

# 2013 National Peer Exchange

- Snow Operations in Colorado DOT

# Prior to July 1, 2013, R4 at a glance

- How many maintenance people report to work orders? 224 people report to work orders
- How many patrols do we have? 40 Patrols , 36 Maintenance and 4 Rest areas
- How many lane miles are we responsible for? 7212.15 lane miles and 368.47 lane miles under city contracts
- How many plow trucks do we have? 171= 80 - midranges / 77 - tandems / 6 - 6X6 tandems/ 4 - 4X4 2 to 3 ton/ and 4 - 5 to 7 ton
- How many loaders do we have? 45= 7 - 1 to 2 yard / 28 - 2 to 3 yard/ 6 - over 3 yard/ and 4 - under 1 yard
- How many graders do we hav?. 16= 8 under 31,000 LB / 8 over 31,000 LB



# Non invasive sensors

---

Sensor use in Colorado

# Today we will discuss

- What R-4 CDOT uses
- Where R-4 CDOT uses it and
- How R-4 CDOT uses it

# DSC<sub>111</sub> Spectro and DST<sub>111</sub> Cyclo





# What information is available?

- Road Condition (Dry, Moist, Wet, Snow, Ice)
- Surface Temperature
- Grip (Slipperiness)
- Dew Point Temperature
- Air Temperature
- Humidity
- Layer Thicknesses

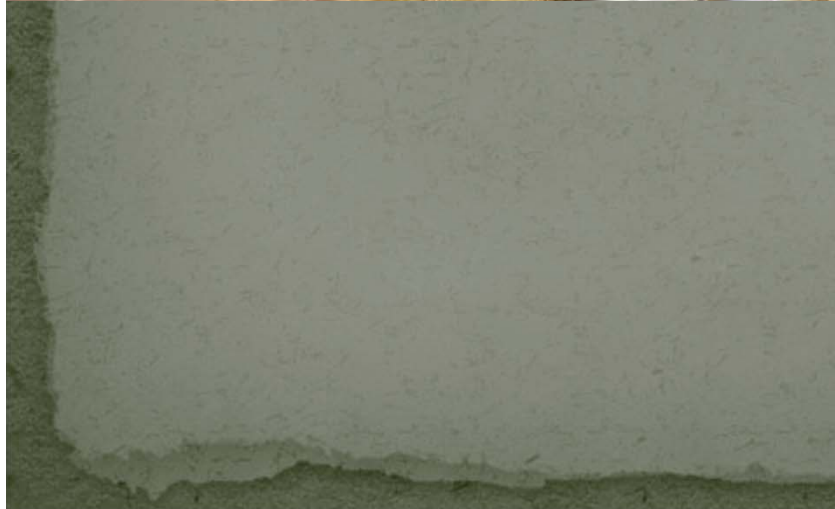
Water

Ice

Slush

Snow or Frost

# Weather stations





# Upgrading I-25 sites for research on LOS



ITD-RuralITS-Award-video.mp4 (1).mp4



# Bridge deicing trigger installed 2005



# Configuration

- 35 degree lock out
- Friction at or below .5
- and/or .3 mm of snow or ice layer build up on the surface of the road
- 20 minute interval before it fires again if the same condition exists
- At Victorville we have this cycle 5 times before going to sleep and resetting after normal conditions return.





