California Department of Transportation

I-880 Corridor System Management Plan

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Caltrans Division of Research & Innovations
2006 Research Connections Series

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Agenda

- Project motivation
- Corridor selection
- Project tasks and stakeholder needs
- Corridor mobility improvement template
- Project team
- I-880 project overview
- Corridor wide performance
- Corridor bottlenecks
- Next steps

PROJECT MOTIVATION AND OBJECTIVES

- Corridor mobility improvement and system management
- Integrate planning and operations
  - TOPS
  - TMS master plan
  - Pyramid

- Performance measurement to drive decision making
- Plans for corridor performance improvements
- Template to be used by Caltrans and corridor partners

SYSTEM AND CORRIDOR PERFORMANCE MEASURES

- Consistency with Caltrans and regional goals and measures
  - Mobility- Delay, speed and travel time
  - Safety- Accident rates
  - Reliability- Travel time variation and estimation
  - Productivity- Peak demand performance (% utilization)
  - Flexibility- Mode split/trends and environmental impacts

- Data for modeling & performance measurement
  - PeMS used for freeway data, missing data collected manually
  - Arterial data, transit ridership and local data provided by corridor partners

CORRIDOR SELECTION

Corridor should:

- Serve interregional mobility for people and goods
- Include multi-modal elements
- Have good detection and existing historical data
- Be a good candidate for mobility improvements with potential for high B/C ratio

PROJECT TASKS AND STAKEHOLDERS

- Review planned and programmed corridor improvements
- Stakeholder feedback and participation
- Data collection and site visit and performance assessment
- Corridor improvement strategies and micro-simulations
- Corridor mobility improvement template (CoMIT)
- Project Stakeholders
  - Caltrans, MTC, Alameda County, VTA, ABAG, BART, ACE, AC Transit, Port of Oakland, CTA, Capitol Corridor Joint Power Authority

CORRIDOR MOBILITY IMPROVEMENT TEMPLATE

- Provides understanding of system/corridor management
- Follows pyramid concept for corridor mobility improvement
- Define critical steps to be undertaken by the corridor partners
- Performance used to monitor and priorities investments
- Template continuously updated/improved using new corridor projects

PROJECT TEAM

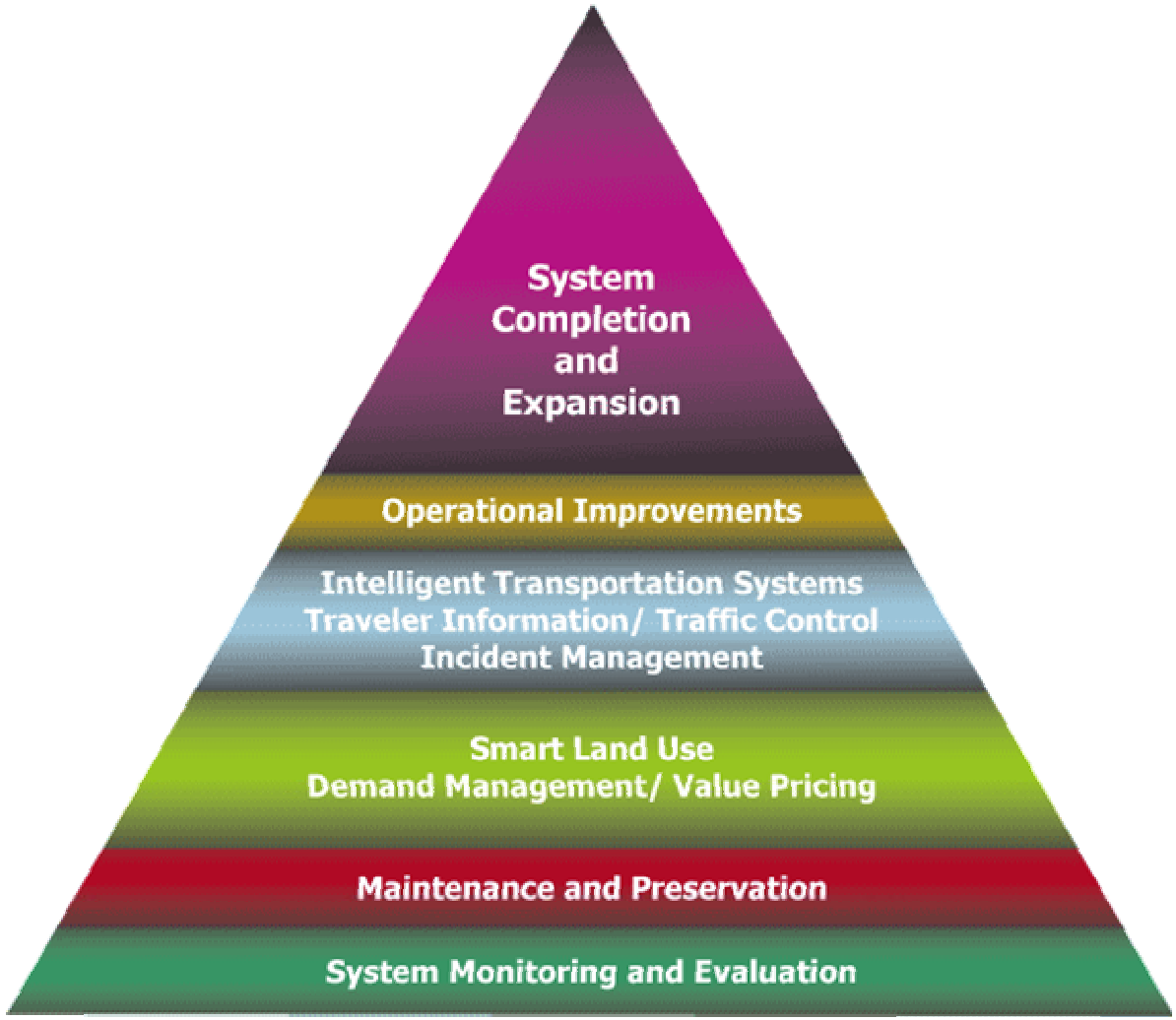
- Project sponsored by Caltrans Division of Traffic Operations and the Division of Transportation Planning
- Project lead- CCIT, UC Berkeley
- Simulation work- UC Irvine and CCIT
- Consultant- System Metrics Group
  - Sub-Consultant- Cambridge Systematics
  - Sub-Consultant – Braidwood Associates
  - Sub-Consultant – Wiltec
- MTC and corridor agencies

Agenda

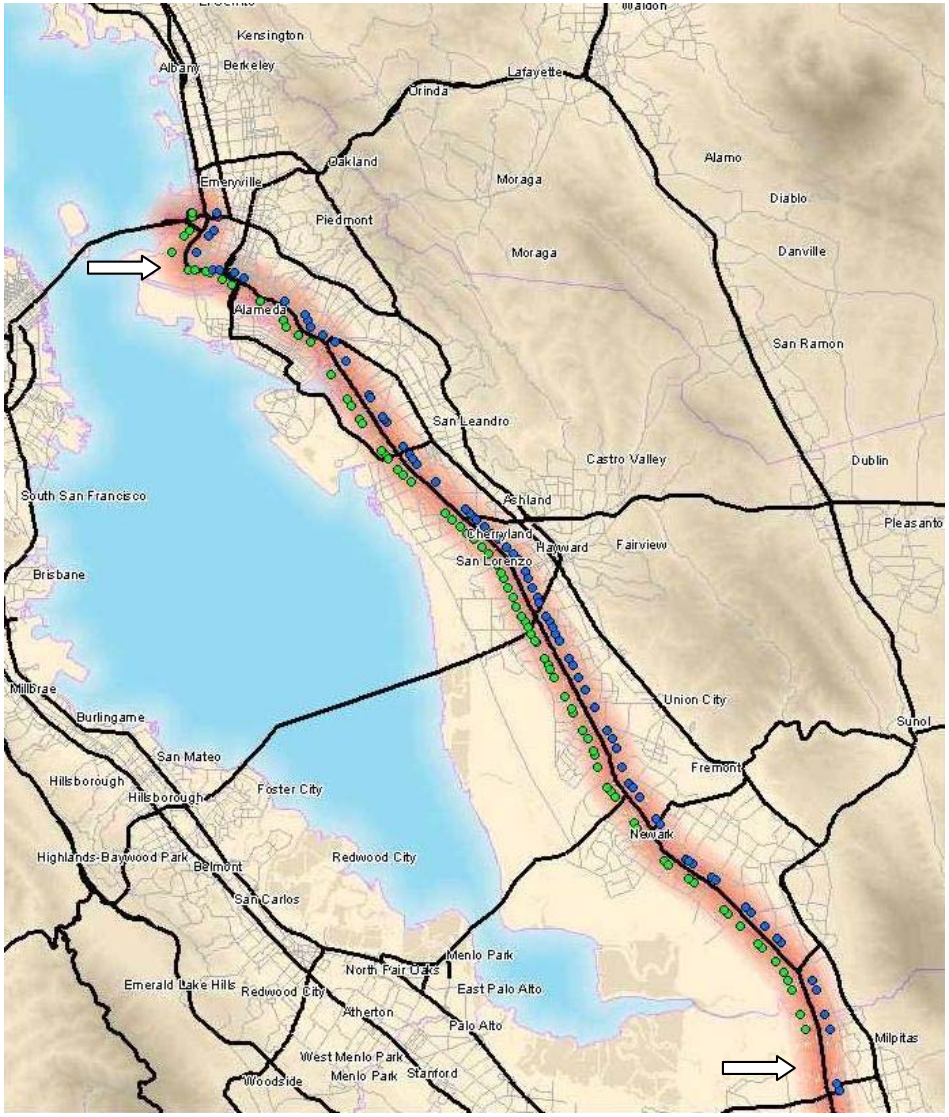
- Project Overview
- Corridor wide performance
- Corridor bottlenecks
- Next steps

Project Overview

This study focuses on system management and all its components and will serve as a template for future efforts

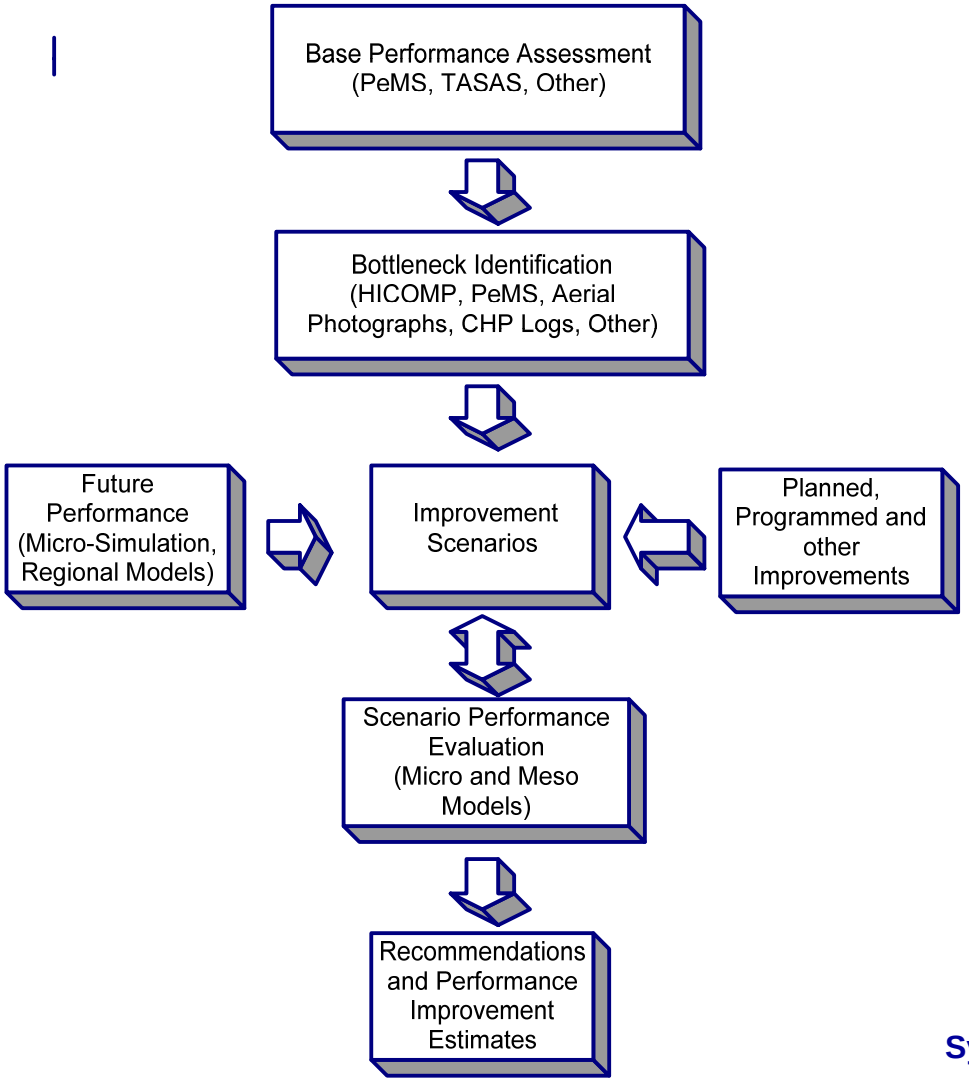


The corridor has good detection and stretched from SR-237 to 7th Street (around 35 miles)



System Metrics Group, Inc.

The approach focuses on detailed performance assessments and micro-simulation based "what-if" analysis



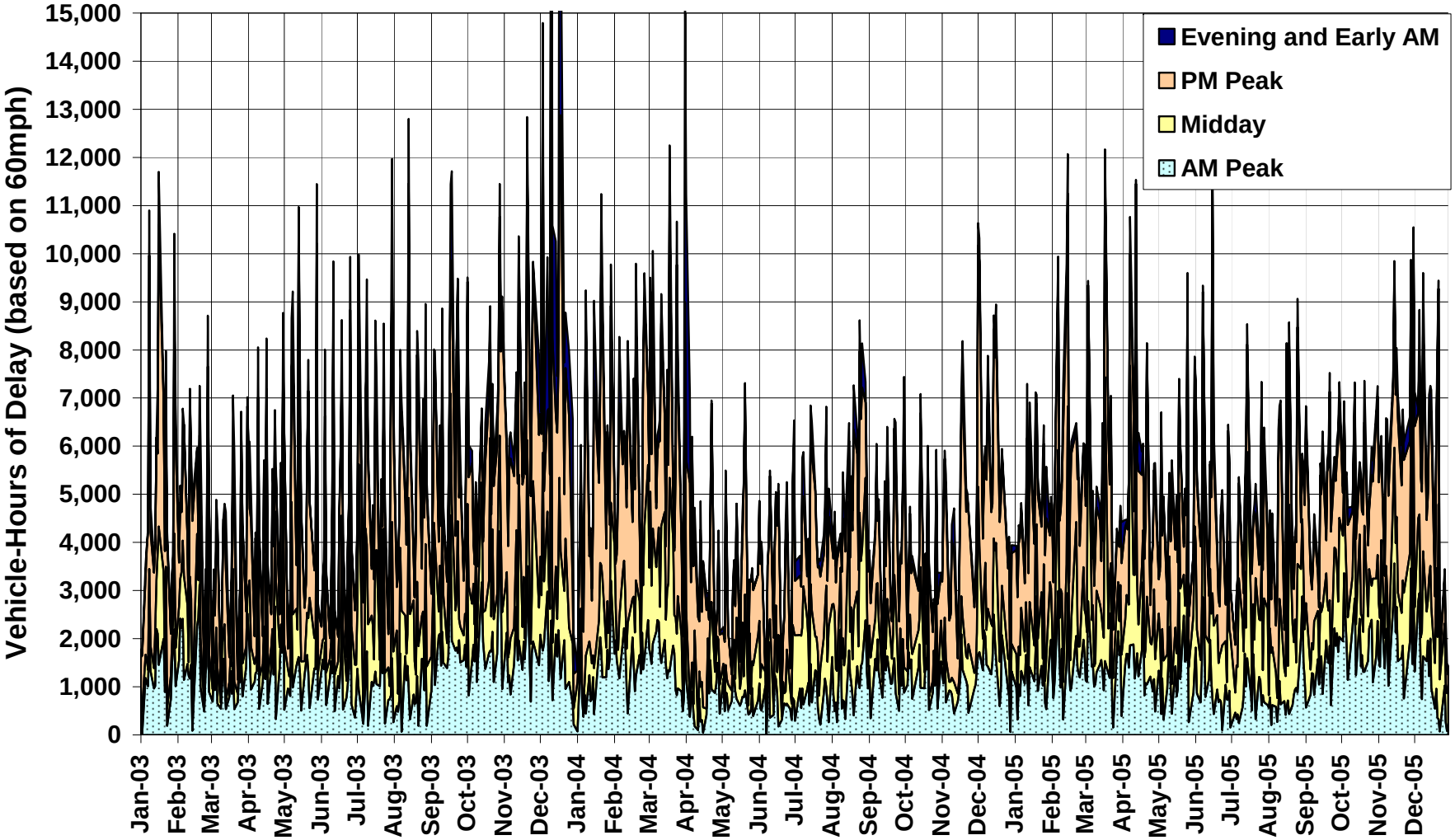
Why Micro Simulation (despite its challenges)?

