



NCHRP 20-68A, U.S. Domestic Scan Program

Scan 08-02

Maximizing Traffic Flow on Existing Highway Facilities

General Findings and Recommendations



Federal Highway Administration



**American Association of State
Highway and Transportation Officials**

NCHRP

**National Cooperative
Highway Research Program**

Presentation Outline

- Background
- Scan approach and objectives
- General findings and observations
- Team Recommendations
- Set the stage



Scan Approach

- Paper framing the issues and scope
- Assemble a team of experts
- Complete a desk scan report
- Identify agencies to visit



Scan Approach

- Amplifying questions for host agencies
- Complete scan/prepare summary report
- Implement promising strategies
- Evaluate benefits



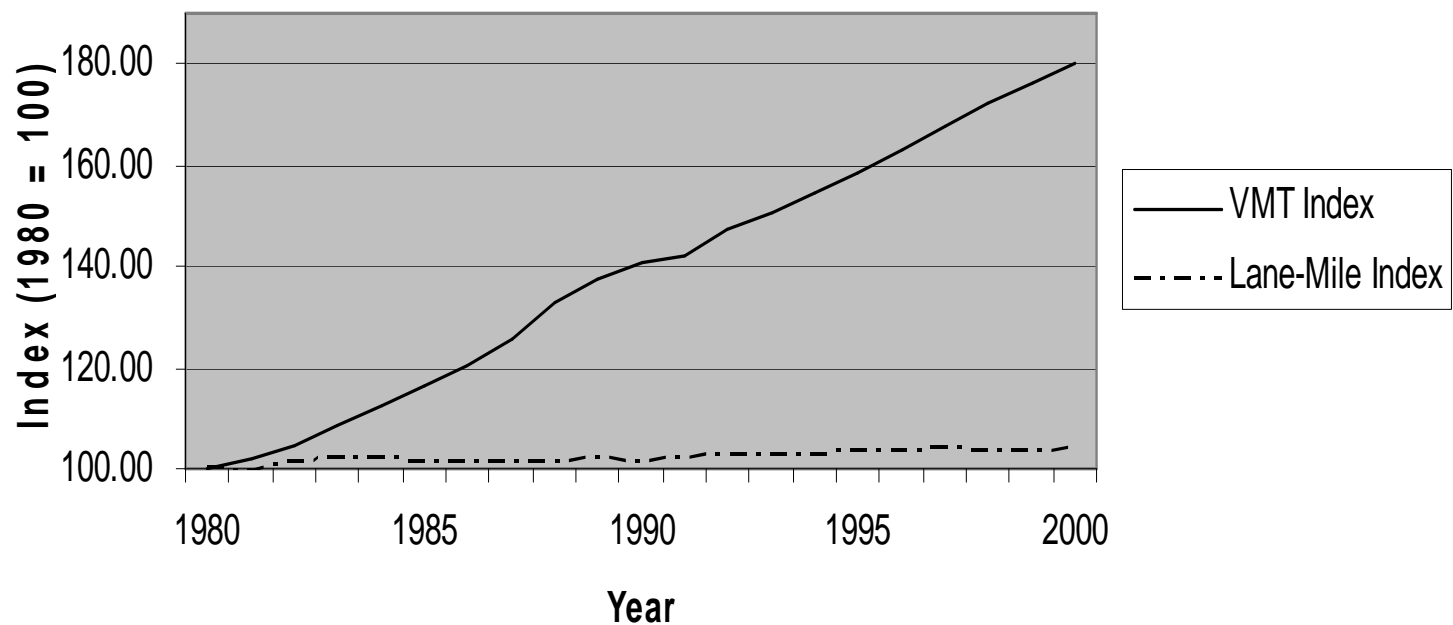
Congestion

- No longer confined to the largest metro areas
- Mobility is constrained
- Economic impacts
- Community livability
- Environmental considerations
- Normally congestion is at the top of the list of civic concerns in metropolitan areas

