Variable Speed Limits
I-80 in Parley’s Canyon
Utah Code
Title 41, Chapter 6a Section 602

“The Department of Transportation shall determine the reasonable and safe speed limit for each highway or section of highway under its jurisdiction”
Utah Code
Title 41, Chapter 6a Section 602

“The Department of Transportation may establish different speed limits… based on:
(a) time of day
(b) highway construction
(c) type of vehicle
(d) weather conditions
UDOT establishes speed limits based on:

- Roadway design speed
- Prevailing vehicle speeds
- Accident history
- Highway traffic and roadside conditions
- Other highway safety factors.

Prevailing vehicle speeds are one of the biggest considerations.
If we don’t allow highly capable vehicles to go faster than the 85th percentile speed in good weather,

Why would we do the same in bad weather?
Northern Utah – several years ago

• UHP proposes a variable speed limit in Sardine Canyon between Brigham City and Logan

• UDOT does our research and agree that it’s a good idea.
UDOT Goes for it

UDOT’s Decision: Install VSL on I-80 in Parley’s Canyon. Existing infrastructure allowing cost reduction is an important factor.
A brand new system needs:

- Hardware
- Software
- Testing

Any system needs

- Power
- Communications
The I-80 Parley’s VSL system consists of:
• 15 Signs
• Arranged in 4 zones
• 2 zones westbound
• 2 zones eastbound
• Upper and lower canyon zones
Project Details

- Cost of just over $700,000
  - Roughly $40,000 per sign
  - Actual sign costs are a fraction of the total
    – a good portion of that went into getting the power and communications to the signs
  - Solar and cell vs. hardline power and communications was a big decision

- Project Challenges
  - Dependent on several road projects – benefits because of same contractor
  - Discovery of bad conduit at the mouth of the canyon
UDOT developed a custom interface for our sign control software
The software creates a record of speed limit decisions in a weather event.

An event is triggered when it is requested by UDOT or UHP staff.
Starting the Process

When an event is requested, the TOC operators contact an engineer who will run the event.
At the start of the event, the weather group at the TOC does a short-term forecast, and freshens it at 1-3 hour intervals.
Setting the Speed Limit

The traffic engineer reviews the weather forecast, notes from the operators and then goes to this page.

The graphs show speeds on I-80. Lane 1 is approximately the 85th percentile speed.
Factors in Speed Choice
• 85\textsuperscript{th} Percentile Speed
• Expected weather trend (better, worse or the same)
• Shed Feedback (will road be clear soon?)
• Chain Restrictions
• End result – an engineering study
Implementing the Limit

Steps to Finalize Speed Limit

- Engineer enters selected speed and reason
- Signs change
- Automatic email to UDOT and UHP
- The TOC operators notify dispatch (start of event only)
- TOC operators post on overhead VMS
A VSL event ends when the speed returns to free-flow (above 65 mph in left lane) and there is no further weather expected.
Results

Operational Stats

• First event on January 6, 2014

• 340 events through June 20, 2017
  • Some small number are test events
  • We do run for heavy rain in the summer.

• During those events, engineers evaluated and set speed limits over 1500 times
Reactions

Anecdotal Evidence

• We’ve received positive public and agency feedback.
• The main complaint has been the brightness (or lack thereof) of the signs. This is being addressed.
• Speeds posted feel reasonable – with the exception of when we have changing conditions in the zone.
Operational Changes

- We’ve missed a few opportunities to lower the speed limit – we’ve asked our TOC operators, UHP and weather staff to be more aggressive on starting events.

- The resources required to run are significantly more than anticipated. It takes about one full time equivalent to maintain and operate the system.
Here are a few of the locations VSL has been suggested:

- Sardine Canyon (the original idea)
- Provo Canyon (has infrastructure)
- I-15 in southern Utah (highest points on I-15)
- Salt Creek Canyon (near Nephi)
Future of VSL

- We will not build where the problems are localized (not corridor-wide)
- We will not build another system until we can automate operation – and we are studying automation
- We think the systems are more useful when they have a large speed range – we’re looking forward to the first in an 80 mph zone.
Now is a good time for questions