# Construction Traveler Information System for I-35 Widening in Central Texas

Overview: I-35 expansion project

✓ 200 directional miles – Central Texas

✓ 14 segments / 19 projects

✓ Costs: ~$2.1B

✓ Traffic Volumes
  - 55,000 – 111,000 vehicles/day
  - 66% through trips
  - Trucks: 25% – 30% (75% at night)
  - Over 5 years, ~ 185 million trips

✓ TxDOT mitigation of impacts
  - Limited lane closures
  - Blackout dates
  - Completion incentives

✓ Complete 2017

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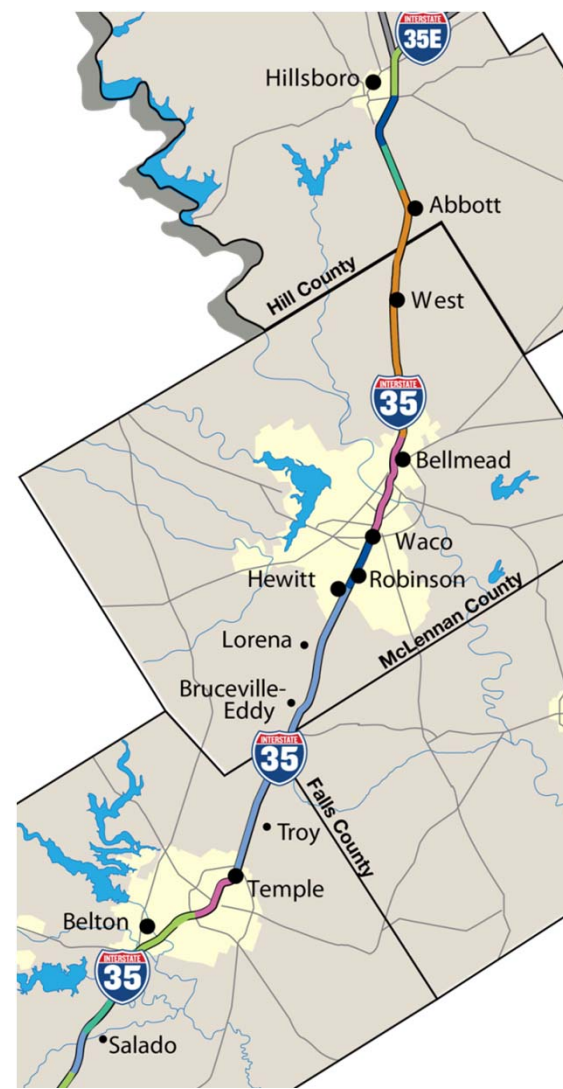
Identifying the Problems/Constraints