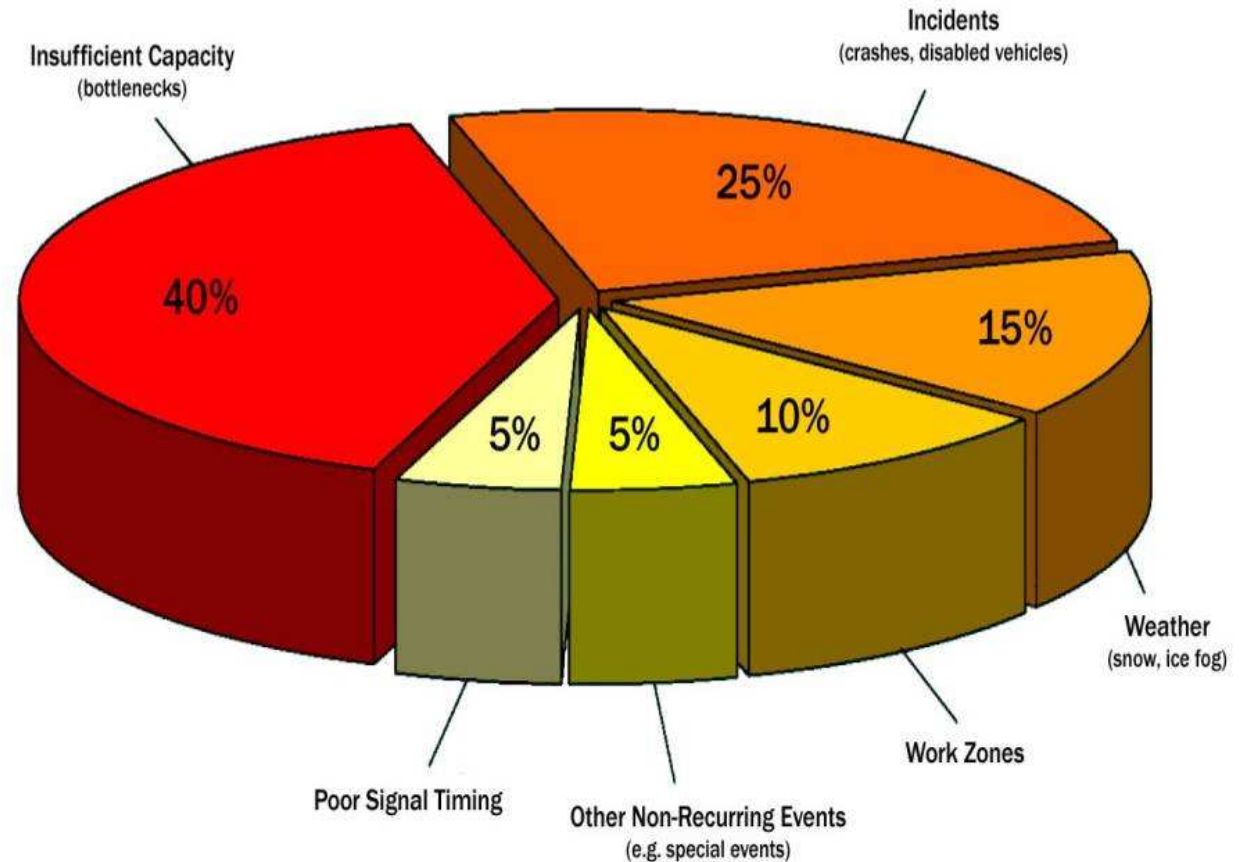


Supply Cannot Chase Demand

Change in VMT and Lane-Miles



Where does congestion come from?



Source: Federal Highway Administration, 2003



AASHTO

U.S. Department of Transportation
Federal Highway Administration

So where does this leave us?

- Increasing congestion requires innovative management strategies
- Sustain acceptable levels of service for the public and freight industry
- Find ways to more effectively utilize the existing infrastructure
- Increased capacity expansion is becoming less of an option due to costs and environmental concerns
- Public accountability has lead to a more customer service driven focus



Our Scan's Objectives Are:

- Identification of best practices and the conditions under which each is applicable/best suited.
- Investigate implementation of these strategies
- Develop a summary report.



Areas of Prime Interest Are:

- Evaluation and selection of alternatives
- Innovative solutions development
- Lane use solutions
- ITS and other management strategies
- Performance monitoring and data
- Lessons learned and research needed



Goals and Objectives

- Identify promising/practical solutions
- Identify and overcome implementation barriers
- Gather specific examples/documentation



