Variable Speed Limits
I-80 in Parley's Canyon

udot.utah.gov

Speed Limit Legalities

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”

Speed Legalities

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

Setting Speed Limits

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.

Its all relative

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?

The Variable Speed Limit Idea

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.

Construction

A brand new system needs:

- Hardware
- Software
- Testing

Any system needs

- Power
- Communications

System Details

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

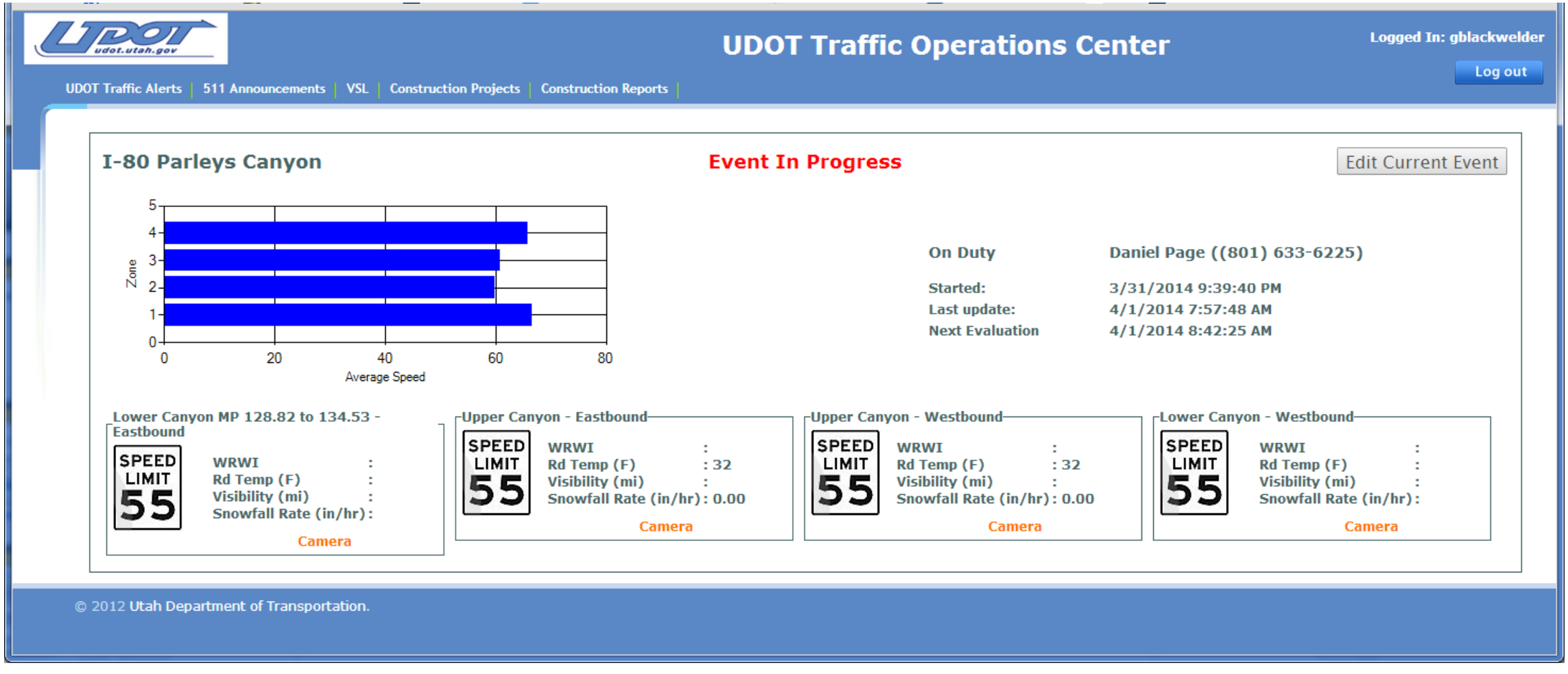
Project Details

- 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

Software

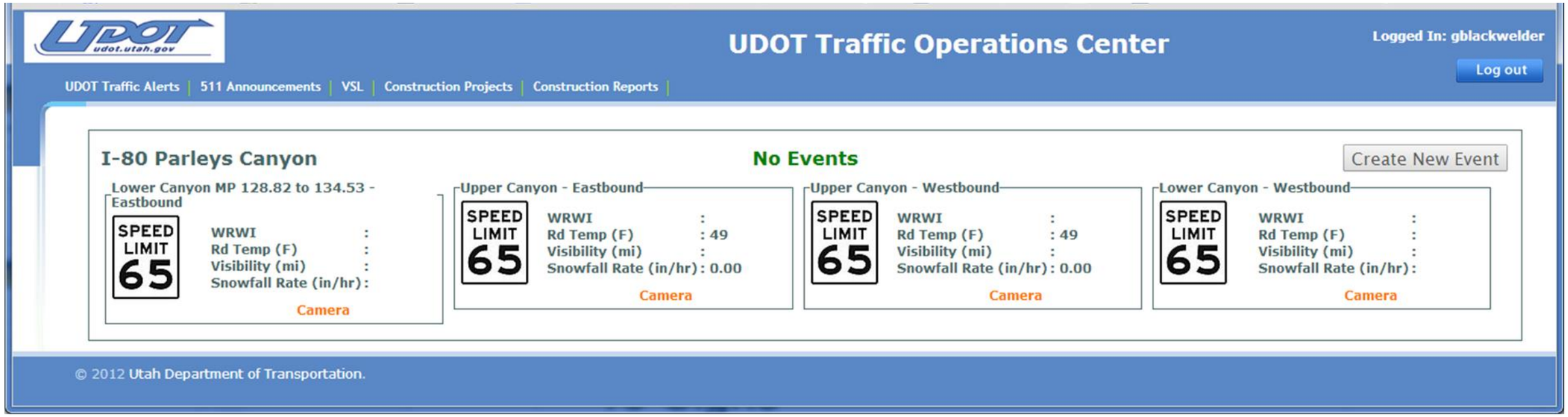
UDOT developed a custom interface for our sign control software



Software Process

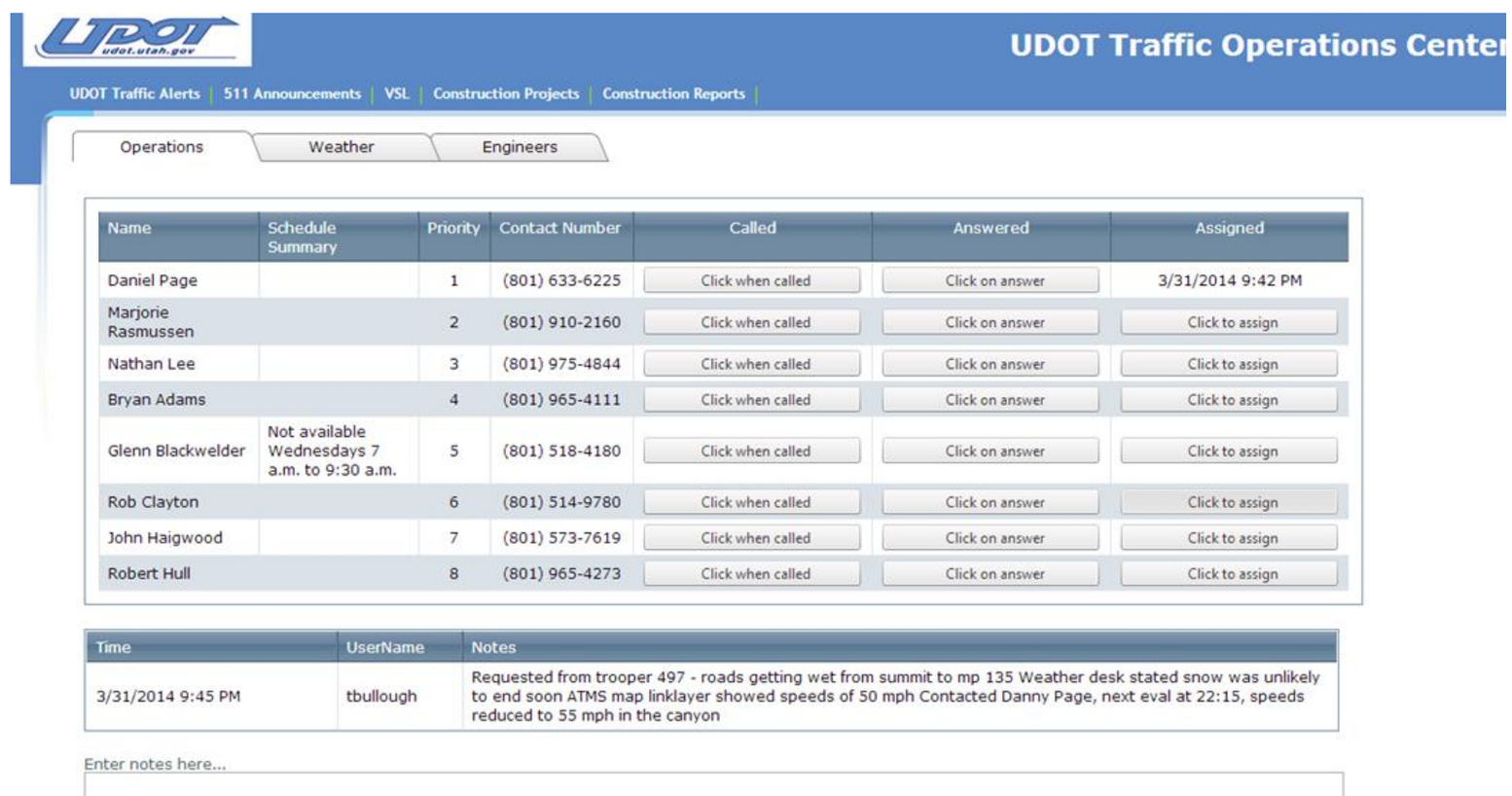
The software creates a record of speed limit decisions in a weather event.