1. Potential for queues during nighttime main lane closures

2. Ramp, frontage road, and cross-street closures affecting local access

3. Potential for multiple nighttime lane closures along corridor

   – Localized delays

   – Cumulative delays for through travelers

4. Accelerated construction schedule

   – Limited coordination of lane closures

   – Lane closure locations constantly changing

   – ROW cross-section constantly changing

Specifying User Needs

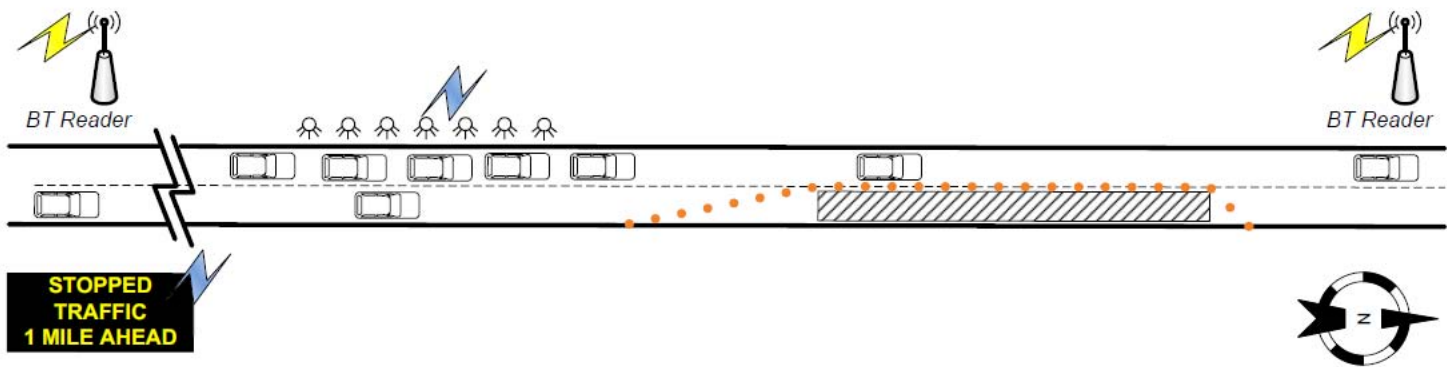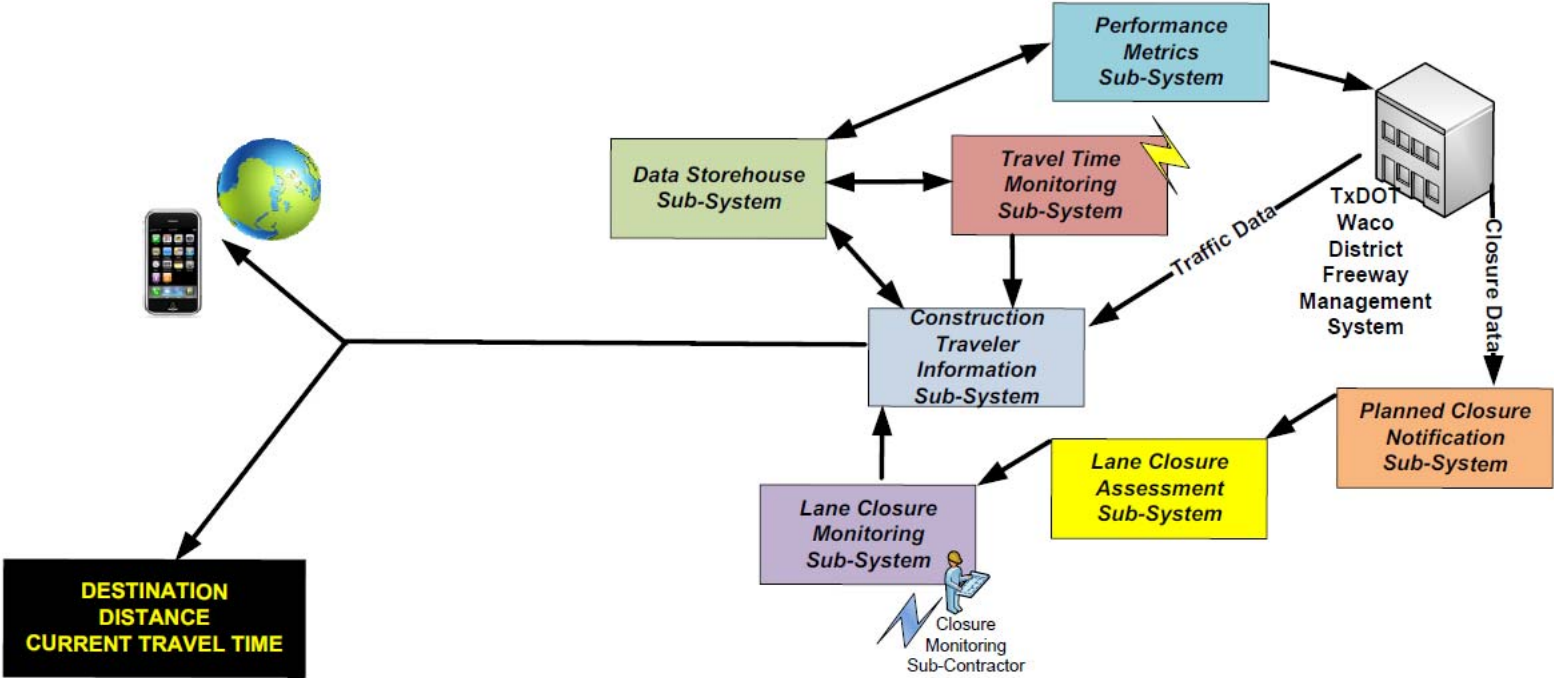| Issue	Travelers Affected	Information Needed
Nighttime freeway lane closures creating traffic queues and speed differentials	All	Real-time warning about downstream queue presence and location
Ramp, frontage road, and cross-street closures hindering local access and limiting traffic flow	Local residents, regional travelers	Access to closure information, "pushed" to those who want it
Freeway lane closures and incidents creating localized delays	Local residents, regional travelers	Current travel times on I-35
Multiple lane closures along corridor on same night causing significant delays to overall trip	Regional, long-distance travelers	Cumulative predicted delays to be encountered along I-35

