MAINE STATEWIDE DEPLOYMENT AND INTEGRATION OF ADVANCED TRAVELER INFORMATION SYSTEMS

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MaineDOT

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Organization of Presentation

Organization of Presentation

- Research Objectives
- Discussion of Findings
  - Dynamic Message Signs (DMS)
  - Variable Speed Limit Signs (VSLS)
  - Overheight Vehicle Detection System (OHVD)

Organization of Presentation

- Evaluation of Institutional Issues
- Lessons Learned
- Recommendations
- Areas for Further Study

Research Objectives

Research Objectives

Primary Objective

- Measure the effectiveness that new information and warning systems in Maine have on the service provided by its highways

Research Objectives

Detailed Objectives

- Review of published and unpublished literature relevant to DMS, VSLS, and OHVD
- Collect data to determine the effectiveness of implementation

Research Objectives

Detailed Objectives

- Evaluate the institutional issues associated with achieving public sector agency cooperation
- Provide a lesson learned report on the technical and institutional issues encountered during the project

Dynamic Message Signs in Maine

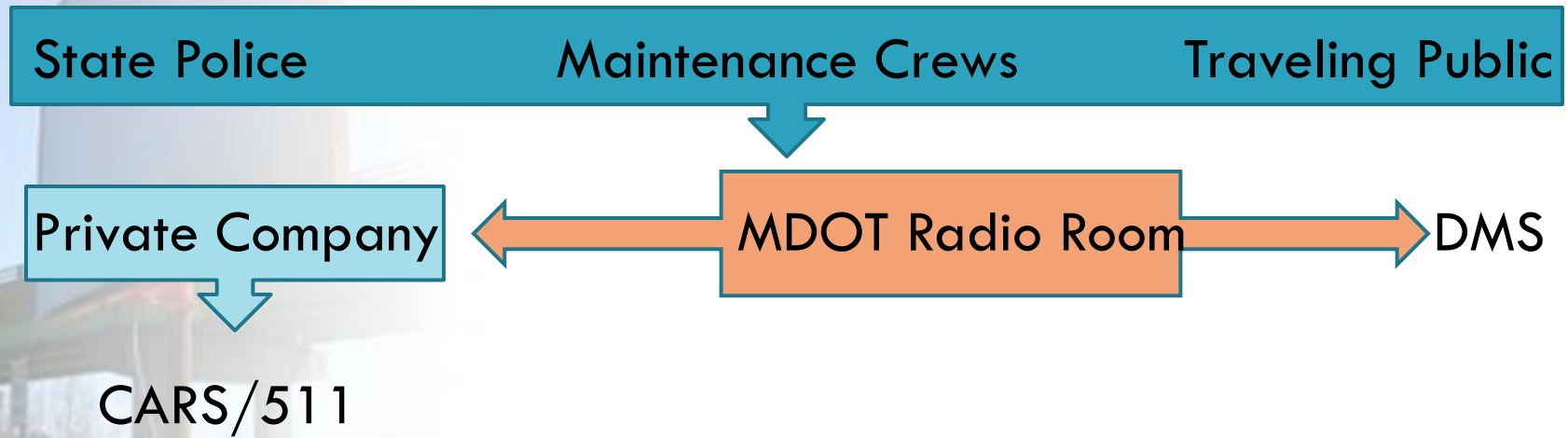
Dynamic Message Signs

Provide motorists with en-route information pertinent to their travels

(ADDCO, 2006)

