



INTERNATIONAL ROAD DYNAMICS INC.



TACS

Tire Anomaly and Classification System – Experience in select States

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Tire Safety Issues

- Tires are the most frequent vehicle-related factor in fatal crashes
- In Oregon, 13 out of 42 (or 31%) of large truck mechanical crashes were due to tire failures in 2017

YEAR	NO. OF TIRE FAILURES
2014	16
2015	11
2016	13
2017	13

Tire Safety Issues

- Tire anomalies and flat tires
 - Decrease directional control
 - Increase the risk of catastrophic failure
 - Negatively impact tire life and fuel economy
- Mismatched and missing tires result in vehicle imbalance, improper load distribution, and potential safety issues.



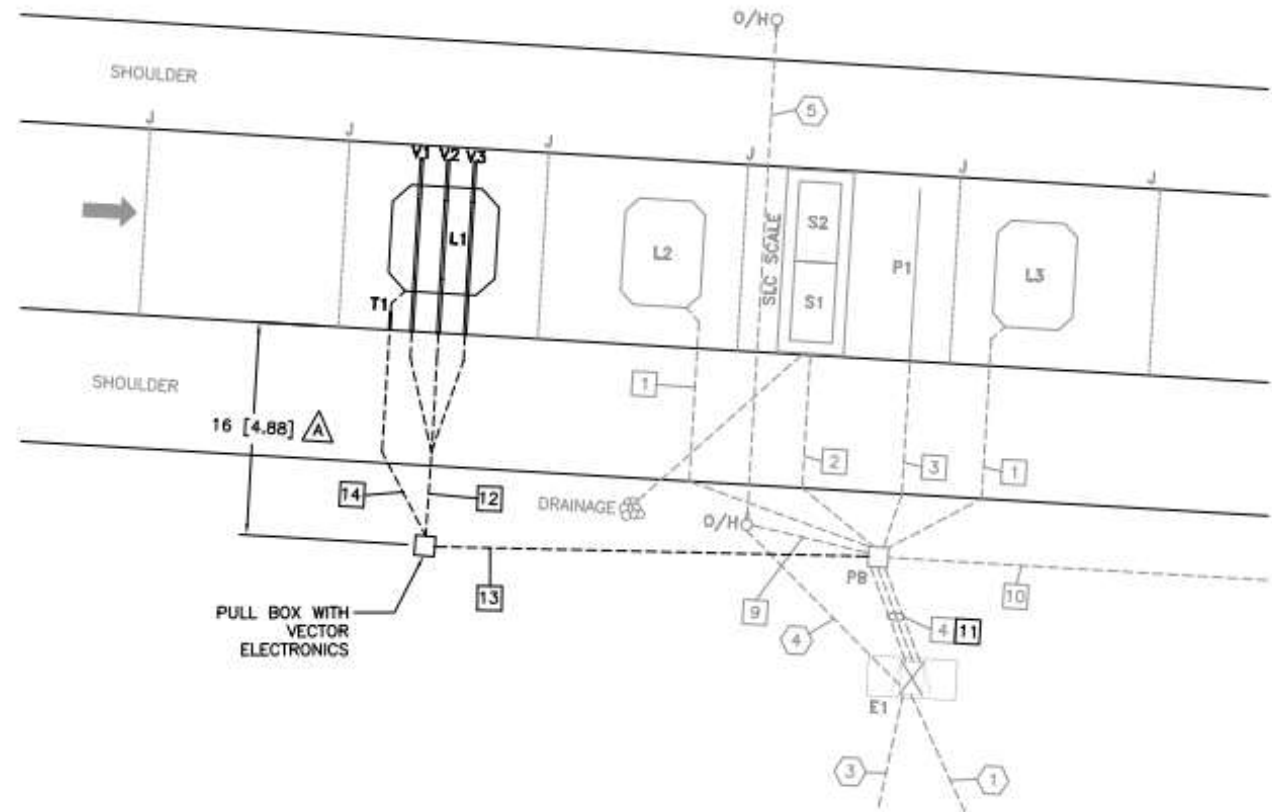
New Technology Approach for Identifying Tire Anomalies



- Supports the screening of commercial vehicles at weigh station facilities to identify those vehicles which are unsafe due to tire anomalies.
- Supports the identification of vehicles which are using wide based tires (including super singles) or single/dual tires.