The Scan Team



The Scan Team – 7 Members

- Representatives:
 - 1 - FHWA
 - 5 - State DOT's
 - 1 - Private Sector



The Team

Greg Jones, Co-Chair
FHWA

Ted Trepanier, Co-Chair
State Traffic Engineer WSDOT

Tony Abbo
Assistant District Three Traffic
Engineer
NM State DOT

Michael Pillsbury
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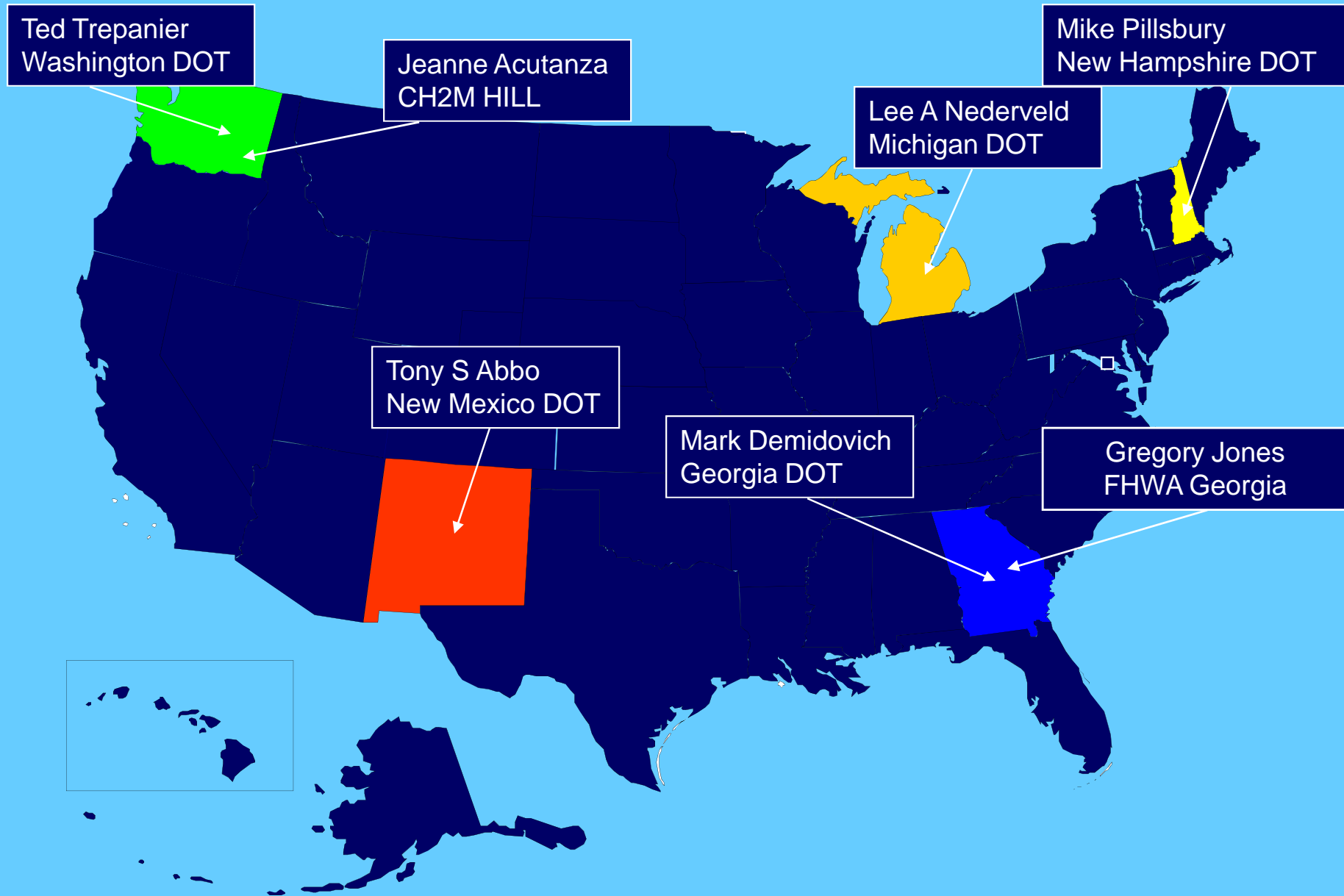
Mark Demidovich
Engineer of Traffic,
Georgia DOT

