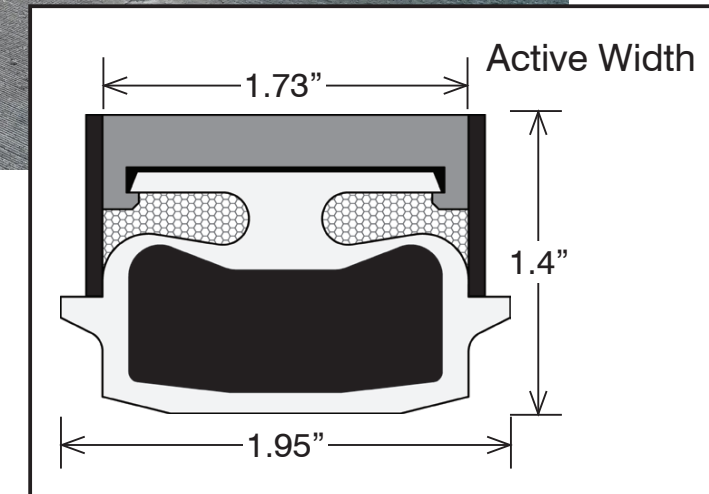
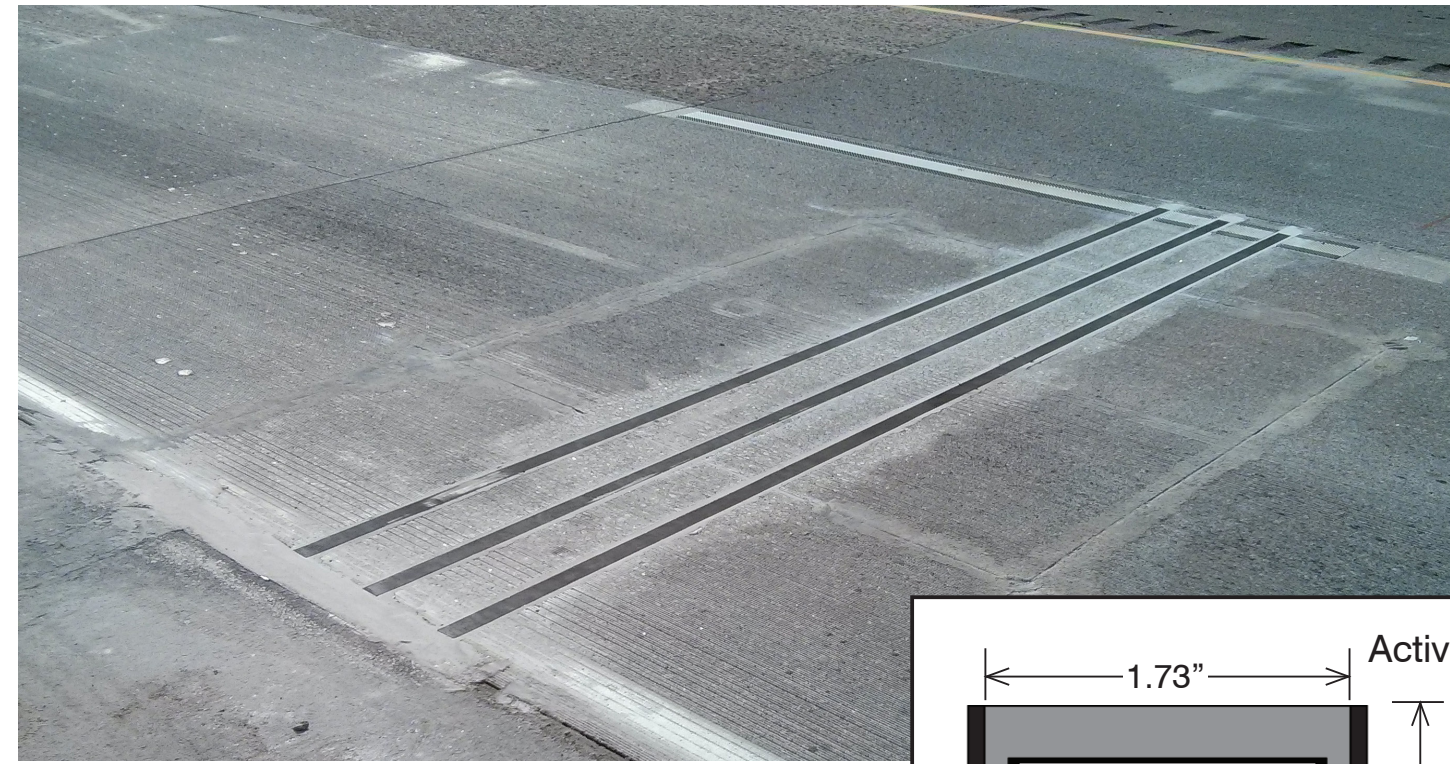


