



COLORADO

Department of Transportation

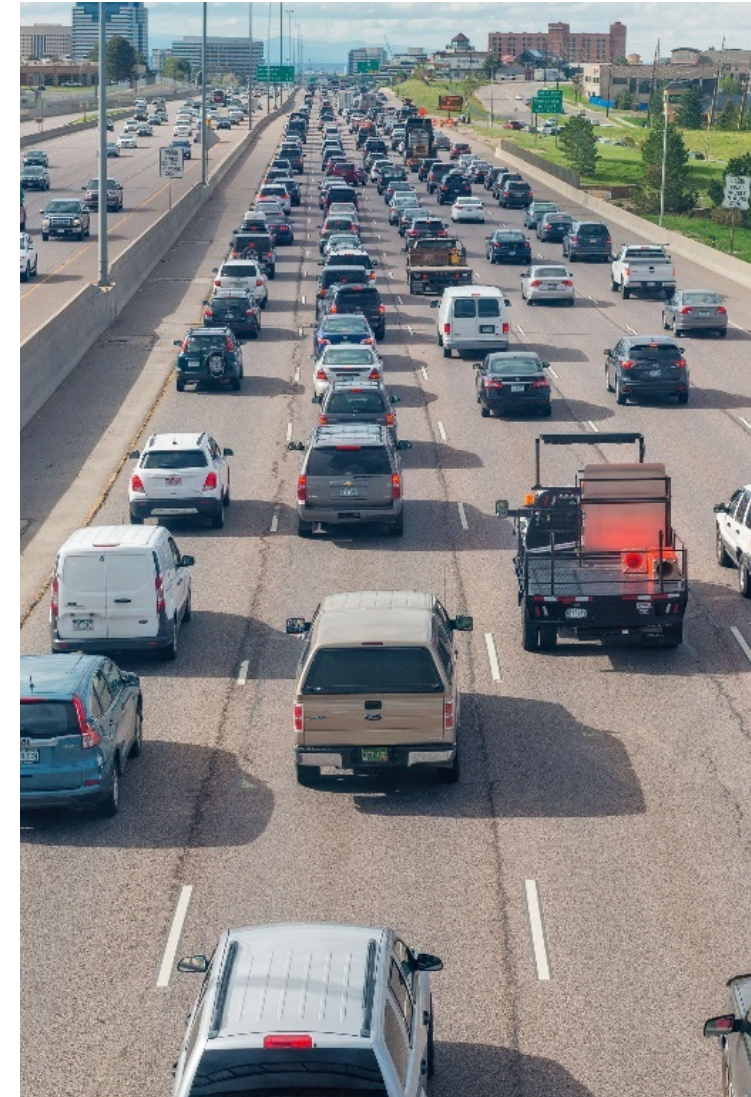
SMART 25 Managed Motorways Pilot Demonstration

Project Update - March 24, 2021



Purpose of Demonstration Project

- Demonstrate Australian Managed Motorway concept in Colorado
- Improve throughput, travel time, reliability, and speed performance on I-25
- Minimize cost of deployment



