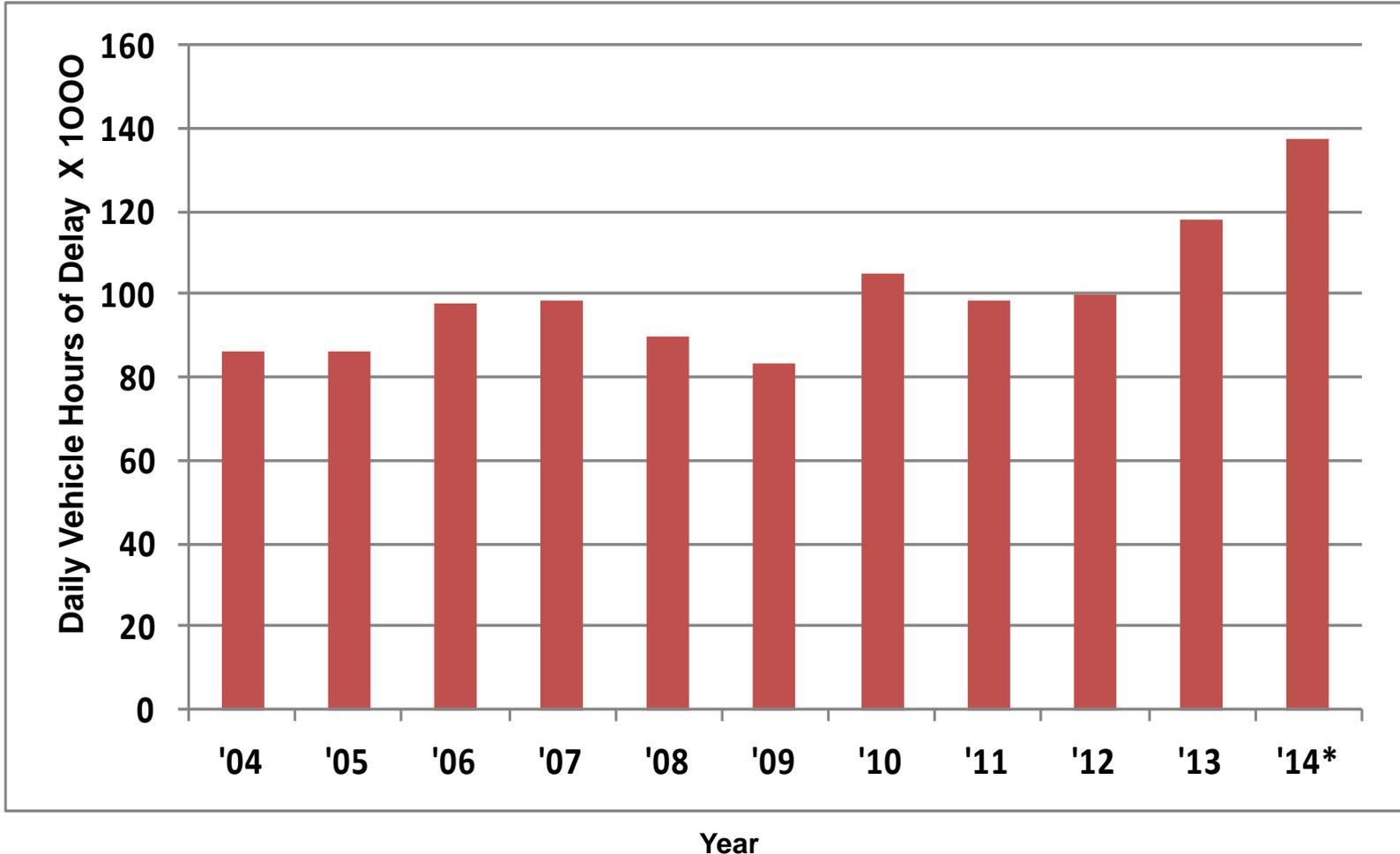
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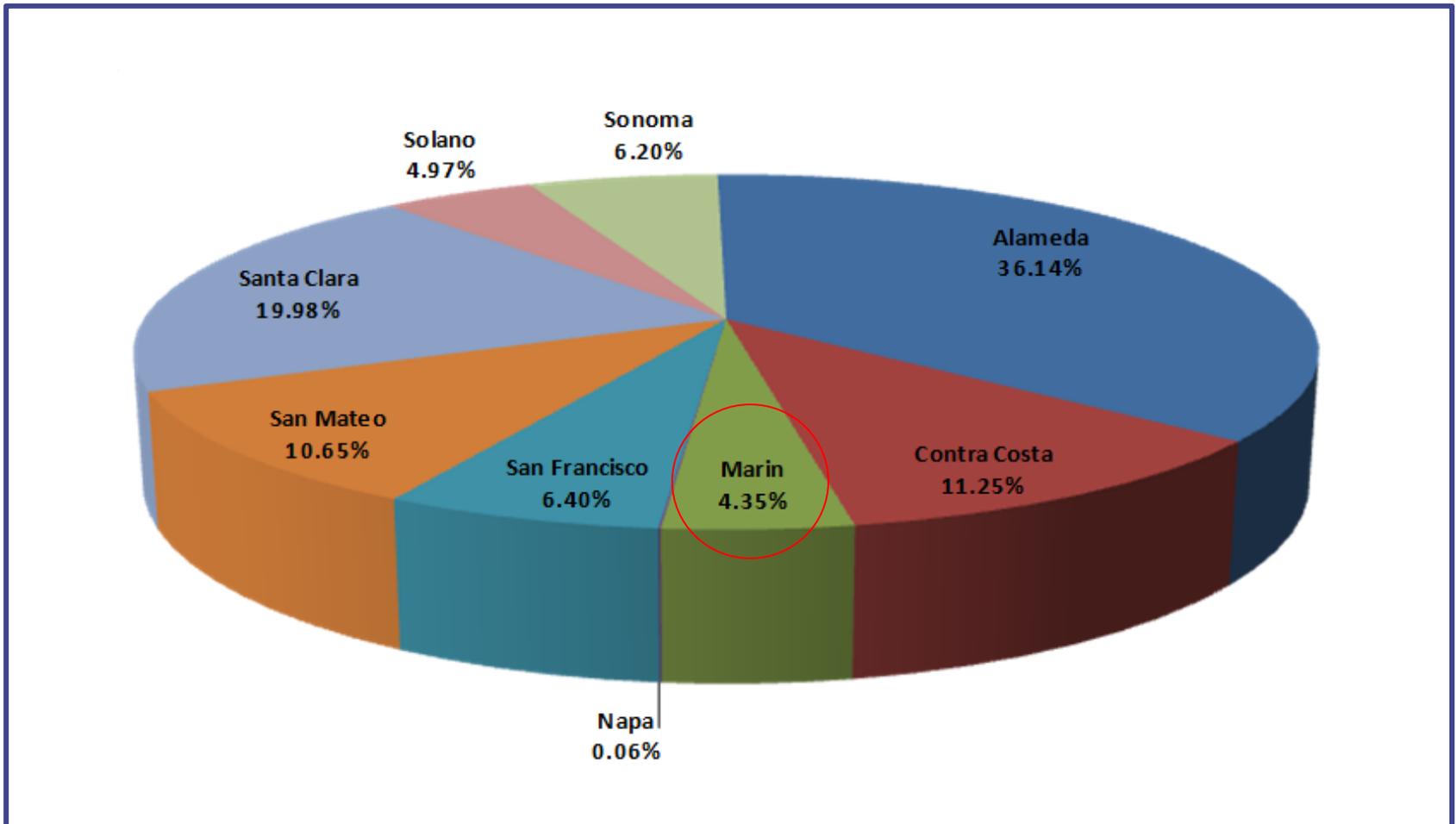
San Francisco Bay Area Freeway Congestion Trends