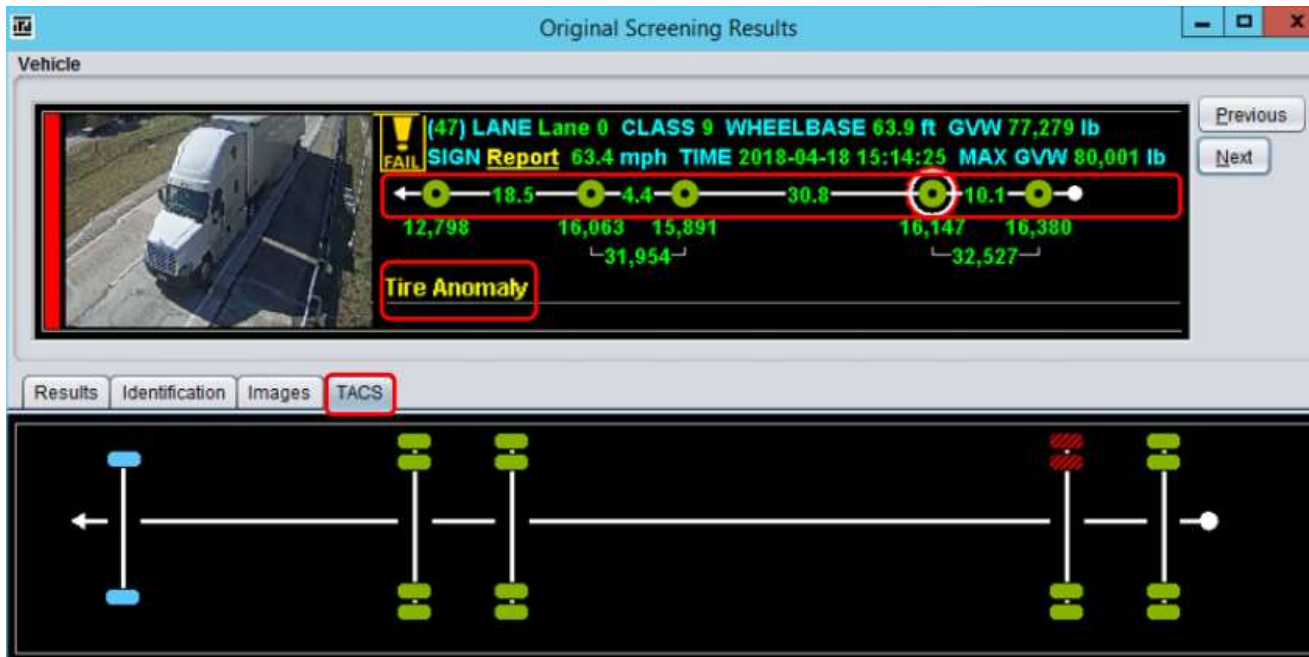
Tire Anomaly and Classification System (TACS)

- TACS consists of in-road sensors, electronics, roadside controller and scale house Operator Interface



Illinois DOT – TACS

- Integration with the existing GUI (Graphical User Interface) shows where an anomaly has been detected on a dual group with weight compliance



Indicates flat or missing tire on an axle.

Tire Results in TACS Tab



Single

Identifies single tire.*

Dual (Good)

No anomalies identified.

Dual (Anomaly)

Indicates anomaly.

* Tire anomaly detection is not currently available for this tire type.

Detection of Actual Tire Problems by TACS



Implementation

TACS™




Detected Tire Problems OK

Oklahoma Kay POE - January 1, 2018 to March 4, 2018						
Week #	ML Total CMVs	ML TACS CMVs	ML TACS %	Ramp Total CMVs	Ramp TACS CMVs	Ramp TACS %
1	12687	247	1.95%	4436	84	1.89%
2	12450	270	2.17%	4592	91	1.98%
3	14612	221	1.51%	4734	67	1.42%
4	14228	275	1.93%	5008	72	1.44%
5	14356	258	1.80%	5152	70	1.36%
6	14350	306	2.13%	5088	88	1.73%
7	14501	238	1.64%	5206	62	1.19%
8	13358	275	2.06%	2859	41	1.43%
9	14845	233	1.57%	5767	77	1.34%
Average	13932	258	1.85%	4760	72	1.51%