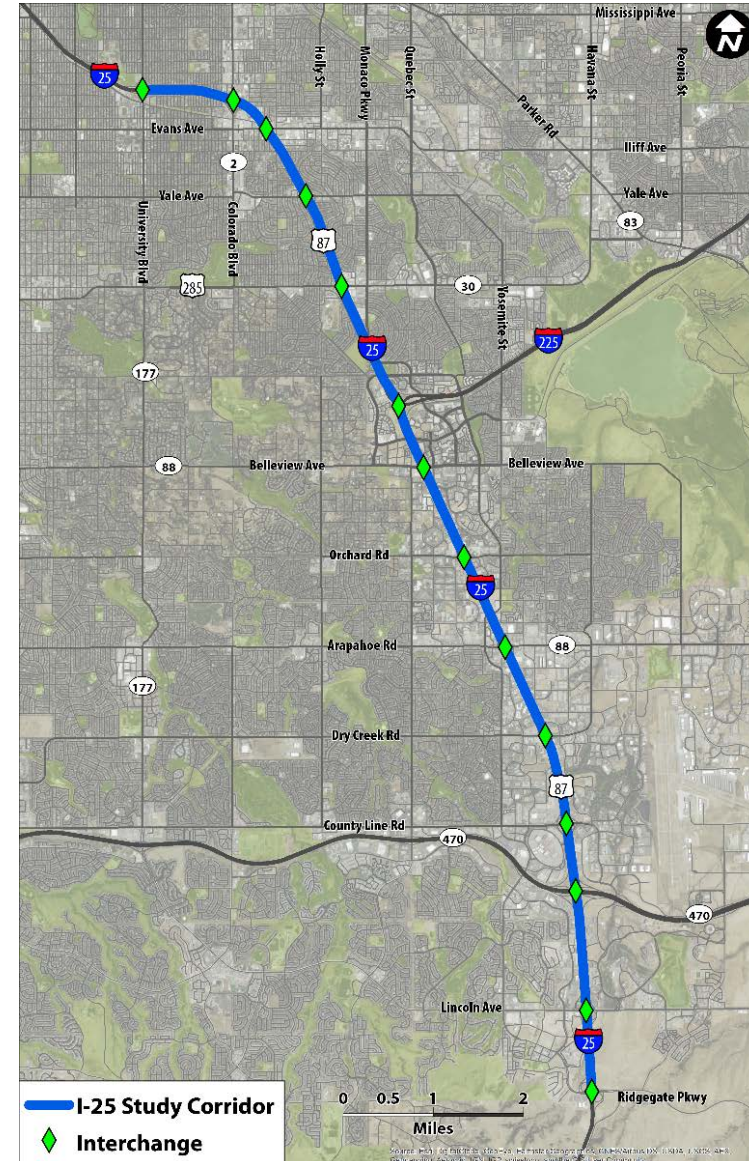
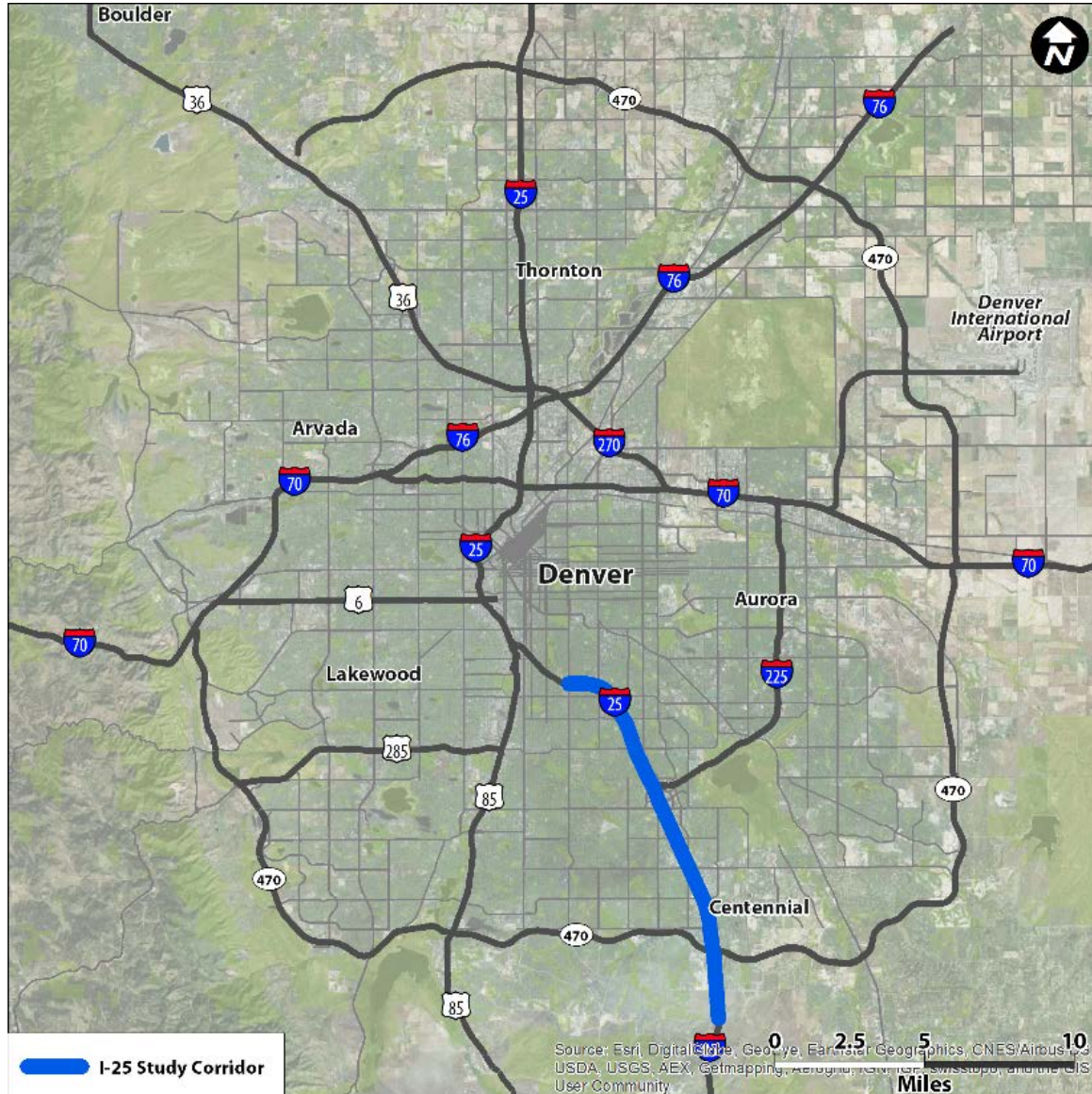


Agenda

- Project team introductions
- SMART 25 Corridor
- Managed Motorways Background
- Schedule
- Outreach
- Question & Answer



SMART 25 Corridor





Coordinated Ramp Metering

Intelligent system optimizes flow along entire route

- Algorithms resolve complex traffic problems to prevent congestion

All freeway entries are metered

- Metering rates differ for each ramp
- Tailored solutions

Coordinates entry ramps to:

- Balance queues and wait times
- Utilize ramp storage across system





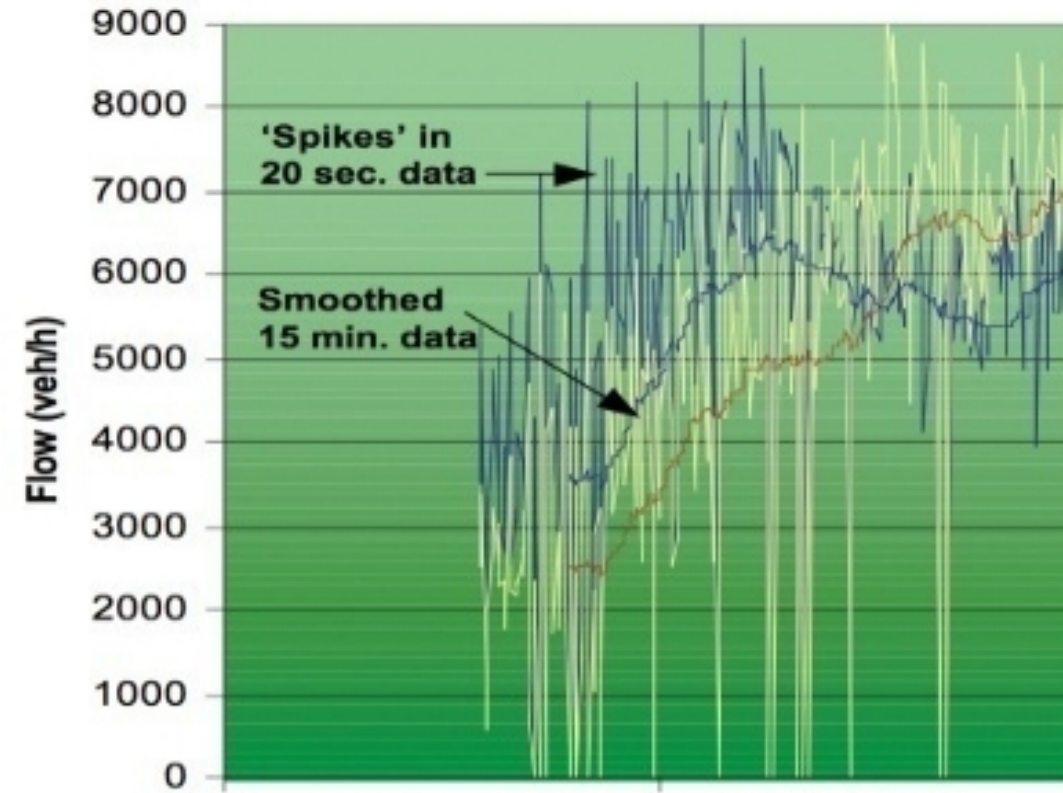
Coordinated Ramp Metering

Ramp signals balance entire system

- Responsive to freeway conditions as a system
- Prevent backups into any given arterials
- Queues managed to the total storage space provided by all ramps

Ramp signals only switch on when needed

Signal timings change every 20 seconds





Melbourne Experience

Results of Managed Motorways on M1 freeway:

- Throughput increased up to 25% during peaks
- Traffic speeds improved 35%-60% during peaks
- Improved overall travel time reliability between 150% (AM peak) and 500% (PM peak)
- Prevented backups onto adjacent roadways





SMART 25 Concept

Deploy Managed Motorways Concept

- Data Collection Period (3 months)
- Temporary Pilot Demonstration (6 months)
- Performance Evaluation Report & Stakeholder workshop
- Fallback to existing CDOT system