Jeanne Acutanza
Senior Technologist
CH2M Hill

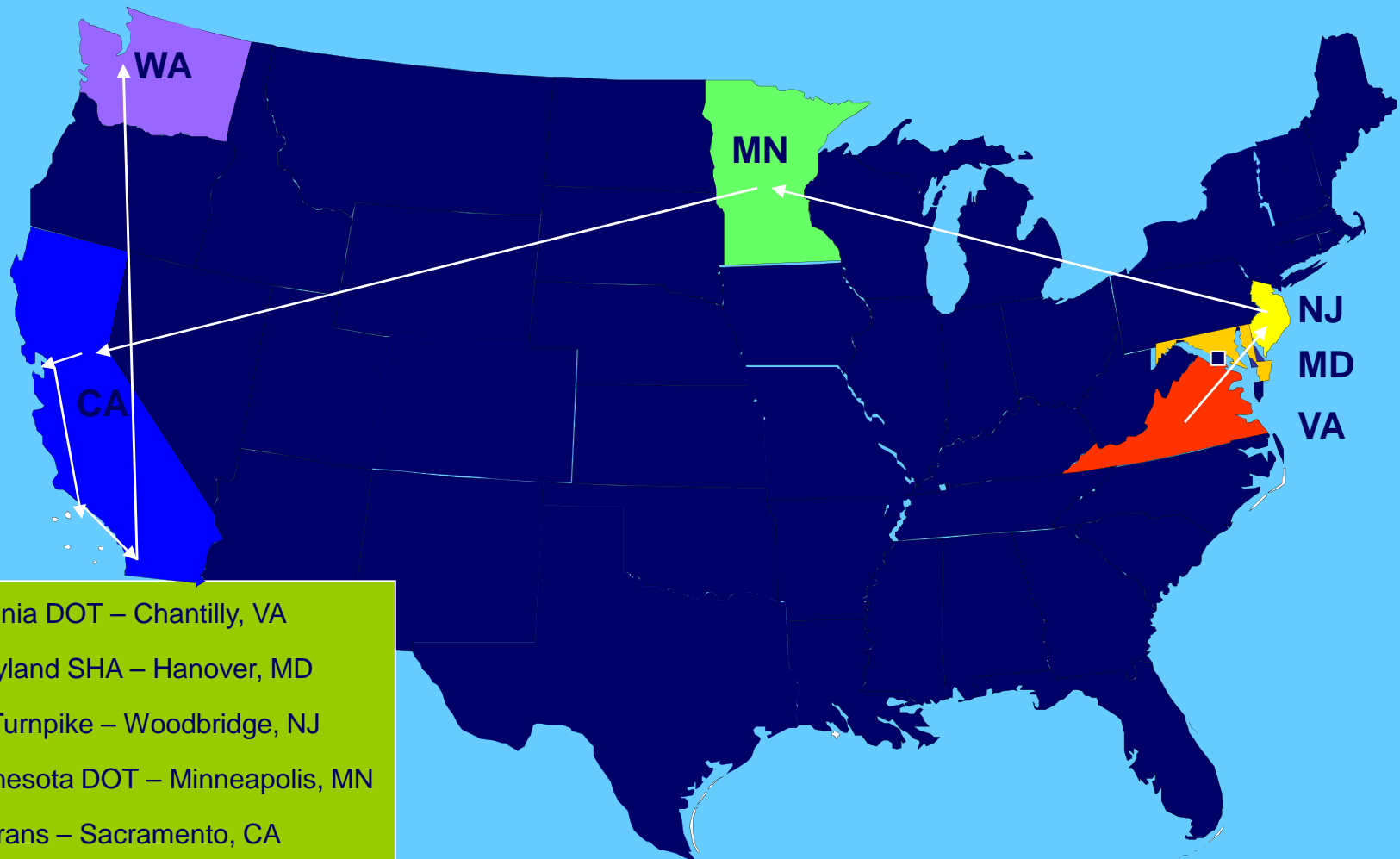
Lee Nedervold
ITS Engineer
Michigan DOT



Scan Team Member Home States



Places Visited - Scan States



- Virginia DOT – Chantilly, VA
- Maryland SHA – Hanover, MD
- NJ Turnpike – Woodbridge, NJ
- Minnesota DOT – Minneapolis, MN
- Caltrans – Sacramento, CA
- Caltrans – San Francisco, CA
- Caltrans – Los Angeles, CA
- Caltrans – San Diego, CA
- WSDOT – Seattle, WA

DDOT – Washington D.C. via Webcast

Strategies to be reviewed may include, but are not limited to such items as:

- Contra flow lanes (lane control signals or moveable barrier systems)
- Reversible lanes
- Real-time traffic management using ITS technologies (ATIS and ATMS)
- Congestion pricing
- Use of shoulders as lanes
- Narrow lanes
- Traffic smoothing strategies such as metering
- Integrated Corridor Management