- Analysis of traffic flows
- Reasonable representation of queues and resulting traffic congestion
- Focus on bottlenecks
- Ability to analyze operational projects
- Integration of planning and operations
- Perhaps most importantly: Quantification of benefits due to operational strategies

Micro-simulation-based presentations/visuals are also more effective in discussions with stakeholders

Corridor Wide Performance Assessment

We used detection data to compute weekday delay on the study corridor over an 12-month period from January 2003 to December 2005 - Northbound



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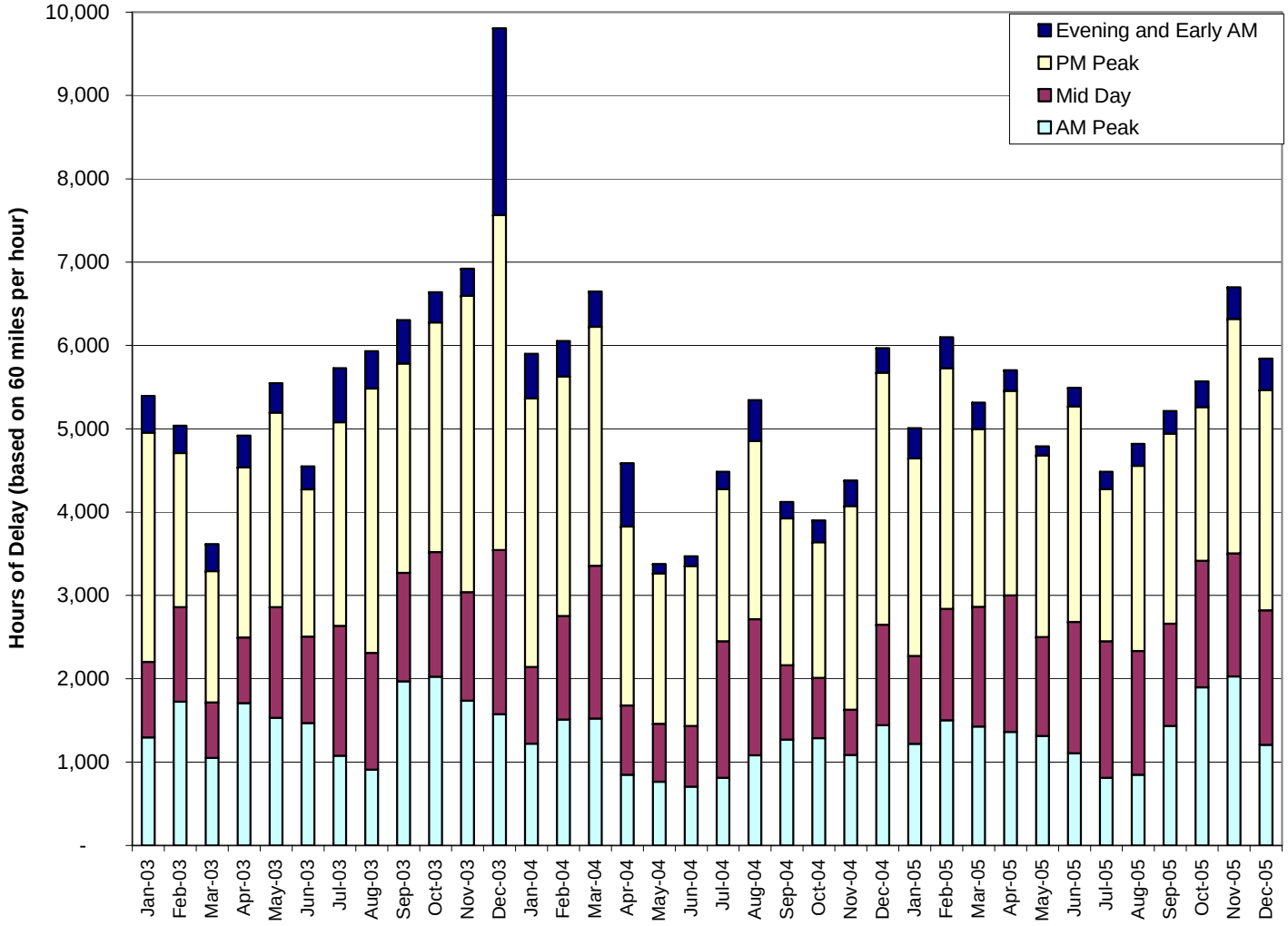
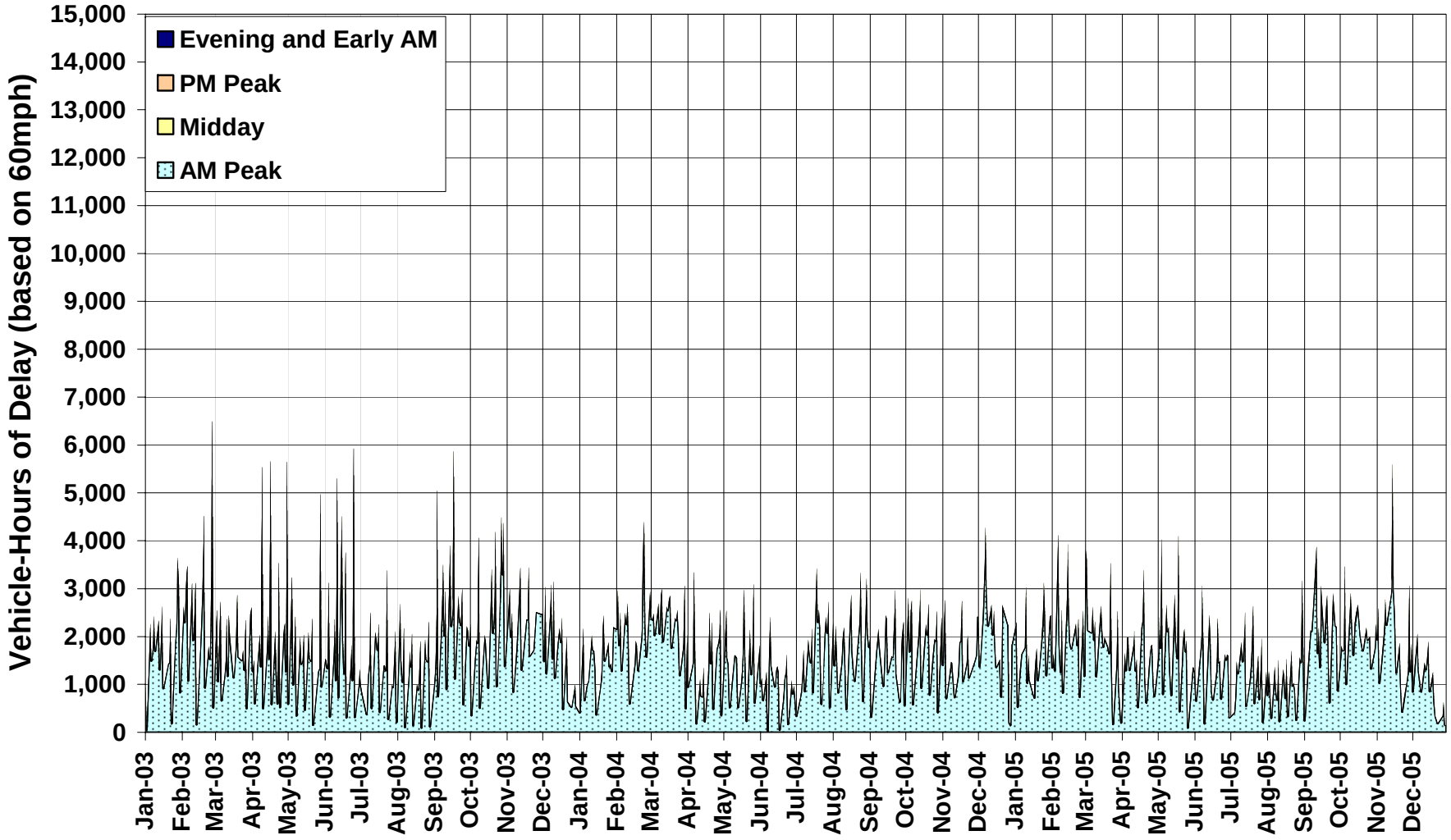
To better see the trends, we computed weekday averages by month (northbound)

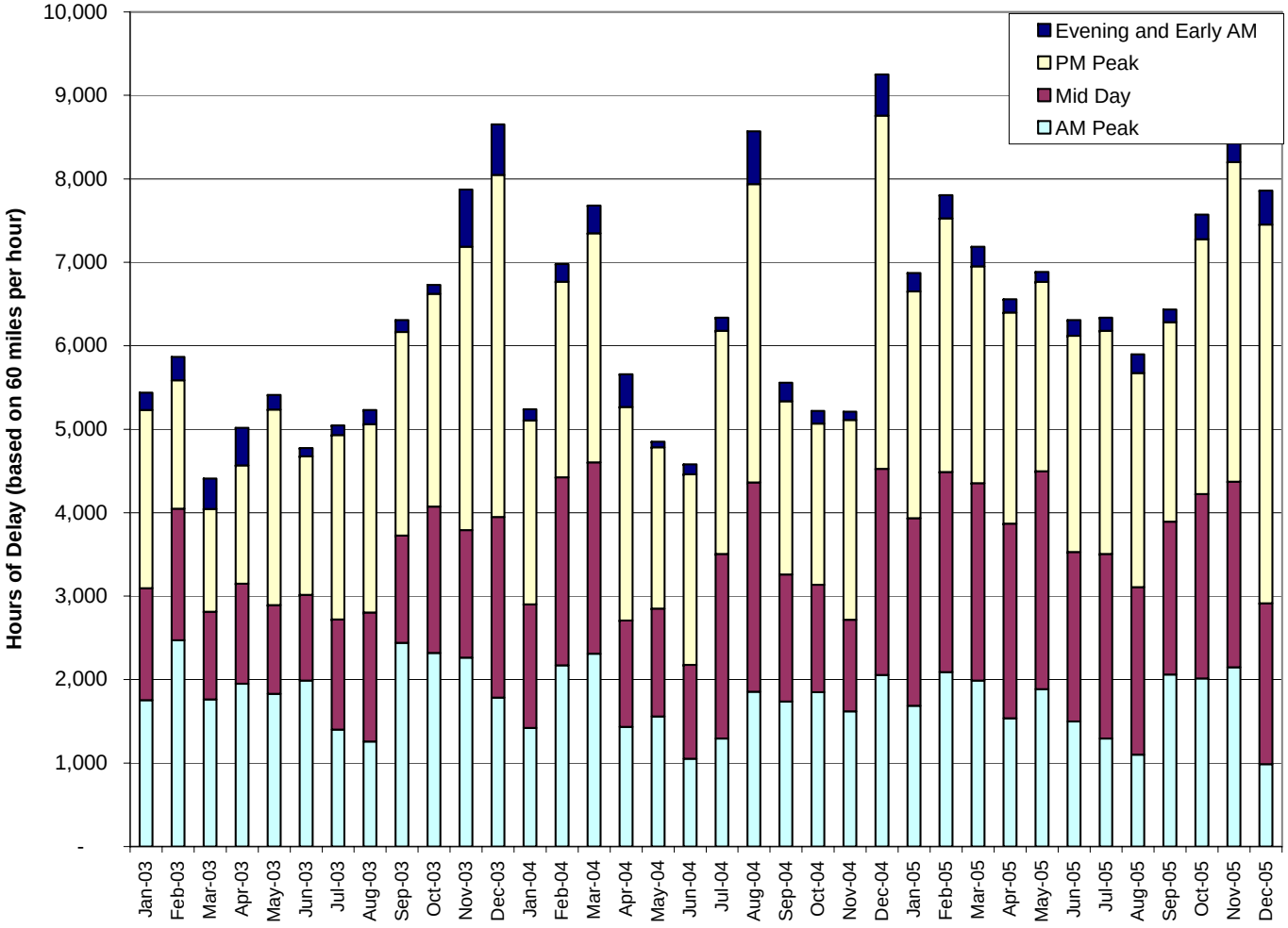


We also used detection data to compute weekday delay on the study corridor over an 12-month period from January, 2003 to December 2005 - Southbound

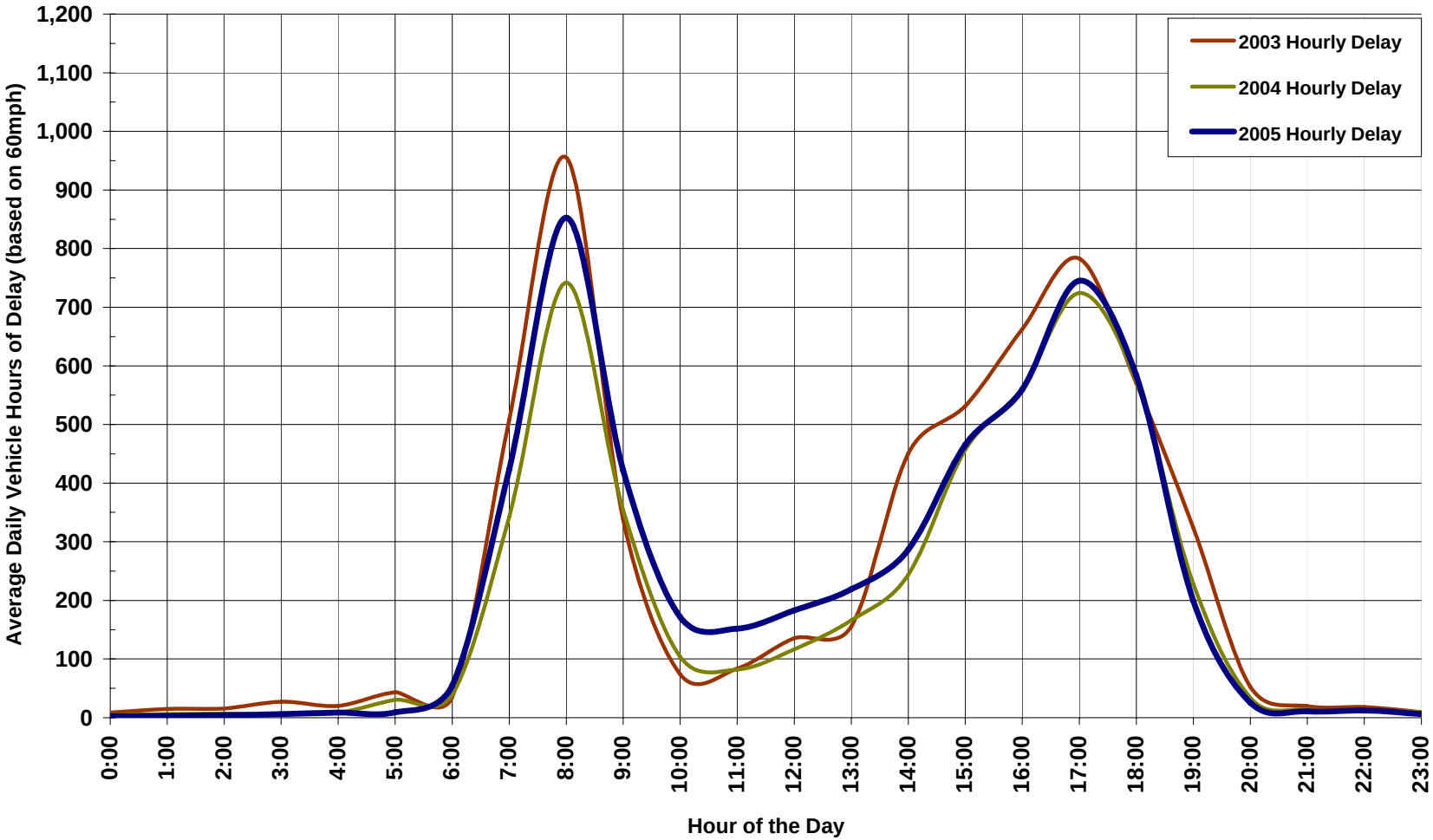


System Metrics Group, Inc.

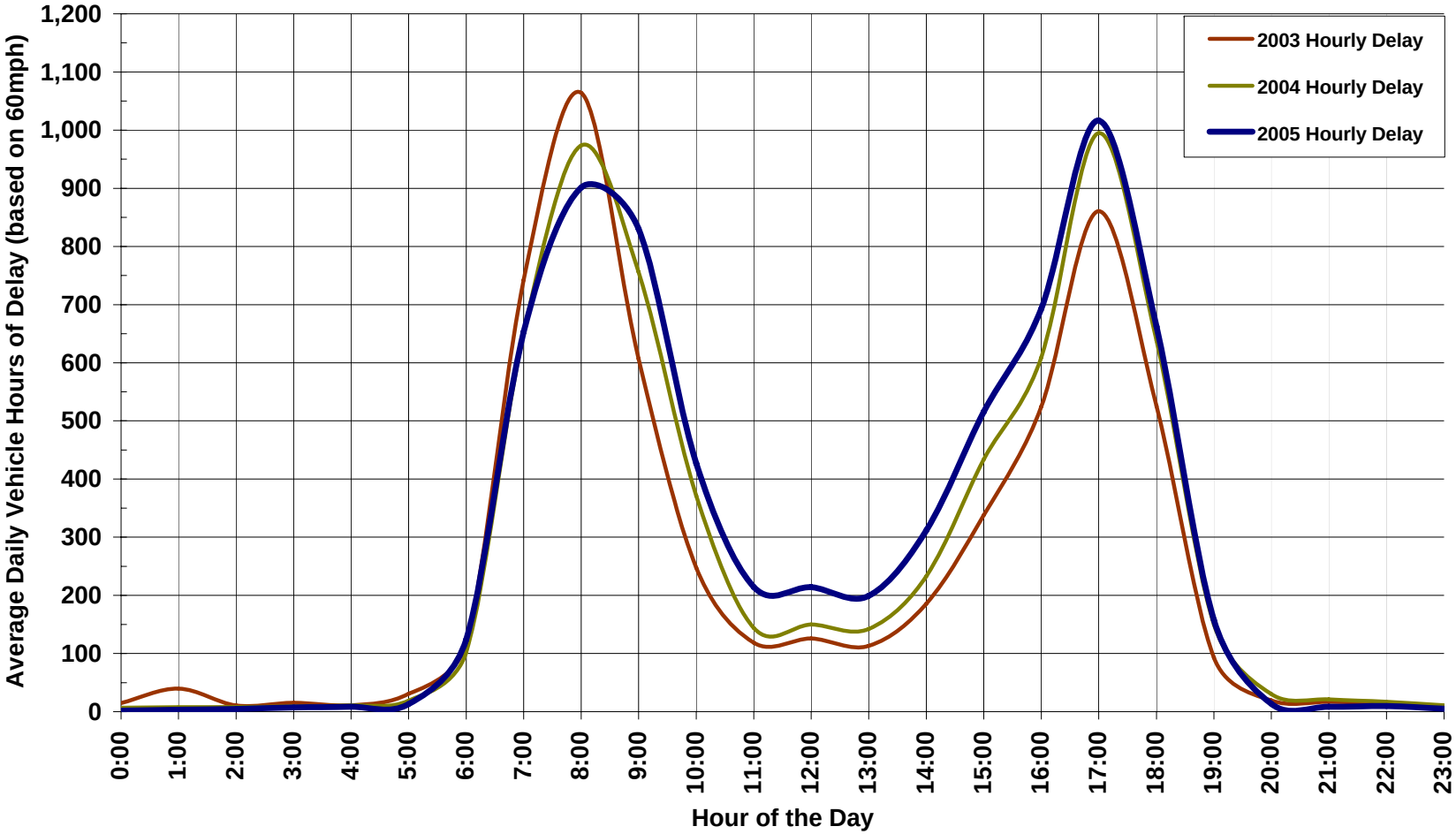
To better see the trends, we again computed weekday averages by month (southbound)