IRD VectorSense™ Technology: Enhancing Existing Traffic Information Systems

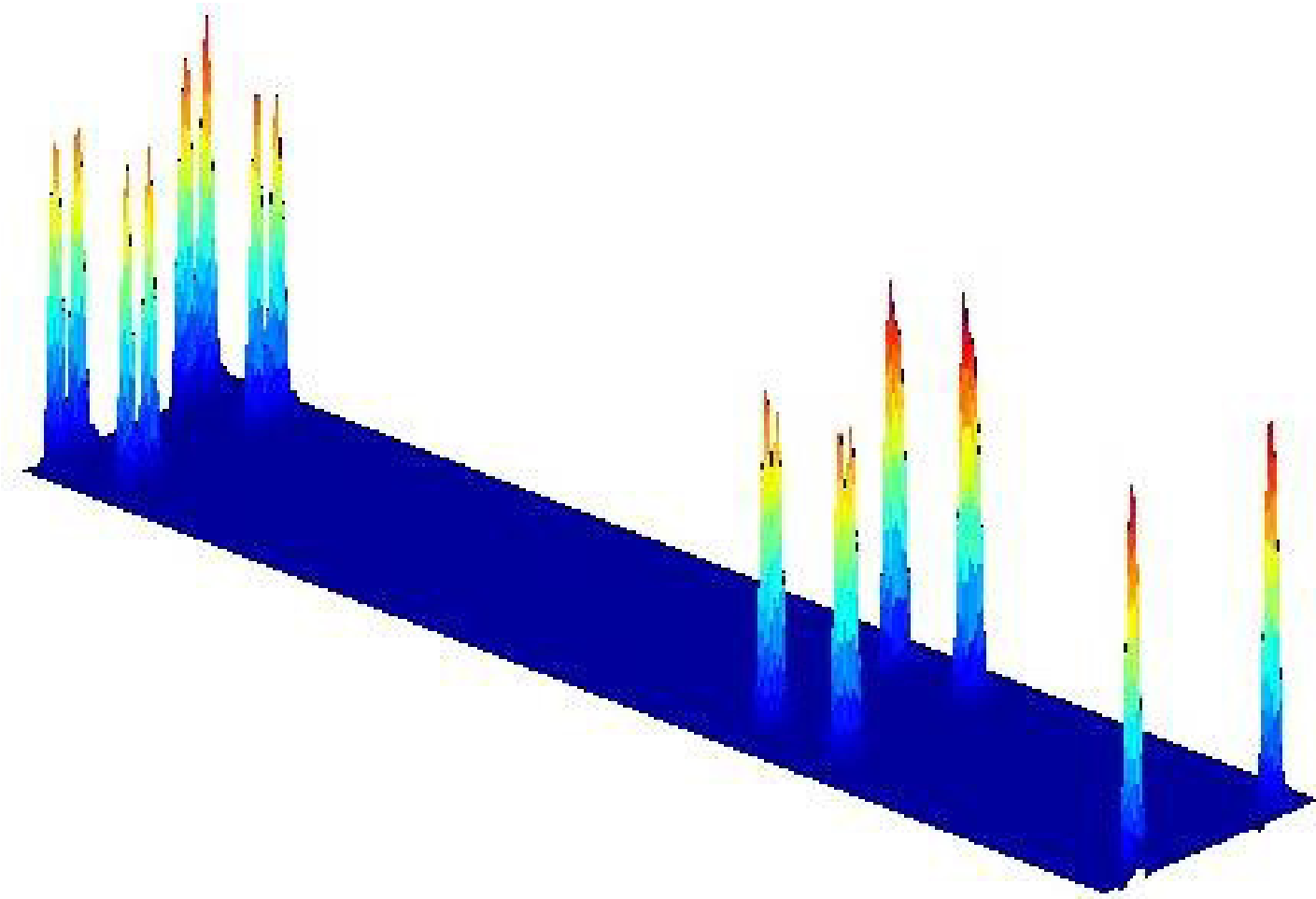
Randy Hanson, Roy Czinku, International Road Dynamics