Dynamic Message Signs

Sequence of Events



Dynamic Message Signs

MDOT Acceptable DMS Information

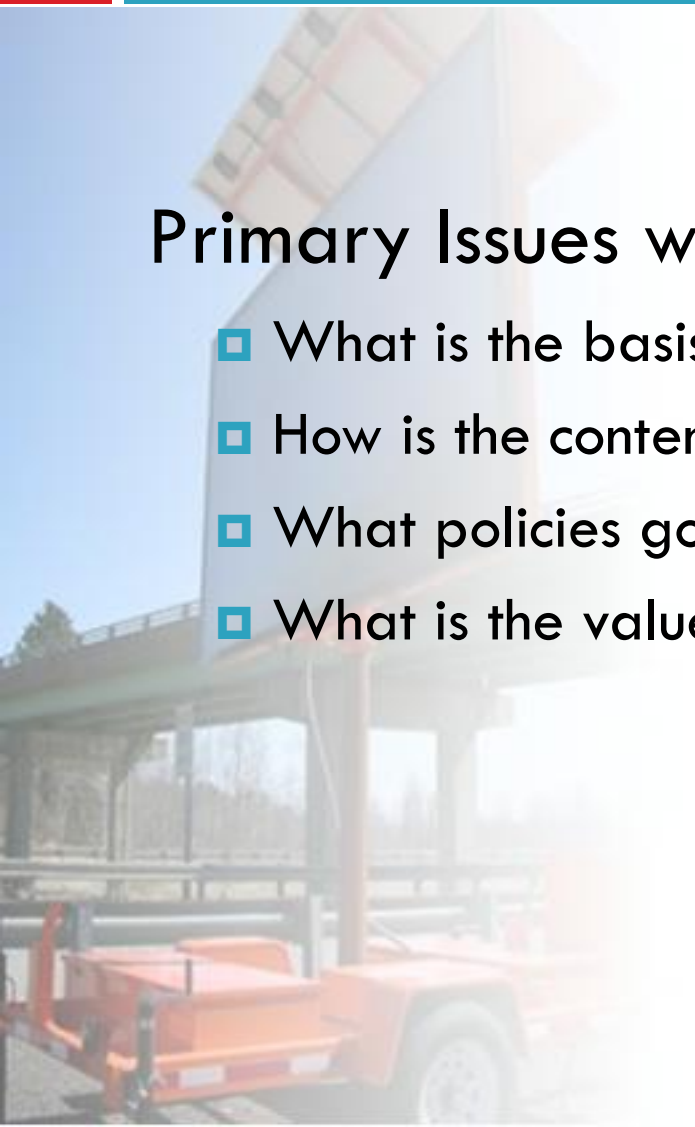
- Weather and road conditions
- Special events impacting travel
  - No direct reference to the specific event
- Travel time
- Enforcement actions
- Congestion management

Dynamic Message Signs

MDOT **Unacceptable** DMS Information

- Advertising
- Public Service Announcements
- Generic Messages
  - Slogans, greetings, holiday wishes
- Date/Time/Temperature
- Long Term Static Signing

Dynamic Message Signs



Primary Issues with DMS

- What is the basis for the message?
- How is the content determined?
- What policies govern the display of the message?
- What is the value of the DMS?

Dynamic Message Signs

MDOT Standard Operation Procedures states that:

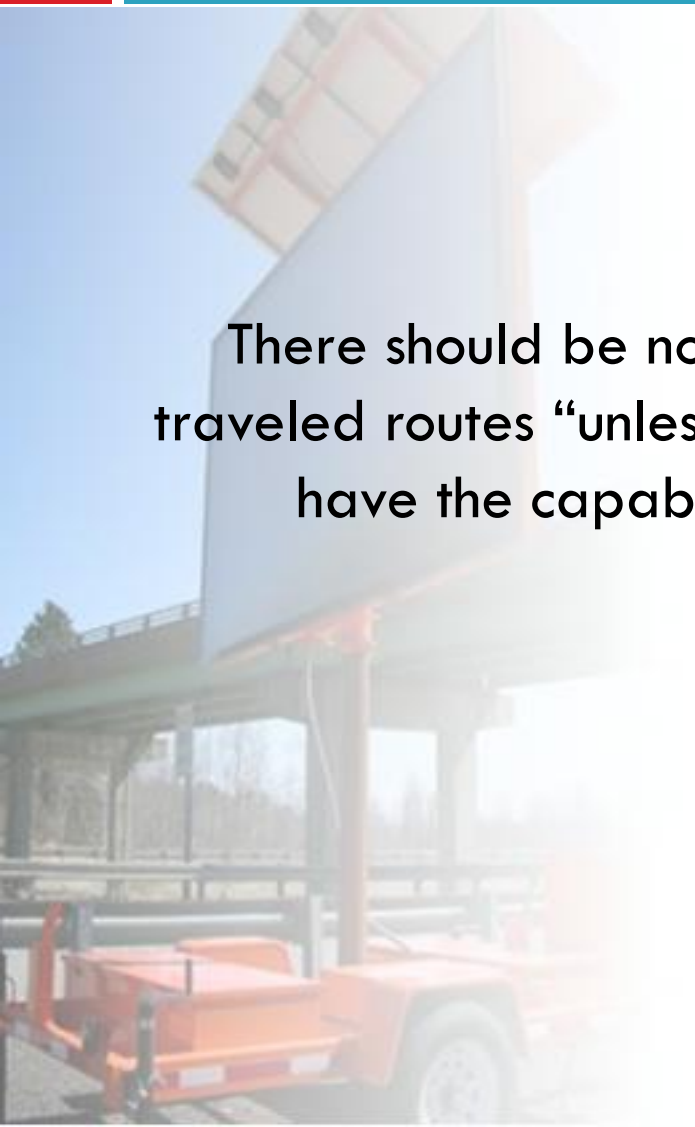
"DMS are to remain blank when no message is to be displayed"

