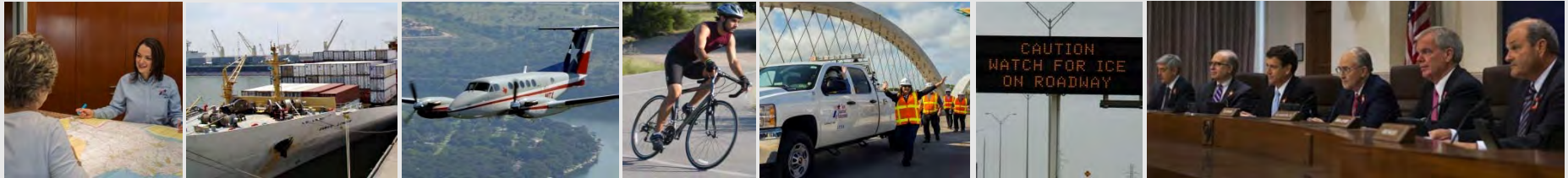




TEXAS DEPARTMENT OF TRANSPORTATION



# VARIABLE SPEED LIMITS: TEXAS PILOT PROJECT

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Dustin Wiggins, P.E.



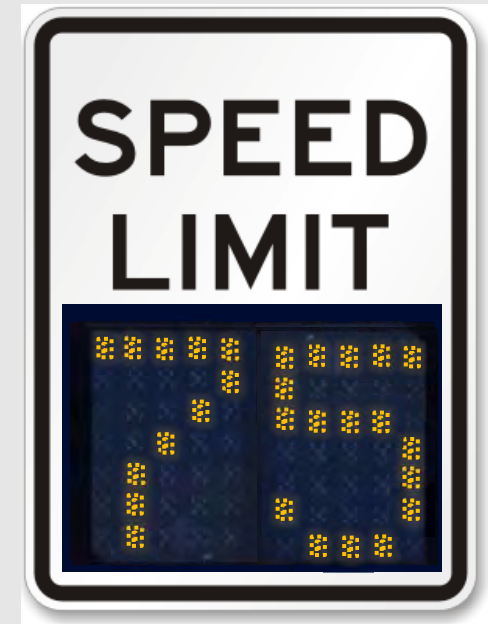
# Table of Contents

<b>1</b>	Variable Speed Limits (VSL) - Introduction	3-5
<b>2</b>	VSL - Defined	6-18
<b>3</b>	VSL - Operation	19-20
<b>4</b>	HB 2204 Pilot Study	22-42
<b>5</b>	Questions	43

# VSL | What is it?

## What is a Variable Speed Limit?

Simply put, it's a **speed limit that changes when activated** based on the conditions of the road including construction, congestion, and weather. Changes to the speed limit can occur in real time with modern systems.





# Variable Speed Limit (VSL) | History

## Michigan (1960) – First VSL

### United States



- Washington
- Michigan
- New Jersey
- Tennessee
- New Mexico

### Europe



Netherlands



Germany



Finland

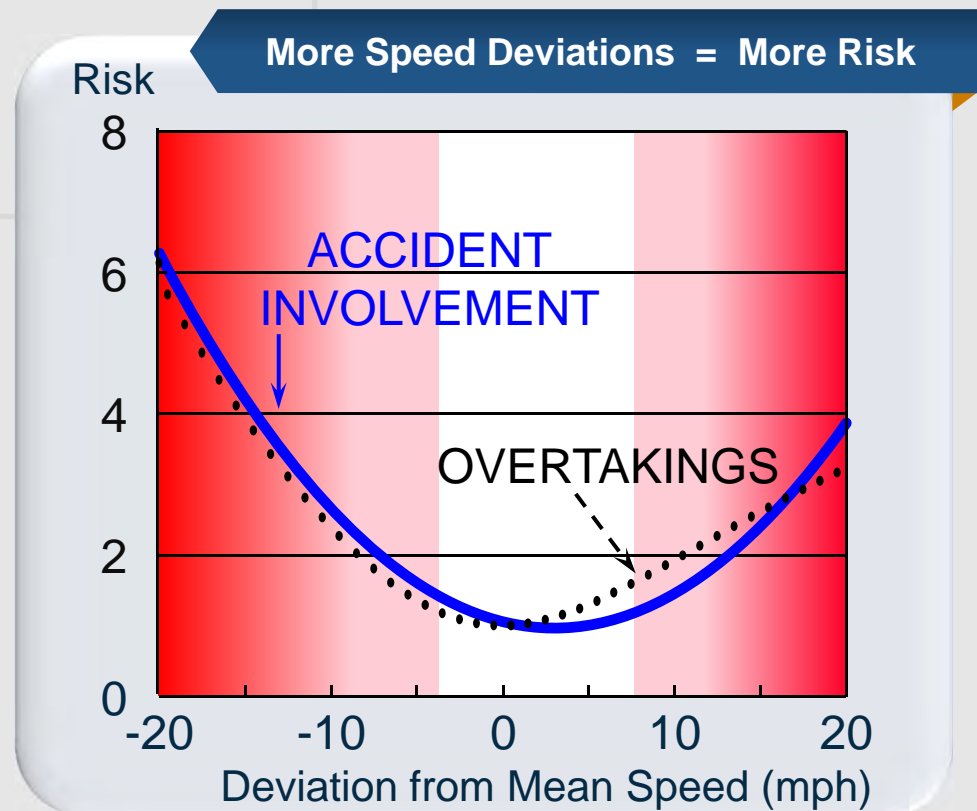


England



# VSL | Why use them?

- ▶ Greater Safety
- ▶ Efficient Use of Highway Facilities
- ▶ Increased Compliance
- ▶ Congestion Relief





