TDOT
Department of Transportation

Statewide Weigh-in-Motion Deployment

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Agenda

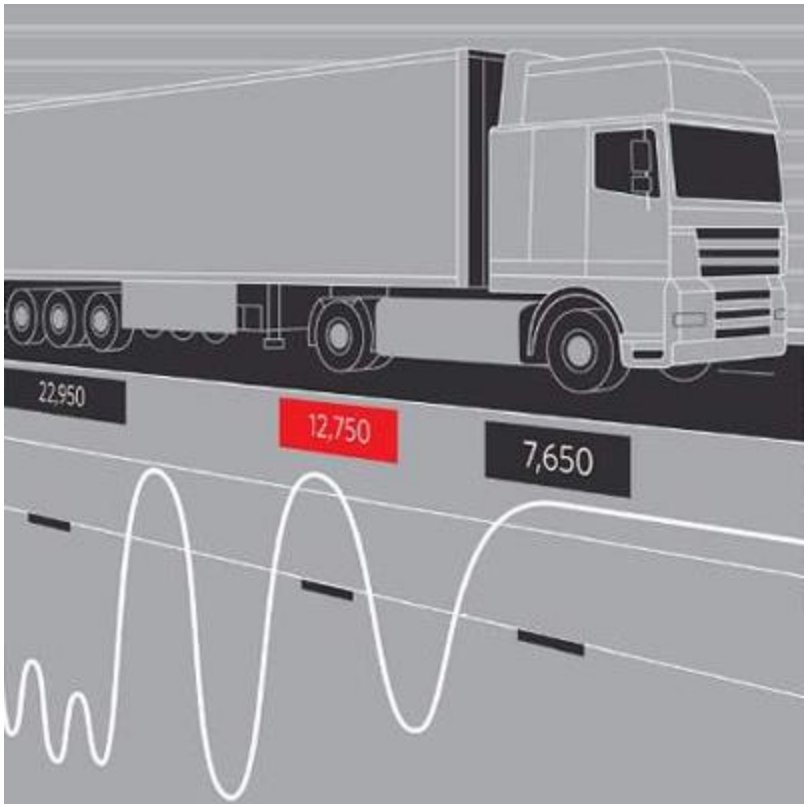
- WIM Introduction
- Uses Cases w/ TDOT & THP
- Technical Specifications
- System Components
- TDOT Statewide WIM Deployment Overview

WIM Intro & Use Cases

WIM Introduction

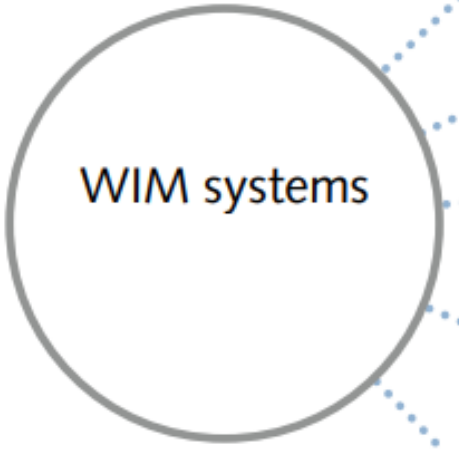
- Designed to capture and record **axle spacings and weights by wheel (single or dual tires), axle, and/or total vehicle (GVW)** as vehicles drive over sensors installed in a roadway or under a bridge.

- Weighing vehicles at normal operational speed makes the weighing process **more efficient and less disruptive** than pull-out permanent or portable static weigh stations that require vehicles to be stopped.



Source: FHWA

WIM Applications



- **Traffic data collection**
  for pavement design or load rate factor calculations; for bridge fatigue calculations
- **Bridge protection**
  to extend bridge lifetimes and reduce risk
- **Weight and tire enforcement**
  (preselection or direct enforcement) to increase traffic safety
- **Industrial truck weighing**
  for ports, mines, logistics zones and other industrial facilities; to invoice industrial goods by weight and check axle loads or total loads
- **Toll collection**
  (manual or electronic toll-by-weight) for fair weight-based charging