Source: PeMS

*Full year estimate based PeMS data obtained on September 28, 2014

San Francisco Bay Area Freeway Congestion By County



Source: Based on delays at 60mph recorded by PeMS 01/01/2014 – 09/30/2014



Marin 101 2013 Bottlenecks

County Rank	Period	City	Freeway	CA_PM	Location	Length (mi)	Total Delay (veh-hr)
1	PM	Larkspur	US101-N	8	Redwood Hwy	3.7	260,630
2	PM	Corte Madera	US101-N	7.35	Tamalpais Dr	2.6	195,328
3	PM	unincorporated	US101-N	24.5	Redwood Sanitary Landfill Rd	2.1	84,738
4	AM	Novato	US101-S	17.04	Alameda Del Prado	2.0	57,069
5	AM	San Rafael	US101-S	13.2	Manuel T. Freitas Pkwy	1.9	45,860
6	PM	unincorporated	US101-N	2.01*	Kastania Rd	7.5	29,348
7	AM	unincorporated	US101-S	15.85	Miller Creek Rd	0.5	27,555
8	PM	Novato	US101-N	R20.9	DeLong Ave	1.5	23,114
9	PM	San Rafael	US101-N	10.04	I-580	0.9	8,676
10	AM	San Rafael	US101-S	14.2	Lucas Valley Rd	0.9	7,574