… and computed average delay by time of day for weekdays northbound



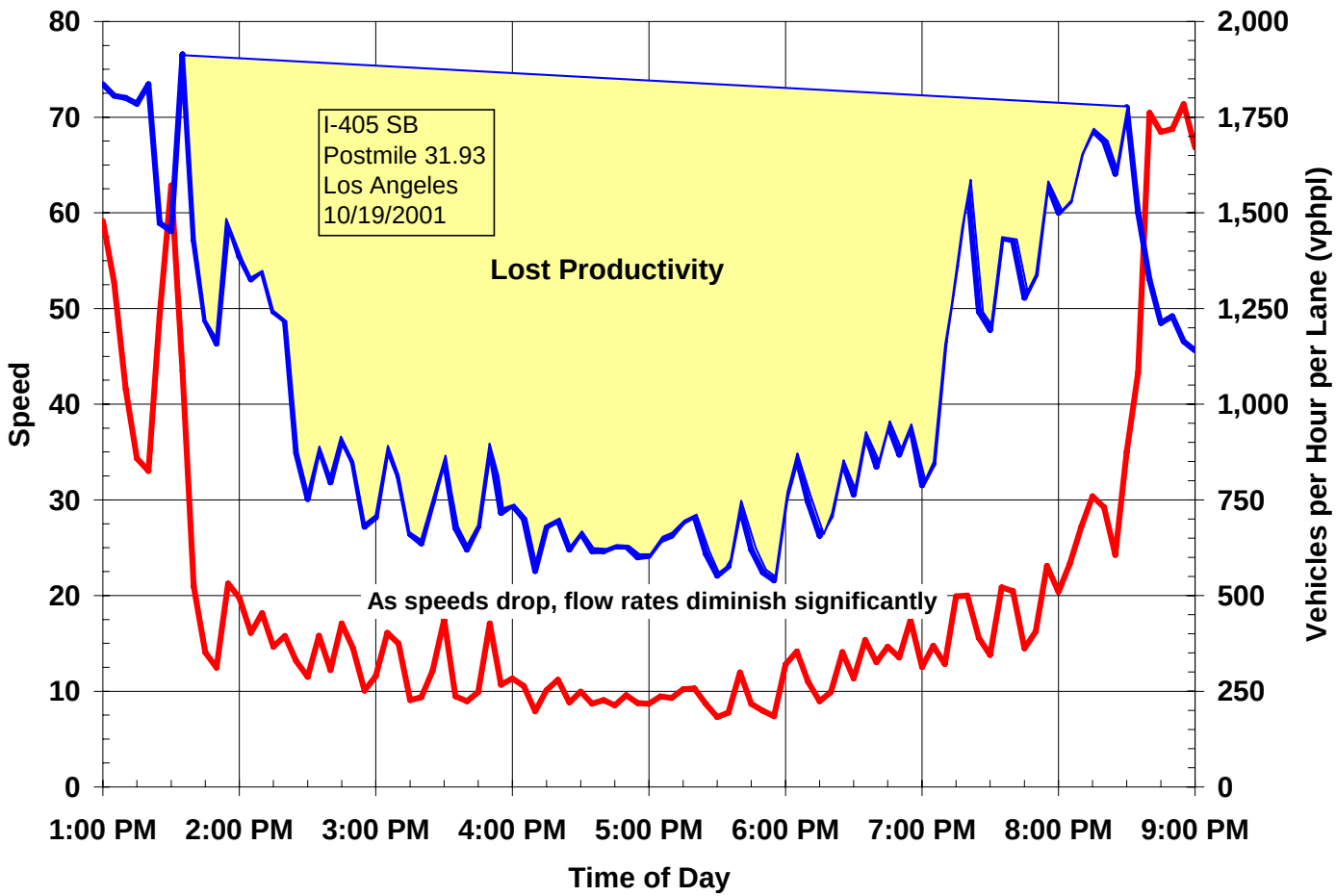
… and southbound



… and averages by year (note the increase in mid-day delay in 2005)

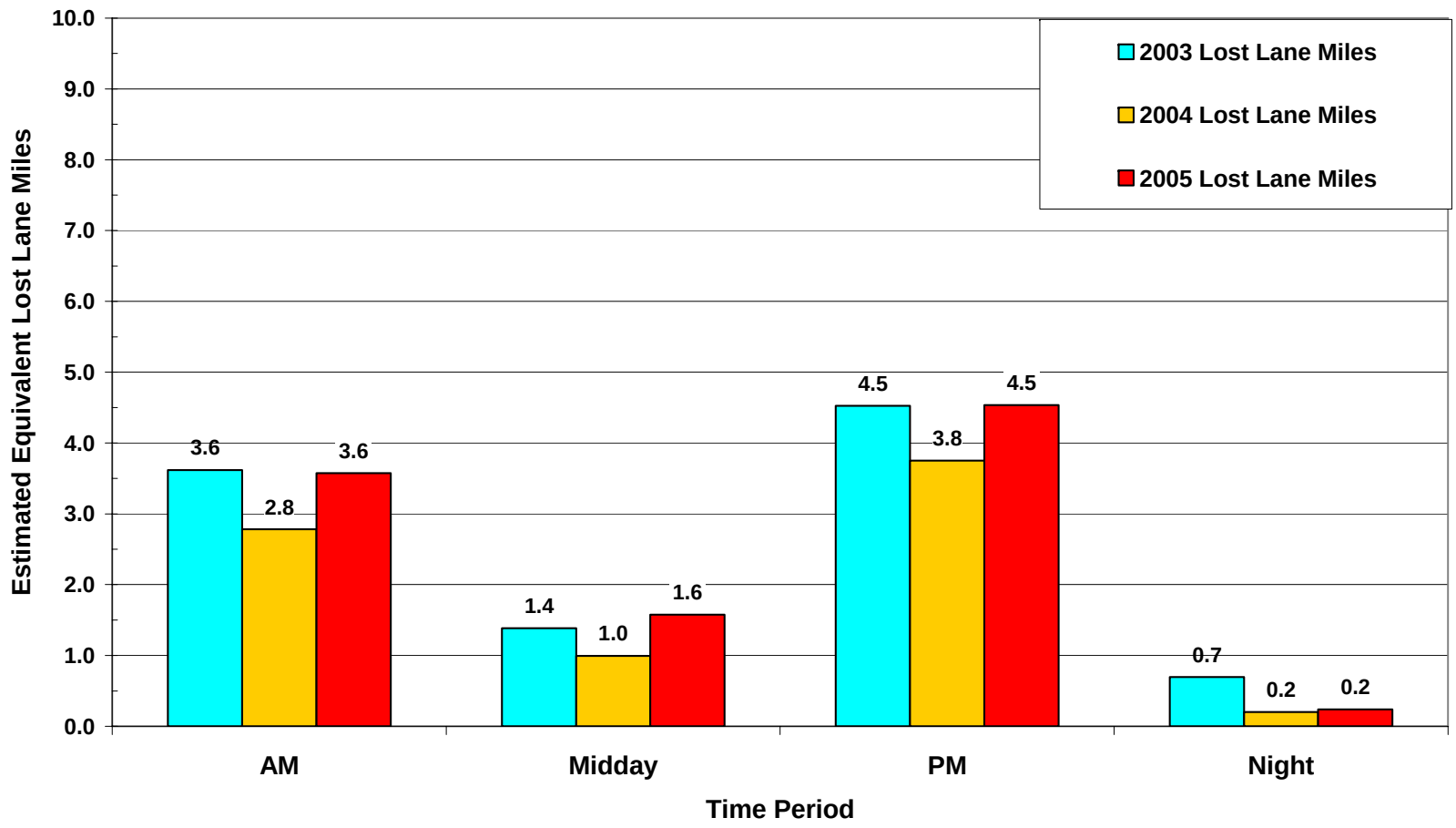
Year	AM Peak	Mid Day	Evening and Early AM	PM Peak	Total Daily
Northbound Direction					
2003	1,499	1,237	552	2,547	5,835
2004	1,124	1,067	360	2,317	4,867
2005	1,331	1,434	285	2,351	5,402
Southbound Direction					
Year	AM Peak	Mid Day	Evening and Early AM	PM Peak	Total Daily
2003	1,924	1,397	276	2,249	5,846
2004	1,728	1,427	291	2,375	5,821
2005	1,678	1,848	232	2,444	6,202
Total Corridor					
Year	AM Peak	Mid Day	Evening and Early AM	PM Peak	Total Daily
2003	3,423	2,634	828	4,796	11,682
2004	2,852	2,494	651	4,691	10,688
2005	3,009	3,282	517	4,795	11,604

Detection also helps us calculate productivity losses by segment



Source: Performance Measurement System (PeMS) – October 2001
Vphpl: volume per lane per hour

… which can be aggregated for the study corridor in terms of lost lane miles for different time periods (Northbound)



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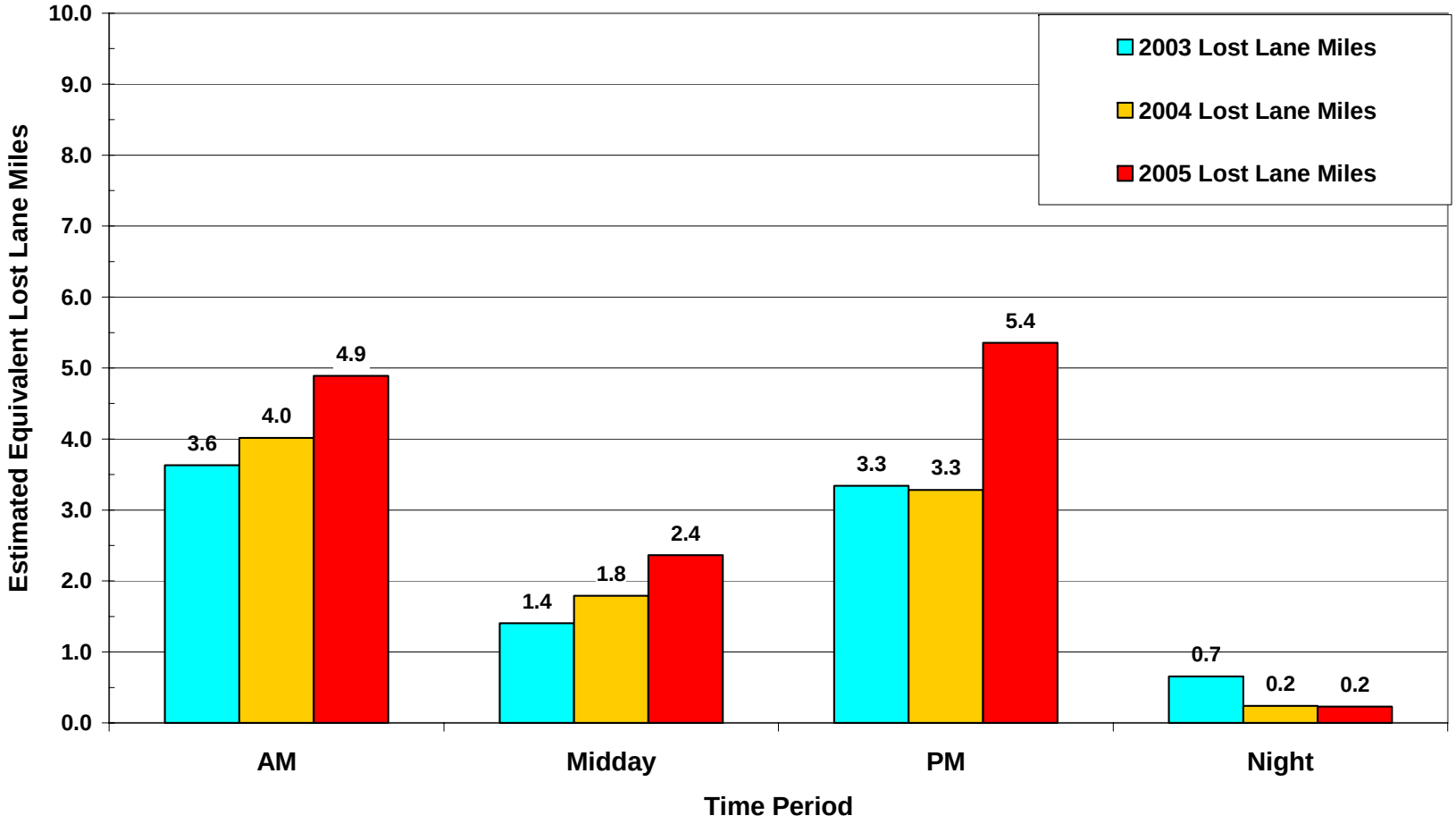
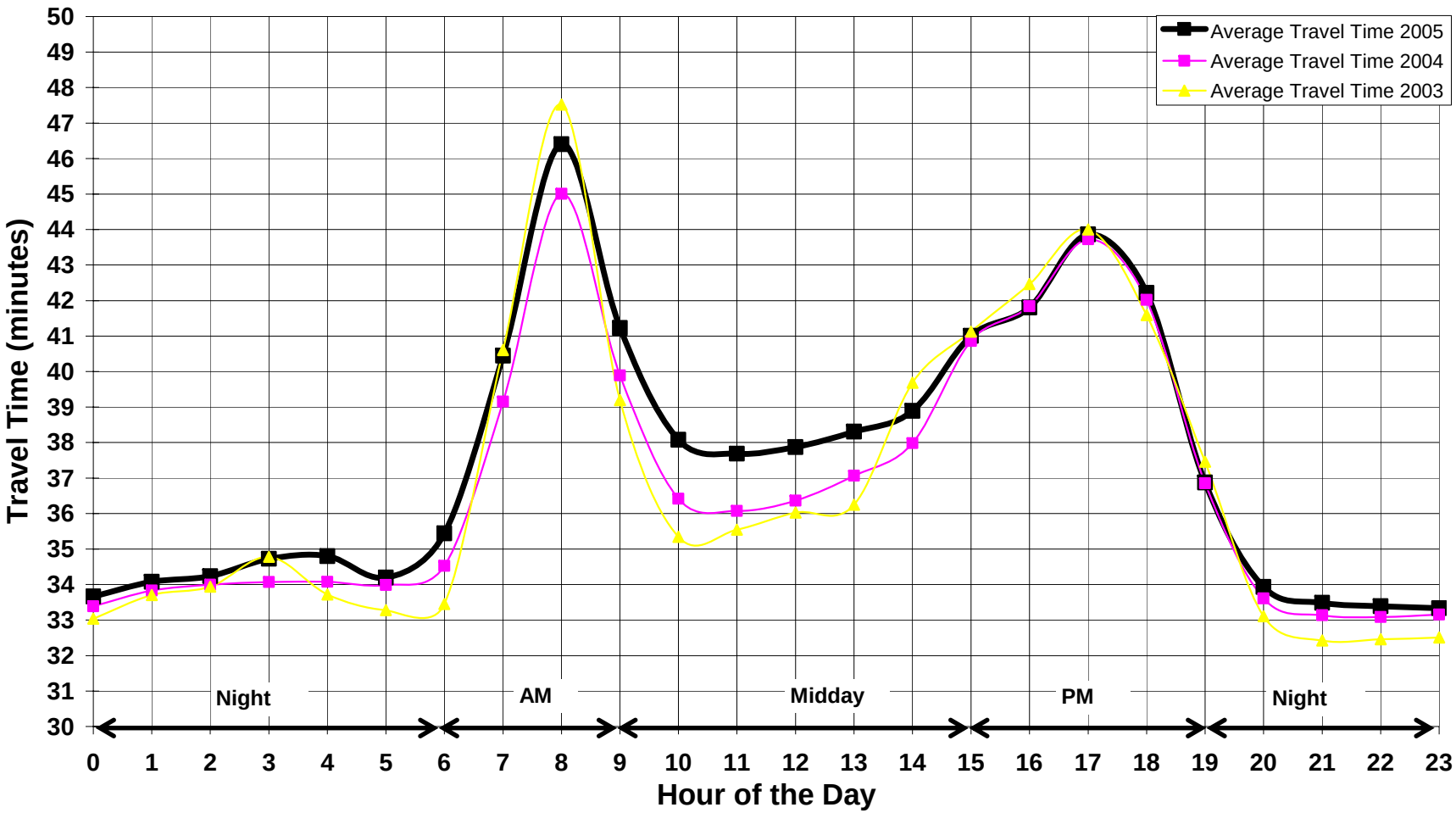
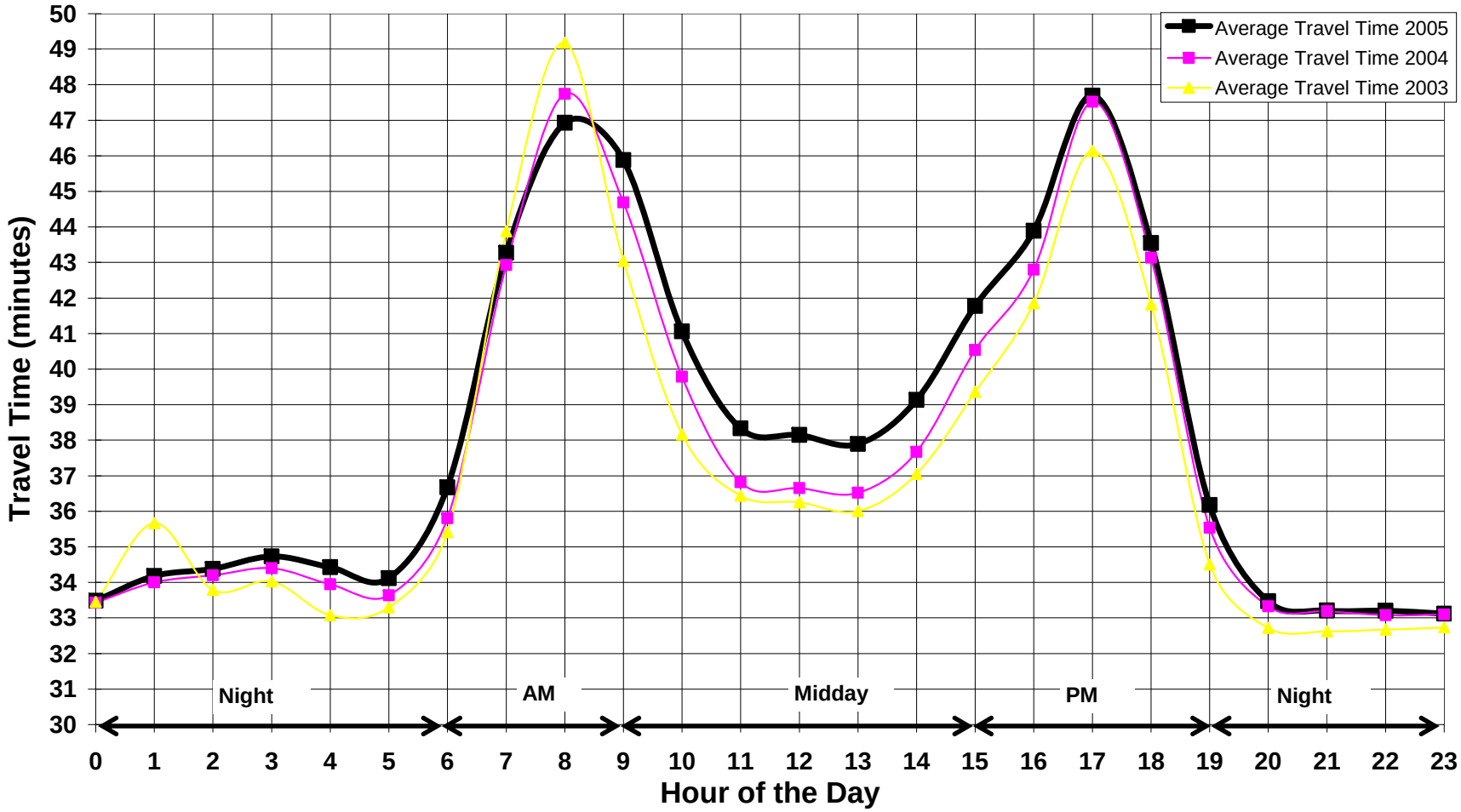


