



# KITTELSON LLC

## FORENSIC TRANSPORTATION ENGINEERING

## KITTELSON LLC – PROVIDING FORENSIC TRANSPORTATION ENGINEERING EXPERTISE FOR CLIENTS NATIONWIDE

Since 1975, our staff members have provided research, technical analyses, and expert witness testimonies and declarations as part of clients' motions before the court. Our team of forensic transportation engineering consultants includes some of the industry's leading experts available to assist you with a variety of legal services.

We have a wealth of experience in crash investigations, reconstructions, and expert witness testimony, and utilize the latest technologies to collect more data and document more perspectives, helping our clients understand more objectively what took place at the scene of a crash.

Our staff members are engaged with the planning and design of transportation facilities, strengthening our expert consultation and testimony through ongoing participation in transportation planning, operations, design, and research.

### AREAS OF EXPERTISE

#### **Asphalt and Concrete Pavement**

##### **Commercial Vehicle Compliance and Inspection**

- Carrier Safety Programs
- Compliance Training
- Driver Activities and Compliance
- Mock DOT Audits
- Risk Management Training

##### **Crash Investigation and Reconstruction**

- Driver Behavior
- ECM/EDR Downloads
- Forensic Examination of Driver Hours of Service Compliance
- Heavy Vehicle Post-Crash Forensic Mechanical Inspection
- Sight Distance

#### **Eminent Domain**

- Parking and Circulation Impacts
- Access and Driveway Impacts

##### **Parking Lot Design and Operations**

#### **Railroad and Transit Crossings**

##### **Research and Emerging Technologies**

#### **Roadway and Intersection Design**

- Highways and Streets
- Pedestrian, Bicycle, and ADA Facilities
- Lighting
- Roundabouts and Other Intersections

#### **Safety**

- Highway Safety Manual
- Roadway Safety Audits
- Tire Safety

#### **Traffic Control**

- Manual on Uniform Traffic Control Devices (MUTCD)
- Signs, Pavement Markings, and Traffic Signals
- Temporary Traffic Control and Work Zones

#### **Traffic Operations**

- Bicyclists and Pedestrians
- Land Use and Transportation Integration
- Traffic Signals



## RESEARCH

Kittelson LLC staff members conduct nationally and internationally applied research that defines industry practice and performance standards. A wealth of ongoing field experience throughout the country—as well as our research activities for the Strategic Highway Research Program, the Federal Highway Administration, and the National Academy of Sciences—provides a unique foundation upon which our technical analyses and interpretations are based, using relevant and state-of-the-art transportation theory and practice. The following is a list of publications involving our staff:

### American Association of State Highway and Transportation Officials (AASHTO)

Highway Safety Manual (1st Edition)

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A Policy on Geometric Design of Highways & Streets (Green Book)

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### Federal Highway Administration (FHWA)

Guidebook for Developing Pedestrian & Bicycle Performance Measures

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Road Safety Audit Guidebook

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Roundabouts: An Informational Guide (1st and 2nd Editions)

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Signalized Intersections Informational Guide (1st and 2nd Editions)

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Traffic Signal Timing Manual (1st and 2nd Editions)

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### Transportation Research Board/National Cooperative Highway Research Program (TRB/NCHRP)

Access Management Application Guidelines

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Highway Capacity Manual (2000, 2010, 6th Edition)

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NCHRP Project 3-72: Lane Widths, Channelized Right Turns & Right-Turn Deceleration Lanes in Urban & Suburban Areas

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NCHRP Project 3-75: Analysis of Freeway Weaving Sections

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NCHRP Project 3-106: Traffic Control Device Guidelines for Curves

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NCHRP Project 3-109: Potential MUTCD Criteria for Selecting the Type of Control for Unsignalized Intersections

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NCHRP Project 7-18: Crash Experience Warrant for Traffic Signals

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NCHRP Report 581: Design of Construction Work Zones on High-Speed Highways

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NCHRP Report 613: Guidelines for Selection of Speed Reduction Treatments at High-Speed Intersections

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NCHRP Report 687: Guidelines for Ramp and Interchange Spacing

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NCHRP Report 785: Performance-Based Analysis of Geometric Design of Highways & Streets

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NCHRP Report 834: Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities: A Guidebook

NCHRP Synthesis 316: Design Exception Practices

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NCHRP Synthesis 351: Access Rights: A Synthesis of Highway Practice

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### Other Industry References

Manual on Uniform Traffic Control Devices

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Transit Capacity and Quality of Service