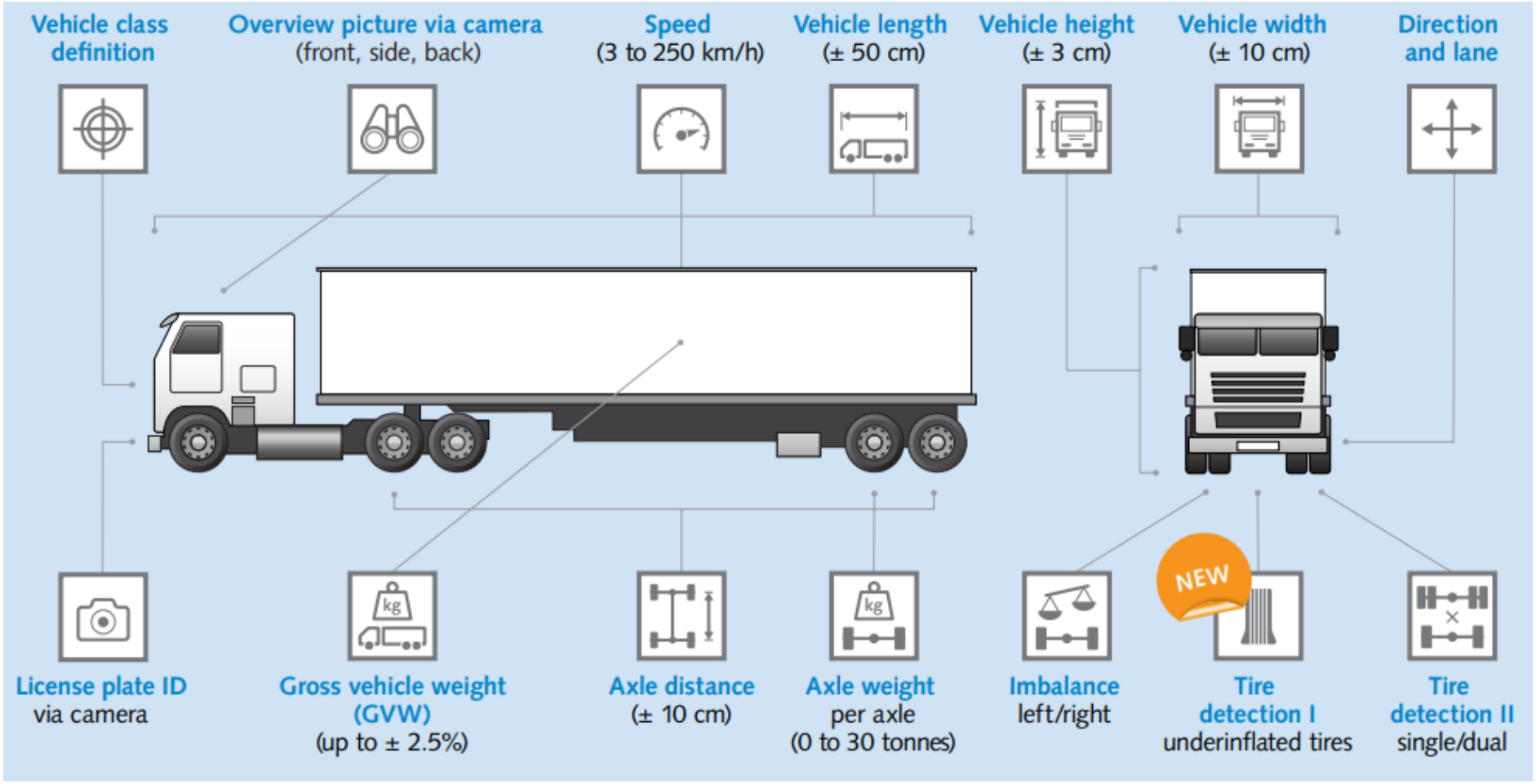
WIM Use Cases at TDOT

- Types of freight data intended to be collected for TDOT and its use at TDOT.
  - Weight of all vehicles
  - Accurate counts of trucks by class
  - Date Benefits
    - Comprehensive reporting
    - Useful in pavement and bridge design, monitoring and research
    - Useful in size and weight enforcement
    - Traffic monitoring
    - Freight flows (empty, partial and full trucks)
  - Reduced costs of road maintenance
  - Improved safety
  - Future freight planning

WIM Use Cases at THP

- Uses for Tennessee Dept. of Homeland Security and Safety
  - Safety – Does not hinder traffic flow
  - Higher degree of enforcement with overloaded trailers and axles
  - Increased productivity and efficiency

WIM System Data Options



Source: Kistler

WIM Specifications & Components

Standards and Performance Requirements

- ASTM E1318-09 is the primary WIM standard accepted in the U.S.. The ASTM E1318-09 standard classifies WIM systems according to **four distinct types**, depending on the application and functional performance requirements.

- **Type I and Type II systems:**
  - Suitable for traffic data collection purposes, with Type I systems having slightly more stringent performance requirements.
  - Vehicle speed range to meet functional performance requirements is 10 to 80 mph.

Source: FHWA

Standards and Performance Requirements

- **Type III systems:**
  - Suitable for screening vehicles suspected of weight limit or load limit violations and have stricter functional performance requirements than Type I and Type II systems.
  - Vehicle speed range to meet functional performance requirements is 10 to 80 mph.