System Requirements

- Identification and tracking of planned lane closures
- Current travel time monitoring
- Forecasted travel conditions
- End-of-queue notification
- Information dissemination
  - Pre-trip, En-route
  - Email, Web, Social Media
- Integration to existing traffic management centers
- Operational and maintenance monitoring
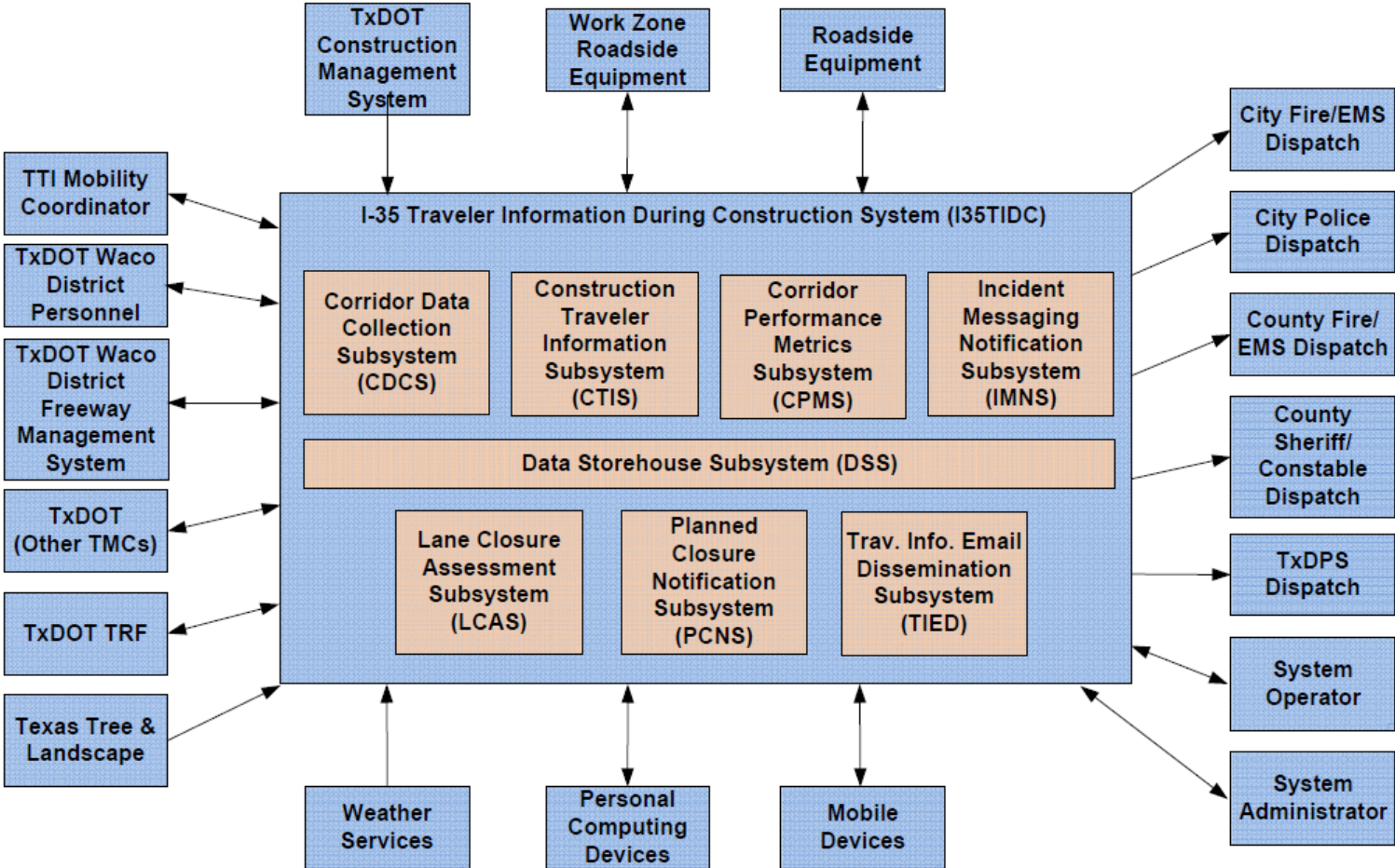
Identifying Alternatives