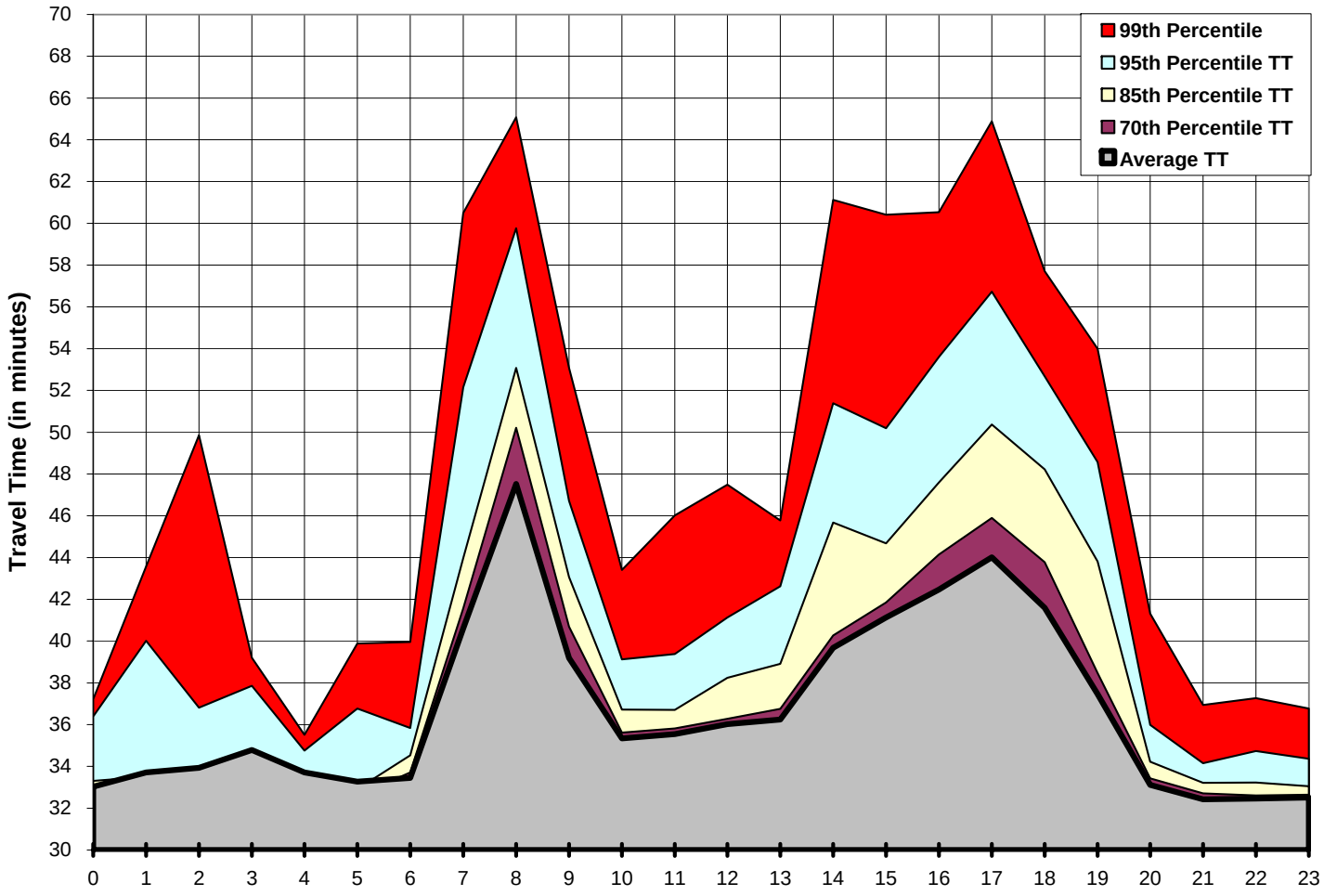
Travel times and trends are also computed for the entire corridor - Northbound



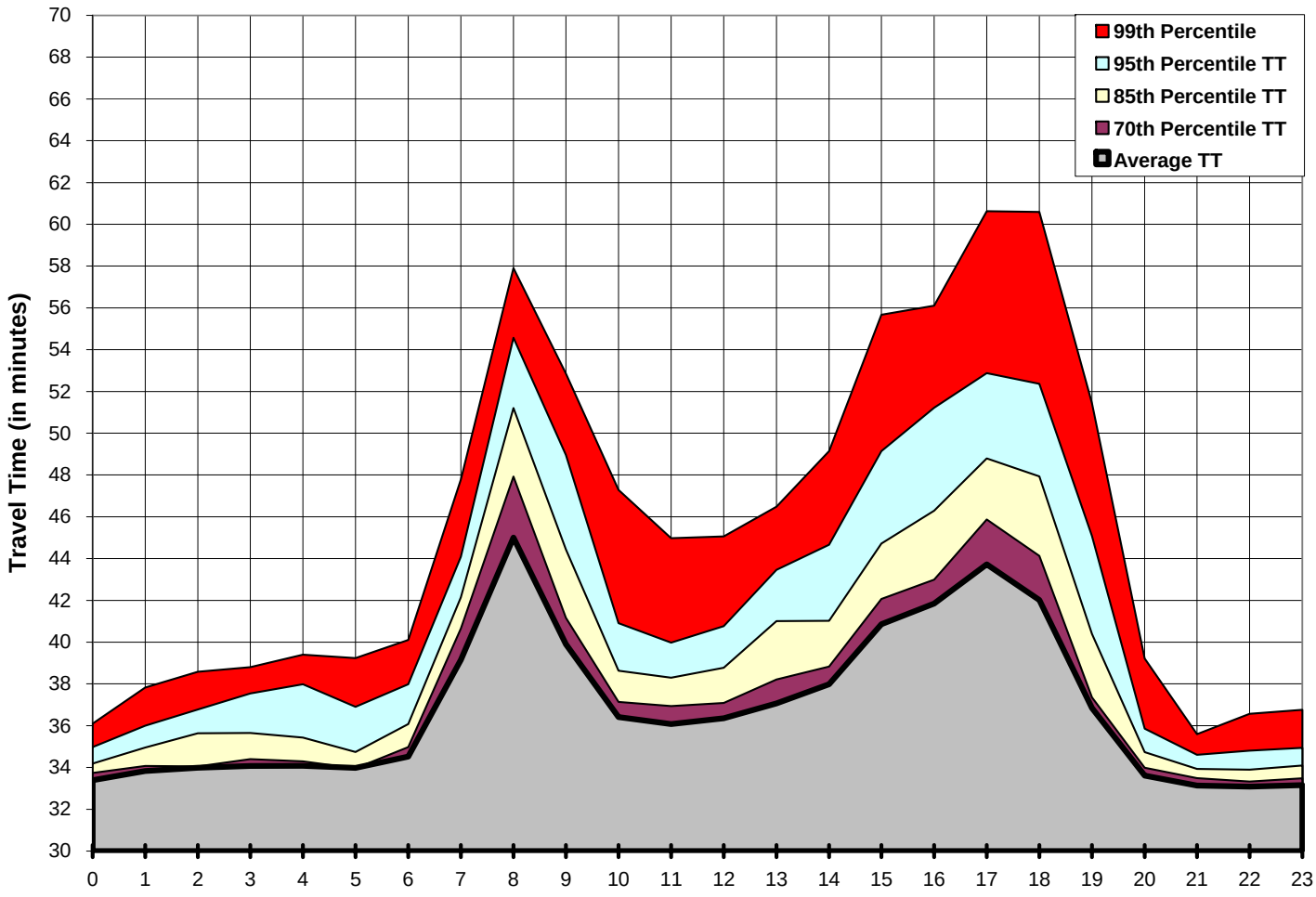
… and southbound



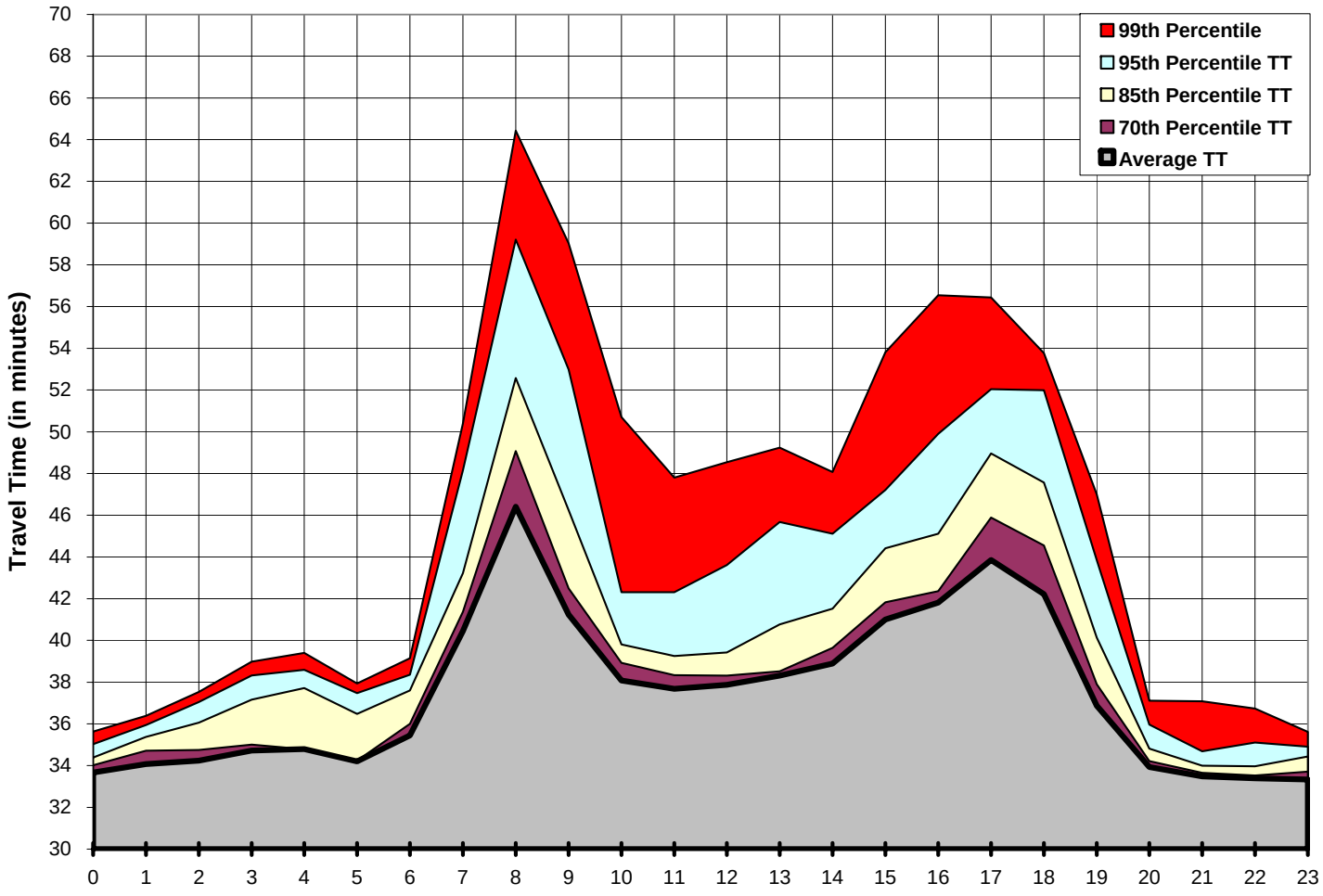
Travel time reliability is computed and shows how averages alone do not tell the whole story – Northbound 2003



