

WYOMING DEPARTMENT OF TRANSPORTATION

GIS/ITS

Cheyenne, WY 82009

POLICY MEMORANDUM

PM-6

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REVISION 6 EFFECTIVE: 02.16.2011

Variable Speed Limit

1. Overview

Interstate 80 in southern Wyoming represents a major east-west corridor used by private citizens and commercial carriers in almost equal numbers. Several stretches of I-80 experience frequent intervals of severe winter weather.

During the 2008 legislative session, Wyoming Statute 31-5-302 was amended to allow for adjustments to the legal speed limit based on “a vehicle or weather emergency”. The statute further allows the superintendent to declare differing speed limits based on time of day, type of vehicle, weather conditions and other factors that bear on safe speeds. Adjustments to the legal speed limit are in effect “when posted upon appropriate fixed or variable signs”.

The Wyoming Department of Transportation (WYDOT) and the Wyoming Highway Patrol (WHP) intend to work together and use the provisions vested in W.S. 31-5-302 to reduce fatalities, crashes and roadway closures. A series of variable speed limit (VSL) signs, speed sensors and road weather information systems were placed between Rawlins and Laramie, as part of WYDOT’s first effort to demonstrate the effectiveness of variable speed limits. As a result of this successful demonstration of the VSL technology, additional roadway segments have been instrumented with sensors and variable speed limit signs.

2. Purpose

The purpose of this policy is to establish a protocol for adjusting the legal speed limit using VSL signs.

3. Scope

This policy applies to WYDOT maintenance employees, Transportation Management Center (TMC) operators, and the Wyoming Highway Patrol troopers and dispatchers who will work together to use VSL technology to enhance the safety and efficiency of Wyoming highways.

4. Definitions

- a. Pace Speed – the 10 mph speed range representing the largest percentage of vehicles in the traffic stream. For the purposes of this policy, the pace speed will be approximated to be the average speed plus 5 miles per hour.
- b. Variable Speed Limit Sign – A specialized variable message sign that may be controlled remotely, via software, or manually at the roadside to reflect an adjustment to the legal speed limit. This type of sign is enforceable upon posting of a speed limit.
- c. Road Weather Information System (RWIS)- sensors that monitor the pavement and atmospheric conditions at a site along the road. For the purposes of this policy, the RWIS sensor is being used to report the visibility and the surface status of the road (dry, wet, etc).

5. Protocol

a. Speed Reduction

A reduction in the legal speed may be initiated by a WHP trooper or maintenance personnel based on a visual inspection of conditions or by a TMC lead operator based on roadway sensors that indicate a reduction in speed of 10 miles per hour for a period of 10 minutes.

- i. **Trooper Initiated Speed Reduction:** Should a WHP trooper initiate a reduction in the legal speed limit, the following process must be followed:
 - 1. The trooper will change his/her radio to talk on the appropriate DOT (i.e, DOT1) channel and request assistance from the TMC
 - 2. The trooper will identify him/herself by badge number

3. The trooper will identify the area in question (i.e., "Interstate 80 in the eastbound direction from milepost 250 to milepost 260) and ask the TMC operator to provide the pace speed.
4. The TMC Operator will investigate the available speed sensing data and provide the pace speed to the trooper.
5. The trooper will communicate to the TMC Operator the estimated speed observed.
6. Based on the pace speed and personal observation of weather and roadway conditions, the trooper will indicate the location and value for an adjustment to the legal speed limit.
7. The TMC operator will echo the request to ensure both parties are in agreement regarding the requested location and value for the speed to be posted.
8. The TMC Operator will make the changes to the VSL as requested by the trooper and record the following:
 - a. The time of the trooper's request
 - b. The trooper's badge number
 - c. The location of the speed adjustment
 - d. The value of the speed adjustment
 - e. The actual speed reported by the trooper.
 - f. The pace speed based on speed sensors
 - g. The reason for the lower speed, if the speed request is different than the pace speed. For example, if the pace speed is 55 mph and the trooper is requesting that 35 mph is posted on the signs, please document their reason for posting something different.
9. The TMC Operator will notify the Maintenance Supervisors and the public (by using the appropriate public GovDelivery group). Note: GovDelivery messages will be sent out only when speeds are initially reduced and when they are returned to 75 mph.