- **Type IV systems:**
  - Not approved for use in the United States but intended for use at weight enforcement stations.
  - Vehicle speed range to meet functional performance requirements is 2 to 10 mph.

Source: FHWA

Standards and Performance Requirements

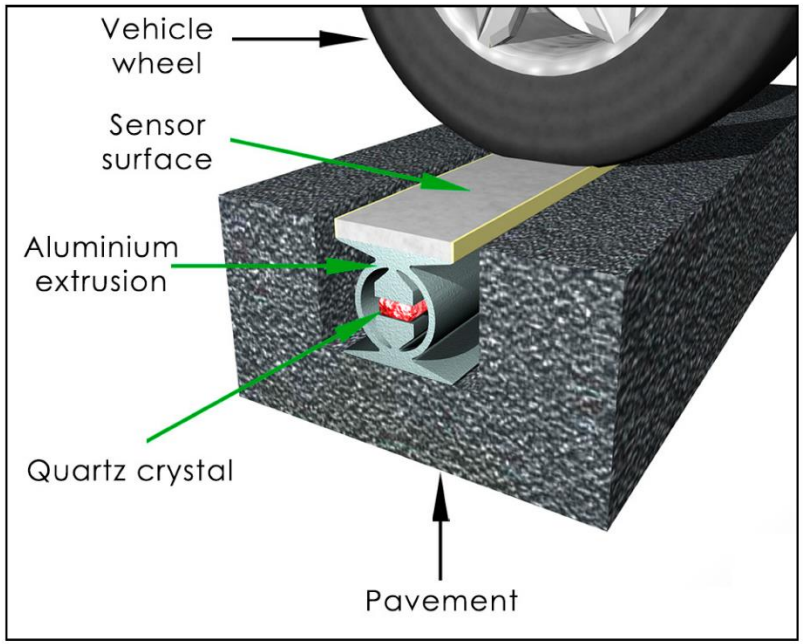
Function	Tolerance for 95% Compliance		
	Type I	Type II	Type III
Wheel Load*	±25%		±20%
Axle Load	±20%	±30%	±15%
Axle-Group Load	±15%	±20%	±10%
Gross Vehicle Weight	±10%	±15%	±6%
Speed	±1 mph		
Axle-Spacing and Wheelbase	±0.5 ft		

* Includes single or dual tires

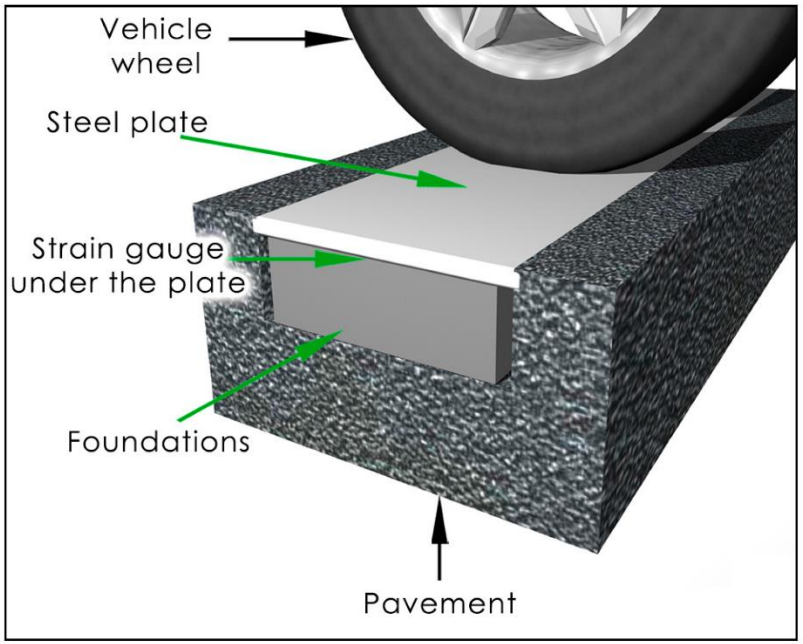
Source: FHWA

WIM System Components

- **WIM sensors** embedded in the roadway surface or placed on the surface or on/under a bridge deck to detect, weigh, and classify vehicles. Several types availible in U.S.