# What Activates a VSL?



## Congestion

- Volume
- Speed
- Occupancy



## Construction

- Lane Closures



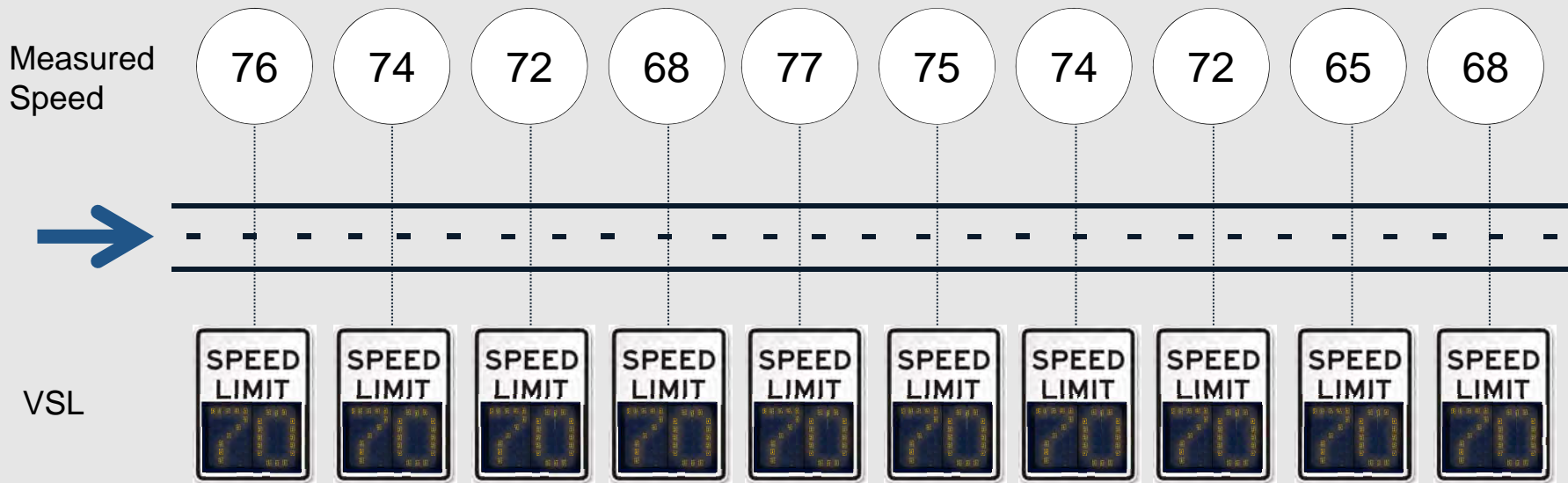
## Weather

- Surface Friction
- Visibility

# VSL | Defined

## Application – Congestion

- Volume / Occupancy
- Speed



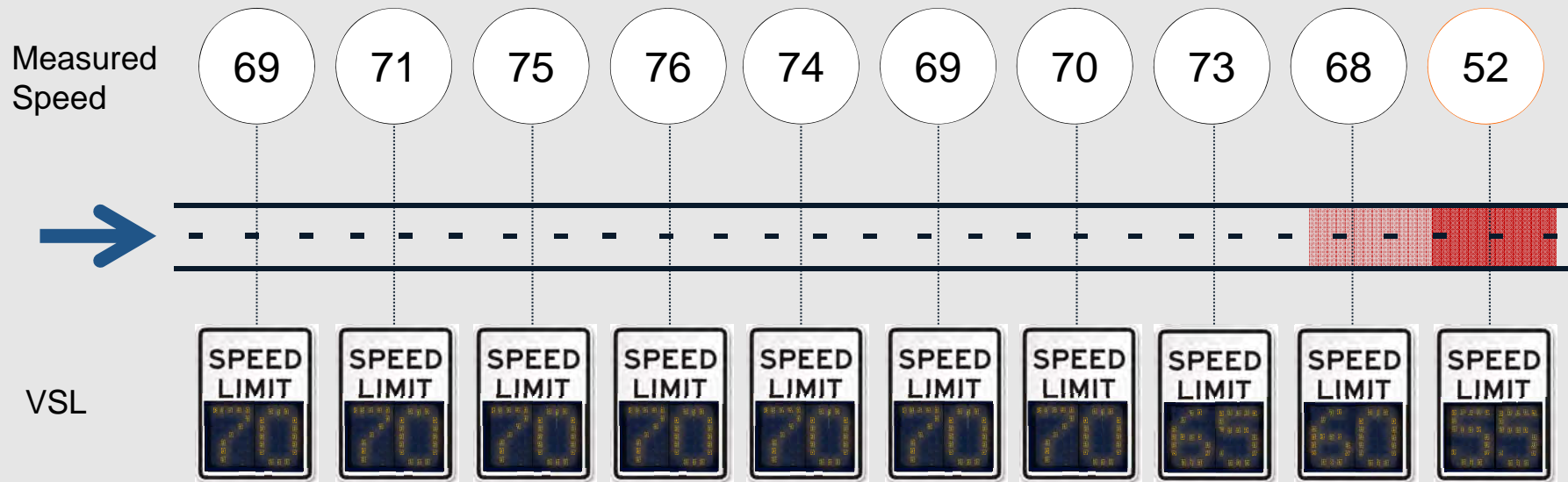
Example for illustrative purposes.  
Not to scale & missing required signage.



# VSL | Defined

## Application – Congestion

- Volume / Occupancy
- Speed



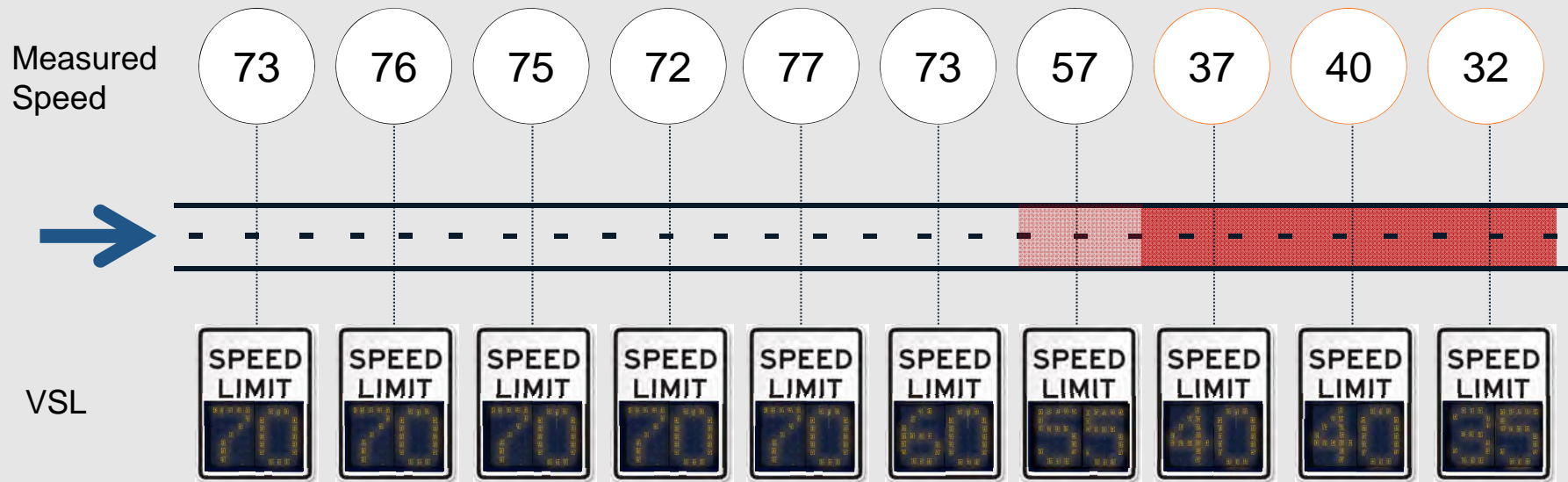
Example for illustrative purposes.  
Not to scale & missing required signage.



# VSL | Defined

## Application – Congestion

- Volume / Occupancy
- Speed

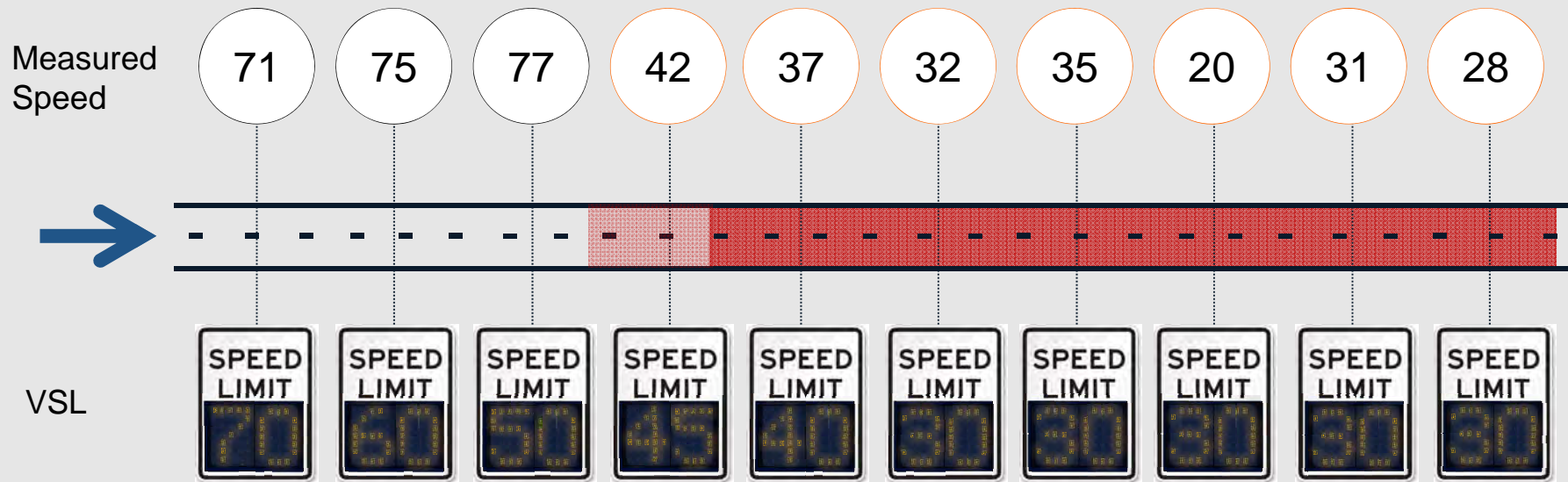


Example for illustrative purposes.  
Not to scale & missing required signage.