Note: Please pay careful attention to any special notifications required for each district in the appendix. These notifications must be done by phone.

ii. **Maintenance Initiated Speed Reduction:**

Should maintenance personnel recognize weather or roadway conditions that warrant a change in the legal speed limit and no trooper is on duty, the following process must be followed:

1. The maintenance employee must identify himself by unit number and request assistance from the TMC.
2. The employee will identify the area in question (i.e., "Interstate 80 in the eastbound direction from milepost 250 to milepost 260) and ask that the posted speed be reduced to the pace speed, if the speed sensors are working.
3. The maintenance employee will communicate to the TMC Operator the estimated speed observed.
4. The TMC operator will echo the request to ensure both parties are in agreement regarding the requested location of the speed to be posted.
5. The TMC operator will make the changes to VSL based on the pace speed derived from speed sensors and record the following:
 - a. The time of the maintenance employee's request
 - b. The maintenance employee's unit number
 - c. The location of the speed adjustment
 - d. The value of the speed adjustment
 - e. The actual speed reported by the maintenance employee.
 - f. The pace speed based on speed sensors
 - g. The reason for the lower speed, if the speed request is different than the pace speed. For example, if the pace speed is 55 mph and the maintenance employee is requesting that 35 mph

is posted on the signs, please document their reason for wanting to post something different.

6. The TMC Operator will notify the Maintenance Supervisors and the public (by using the appropriate public GovDelivery group). Note: GovDelivery messages will be sent out only when speeds are initially reduced and when they are returned to 75 mph.

Note: Please pay careful attention to any special notifications required for each district in the appendix. These notifications must be done by phone.

iii. TMC Lead Operator Initiated Speed Reduction:

Should a lead operator recognize a drop in the average speed of 10 mph for a period of 10 minutes in an area of the variable speed limit zone, and no trooper or maintenance personnel is present in the VSL section, the following process must be followed:

1. The TMC Lead Operator will identify the area impacted by an actual reduction in speed data as indicated by speed sensors.
2. The TMC Operator will make the changes to VSL based on the pace speed derived from speed sensors and record the following:
 - a. The time of the speed reduction
 - b. The location of the speed adjustment
 - c. The value of the speed adjustment
 - d. The pace speed based on speed sensors
3. The TMC Operator will notify the Maintenance Supervisors and the public (by using the appropriate public GovDelivery group). Note: GovDelivery messages will be sent out only when speeds are initially reduced and when they are returned to 75 mph.
4. The TMC will broadcast on the appropriate District radio channel, the section and posted speed limit for any speed

limit changes initiated by the TMC, and the reason for the change.

Note: Please pay careful attention to any special notifications required for each district in the appendix. These notifications must be done by phone.

b. Increase in speed

- i. If a trooper, maintenance area supervisor or maintenance foreman is available in the area to provide a visual inspection, and they see that an increase in speed is warranted based on what they observe, they shall contact the TMC and advise them to raise the speed.
- ii. If no area supervisor, maintenance foreman or trooper is available in the affected area, a TMC lead operator may raise the speed based on an increase in the pace speed that is at least 15 mph greater than the posted speed for a period of 10 minutes. In this situation, the TMC lead operator may raise the speed to be within 10 mph of the detected pace speed. If the speed was originally lowered as a result of inclement weather conditions, the TMC lead operator should also verify that conditions have improved by using any and all means available.
- iii. The TMC will broadcast on the appropriate District radio channel, the section and posted speed limit for any speed limit changes initiated by the TMC, and the reason for the change.
- iv. As a reminder, the variable speed limits can be used after a road has been reopened to incrementally increase the speeds. In such situations, no speed data will be available so judgment must be used when increasing speeds.

c. RWIS-based speed changes

During reduced visibility situations, driver's speeds also become dispersed. Even though the roadway may be dry, since visibility is reduced, it is up to the driver to choose a speed that is safe for them. Oftentimes, drivers may not choose a speed that gives them the ability

to react to something in the roadway that is hidden due to the reduced visibility.

