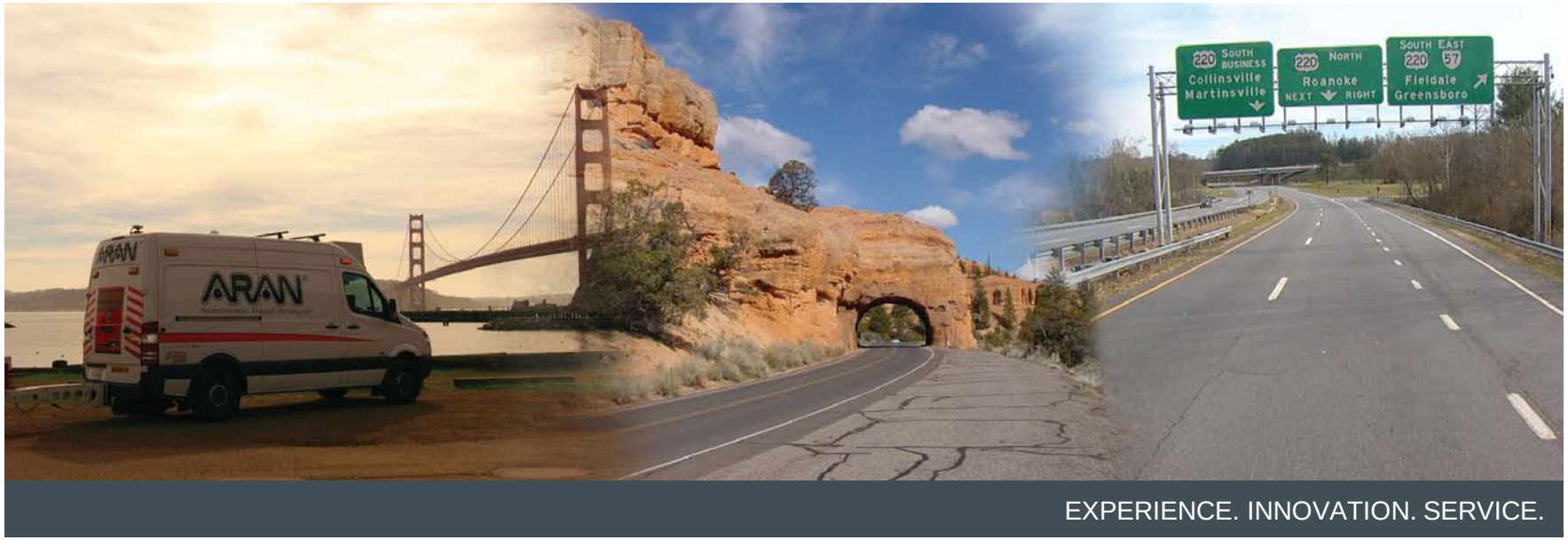
DAVID LOWE, FUGRO ROADWARE



EXPERIENCE. INNOVATION. SERVICE.

Using Roadway Geometry and Asset Information for Safety Analysis and Enhancement: SHRP 2 Safety Program

We all know someone!!!

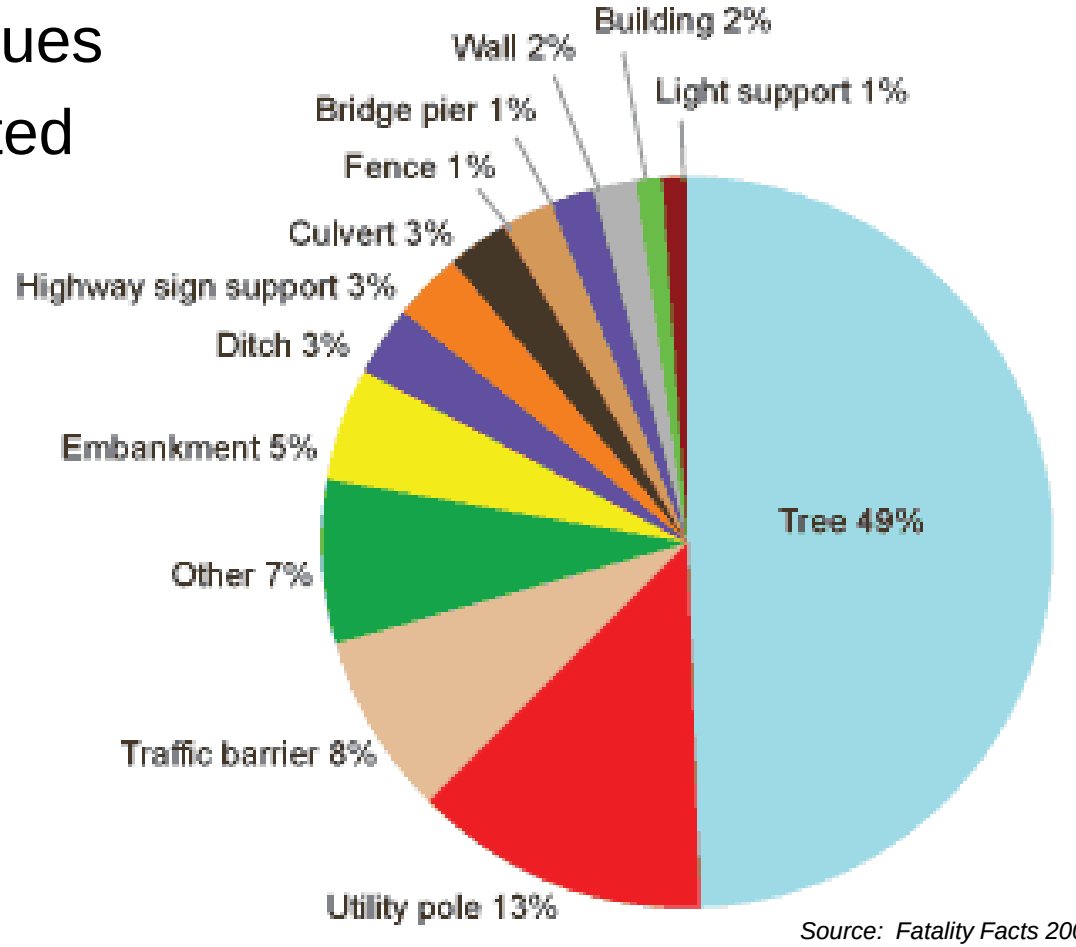
Preventable?