HOWEVER

"A 'dark' or blank DMS is a transportation investment that is not being fully utilized. We should be asking why it is dark and what it will take to get travel times posted on an ongoing basis."

(Paniati, 2004)

Dynamic Message Signs

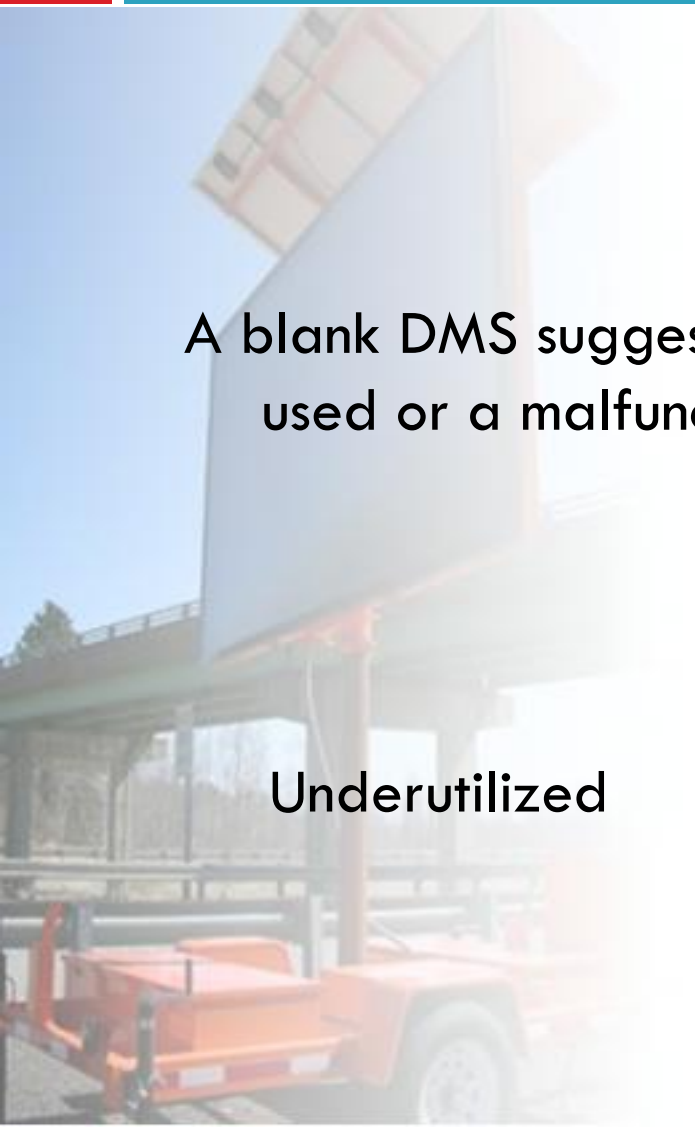


ALSO

There should be no new installations of DMS along heavily traveled routes “unless the operating agency and the jurisdiction have the capability to display travel time messages.”

(Paniati, 2004)

Dynamic Message Signs



PROBLEM

A blank DMS suggests to the public that they are ineffectively used or a malfunctioning expensive piece of technology

Underutilized OR Impertinent information provided

Dynamic Message Signs

SOLUTION

Avoid blank DMS

Dynamic Message Signs

Travel times appropriate for every location?

Consideration for southern Maine (especially) which experiences periods of recurring congestion?