This section of the policy will cover steps that the TMC can take to make a decision based on RWIS-reported conditions. The speeds listed in this document are the maximum speed limits that should be posted on the signs based on the conditions seen on the RWIS. If someone in the field calls in and reduces it further, that recommendation must be followed.

The distances provided in this section with the speeds were based on stopping sight distance speeds from the AASHTO "Green Book". This is because the driver may need to stop because of something that is in the road (vehicles, plows, animals) and they must be able to stop from the time that they can see the object in the road. The friction factor was reduced by half and a third to derive distances when the road is reported by the RWIS to be slick in spots or slick, respectively.

The TMC will use also use the surface status conditions that the RWIS displays to reduce the speed limit.

- If the road is reported wet or dry, and the RWIS sensor display is green or blue, then the speed limit can remain 75 mph until it meets one of the visibility criteria.
- If the road is reported slick, or the RWIS sensor display is red, then the speed limit should be reduced to 65 mph due to surface conditions. If the visibility drops, the speed can be lowered to the speed that corresponds with that visibility.

Should an operator recognize a drop in the visibility in an area of the variable speed limit zone and/or a change in the surface status, the following process must be followed:

1. The TMC Lead Operator will identify the area impacted by either a reduction in visibility or deterioration in surface status.
2. The TMC Operator will ensure the posted VSL speed limit is no greater than those listed in the table below. If

it is, they will reduce the speed limits based on the table below.

Reported condition:	WET or DRY	SLICK SPOTS	SLICK
RWIS Surface Status:	Green or Blue	Yellow or Orange	Red
Speed Limit (mph)	Visibility (feet)		
75	> 950	>1625	
65	725 - 950	1225 - 1625	> 1700
50	475 - 725	750 - 1225	1025 - 1700
35	< 475	< 750	< 1025

3. The TMC Operator will record the following when doing an RWIS-based speed reduction:
 - a. The time of the speed reduction
 - b. The location of the speed adjustment
 - c. The value of the speed adjustment
 - d. The visibility value and/or the surface condition from the RWIS sensor.
4. The TMC Operator will notify the Maintenance Supervisors and the public (by using the appropriate public GovDelivery group). Note: GovDelivery messages will be sent out only when speeds are initially reduced and when they are returned to 75 mph.
5. The TMC will broadcast on the appropriate District radio channel, the section and posted speed limit for any speed limit changes initiated by the TMC, and the reason for the change.

6. 511 Notify/GovDelivery notification:

The TMC operators will send a 511 Notify/GovDelivery notification when the speed is initially adjusted within the variable speed limit zone, and then again when all the speeds within the segment are returned to their normal postings. Each message should include the route, the appropriate speed limit verbiage, the

landmark endpoints for the zone, and the timestamp. TMC operators should use the following guidelines:

Activation:

Recipients:

- Alerts and Opens/Closures-current time period

Subject:

- I80 between Rawlins and Laramie

Email:

- I80: Reduced speed limits in effect between Peterson Interchange (mp 238.15) and Quealy Dome Interchange (mp 290.44). Speed limits strictly enforced. "TIMESTAMP"

Wireless Alert:

- I80: Reduced speed limits in effect btwn Peterson Int (mp 238.15) and Quealy Dome Int (mp 290.44). Speed limits strictly enforced. "Timestamp"

Deactivation:

Recipients:

- Alerts and Opens/Closures-current time period

Subject:

- I80 between Rawlins and Laramie

Email:

- I80: Speed limit of 75 mph in effect between Peterson Interchange (mp 238.15) and Quealy Dome Interchange (mp 290.44). "Timestamp"

Wireless Alert:

- I80: Speed limit of 75 mph in effect btwn Peterson Int (mp 238.15) and Quealy Dome Int (290.44). "Timestamp"