VectorSense Sensor Configuration and Size

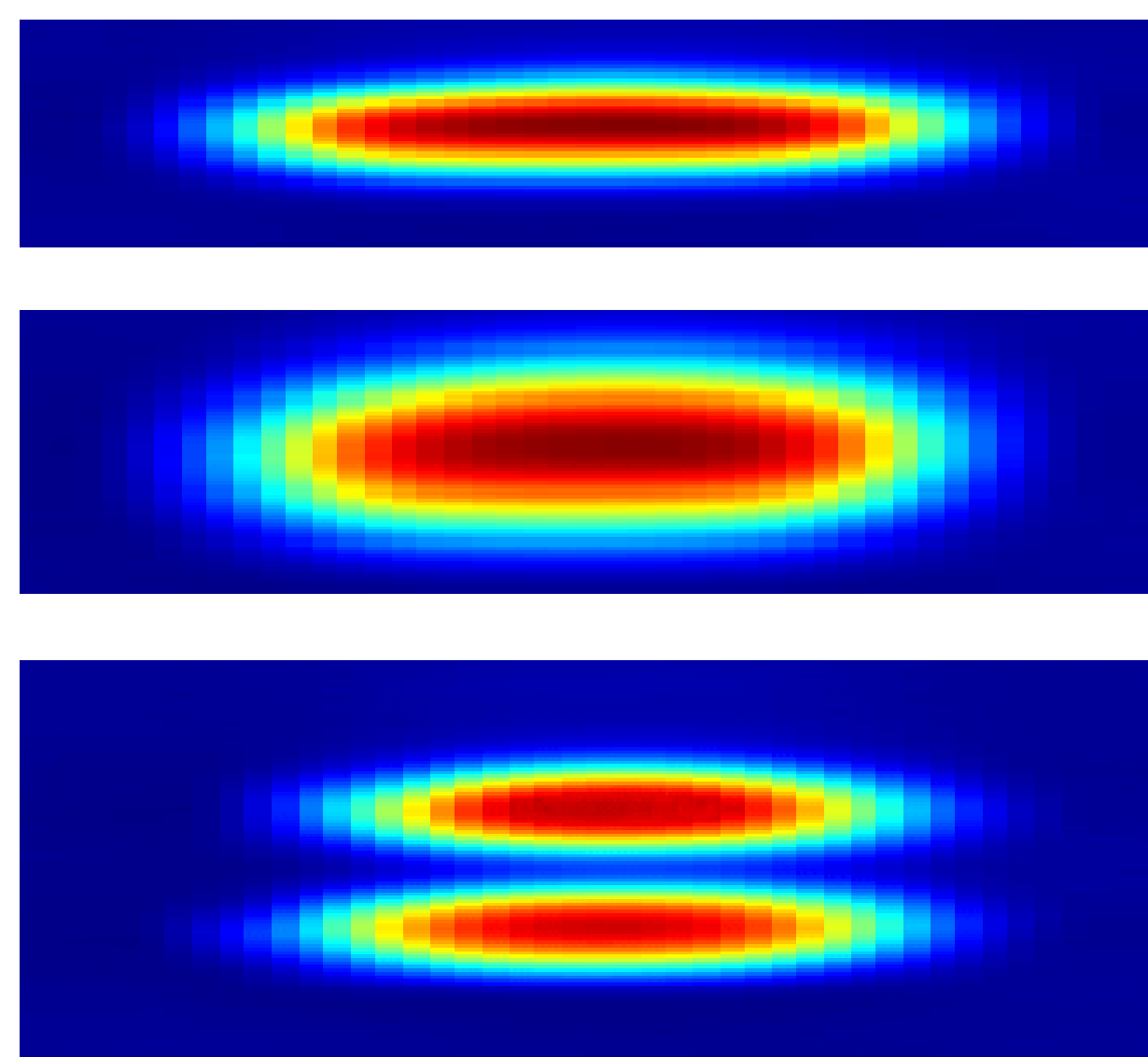
- A suite of three sensors was installed at the MnRoad Test Facility with the objective of collecting tire footprint data.



