Practitioner's Guide to Solving Transportation Safety

STREETLIGHT

INCLUDES:

- VISION ZERO
- COMPLETE STREETS
- WORK ZONE SAFETY
- AND MORE

Safety Is Multimodal

Traffic collisions are preventable, and curbing them can save lives and dollars. According to the FHWA, roadway fatalities were down marginally in 2021, after 2020 saw nearly 39,000 people losing their lives on American roads — the highest number since 2007.[1] And it's not just drivers who are at risk. Pedestrian and bicyclist fatalities comprise about 16 percent of all traffic fatalities, with approximately **5,000 pedestrian deaths and 800 bicyclist deaths every year.**[2]

During the thick of the COVID-19 pandemic, vehicle-related fatality rates rose in many states, especially impacting bicyclists and pedestrians. This happened despite a decrease in traffic volume and Vehicle Miles Traveled (VMT), and increased speed was a major factor.[3] Speed is one of the top contributors to car crashes — the faster someone is driving, the more likely they are to kill someone in a crash whether that person is in a car, on foot, or on a bicycle.

There are many effective ways that infrastructure can manage speeds, such as narrowed car lanes, traffic calming, road diets, wider sidewalks/bike lanes, and other street-engineering techniques.

[1] U.S. DOT FHWA, "About Safety," April 2022
[2] U.S. DOT FHWA, "Pedestrian & Bicycle Safety," September 2022
[3] New York Times, "Why Emptier Streets Meant an Especially Deadly Year for Traffic Deaths", January 2021
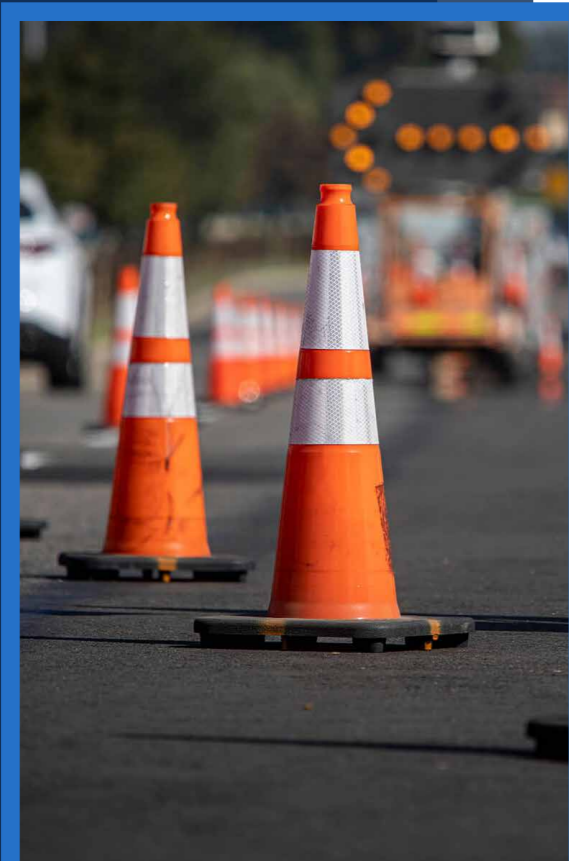
With pedestrian and bicycle safety increasingly top of mind, USDOT launched the first-ever **Pedestrian Safety Action Plan** in November 2020, which promotes data-driven practices to address pedestrian fatalities and injuries. Additionally, as of November 2021, the Bipartisan Infrastructure Law (BIL) requires all states to develop a Vulnerable Road User Safety Assessment as part of their Highway Safety Improvement Program (HSIP), emphasizing the safety needs of pedestrians, cyclists, and road workers. Planners can employ many safety techniques for cyclists and pedestrians, but they need multimodal transportation insights to effectively prioritize traffic safety investments using empirical data.

With transportation analytics, planners spend less time and money on data collection and can focus on managing transportation. Access to powerful data sources for bike and pedestrian activity, traffic volume, speed data, and more allows planners to easily calculate exposure rates, inform strategic safety assessments, and provide actionable insights.