- Standard TxDOT/contractor traveler information dissemination methods

- Commercial-Off-The-Shelf (COTS) systems

✓ Customized solution involving the integration of technologies

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Concept of Operations

Systems Diagram

System Design Components

- Actively managed lane closure database (PCNS)

- Automated analysis of potential impacts of lane closures (LCAS)

From	To	Expected Queue (mi)	Expected Delay (min/veh)	Worse Case* Queue (mi)	Worse Case* Delay (min/veh)
07:00 PM	08:00 PM	0.5	2.7	1.5	7.3
08:00 PM	09:00 PM	1.0	4.6	3.0	13.9
09:00 PM	10:00 PM	0.3	2.0	3.1	14.8
10:00 PM	11:00 PM	0.0	0.0	3.0	14.8
11:00 PM	12:00 AM	0.0	0.0	2.4	12.5
12:00 AM	01:00 AM	0.0	0.0	0.5	3.2
01:00 AM	02:00 AM	0.0	0.0	0.0	0.0
02:00 AM	03:00 AM	0.0	0.0	0.0	0.0
03:00 AM	04:00 AM	0.0	0.0	0.0	0.0
04:00 AM	05:00 AM	0.0	0.0	0.0	0.0
05:00 AM	06:00 AM	0.0	0.0	0.0	0.0
06:00 AM	07:00 AM	0.0	0.0	0.0	0.0

Components (cont'd)

- Bluetooth monitoring of current travel times over 2-5 mile segments

- Deployment of end-of-queue warning technology when and where needed (based on queue analysis)

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Components (cont'd)

- Advance notification of lane closure impacts
  - Up to 7 days out
  - Updated daily
- Email and feed to TxDOT websites
  - My35.org
  - DriveTexas.org
- Future corridor impacts under development
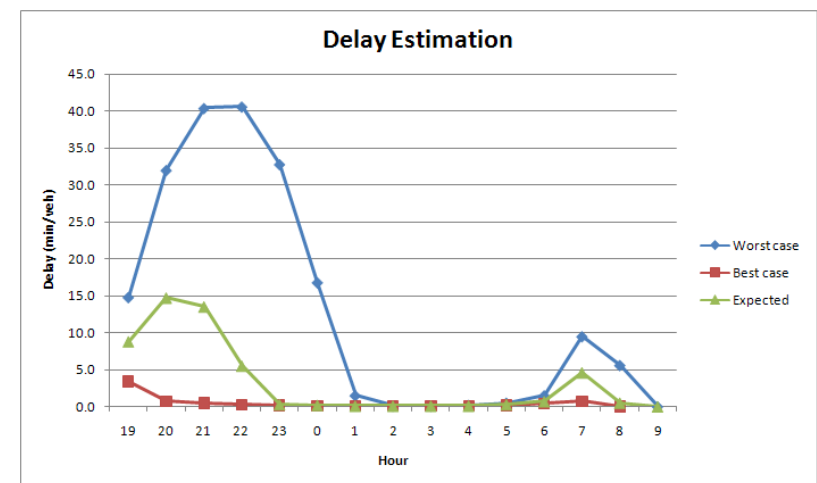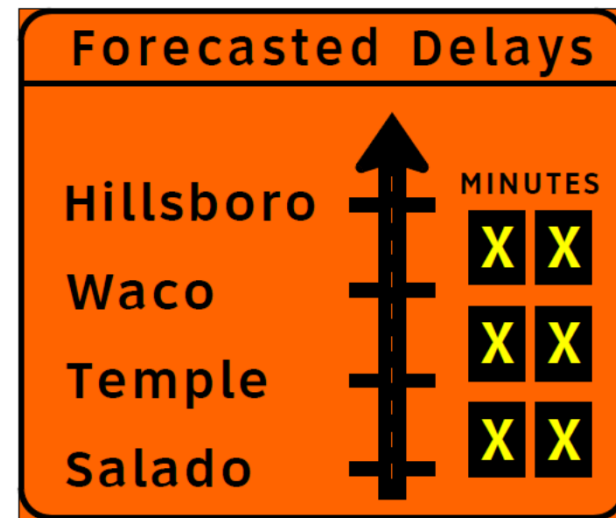
Components (cont'd)

- Current travel times via PCMS
  - 21 signs
  - 7-10 mile spacing
- Integrated with TxDOT LoneStar software
  - C2C communication
  - Allows TxDOT personnel to take over sign control