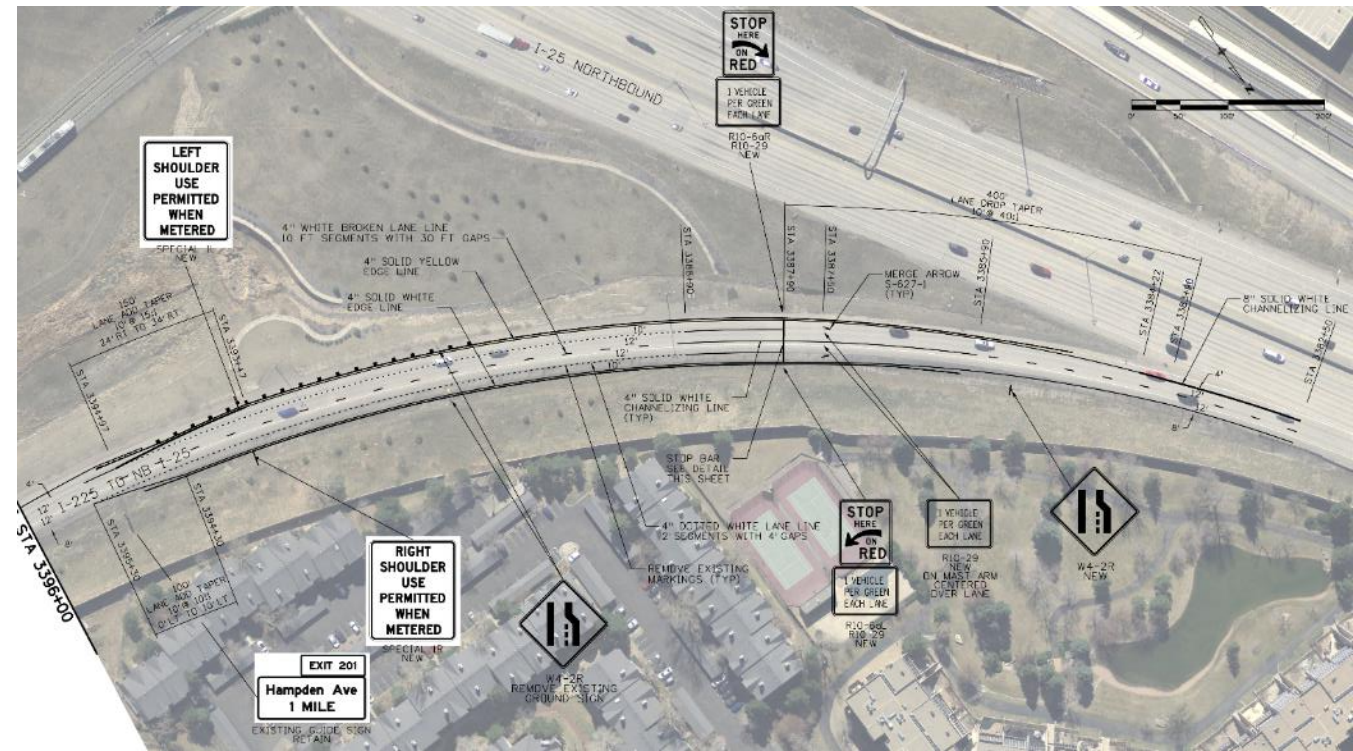




Ramp Meter Locations

All entrance ramps must be metered

- 18 individual entrance ramps
- 3 freeway to freeway system ramps
 - I-225
 - C-470
 - E-470





Freeway System Ramp Meters

Freeway to Freeway metering *necessary*

Managed Motorways will not work without *full system control*

- Activated only when needed
- Control of “last resort”