# VSL | Defined

## Application – Congestion

- Volume / Occupancy
- Speed

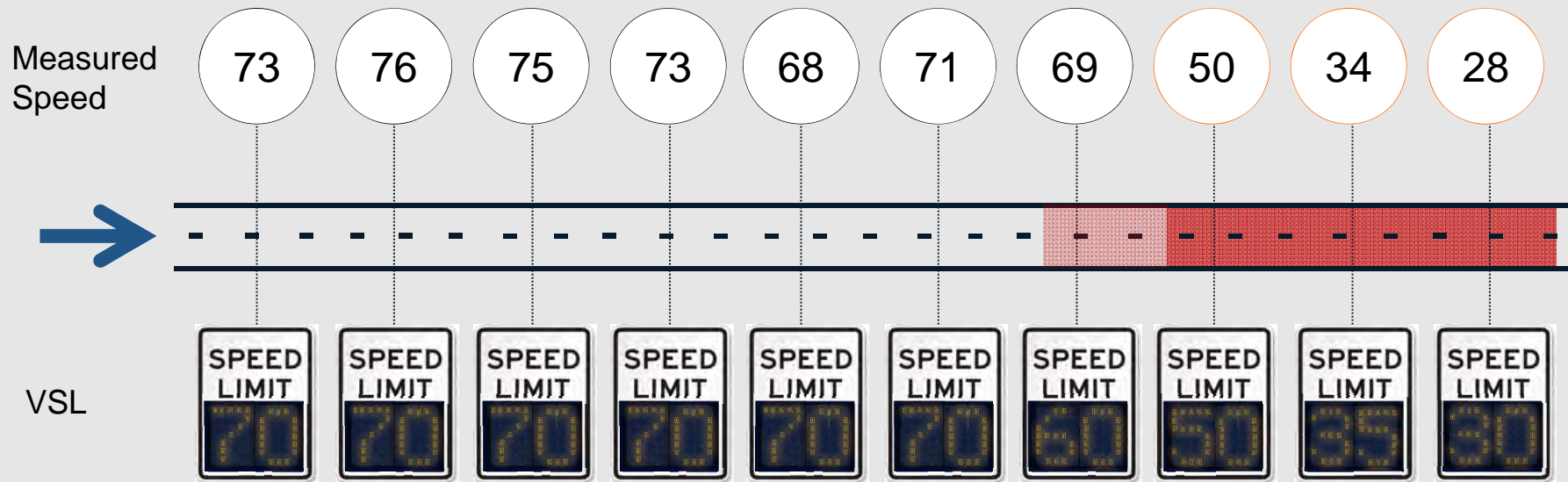


Example for illustrative purposes.  
Not to scale & missing required signage.

# VSL | Defined

## Application – Congestion

- Volume / Occupancy
- Speed



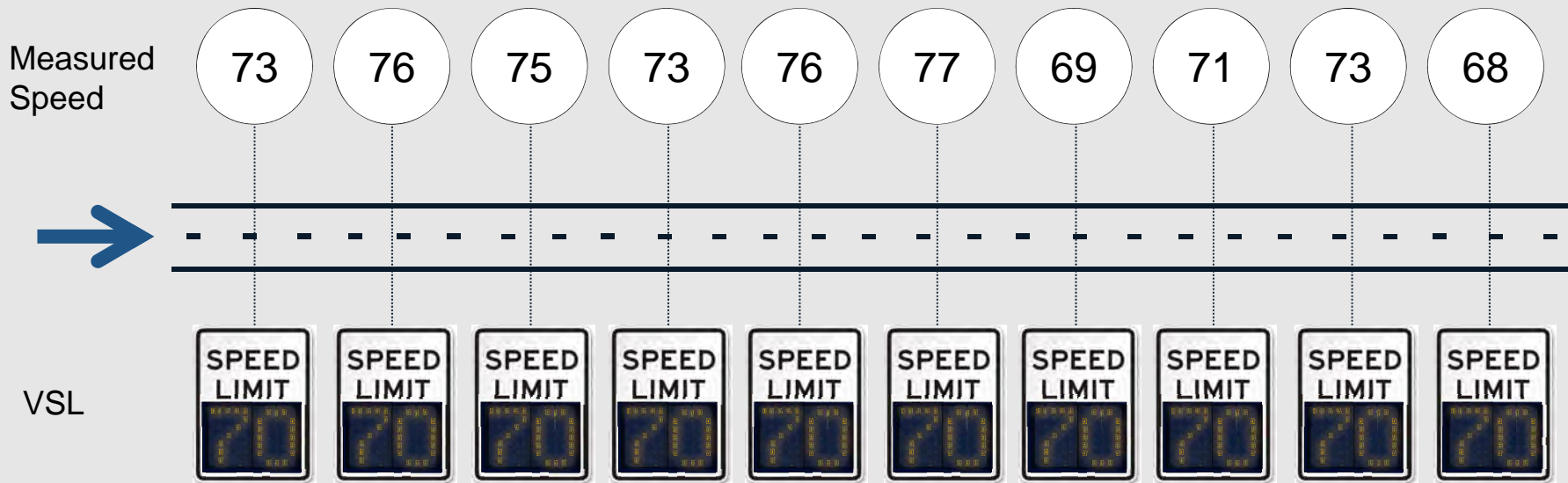
Example for illustrative purposes.  
Not to scale & missing required signage.



# VSL | Defined

## Application – Congestion

- Volume / Occupancy
- Speed

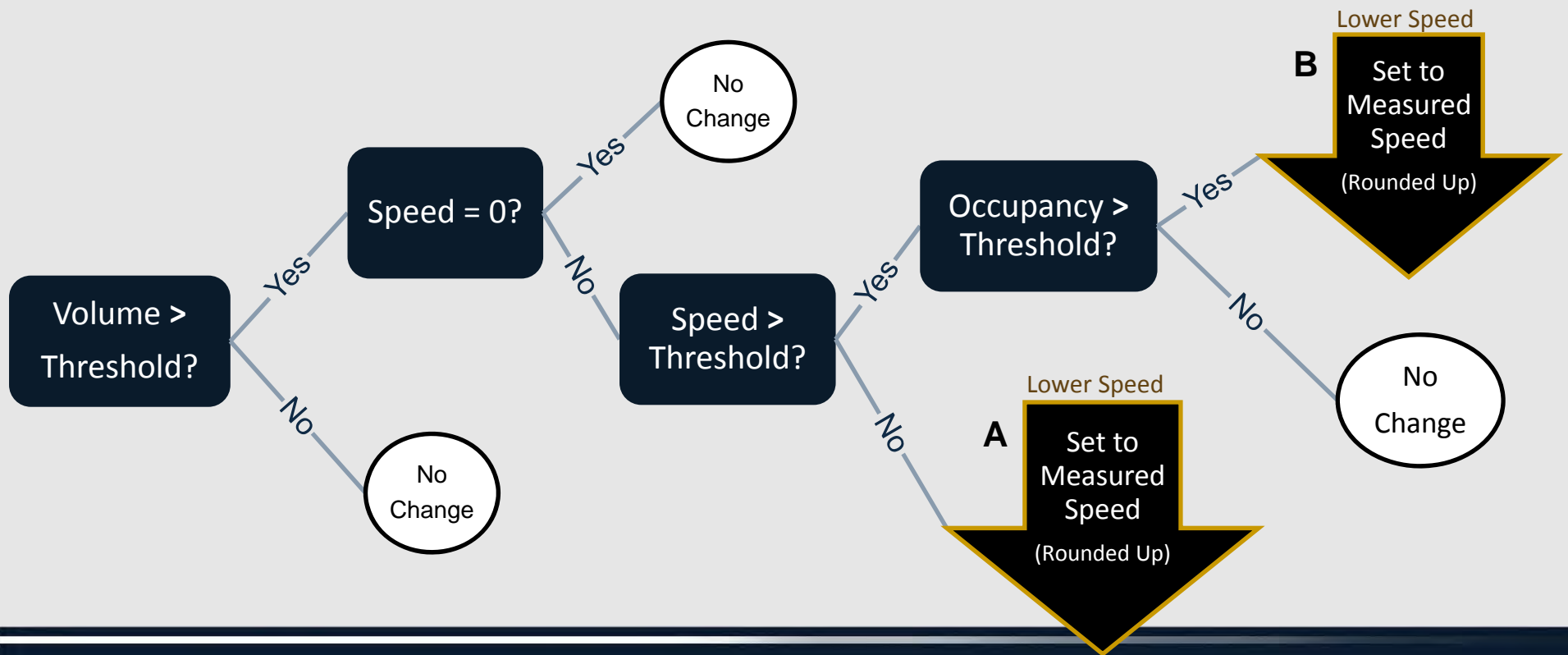


Example for illustrative purposes.  
Not to scale & missing required signage.

