Improving Traffic Detection Through New Innovative i-LST Technology Demonstration Pilot (2022) - Pooled Fund

Background

Current traffic monitoring practices primarily focus on counting the number of vehicles, classifying vehicles by length or axle arrangement, and weighing vehicles. Additional critical information such as body type (tractor and/or trailer) is not readily captured due to technology limitations. However, body type data and information are vital for goods movement and freight analysis as different commodities are transported by different vehicles. For example, perishables and other temperature-sensitive goods are carried by the so-called reefer, a sealed trailer with a refrigerated unit to keep the truck contents at a cooled temperature. Liquids and gases are typically transported by tanker trucks. Flatbed trailers have open decks with no roofs or sides, offer the greatest flexibility to carry not only oversized goods but also a wide range of other freight. Intermodal trucks carry standardized ocean containers. Dry freight trailers provide significant protection to the freight being moved from both inclement weather and other detrimental effects. In addition to the body type identification challenge from current traffic monitoring technologies, current practices also miss the highly desired data regarding the trave time and on/off points where vehicles enter or exit a roadway network, such as where and when a given truck enters or exits a particular highway. Information like this is vital to modeling and projecting vehicle routing associated with demand analysis.

The proposed pool fund study will deploy and demonstrate a set of effective technologies previously developed through the U.S. Department of Transportation Small Business Innovation Research (SBIR) program (SBIR: [Measuring Traffic Performance with the Inductive Loop Detector Signature Technologies | SBIR.gov](#)) to capture not only the legacy traffic monitoring data items but also additional body type and system usage information. The new to be deployed technology requires no new-on-the-roadway physical activities. The new technology relies on utilizing existing roadway embedded loop sensors to gain all needed data.

Objective:

Demonstrate the loop signature technology (inductive Loop Signature Technology: i-LST) over various corridors across the US to demonstrate application of new effective and comprehensive data collection methods.

Project Description:

FHWA seeks partnerships with State DOTs and MPOs to conduct a traffic monitoring technology demonstration project. The project will enable participating agencies to gain additional data and information (e.g., detailed 100+ vehicle classifications and trailer body types, freight network travel characteristics) on top of the traditional counts and axle-based classification information. No physical in the roadway activities are needed. Any volume, classification or weigh-in-motion (WIM) location with loops in each lane can be used for this proposed pooled fund project.

Specifically, the project seeks agencies with candidate networks and freight corridors covering both Interstate and other functional class roadways where inductive loop sensors are used as the existing traffic monitoring method. Any volume, classification or WIM location with loops in each lane can be used for this proposed pooled fund project.

This new technology relies on capturing high-resolution inductive loop signals from existing inductive loop sensors and then characterizing these high-resolution signals (signature) to obtain vehicle class, vehicle speed, vehicle and trailer body type, and on/off highway network point identifications. Corridors will include both Interstates and interconnected roadways to ascertain the full picture of travel patterns along routes and between routes.

New Technology Capability:

- Detecting and classifying over 100+ types of vehicles with only one loop
- Determining vehicle speed from only one loop (loop shape or size up to 8' makes no difference)
- Gaining additional identification data related to body/trailer type and vehicles by major categories (flatbed, dry goods semitrailer, tankers, refrigerated trucks, recreational vehicles, transit, inter-modal freight, logging trucks, electric vehicles, smart cars, etc.)
- Offering 5-digit coding of vehicles detailing vehicle characteristics without privacy issues
- Identifying freight travel patterns – where vehicles enter and exit the highway network
- Obtaining actual link travel time – the entire fleet becomes probe vehicles
- Enabling slow speed scenario (down to 5 mph) data collection

Anticipated Benefits from the Demonstration Pilot Project:

- Leadership – showcasing your leadership with new new technologies to improve traffic data collection capability and sustainability.
- Showcasing your State and agency practices to other agencies throughout the nation with peer-exchanges.
- Gaining opportunities to visit and learn from other States and other entities.
- New Data – in addition to gaining all the traditional loop data items, new data such as these listed below will also be provided:
    - Specific vehicle class data – meeting the needs of freight analysis
    - Travel time – true corridor level reliability by vehicle type
    - Vehicle on and off points for roadway systems – benchmarking data for travel demand modeling and analysis
    - Slow speed scenario data (congestion) – gaining information otherwise not collected
- Gaining first-hand experience, knowledge, and practices in utilizing signature technology to improve your State/agency traffic monitoring program.

Agency Participation

Agency contributions can be made over 2 fiscal years: 2023 or 2024.

Amount of agency contribution – $30,000

Goal – 20 states participating, $600,000

FHWA Contribution - $400,000

Overall budget – $1 million

SP&R 100% Match Waiver – anticipated for research SP&R funding would be obtained

Length of performance period – 3 years

Any public agencies that own and operate existing inductive loop-based traffic monitoring sites or wish to install them, can participate.