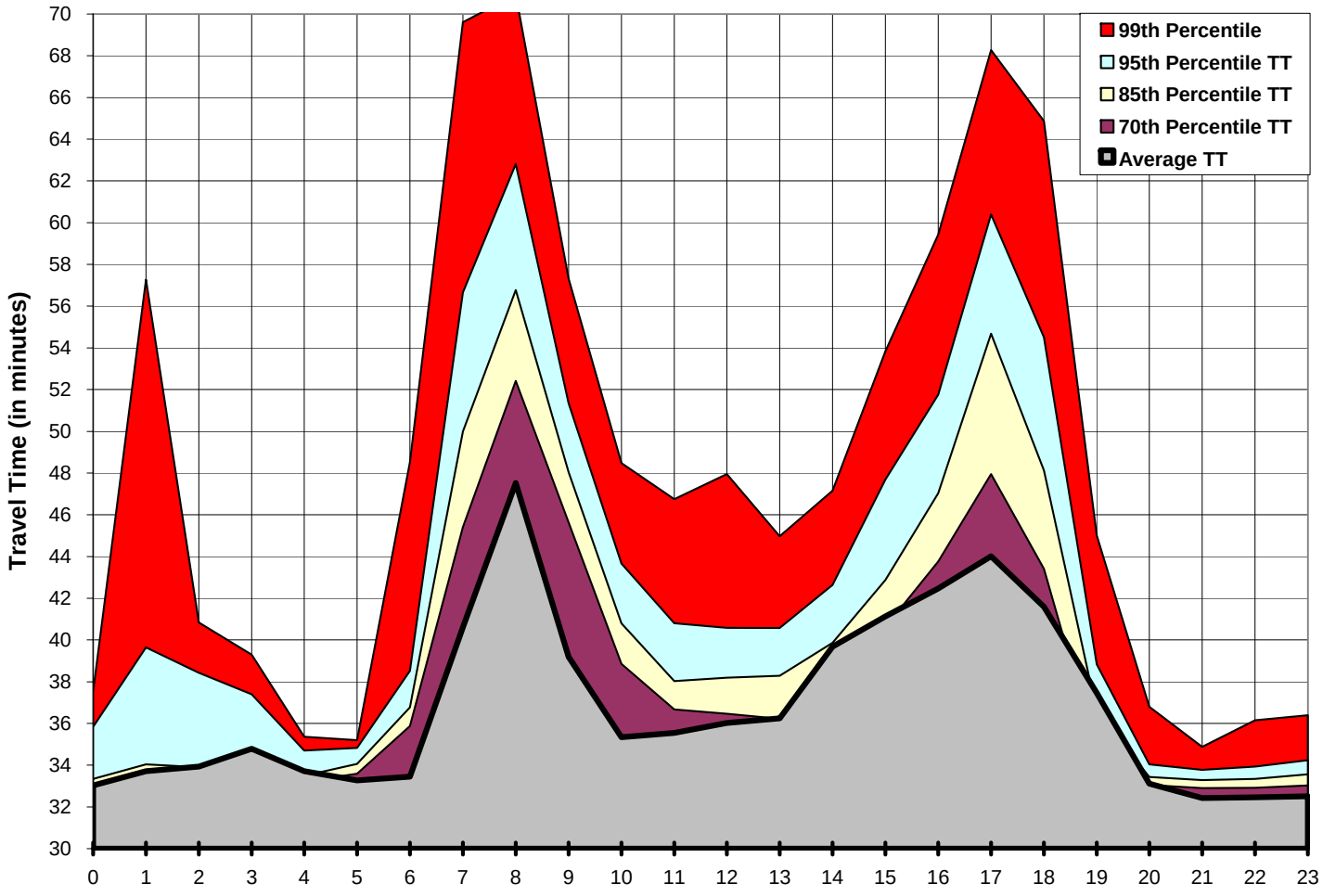
Northbound 2004



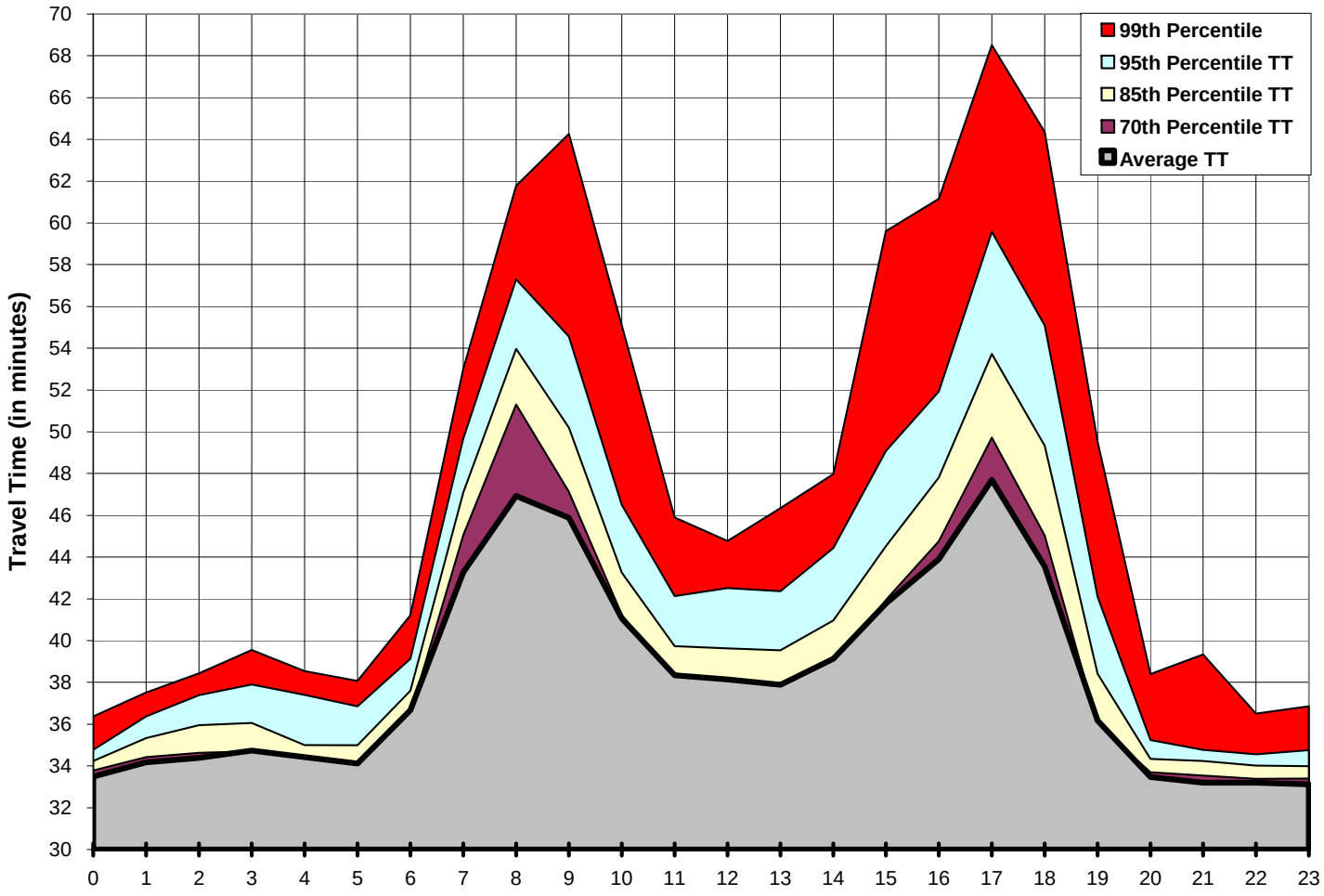
Northbound 2005



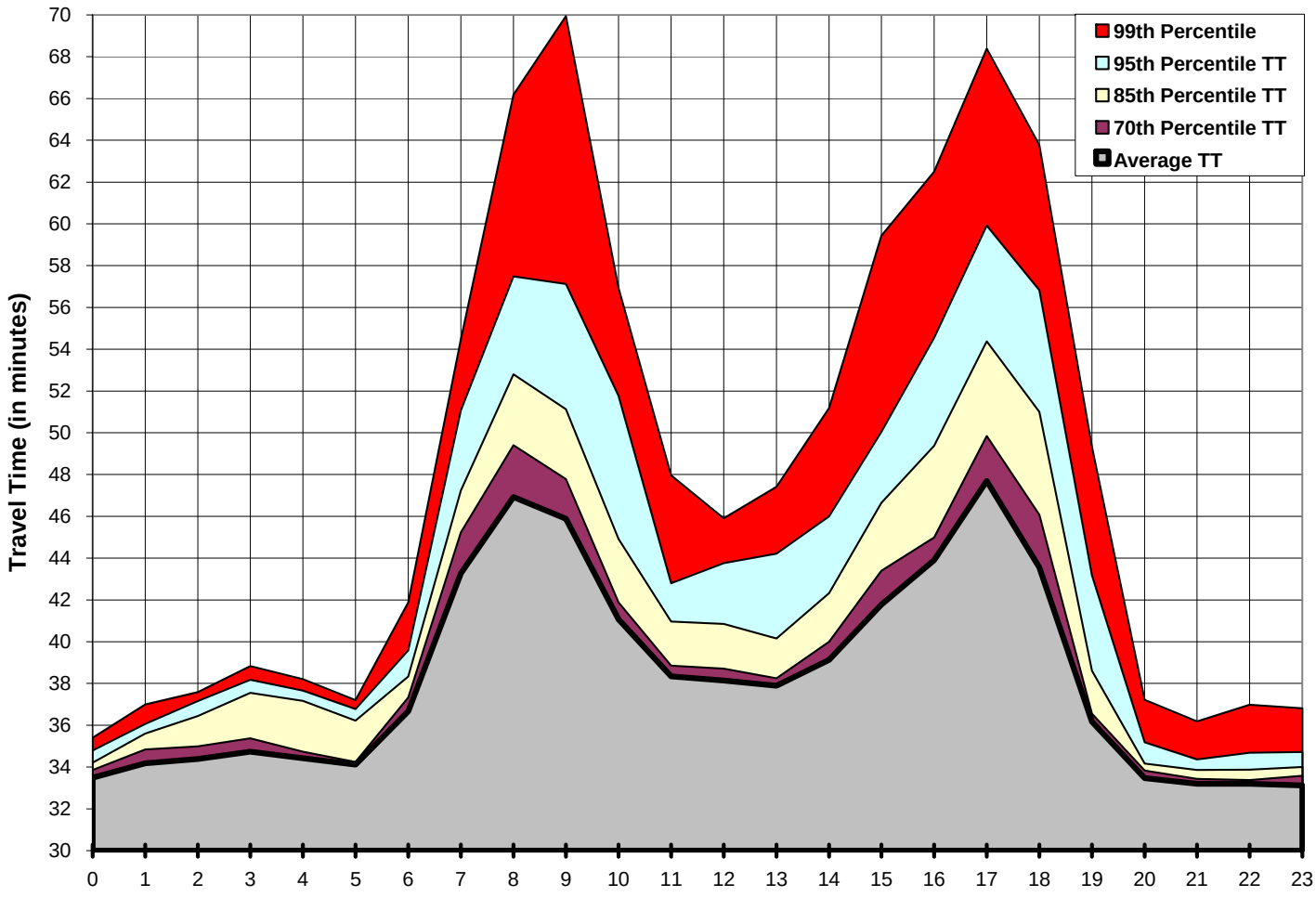
Southbound 2003



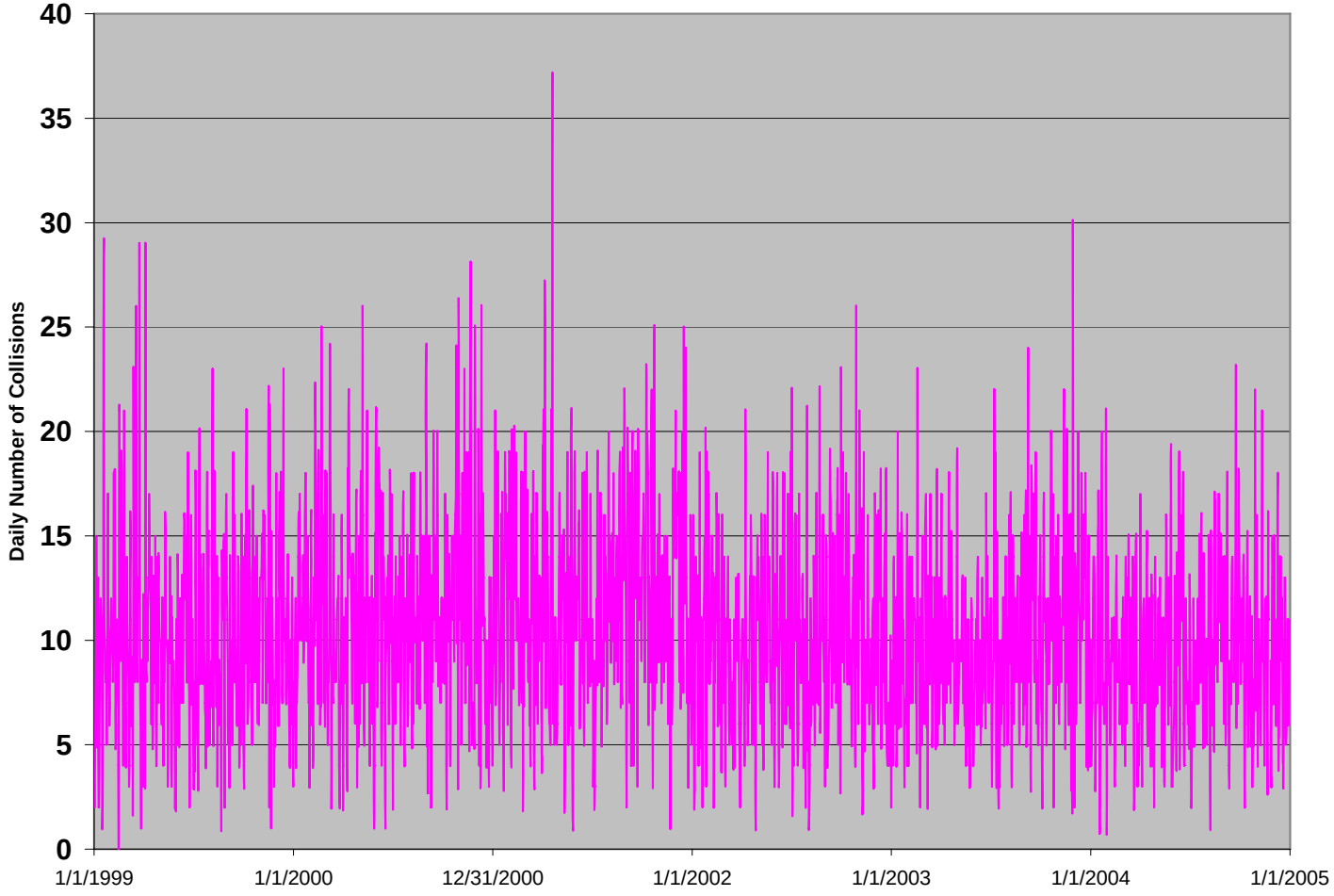
Southbound 2004



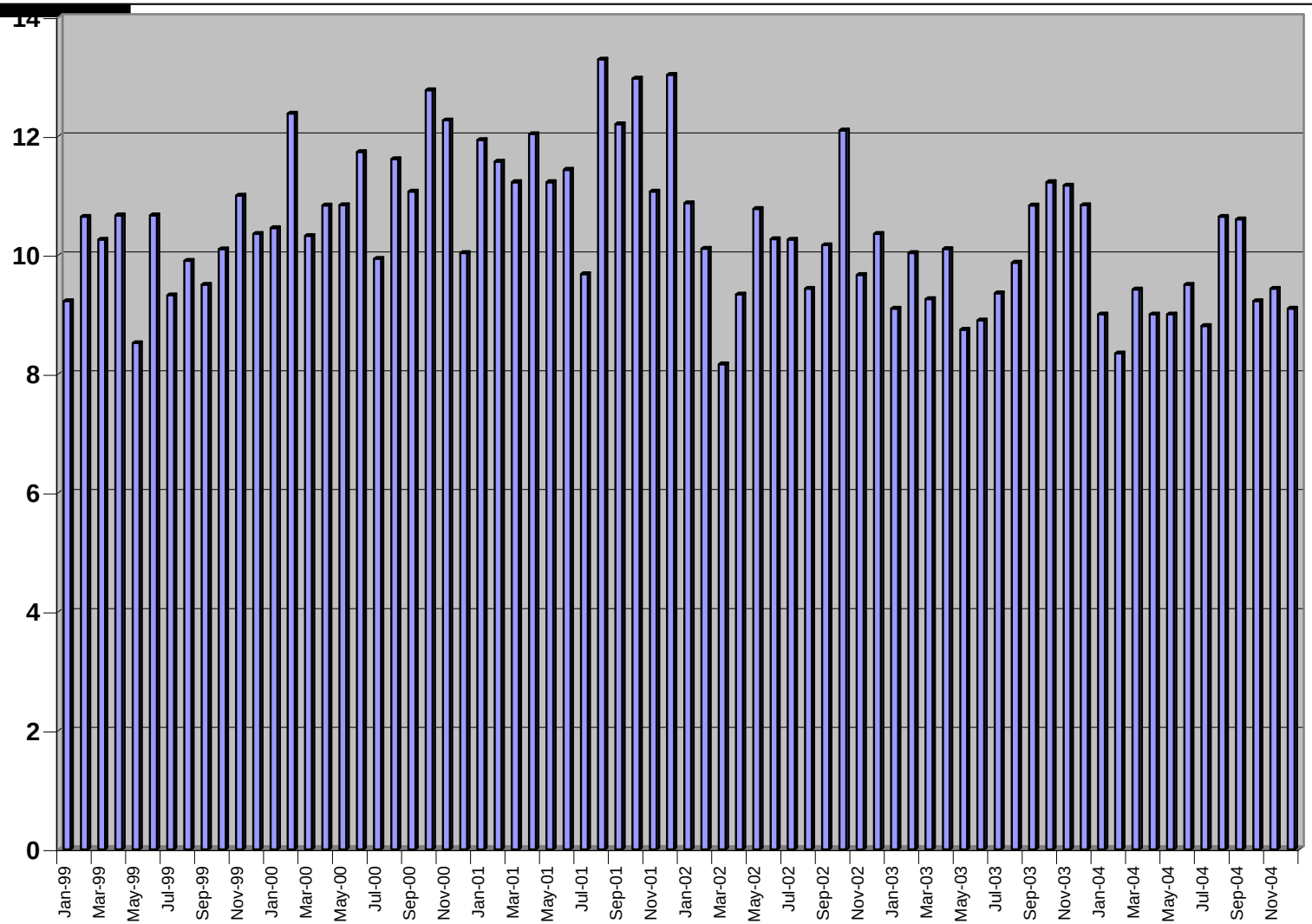
Southbound 2005



The Caltrans collision database shows that, over a four-year period, generally between 5 and 15 collisions occur daily… collision-free days are rare



On the other hand, monthly averages show a downtrend in collisions



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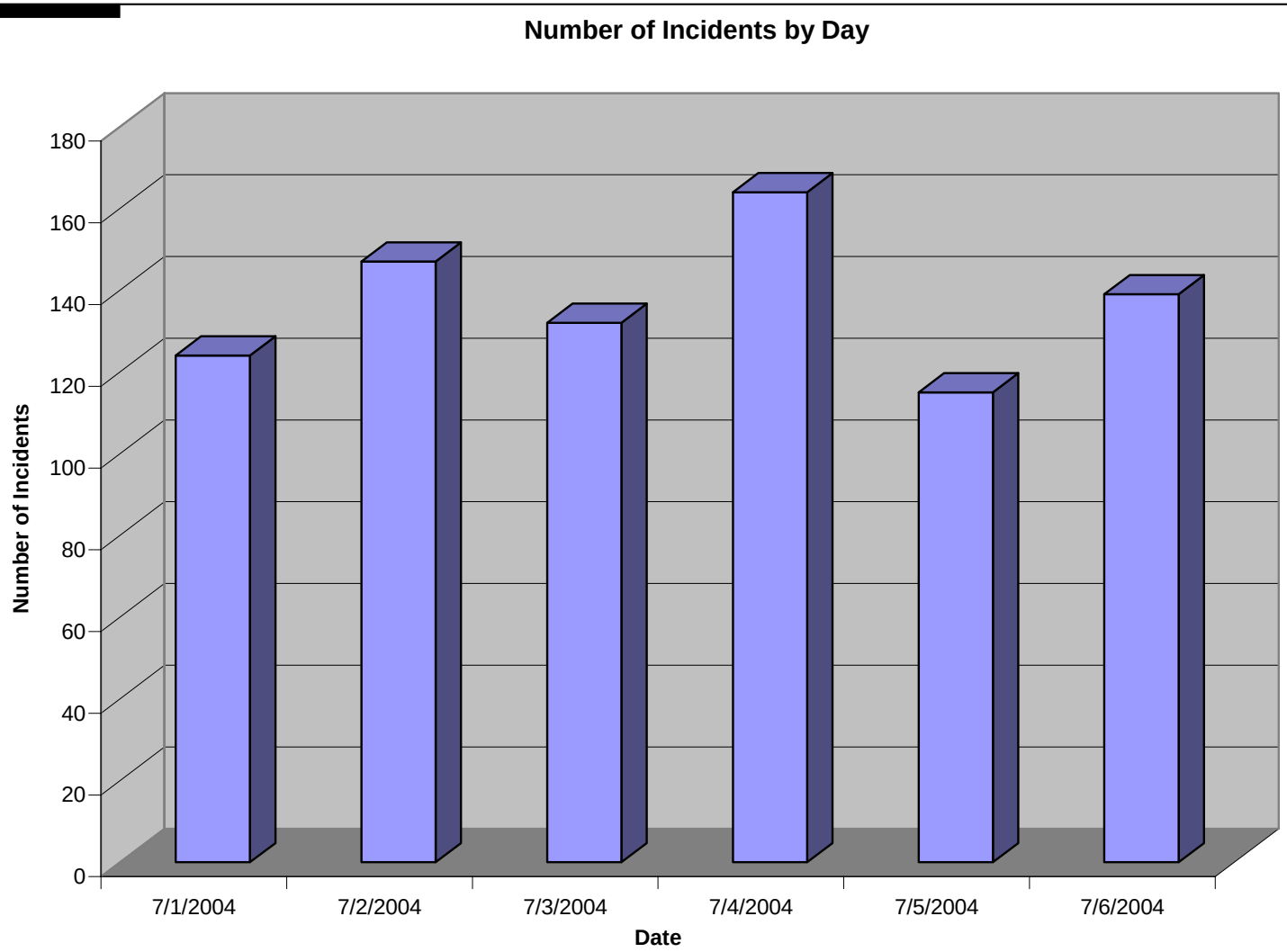
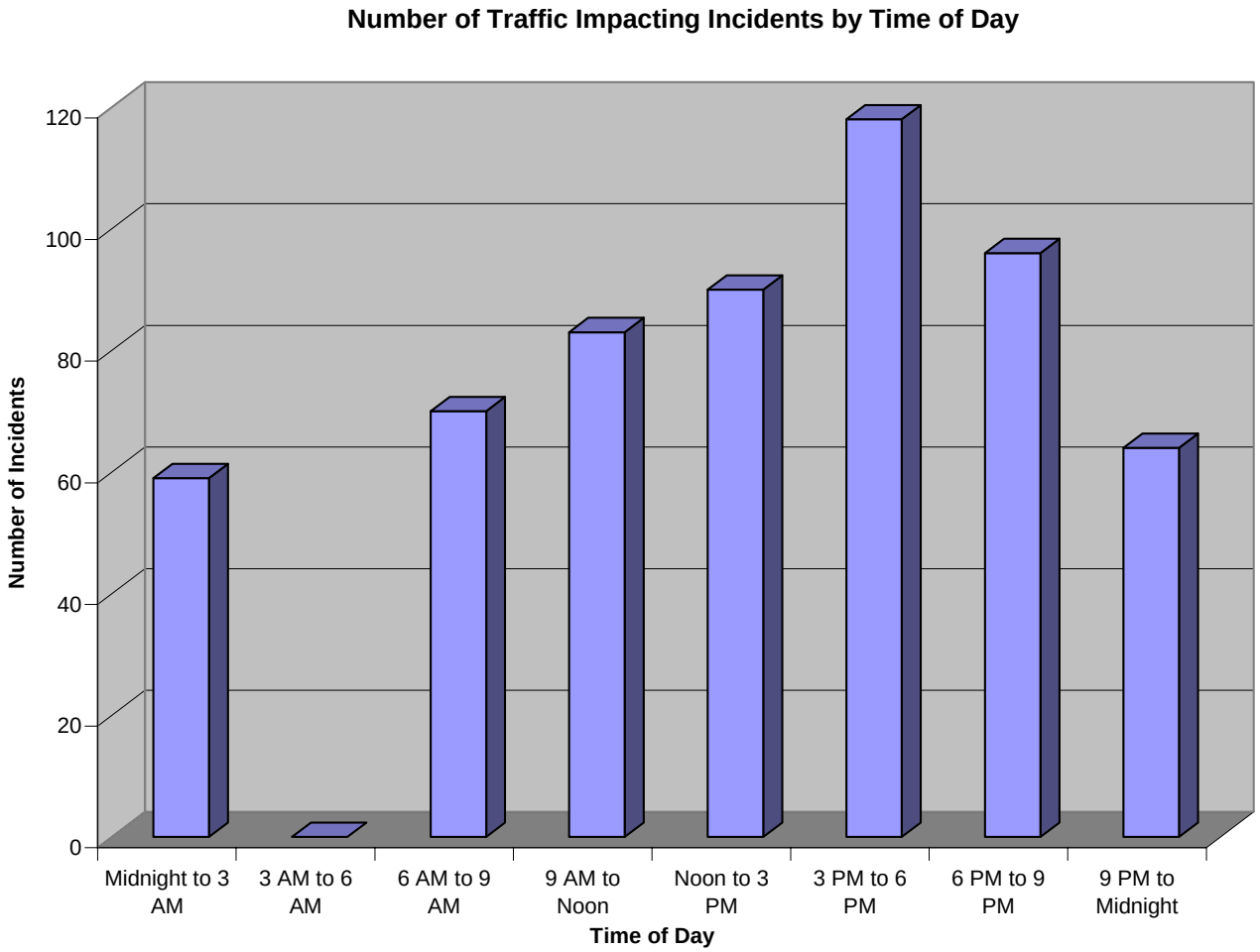
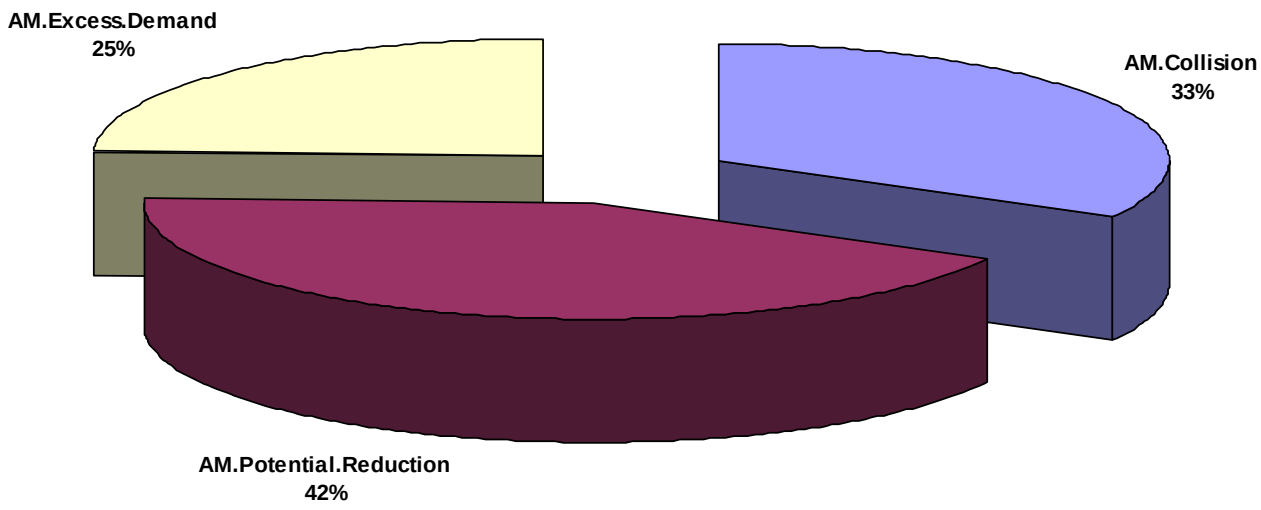
Every day of the week, CHP reports more than 100 incidents on the corridor