VI²M creates a vehicle record from multiple tire footprints

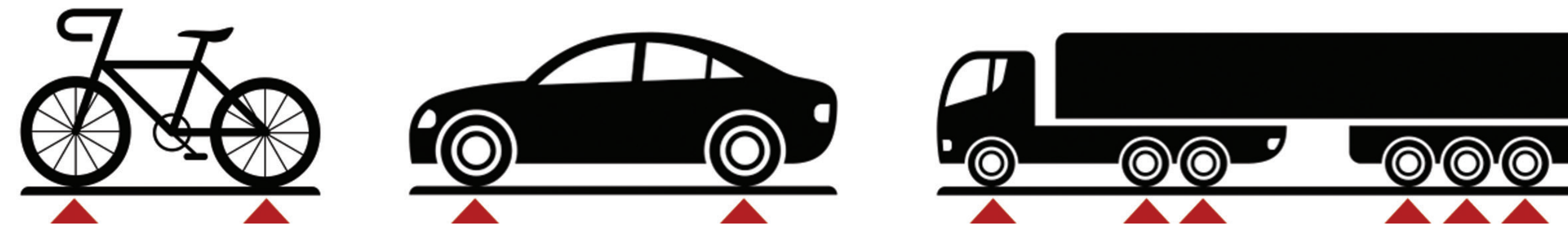


Contact Area – Single Tires, Super Single, Dual



Vehicle Information in Motion (VI²M™)

- VI²M is an enhanced traffic data system that can function stand-alone or can augment existing vehicle count, classification, and Weigh-in-Motion (WIM) technologies with additional traffic data.
- VI²M provides previously unavailable traffic data information that satisfies Mechanistic Empirical Pavement Design Guide (MEPDG) requirements.
- VI²M differentiates between single standard tire width, “super single” tire width (also referred to as “single wide” and “wide base”) and dual tire configurations.
- VI²M can detect all types of vehicle configurations, including:
 - Two wheels (bicycles and motorcycles)
 - Three wheels (tricycles and motorcycles with unicycle trailers)
 - Oversized vehicles with nonstandard axle arrangements



VI²M™ can detect all types of vehicle configuration.

MNRoad Test Facility Wheel Type Study

Between December 2015 and March 2016, a VectorSense™ Sensor Suite collected data on over one million axles for analysis in the following areas:

- Dual and Super Single tire identification
- Lateral vehicle lane position
- Axle width measurement