Source: PeMS

LEGEND

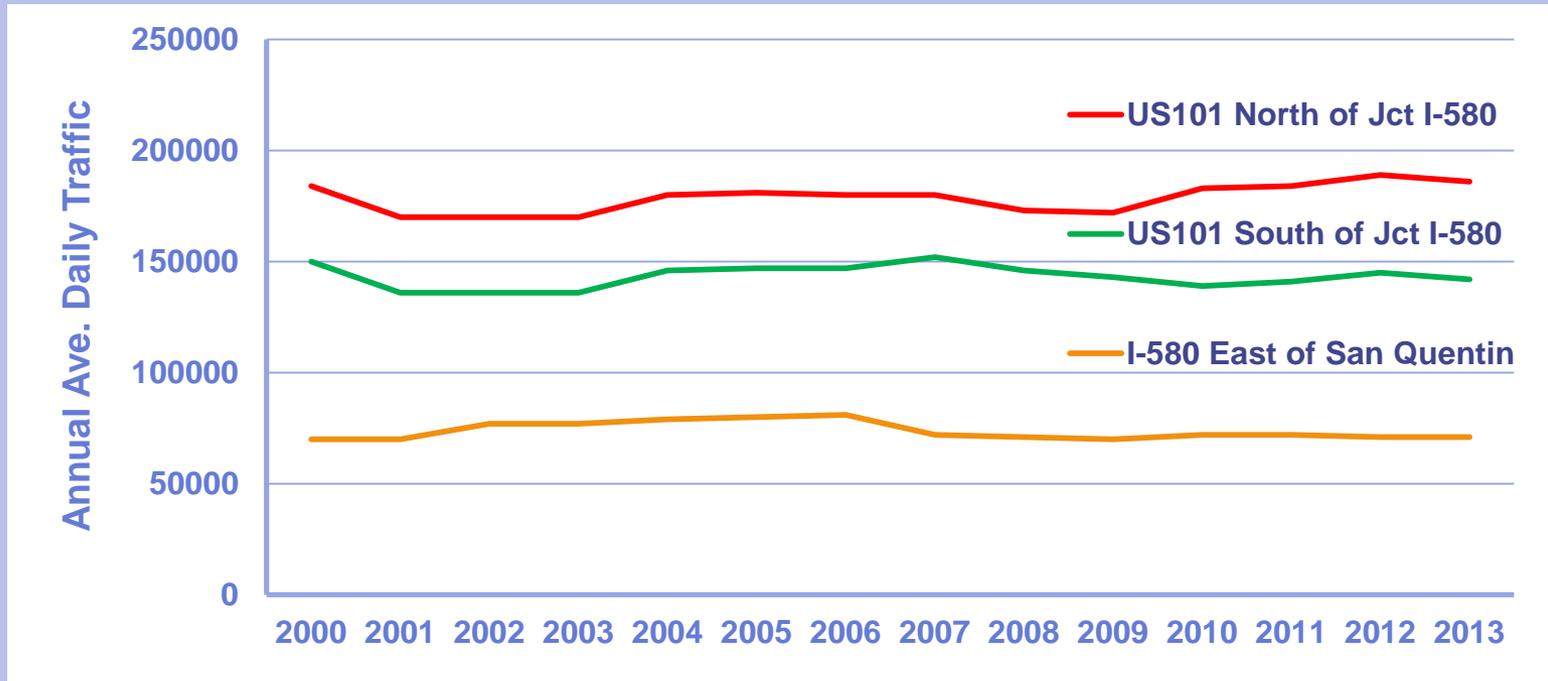
- AM Congestion
- ▶ AM Bottleneck
- PM Congestion
- ▶ PM Bottleneck





Marin County Freeway Traffic Volumes & Incidents

Average Annual Daily Traffic Volumes

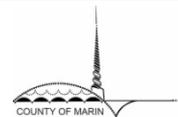


Accident & Incident Data (3-Year Average: TASAS & PeMS)