Safety is our personal responsibility

Ran off the road Here and

Road Infrastructure

- Accidents can be caused by an array of factors:
  - Human related issues
  - Infrastructure related



Source: Fatality Facts 2009: Fixed Object Crashes

Combining a Naturalistic Driving Study with Roadway Information

NDS Data

Query

(Lat/lon from DAS GPS) Link

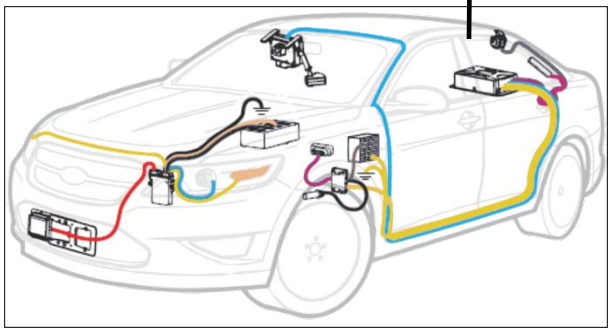
Requested Data

Analysis

Roadway Data (GIS)

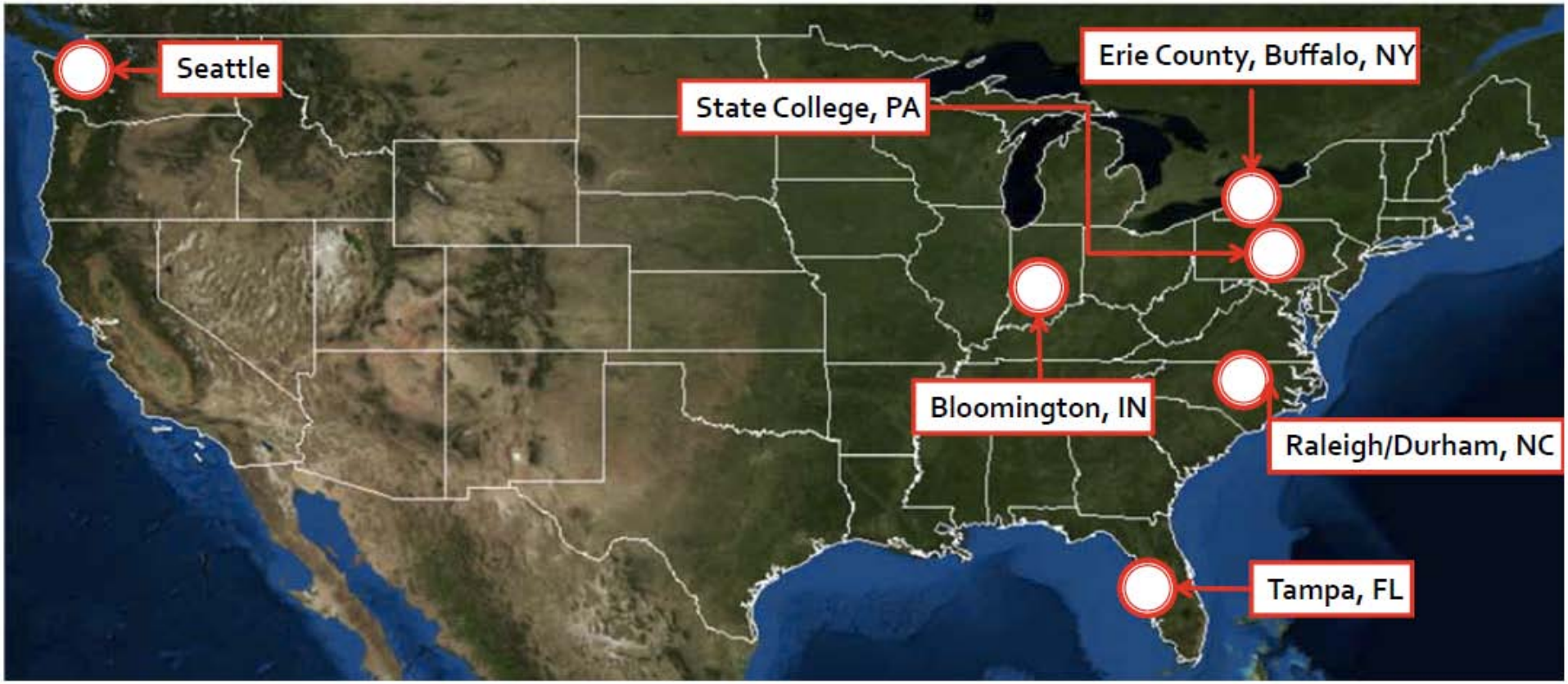
Existing Data from 6 DOTs, Others,
roadway,(crash, safety campaigns, weather, traffic)