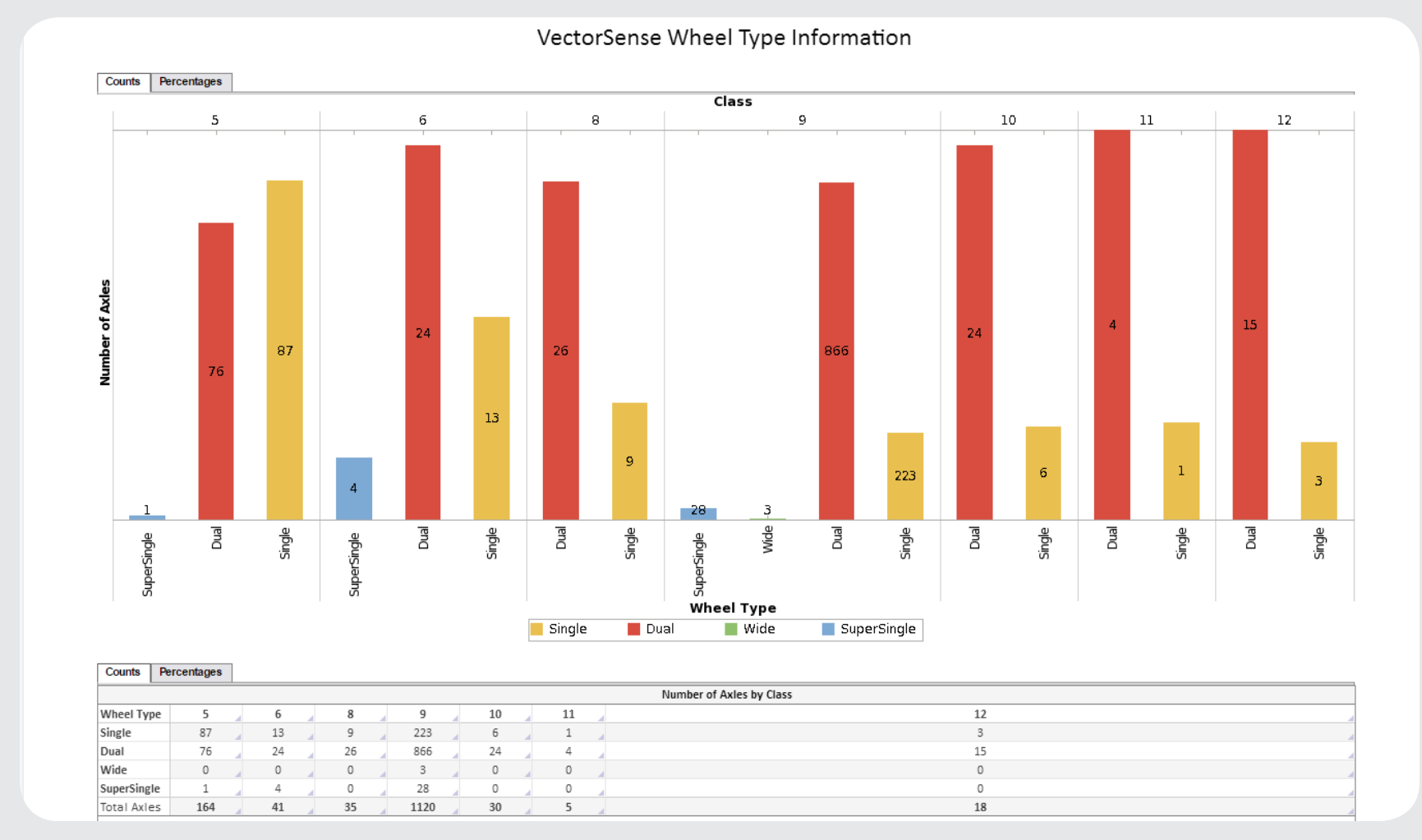
Data was collected by VectorSense and the vehicle records were sent to the cloud (AWS servers) for storage and analysis.