Working Meetings

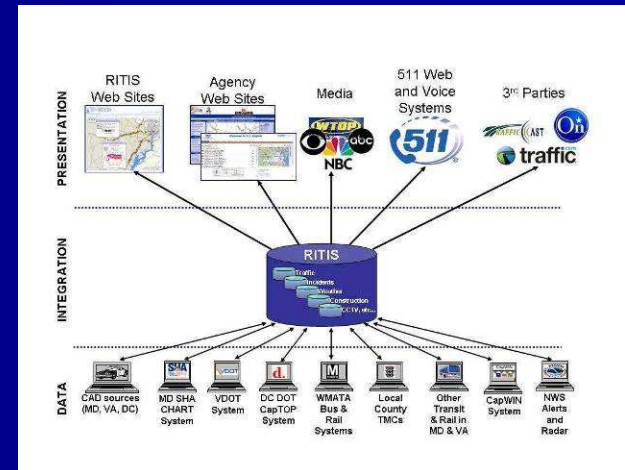
- 55 Presentations
- 8 Operation Center Tours
- 1 Webinar



Findings & Observations – MSHA/VDOT/WDC DOT

- Good example of cross jurisdictional coordination through MATOC
- Partnership with U MD for data fusion
RITIS Construction interface for workzones
- Pool fund makes RITIS available to others

- ⌘ Emerging utility
- ⌘ Developing a tool to assess contraflow
- ⌘ 3-D Capability
- ⌘ Share Ware
- Coordination with I-95 Corridor
- CapWIN software for incident management



Findings & Observations – VDOT

- McConnell Operations Center
 - Shared Use 911/Security
 - Supervisor Coordination Area
- Business Model from Utility company
- Strength is Leadership within the organization
- Coordinated Construction Zone data entry
- Retail Center Traffic Information 511 Kiosks



Findings & Observations – VDOT

- Coordinated Construction Zone data entry
- Retail Center Traffic Information 511 Kiosks
- Signal retiming each 2 years
- Ramp Metering implementing in reverse
- Shoulder Use on I-66
 - DMS
 - pavement color



Findings & Observations – MSHA

- CHART Operations Center
 - TOCs Cover the State
 - Time of Year
- Unconventional intersection design
<http://attap.umd.edu/>
- Use Blue Tooth Speed data
- Integrated Corridors
 - Skycomp aerial survey
 - Mesoscopic Modeling



Findings & Observations – MSHA



- After Action Incident Planning/RITIS
- Signals Retimed every 3 years
- Bay Bridge Contraflow
 - DMS Show Queue time and alternate routes
- I-95
 - Implementing open toll express lanes
 - CCTV, DMS, detection
 - Lane crossing detection

Findings & Observations – WDC DOT

- Radial Hub System
 - Part of MATOC
 - 1100 miles of road and 15 miles of freeway
 - 2/3 driving in the city don't live there
 - Trying to reduce cut through trips
 - 37% don't own a car and emphasis on CSS/Livability
- Reversible Lanes
 - Fine arts Commission Policy on Overhead signs
 - Reversible lanes
 - Vehicle Conflicts
 - Signal timing balanced with peds
- Education and outreach is key using social media



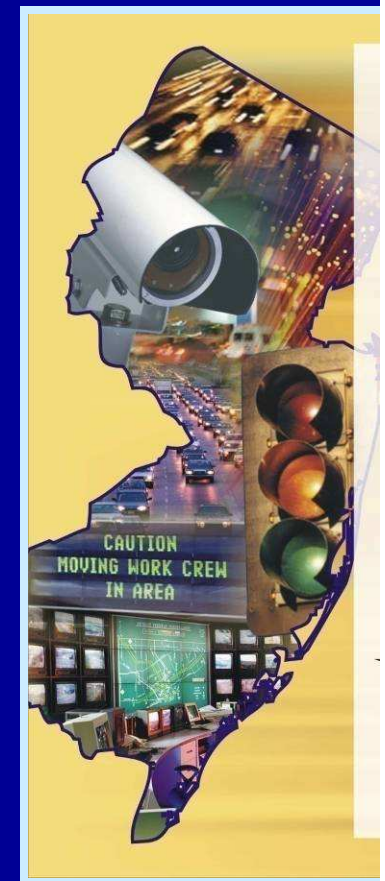
Findings & Observations – NJDOT/NJTPKE/PANYNJ