New Roadway Data Collected

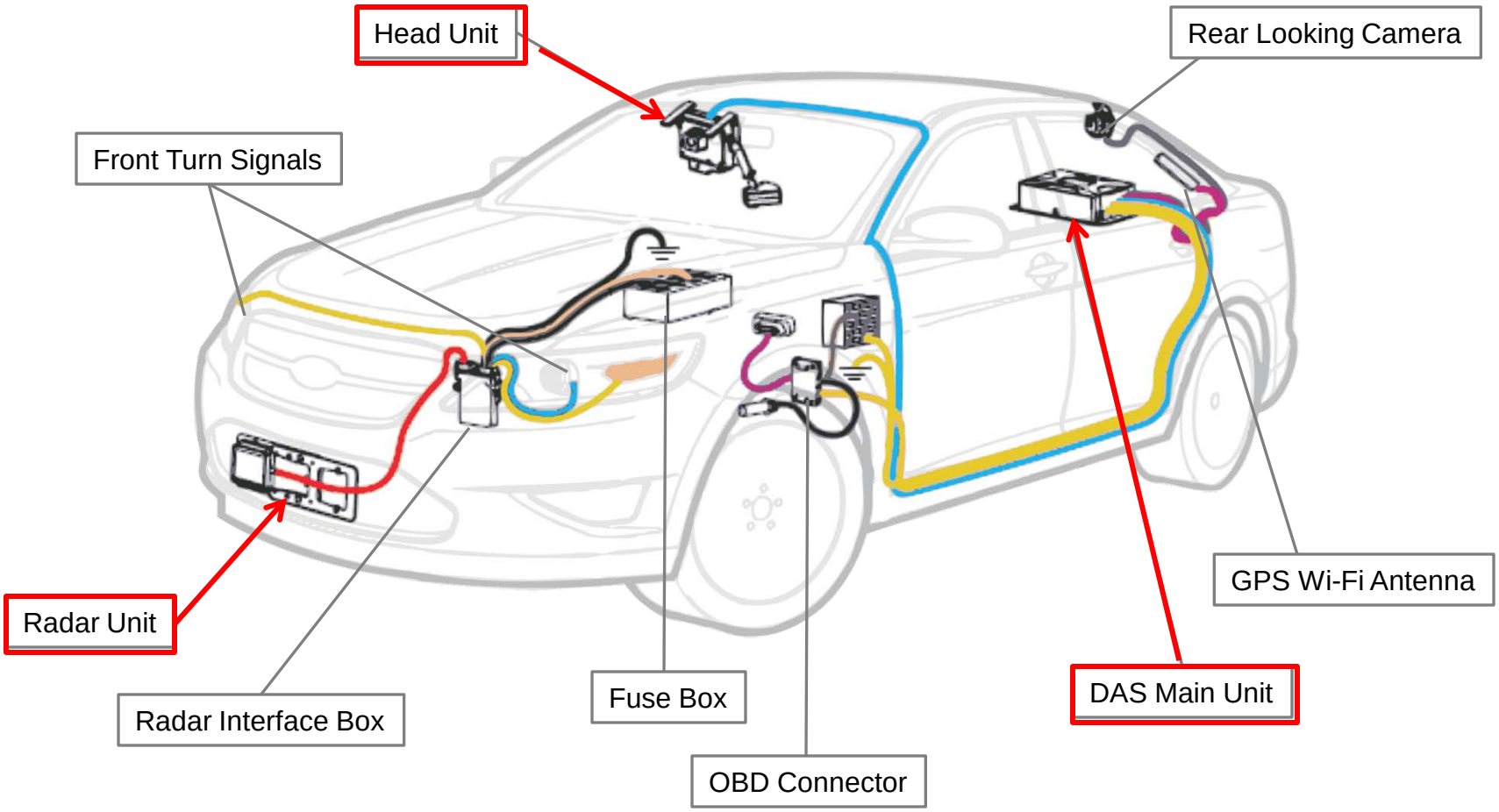


Application of Results: Safety Countermeasures

Six Naturalistic Driving Study (NDS) Sites



Equipment Installed into Subject's Own Vehicles: Data Acquisition System (DAS) – One System to Fit ALL Vehicles

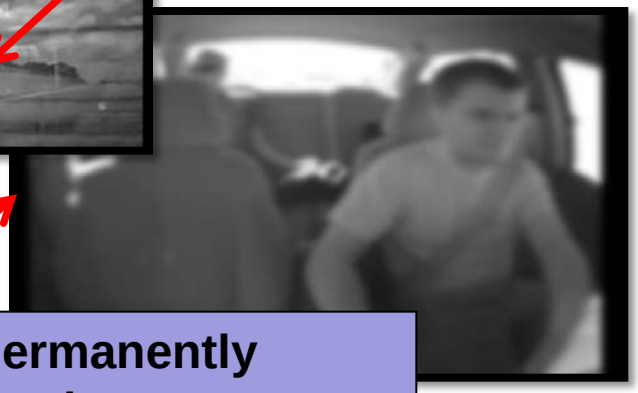


Camera Image Samples

Forward View - color

Driver Face – Rotated for max pixel efficiency

Right-Rear View



Center stack – Pedal Interactions

Periodic still cabin image, permanently blurred for passenger anonymity

SURVEY EQUIPMENT

CALIBRATED VIDEO

The ARAN can be outfitted with as many as six HDTV cameras which captures right-of-way images allowing you to virtually view the road from the comfort and safety of your office.

POSITIONING – **INERTIAL** GPS

Every ARAN is equipped with a GPS and is integrated with other subsystems so that if the receiver cannot lock on enough satellites to determine its position, the ARAN DMI and the ARAN Inertial Reference System will fill in the gaps.

TRANSVERSE PROFILE

The Laser Transverse Profiler uses dual scanning lasers to accurately measure the transverse profile of the road with 1280 points over 4 meters.

GRADE

Four ultrasonic grade sensors and two accelerometers measure the vehicle body roll, pitch and yaw relative to the road surface.