Type \ Location	District 4	Marin County	US 101 Marin County
Incidents	106,794	5,015	4,275
Accidents	28,962	1,093	862

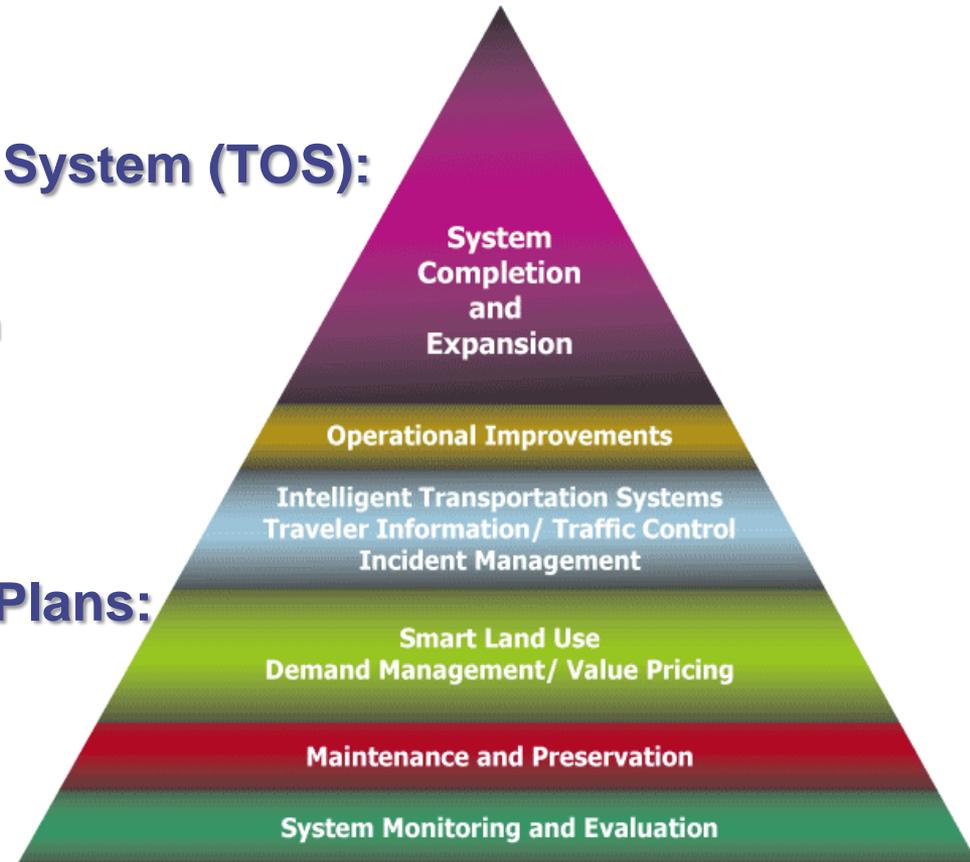
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Current Key Focus Areas

- **Build-out of Traffic Operations System (TOS):**
 - System Monitoring
 - Performance Measurement System
- **Incident Management**
- **Traveler Information**
- **Corridor System Management Plans:**
 - Ramp Metering
 - Express Lanes
 - Operational Improvement
 - SMART Corridor & Active Traffic Management





California State Traffic Operation System

Inventory	Bay Area	Marin Co. Existing	Marin Co. Total Build-out
CCTV – Closed Circuit Television Camera	438	19	56
VDS – Vehicle Detection Station	2,494	148	210
CMS – Changeable Message Sign	156	8	12
HAR – Highway Advisory Radio	27	2	2
EMS – Extinguishable Message Sign	81	8	8
RM – Ramp Meters	459	0	59

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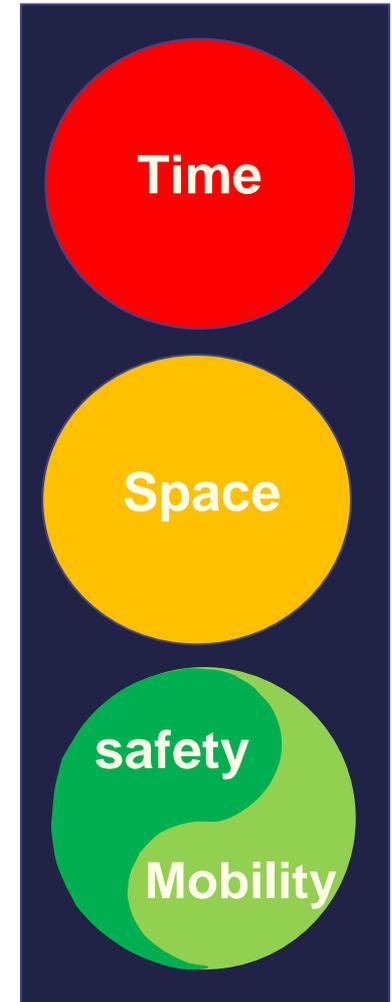


Ramp Metering



What is Ramp-Metering?

