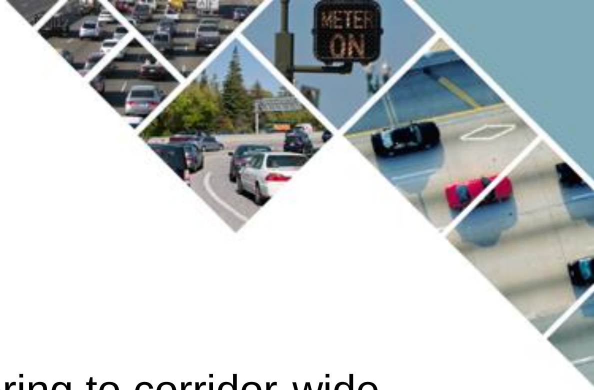
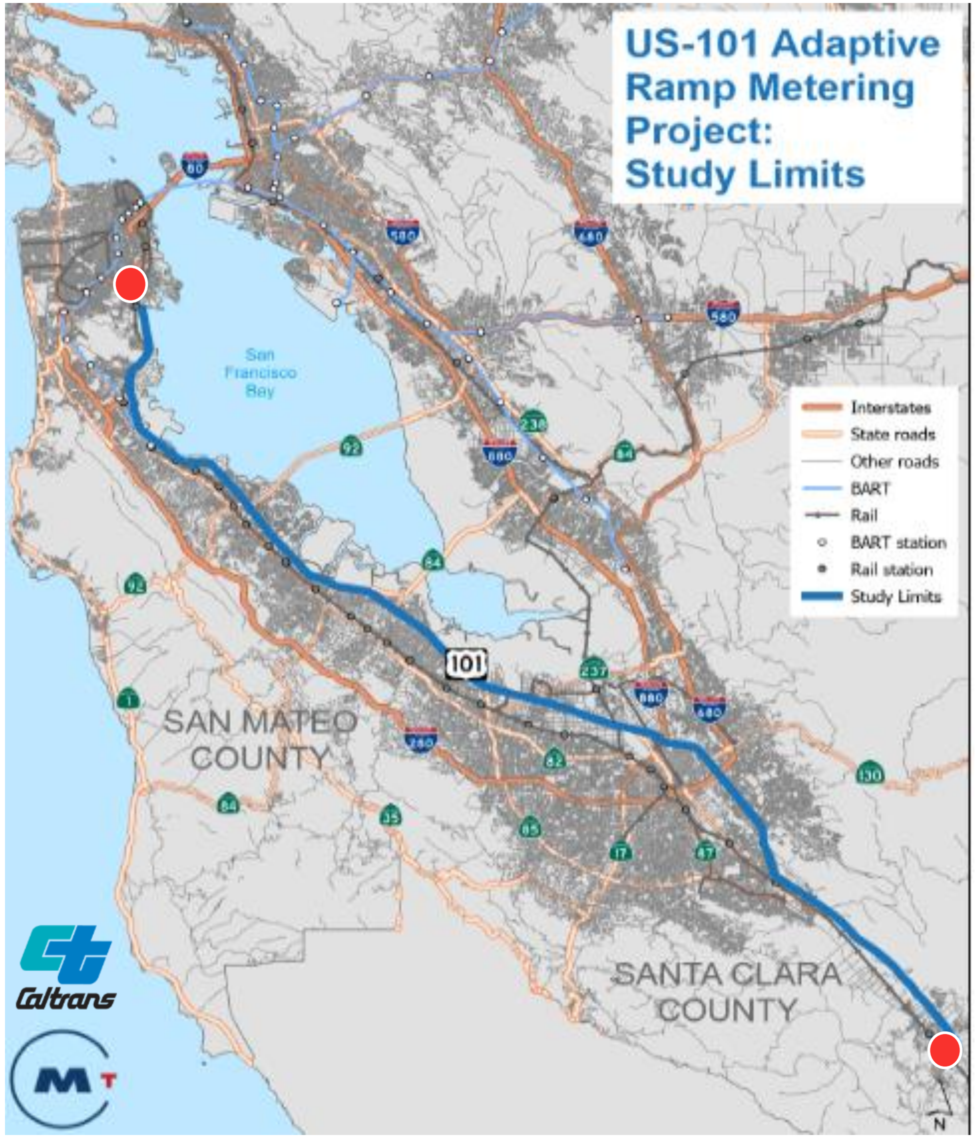
US-101 Adaptive Ramp Metering Implementation