POSITIONING - DMI

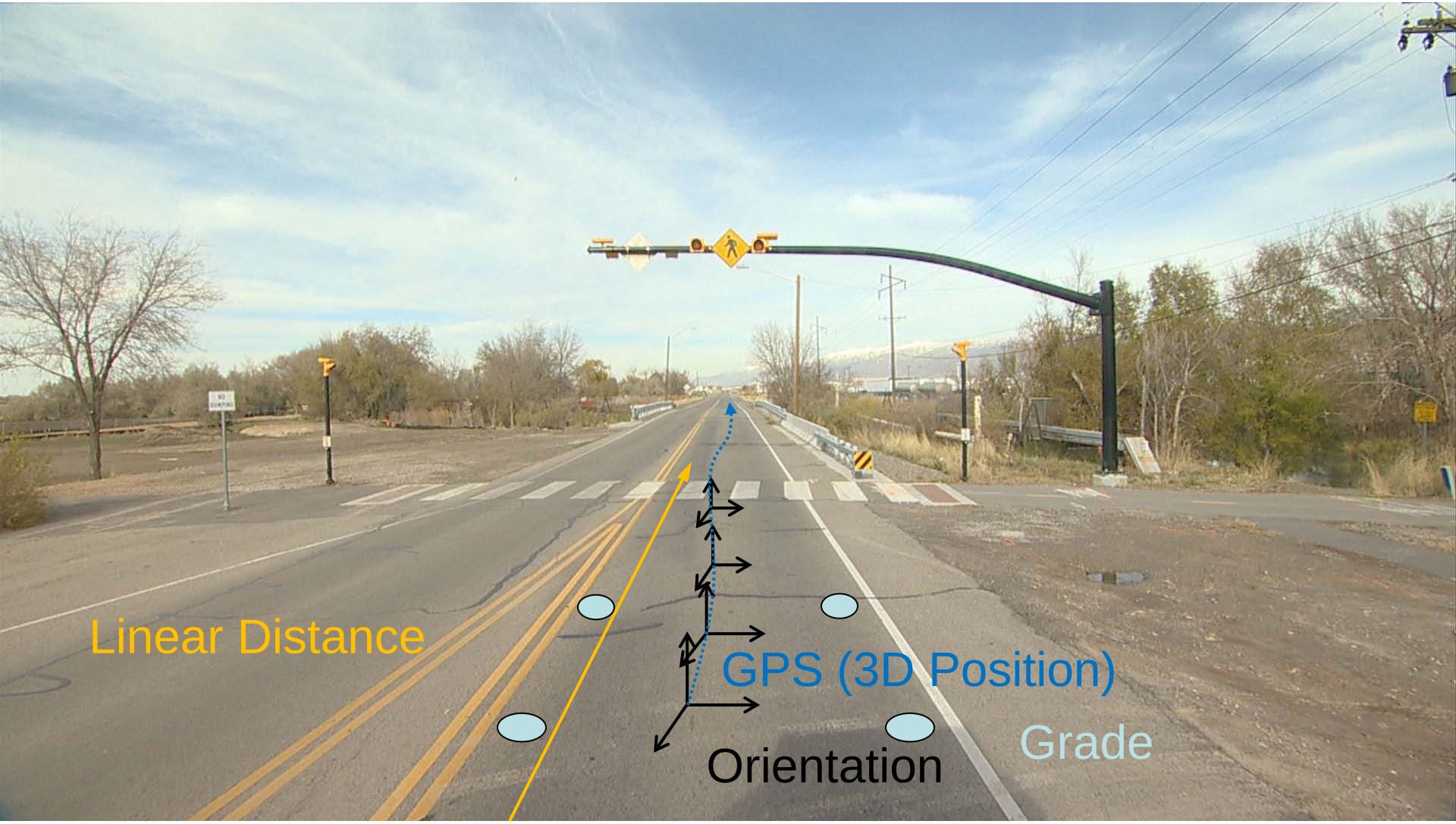
The Distance Measuring Instrument measures ARAN chainage and linear distance travelled. Every ARAN is equipped with a GPS and is integrated with other subsystems so that if the receiver cannot lock on enough satellites to determine its position, the ARAN DMI and the ARAN Inertial Reference System will fill in the gaps.