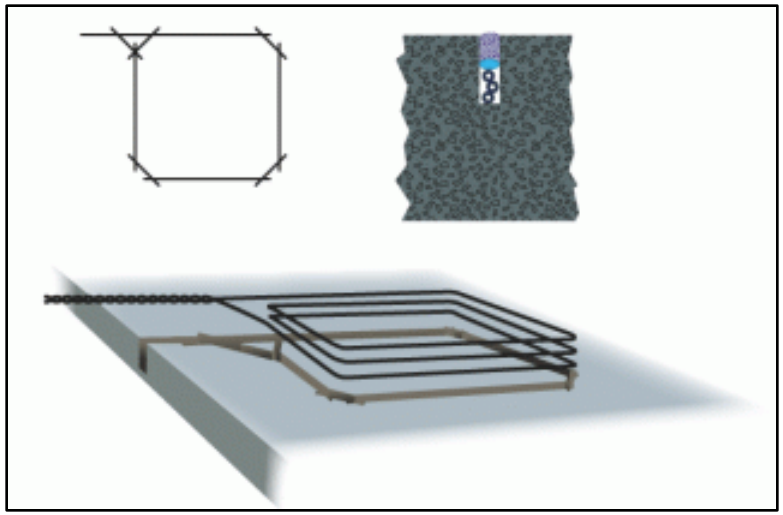
Quartz Sensor



Bending Plate Sensor

WIM System Components

- **Inductive loops** are frequently installed in the roadway as part of the WIM array. They consist of four parts:
  - a wire loop of one or more turns of wire embedded in the roadway pavement,
  - a lead-in wire running from the wire loop to a pull box,
  - a lead-in cable connecting the lead-in wire at the pull box to the controller, and
  - an electronics unit housed in the controller cabinet.