Four tire types were defined: single, dual, wide (between 27 and 32 cm) and super single (greater than 32 cm). The following distribution of Dual and Super Single was observed over all classes of vehicles:

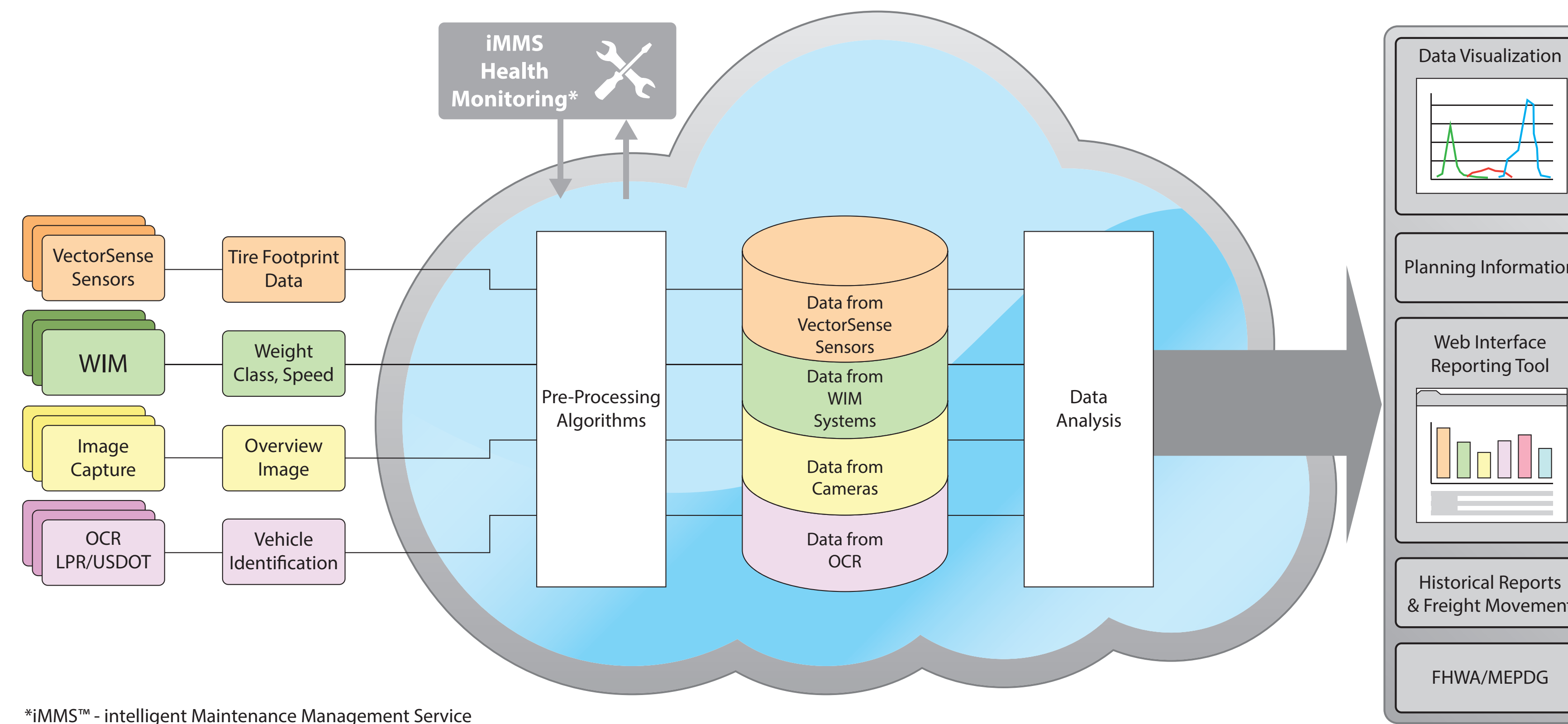
Total Axles	1,372,746	
Axles with Duals	322,807	23.52%
Axles with Super Singles	9,793	0.71%

The collected data was also used to conduct an analysis of the lateral vehicle lane position to determine the wheel paths over the sensor.

Finally, VectorSense was used to measure axle widths. This information was integrated with the vehicle record for the existing WIM system at MNROAD to provide a more complete picture of each vehicle being detected.