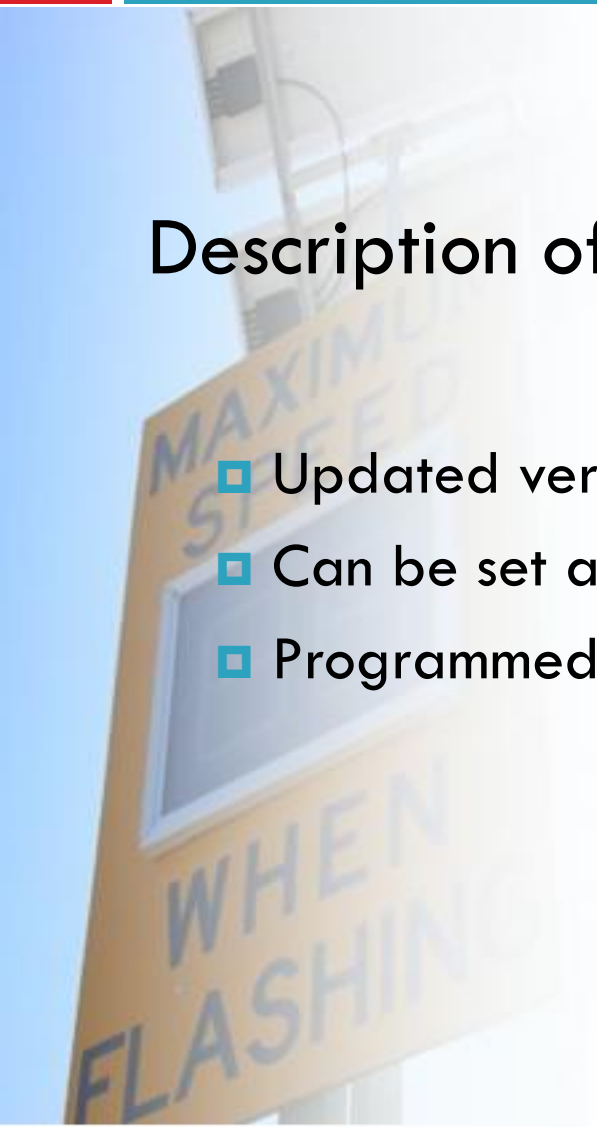
Dynamic Message Signs

DMS Survey

- Majority found information useful
- Only few had used info to alter traveling route
  - Not familiar with area
  - Shorter to wait
- Most unfamiliar with 511 system
  - If used => Unreliable

Variable Speed Limit Signs in Maine

Variable Speed Limit Signs



Description of VSLS System

- Updated version of “old flashing 45 mph’s”
- Can be set at any speed (theoretically 01 mph to 99 mph)
- Programmed using low band frequency

Variable Speed Limit Signs

Weather Conditions

Road Conditions	CLEAR	PARTLY CLOUDY	CLOUDY	RAINING	FREEZING RAIN	SLEETING	LIGHT SNOW	HEAVY SNOW	HEAVY RAIN (T-STORM)
BARE & DRY	Off	Off	Off	-----	-----	-----	-----	-----	-----
BARE & WET	Off	Off	Off	Off	-----	-----	45-55	-----	45
SNOW COVERED	25-45	25-45	25-45	25-45	25-45	25-45	25-45	25-45	-----
ICY	25-35	25-35	25-35	25-45	25-35	25-35	25-35	25-35	-----
SLUSH	-----	-----	-----	-----	-----	45	45	45	-----

Note: (Special Conditions): "Whiteout", Fog, Standing Water on/over Roadway will require a speed posting decision specific to the severity of the condition.