C/CAG TAC Committee

August 21, 2024

PROJECT OVERVIEW





Project Goal

Upgrade existing local responsive ramp metering to corridor-wide Adaptive Ramp Metering (ARM)

Project Scope Area

US 101 Corridor in San Mateo County and Santa Clara County

Operation Hours

5AM - 8PM for Weekdays and weekends

The metering light will be set as Rest-in-Green

- When the mainline can accommodate the incoming traffic
- When the ramp storage can not accommodate the ramp demand

PHASE 2 LIMITS

32 ramps, 19.5-mile span

Northbound

Whipple Ave (Redwood City) to Harney Way (Brisbane)

Southbound

Harney Way (Brisbane) to Whipple Ave (Redwood City)

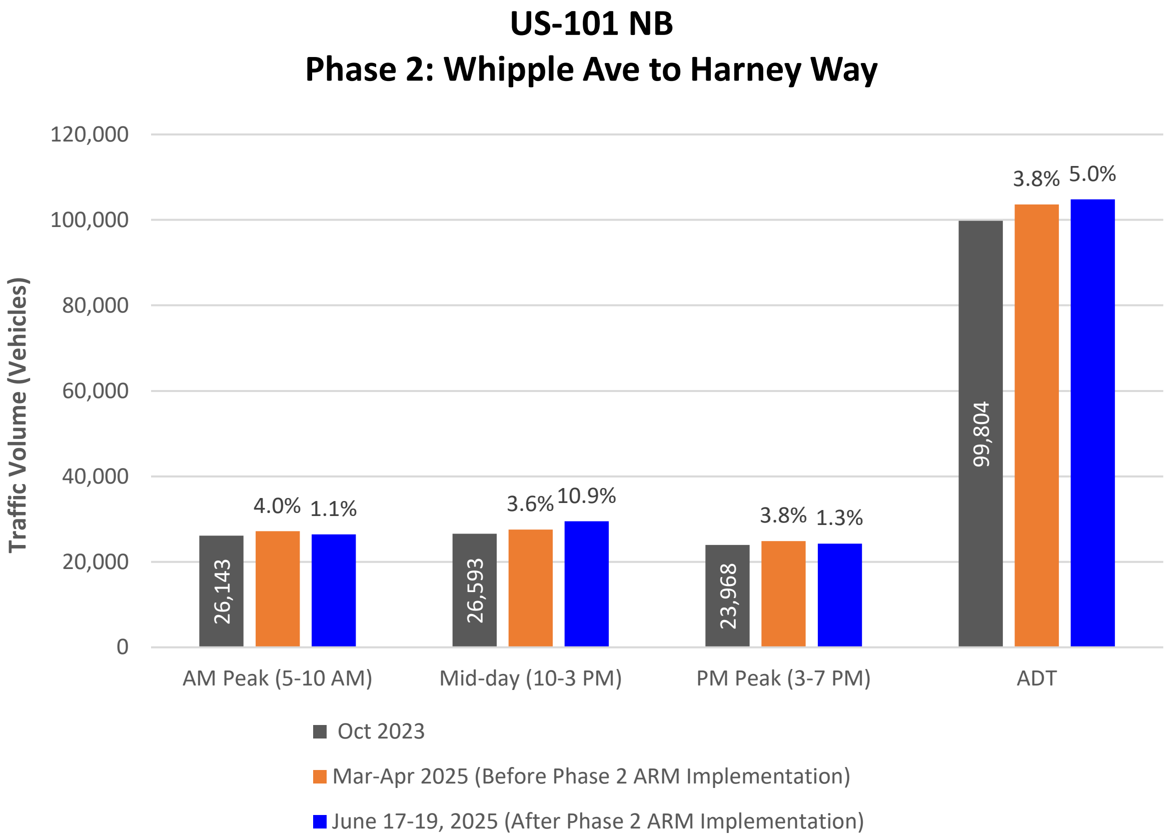
Rollout in three groups:

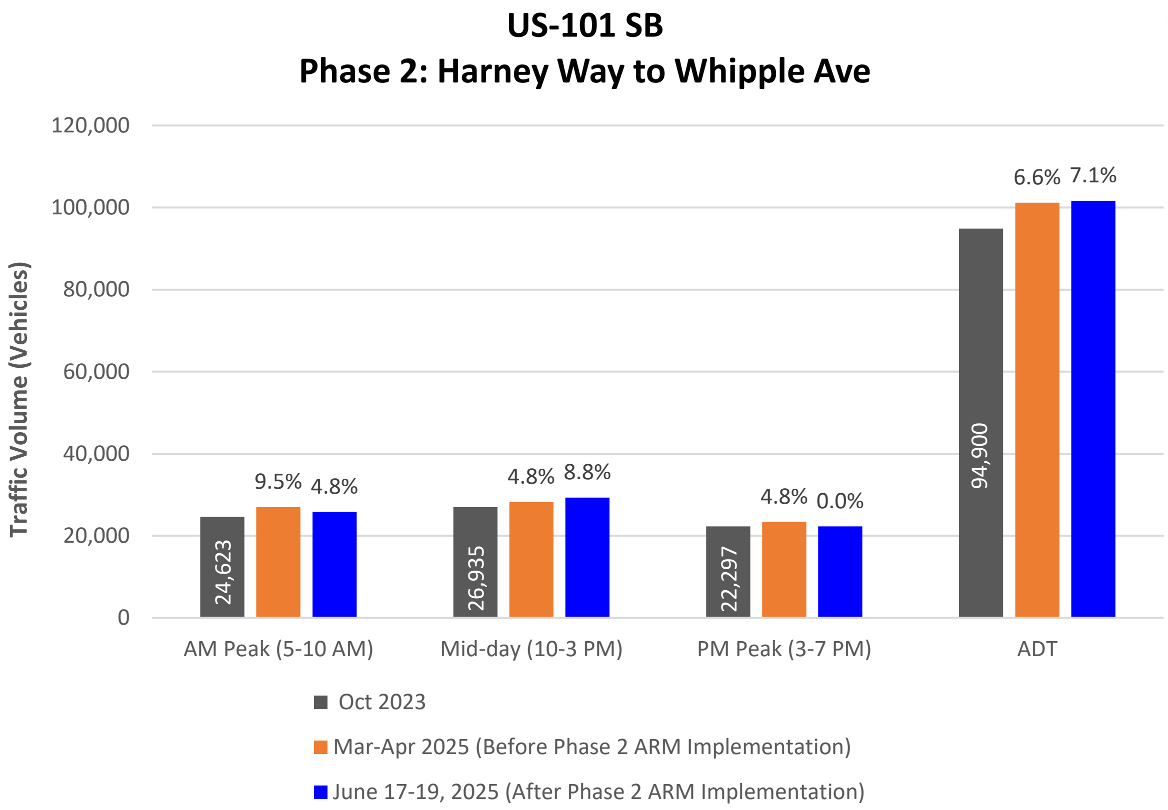
Group 1: Weeks of May 19th & 26th

Group 2: Week of June 2nd

Group 3: Week of June 9th

PHASE 2 TRAFFIC THROUGHPUTS MID-WEEKDAY

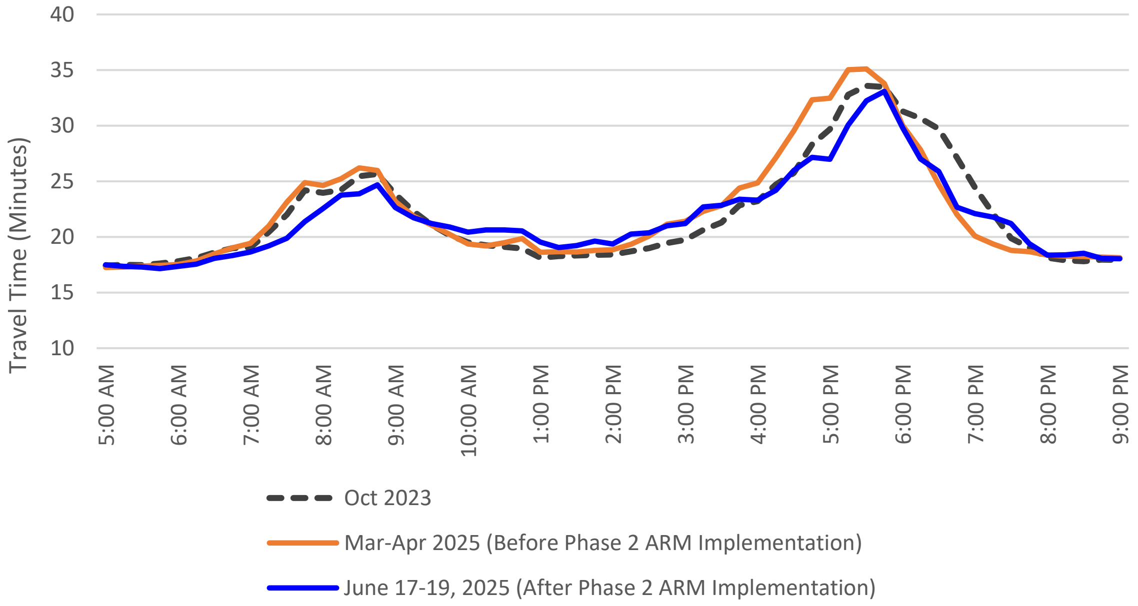