Roadway Geometry

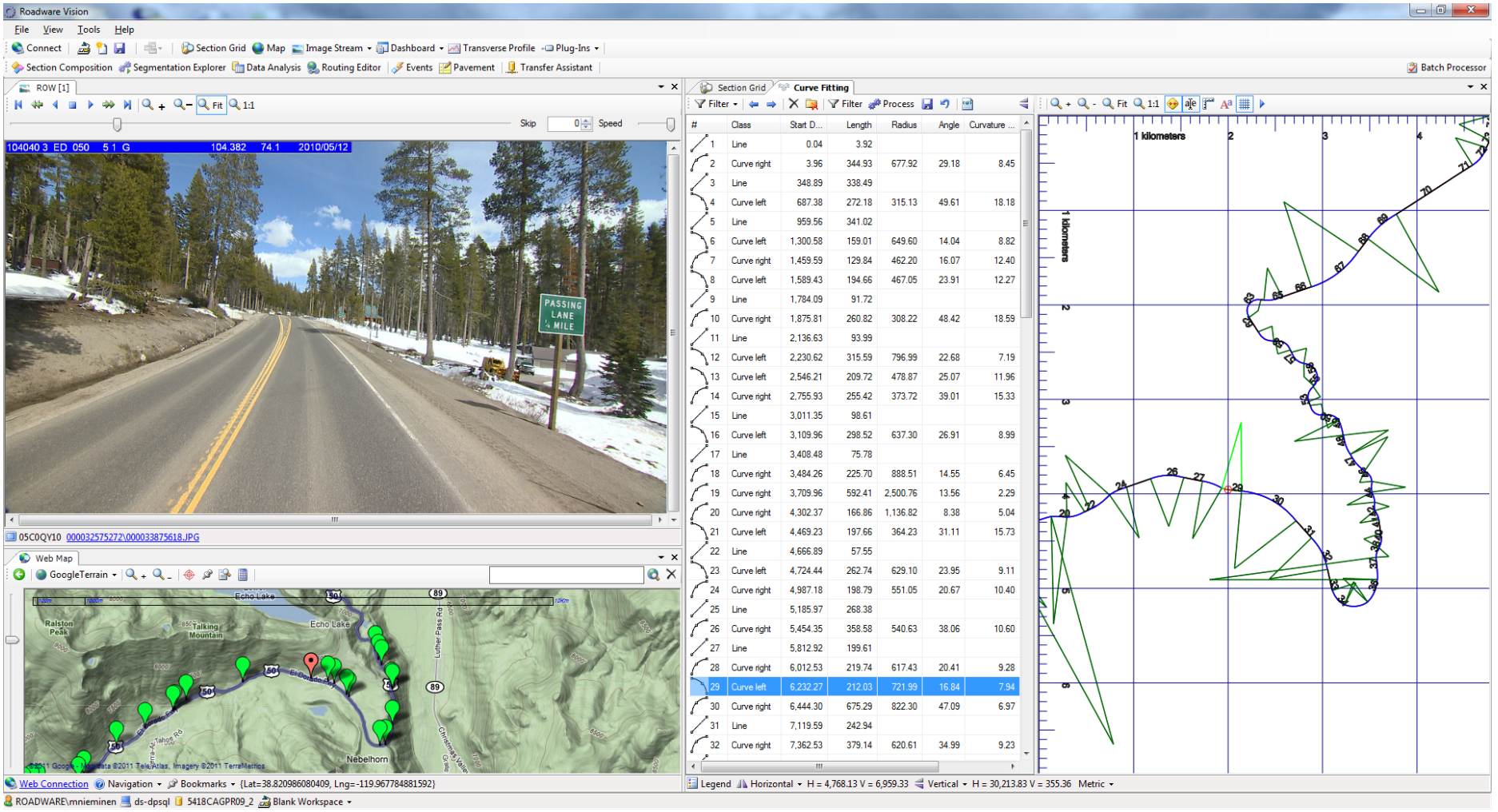
ROAD GEOMETRY:

- Longitudinal grade
- Horizontal cross slope
- super elevation of curves
- Degree of Curvature
- Radius of Curvature
- Curve start and end coordinates +/- 50feet