# VSL | Defined

## Application – Congestion

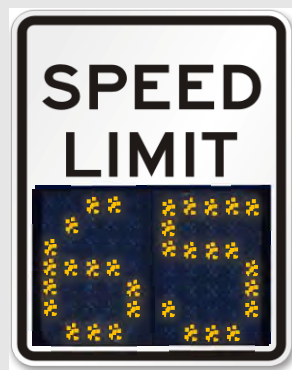
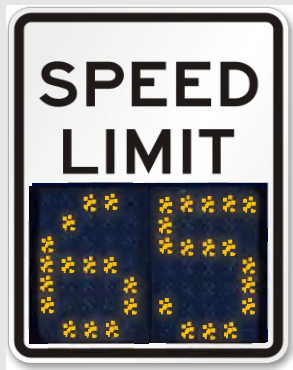
- Volume / Occupancy
- Speed



# VSL | Defined

## Application – Construction

- Lane closure
- Other congestion event



*Example for illustrative purposes.  
Not to scale & missing required signage.*

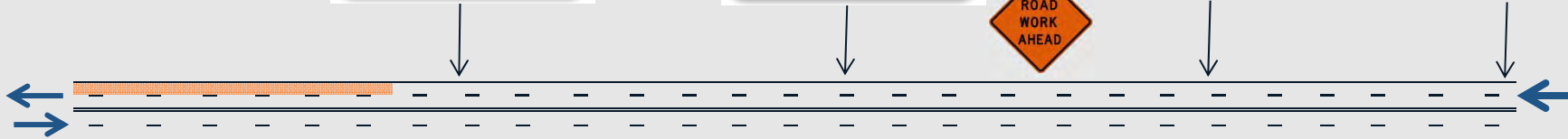
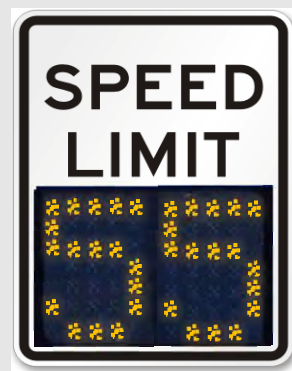
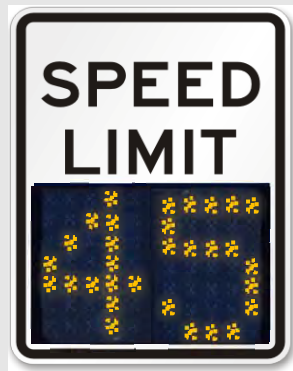
Status: No Work Present



# VSL | Defined

## Application – Construction

- Lane closure
- Other congestion event



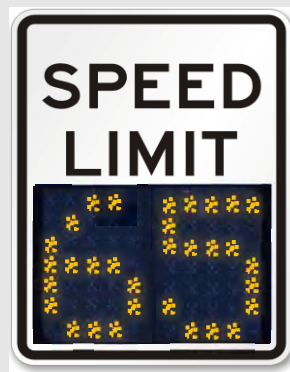
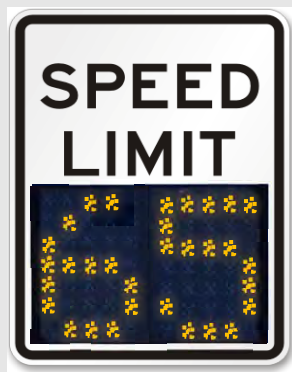
Example for illustrative purposes.  
Not to scale & missing required signage.

Status: Lane Closure

# VSL | Defined

## Application – Weather

- Visibility
- Surface Friction



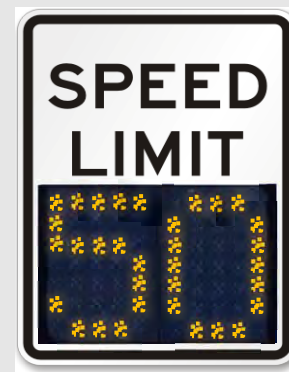
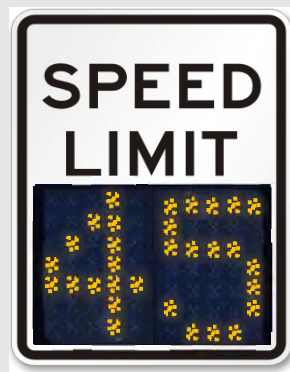
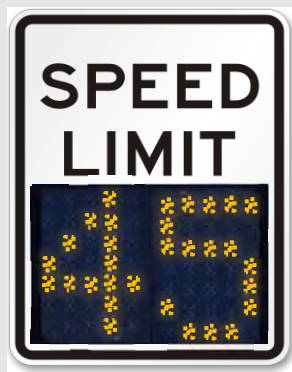
*Example for illustrative purposes. Not to scale.*

Status: All Clear

# VSL | Defined

## Application – Weather

- Visibility
- Surface Friction



*Example for illustrative purposes. Not to scale.*

Status: Weather Event



## Application – Weather

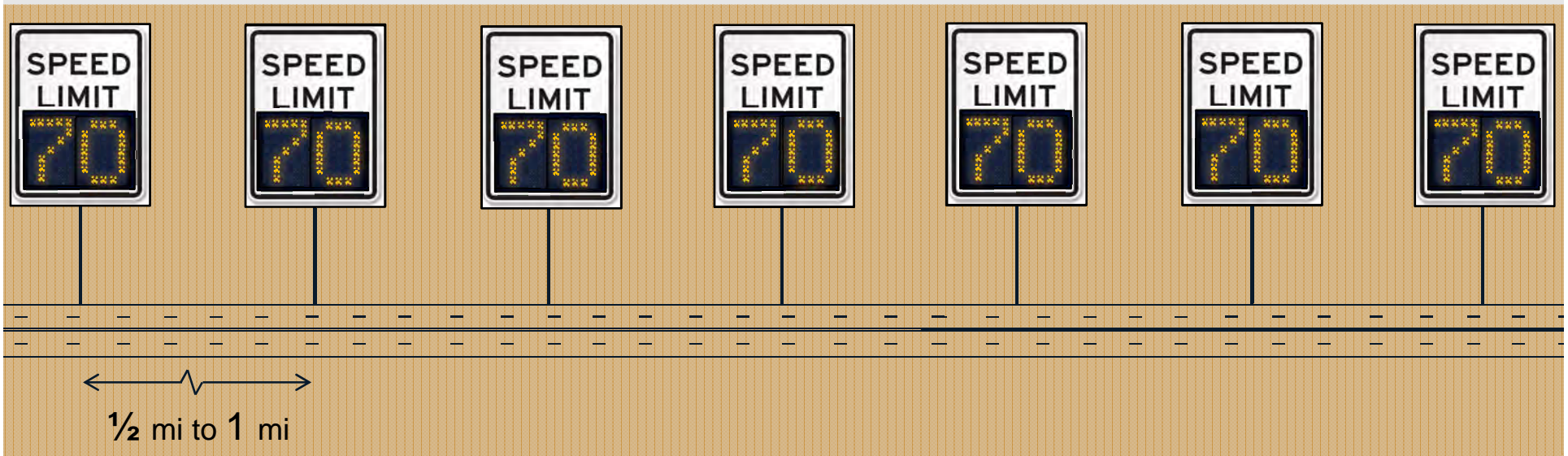
- Visibility
- Surface Friction



		Surface Friction		
		Dry	Wet	Ice/Snow
Visibility	Good	65	45	30
	Poor	50	40	30

*Example from Pilot Study*

# VSL | Operation



- ▶ 1/2 mi to 1 mi spacing
- ▶ Transitions of 5, 10, 15 mph – *except downstream*
- ▶ Speed harmonization via Troupes



# VSL | Operation



## Activation

- VSL system pings the traffic management center if it detects need for VSL
- An operator has the ability to accept/deny the implementation of VSL

## De-activation

- System will notify operator when conditions have returned to normal
- Operator “acknowledges” deactivation. Important information is logged in the system, such as date, time, speeds that were set during VSL, etc.