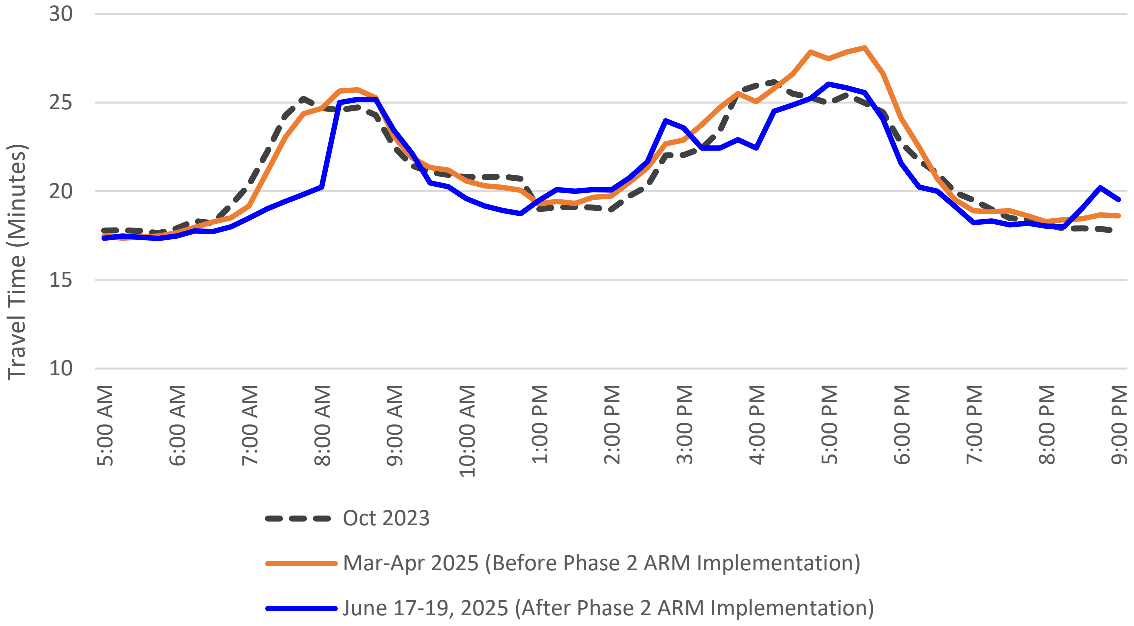
- Increased traffic demand observed in both directions
- Seasonal variations: lower traffic during peak periods & higher traffic during mid-day in June