CDOT

Anderle, Phillip

Home Sites Orgs Users Logout

Map - CDOT

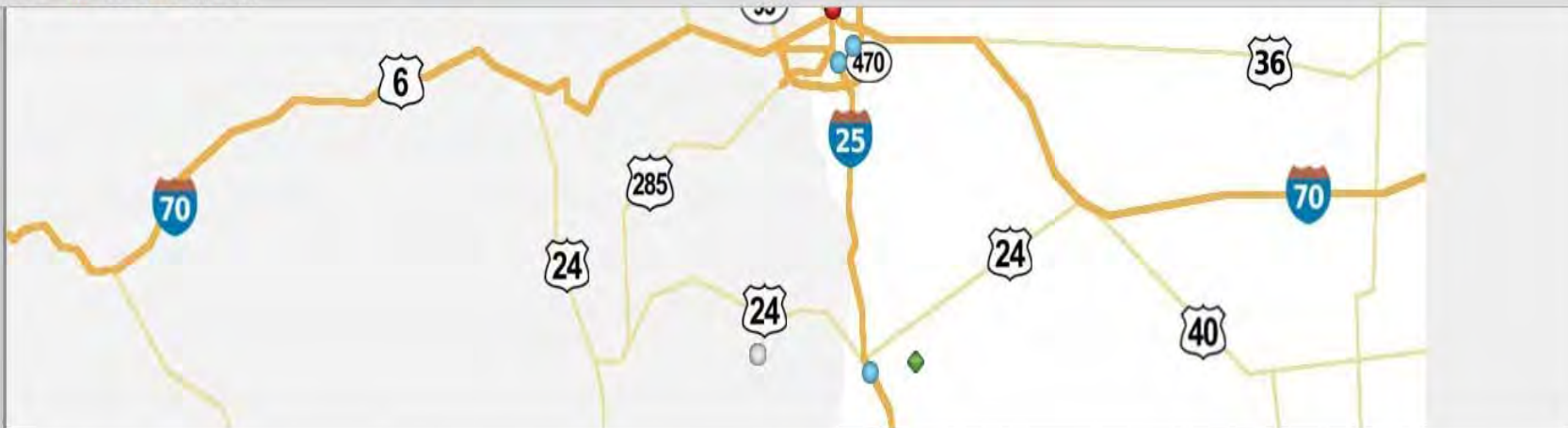


Site Controller Status

Site Name	Base Org	Air	Ground	Grip	Snow	Ice	Water	Pump	Flood	Empty	Tank Level	Activation	Activation At	Last Update	
119	CDOT NORTH SYSTEMS	80°F	111°F	0.82	0.0	0.0	0.0	Off	On	On	33.98%	Sensor	2013-04-23 07:42:21	2013-05-15 13:28:18	<a href="#">Edit</a> <a href="#">Alerts</a>
				0.73	0.0	0.0	0.0	Off	On	Off	4.28%	Sensor	2013-05-02 09:48:30	2013-05-15 13:28:05	<a href="#">Edit</a> <a href="#">Alerts</a>