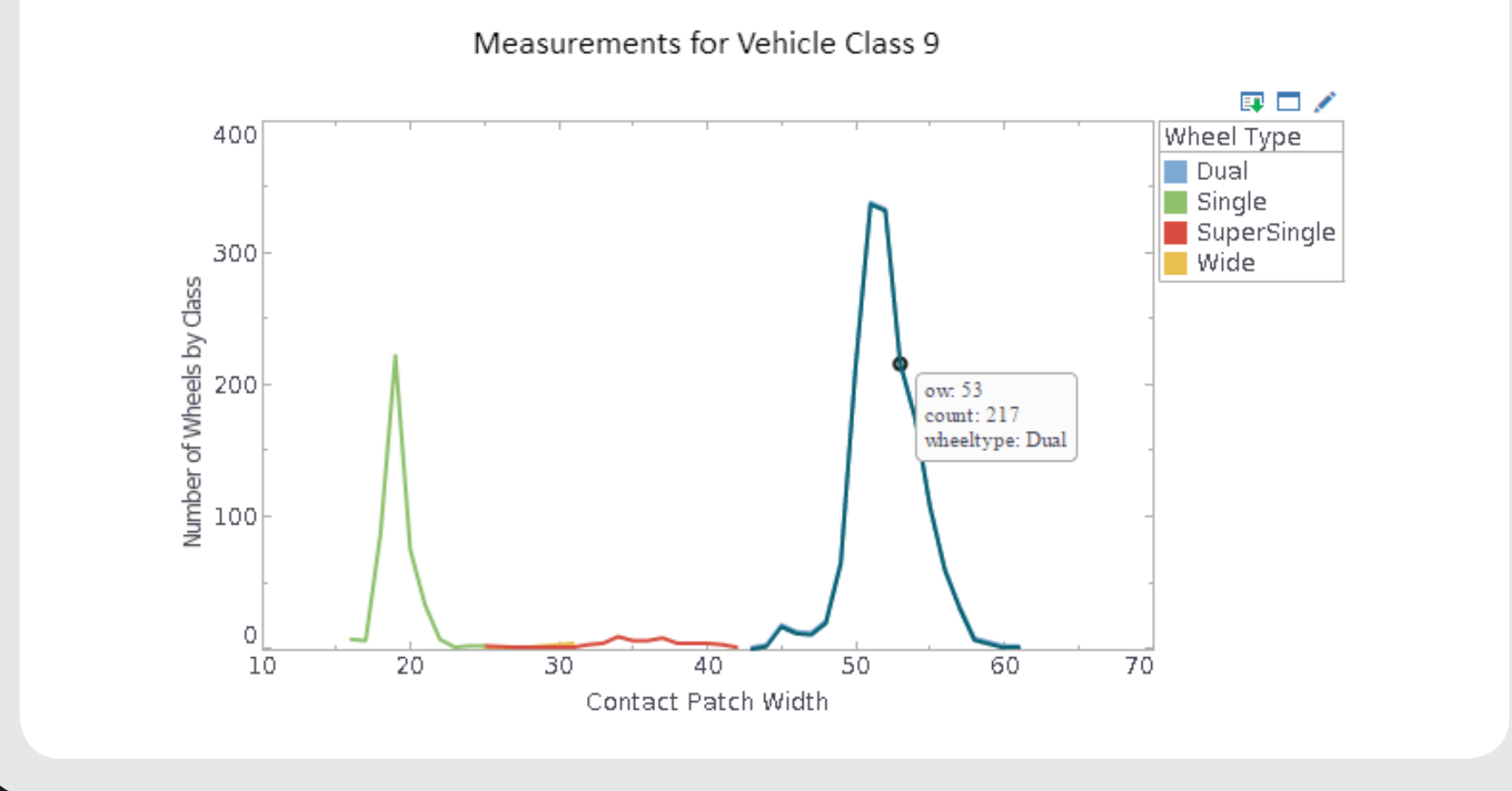


VI²M – Central Data Repository



*iMMS™ - intelligent Maintenance Management Service

VectorSense Wheel Measurement Information



VectorSense Wheel Path