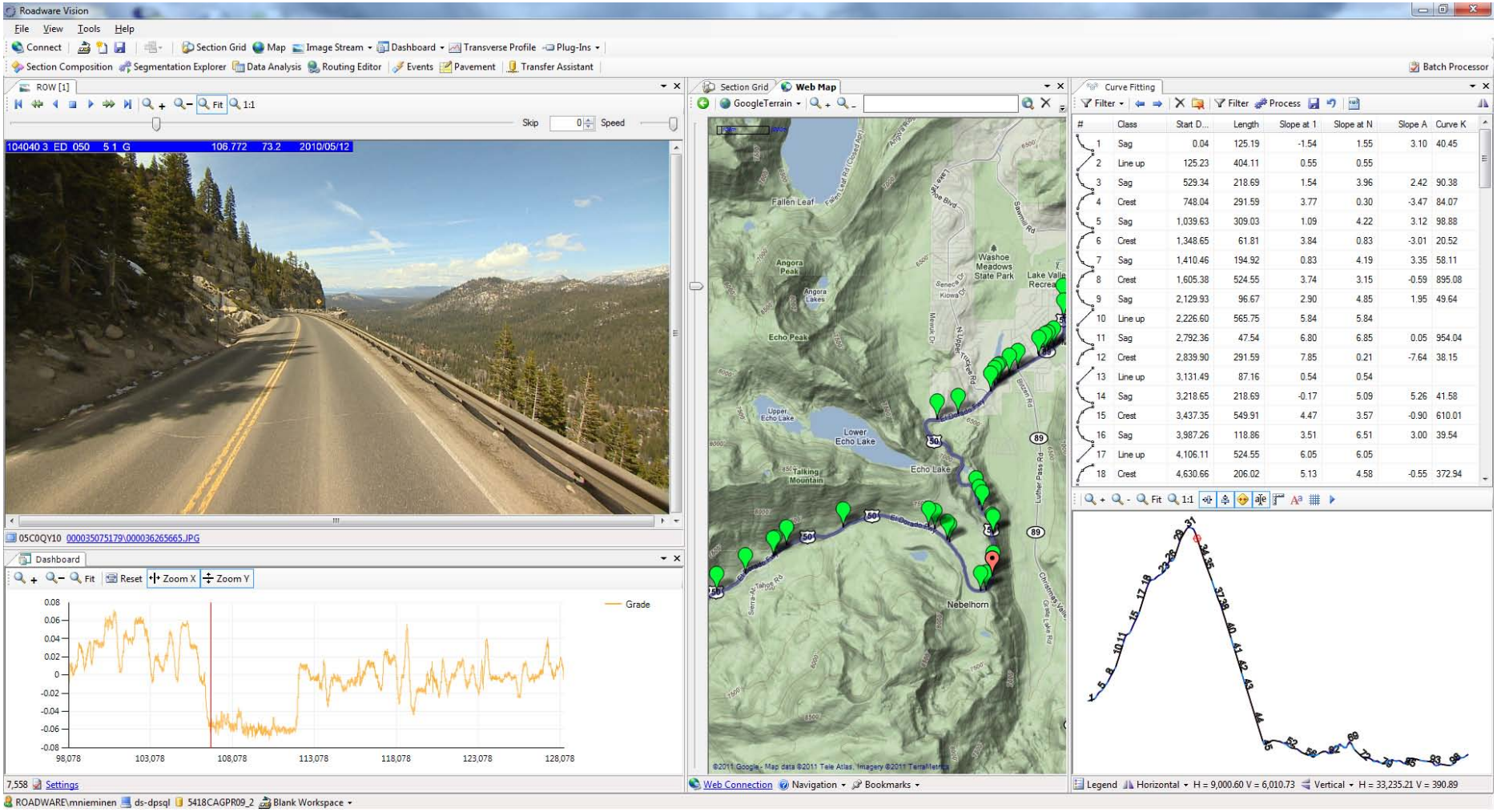
Raw Data – Position and Orientation



Derived Data – Horizontal Curvature



Derived Data – Vertical Curvature



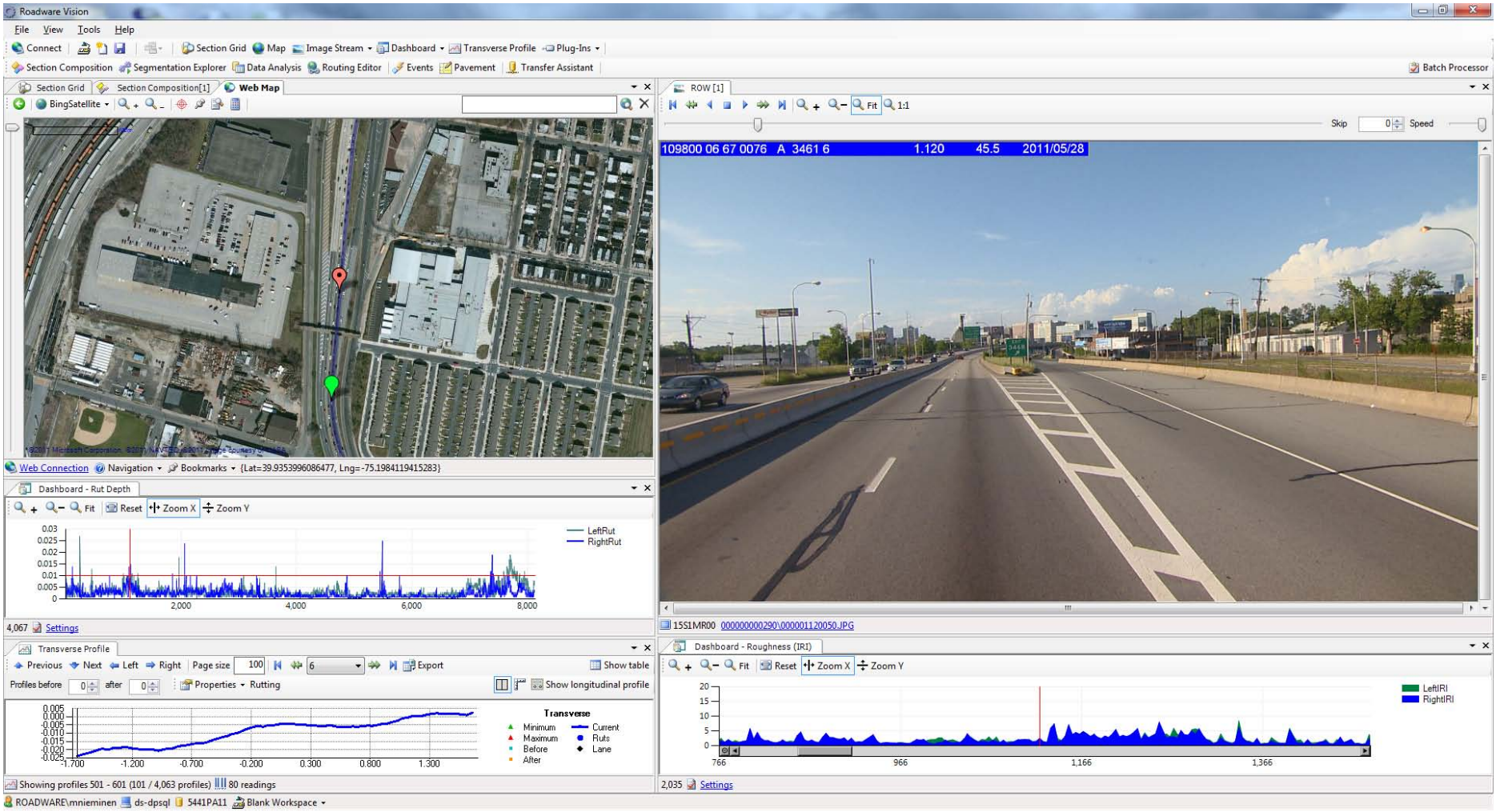
TRANSVERSE PROFILE

Pair scanning lasers

Measures profile across 14 feet lane width with 1280 pts

Raw Data – Profiles

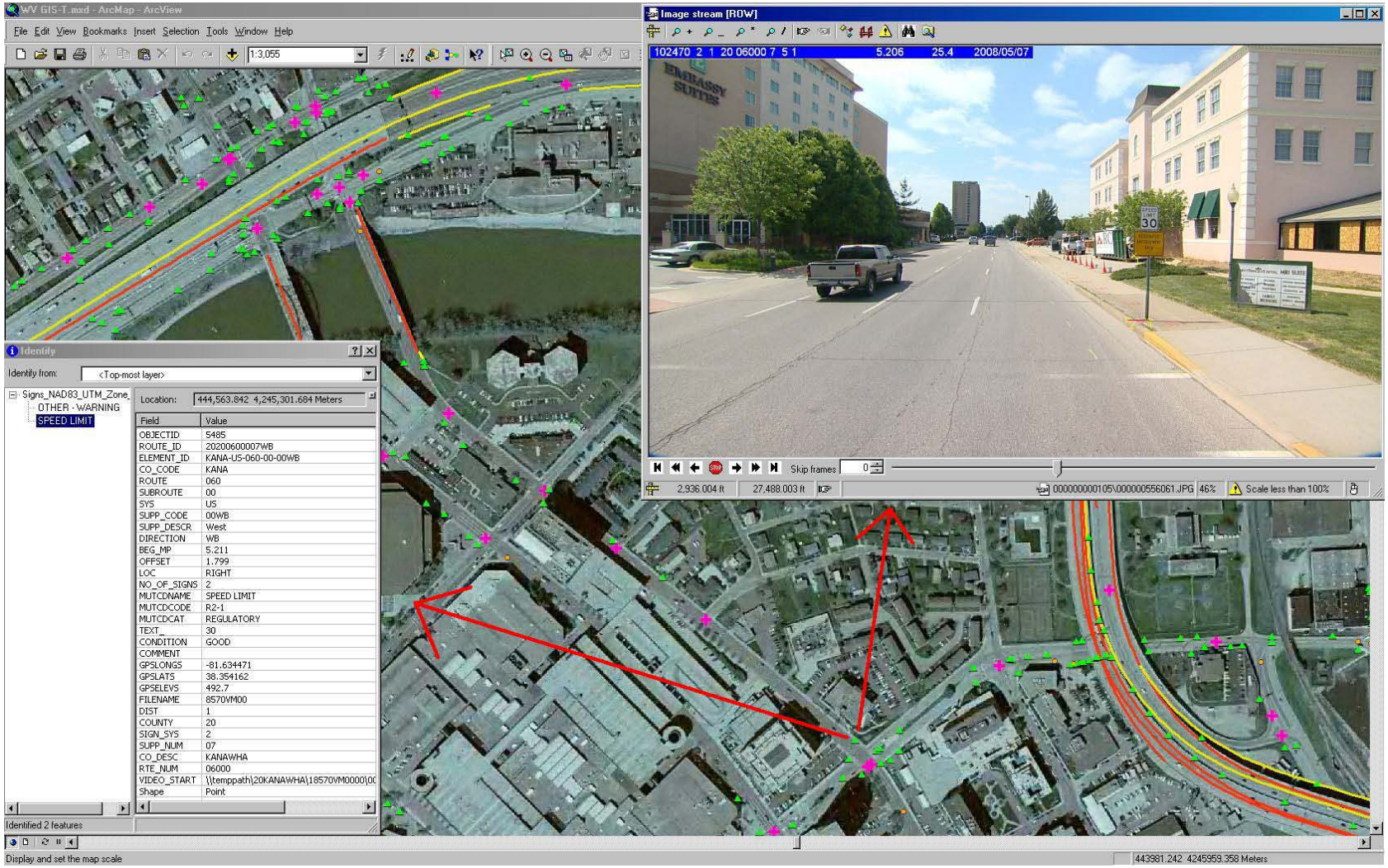
