




LUNCH and LEARN with FHWA

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Operations in the 21st Century DOT

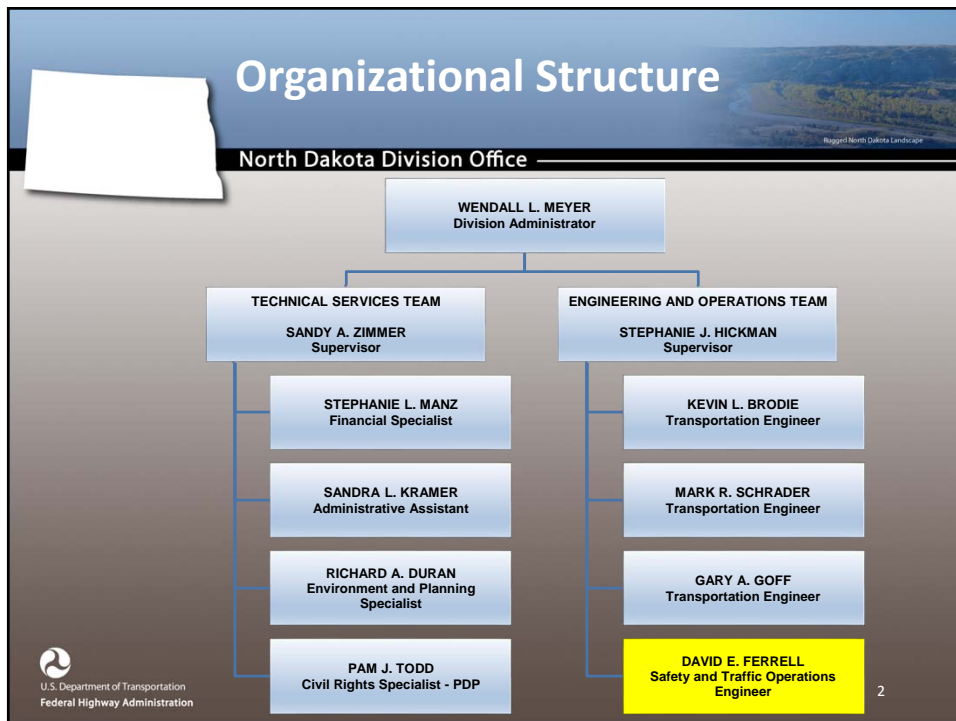
Meeting Customers Needs & Expectations



Presenter:
David Ferrell




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Key Areas

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- Challenges brought about by the changing transportation environment and public (i.e., “customer”) expectations
- How operations and supporting technologies can help address these issues
- Importance of mainstreaming operations into the DOT’s program (and the transportation planning process)

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What is TSM&O?

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Transportation Systems Management and Operations (TSMO, TSM&O)

- Defined in MAP 21
- “Integrated strategies to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects”
- **The highest mobility for the lowest cost**

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Example Operations Strategies and Solutions

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- Work Zone Management
- Traffic Incident Management
- Service Patrols
- Special Event Management
- Road Weather Management
- Transit Management
- Traffic Signal Coordination
- Traveler Information
- Ramp Management
- Managed Lanes
- Active Traffic Management
- Integrated Corridor Management

More discussion of some of these and their benefits later



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The Transportation Environment is Changing

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- Increased reliance on information and technology
- Increasing customer needs and expectations
- Growing emphasis on measuring performance
- Reduced financial resources
- Technology also offers opportunities – multiple operations strategies and regional integration of various modes

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Technology is Transforming Our World

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- Increased availability of information
 - Internet connectivity, wireless communications, cloud computing
 - Information is available 24/7 on mobile devices
- Customers' perception: technology can improve efficiency and service
- The future – even more innovative technologies and a shorter shelf life
 - New data services
 - Connected / autonomous vehicles



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Changing Expectations and Needs

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- Public's expectations of government
 - Increased productivity and efficiency
 - Greater demand for accountability – value expected from the use of tax and toll dollars
- Improved performance and service for commuter, freight, recreational, and other trips:
 - Mobility including reduced delays and congestion
 - Safety
 - Accurate, timely, and accessible information
 - Reliability (a focus of SHRP 2 program)

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Performance Measures

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Element of increased accountability

“The game gets serious when you start to keep score!”