PHASE 2 TRAVEL TIME MID-WEEKDAY

US-101 NB
Phase 2: Whipple Ave to Harney Way



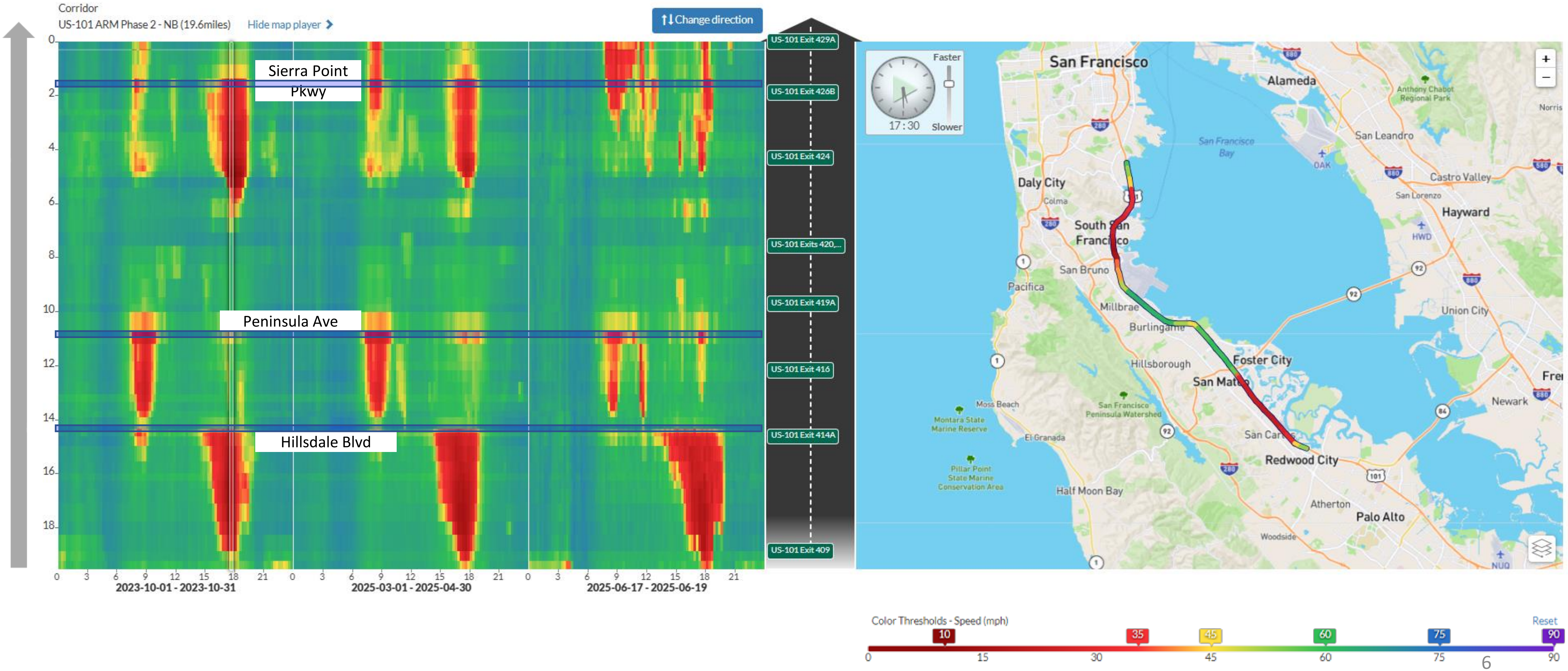
US-101 SB
Phase 2: Harney Way to Whipple Ave