Derived Data – Cross fall, Grade and Edge dropoff



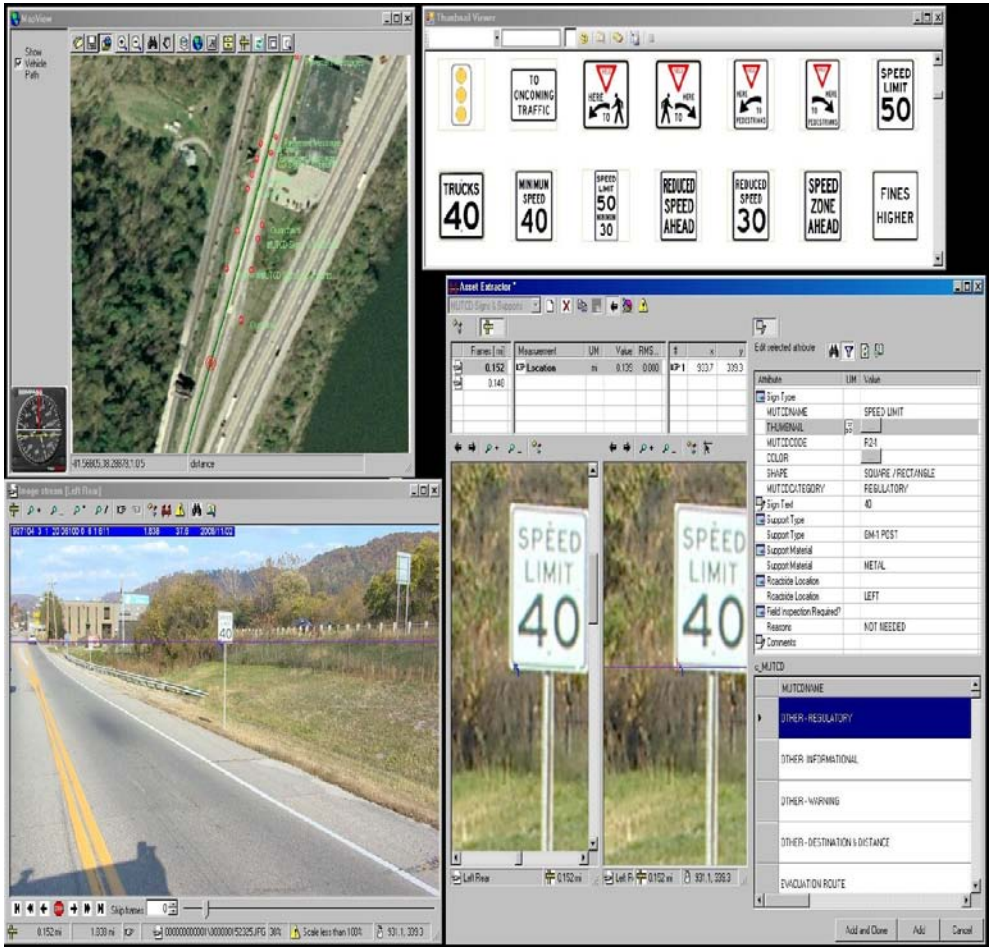
Asset Inventory

- Complete roadside Asset Inventory extracted from specially-calibrated digital video-log images
- Includes type, location (GPS and linear), condition, measurements, unique identifiers
- Export to GIS or AMS formats