- STIMC Operations Center
 - Turnpike/NJDOT (coordination with PA NY/NJ)
 - History with ITS
 - Enforce Speeds/Speed Protocol
 - 511 Travel e-alerts
 - Considering traffic prediction tools for incidents
- Transcomm overarching planning (\$250K membership)
- Commercial Data Use
 - Toll Tag Data fused with INRIX
 - Currently SWIFT/INRIX Side by side (I-95 coalition)

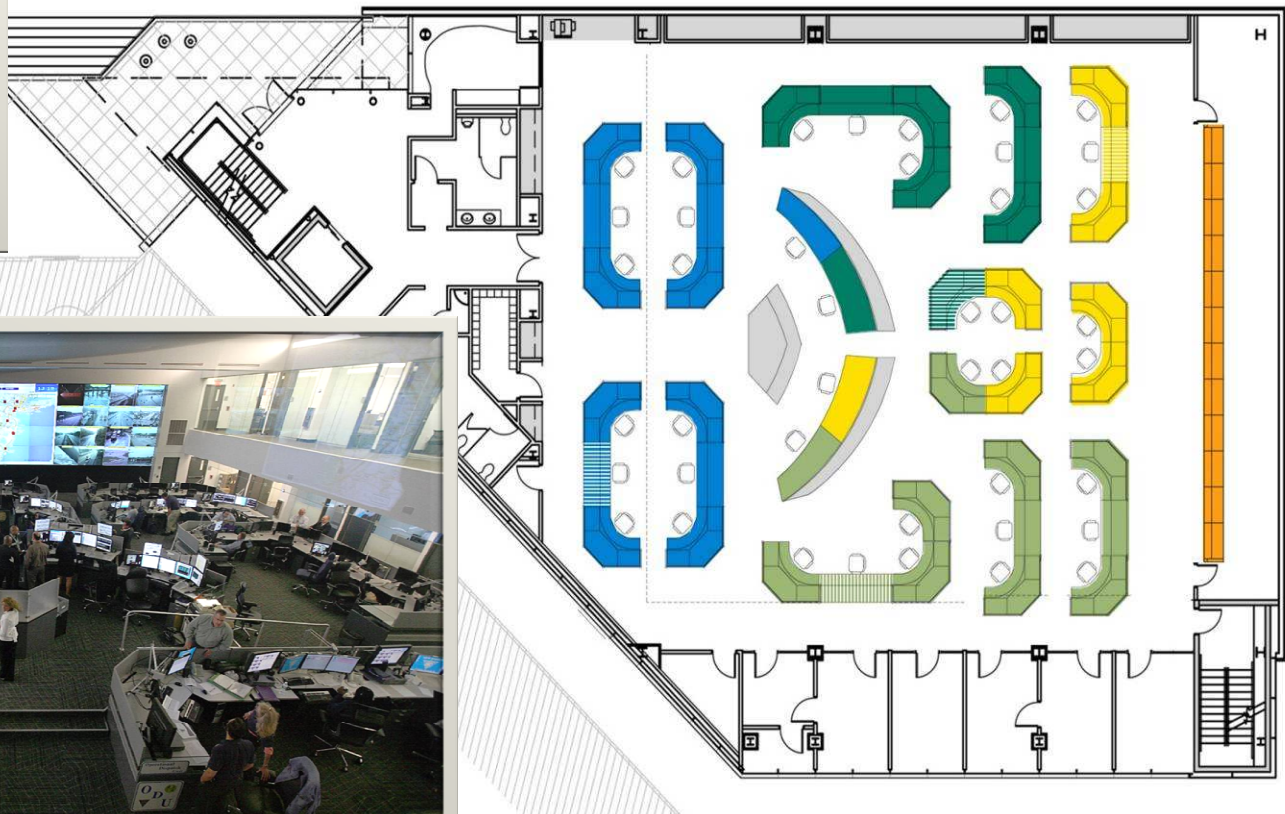
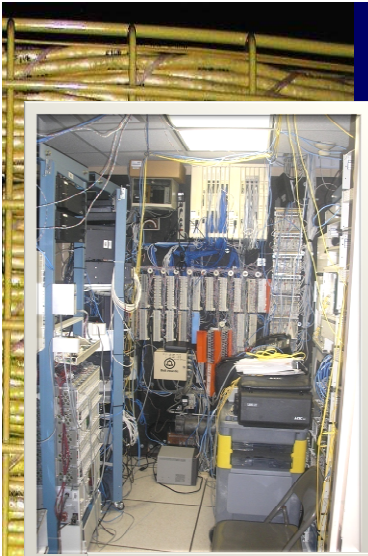
Findings & Observations – NJDOT/NJTPKE/PANYNJ