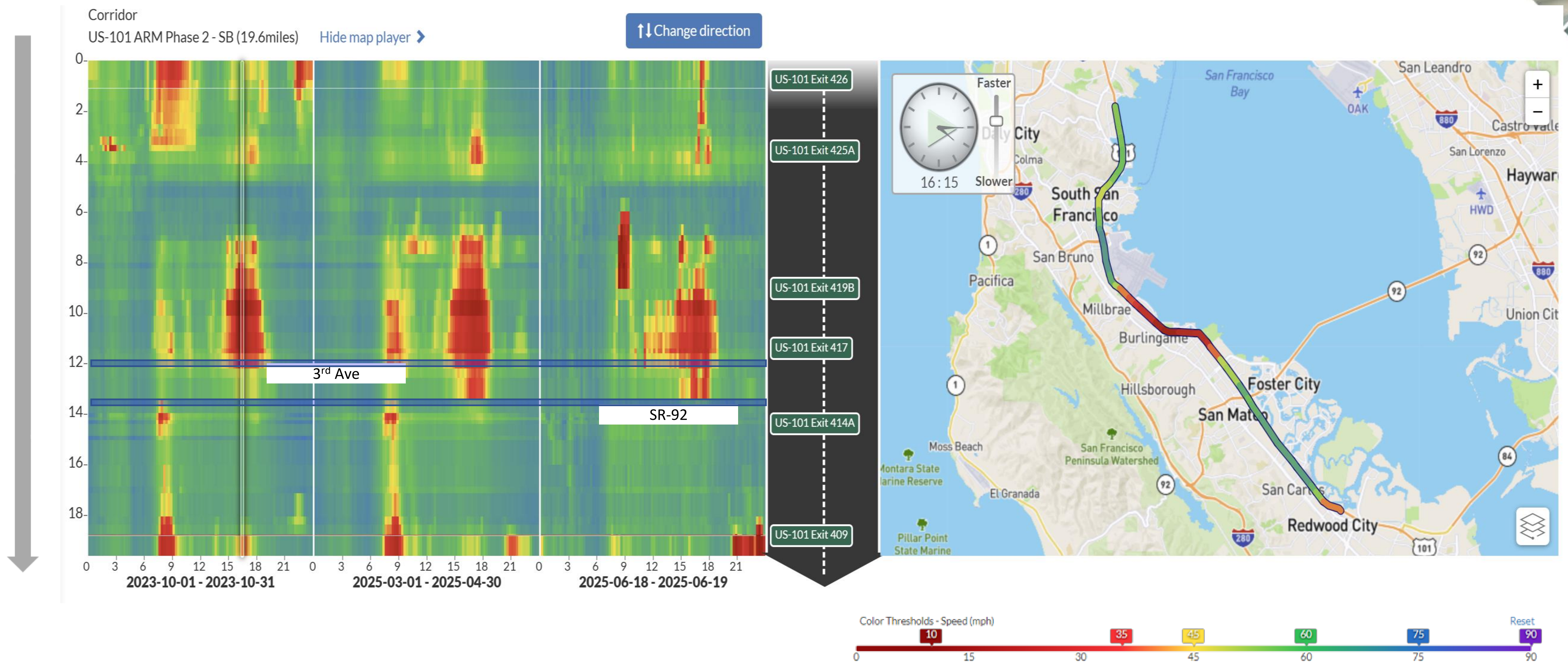
* *Excluding June 17 (a major accident occurred close to Millbrae Ave)*

- Travel time reduction during both AM &PM Peak Periods in both directions
- Slightly increased travel time during mid-day along US 101 northbound