A data-driven, multimodal approach can help planners prioritize where to invest in safety by:

I. Identifying focus areas to meet **Vision Zero** goals

II. Getting safety assessment data for **Complete Streets** policies

III. Accessing on-demand traffic data to power projects for **Maintenance of Traffic Planning**

IV. Streamlining data collection to fulfill **MIRE** requirements

V. Unlocking **infrastructure grant funding** to enable safety upgrades

VI. Prioritizing **equity in planning**, as safety disproportionately impacts vulnerable communities

Metrics for the Time Period of Your Choice

Why should safer streets wait on surveys, data collection, and processing? StreetLight InSight® allows your team to get near-instant access to validated Metrics[1] for virtually all North American roadways, bike lanes, and sidewalks.

Bypass the time and expense of data collection and calibration by accessing powerful multimodal transportation Metrics right on your desktop in a matter of minutes.

1. Trip Speed

2. AADT

3. Multimodal Traffic

4. Origin-Destination (O-D)

5. Top Routes

Bicycle Volume example from StreetLight InSight®. Get baseline and current Metrics for vehicles, bikes, pedestrians, or transit.

Table of Contents

I. Achieve Vision Zero Goals

Vision Zero is a strategy for eliminating traffic fatalities and severe injuries by influencing system-wide practices, policies, and designs to lessen the severity of crashes.

First implemented in Sweden in the 1990s, this multidisciplinary approach to road safety emphasizes collaboration among engineers, policymakers, and public health professionals in order to address the complex systems contributing to severe crashes.[1]

The Vision Zero approach affirms that roadway fatalities and injuries are not inevitable — roadway design, speed reduction tactics, technology, policy, and more can work together to prevent them.

Transportation analytics provide crucial insight into the factors that contribute to severe crashes — and what can be done to eliminate them. Hone in on the right hotspots to meet your Vision Zero goals.
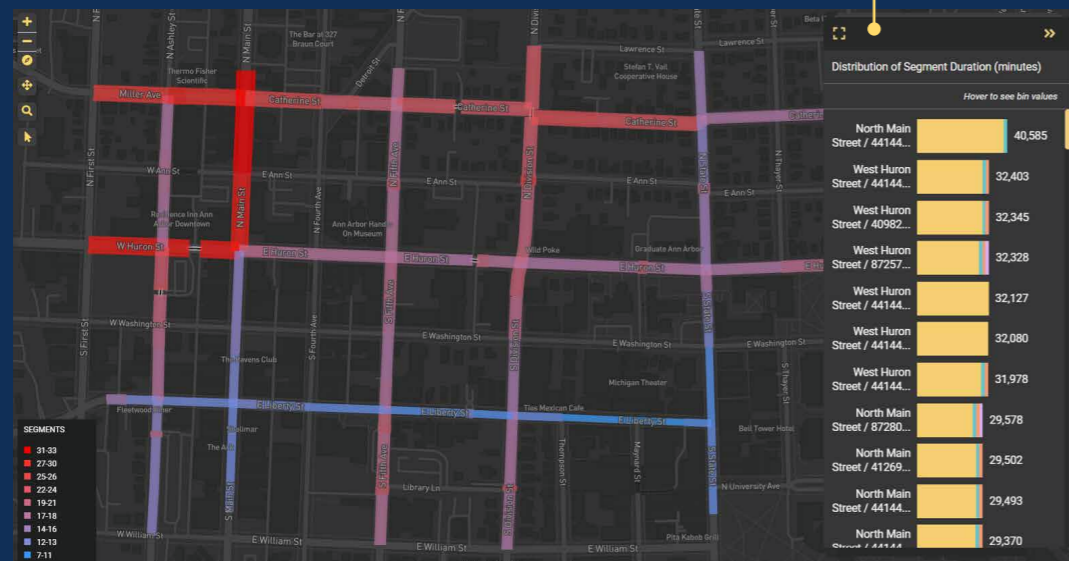