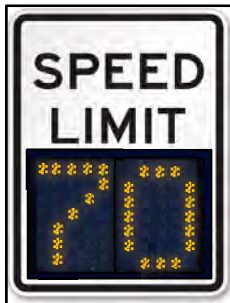


*Will they take over all speed limits in Texas?*



83<sup>rd</sup> Session  
2013

HB 2204



# HB 2204 Pilot Study



➤ Select 3 locations w/ Construction, Congestion, & Weather pilot studies

➤ Advanced warning signs required

➤ Bill expires February 2015

➤ Inter-agency contract with TTI  
*Working with Southwest Research*

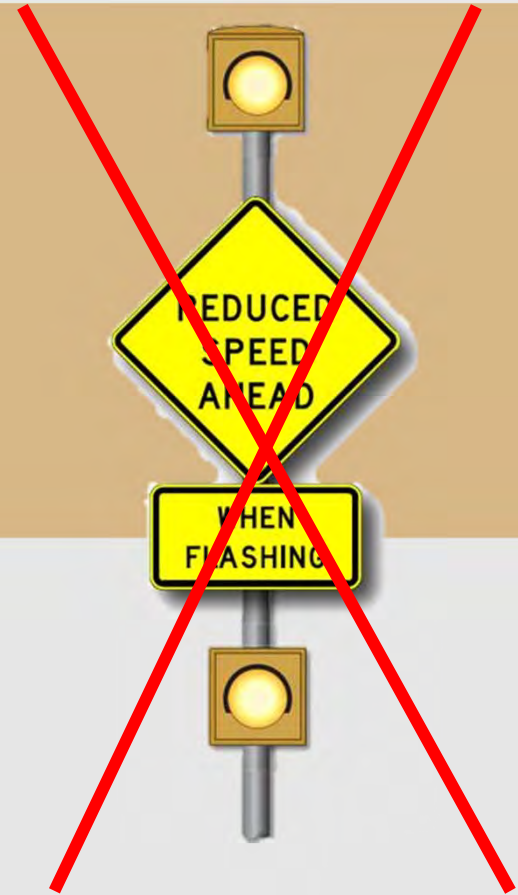


# HB 2204 Pilot Study | Advanced Warning



Legislative bill requires an advance warning sign

Beacons will flash when VSL is in operation

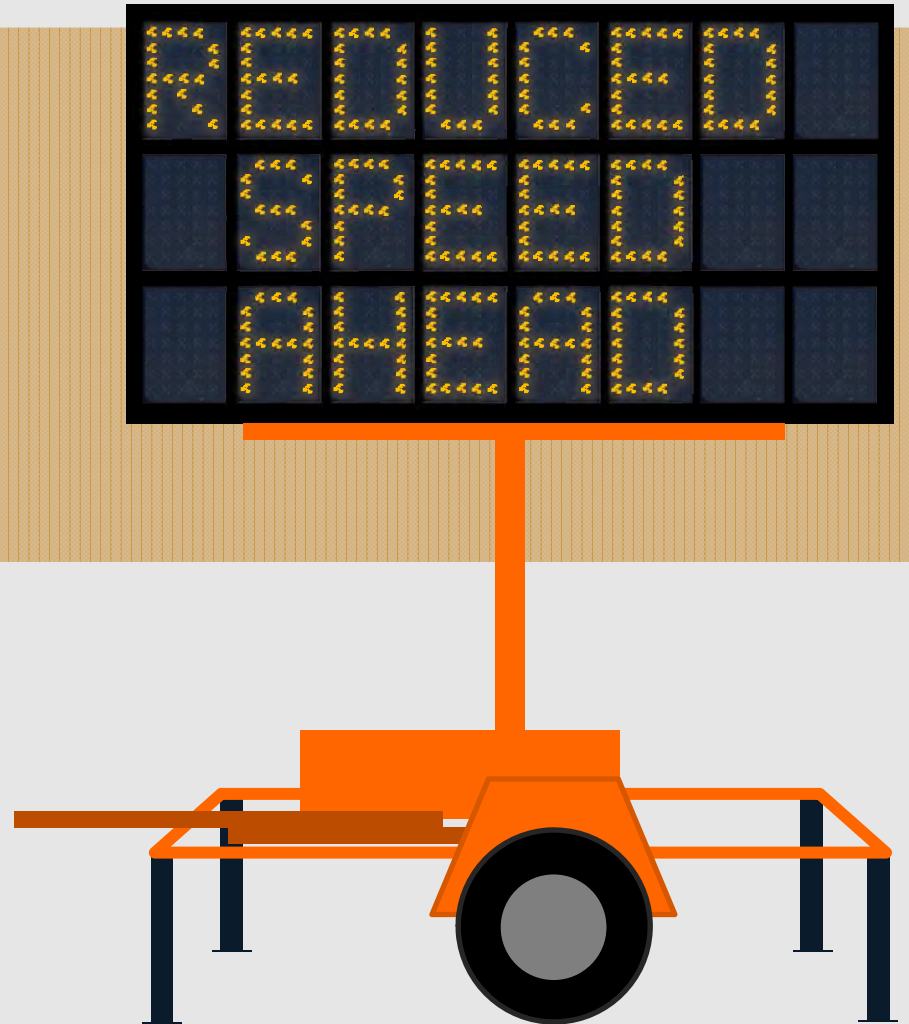


# HB 2204 Pilot Study | Advanced Warning



Legislative bill requires an advance warning sign