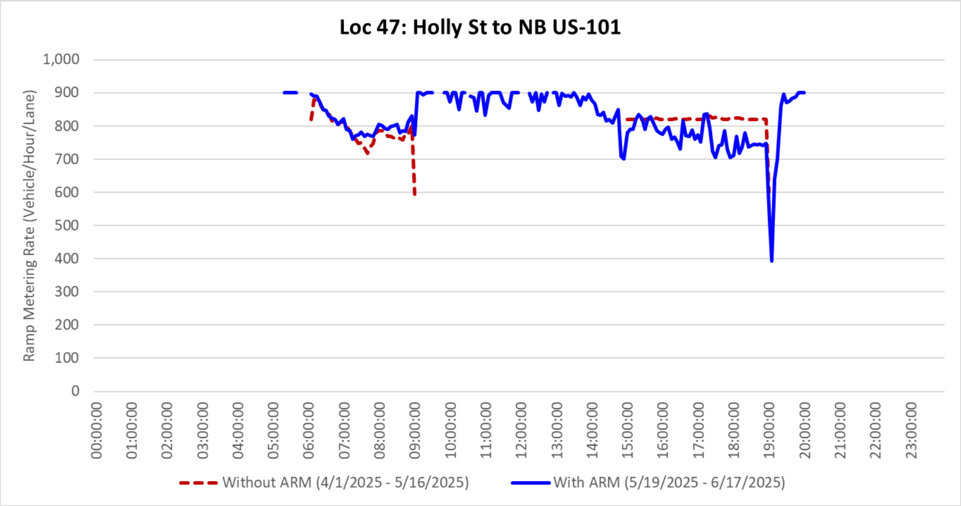
PHASE 2 SPEED HEATMAP MIDWEEK DAY - NB

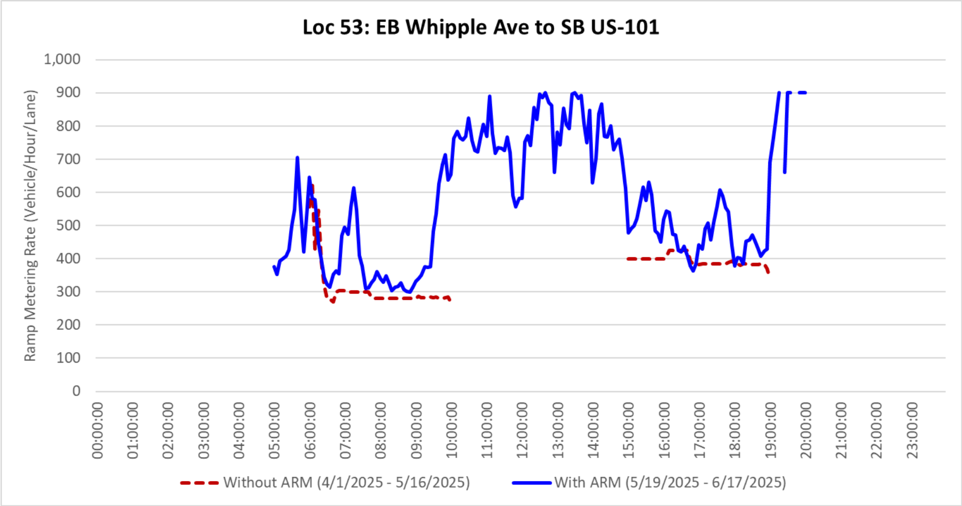


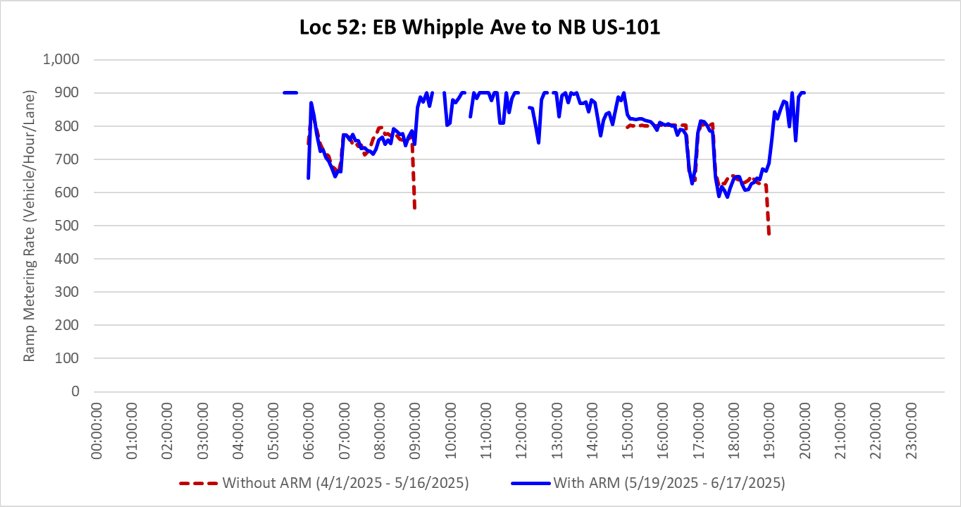
PHASE 2 SPEED HEATMAP MIDWEEK DAY - SB

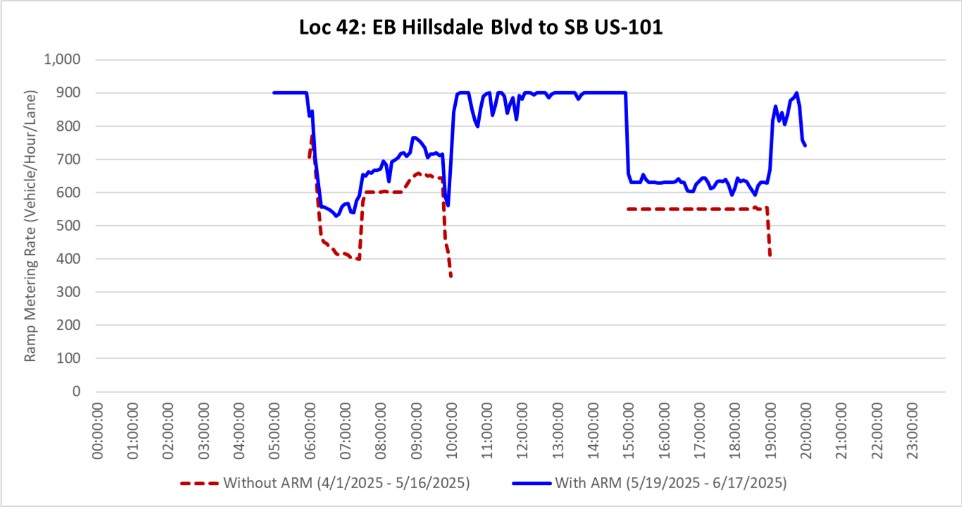


PHASE 2 RAMP METERING RATE COMPARISON









- ARM operates during mid-day period.
- ARM allows more proactive traffic management with more appropriate metering rates

FIELD OBSERVATIONS

Field observations conducted by both Caltrans and consulting team.

- Metering rates consistent with the ATMS system
- HOV on-ramp lanes with very short queues (0–5 vehicles depending on location)
- Queue lengths comparable to pre-ARM conditions
- Several locations with queue backup – Most occurred only during brief time periods:
  - Queues spilled from mainline to ramp gore
  - Limited on-ramp storage
  - Other

IMPLEMENTATION ROLLOUT SCHEDULE

Task	Schedule	Status
ATMS Acceptance Test	March 2025	Completed
Phase I Implementation (Group 1) & Field Observations	April 2025	Group 1 Completed, Group 2&3 Paused*
Phase 2 Implementation (Groups 1-3) & Field Observations	May - June 2025	Completed
Phase 3 Implementation (Groups 1-3) & Field Observations	July 2025	Completed
Phase 4 Implementation (Groups 1-3) & Field Observations	Aug.- Sep. 2025	On-going
Phase I Implementation (Groups 2&3) & Field Observations	Sep. 2025**	Scheduled**
Weekend Implementation & Field Observations	Oct. 2025**	Scheduled**
Early Performance Evaluation	Since April 2025	On-going

Notes:

* : Paused due to on-going pavement project

** : Will resume once the pavement project is completed and the detectors function properly

NEXT STEPS

Project Team

- ARM Phase 4 Roll out
- Field Observation
- Field repair and troubleshooting
- Early Performance Assessment

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