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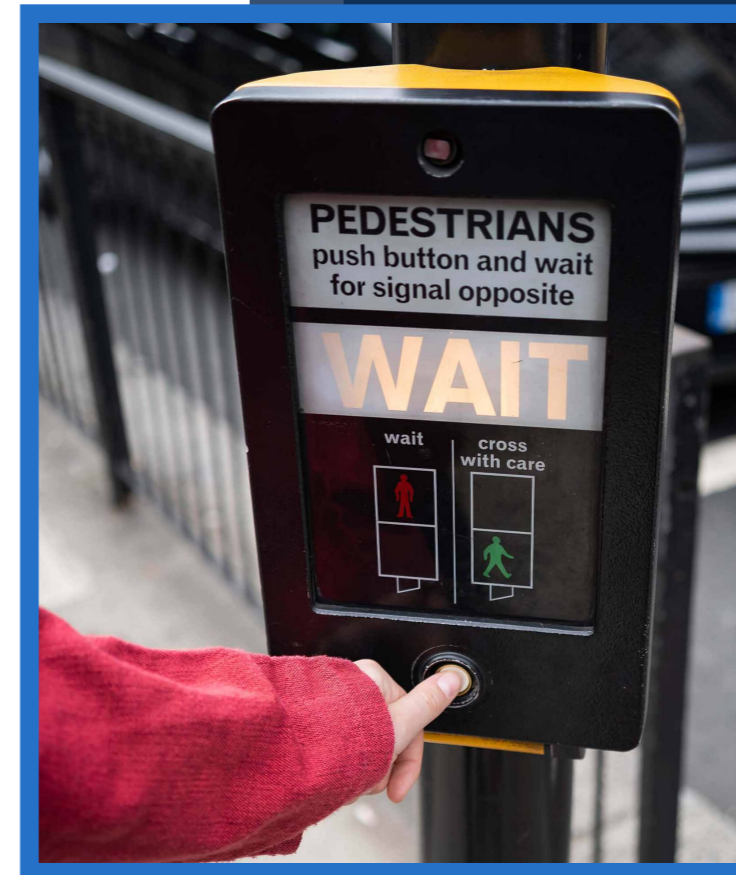
[1] Vision Zero Network, "What is Vision Zero?" 2022

VIEW PEDESTRIAN O-D PATTERNS FOR SPECIFIC INTERSECTIONS
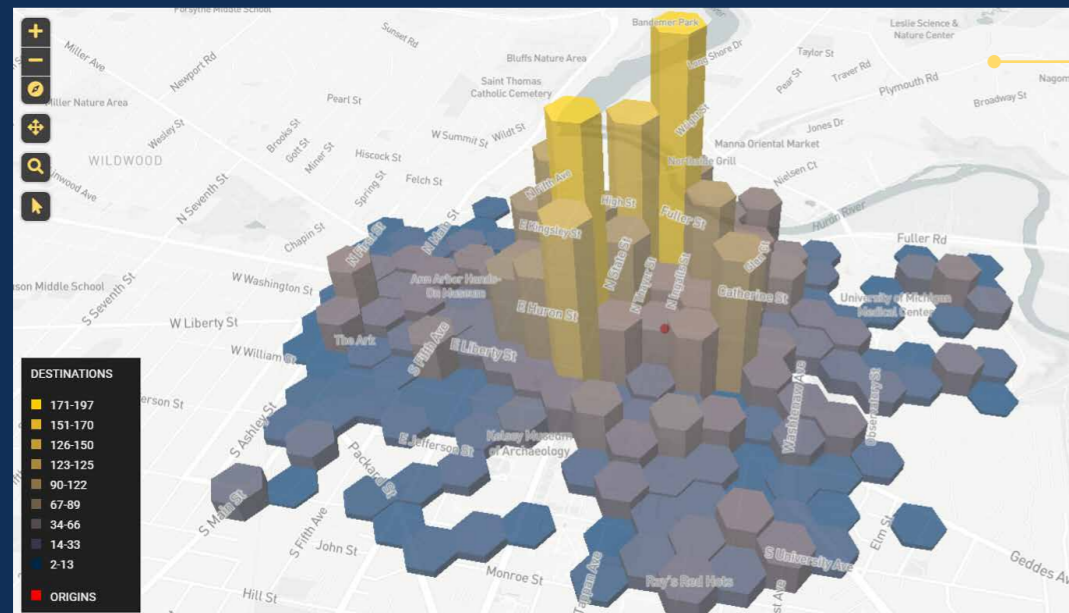
Figure 1: View most common origins and destinations to inform where connections can be made safer.