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.



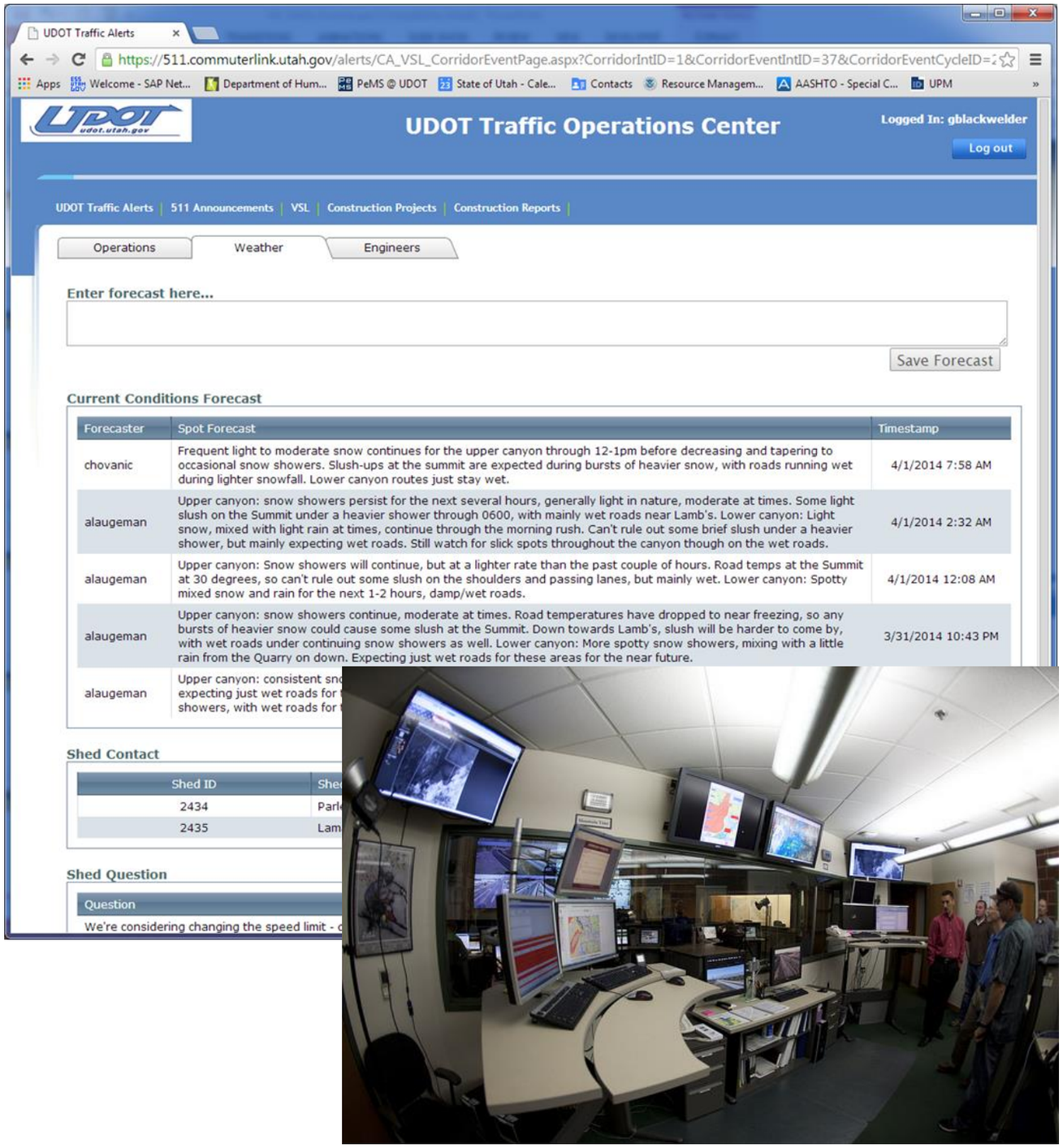
Name	Schedule Summary	Priority	Contact Number	Called	Answered	Assigned
Daniel Page		1	(801) 633-6225	Click when called	Click on answer	3/31/2014 9:42 PM
Marjorie Rasmussen		2	(801) 910-2160	Click when called	Click on answer	Click to assign
Nathan Lee		3	(801) 975-4844	Click when called	Click on answer	Click to assign
Bryan Adams		4	(801) 965-4111	Click when called	Click on answer	Click to assign
Glenn Blackwelder	Not available Wednesdays 7 a.m. to 9:30 a.m.	5	(801) 518-4180	Click when called	Click on answer	Click to assign
Rob Clayton		6	(801) 514-9780	Click when called	Click on answer	Click to assign
John Haigwood		7	(801) 573-7619	Click when called	Click on answer	Click to assign
Robert Hull		8	(801) 965-4273	Click when called	Click on answer	Click to assign