Components (cont'd)

- Hybrid forecasted delay signs
  - Targeting long-distance travelers en-route
  - Based on expected arrival times to queues

Implementation/Procurement

- Field monitoring devices procured and deployed through a contract with TTI

- End-of-queue warning technology procured through project change orders

- Corridor delay forecasting development and calibration continues

- Corridor performance metrics development continues

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Evaluation - Lane closure notifications

- 1100 email recipients
- Usefulness
  - 81% useful
  - 91% easy to understand
  - 93% abbreviations easy to understand
  - 90% right amount of detail
- Format:
  - 67% continue current
  - 33% customize for my location
  - Points to through nature of trips

Evaluation – Travel Times via PCMS

- 91% had seen

- 83% useful

- 82% frequent enough

- 92% agree with appropriateness of destination cities

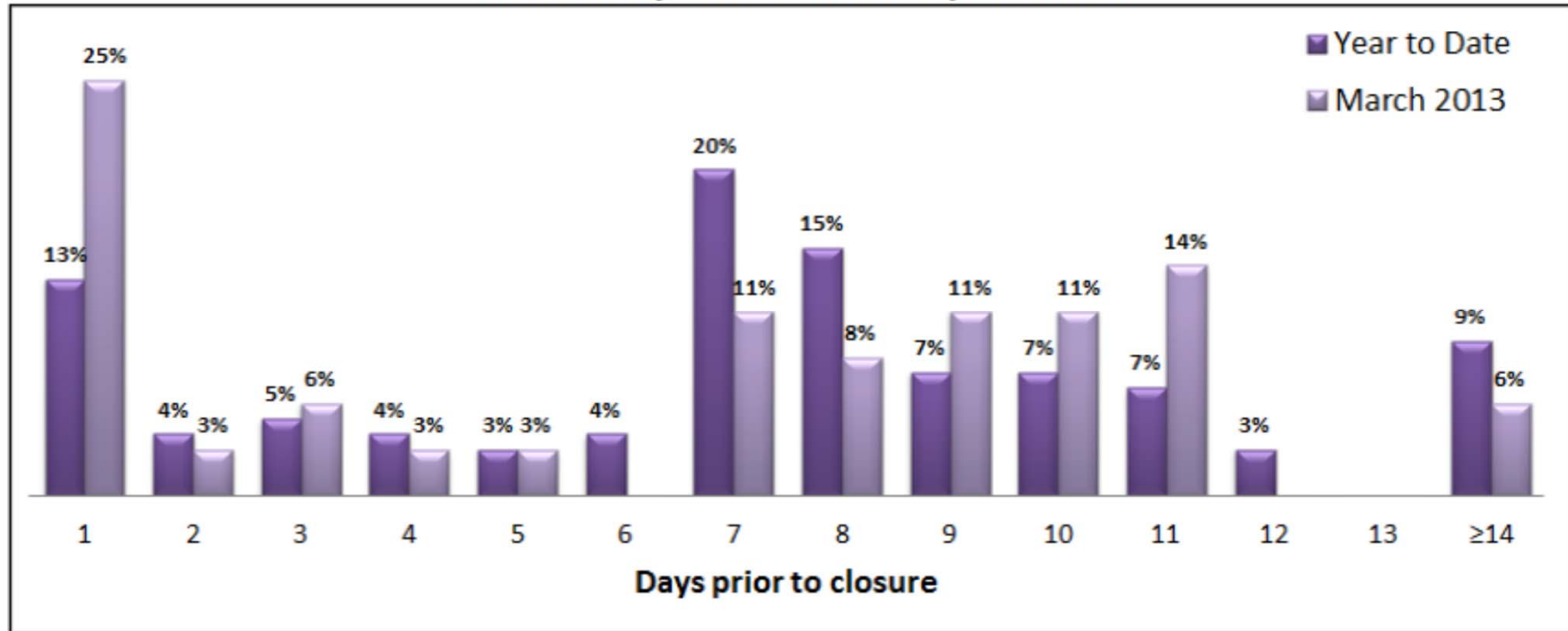

Suggested Travel Time Data Collection Sections
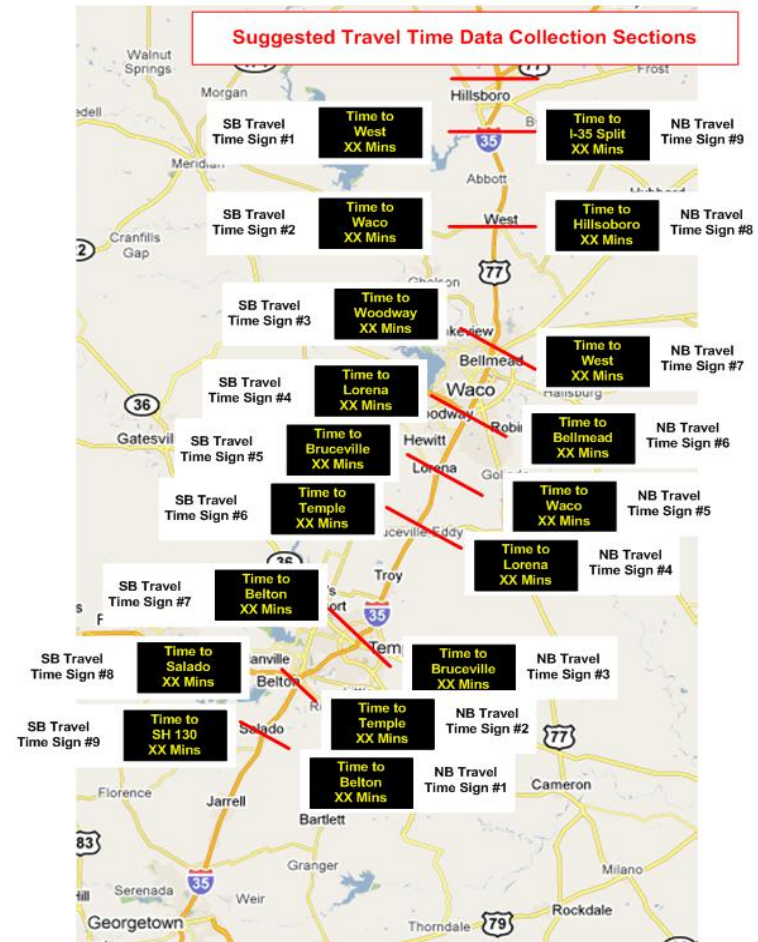
Evaluation – Performance Metrics

Distribution of I-35 main-lane closures per night
March 2012 excluding weekend black-out days
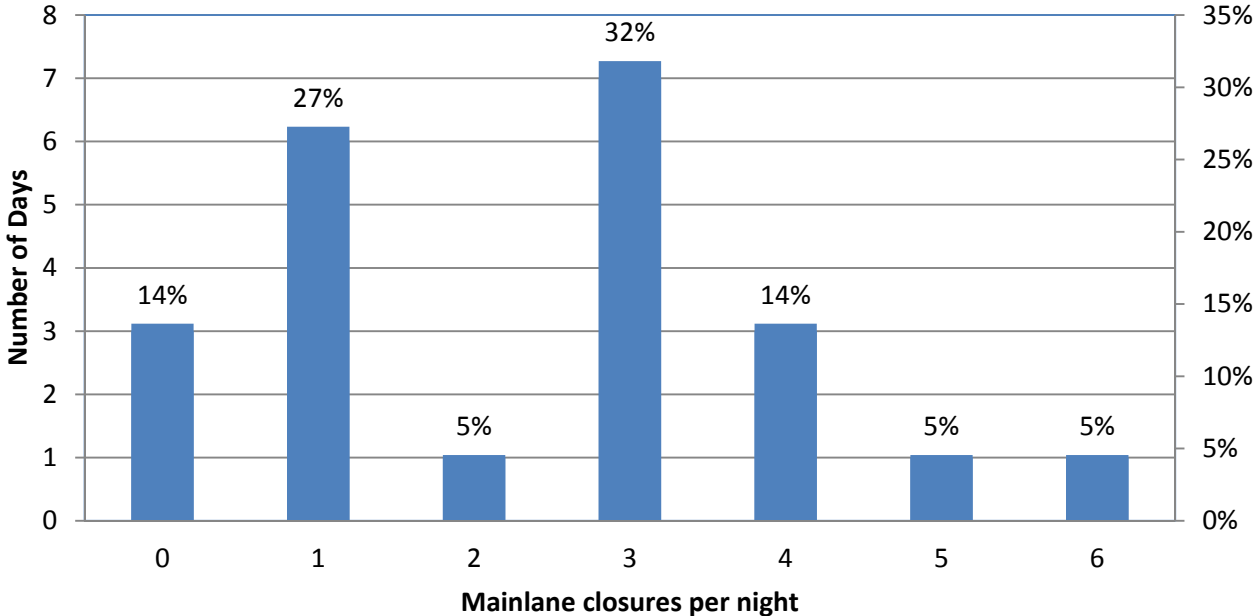
Performance Metrics (cont'd)