www.esispray.com/site/controller?site\_id=28





#### Site Controller Status

Site Name	Base Org	Air	Ground	Grip	Snow	Ice	Water	Pump	Flood	Empty	Tank Level	Activation	Activation At	Last Update	
<a href="#">119</a>	<a href="#">CDOT NORTH SYSTEMS</a>	80°F	111°F	0.82	0.0	0.0	0.0	Off	On	On	33.98%	Sensor	2013-04-23 07:42:21	2013-05-15 13:28:18	<a href="#">Edit</a> <a href="#">Alerts</a>
<a href="#">270 @ I76</a>	<a href="#">CDOT Central</a>	86°F	None	0.73	0.0	0.0	0.0	Off	On	Off	4.28%	Sensor	2013-05-02 09:48:30	2013-05-15 13:28:05	<a href="#">Edit</a> <a href="#">Alerts</a>
<a href="#">CO Springs</a>	<a href="#">CDOT South</a>	69°F	78°F	0.81	0.0	0.0	0.0	Off	On	Off	0.82%	Sensor	2013-04-23 07:22:17	2013-05-15 13:29:54	<a href="#">Edit</a> <a href="#">Alerts</a>
<a href="#">Cripple Creek</a>	<a href="#">CDOT South</a>	32°F	32°F	0.0	0.0	0.0	0.0	Off	On	Off	0.0%	None	None	2013-05-15 13:29:05	<a href="#">Edit</a> <a href="#">Alerts</a>
<a href="#">Drake</a>	<a href="#">CDOT NORTH SYSTEMS</a>	32°F	41°F	0.82	0.0	0.0	0.0	Off	On	On	None	Sensor	2013-05-01 22:33:52	2013-05-11 06:22:01	<a href="#">Edit</a> <a href="#">Alerts</a>
<a href="#">HWY 52 @ I25</a>	<a href="#">CDOT North</a>	32°F	32°F	0.0	0.0	0.0	0.0	Off	On	Off	79.21%	Button	2012-11-27 15:10:11	2013-05-15 13:28:03	<a href="#">Edit</a> <a href="#">Alerts</a>
<a href="#">HWY 66 @ I25</a>	<a href="#">CDOT North</a>	80°F	116°F	0.82	0.0	0.0	0.0	Off	On	On	99.99%	Sensor	2013-04-16 22:32:29	2013-05-15 13:30:29	<a href="#">Edit</a> <a href="#">Alerts</a>
<a href="#">I25 @ HWY 28</a>	<a href="#">CDOT North</a>	80°F	66°F	0.82	0.0	0.0	0.0	Off	On	On	2.34%	Sensor	2013-04-23 09:08:09	2013-05-15 13:31:41	<a href="#">Edit</a> <a href="#">Alerts</a>
<a href="#">I25 @ St Vrain</a>	<a href="#">CDOT North</a>	78°F	95°F	0.82	0.0	0.0	0.0	Off	On	On	0.0%	Sensor	2013-05-01 21:15:04	2013-05-15 13:28:31	<a href="#">Edit</a> <a href="#">Alerts</a>
<a href="#">I25@225</a>	<a href="#">CDOT Central</a>	82°F	107°F	0.82	0.0	0.0	0.0	Off	On	On	6.39%	Sensor	2013-05-01 20:39:37	2013-05-15 13:32:03	<a href="#">Edit</a> <a href="#">Alerts</a>
<a href="#">Parker@Arapahoe</a>	<a href="#">CDOT Central</a>	50°F	78°F	0.82	0.0	0.0	0.0	Off	On	On	70.75%	None	2013-02-21 00:13:08	2013-04-30 10:42:03	<a href="#">Edit</a> <a href="#">Alerts</a>
<a href="#">Sleepy Hollow</a>	<a href="#">CDOT NORTH SYSTEMS</a>	64°F	78°F	0.82	0.0	0.0	0.0	Off	On	On	0.0%	Sensor	2013-05-02 02:48:38	2013-05-15 13:30:41	<a href="#">Edit</a> <a href="#">Alerts</a>

#### Tank Status - MT VISTA

Site Name	APEX 1	Tank 2	Tank 3	Tank 4	Tank 5	Tank 6	Last Update	
<a href="#">MT VISTA</a>	12%	31%	58%	17%	8%	28%	2013-05-15 13:30:10	<a href="#">Edit</a> <a href="#">Alerts</a>

#### Tank Status - Powers Storage

Site Name	APEX	APEX	Last Update	
<a href="#">Powers Storage</a>	52%	54%	2013-05-15 13:30:10	<a href="#">Edit</a> <a href="#">Alerts</a>





Google Apps

Edit Site - ENVIROTECH

← → ↻ 🏠

www.esispray.com/site/edit?site\_id=28

☆ 📄 📌 🔑

Envirotech Services ...

VA Vaisala

Google Maps



CDOT » CDOT North » CDOT NORTH SYSTEMS » 119

Anderle, Phillip

Home

Sites

Orgs

Users

Logout

119

Update Site Information

Site Name

119

Organization

CDOT NORTH SYSTEMS

Remove Site

Update Site

[Add Tank Controller](#)

[Add Camera](#)

Update Site Controller

Internet Address

166.140.209.216

Serial Number

4b000056dbdc8401

Atmospheric Sensors

☒ Air Temp.

☒ Humidity

☐ Wind Speed

☐ Wind Direction

☐ Barometer

☐ Precipitation

☐ Visibility

☒ Dew Point

Road Sensors

☒ Road Grip

☒ Road State

☒ Ground Temp.