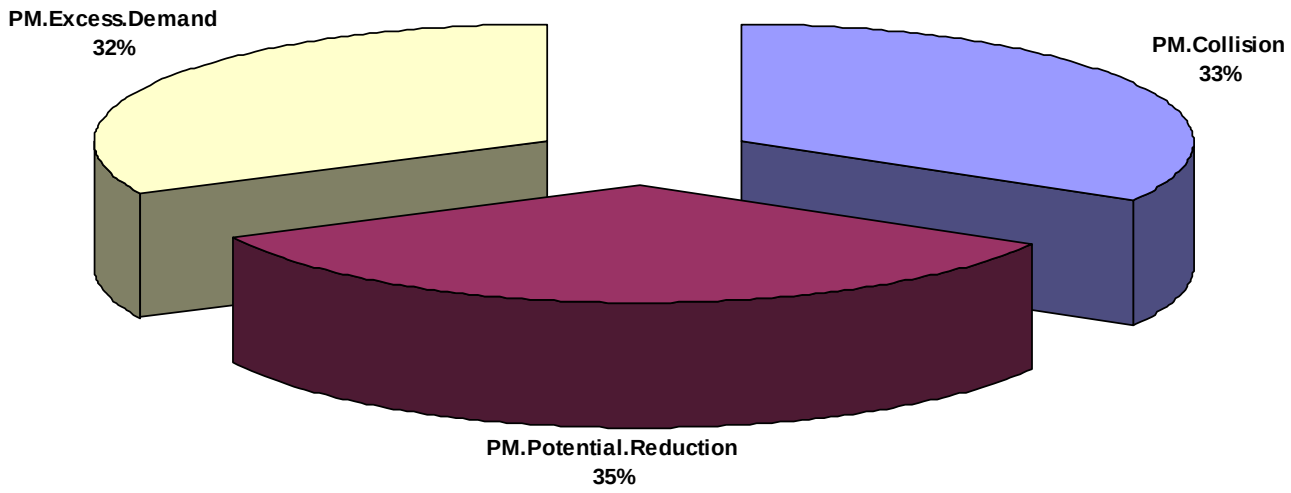
We identified the CHP reported incidents most likely to impact traffic, which represent about 70 percent of all incidents reported



A preliminary UCB analysis of congestion by cause suggests that collisions cause about a third of total delay in the morning peak period …

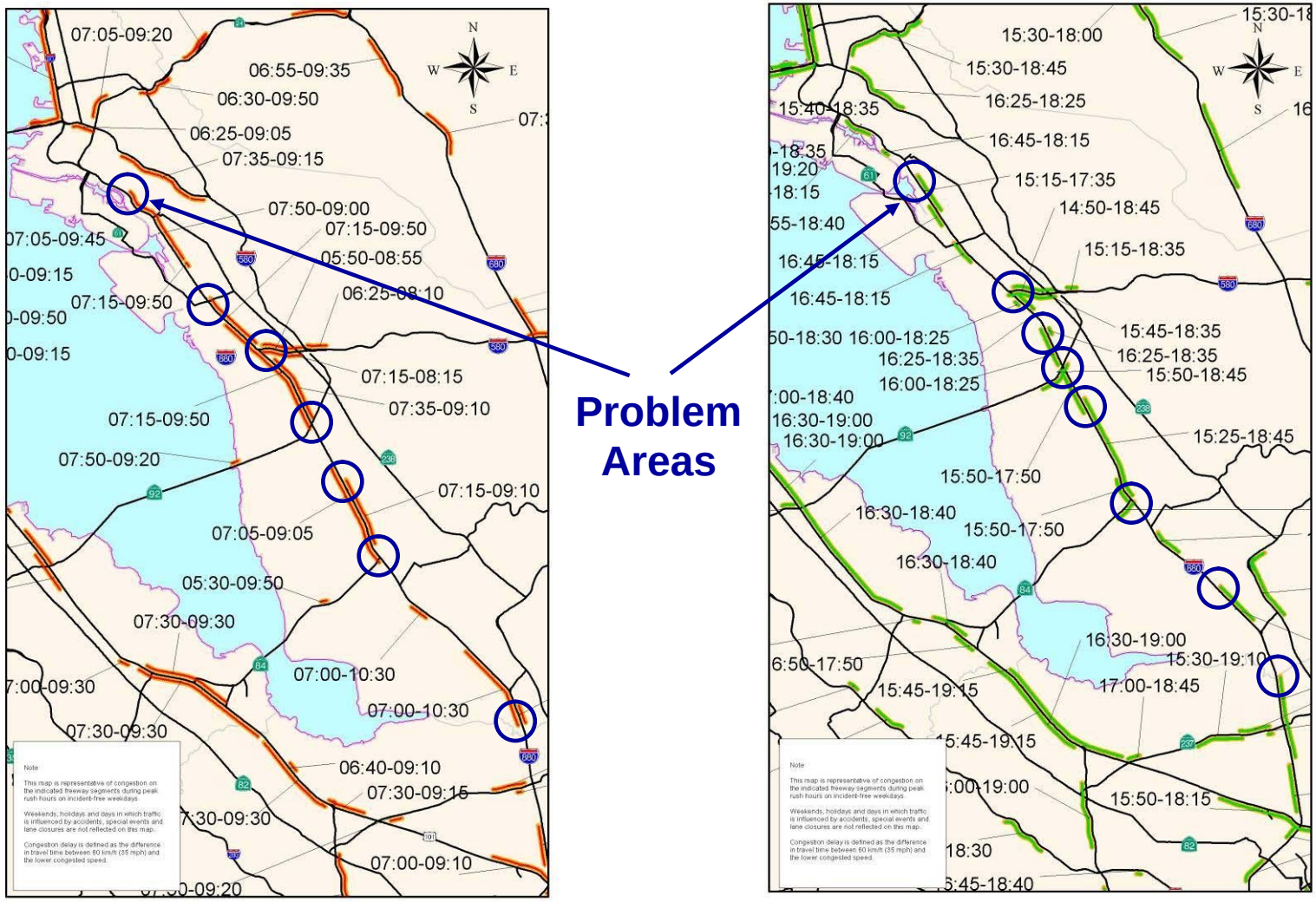


… and in the afternoon peak period



Corridor Bottlenecks Identification and Analysis

The 2003 Highway Congestion Monitoring Report (HICOMP) helped identify problem areas as a starting point



Problem Areas

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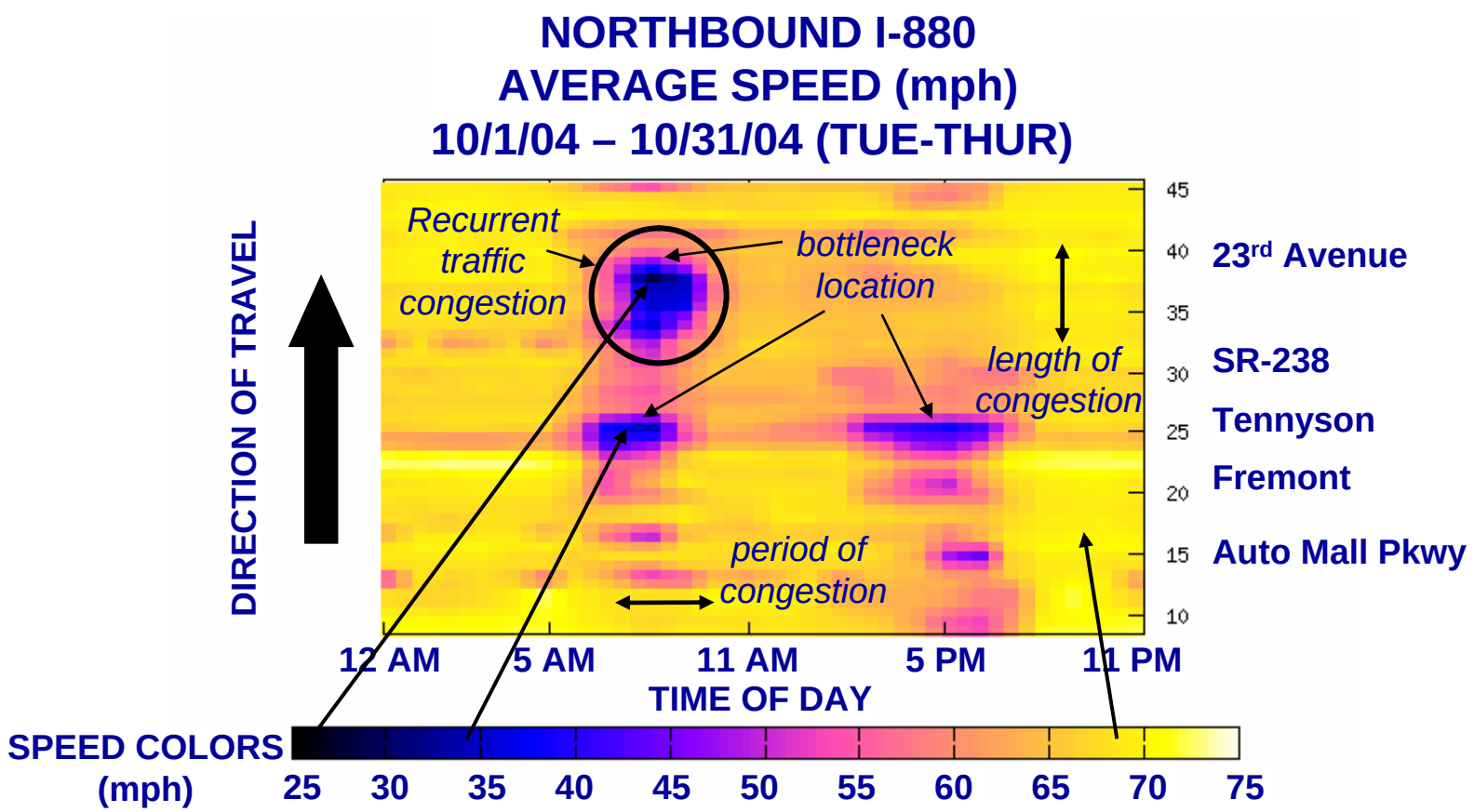
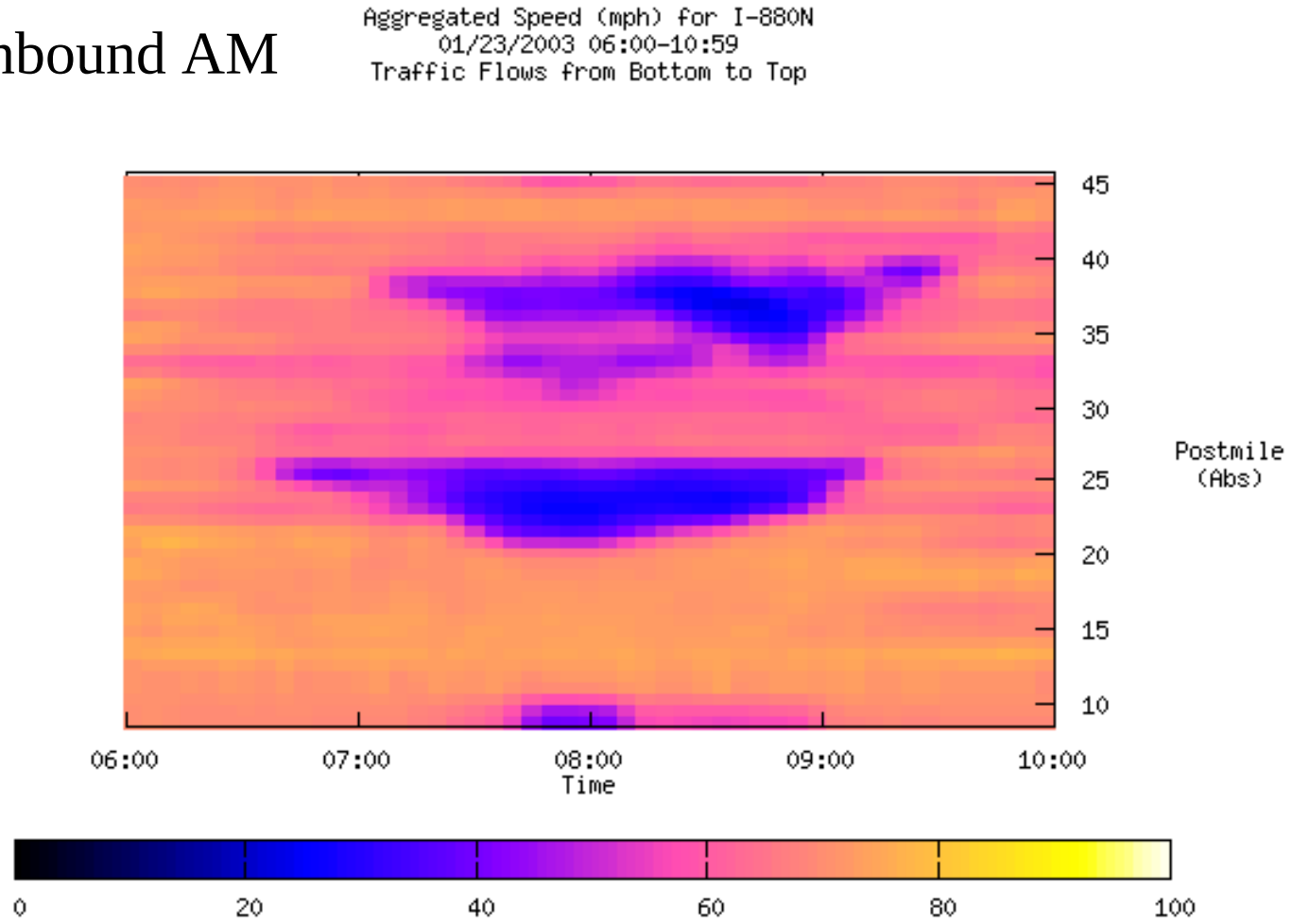
We then used speed contours helped clarify the specific locations and extent of bottlenecks