Tire Anomalies Report – Central Data Repository

- Data are collected in web based central data repository for reporting and data analysis
- Data and reports can be exported



Tire Anomalies by Class by Hour: Daily Report

Report start: May 17, 2018 12:00 AM Site: A16 Dordrecht Start class: 0 Lanes: ML_WIM
 Report end: May 17, 2018 11:59 PM Classification: Class at Site End class: 15
 Time Zone: America/Chicago (UTC-05:00)

May 17, 2018		Vehicle counts with tire anomalies																
Classification	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Unassigned	Total
Hour																		
0-1	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	3
1-2	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	4
2-3	0	0	0	0	0	2	2	0	2	1	0	0	0	0	0	0	0	7
3-4	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4
4-5	0	0	0	0	1	1	0	0	4	0	0	0	0	0	0	0	0	6
5-6	0	0	0	0	0	1	0	0	2	1	0	0	0	0	0	0	0	4
6-7	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	1	4
7-8	0	0	0	0	0	3	1	1	1	0	0	0	0	0	0	0	1	7
8-9	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
9-10	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	3
10-11	0	0	0	0	0	1	0	0	4	0	0	0	0	0	0	0	0	5
11-12	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
12-13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13-14	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
14-15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-16	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
16-17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18-19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19-20	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
20-21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21-22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22-23	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	0	0	6
23-24	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	3
Total vehicles with anomalies	0	0	0	0	2	10	4	2	32	8	0	2	0	0	0	0	2	62
Percent	0.00%	0.00%	0.00%	0.00%	3.23%	16.13%	6.45%	3.23%	51.61%	12.90%	0.00%	3.23%	0.00%	0.00%	0.00%	0.00%	0.00%	3.23%
Total vehicles	150	0	167	10097	91	2387	153	74	6941	616	36	19	0	0	0	0	0	20733
Percent	0.72%	0.00%	0.81%	48.70%	0.45%	11.51%	0.74%	0.36%	33.48%	2.97%	0.17%	0.09%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Applications for the Tire Anomaly and Classification System

- Pre-screening of commercial vehicles at weigh stations
- Classification of vehicles for statistical purposes
- Road Design – inputs based on vehicle wheel position on the roadway, number of super singles and dual wheels
- Truck Terminals – checking for tire anomalies when trucks depart or return to the terminal

Thank You

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Detected Tire Problems OR

Woodburn, Oregon Weigh Station April 1, 2018 to July 7, 2018				
Week #	Date	Ramp Total CMVs	Ramp TACS CMVs	Ramp TACS %
1	1 Apr - 7 Apr	11336	131	1.16
2	8 Apr - 14 Apr	10730	152	1.42
3	15 Apr - 21 Apr	12826	160	1.25
4	22 Apr - 28 Apr	11602	142	1.22
5	29 Apr - 5 May	9649	121	1.25
6	6 Apr - 12 May	9598	106	1.10
7	13 May - 19 May	11972	149	1.24
8	20 May - 26 May	6296	67	1.06
9	27 May - 2 Jun	7727	109	1.41
10	3 Jun - 9 Jun	7659	115	1.50
11	10 Jun - 16 Jun	10550	140	1.33
12	17 Jun - 23 Jun	9305	121	1.30
13	24 Jun - 30 Jun	12136	159	1.31
14	1 Jul - 7 Jul	8217	114	1.39

TACS Results IL

Date [2018]	Vehicle Count	TACS Count	%
6 May – 12 May	9129	105	1.15
13 May – 19 May	8546	93	1.09
20 May – 26 May	9551	117	1.23
27 May – 2 Jun	6676	67	1.00
3 Jun – 9 Jun	3423	36	1.05
10 Jun – 16 Jun	8857	109	1.23
17 Jun – 23 Jun	8745	110	1.26
24 Jun – 30 Jun	9110	119	1.31
1 Jul – 7 Jul	4771	83	1.74
8 Jul – 14 Jul	8989	118	1.31
15 Jul – 21 Jul	9122	106	1.16
22 Jul – 28 Jul	9336	104	1.11
29 Jul – 4 Aug	7815	78	1.00
5 Aug – 11 Aug	5724	70	1.22