- **Signals regulate traffic to enhance safety & mobility.**
- **At intersections, traffic signals ensure safety by eliminating conflicting traffic movements to prevent accidents.**
- **At on-ramps, ramp-metering signals minimize congestion and enhance safety by balancing conflicting traffic demands commensurate with available capacity.**



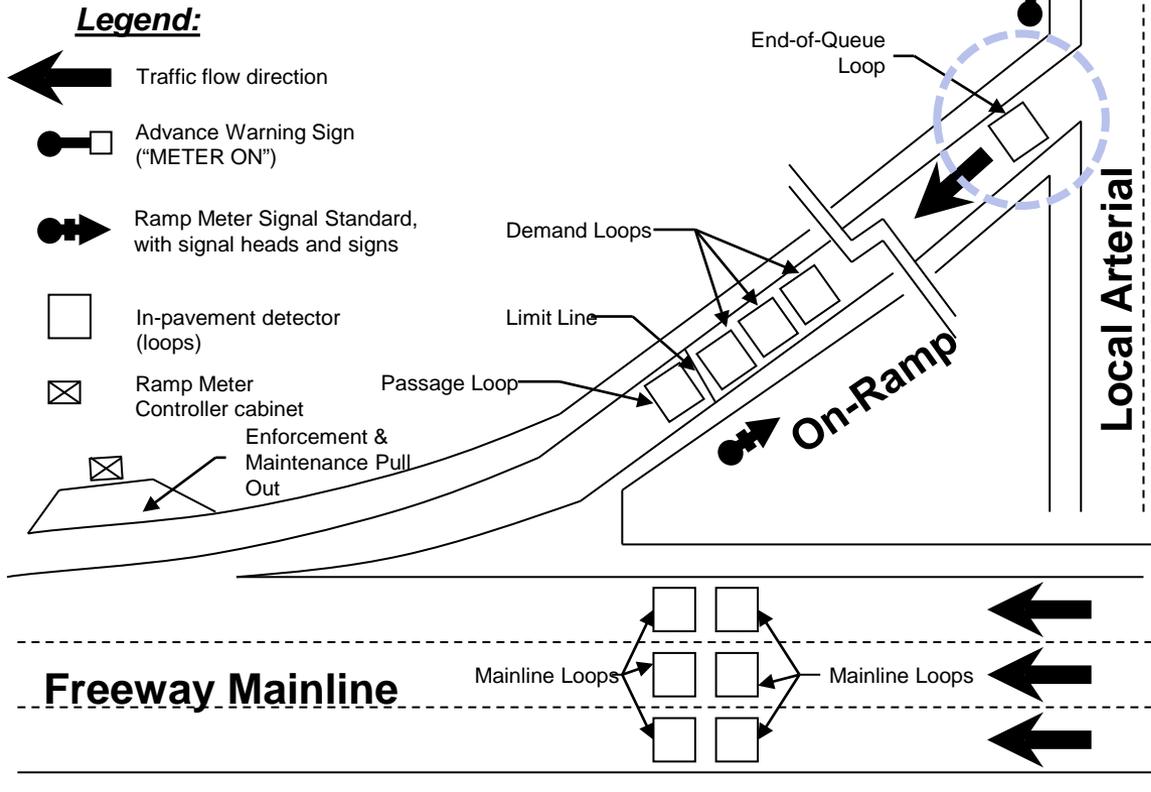
Why Ramp-Metering?

- **Maintains peak performance flow at freeway on-ramps.**
- **Breaks up vehicle “ platoons”, making merges safer.**
- **Reduces total delay for a driver’s entire commute.**
- **Reduces cut-through traffic on local roads and reduces ramp volumes.**
- **Provides reliability & consistent travel times for travelers.**
- **Promotes Carpool incentives with Bypass Lanes.**



Typical Ramp Meter Design

Ramp-Metering Hardware



End-of-Queue loop detectors at entrance of on-ramp prevent local street congestion by releasing ramp traffic when queues are present over detector.