Beacons will flash when VSL is in operation



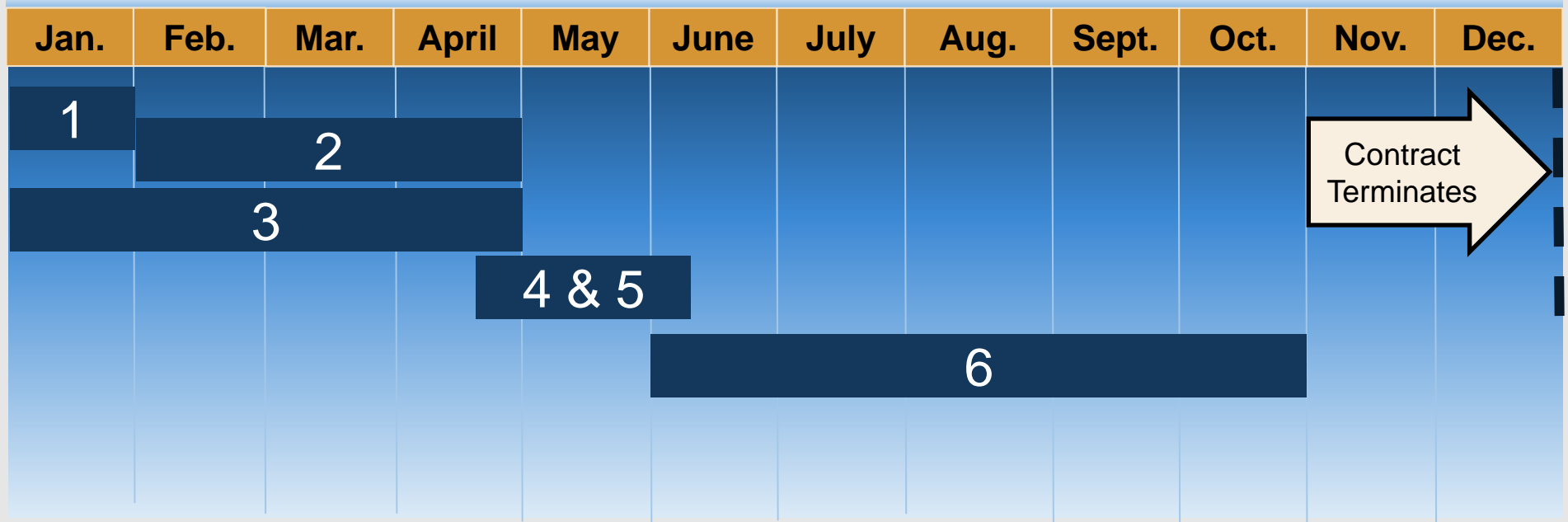
# HB 2204 Pilot Study | Time Line



## Tasks

1. Site Selection Assistance
2. Implementation Plan
3. Develop Evaluation Plan
4. Equipment Assistance
5. Implementation Assistance
6. Evaluation & Evaluation Report

2014



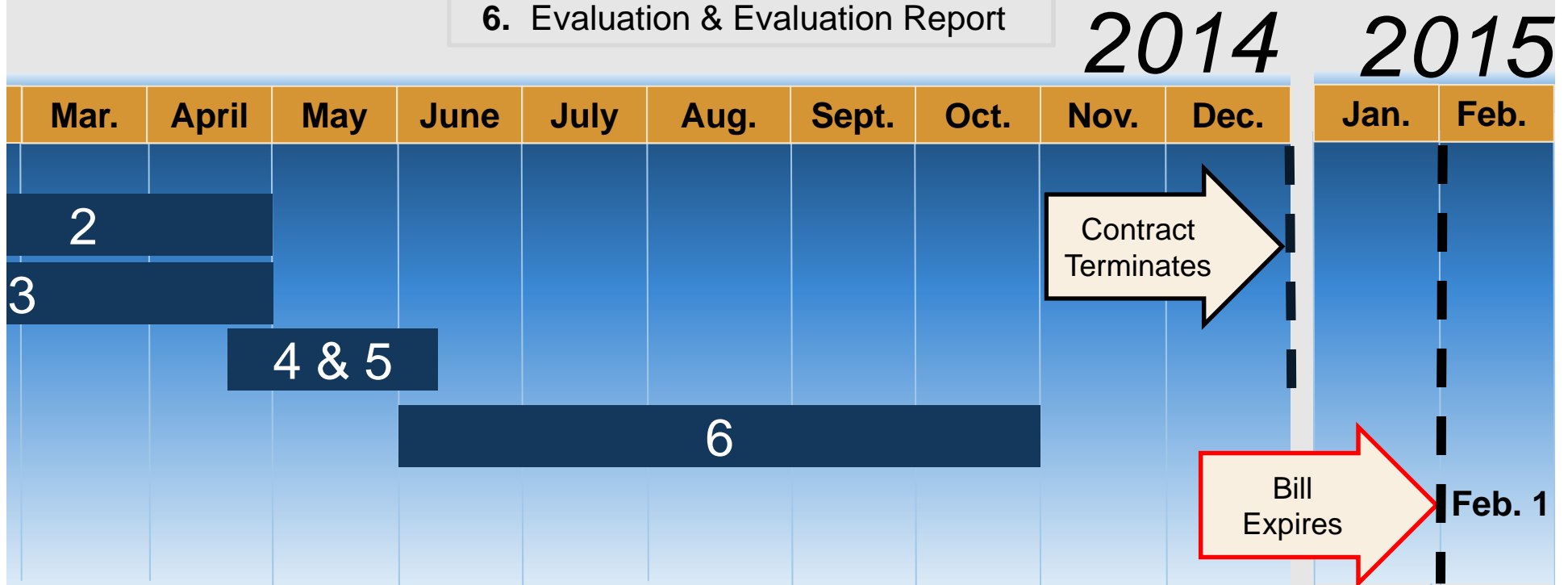


# HB 2204 Pilot Study | Time Line



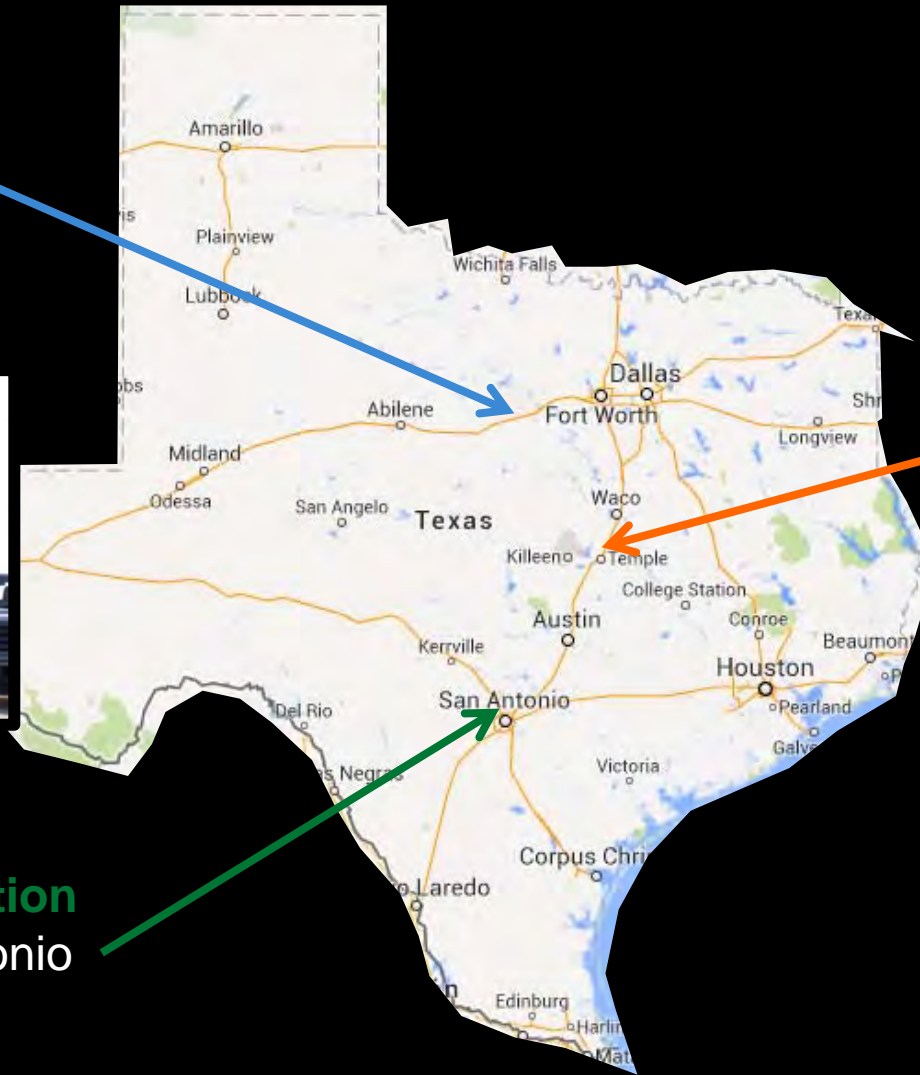
## Tasks

1. Site Selection Assistance
2. Implementation Plan
3. Develop Evaluation Plan
4. Equipment Assistance
5. Implementation Assistance
6. Evaluation & Evaluation Report