Emphasized in MAP 21

Goals and associated measures being established for:

- Safety
- Infrastructure Condition
- Congestion Reduction
- System Reliability
- Freight Movement and Economic Vitality
- Environmental Sustainability
- Reduced Project Delivery Delays

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Operations Can Help Address These Challenges

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- **Leverage Technology**
 - Preserve and maximize existing capacity
 - Enhance safety
 - Promote mobility and customer outreach
 - Improve reliability for commuters and freight
 - Manage bottlenecks
 - Monitor performance
 - Implement quickly at relatively low cost



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Traditional Approach to Managing Transportation

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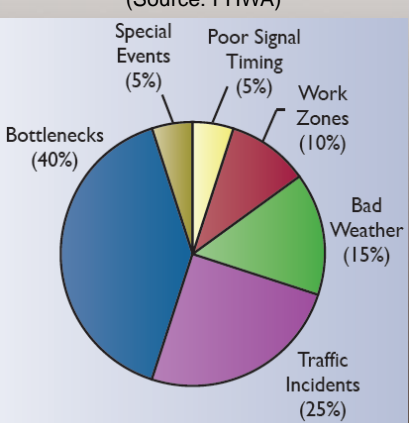
- Predict future (long range) traffic volumes
- Fund major capital projects to provide additional capacity

This only addresses 40% of the congestion problem

- Also becoming more and more difficult to provide new capacity

Causes of Congestion

(Source: FHWA)



Cause	Percentage
Bottlenecks	40%
Traffic Incidents	25%
Bad Weather	15%
Work Zones	10%
Poor Signal Timing	5%
Special Events	5%

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Providing Effective, Safe and Reliable Transportation




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- Building the necessary infrastructure
- Keeping in a state of good repair (maintenance & reconstruction)
- Operating and managing the infrastructure on a day-to-day basis

Core competencies of every DOT; and have been for decades

Operations should become a formal core program along with construction and maintenance activities

New construction will continue to be important. But we can't build our way out of congestion!



Work Zone Management






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Several strategies and technologies available

- Traveler information & portable DMS (delays, alternate routes)
- Variable speed limits
- Automated speed detectors, warning signs & enforcement
- Dynamic lane merge system
- Maintenance decision support

Demonstrated benefits include:



- Reduced crashes
- Reduced work zone traffic
- Reduced delays



Traffic Incident Management (TIM)

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- Planned and coordinated process to detect, respond and clear incidents and crashes quickly and safely
- Multi-disciplinary activity involving DOTs & emergency service providers
- TIM reduces the duration of traffic incidents (30-50%)
 - Reduces congestion
 - Improves reliability
 - Improves safety - reduces secondary crashes



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Safety Service Patrols and Incident Response Trucks

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Part of TIM Program

- Specially equipped response trucks and trained operators
- Assist stranded motorists and clearing debris
- Provide traffic control during traffic incidents



Example Benefits

- Cleared 80% of incidents within 10 minutes.
- Average Benefit / Cost Ratio of 12.4 : 1
- Favorable public response



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Photo: Courtesy of Florida Department of Transportation

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Planned Special Event Management

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Effective event management requires agency collaboration and coordination

- Planning and protocols
- Day of event activities
- Post event activities



Example Benefit:

- Travel time to a major racing facility in Phoenix reduced by over 70% by applying event management strategies.