- Port Authority Tolls linked to CPI
- Outsourcing ITS on Corridors
- Collaborating with NJIT and Rutgers
- Smart workzones
 - real time messages
 - ITS in workzones
- Incident response includes Quick Clearance
- Shoulder use Newark Bay Bridge
- Lincoln Tunnel Reversible Lanes
 - XBL
 - Port Authority storage of buses
- Time of day Shoulder Use by Transit (GWB)



Findings & Observations – NJDOT/NJTPKE/PANYNJ

- STMC before and after



Findings & Observations – MNDOT

- RTMC Operations Center
 - State Patrol 911 call center
 - Parking information
 - Loops Excellent Reporting 30 sec.
 - Warehouse Data
- On-going planning Low Cost Projects (CMSP) solving bottlenecks
- Ramp Metering
 - Tested Thru Controversy
 - Performance Guarantees 2/4 Minutes
 - Meter HOVs

“You can do more with less but you can’t do everything with nothing” James Kranig, MNDOT



Findings & Observations - MNDOT

- Active Traffic Management
 - Incident response “proactive”
 - I-35 Great example benefit of redundant fiber
 - FIRST Incident Response
- Priced Dynamic Shoulder
- LED Pavement Lighting
- Comprehensive Ramp Metering
- “Scabbed in” shoulder lane very effective

“We don’t have a spare I-35W” James Kranig



Findings & Observations - MNDOT

- Bus on Shoulders
 - AVL Technology
 - Time of Day Use
 - 250 Mile System
- Narrow Lanes to add Lane 35th
- IRIS in house control software (\$700,000)
- Arterial Traffic Management Highway 13 UPA
- ICM projects I-35
- Future ICM Expansion (494) including Trailblazing and detouring



Findings & Observations – CA - Statewide

- SB 45 – MPO coordination DOTs 1997
- PeMS Data collection and Data sharing
- State law allows Hybrids in HOV lanes – law may sunset
- Urban Areas Differ Across the State
- Mobility Pyramid



Intelligent Transportation Systems (Improved Mobility & Reduced Congestion)

This pyramid outlines Caltrans' System management strategies for reducing congestion.

ITS deployment is a prominent Caltrans system management strategy for reducing congestion.

System monitoring & evaluation is the foundation.



Findings & Observations – CA – Bay Area

- Web based construction inputs
- Fusing data from speedinfo transponders loops
- Ramp Metering
- Looking into Pricing Cordoned Areas
- After Action Incident Planning
- 511 System
 - Alternative Route Comparisons
 - e-alerts
 - Travel Time Comparisons
 - Social Media and Monitoring
- Expressway System
 - 400 miles to 800
 - HOT



Existing Bus Service on the Express Lanes Network



Findings & Observations – CA – Bay Area

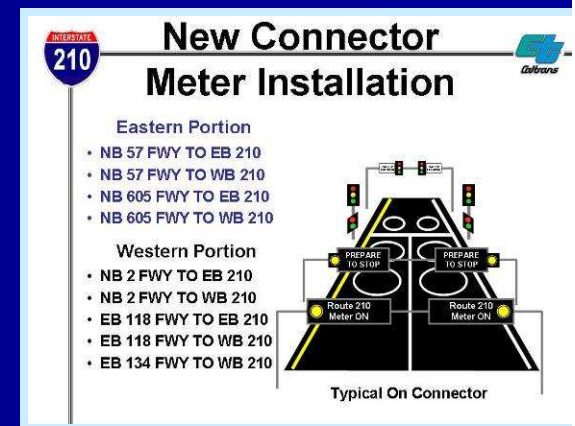
- ICM I-80
- UPA project includes parking management
- San Mateo 101 corridor project (SMART)
 - Travel time and train times Comparison
 - Active trail blazing
 - Signal coordination and synchronization
 - Software SMART Corridor
- Detection best investment
- Study of non-recurring congestion



- # Dynamic Map View

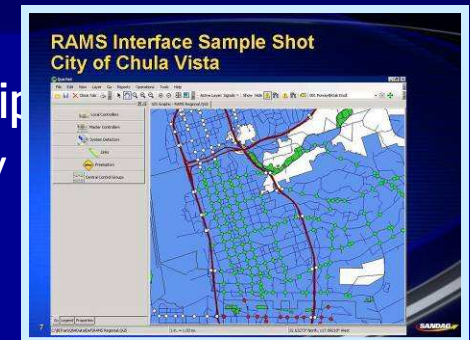
Findings & Observations – CA – Los Angeles