# HB 2204 Pilot Study

**Weather**  
Ranger  
(Ranger Hill)  
I-20



**Construction**  
Temple – Belton  
I-35



**Congestion**  
San Antonio  
SL 1604



# HB 2204 Pilot Study | Construction VSL

maps.google.com

## I-35 (NB) Temple - Belton



X Visibility





# HB 2204 Pilot Study | Construction VSL

## I-35 (NB) Temple – Belton



X Visibility



# HB 2204 Pilot Study | Construction VSL

## I-35 (NB) Temple – Belton



Lane Closure



# HB 2204 Pilot Study | Construction VSL

## I-35 (NB) Temple – Belton



X Visibility



Congestion in  
Work Zone



# HB 2204 Pilot Study | Construction VSL



## Activation

- ▶ Began on June 23, 2014
- ▶ Thunderstorm 15 min after
- ▶ Includes Pavement Sensors

## Initial Observations

- ▶ Weather detection devices needed calibration
- ▶ Complaints on visibility / location of signs
- ▶ July 3 – Thunderstorm destroyed two signs



# HB 2204 Pilot Study | Congestion VSL

## Loop 1604 (WB) San Antonio



X Visibility



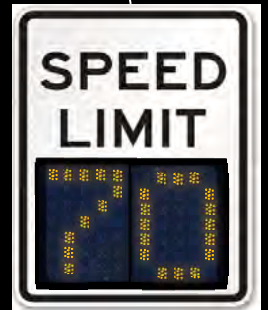
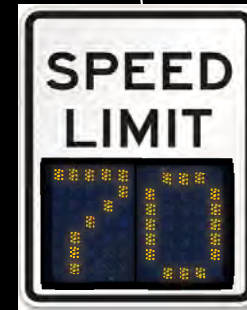
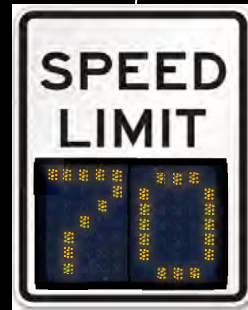
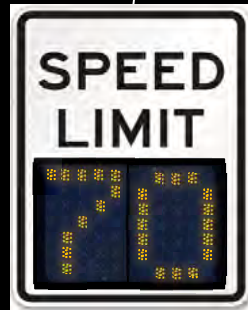
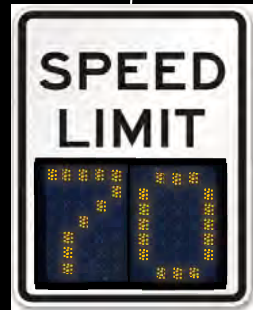
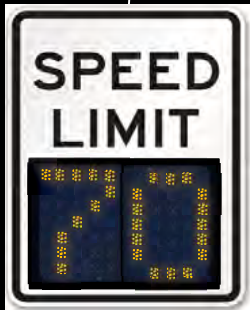
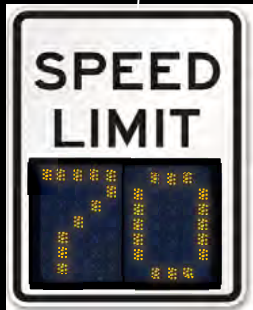
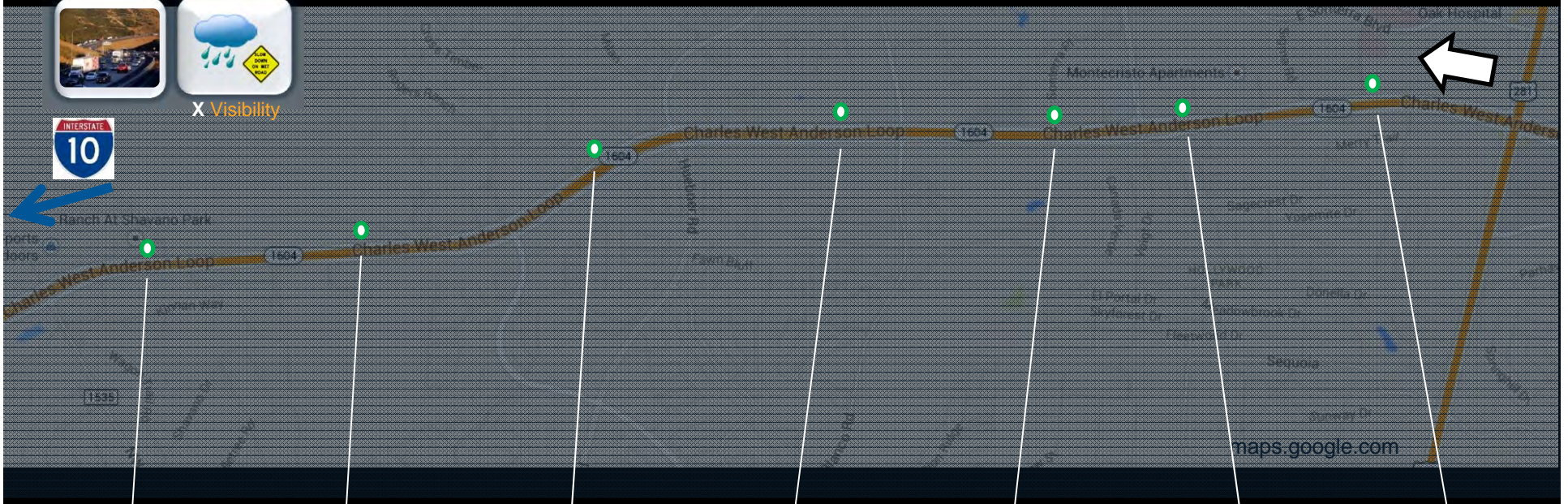


# HB 2204 Pilot Study | Congestion VSL

## Loop 1604 (WB) San Antonio



X Visibility





# HB 2204 Pilot Study | Congestion VSL

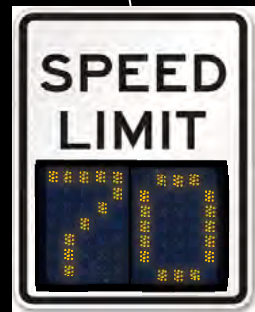
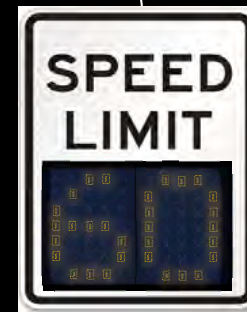
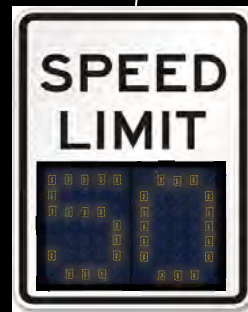
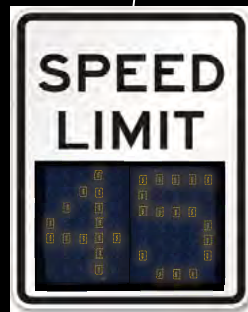
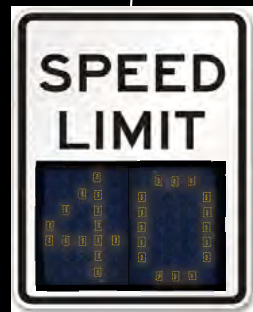
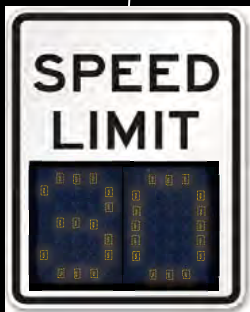
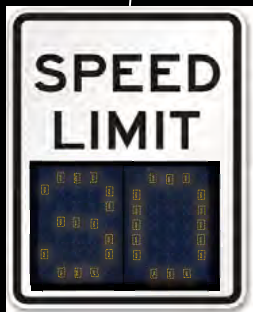
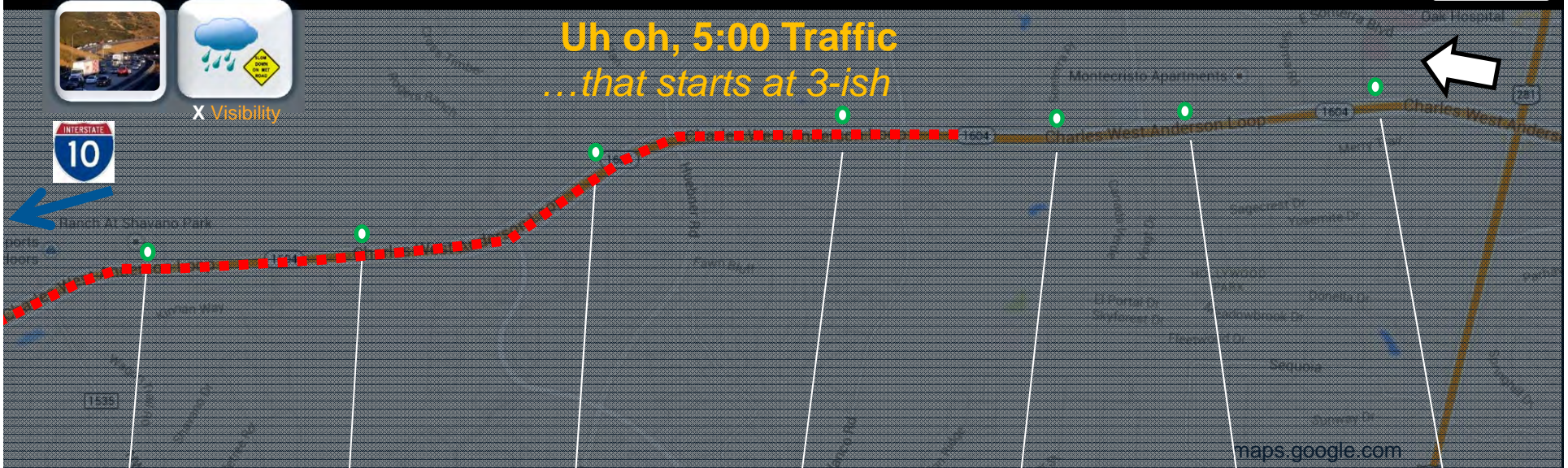
## Loop 1604 (WB) San Antonio



