# CPS: Synergy: Collaborative Research: Enhanced Structural Health Monitoring of Civil Infrastructure Systems by Observing and Controlling Loads using Cyber-Physical Systems

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Project Objectives

- **Monitor trucks in highway corridors to assess their loads on bridges**

- **Quantitatively assess bridge health based on measured responses**

- **Control trucks to minimize negative impact on bridge health**

Weigh in Motion Station

Newburg Road Bridge

Telegraph Road Bridge
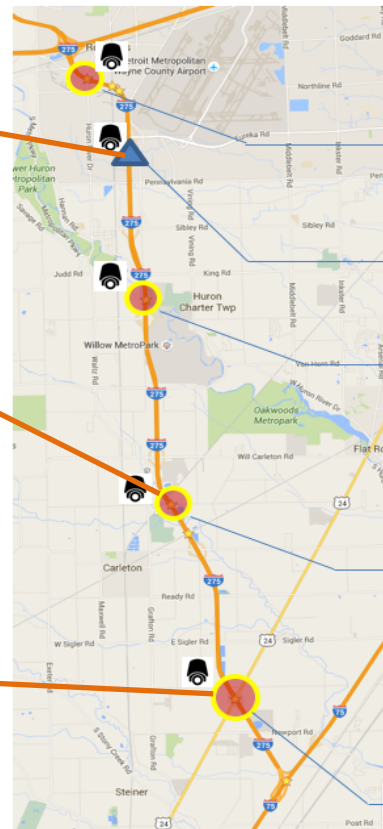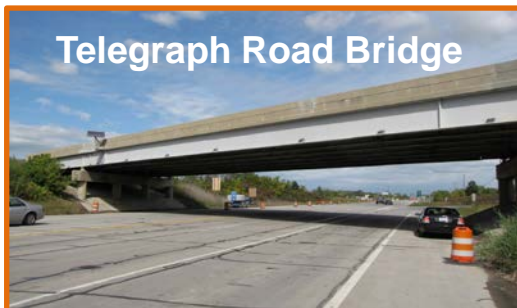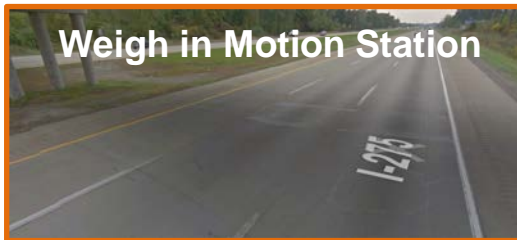
Huron River Drive Bridge (2017)

Weigh in Motion System (WIMS)

Huron River Bridge (2017)

Newburg Road Bridge (2016)

Telegraph Road Bridge (2010)

Project Accomplishments

- **Deployed monitoring systems on two bridges:**
  - Wireless sensor nodes and high resolution cameras

- **Established a cloud-based data management and analytics solution:**
  - Distributed NoSQL database implemented in Azure

- **CPS-based triggered data collection of bridge monitoring systems:**
  - Collect truck responses only to collect data of most interest

- **Instrumented trucks with wireless sensors to control loads:**
  - Identify truck loads and predict bridge responses
  - Control truck speeds and lanes to minimize consumed life

Triggered Data Collection of Trucks
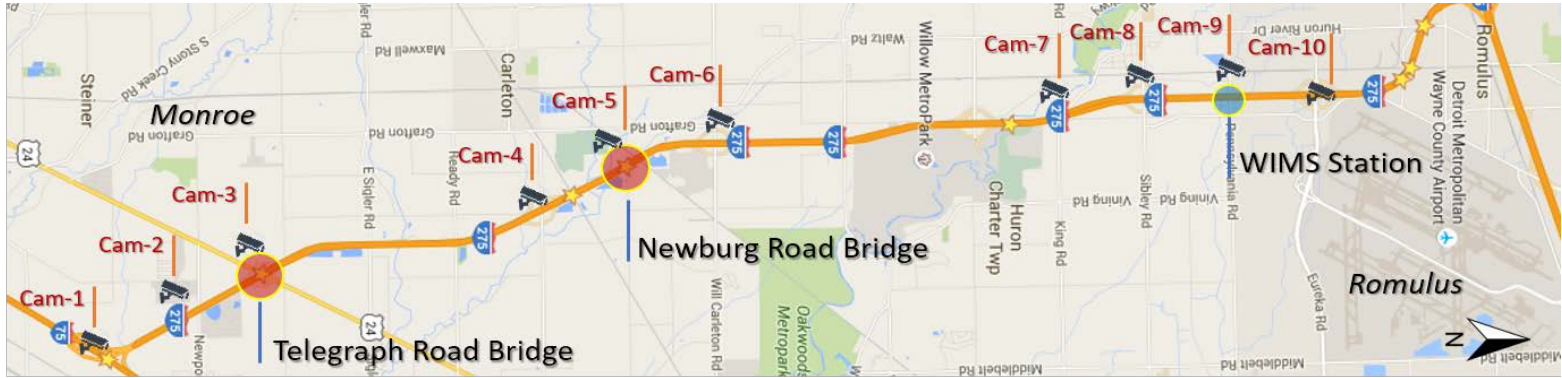
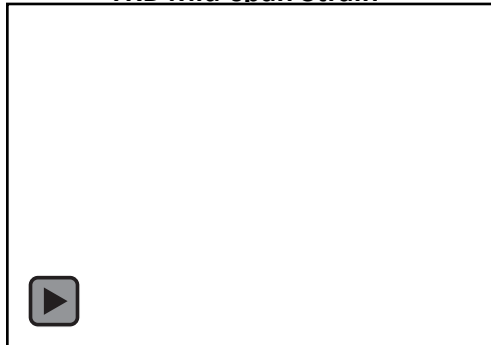**Truck Identified Entering I275N**

Truck Captured on TRB

Truck Captured on NRB

Truck Captured at WIMS

TRB Mid-span Strain

NRB Mid-span Strain