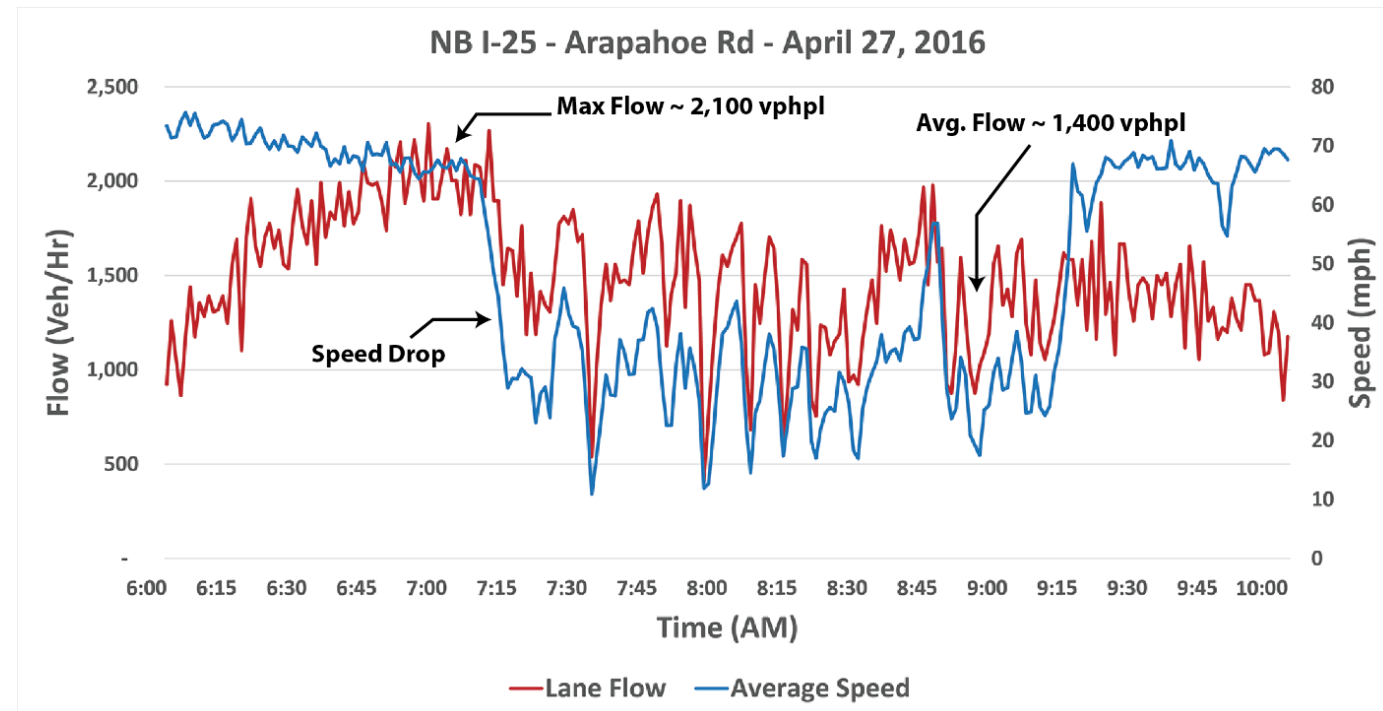




Contemporary Traffic Theory

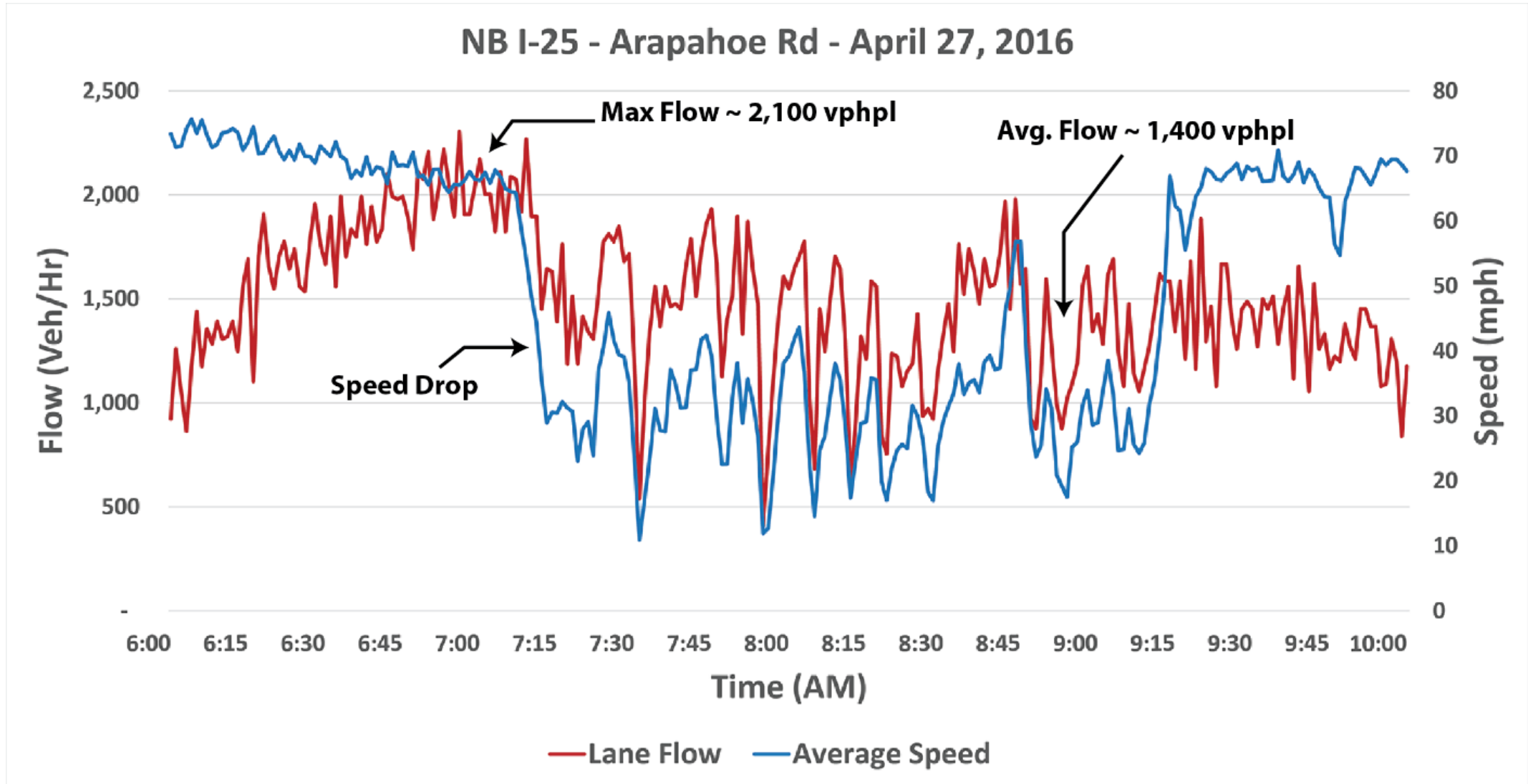
Maximum flow rates described in HCM (~2,300 vphpl)

- *Rarely achieved in practice*
- Traffic flow *extremely unstable* near critical capacity