Road Weather Management

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Reduce the impact of adverse weather conditions on travelers

- Data collection
- Data assimilation and analysis
- Information dissemination



Example Benefits


- Low visibility warning system.
 - Crash rates during fog conditions reduced 70 – 100%
- Wet pavement detection & advisory system reduced crashes by 39%
- B/C ratio for automated wind advisory in Oregon = 4:1 and 22:1





Emergency Management

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- Large-scale impacts
 - Severe weather
 - Homeland security
- Can happen anytime, often without warning
- Transportation operations is critical to effective response
 - Whether transportation infrastructure is affected or not
 - Prior, during, and following event
 - Multi-agency planning and coordination a must







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Traffic Signal Synchronization


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Timing adjacent traffic signals to minimize stops


- Can be based on time of day, traffic flows, special events

Example Benefits

- Reductions in traffic delay ranging from 15-40%
- Reductions in travel time up to 25%
- Very high benefit – cost ratios, sometimes exceeding 50:1



2012 National Traffic Signal Report Card gave an overall grade of D+




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Traveler Information

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- 511 Web and Voice
- Dynamic message signs (DMS)
- Radio and television traffic reports
- SmartPhone apps
- Social media tools
- Commercial traffic condition and prediction services

Services may be provided by private sector



Example Benefits

- 511 customer satisfaction of 68% - 92%
- Route-specific travel times: 5% -13% increase in on-time performance (i.e., reliability)



Ramp Management

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Metering - traffic signals on ramps to dynamically control the rate at which vehicles enter a freeway

- Smooths the flow of traffic onto the mainline

Example Benefits

- Metering increases freeway throughput 13 - 26%
- Metering decreases crashes 15 - 43%

Greatest benefits occur when applied corridor-wide





Active Traffic Management (ATM)

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Dynamically manage congestion based on prevailing traffic conditions

- Variable speed displays
- Dynamic lane control
- Queue warning
- Hard shoulder running





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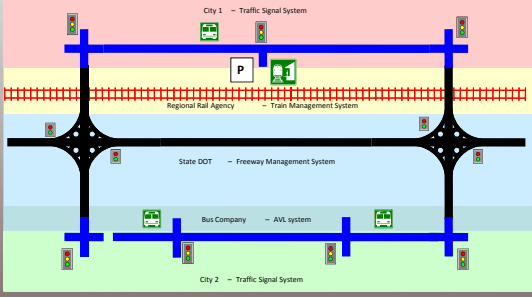
Relatively new to US - European Experience

- Throughput increased by 3–7%
- Decrease in incidents of 3–30%
- Emissions decreased 2-8%
- Benefit/Cost ratio of 3.9 : 1

Integrated Corridor Management

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- Corridors offer opportunities to optimize the entire system
- ICM is the operational coordination of multiple transportation networks and cross-network links
 - Integrated traveler info
 - Operational efficiency of network junctions
 - Cross-network route & modal shifts
 - Capacity and demand



Example Benefits

- ICM along I-15 in San Diego: estimated B/C ratio of 9.7:1
- Simulation of ICM: B/C ratios of 7.1:1 to 25.1:1

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Active Transportation and Demand Management (ATDM)

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Broad operational philosophy – an integrated approach for dynamically and pro-actively managing and influencing travel demand and traffic flow
Uses a combination of the real-time operational strategies:

- Those previously noted
- Managed Lanes
- Active Traffic Management
- Integrated Corridor Management
- Dynamic pricing




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Connected Vehicles and the Future


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- Vehicles “reading” the roadway and one another
- Collisions reduced; reliability improved
- Smarter operational decisions (possibly predictive)



The Future?

- Technology transformation changes mobility
- What might be the impact of autonomous vehicles?
- DOT role in supporting development



Reaching Full Potential of Operations

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- Full potential is **not** primarily a “technology” issue or knowledge of best operations practices
- The key: Put in place and manage specific supportive business and technical processes and supporting institutional arrangements

“Mainstreaming Operations”

Necessary at agency & regional level – Per MAP 21: State DOTs and MPOs must consider projects and strategies as part of their planning process that promote efficient operations

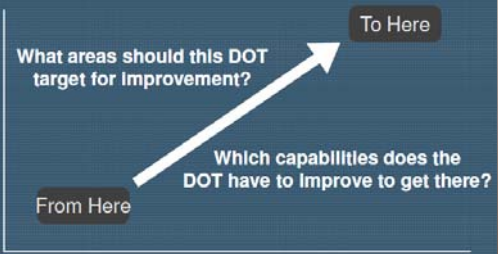


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Key Leadership Questions for Mainstreaming Operations

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- What are your customers’ needs and expectations?
- What are your current business processes for operations (e.g., who is responsible)?
- Where are you today?
- Where do you want and need to go?
- How are you going to get there?