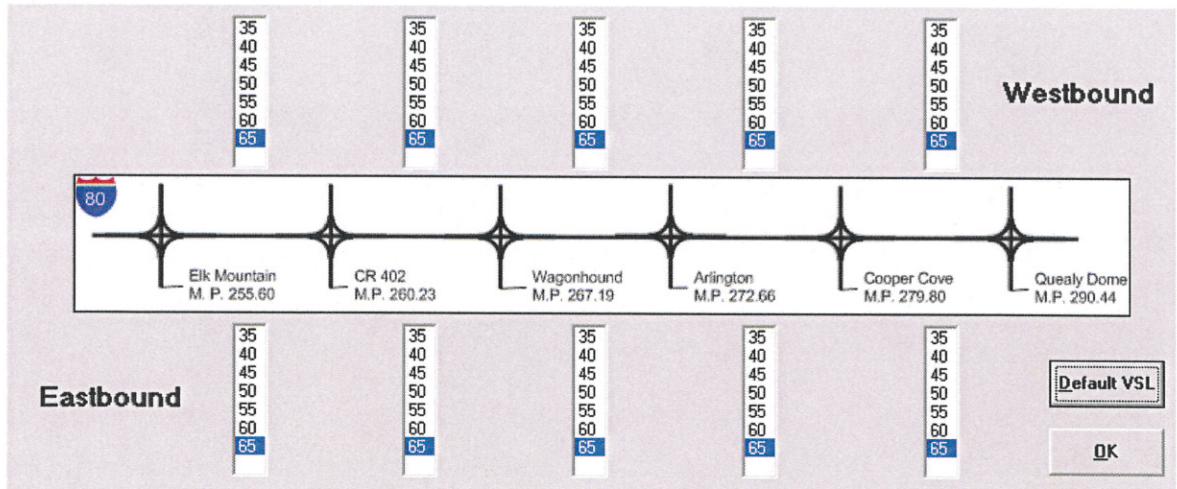
Appendix A

Corridor-Specific Information

Rawlins - Laramie

All notifications via GovDelivery.

VSL Location Map:



Green River – Rock Springs

Please notify the following people by phone in the event of a VSL change:

Robert Johnston
 Ed McPherson
 Ken Hellwinkel

Note: Phone calls will be made when speeds are initially reduced and when they are returned to their normal posting (either 65 or 75 mph), depending on the sign.

RM	Static/Variable	Description
Eastbound		
88.86 (65 MPH)	Variable	Beginning of Corridor
90.05 (65 MPH)	Variable	Green River West Interchange
92.75	Variable	Green River East Interchange
99.9	Variable	US 191 S Interchange
103.2	Variable	Dewar Drive Interchange
104.55	Variable	College Drive Interchange
105.65	Variable	Elk Street Interchange
107.9	Static	Pilot Butte Interchange
110.3	Static	End of Corridor
Westbound		
110.36	Variable	Beginning of Corridor
106.8	Variable	Pilot Butte Interchange
104.55	Variable	Elk Street Interchange
103.2	Variable	College Drive Interchange
101.71	Variable	Dewar Drive Interchange
97.9	Variable	US 191 S Interchange
90.45 (65 MPH)	Variable	Green River East Interchange
88.85 (65 MPH)	Static	End of Corridor

VSL Location Map:

The screenshot shows a software window titled "Form1" with a central map of a highway segment. The highway is labeled "80" with a shield icon. The map shows a horizontal line representing the highway with vertical tick marks for mileposts. Above the line, mileposts are labeled: 90.45, 97.9, 101.71, 103.2, 104.55, 106.8, and 110.36. Below the line, mileposts are labeled: 88.859, 90.06, 92.75, 99.9, 103.2, 104.55, and 105.65. Above the map, there are seven vertical speed limit control sliders for the "Westbound" direction. Each slider has a scale from 30 to 75 in increments of 5. Below the map, there are seven vertical speed limit control sliders for the "Eastbound" direction, also with a scale from 30 to 75 in increments of 5. At the bottom of the window, there is a text box with the following text: "The VSL interface is used to post information to the web and telephone-based travel information systems." Below this, another text box says: "TMC operators are reminded to return to this form any time an adjustment is made to the speed limits in this corridor." To the right of the text boxes are two buttons: "Default VSL" and "OK".

Form1

Westbound

MP 90.45 MP 97.9 MP 101.71 MP 103.2 MP 104.55 MP 106.8 MP 110.36

MP 88.859 MP 90.06 MP 92.75 MP 99.9 MP 103.2 MP 104.55 MP 105.65

Eastbound

The VSL interface is used to post information to the web and telephone-based travel information systems.

TMC operators are reminded to return to this form any time an adjustment is made to the speed limits in this corridor.

Default VSL

OK