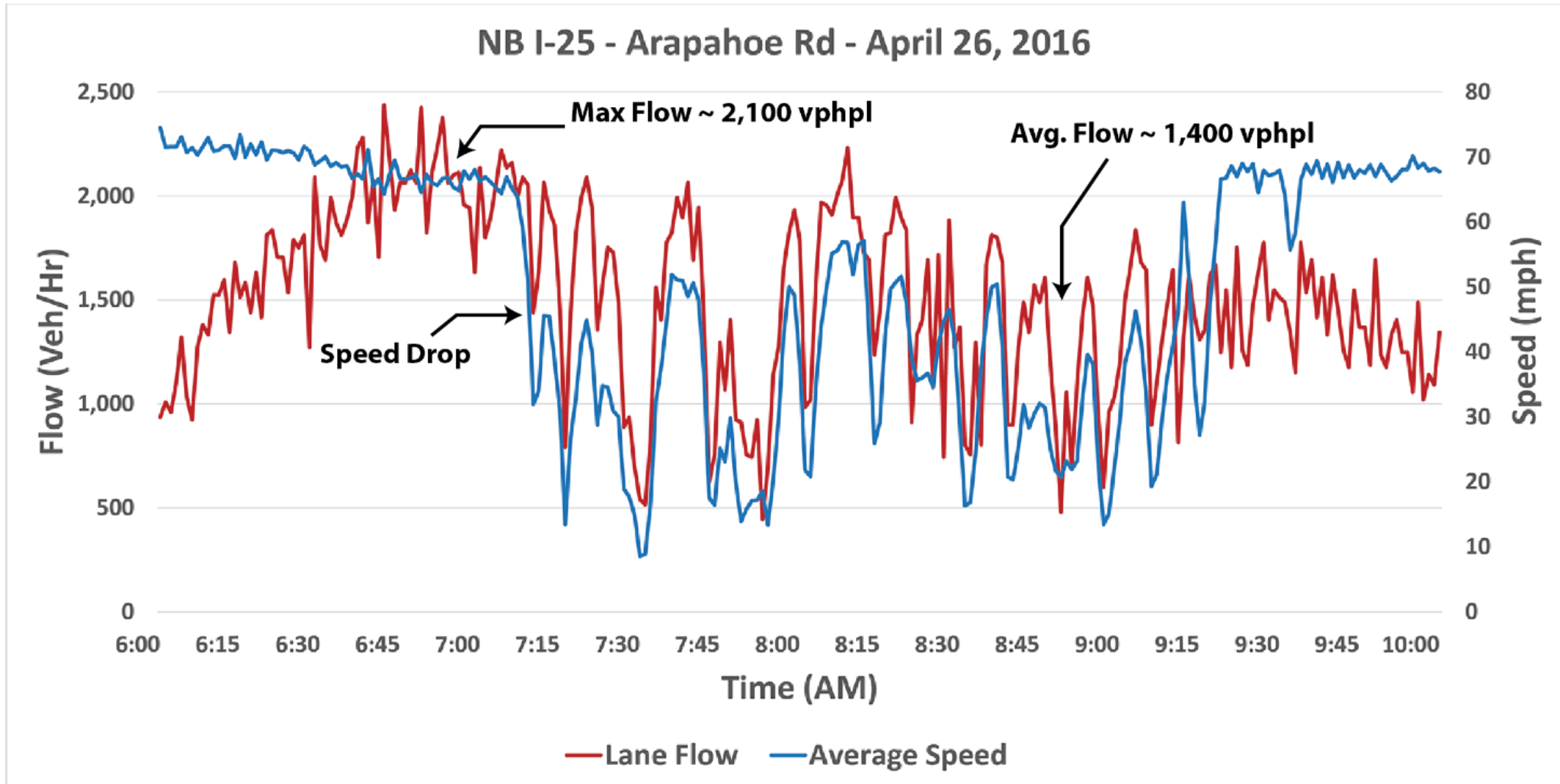


Contemporary Traffic Theory



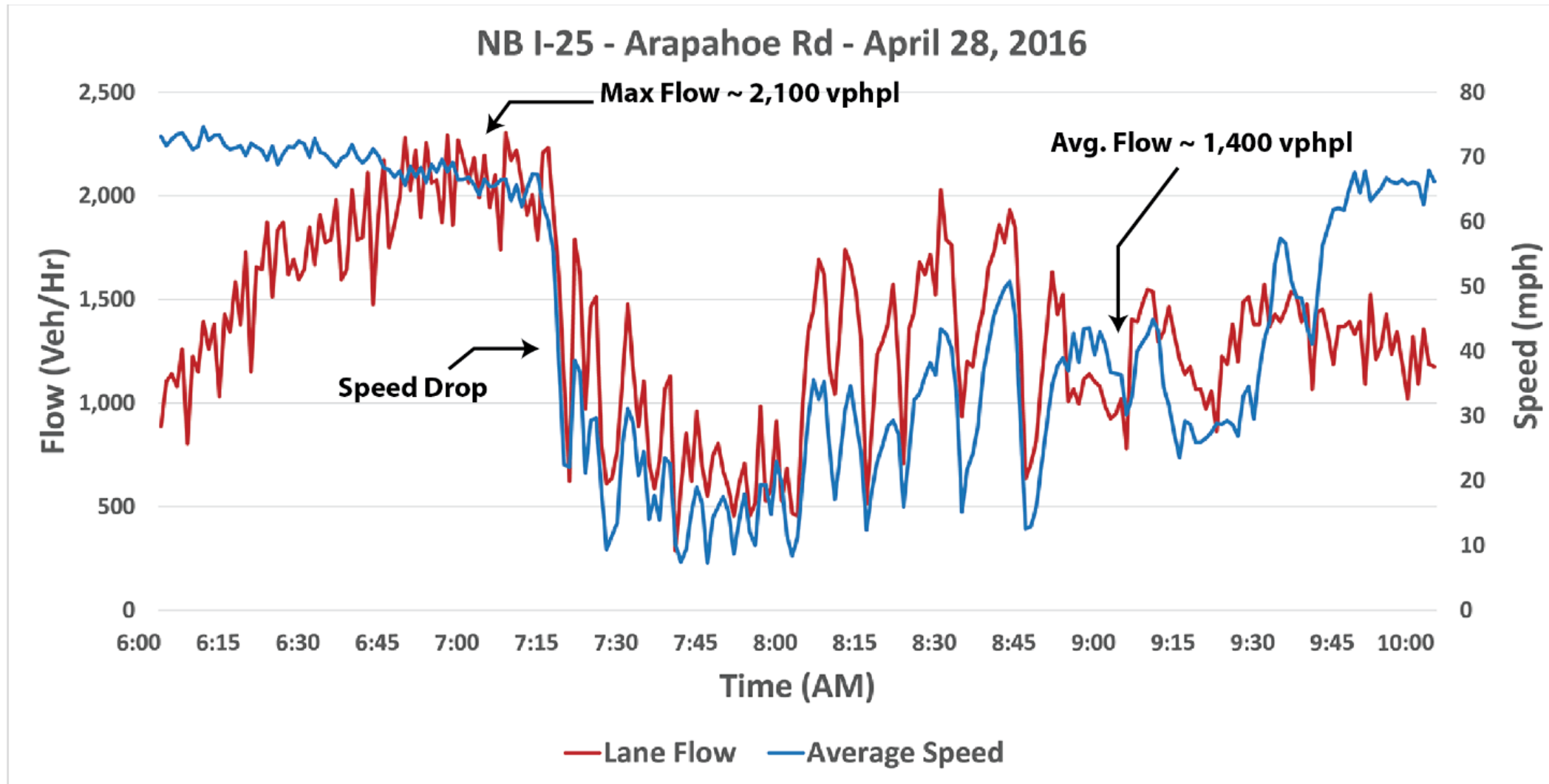


Contemporary Traffic Theory





Contemporary Traffic Theory





Impacts to Adjacent Roadways

Current I-25 Conditions	SMART 25 Conditions
<ul style="list-style-type: none">• Ramp queues inferred• Limited detection	<ul style="list-style-type: none">• Better understanding of ramp storage<ul style="list-style-type: none">- Additional detection- Maximum vehicle storage set for each ramp
<ul style="list-style-type: none">• Congestion when I-25 is saturated<ul style="list-style-type: none">- Significantly lower throughput- Ramp queues already having