- Shoulder Use on 110 Freeway to Freeway
 - DMS and in pavement markers
- Foothill Freeway I-210 Ramp Metering
 - Full control of the system
 - SWARM Algorithms
 - Meter HOV bypass lanes
 - Meter freeway to freeway
- Recalibrate Loops Every Night at 2am
- RIITS data integration/fusion



Findings & Observations – CA – San Diego

- Strong Planning – Operations Partnership
 - Matching grant opportunities to technology
 - Pricing as Congestion Management (not revenue generation)
- Sustainability Evaluation Criteria
- Regional Arterial Management System
- Regional Traffic Engineering council
- Signal control flushes arterials
- Data Collection
 - Arterial PeMs
 - Transit PeMS and
 - BlendedPeMs
- Compass Card integrates transit/parking
- 511 system 2 Mil. calls/1Mil. visitors
- Performance metrics to public



Findings & Observations – CA – San Diego

- Ramp Metering
 - Adaptive with local control
 - Converting HOV bypass to mixed uses
- Bus only Shoulders (BOSS)
 - I-80%
 - Commercial Vehicle Buy-in
- I-15 HOT lanes
 - Defines Acces
 - Convenient park-and-ride w/direct access
 - Performance Guarantee
 - SOVs may be restricted
 - Intermediate Access Point
 - Pop up delineators
 - Future automated vehicle occupancy
 - Congestion to pricing algorithms



Findings & Observations – WA

- Q program for planning and prioritization of small projects
- Gray notebook of performance metrics
- Communications Public
 - Pumptoppers, post cards, signs
 - Social Media
- UW students TMC Operators
- Moving to ATM and Lane Control
 - Enforced Variable Speeds
 - Branding as Smart Highways



Findings & Observations – WA

- SR 167 HOT Lanes exit/entry Striping
- Shoulder use time of day for SR 520 US2 and ramp meters
- Reversible/Express Lanes I-5 and I-90
- Dedicated Travel times signs at decision points
- Instant tow and Blok Buster towing
- MIT incident response
- JOPS – State Patrol and DOT
- County Coroner Agreements (Quick Clearance)



Findings & Observations – INRIX

Follow up to VA, MD and NJ

Fusion of probe, loop other and historical data

Other private providers

NAVTEQ

Air sage

Strengths

Fill in data gaps

Provide data quickly where loops are not present

Weaknesses

Don't provide volume data

Don't cover arterials well nor rural areas



Common Practices

- Traffic Operations Centers with ITS
 - Detection (loops, radar)
 - Dynamic message signs (DMS)
 - Surveillance cameras (CCTV)
- Advanced traveler information systems
 - incident response
 - vehicle clearance
 - work zone and management
- Reversible lanes within specific right-of-way
- Freeway System Ramp Meters
- Use of Shoulders
 - Time of day
 - Transit



Best Practices

- Traffic Operations Centers with ITS
 - Detection (loops, radar)
 - Dynamic message signs (DMS)
 - Surveillance cameras (CCTV)
- Work zone coordination and management
- Advanced traveler information systems
 - Incident response
 - Vehicle clearance
- Management incident response vehicles using AVL



Best Practices

- Broadcast of data
 - Real time travel speeds
 - Social Media
- Advanced traffic signal timing
 - Maintenance of signal timing
 - Multiple signal timing plans.
- Shoulder use
 - Professional drivers accompanied with
 - Pavement markings, signs and overhead designation
- Express lanes as managed or HOT facilities.



Emerging Practices

- Advanced traveler information including routes and mode choice
- Traveler information data is being fused to predict and plan for congestion
- Active traffic management
 - Express lanes or congestion pricing (HOT)
 - Lane by lane control
 - advisory or enforced variable speeds
 - dynamic messages
- In pavement markings LED to change lane designations



Emerging Practices

- Photo radar in work zones.
- Adaptive traffic signal control for intersection use
- Shoulder use by transit and commercial vehicles using Intellidrive
- Automated enforcement including passenger detection
- Ramp-metering
 - Eliminate or meter HOV bypass lanes
 - Meter freeway-to-freeway system ramps



Questions and Acknowledgements



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