STUDY SPEEDS ON ALL ROADS

Figure 2: Segment Analysis can be used to highlight roads and segments that have high speeds when performing corridor safety assessments.

StreetLight InSight® allows you to:

1. Overlay bicycle and pedestrian O-D data with your crash data to build **safety exposure models.**
   (see StreetLight InSight® example in Figure 1)

2. View traffic volumes and speed data for **corridor safety assessments.**

3. Segment traffic volume by light-, medium-, and heavy-duty vehicles to explore where high truck activity may create safety challenges and **inform safer freight routing.**

4. Get turning movement count data to **identify prime intersections for traffic control devices** (e.g., signal placement, roundabouts, etc.).

5. Access speed data to explore reasons deadly crashes may have increased even if VMT has decreased.
   (see StreetLight InSight® example in Figure 2)

6. Run **before-and-after studies** to determine the impact of safety infrastructure changes and **prove countermeasure effectiveness**, while providing evidence that countermeasures don't overburden other goals like travel time.

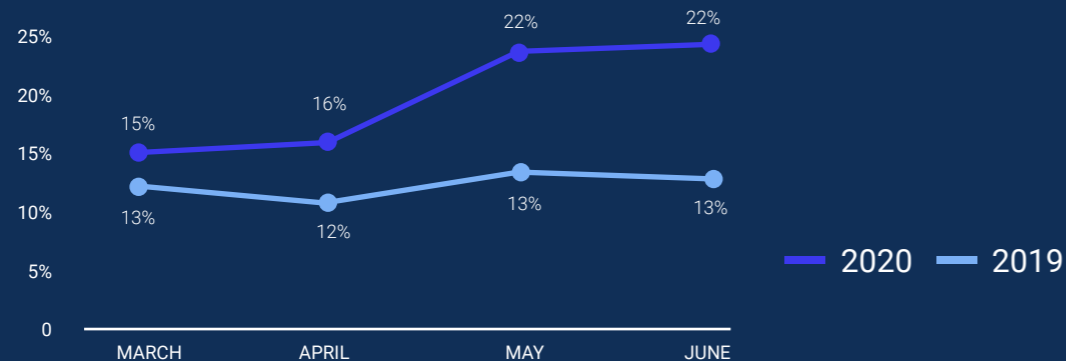Get essential safety metrics, including counts, speed, O-D, and routing.

streetlightdata.com/transportation-metrics

Case Study

Walk Bike Nashville's Mobility Data for Safer Streets Project

Learn how Walk Bike Nashville, as part of Spin's Mobility Data for Safer Streets program, used traffic data from StreetLight InSight® to advocate for funding of improved infrastructure and safer streets in the city's new Vision Zero program.

% OF DRIVERS OVER 30 MPH

Chart: % of drivers over 30 mph, by month (March–June), comparing 2020 and 2019.

- 2020: March 15%, April 16%, May 22%, June 22%
- 2019: March 13%, April 12%, May 13%, June 13%

Legend: 2020 — 2019

streetlightdata.com/nashville

> "
> We were very grateful to be able to validate the residents' concerns and bring attention to this critical issue using the tools provided to us by our participation in the Mobility Data for Safer Streets program — and specifically the StreetLight InSight® platform.
>
> – Nora Kern, Walk Bike Nashville

WALK BIKE NASHVILLE

II. Implement Complete Streets Policies

Complete Streets is an approach to roadway policy and design that focuses on enabling safe mobility for all road users — drivers, pedestrians, bikers, and public transit riders alike, across the full spectrum of ages and abilities.[1]

For example, a Complete Streets policy may call for the implementation of pedestrian traffic signals that are accessible to those with visual impairments. Policies may also call for added bike lanes and bus lanes to improve access to these transportation modes, or the installment of curb extensions and crosswalks to provide safer paths for pedestrians.