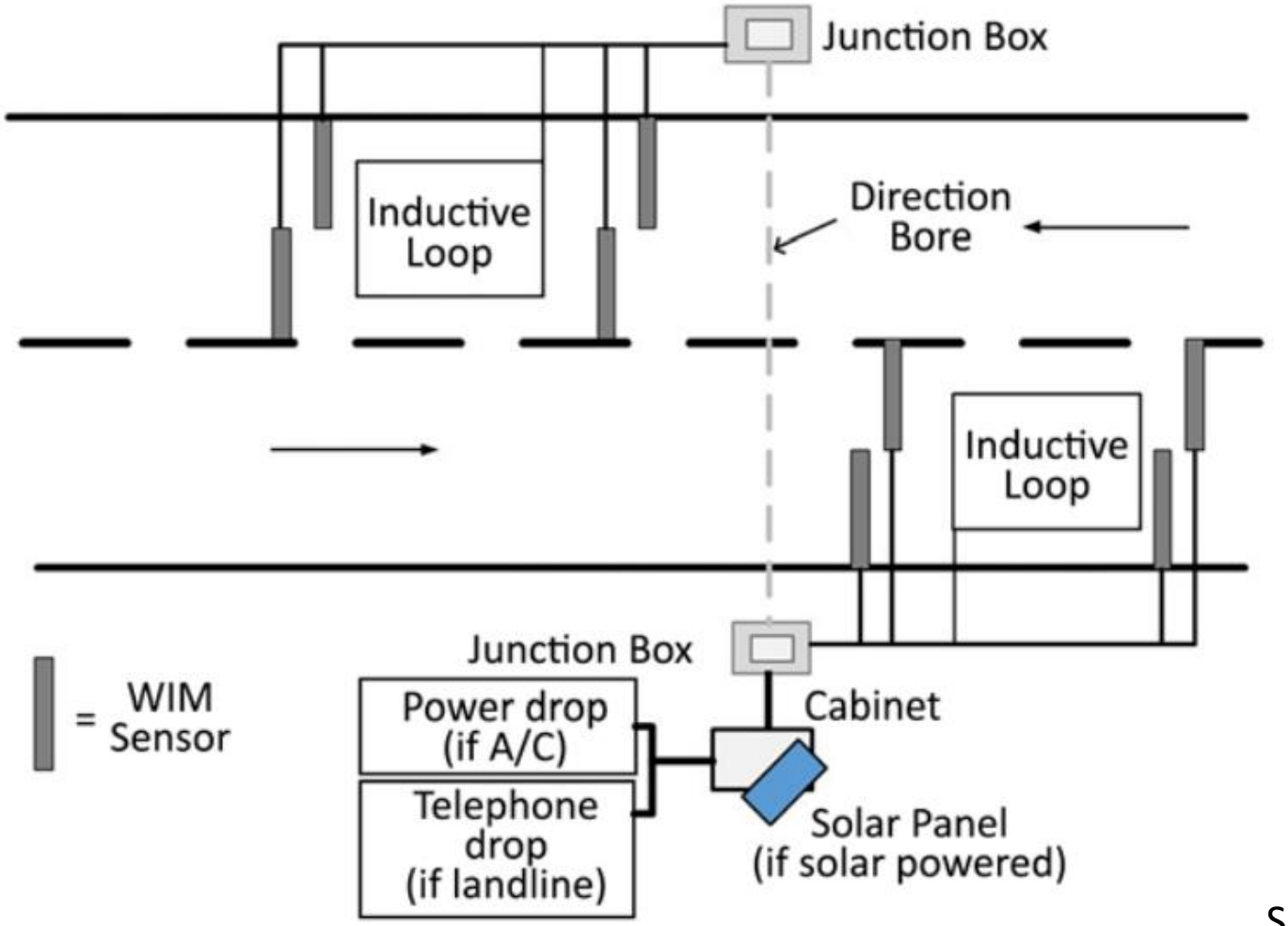


WIM System Components

- The **WIM controller**, supporting electronics, and **communications devices** are usually located in a roadside cabinet. Communication devices may include telephone jacks or a cellular modem.

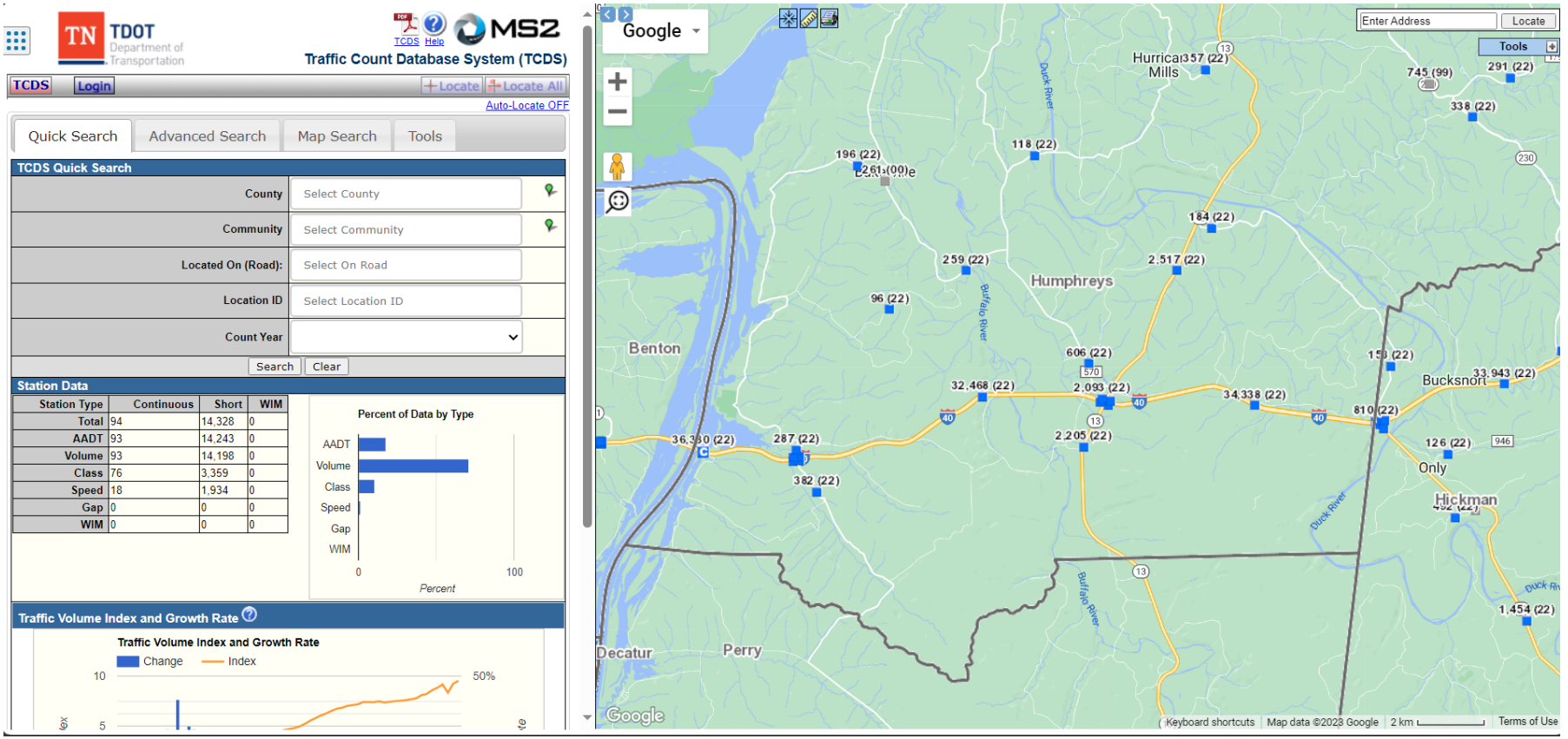
Source: FHWA

WIM System Typical Layout



Source: FHWA

TN-TIMES



- The Tennessee Traffic Information Management and Evaluation System (TN-TIMES) is an analytical, data processing tool used by TDOT to maintain, analyze, and report traffic data.