How Is Ramp-Metering Implemented?

- **Corridor Approach:** *Implemented on corridor level and in appropriate phases.*
- **On-going communication:** Information sharing with elected officials, community outreach with public groups, chambers of Commerce and service clubs; advance notification via highway signs, websites and 511, and coordination with media.
- **Local Engagement:** Ramp metering technical committee comprised of representatives from affected local agencies, technical staff, CMA, MTC, CHP & Caltrans develops consensus on metering strategies and sets metering rates.
- **Local Sensitivity:** Impact on local streets is avoided through end-of-queue detectors, ramp widening, or improvements at local intersections.
- **Measuring Effectiveness:** Before & After studies; real-time adjustments; telephone hotline for addressing complaints.



Ramp-Metering Benefits:

Reduction in Travel Times

County/ Route	Corridor	Reduction In Travel Time		Reduction In Duration of Peak Period, hours
		Minutes	%	
SM 101	SB Hillsdale to University	19	57	1
ALA 580	EB Foothill to Greenville	11	33	2
SM 280	NB Sneath to Serramonte	3	28	1
SCL 85	SB Almaden to Cottle	4	52	1
SCL 87	NB Route 85 to Skyport	4	30	2
SCL 87	SB Charcot to Santa Teresa	9	41	1
ALA 580	WB Interstate 205 to Foothill	7	24	1
SCL 101	SB Embarcadero to De La Cruz	1	5	0
SCL 880	SB Route 237 to Stevens Creek	11	38	1
SOL 80	EB Red Top Rd to N. Texas St.	6	25	Data Pending
SON 101	SB Windsor to Petaluma	2	9	Data Pending
SM 101	Fashion Is. To Harney Way	3	10	Data Pending

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



Ramp Metering Benefits

Reduction in Accidents on Eastbound I-580, Alameda County

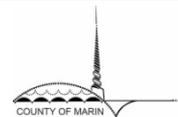
Before/After	Total Accidents	Fatal	Injury	Property damage Only	% Change in Total Accidents
Phase I: Hopyard On-ramp to Santa Rita On-ramp					
“Before” (6/1/02 to 5/30/03)	248	0	59	189	-21%
“After: (6/1/03 to 5/30/04)	205	1	58	146	
Phase II: Foothill On-ramp to Greenville On-ramp (including Phase I)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

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Ramp-Metering on US-101 Marin and Sonoma Counties



- Active Ramp Metering
- Phase I (in Design)
- Phase II (PAED completed)
- Meter Equipment Installed/In-Active
- - - Future Plans



Marin US-101 Ramp Metering Plan

Route (PM)	Limits	Scope	Capital Cost	Schedule
MRN101 (0.0/9.0)	Phase 1, from Golden Gate Bridge to Sir Francis Drake Blvd (NB Only)	10 Ramp Meters and 7 TOS Elements	\$8.6 M	In Design, Constructed by Early of 2016
MRN101/580 (0.0/27.6, 2.5/4.4)	Phase 2, On MRN101, from Golden Gate Br. to Marin/Sonoma County Line and on MRN580, from 101 to San Rafael Br.	49 Ramp Meters and 53 TOS Elements	\$40.9 M	PAED Completed, Not Funded for Design and Construction

Phase 2, includes locations in Marin US-101 that are inactive but will require minor upgrades.