SURVEYOR: ASSET DATA COLLECTION

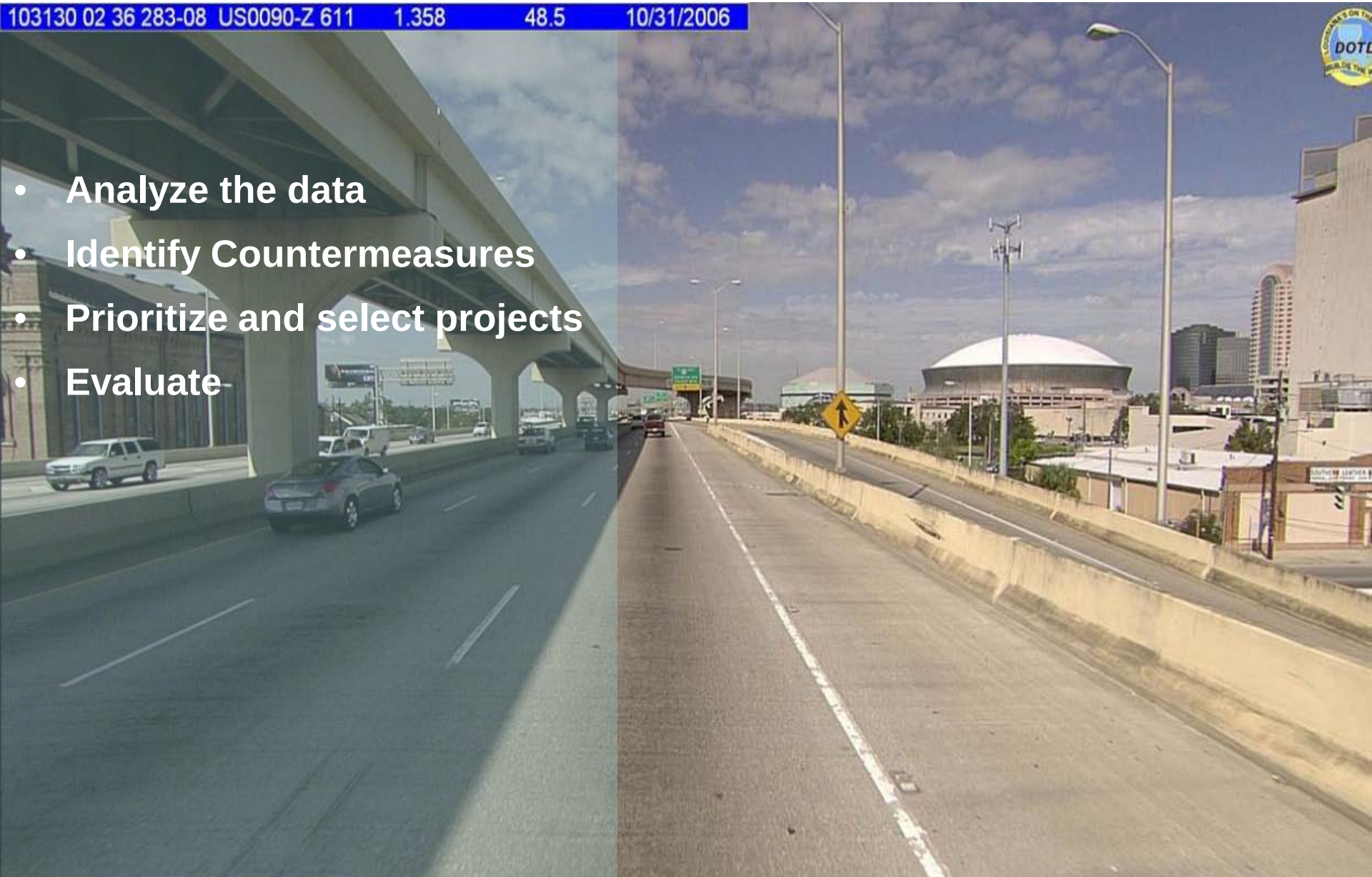


GEO REFERENCING



- Geo-referenced images are used to triangulate asset location
- Close-range photogrammetry
- Images are calibrated to identify the location of the full image
- Back-to-back images are used to locate the same point

Highway Safety Improvement Program



- Analyze the data
- Identify Countermeasures
- Prioritize and select projects
- Evaluate

Virginia DOT ~ Safety Group

- Leverage the State Contract for Highway Condition
- Existing data sets were used to extract Asset and Road Geometry information
- Identifying roads at or below standards of safety.
  - Horizontal Curve
  - Vertical Curve
  - Grade
  - Cross fall
  - Edge drop off
  - Super elevation
  - Sign inventory

iRAP
International Road Assessment Programme

- Charity
- 60 countries
- inspect high-risk roads
- Star Ratings
- Safer Roads Investment Plans
- 73,000 road crash deaths and injuries Save US$7 billion

Roadway Data Collected

- Collecting Roadway Safety data is a low cost initiative
  - Use what the agency already has
  - Supports other surveys
  - Collect what is needed
- Luck is not a strategy
  - Data driven studies
- Get Involved.
  - Propose Research.
  - Use the data

Thank You