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Qualification of Joint Sealant Effectiveness Regarding Jointed Concrete Pavement Performance

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Design Methodology for Subgrades and Bases Under Concrete Roads and Parking Lots, Engineering Report

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Test Methods & Results of Erosion Potential of Commonly Used Subgrade and Base Materials

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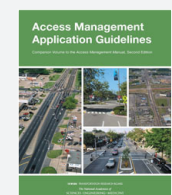
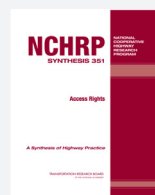
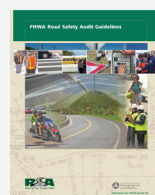
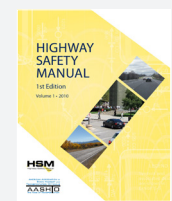
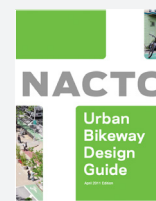
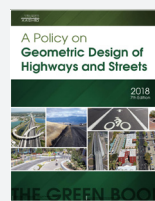
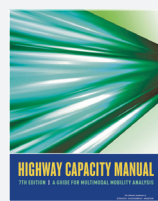
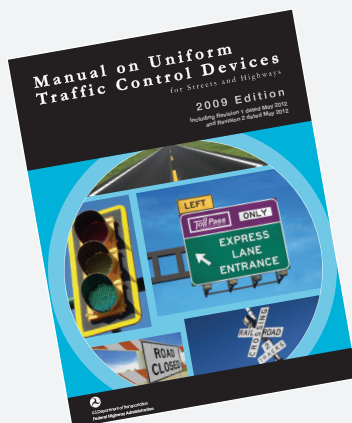
Urban Bikeway Design Guide

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● Principal Investigator/Author

● Supporting Review/Contributor

● Implementing Committee Participation





# TECHNOLOGICAL CAPABILITIES

## DRONE AERIAL MAPPING

We use drones to survey sites and document evidence. The overhead perspective that drones provide is helpful when documenting crash site information, such as skid marks, gouge marks, scrape marks, travel paths made outside of paved areas, and pavement markings. With today's technology, collected data can even be shared directly from the field. The data collected by drones also can be used to develop layouts and animations to illustrate crash scenarios.



## VIRTUAL AND AUGMENTED REALITY

Virtual reality is a completely immersive 3D environment that allows users to freely navigate and view the environment from multiple vantage points or perspectives. Augmented reality mixes 3D models with the outside world through the view finder of a camera lens on a smart device. Both provide the user the opportunity to explore multiple viewpoints and drive their own experience, compared to the more linear, predefined camera perspective in a video animation. Kittelson's growing expertise in these relatively new techniques offers more opportunities for communicating information and recreating crash scenes.



## FARO LASER SCANNING

Our FARO 3D laser scanners are used to precisely measure crash scenes and vehicles. Laser scanning collects millions of data points in a fraction of the time used by traditional methods and produces a point cloud that can be imported into computer software to complete various analyses. It also allows for the long-term digital storage of vehicle and scene data. Additionally, scanning is safer for our experts, allowing them to collect data from the side of the road rather than taking measurements in the roadway.

## HEAVY VEHICLE AND PASSENGER VEHICLE DOWNLOADS

Kittelson LLC experts have specialized training and use the latest tools to extract and analyze crash-related event data from heavy vehicle Engine Control Modules (ECMs) and passenger vehicle Electronic Data Recorders (EDRs). Heavy vehicle ECMs may have the ability to record event data pertaining to a crash. An EDR in a passenger vehicle, commonly referred to as a "black box," is a device that can record data parameters related to a crash due to a deployment or non-deployment level event. These systems can record crash data such as speed, brake switch status, engine rotations per minute, and seat belt usage, along with other data parameters.

## DIAGRAMMING, ANIMATIONS, AND FLY THROUGHS

Using our crash reconstruction animation tools in combination with professional expertise, we can develop an illustrative crash recreation. Whether the crash involved a single vehicle, multiple vehicles, or rail crossing, an animation can be an effective tool to illustrate the sequence of events that led up to a crash, including the perspective of a driver.



## OUR EXPERTS

Kittelson LLC team members provide expertise to legal counsel, transportation agencies, engineering consulting firms, trucking companies, insurance companies, private companies, and individuals, among many others. We are skilled researchers, investigators, writers, and speakers, able to serve as expert witnesses on both plaintiff and defense cases. Kittelson LLC is supported by over 300 staff at Kittelson & Associates, Inc.



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