☒ Snow Level

☒ Ice Level

☒ Water Level

☒ Surface Status

Pump Sensors

☒ Pump Status

☒ Flooding Alarm

☒ Tank Empty

☐ Tank Level

☐ Pressure

☐ Flow

Remove Controller

Update Controller

Update Site Controller



1:27 PM

5/15/2013



# Camera image

Iwapi Spray System Detail - Windows Internet Explorer provided by Colorado DOT for v7

<http://my.iwapi.com:8080/MDSSAVL/SNSprayStatus.jsp?serialnumber=iwapiC55009600174>

Iwapi Spray System Detail

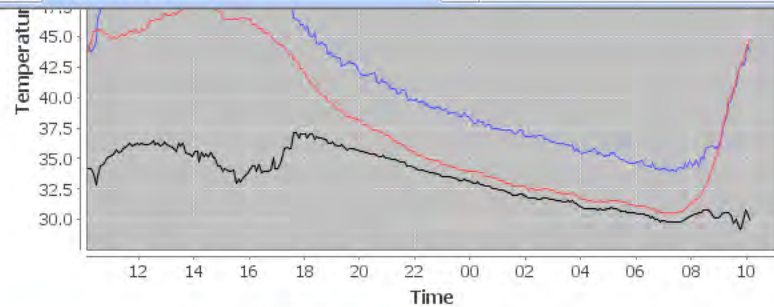


Image Stored At: 2010-10-14 10:04:22 MDT

Done

Internet | Protected Mode: On

100%

Windows taskbar showing open applications: Inbox - Microsof..., Vaisala training ..., \\r4maintweb\P..., Home - R4 Main..., Iwapi AVL - Win..., Iwapi Spray Syst..., Maintenance De..., and system clock: 10:09 AM.