TACS™ – Validation / Inspected Vehicles

- 73 flats flagged in by the system and inspected:

70 flat tires



3 Mismatched Tires

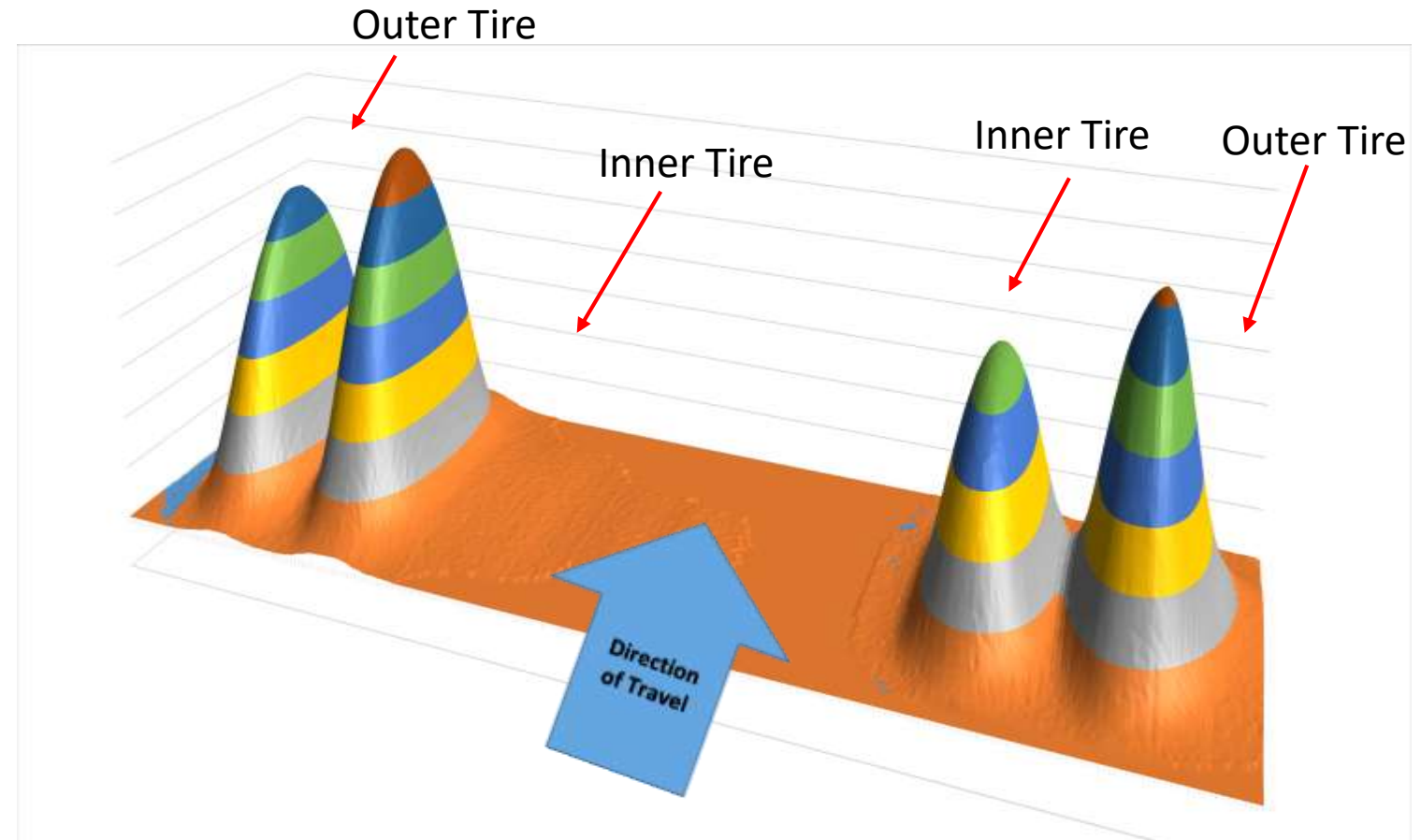


Vehicles on Ramp During Test	Flats flagged by system during Test	Flats inspected (and confirmed)
January 23: 262	8	5/5 Flats confirmed
January 24: 712	8	8/8 Flats confirmed
January 25: 609	14	12/12 Flats confirmed
January 26: 327	10	7/7 Flats confirmed