X Visibility



Uh oh, 5:00 Traffic  
...that starts at 3-ish





# HB 2204 Pilot Study | Congestion VSL



## Loop 1604 (WB) San Antonio

### Activation

- ▶ Activated on June 30, 2014
- ▶ Includes Pavement Sensors

### Initial Observations

- ▶ Congestion related activation occurs on a daily basis

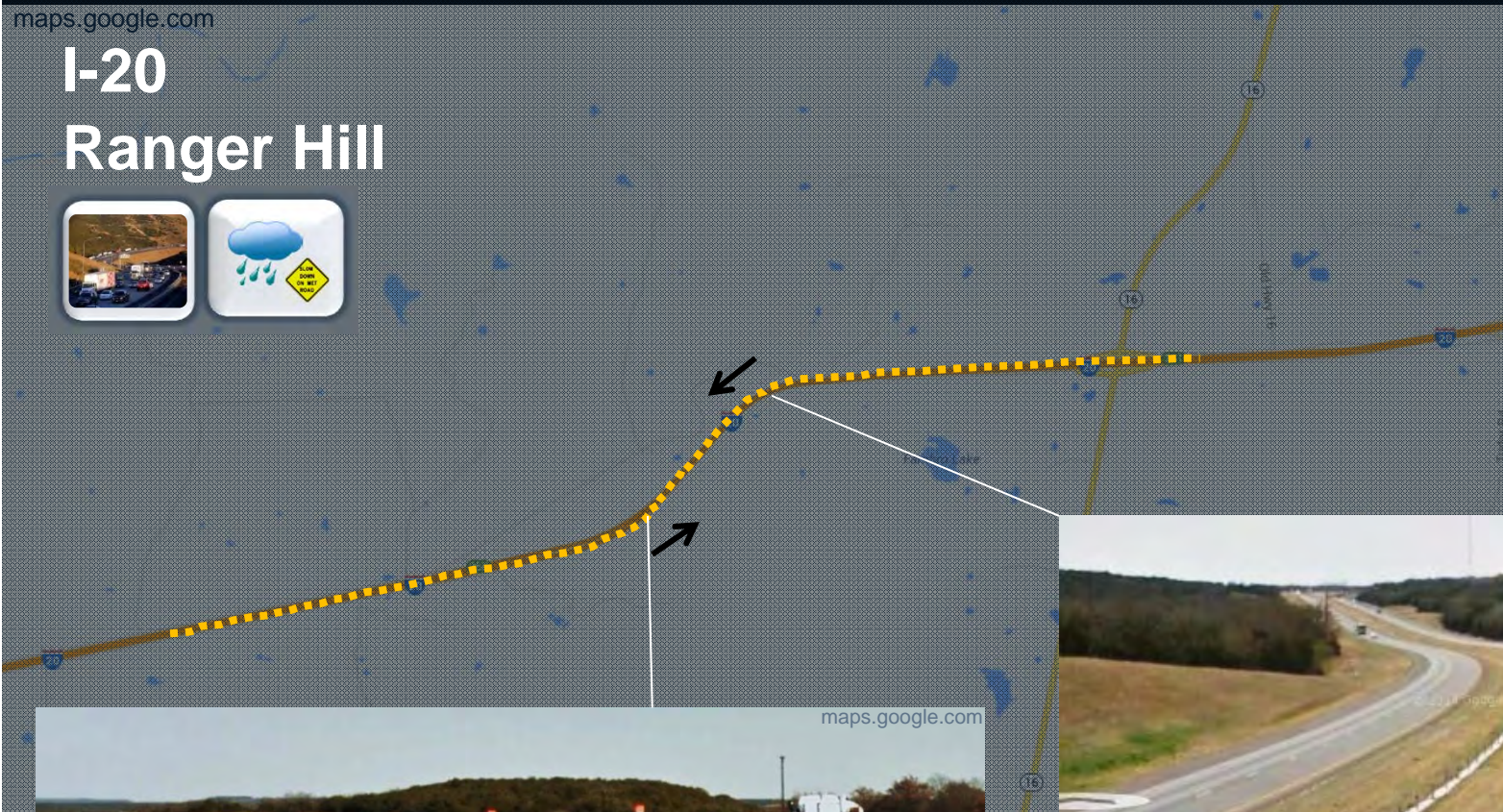


# HB 2204 Pilot Study | Weather VSL

maps.google.com

## I-20

## Ranger Hill



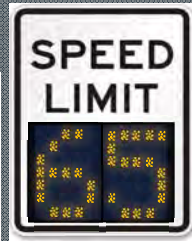
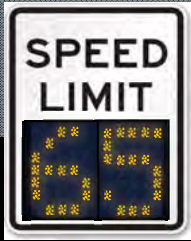
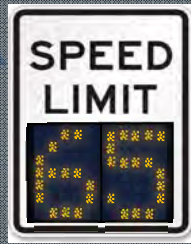


# HB 2204 Pilot Study | Weather VSL

maps.google.com

## I-20

## Ranger Hill



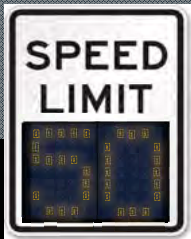


# HB 2204 Pilot Study | Weather VSL

maps.google.com

I-20

Ranger Hill



Heavy Rain

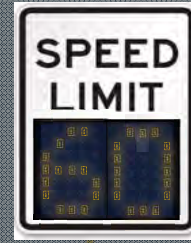


# HB 2204 Pilot Study | Weather VSL

maps.google.com

## I-20

## Ranger Hill



Ice



# HB 2204 Pilot Study | Weather VSL



I-20  
Ranger Hill



## Activation

- ▶ Activated on July 21, 2014
- ▶ Includes Pavement Sensor & Visibility Sensor

## Observations

- ▶ Weather “hot spots” hard to predict
- ▶ No major weather flare-ups yet



## TEXAS DEPARTMENT OF TRANSPORTATION



### VARIABLE SPEED LIMITS

---

Dustin Wiggins, P.E.  
Traffic Engineer  
(512) 416-3224

### TRF Contacts - VSL

Darren McDaniel, P.E.  
TRF - Safety Engineer  
512-416-3331

Charlie Farnham  
TRF-TE, ITS Supervisor  
512-506-5115