impact	<ul style="list-style-type: none">• System-wide control<ul style="list-style-type: none">- Ramp queues balanced throughout entire corridor- Improvement in I-25 vehicle throughput- Prevent impacts to adjacent roadways



System Activation

Data Collection Period

- 12 weeks
- Calibrate system based on existing traffic performance
- “Before” case for evaluation

Phased Activation (Soft Launch)

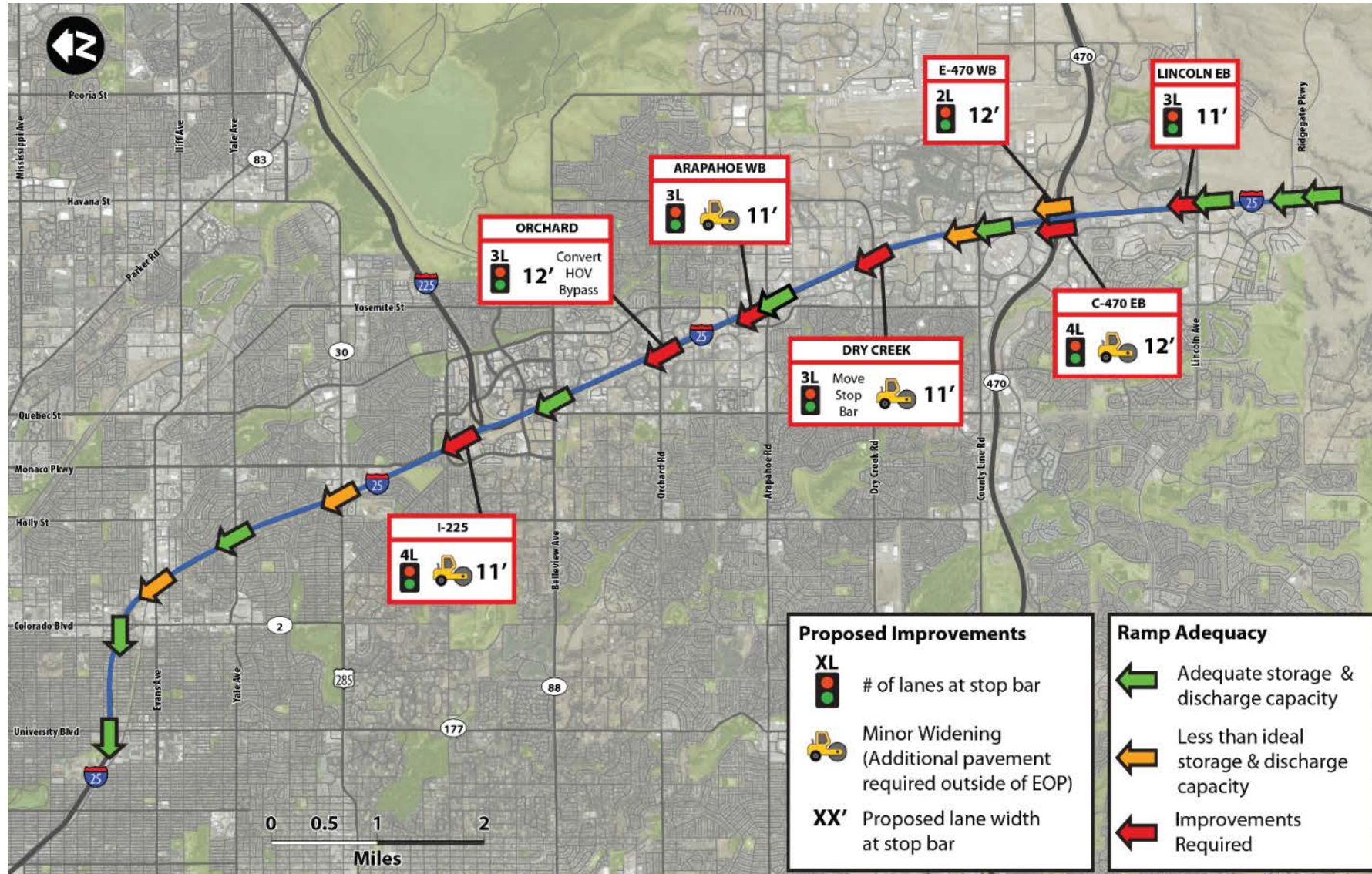
- First 8 weeks of pilot operations
- Incremental roll-out of system (5-10% at a time)
- Adjustment period for drivers
- Ability to *add new parameters as issues arise*
- *Freeway to Freeway ramp meters NOT ACTIVATED*