# I-25 over St. Vrain River



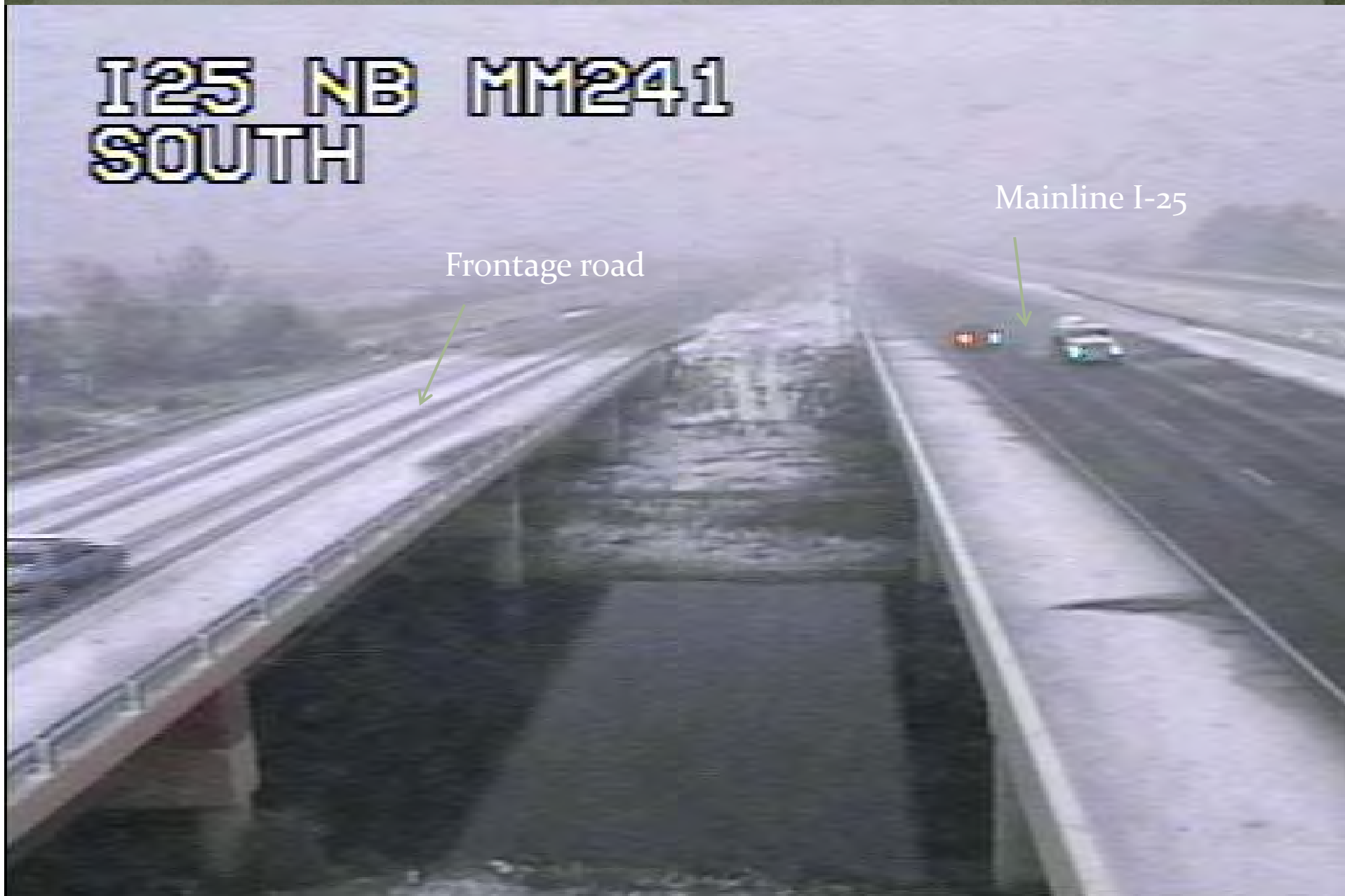


# I-25 over St. Vrain River

**I25 NB MM241**  
**SOUTH**

Frontage road

Mainline I-25



# State Highway 66 over I-25



Vault- below ground

Electronics- above ground



# State Highway 66 over I-25 (10-28-09)

I25 NB MM243  
WEST





Sleepy Hollow Bridge-  
US 34 Big Thompson  
Canyon over the river





# 119 Crossing the Saint Vrain River

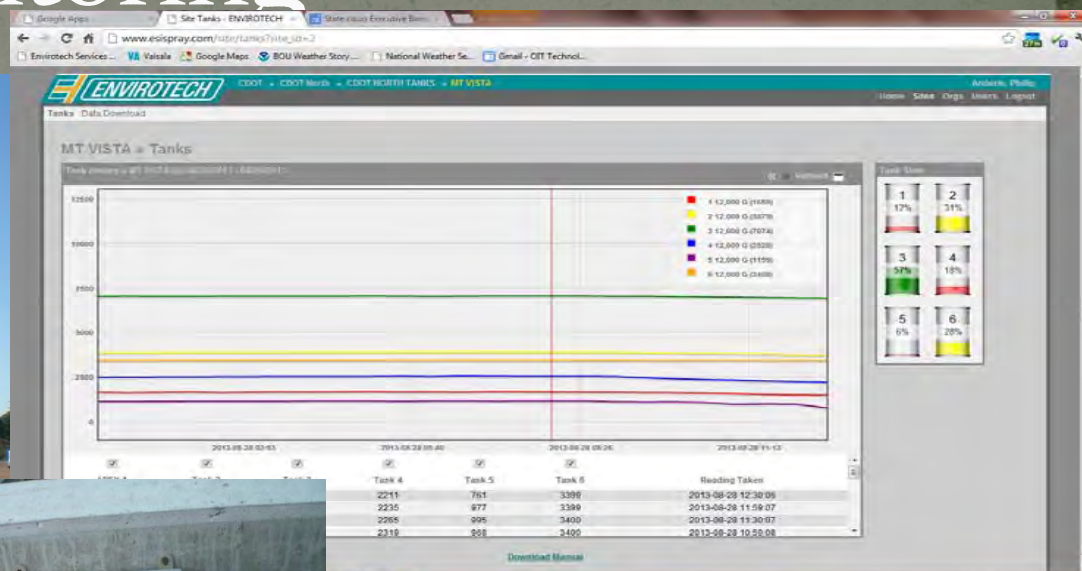


# Mobile applications





# Tank farm Monitoring



8/28



8/28/2013 8:45



8/28/2013 8:41



8/28/2013 8:46



# TowPlows and 14' plows (1 pass plowing)

3 units so far consisting of 2 combo units and one all liquid unit.