Time	UserName	Notes
3/31/2014 9:45 PM	tbullough	Requested from trooper 497 - roads getting wet from summit to mp 135 Weather desk stated snow was unlikely to end soon ATMS map linklayer showed speeds of 50 mph Contacted Danny Page, next eval at 22:15, speeds reduced to 55 mph in the canyon

Enter notes here...

Gathering Information

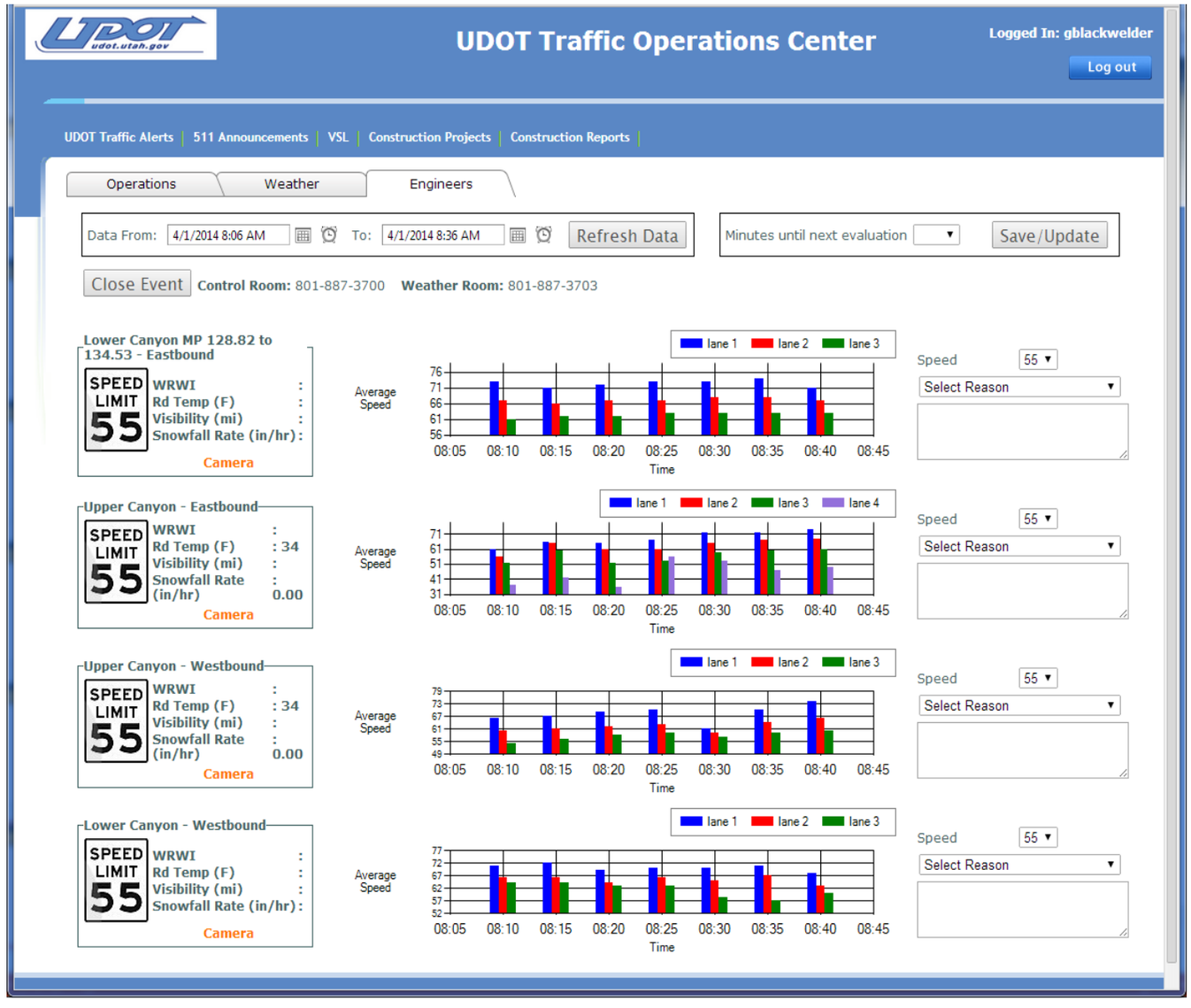
At the start of the event, the weather group at the TOC does a short-term forecast, and freshens it at 1-3 hour intervals.