Distribution of Advance Closure Notification Times

Performance Metrics (cont'd)

Percent of Lane Closures with Delay

Project Section	> 0 min	>=10 min	> 20 min
5C	7%	2%	
5B	10%	5%	3%
5A	13%	4%	2%
4	11%	6%	2%
3C	15%	7%	3%
3B	13%	5%	
3A-2	12%	6%	2%
3A-1	17%	9%	3%
1C	28%	17%	9%
1B	15%	7%	
1A	18%	8%	2%
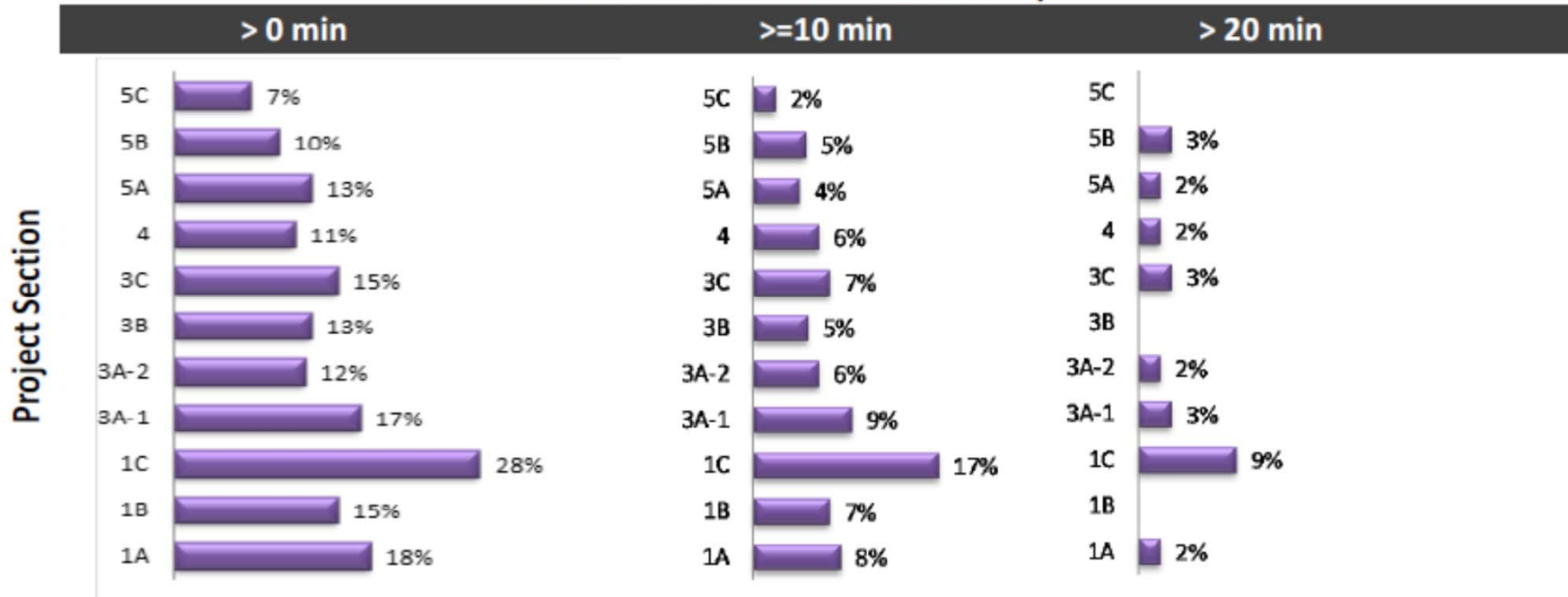
Lessons learned

- Balancing lane closure advance notification time versus accuracy is a challenge
- Field infrastructure locations have to move quickly with phasing
  - Temporary deployments critical
  - Geolocate and track via GPS
- BT spacing can go 5-8 miles in rural settings
- Public does pay attention to real-time information, prefers specifics

Lessons learned (Cont.)

- Change ordering in technologies to existing projects continues to be a challenge
- Ensuring good data exchange protocols is critical → XML

Questions?