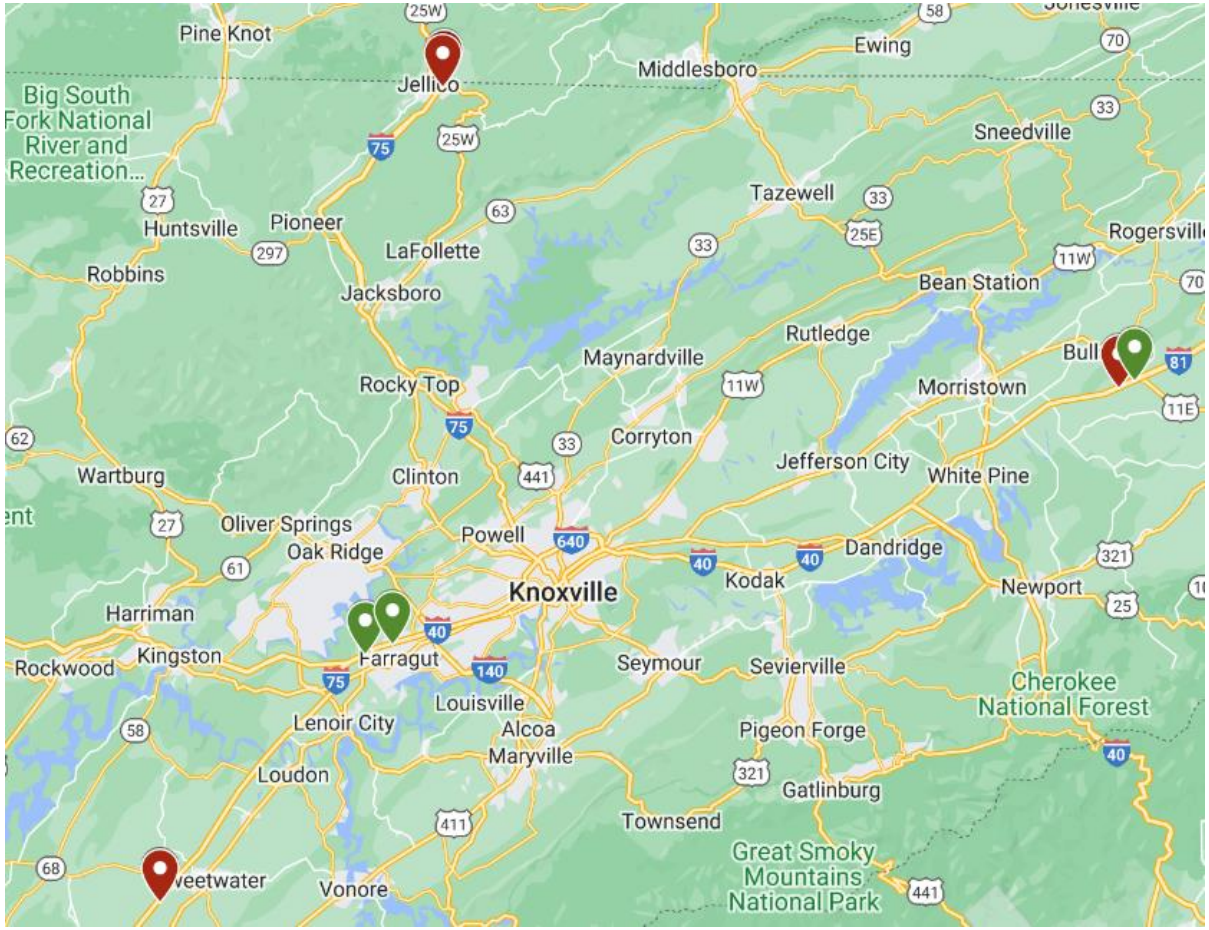
Statewide WIM Deployment Overview

WIM Site Locations

- 30 WIM site proposed throughout TN
  - 22 data collection sites
  - 8 data collection + enforcement sites
    - Near existing commercial vehicle scale complexes