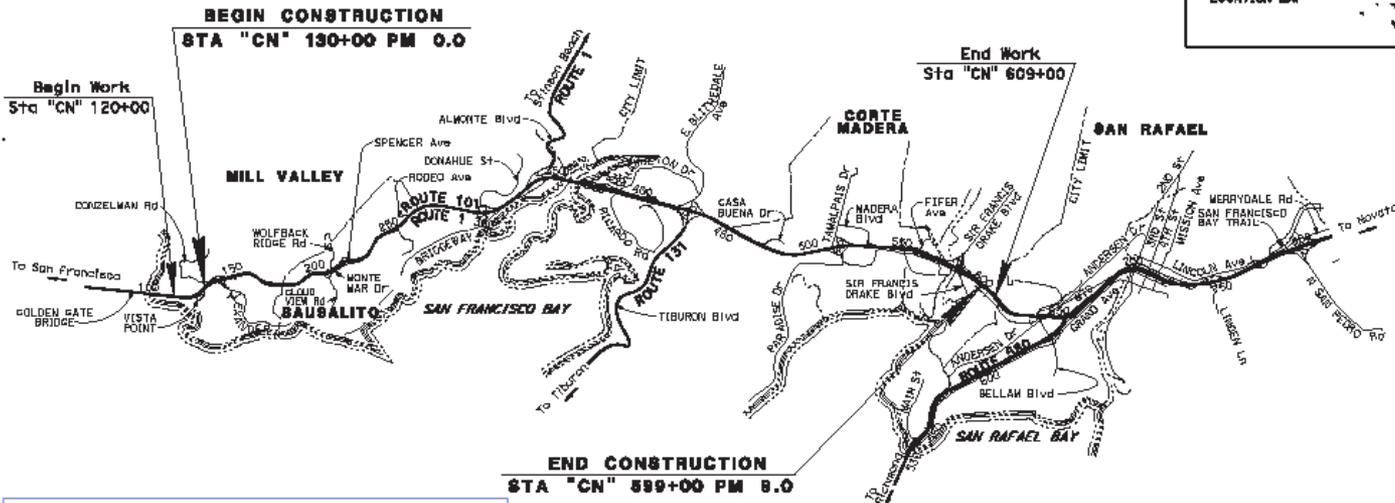
Proposed Phase 1 Project

(Marin US-101 Monte Mar/Spencer to Sir Francis Drake)

INDEX OF PLANS

STATE OF CALIFORNIA
 DEPARTMENT OF TRANSPORTATION
 PROJECT PLANS FOR CONSTRUCTION ON
 STATE HIGHWAY
 IN MARIN COUNTY
 ON ROUTE 101
 FROM NORTH OF THE GOLDEN GATE BRIDGE
 TO 0.3 MILE NORTH OF SIR FRANCIS DRAKE BOULEVARD
 TO BE SUPPLEMENTED BY STANDARD PLANS DATED 2010

DIST	COUNTY	ROUTE	POST MILES TO THE PROJECT	SHEET NO.	TOTAL SHEETS
04	Marin	101	0.0/8.0		



PS&E at 65%

NO SCALE

THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE 'NOTICE TO BIDDERS.'

PROJECT ENGINEER DATE

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS DEPARTMENT OF HIGHWAYS SHALL NOT BE RESPONSIBLE FOR THE ADEQUACY OR COMPLETION OF PLANNED IMPROVEMENTS OF THIS PROJECT.



CONTRACT No. **04-151814**
 PROJECT ID **0414000446**



Marin US-101 Ramp Metering Phase 1 Locations and Configurations

Location	Type	Proposed Ramp Configurations at RM Limit Line	Project Scope of work
Monte Mar Dr/Spencer On-Ramp	diagonal	1 Mixed Flow Lane	Install Ramp Metering Equipment
Rodeo Ave On-Ramp	diagonal	1 Mixed Flow Lane	Install Ramp Metering Equipment
Donahue St/Marin City (Gate 6/Bridgeway) On-Ramp	diagonal	2 Mixed Flow Lanes	Install Ramp Metering Equipment and Restripe on-ramp to 2 lanes
Rte 1 (Almonte Blvd) On-Ramp	connector/hook	1 Mixed Flow Lane	Install Ramp Metering Equipment.
Redwood Hwy/Frontage Rd On-Ramp	hook	1 Mixed Flow Lane	Install Ramp Metering Equipment
East Blithedale Ave (EB) On-Ramp	loop	2 Mixed Flow Lanes	Install Ramp Metering Equipment and Widen on-ramp to 2 lanes
East Blithedale Ave (WB) On-Ramp	diagonal	1 HOV/ 2 Mixed Flow Lanes	Install Ramp Metering Equipment and Widen on-ramp to 3 lanes
Tamalpais Dr (EB) On-Ramp	loop	1 Mixed Flow Lane	Install Ramp Metering Equipment.
Tamalpais Dr (WB) On-Ramp	diagonal	1 Mixed Flow Lane	Install Ramp Metering Equipment.
Sir Francis Drake Blvd On-Ramp	diagonal	1 HOV/ 2 Mixed Flow Lanes	Ramp Metering Equipment Upgrade and Widen on-ramp to 3 lanes



Marin US-101 Ramp Meter Schedule Phase 1

PS&E – Qtr 1, 2015

Construction – Qtr 1, 2016

Activation – Qtr 1, 2016

