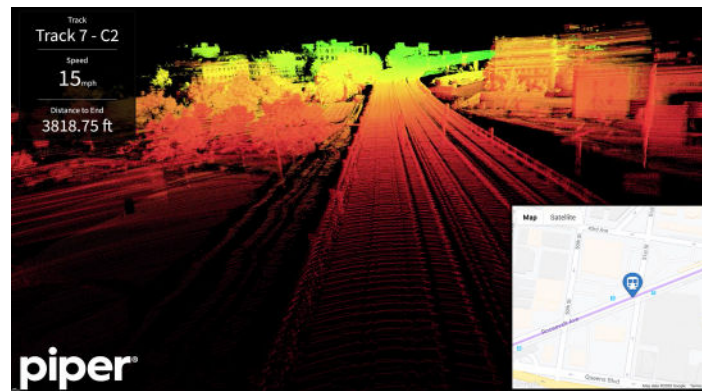# HELIX™
by piper

LIMITS COMPLIANCE & COLLISION AVOIDANCE SYSTEM

Helix™ is an advanced, multi-sensor Limits Compliance and Collision Avoidance System (LCCAS) that integrates LiDAR, UWB and other technologies. The Maintenance of Way (MoW) safety solution allows for fleets of rail-bound and hi-rail equipment to be accurately detected and tracked on the railroad in real-time, thereby reducing the potential for worker injury, equipment damage, and operational disruptions resulting from accidents or major rule violations.


Piper Helix™ LCCAS incorporates multiple sensors to provide railroads with a modular vehicle-centric safety system:

- **Collision Avoidance** - Ultra-Wideband (UWB) radios for collision avoidance between equipped vehicles and localization in complex junctions, yards, and/or areas where GPS is unavailable.

- **Obstacle Detection** - Piper's TrackSight™ LiDAR uses Piper's proprietary Virtual Tunnel algorithms for reliable obstacle detection.

- **Limits Compliance** - GPS-RTK provides a high precision position & speed calculation for limits compliance and time synchronization.

- **Collision Detection** - Onboard Inertial Measurement Unit (IMU) for collision detection.

- **Event Recorder** - HD Cameras capture outward and inward video purely for forensic purposes.

Helix™ uses Piper's patent-pending, Solid State LiDAR technology, called TrackSight™ (above), to compare real-time imaging to an onboard database. It maintains an image of the railroad to allow our onboard computer to compare differences and detect objects in the fouling envelope of the vehicle which pose an obstruction hazard.
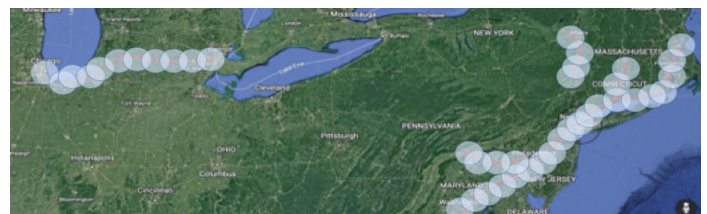
Piper's GPS RTK Base Stations along with Piper's Ultra Wideband (UWB) technology, provide consistent and redundant positioning data to an onboard system. The map above shows Piper's current GPS RTK Base Station network in the Northeast.

Piper Networks is an innovative rail engineering solutions provider and systems integrator specializing in the development of transportation technologies. Founded in 2011, Piper has four primary product lines that serve the industry, including: Vital Train Positioning, Maintenance of Way (MOW) Protection, Automatic Train Protection (ATP), and Passenger Information Display Systems (PIDS). Piper's proprietary Ultra Wideband (UWB), GPS-RTK, and patent-pending TrackSight™ LiDAR image positioning technology are designed to operate in some of the most challenging transportation environments while maintaining pinpoint accuracy that improves performance for train operators and train control suppliers.

HELIX™
by piper

# MOW Limits Compliance & Collision Avoidance System (LCCAS) Overview

Piper's Helix™ LCCAS solution allows for fleets of rail-bound and hi-rail equipped MoW equipment to be detected and tracked on the railroad for the purpose of enhancing safety. Railroads can choose to deploy the solution as an integrated solution or can choose to deploy select modules into Higher Level / 3rd Party systems to achieve specific functionality.

GPS-RTK Base Station

Easy installation of units
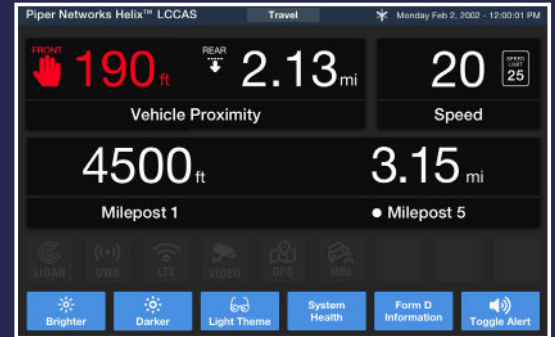
LCCAS Operator Dashboard

01. Collision Avoidance - *Ultra Wideband*

UWB sensors deliver continuous positioning data relative to nearby MoW vehicles and personnel with in-cab alerts for operators.

02. Object & Worker Detection - *LiDAR*

Alerts operators to presence of objects and workers in the path of vehicles.

03. Brake Interface

Interfaces to integrate with available onboard braking systems. Pricing varies depending on vehicle configuration / available interfaces.

04. Limits Compliance - *GPS RTK*

GPS RTK technology communicates the details of MoW location and vehicle work limits with sub-meter accuracy.

05. Collision Detection - *IMU*

Onboard IMU devices provide valuable operational telemetry data and alert operators instantly to any collisions.

06. Event Manager - *LTE Router and Cloud Server*

Piper's Event Manager provides a Web interface to monitor all deployed assets and creates a bridge to integrate the Helix™ system into 3rd party dispatch systems to facilitate movement authorities and work orders to be electronically communicated to the MoW fleet.

07. HD Cameras

Capture live video from each equipped MoW vehicle.

08. Operator Display

Visual interface for operator with warnings and alerts. Alternatively, this function can be delivered as an Android or iOS application to load onto an existing employee phone / tablet.

09. Employee in Charge (EIC) - *Application*

EIC receives tablet with interface to monitor vehicles and limits in real-time. This is an iOS application to load onto the employees phone / tablet.

10. Misc.

Processors (depending on integrations)
Enclosure / Cabling

Benefits of Piper Helix™ LCCAS System

Reliable system provides high-precision navigation of rail vehicles.	Works in extreme conditions & above or underground rail environments.	Advanced track worker and MoW equipment protection functionality.	Suite of sensor technologies includes UWB, LiDAR, IMU and optional GPS.	Consistent two-way communication with local MoW system using LTE Modem.	Equipment tested against AREMA C&S 11.5.1 and IEEE 1478

Learn more at pipernetworks.com

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