Many public officials at the local, regional, state, and federal levels are working to build better bicycle and pedestrian infrastructure through Complete Streets policies. The concept of Complete Streets is now mainstream in transportation, with planners striving to design and build streets that safely accommodate all transportation modes and users.
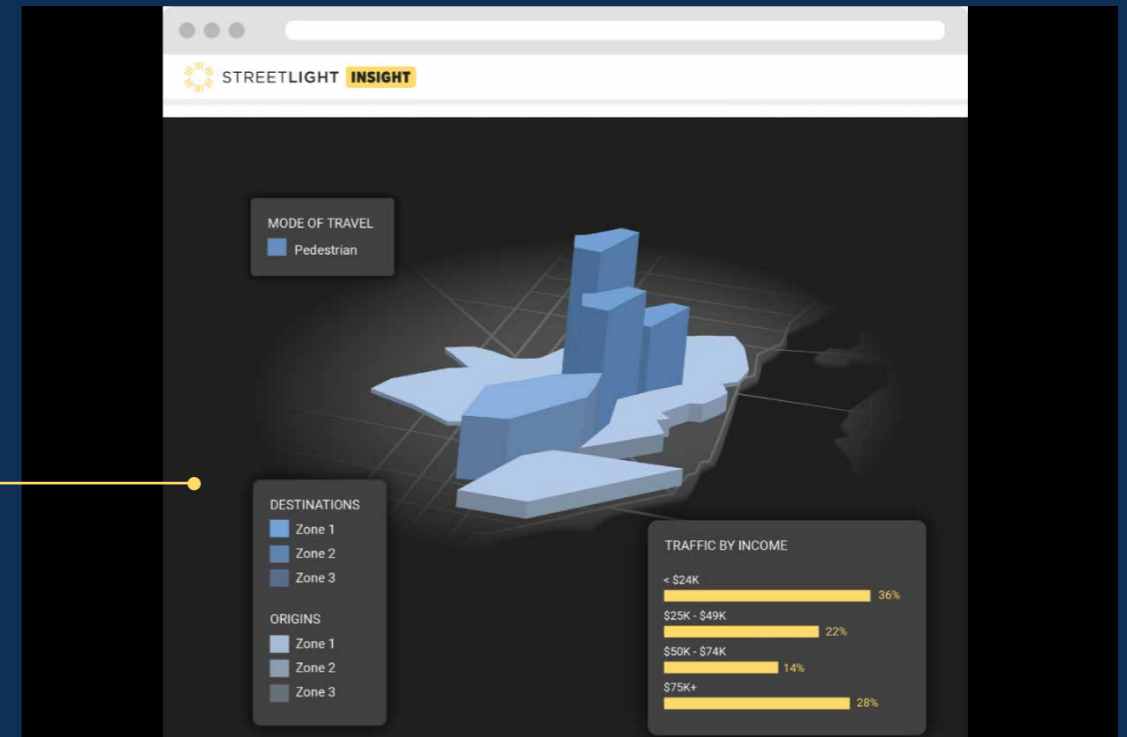
Figure 3: StreetLight InSight® allows you to overlay aggregated demographic information on active transportation mode analyses, providing a fuller picture of who may be most impacted by potential infrastructure changes.

StreetLight InSight® allows you to:

1. Analyze top O-D pairs for bike and pedestrian traffic to inform where safety improvements will have the greatest impact.

2. Pair vehicle travel patterns with bike and pedestrian travel patterns to evaluate the impact of mode-shift investment.