## Materials use in R4

- Mag Chloride- \$.64 per gallon
- Cold Temp Mag Chloride- \$.73 per gallon
- Ice Slicer/Sand mix 7%- up to \$32.00 per ton
- Wet sand at 4 gallons of thick cold temp mag per ton- as low as \$10.37 per ton
- Ice Slicer- up to \$119.75 per ton

# MDSS saves money and materials

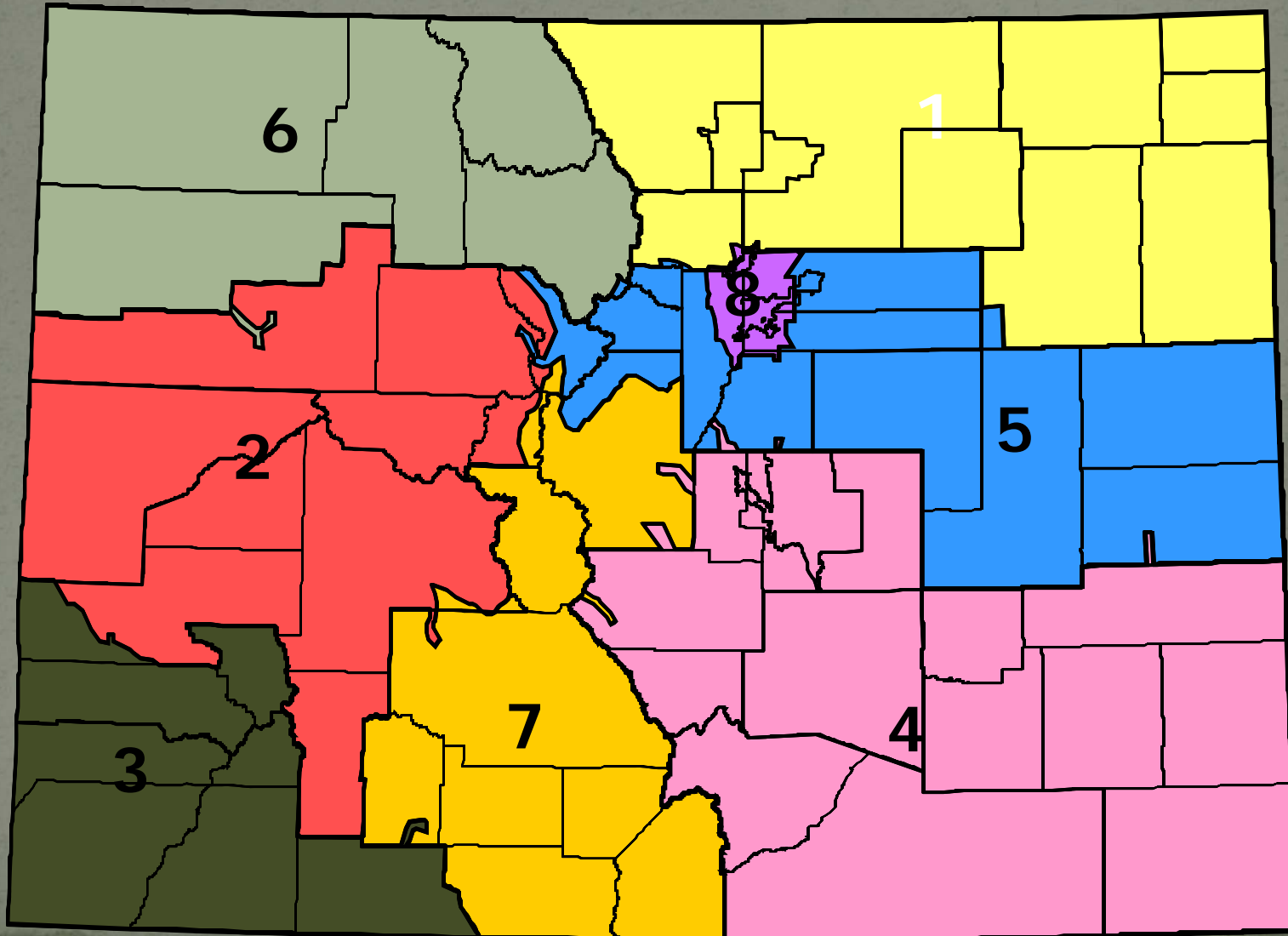
- [F:\Before and After MDSS \(1\).xlsx](#)
- 3 year average before MDSS \$5,321,000
- 3 year average after MDSS \$4,300,000
- 3 year average before MDSS on materials \$259,000
- 3 year average after MDSS on materials \$233,000
- 3 year average before MDSS for equipment \$1,046,000
- 3 year average after MDSS for equipment \$938,000