Bottlenecks change in severity from day to day

Northbound AM



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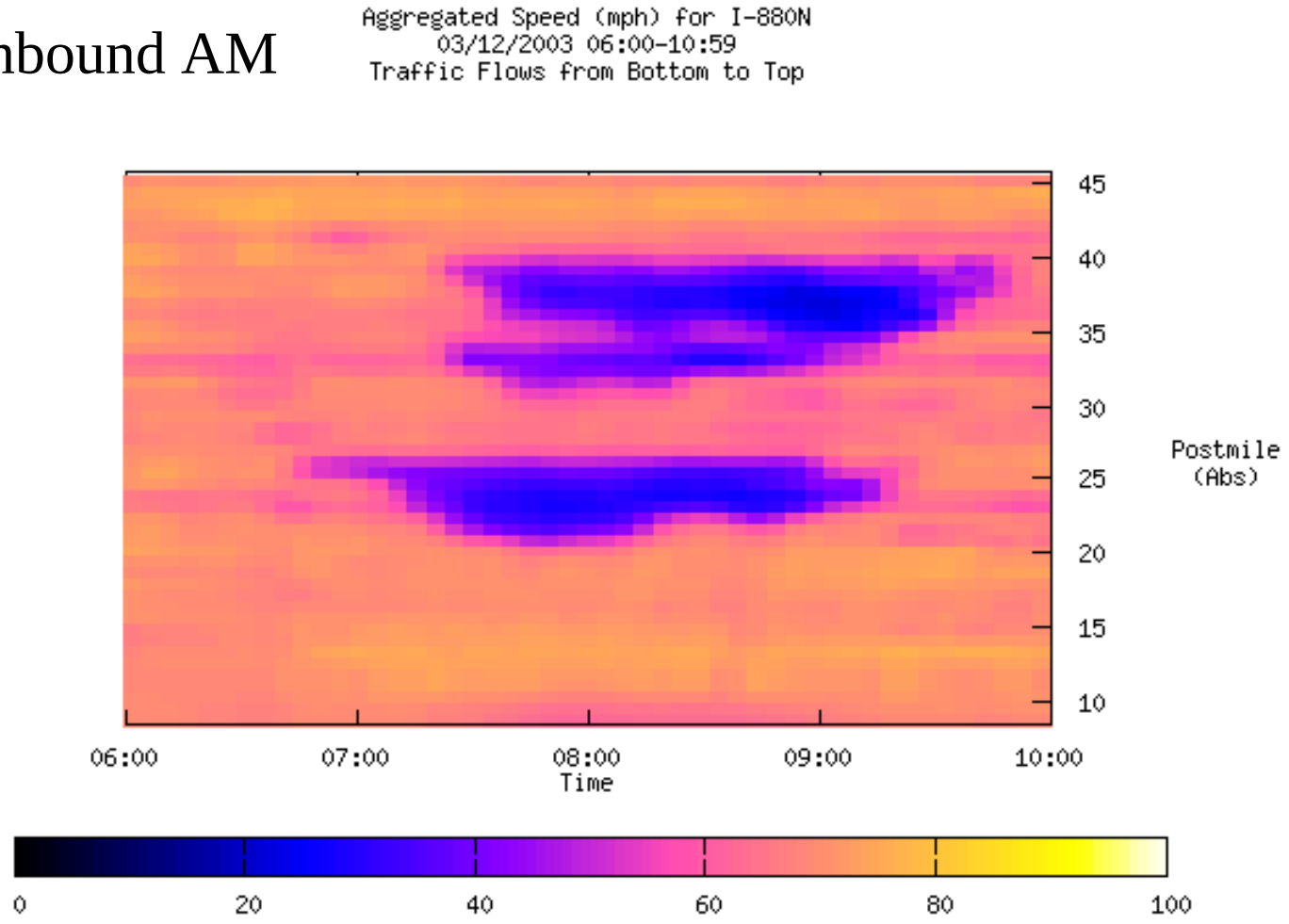
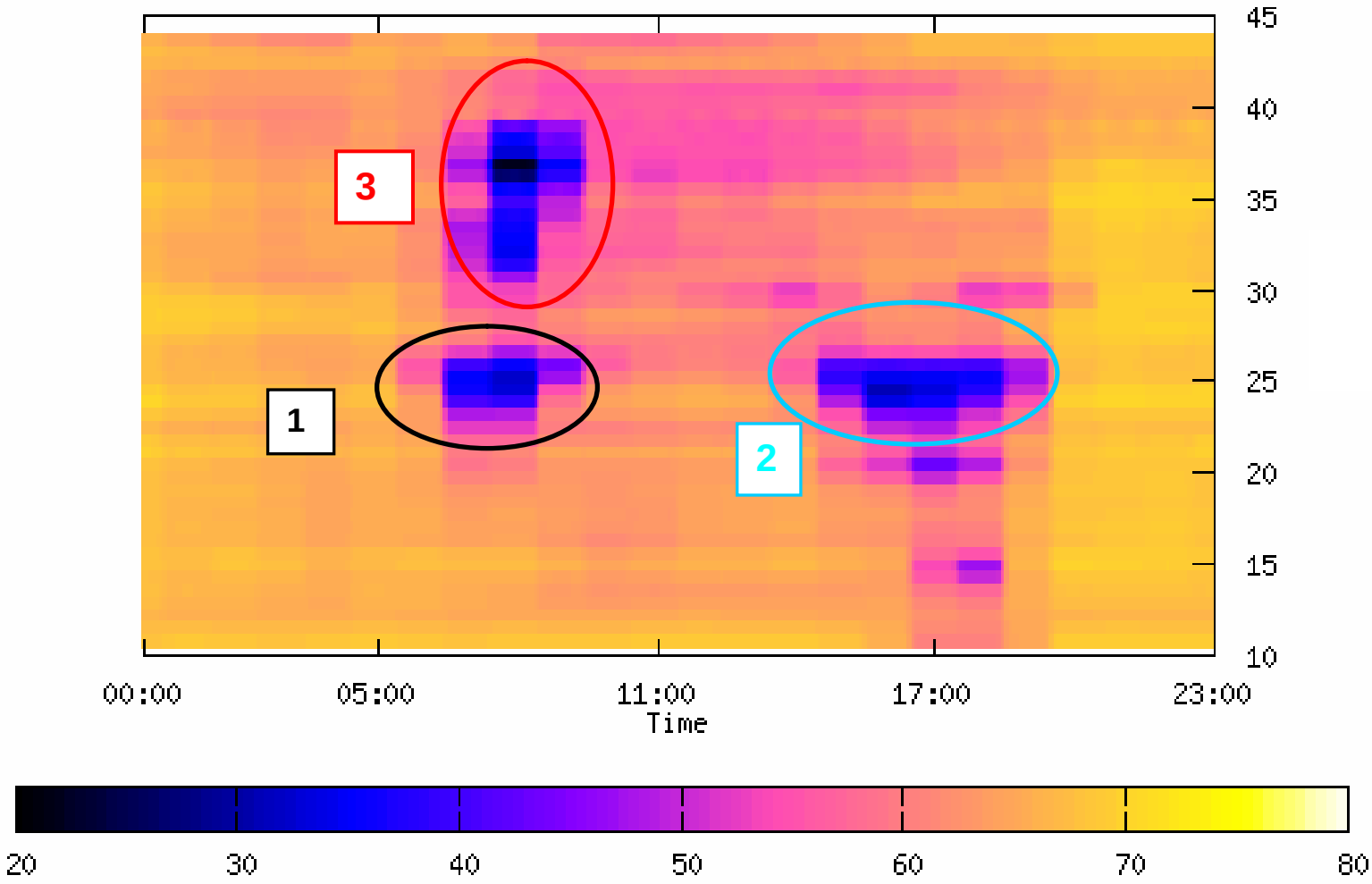
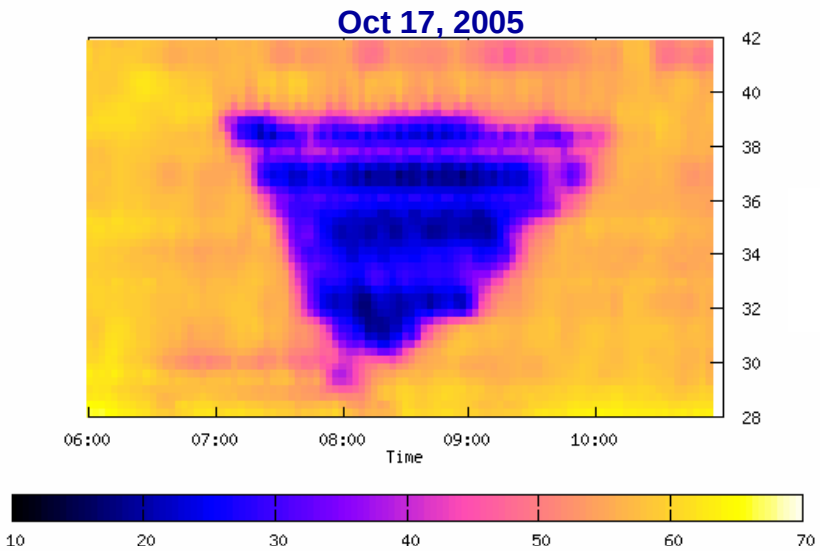
Northbound AM

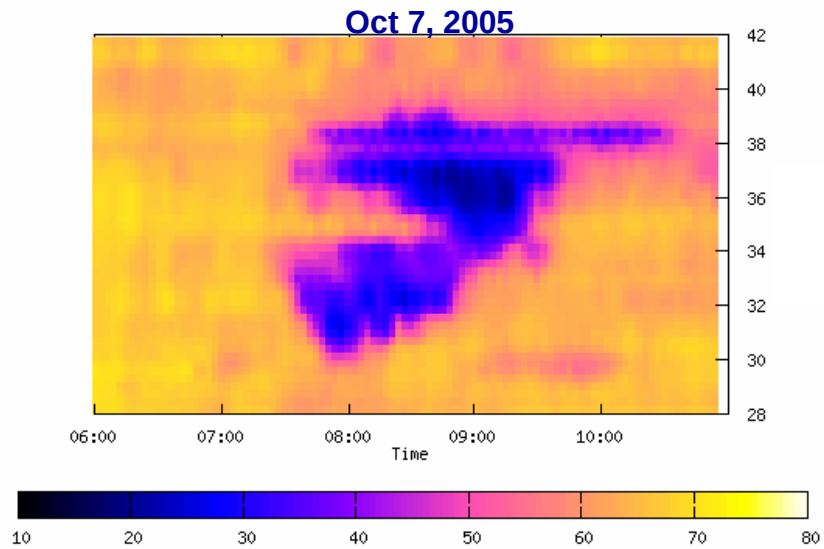


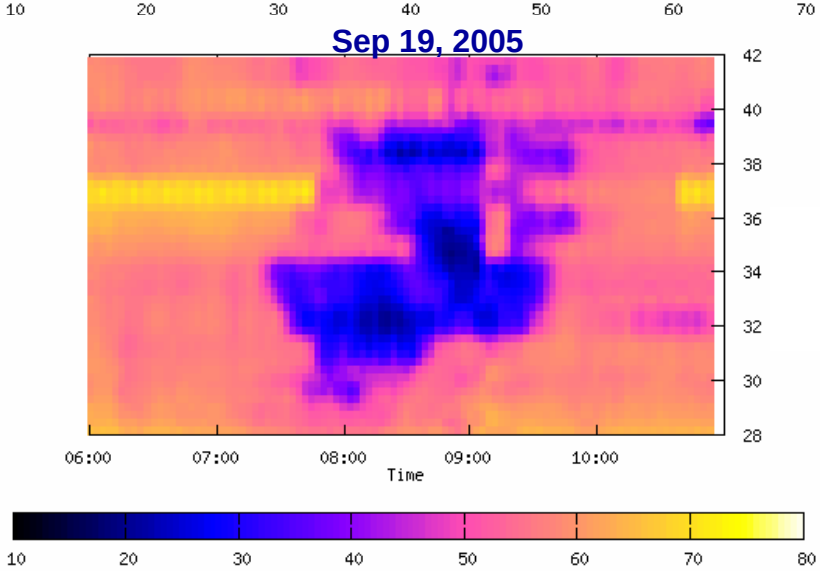
When reviewing the speed contours for the northbound direction (for October 2005), it appears there are three major bottlenecks (two of them in the same location at Tennyson and one at 23rd Avenue)

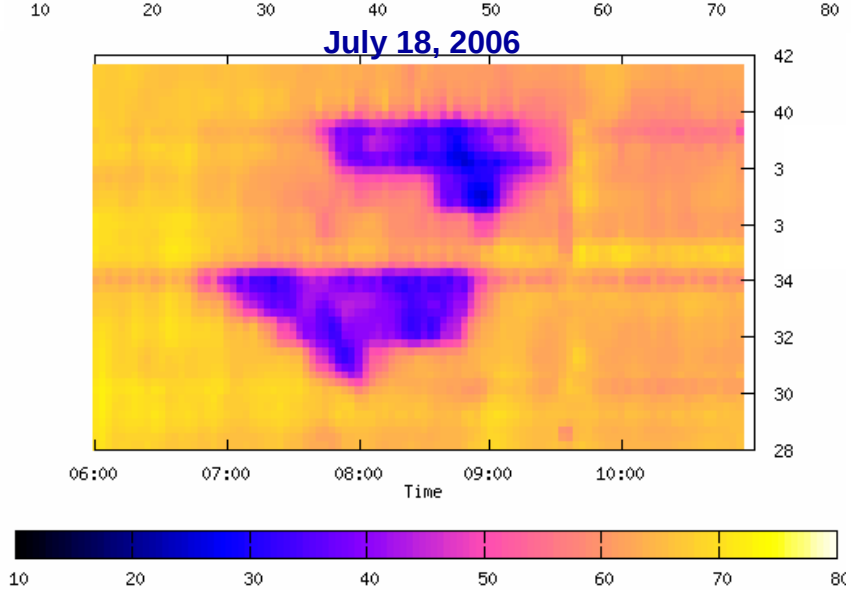


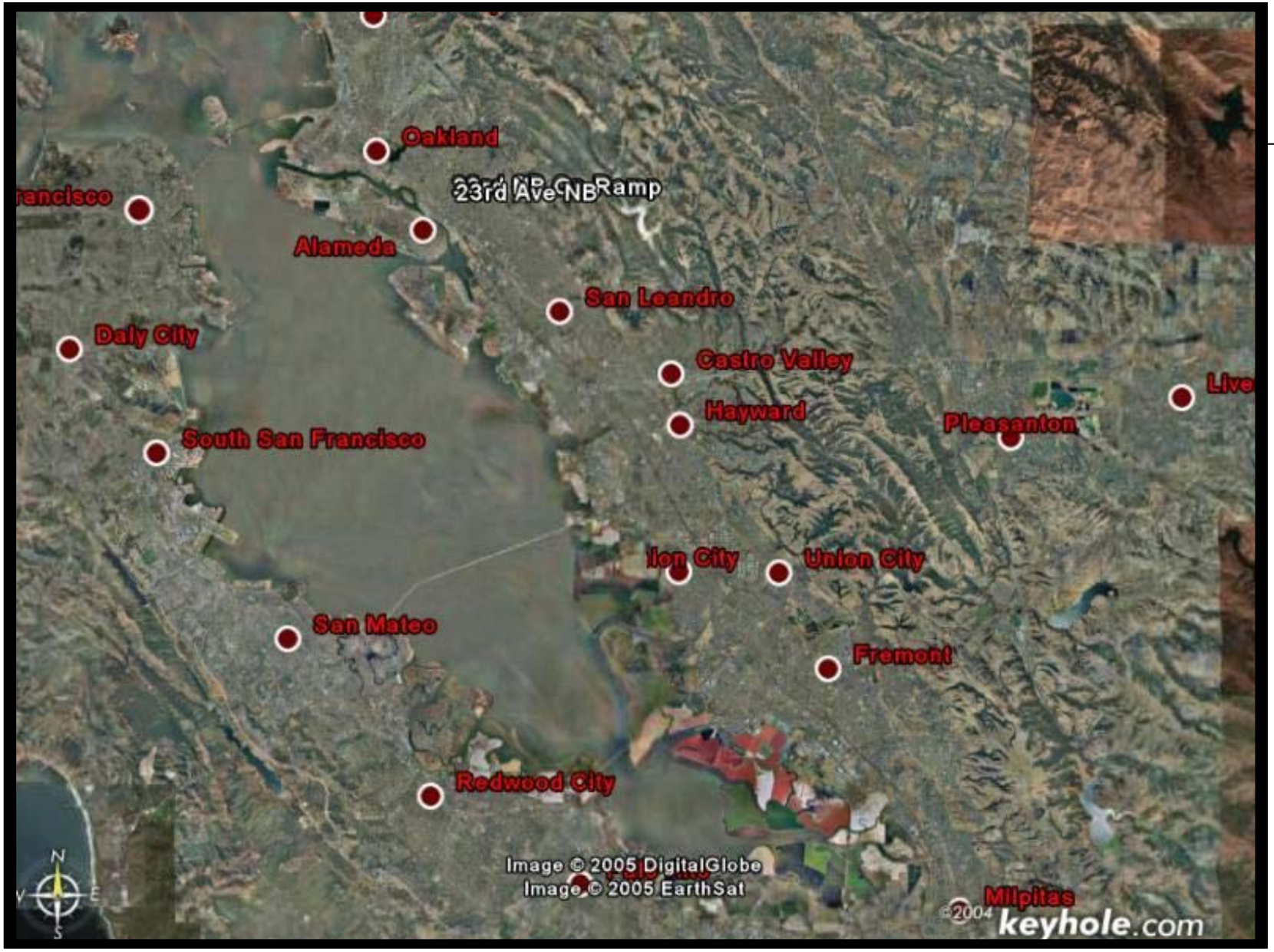
But upon more detailed review, the third dark area actually represents two separate bottlenecks (one at 23rd and the other at Davis on-ramps)










Oakland
23rd Ave NB Ramp
Alameda
San Leandro
Daly City
Castro Valley
Hayward
Pleasanton
South San Francisco
Union City
San Mateo
Fremont
Redwood City
Milpitas
Image © 2005 DigitalGlobe
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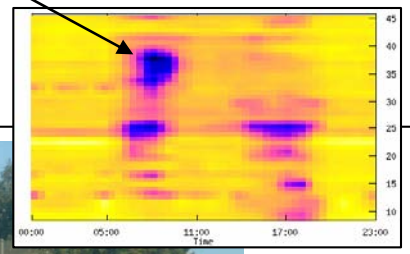
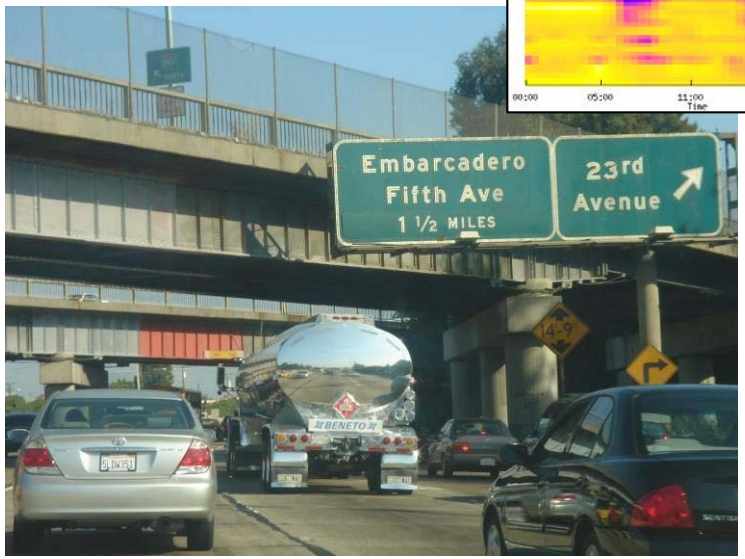
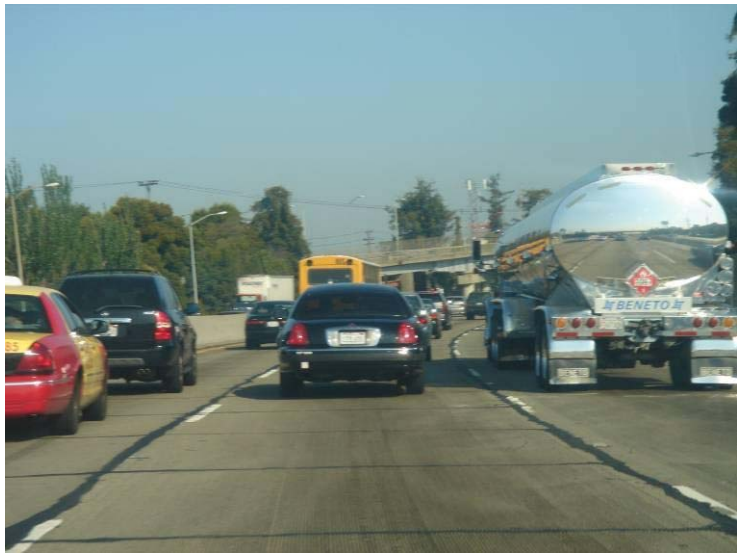
Aerial of 23rd Bottleneck