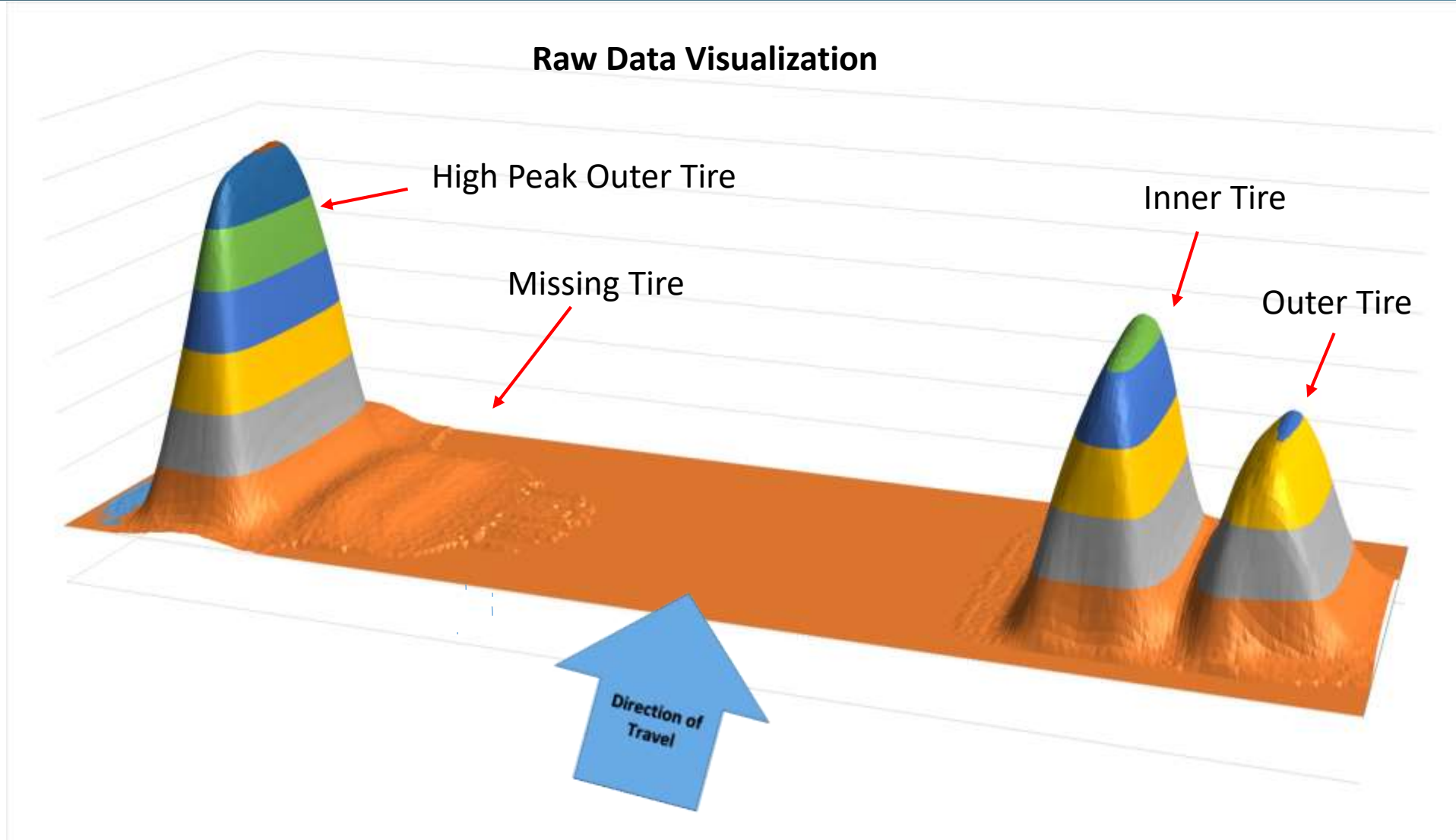
Dual Tire Identification

- Time Domain Reflectometry (TDR) based sensor technology that gives positional data based on the contact between the tire and the road.