# Research Projects

- Thermal mapping
- Route Optimization
- Traffic patterns related to snow removal efforts
- Friction as a Levels of Service measurement (ITD)
- Product comparison using friction readings
- Living snow fence
- Cost benefit on FAST sites
  - For completed research findings, visit:
    - <http://www.coloradodot.info/programs/research>

# CDOT Maintenance Sections pre July 2013



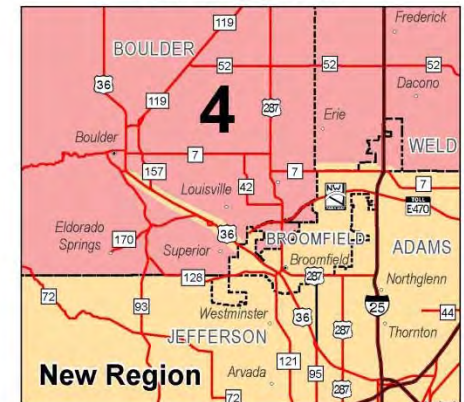


## CDOT Proposed Engineering Regions



- Toll Road
- Interstate Highways
- U.S. Highways
- State Highways
- County Seat
- Cities and Towns

### Boulder/Broomfield North Denver Metro Area

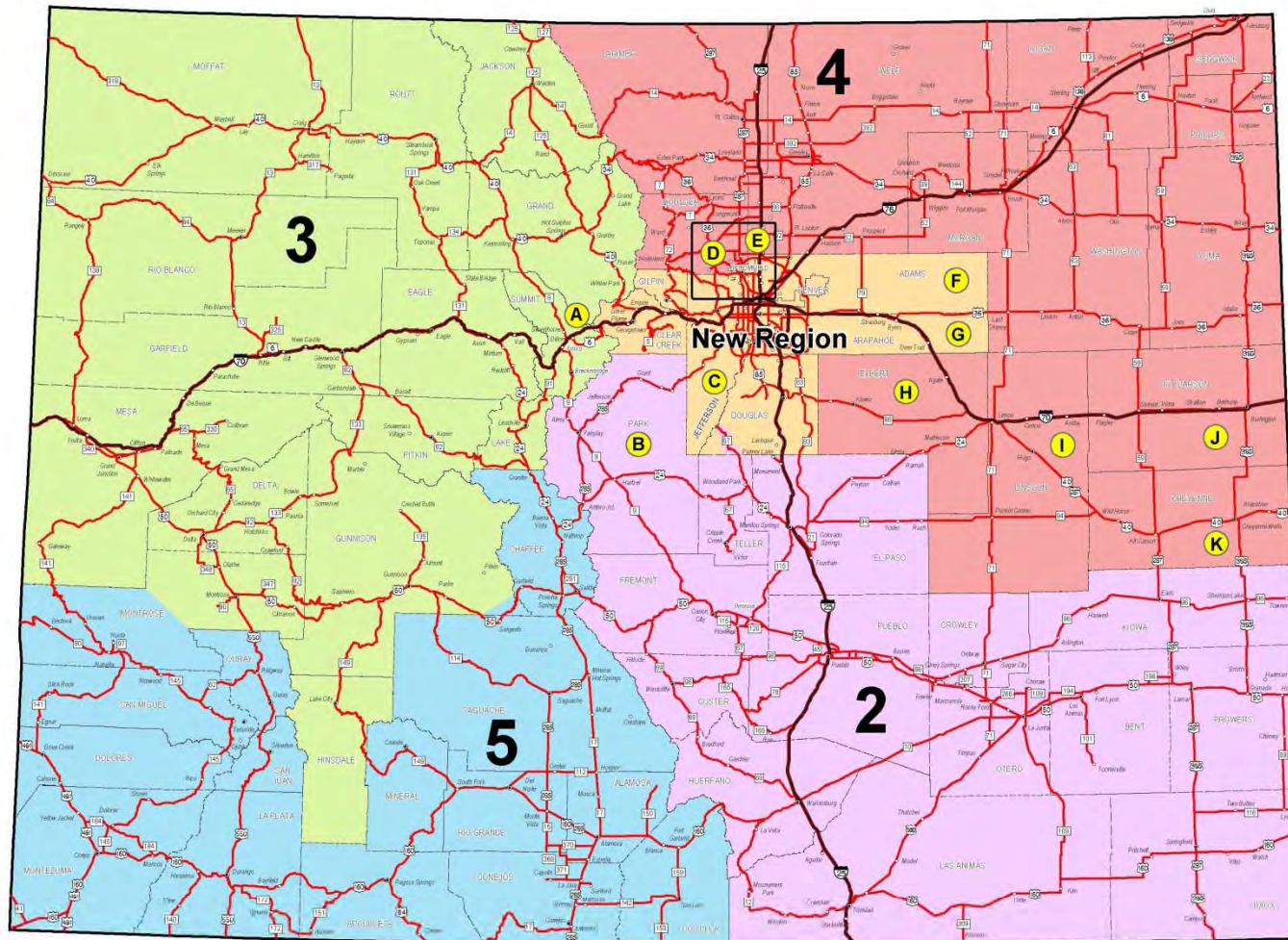


Data Source: CDOT 2012  
Published: December 19, 2012

The information contained in this map is based on the most currently available data and has been checked for accuracy. CDOT does not guarantee the accuracy of any information presented, is not liable in any respect for any errors or omissions, and is not responsible for determining "fitness for use".

**+2,115 lane miles**  
**9,677 R4 total &**  
**1,000 bridges**

**(K)** All of Cheyenne County will move from Region 1 to Region 4.



**(A)** Summit County moves from Region 1 to Region 3. Eisenhower/Johnson Tunnel is entirely in New Region.

**(B)** All engineering and maintenance of Park County to Region 2.

**(C)** All of Jefferson County will be in New Region.