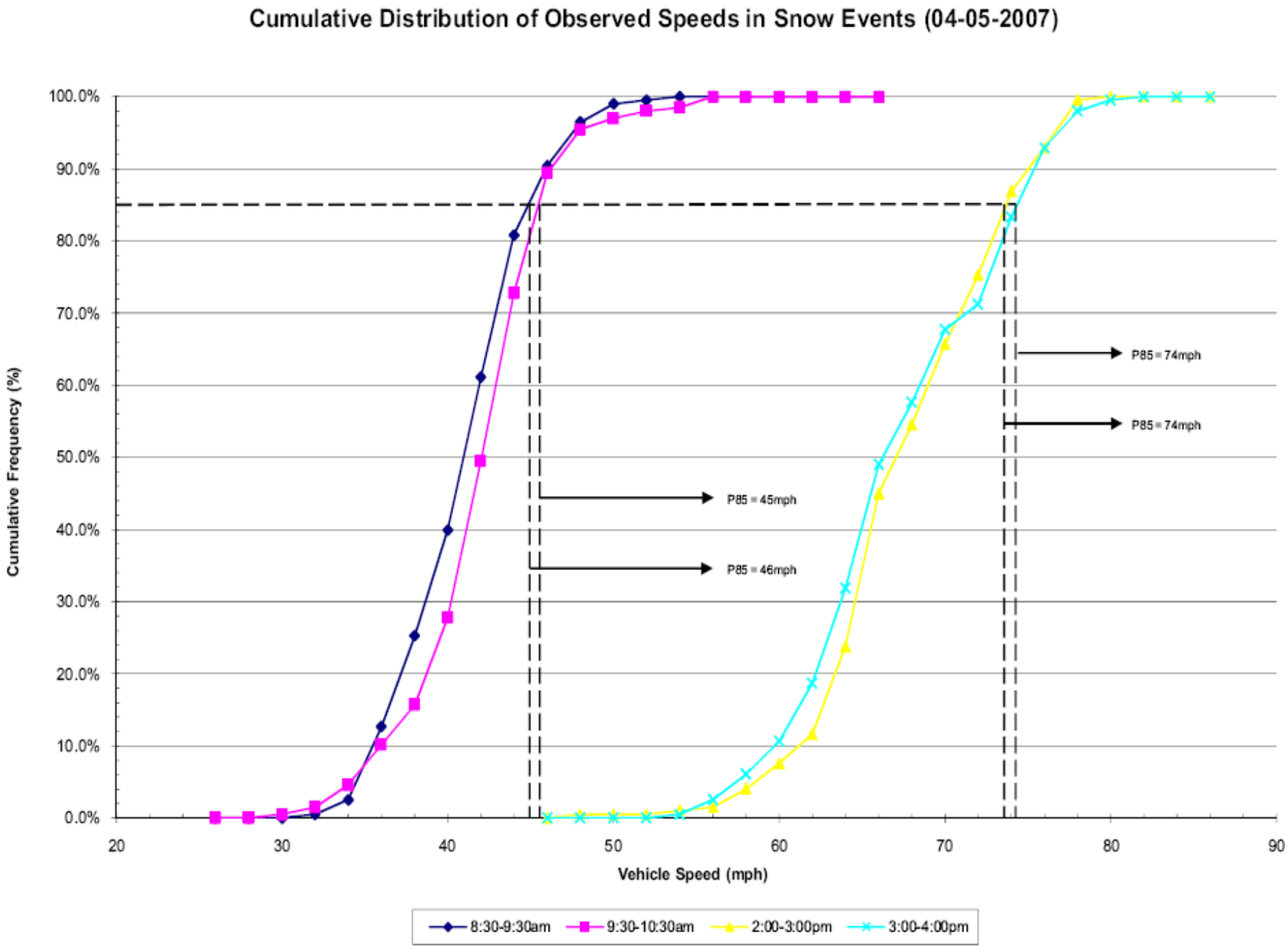
Variable Speed Limit Signs

Description of VSLS System

- State Police responsible for notifying MDOT Radio Room when it is appropriate to activate VSLS
  - Do not always call when conditions are deteriorating
- Maintenance crews will call Radio Room
  - Radio room has to request permission from State Police
- Radio Room also monitors CCTV and publicly available video

Variable Speed Limit Signs

Inclement Weather Speed Data


Cumulative Distribution of Observed Speeds in Snow Events (04-05-2007)
Cumulative Frequency (%)
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
20
30
40
50
60
70
80
90
Vehicle Speed (mph)
P85 = 45mph
P85 = 46mph
P85 = 74mph
P85 = 74mph
8:30-9:30am
9:30-10:30am
2:00-3:00pm
3:00-4:00pm

