VARIABLE SPEED LIMITS: TEXAS PILOT PROJECT

Dustin Wiggins, P.E.
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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.
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

More Speed Deviations = More Risk

![Graph showing relationship between deviation from mean speed and risk](image)
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.
Application – Congestion

- Volume / Occupancy
- Speed

Measured Speed

69 71 75 76 74 69 70 73 68 52

VSL

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

- Volume / Occupancy
- Speed

Measured Speed

VSL

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

Application – Congestion

- Volume / Occupancy
- Speed

Measured Speed

71 75 77 42 37 32 35 20 31 28

VSL

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

- Volume / Occupancy
- Speed

Measured Speed:
- 73
- 76
- 75
- 73
- 68
- 71
- 69
- 50
- 34
- 28

VSL:
- Speed Limit 70
- Speed Limit 70
- Speed Limit 70
- Speed Limit 70
- Speed Limit 70
- Speed Limit 50
- Speed Limit 50
- Speed Limit 35
- Speed Limit 30

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

Application – Congestion

- Volume / Occupancy
- Speed

Measured Speed:

73 76 75 73 76 77 69 71 73 68

VSL:

- SPEED LIMIT 70
- SPEED LIMIT 70
- SPEED LIMIT 70
- SPEED LIMIT 70
- SPEED LIMIT 70
- SPEED LIMIT 70
- SPEED LIMIT 70
- SPEED LIMIT 70
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- SPEED LIMIT 70

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

- Volume / Occupancy
- Speed

- Volume > Threshold?
  - Yes
  - Speed = 0?
    - Yes
    - No Change
    - No
    - Speed > Threshold?
      - Yes
      - Occupancy > Threshold?
        - Yes
        - Set to Measured Speed (Rounded Up)
        - No
        - Lower Speed
          - Yes
          - B
          - No
          - A
        - No
        - Lower Speed
          - Yes
          - B
          - No
          - A
      - No
      - Lower Speed
        - Yes
        - B
        - No
        - A
    - No
    - No
      - Set to Measured Speed (Rounded Up)
  - No
    - No
      - No Change
  - No
    - No Change
Application – Construction

- Lane closure
- Other congestion event

Status: No Work Present

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

Application – Construction

- Lane closure
- Other congestion event

Status: Lane Closure

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

- Visibility
- Surface Friction

Example for illustrative purposes. Not to scale.

Status: All Clear
Application – Weather

- Visibility
- Surface Friction

Example for illustrative purposes. Not to scale.

Status: Weather Event
Application – Weather

- Visibility
- Surface Friction

Example from Pilot Study
VSL | Operation

- ½ 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?
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
Legislative bill requires an advanced warning sign

Beacons will flash when VSL is in operation
HB 2204 Pilot Study | Time Line

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

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Contract Terminates
HB 2204 Pilot Study | Time Line

Tasks
1. Site Selection Assistance
2. Implementation Plan
3. Develop Evaluation Plan
4. Equipment Assistance
5. Implementation Assistance

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Contract Terminates Feb. 1
Bill Expires Feb. 1
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

I-35 (NB)
Temple - Belton

Visibility
I-35 (NB)
Temple – Belton

Visibility

SPEED LIMIT 65

WORK ZONE

SPEED LIMIT 65
HB 2204 Pilot Study | Construction VSL

I-35 (NB) Temple – Belton

Lane Closure

Visibility

SPEED LIMIT 65

SPEED LIMIT 40

SPEED LIMIT 30

WORK ZONE

WORK ZONE

WORK ZONE

SPEED LIMIT 30

SPEED LIMIT 30

SPEED LIMIT 30
I-35 (NB) Temple – Belton

Congestion in Work Zone
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
HB 2204 Pilot Study | Congestion VSL

Loop 1604 (WB)
San Antonio
HB 2204 Pilot Study | Congestion VSL

Loop 1604 (WB)
San Antonio

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

I-20
Ranger Hill
HB 2204 Pilot Study | Weather VSL

I-20
Ranger Hill
HB 2204 Pilot Study | Weather VSL

I-20
Ranger Hill

SPEED LIMIT 45
SPEED LIMIT 50
SPEED LIMIT 50

SPEED LIMIT 65
SPEED LIMIT 50
SPEED LIMIT 45

Heavy Rain
HB 2204 Pilot Study | Weather VSL

I-20
Ranger Hill

SPEED LIMIT 65
SPEED LIMIT 50
SPEED LIMIT 45
SPEED LIMIT 30
SPEED LIMIT 45
SPEED LIMIT 30
SPEED LIMIT 75

maps.google.com

Ice
Activation

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

Observations

- Weather “hot spots” hard to predict
- No major weather flare-ups yet
VARIABLE SPEED LIMITS

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