Raw Data Visualization

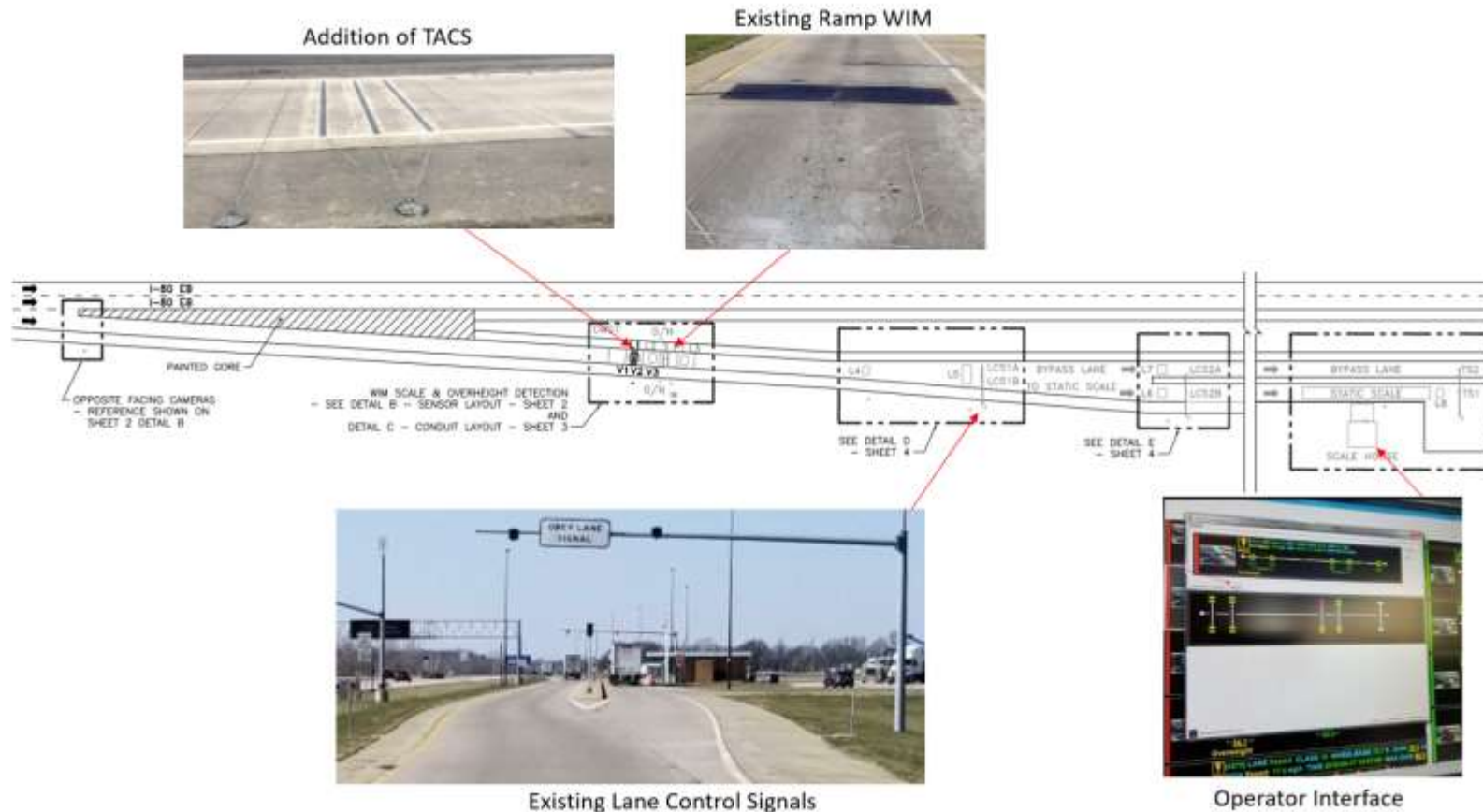


Missing Tire



Tire Anomaly and Classification System (TACS)

- Initiated a Pilot Project to install a Tire Anomaly and Classification System (TACS) for screening of commercial vehicle tires at the I-55 Williamsville Weigh Station
- Upgrade of existing Ramp Weigh-In-Motion (WIM) Screening System to for tire safety screening



Illinois DOT I-55 Williamsville Weigh Station - TACS

- Integration with the GUI (Graphical User Interface) shows where an anomaly has been detected on a dual group



Screened for potential violation

Warning of type of violation(s)

TACS Tab to provide details