Variable Speed Limit Signs

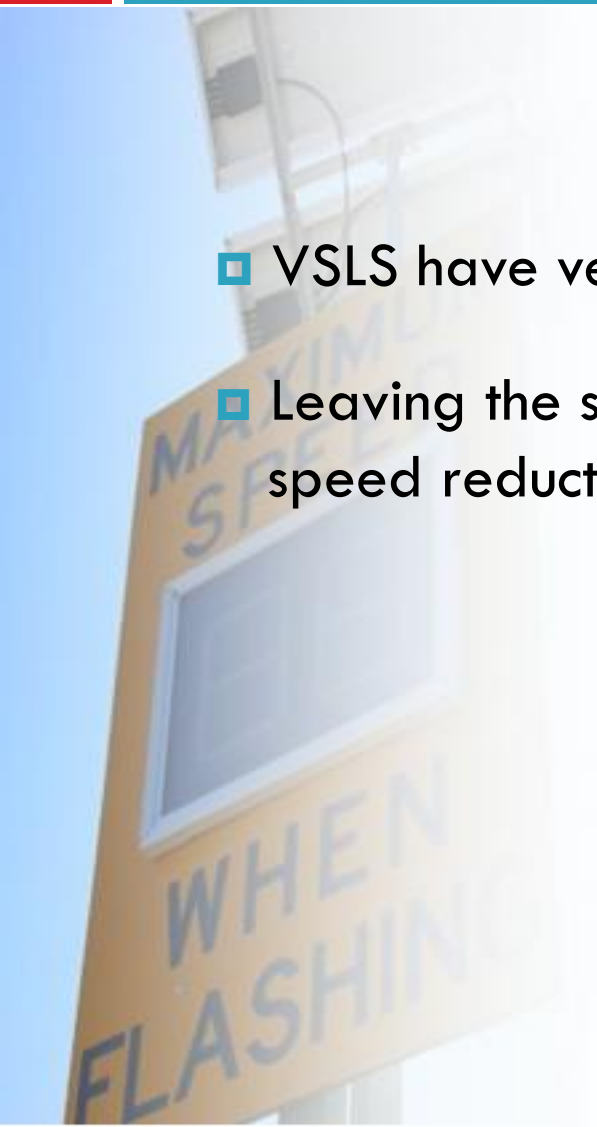
VSLS Survey

- Majority found the VSLS useful

BUT

- Drive for conditions they feel appropriate
- Consider adhering to advisory if given specifics
- Most have seen VSLS active when road conditions were dry and there was no precipitation

Variable Speed Limit Signs



- VSLS have very little bearing on motorist speed
- Leaving the signs activated when conditions do not warrant speed reduction → Unreliable

Variable Speed Limit Signs

PROBLEM

Poor adherence to VSLS advisory speed

QUESTION

Should variable speed limits be enforced?

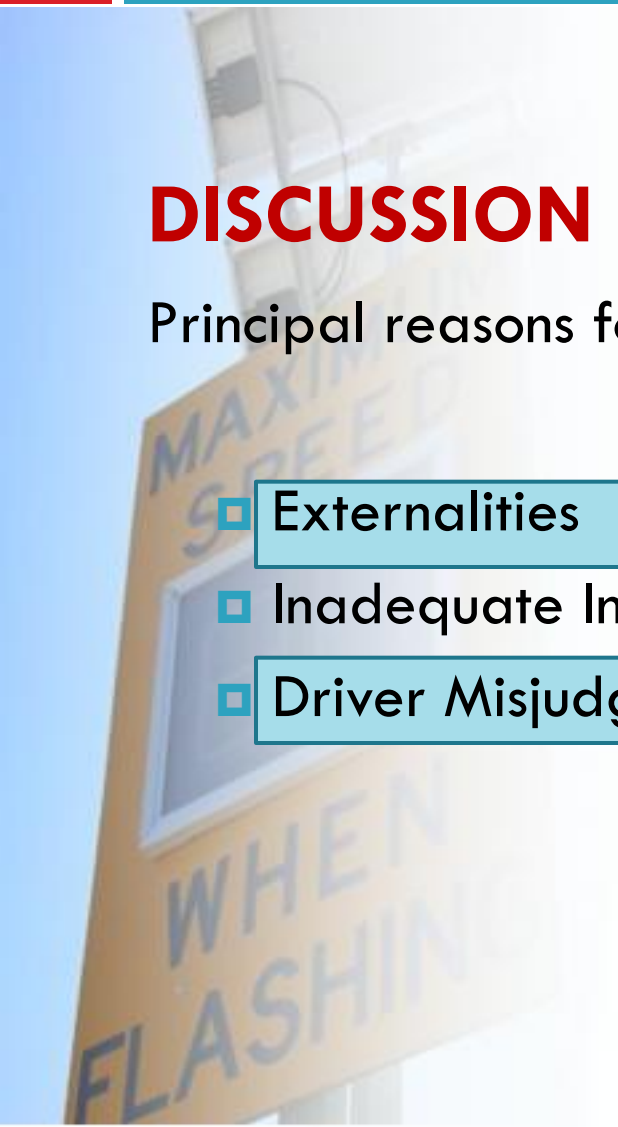
Variable Speed Limit Signs

DISCUSSION

Principal reasons for regulating a drivers' speed choice:

- Externalities
- Inadequate Information
- Driver Misjudgment

Variable Speed Limit Signs



DISCUSSION

Principal reasons for regulating a drivers' speed choice:

- Externalities
- Inadequate Information
- Driver Misjudgment

Greater effect during inclement weather

Variable Speed Limit Signs

SOLUTION

Enforce Variable Speed Limits

(Make VSLS regulatory instead of advisory)

Variable Speed Limit Signs

VSLS Speed Criteria

- Current MDOT method incomplete and ineffective
- Roadway surface conditions → **Friction**
- Snowfall rate → **Visibility**

Variable Speed Limit Signs

Suggested Variable Speed Limits and Trigger Criteria

Surface Condition Criteria	
Surface	Speed (mph)
Dry Asphalt	65
Partial Frost	60
Frost	55
Heavy Frost	45
Tracked Snow	45
Untracked Snow	45
Snow & Ice	40
Black Ice	40
Sunny Ice	35
Wet Ice	35
Glare Ice	35

Visibility Condition Criteria	
Snowfall Rate (LE*)	Speed (mph)
Light (≤ 0.2 in/hr)	55
Moderate (0.4 in/hr)	45
Heavy (≥ 0.5 in/hr)	35

*Liquid Equivalent

Overheight Vehicle Detection System in Maine

Overheight Vehicle Detection System

PROBLEM

15 strikes to I-95 bridge in past 12 years

Three occasions with repairs exceeding $60,000

SOLUTION

Install an Overheight Vehicle Detection System

Overheight Vehicle Detection System

OHVD system $$ Damage to structure

Overheight Vehicle Detection System

Overheight Vehicle Detection System

QUESTION

Was the OHVD effective in preventing strikes to the bridge?

Overheight Vehicle Detection System

QUESTION

Was the OHVD effective in preventing strikes to the bridge?

YES (however)

15% chance of no hit in 1.5 years (no sign)

Bridge hit in westbound direction

No verification that loads are being checked

Evaluation of Institutional Issues

Institutional Issues

- CARS/FORETELL/511 not integrated with DMS VSLS
  - System provided by private company does not suit needs
  - Cheaper, more effective to develop in-house system
- Maine Turnpike Authority
  - Do not always update to CARS/511
  - Only display info causing delays greater than 30 minutes
- ATIS is highly dependent on updates from State Police
  - Not always done in timely manner, if at all
- Education of the public

Lessons Learned

Lessons Learned

- DMS/VSLS provide a quick and relatively easy way to make traveling information available to the public
  - More noticeable than HAR
  - Near instantaneous information dissemination
- OHVD setup similar to HAR signage and beacons
- High initial and replacement/upgrade costs
  - Cost of OHVD outweighs potential cost of damage

Lessons Learned

- Portable DMS stability issues in high winds
- Difficult to verify display of messages
- Need for a shared database

Lessons Learned

- US Department of Transportation ITS Benefits and Cost Impact Ratings

  - DMS → "Not Enough Data"
    - DMS Survey → "Mixed Results"
  - VSLS → "Negligible Impact"
  - OHVD → "Positive Impact"

Recommendations

Recommendations

EFFECTIS Guidelines

Effective Facilitation of Functional and Enforceable Controls for Transportation Information Systems

- Constantly display information on DMS
- DMS locations at 30 minute intervals
- Shared information database
- Regulatory variable speed limits

Recommendations

EFFECTIS Guidelines

Effective Facilitation of Functional and Enforceable Controls for Transportation Information Systems

- Updated VSLS trigger criteria
- Use DMS in conjunction with VSLS
- OHVD on both approaches to low-clearance bridges

Areas for Further Study

Areas for Further Study

- Effect of VSLS with varying speed limits
- Enforced vs. not enforced
- Improved weather sensing and predicting technologies at each VSLS location
- DMS study done once logs of use are kept
- Blank DMS vs. constant display

QUESTIONS/COMMENTS

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