Full Pilot Operations





Ramp Improvements



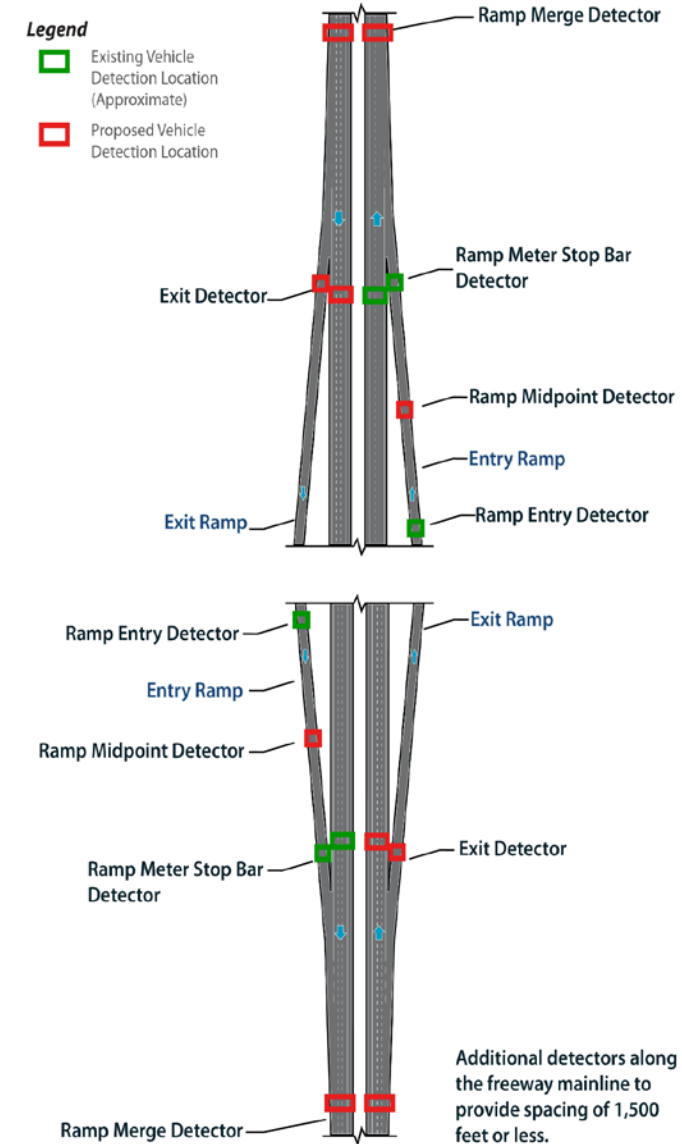


Vehicle Detection

System algorithms require $\pm 2\%$ accuracy

- Lane by lane Volumes, Speeds, Lane Occupancy, & Vehicle Classification

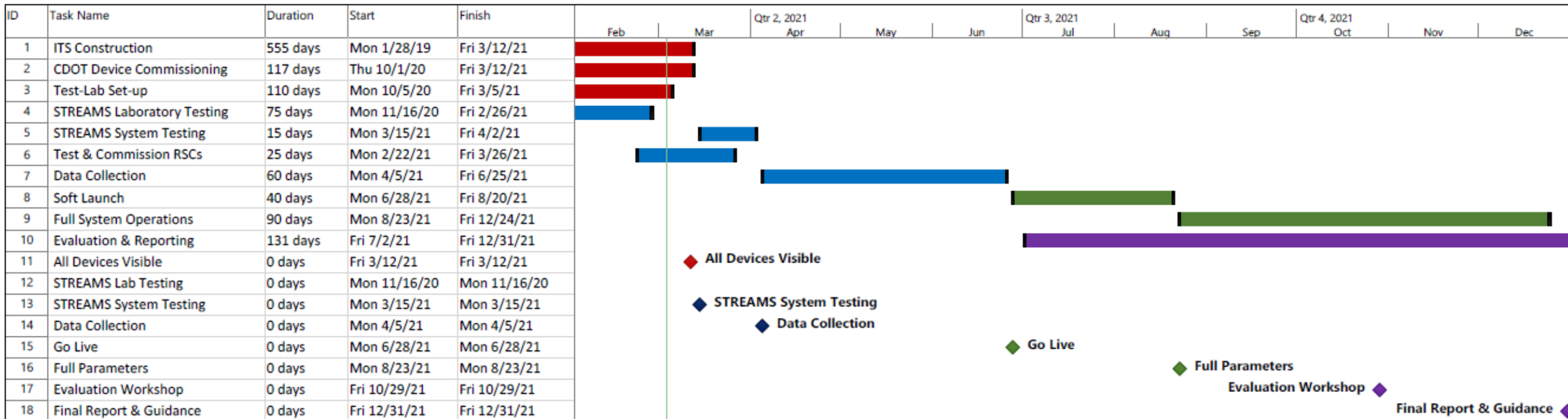
Existing microwave radar device
DO NOT meet standard





Status & Schedule

- Data Collection Period - *April*
- Soft Launch - *June/ July*
- Full Operations - *August/ September*





Outreach

- CDOT Project Website - *Coming soon*
- Follow-up presentations with corridor agencies - *As Requested*



Thank You!

- For questions or comments, please contact:

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