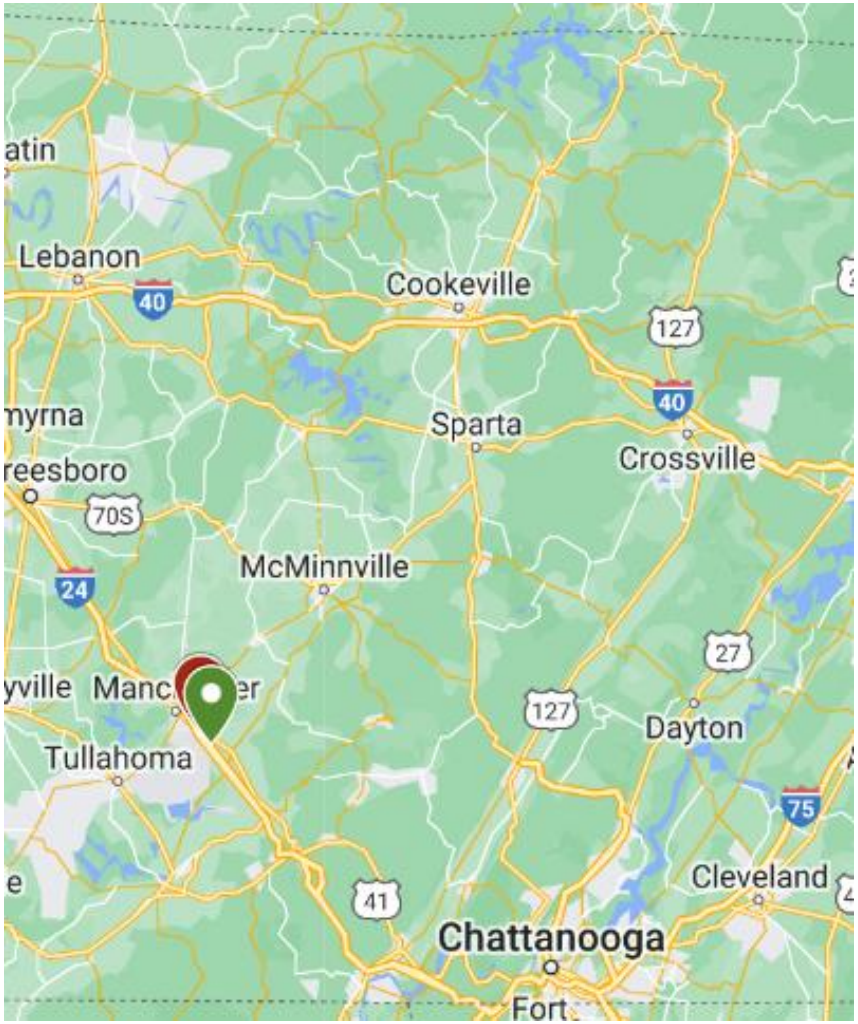
WIM Site Locations – Region 1

- Campbell I-75 (2)
- Greene I-81 (2)
- Knox I-40 (2*)
- McMinn I-75 (2*)



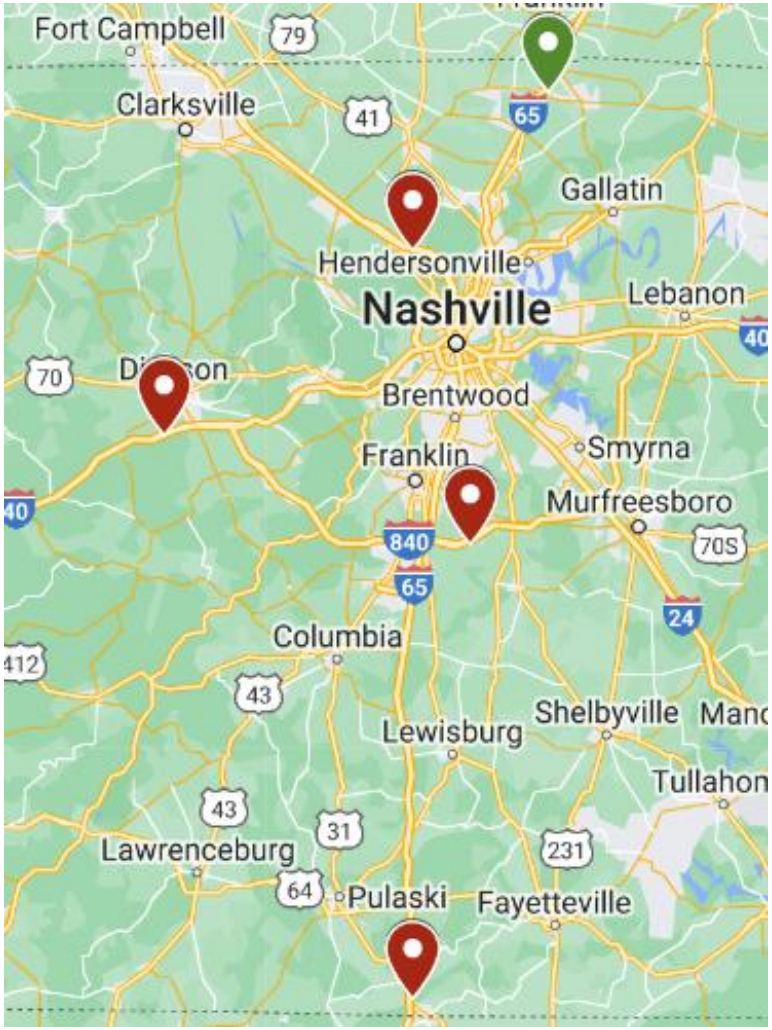
WIM Site Locations – Region 2

- Coffee I-24 (2*)