Field observations for northbound bottleneck at 23rd Street







Oakland
San Francisco
Alameda
San Leandro
Daly City
Castro Valley
Hayward
Pleasanton
South San Francisco
Lane Drop 5 to 4
Union City
San Mateo
Fremont
Redwood City
Milpitas
Image © 2005 DigitalGlobe
Image © 2005 EarthSat
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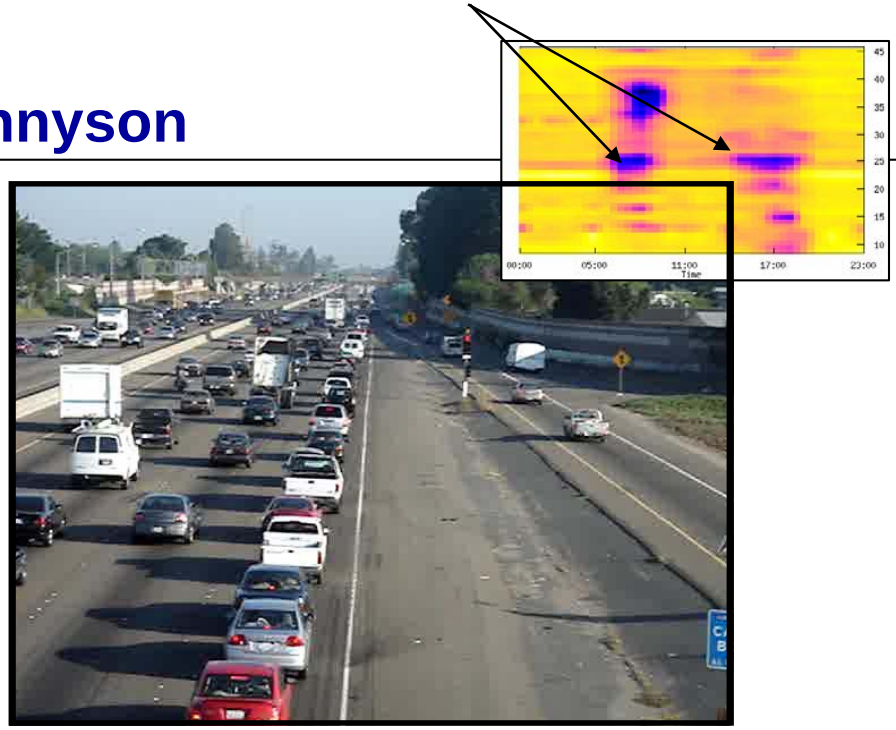
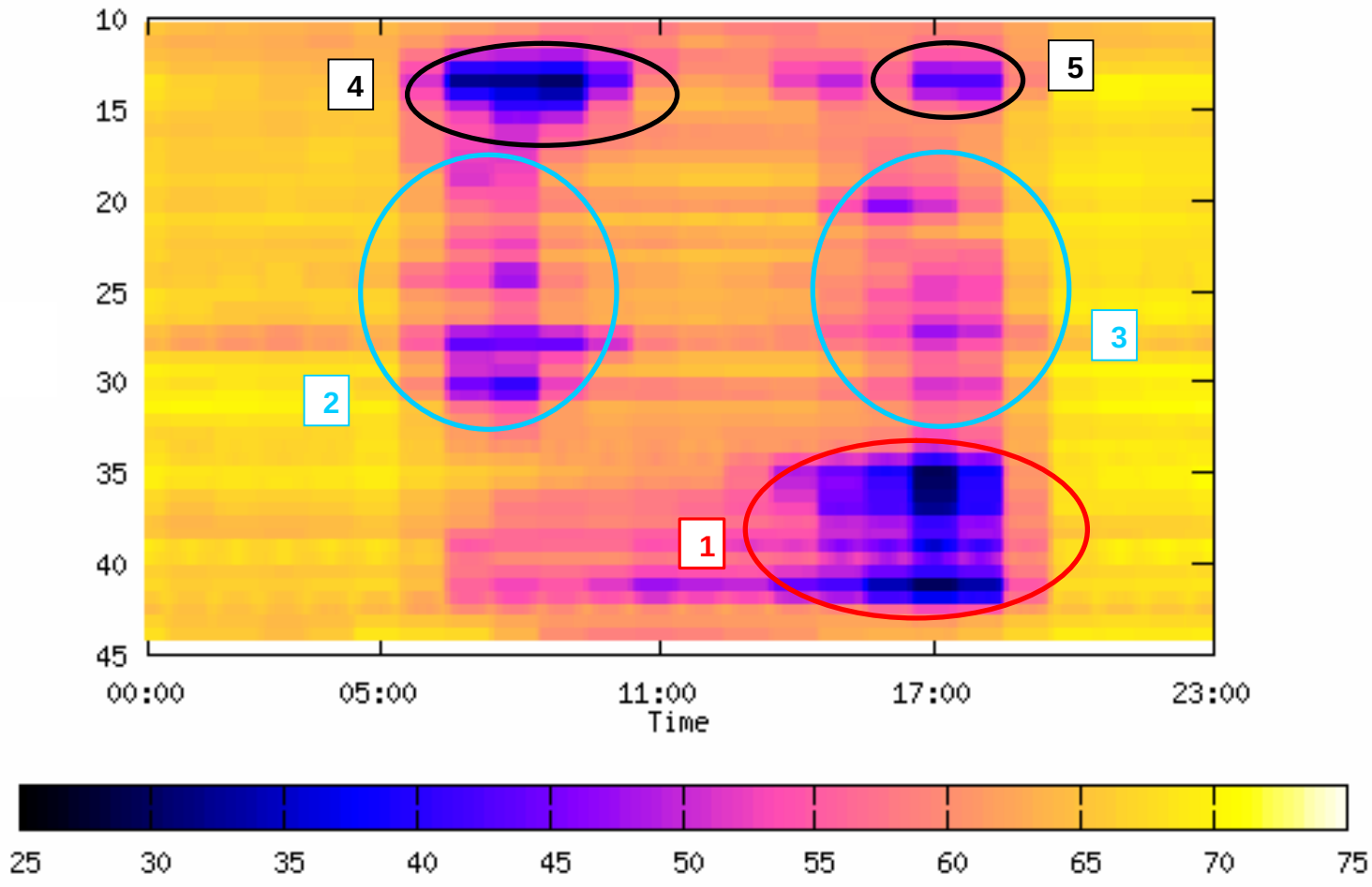
Northbound Bottleneck at Tennyson



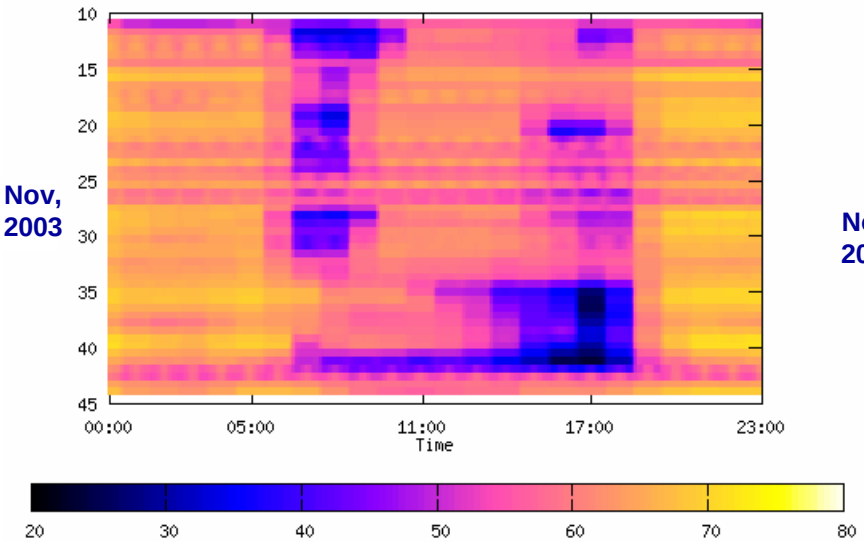
Central
ALAMEDA COUNTY
CALL
BOX
AL 880 158

Similarly, in the southbound direction for 2005, we identified five bottleneck areas, two of which are at the same locations for both the AM and PM peaks (at different severities)

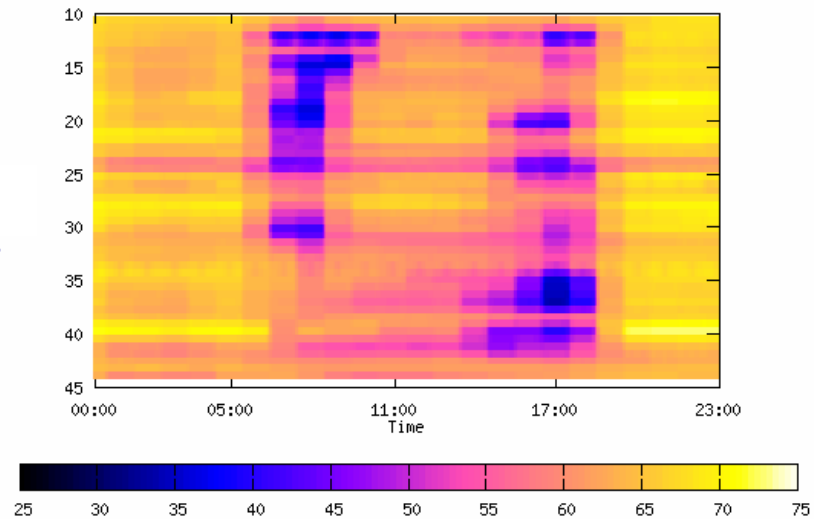


Note that the southbound bottlenecks changed over the three years analyzed, with some diminishing significantly and others intensifying

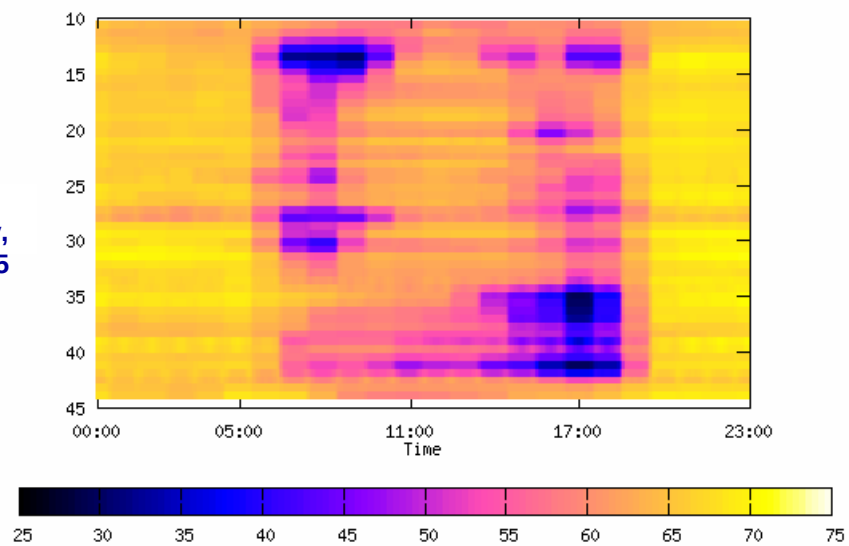
Nov, 2003



Nov, 2004



Nov, 2005



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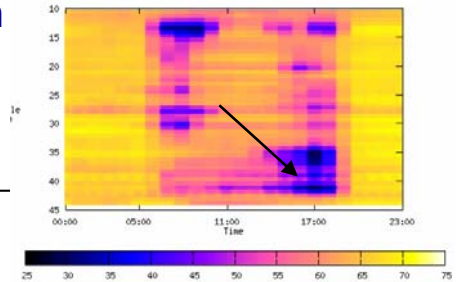
And identified likely causalities (example 98th bottleneck with two adjacent on-ramps with high peak volumes)



We then looked at the comprehensive list of projects proposed for the corridor and related each to the bottlenecks …

Rte	PM Begin	PM End	Project Source	Project Description	Est Total Cost	Direct Indirect	Near or Long Term
92	4.48	4.48	T-2030 Committed	Dumbarton Express park-and-ride: 90 spaces on Decoto Road near I-880 by the Dumbarton Bridge (includes right-of-way acquisition)	$1.5	I	N
238	14.47	16.70	T-2030 Committed	Widen I-238 between I-580 and I-880 from 4 to 6 lanes. Including auxiliary lanes on I-880 s/o I-238	$108.0	I	L
262	0.00	0.70	T-2030 Committed	Widen SR 262 from I-880 to Warm Springs Blvd. (including reconstructiing SR 262-I-880 and SR 262/Kato Rd. Interchanges and reconstruct UPRR undercrossings	$38.3	I	L
262	R0.0	R0.0	Committed	Reconstruct I-880/SR-262 interchange and widen I-880 from SR-262 (Mission Boulevard) to the Santa Clara County line from 8 to 10 lanes (8 mixed flow and 2 HOV lanes)	$162.5	D	L
880	0.00	31.68	T-2030 Big Tent	I-880 incident management, ramp metering and travel advisories	$20.00	D	N
880	0.00	34.50	10 YR SHOPP	Install TMS Elements (Monitoring Statations, CCTV, CMS, HAR)	$6.2	D	N
880	2.28	2.28	T-2030 Committed/RM II	Reconstruct I-880-Route 262 Interchange including UPRR grade seperation (phase 2)	$52.0	I	L
880	3.25	3.25	T-2030 Committed	Exend Fremont Boulevard to connect to I-880/Dixon Landing Road	$4.50	I	L
880	6.24	6.24	T-2030 Committed	Stevenson Blvd. I-880 Blacow Road ramp impacts (Widen Stevenson Fr 880 to Blacow, 4 to 6 lns)	$1.2	I	L
880	8.84	8.84	T-2030 Big Tent	I-880 SB to SR 84 WB HOV direct connector	TBD	I	L
880	15.6	17.6	T-2030 Committed/RM II	I-880/SR-92 I/C Improvements	$133.8	D	L
880	16.69	20.29	T-2030 Vision	Widen I-880 between Whipple and Jackson	TBD	D	L
880	19.2	24.8	TCCR/ TOPS-T-2030	Widen I-880 for NB HOV lanes from Hacienda to 98th St. and SB from 98th St. to Marina Blvd.	TBD	D	L
880	20.90	20.90	2004 10 Yr SHOPP	I-880-Washington Ave. interchange Realign SB off-ramp & install traffic signals	$80.0	I	N

I = Indirect, D=Direct, N=Near Term, L=Long Term

We have looked at the comprehensive list of projects proposed for the corridor and related each to the bottlenecks …continued

Rte	PM Begin	PM End	Project Source	Project Description	Est Total Cost	Direct Indirect	Near or Long Term
880	22.83	22.83	T-2030 Committed/10 Yr SHOPP/Ala CTP Tier 1	I-880 Marina Blvd. IC - replace overcrossing on I-880	$8.0	D	L
880	25.50	26.61	T-2030 Big Tent/Ala CTP Tier 1	Construct auxiliary lane on I-880 between Hegenberg Blvd. and 66th St. and shift merge point from Wb Hegerberg Rd. to I-880 on ramp	$4.60	D	L
880	25.50	31.68	T-2030 Big Tent/Ala CTP Tier 1	I-880 modernization and ramp reconfiguration in Oakland as identified in the I-880 Safety and Operations Study	TBD	I	L
880	25.50	31.68	T-2030 New Commitment	I-880 from Hegerberg Rd. to I-980 operational improvements (includes freight movement to Port of Oakalnd)	$20.0	I	N
880	28.0	28.0	T-2030 Commited	42nd Ave/High St access improvements to I-880 in Oak, includes widening and realignment of local streets, connector roads, and ramps near interchange.	$15.9	I	L
880	28.69	28.69	T-2030 New Commitment	I-880/29th Avenue interchange safety and access improvements	$15.0	I	N
880	29.30	29.30	T-2030 Committed/RM II/Ala CTP-Tier 1	I-880/29th Avenue interchange safety and access improvements	$15.0	I	N
880	30.38	30.38	T-2030 Committed	Reconstruct on and off ramps from NB & SB I-880 @ I-880/5th St. IC	$20.0	I	L
880	30.38	30.38	T-2030 New Commitment	I-880/5th Ave. ramp improvements	$20.0	I	L
880	31.09	31.09	T-2030 Big Tent	I-880-Oak St. ramp reconstruction	$30.0	I	L
880	31.10	31.10	T-2030 Big Tent / 2004 10 year SHOPP	I-880 In Oakland - southbound Oak Street on-ramp - construct auxiliary lane	$1.8	D	L
880	31.20	32.60	T-2030 Committed	I-880/Broadway-Jackson interchange improvements (Phase 1)	$28.0	D	L
OFF	OFF	OFF	ALA CTP - T 2030 commited	I-880/Davis St overcrossing	$10.2	D	L
VAR	VAR	VAR	T-2030 Big Tent	Freeway Traffic Operations Systems (TOS)	$255.0	D	N

I = Indirect, D=Direct, N=Near Term, L=Long Term

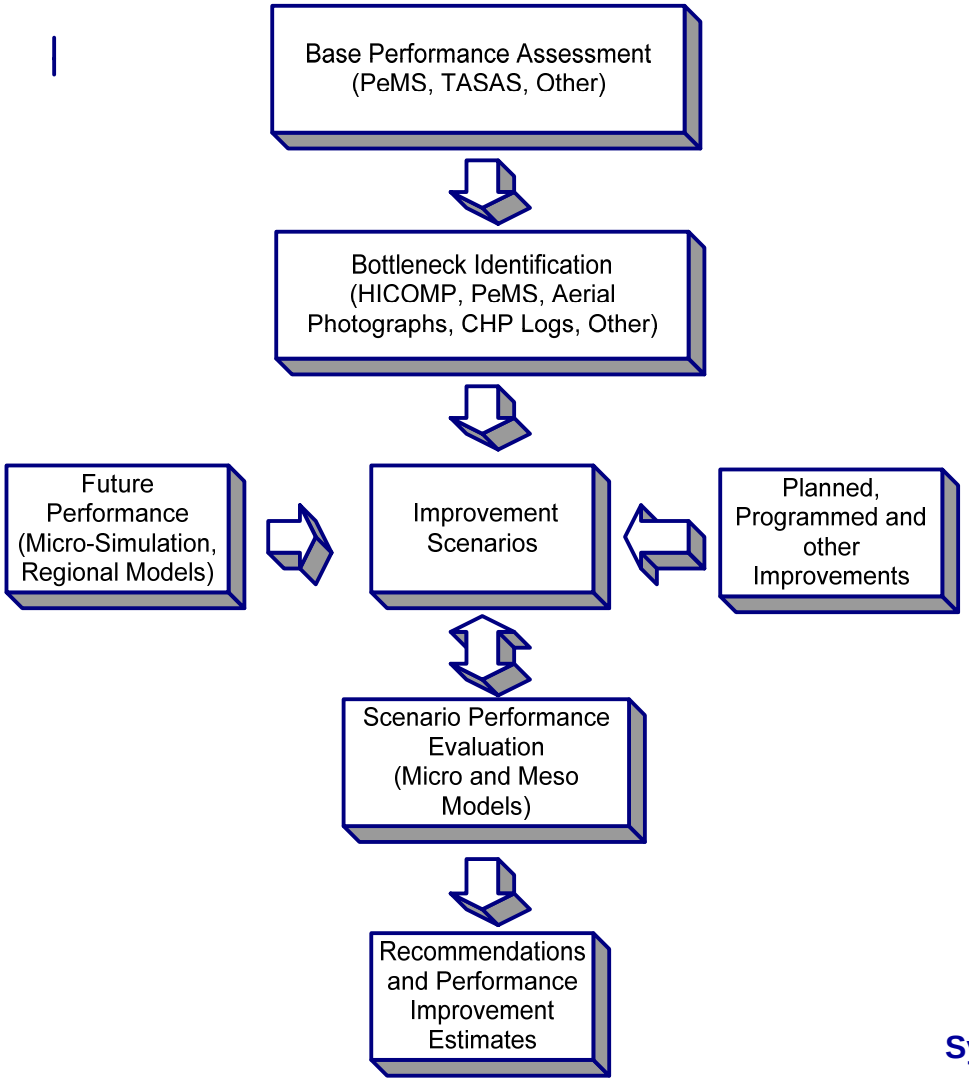
Transit projects cannot be directly evaluated by micro-simulation, but would be taken into account indirectly …

Rte	PM Begin	PM End	Project Source	Project Description	Est Total Cost	Direct Indirect	Near or Long Term
OFF	OFF	OFF	T-2030 New commited/RM II/Ala CTP	BART-Oakland International Airport Connector	$254.3	T	T
OFF	OFF	OFF	T-2030 New Commitment	AC Transit Bus Rapid Transit (BRT) and Enhanced Bus, Phase 1: Telegraph Avenue/International Boulevard corridor	$167.0	T	T
OFF	OFF	OFF	T-2030 New Com./ ALA CTP-Tier 1	Transit oriented development (including replacement parking) at MacArthur, West Oakland, and/or Coliseum BART Stations	$25.0	T	T
VAR	VAR	VAR	T-2030 Committed	AC Transit bus corridor improvements	$20.0	T	T
VAR	VAR	VAR	T-2030 Committed	Capitol Corridor intercity rail service (track capacity/frequency imp. from Oakland to San Jose designed to allow 16 daily round trips between Oakland and Sacramento/San Jose)	$158.0	T	T
VAR	VAR	VAR	T 2030 Committed/ RM II	RM II Express Bus North Improvements (includes park and ride lots and rolling stock)	$10.5	T	T
VAR	VAR	VAR	T 2030 Committed/ RM II	RM II Express Bus North Improvements (includes park and ride lots and rolling stock)	$18.0	T	T

T = transit

Next Steps

Next steps will focus on testing the scenarios developed specifically to address the bottlenecks identified and develop a phased implementation plan



Questions?