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.



The Speed Decision

Factors in Speed Choice

- 85th 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

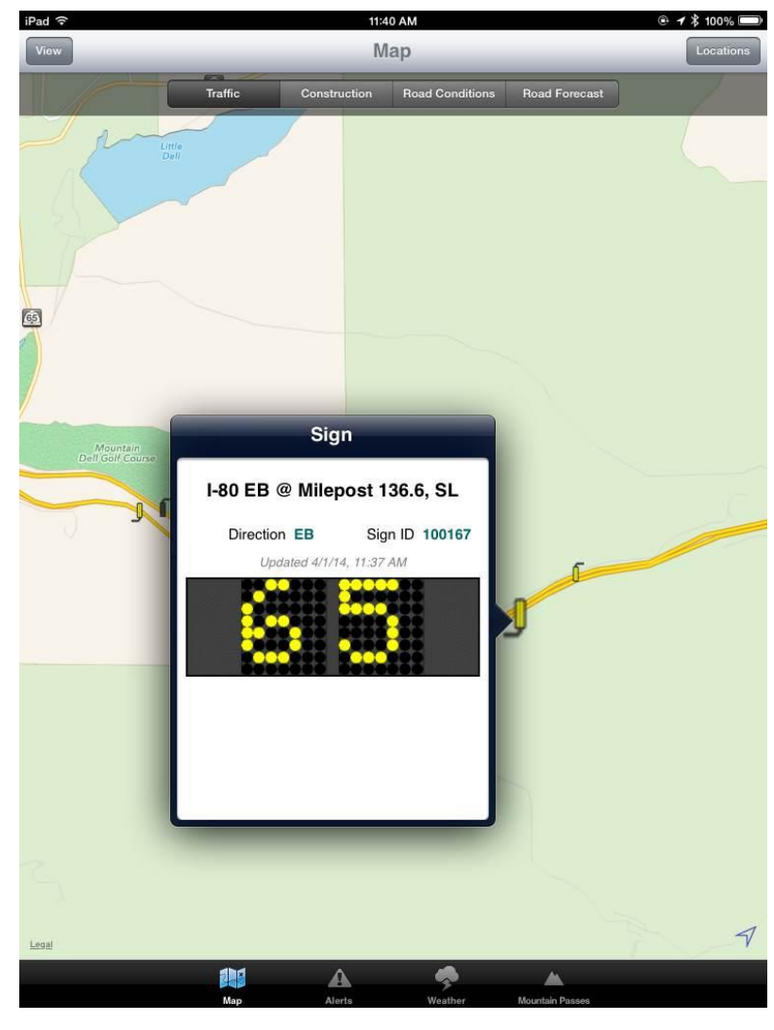
- Engineer enters selected speed and reason
- Signs change
- Automatic email to UDOT and UHP
- The TOC operators notify dispatch (start of event only)
- TOC operators post on overhead VMS

Photo: Chris Siavrakas

End of the Event

A VSL event ends when the speed returns to free-flow (above 65 mph in left lane) and there is no further weather expected.

Photo: UDOT



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 syste.

Future of VSL

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