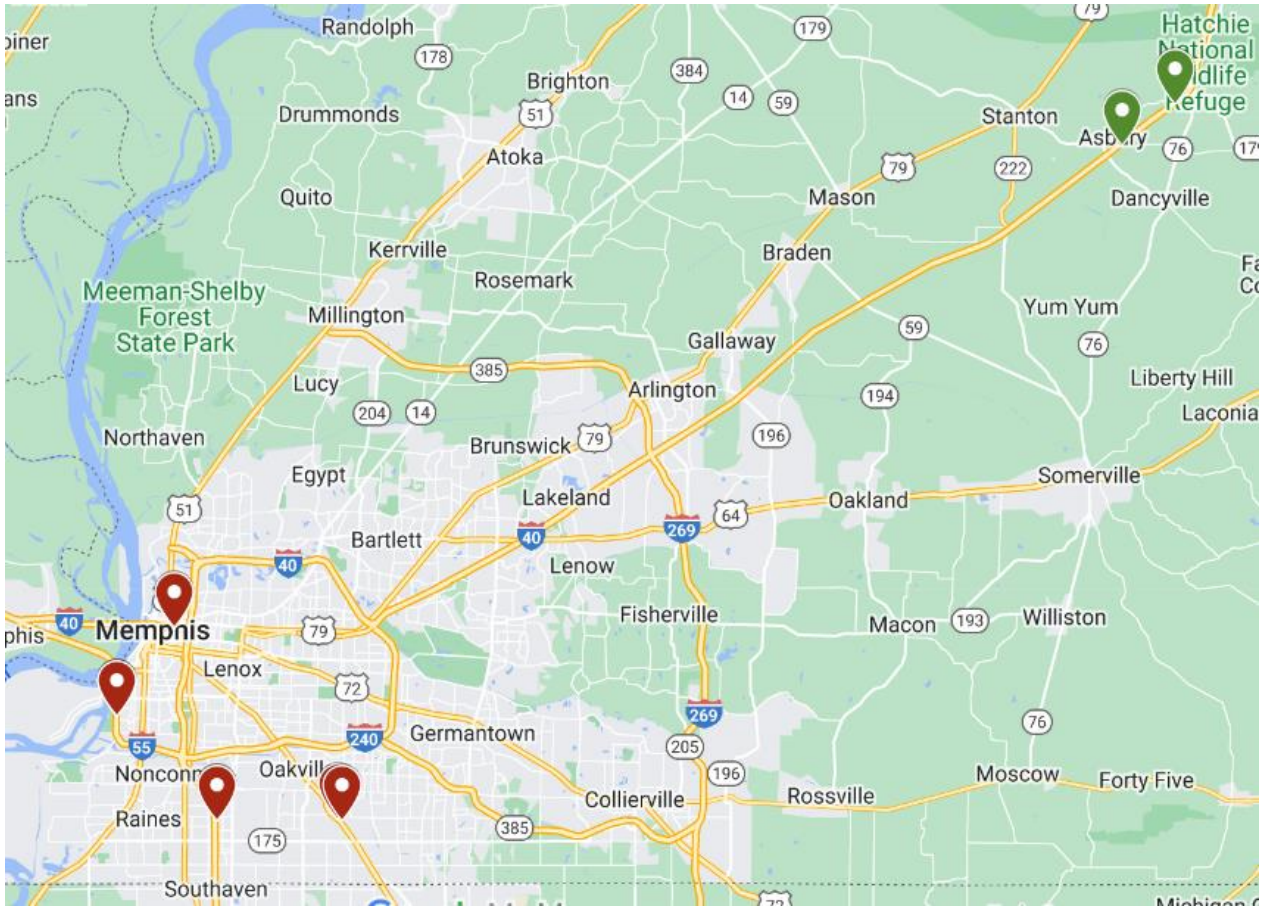
WIM Site Locations – Region 3

- Davidson I-24 (2)
- Dickson I-40 (2)
- Giles I-65 (2)
- Robertson I-65 (2*)
- Williamson I-840 (2)



WIM Site Locations – Region 4

- Shelby I-40 (2)
- Shelby I-55 (4)
- Shelby SR-4 (2)
- Haywood (2*)



Thank you!