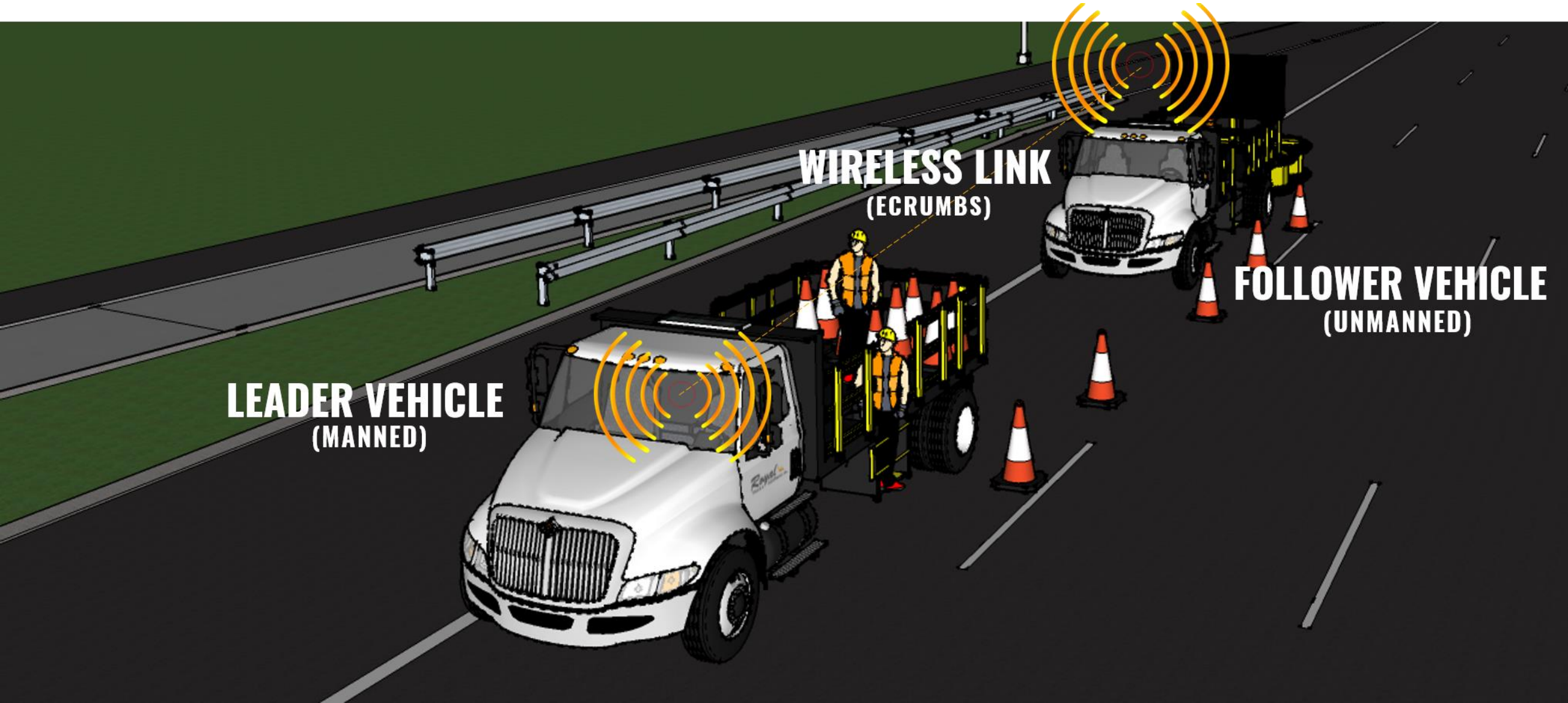




Autonomous TMA Truck (ATMA) Project Background



**LEADER VEHICLE
(MANNED)**

**WIRELESS LINK
(ECRUMBS)**

**FOLLOWER VEHICLE
(UNMANNED)**



Approached by Project Partners



- Defense Contractor
- Developing unmanned ground systems for US military
- Adapted unmanned systems to TMA truck



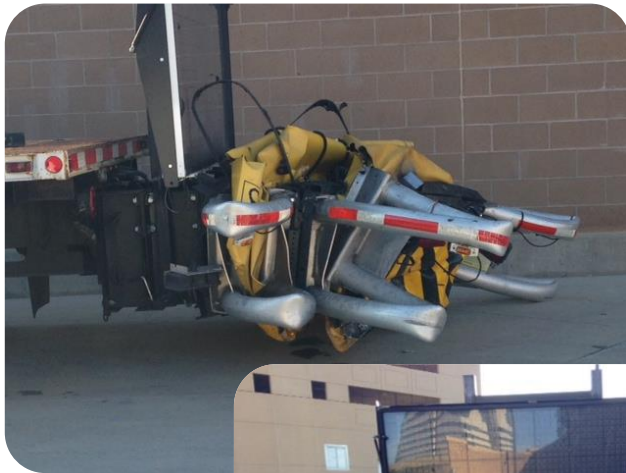
- TMA builder and outfitter
- Extensive industry experience
- Safety innovator

- Kratos & Royal needed a partner willing to deploy the tech
- Colas (UK) and CDOT (US) stepped up





Why a TMA?



- It's intended to be hit - but still has a driver
- Often the only protection in mobile operations
- CDOT TMAs struck by the public 26 times in the past four years
- Nationwide danger - for example Texas loses one TMA a week



Project Vision

- Remove driver from TMA truck
- Decrease risk of operations
- Increase efficiency of operations
- Pursue cutting-edge technology to improve highway management





How it Works

- ATMA autonomously follows a leader vehicle
 - Leader transmits high-accuracy position, speed, heading
 - Follower matches leader's movements using steering, throttle, brake actuators
- Front mounted radar on follower provides obstacle detection
 - Only reacts to obstacles in the path between leader and follower
 - Emergency stops upon obstacle detection





Equipment Retrofit

- Leader requires installation of
 - Communications and GPS antennae
 - Control module
 - Emergency stop controls
- Install on CDOT vehicle took 1 day
- Follower vehicle systems came pre-installed on purchased vehicle



CDOT Deployment

- Installed lead vehicle systems on paint truck
- Conducted performance verification scenarios on closed track
 - Initially with prototype vehicle
 - Final tests with CDOT's purchased truck
 - More detail on this phase of the project later today
- First operational use on August 18



Questions?