Each DOT will have unique challenges and opportunities



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Critical Dimensions for Improved Operations in a DOT

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- Business Processes
- Systems & Technology
- Performance
- Culture
- Organization / Staffing
- Collaboration

- All (6) dimensions are:
 - Essential
 - Interrelated
- Requires executive support and leadership
- Objective is continuous improvement of operations and reliability

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Levels of Capability Maturity

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Ultimate Goal for the Future

LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
Performed	Managed	Integrated	Optimized
<ul style="list-style-type: none"> • Relationships & Activities ad hoc • Champion-driven 	<ul style="list-style-type: none"> • Processes developing • Staff training • Limited accountability 	<ul style="list-style-type: none"> • Process documented • Performance measured • Organization aligned • Program budgeted 	<ul style="list-style-type: none"> • Performance-based improvement • Formal program • Formal partnerships

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Regional Operations Collaboration

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“Planning for Operations”

- Multi-modal collaboration between agencies and jurisdictions
- Collaboration between planners and operators
- Focus on specific outcomes and regional objectives
- Prioritize investments to achieve operations objectives
- Demonstrate accountability through performance measures

“Objectives-Driven Performance Based Approach”



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Summary

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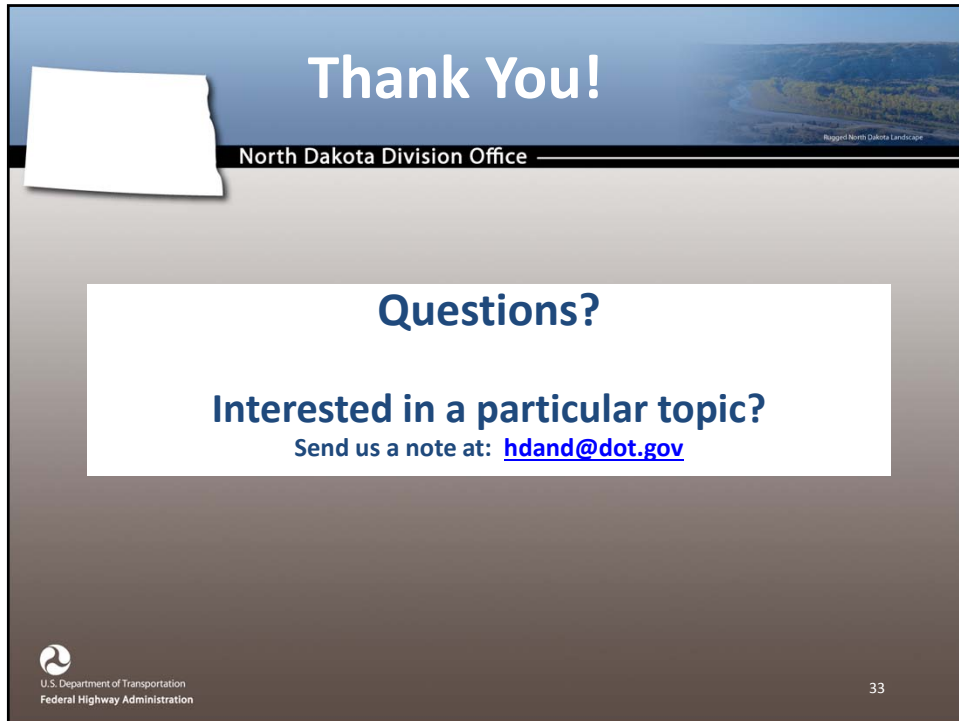
- Operations is a critical component for managing the transportation network on a daily basis.
 - Preserve and maximize existing capacity
 - Enhance mobility, reliability, safety, and environment
 - Provide customer service via a performance-based approach
 - Achieve quick and cost-effective implementation
- To be successful, operations need to be “mainstreamed” into the agency's institutional and organizational framework.

You have an important role to play in this regard.



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Thank You!

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Questions?

Interested in a particular topic?
Send us a note at: hdand@dot.gov

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