**(D)** All of Boulder County will be in Region 4, with the exception of the US 36 corridor (south of Baseline Rd.) which will move to New Region.

**(E)** Majority of Broomfield County in New Region with the exception of a small portion north of SH 7 (see inset) remains in Region 4.

**(F)** All of Adams County will be in New Region.

**(G)** All of Arapahoe County will be in New Region.

**(H)** All of Elbert County will move from Region 1 to Region 4.

**(I)** All of Lincoln County will move from Region 1 to Region 4.



# Statewide numbers

- Center-line miles 9,161
- Lane-miles 23,106
- 3,775 Bridges
- Vehicle-miles traveled 28.6 billion
- Vehicle miles traveled (VMT) on all Colorado roads were 48.6 billion; VMT on state highways accounts for 59% of this total.
- The interstate system accounts for 10% of the total state system mileage, yet 40% of all VMT takes place on the interstate system.
- 1,800 maintenance workers statewide
- CDOT has approximately 950 snowplows statewide. We also use Loaders, Motor graders, Dozers, Helicopters and snow blowers to help combat snow.



APWA WESTERN  
**SNOW & ICE**  
CONFERENCE AND NATIONAL SNOW ROADED

There's No Business Like  
Snow Business





# Questions?



Phillip Anderle  
Deputy Superintendent  
CDOT, Greeley, Region 4  
970-350-2100  
[Phillip.anderle@state.co.us](mailto:Phillip.anderle@state.co.us)