3. Layer on demographics to diagnose the **social equity impact** for safety initiatives.
   (see StreetLight InSight® example in Figure 3)

4. Measure the effectiveness of Complete Street projects with **before-and-after studies**.

5. Understand traffic volume and speed to **justify road diet and traffic-calming initiatives.**

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[1] U.S. DOT, "Complete Streets," August 2015

Joaquin Siques
and
Hy Lao
City of Pasadena
Transportation Department

STREETLIGHT IN
SOUTHERN CALIFORNIA

During COVID-19, the City of Pasadena wanted to manage traffic flow and traffic speeds, so they implemented various traffic signal timing techniques to reduce the speed on corridors with outdoor dining, as well as other arterials. They wanted to efficiently monitor traffic volumes and speeds citywide and measure the impact of their traffic-calming measures. StreetLight InSight® enabled them to access these insights remotely without setting up traffic counters.

streetlightdata.com/pasadena

Case Study

Enhancing Bike and Pedestrian Safety in Pittsburgh

To enhance bike and pedestrian safety, the City of Pittsburgh used StreetLight Data's O-D Metrics to capture bike and pedestrian trip information. See why high-travel corridors didn't correlate with crash severity.

streetlightdata.com/pittsburgh

> " We no longer have to make assumptions in people's trip activity and travel behaviors. Now we have data to support our research and it separates fact from fiction.
>
> – PANINI CHOWDHURY, AICP

The Great Seal
of the City of Pittsburgh

III. Plan for Work Zone Safety

Safety isn't just about protecting those who use the roads, but also the workers who maintain our transportation infrastructure. Roadway workers face unique safety challenges that result in over 700 fatalities in work zones each year. Many of these work zone crashes involve large trucks and buses due to their limited maneuverability and large blind spots.[1]

Safety strategies for a work zone include programs to reduce work zone speeds, change driver behavior, implement temporary traffic control measures and devices, enhance public information and outreach, and provide operational strategies such as travel demand management, signal retiming, and traffic incident management.

Use transportation data to power Maintenance of Traffic planning.

StreetLight InSight® allows you to:

1. Understand peak hours and traffic conditions surrounding work zones in order to properly plan for safe and efficient mitigation strategies such as temporary traffic control.
(see StreetLight InSight® example in Figures 4 and 5)

2. Get the most up-to-date volume on roads — especially those heavily impacted by dynamic trends like COVID — to understand if a full road shutdown during construction may be feasible where only partial shutdowns were allowed previously. This both improves safety and reduces costs.

3. Improve traffic flow through work zone areas by identifying alternative routes for detour planning.
(see StreetLight InSight® example in Figure 6)

4. Analyze road work efficacy in work zones by performing before-and-after studies to diagnose if the road work improved mobility conditions and view construction detour impact.

UNDERSTAND TRAFFIC CONDITIONS SURROUNDING WORK ZONES
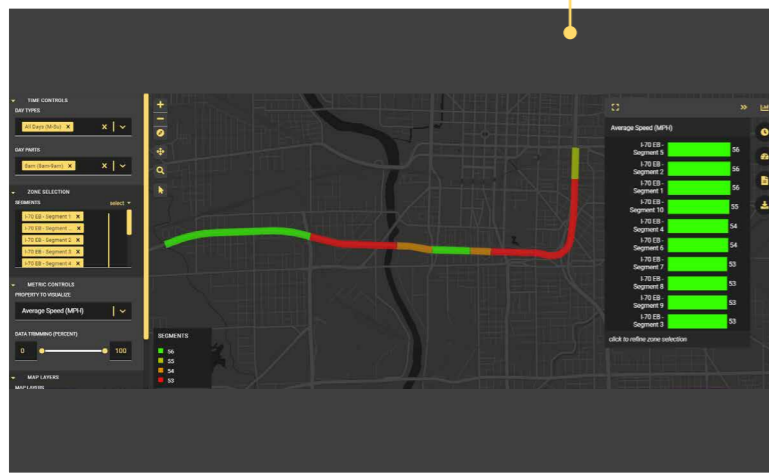

Figure 4: A Segment Analysis highlighting the historical distribution of segment speed can be used to identify where workers face the highest risk from high-speed crashes.

IMPROVE THE FLOW OF TRAFFIC THROUGH WORK ZONE AREAS
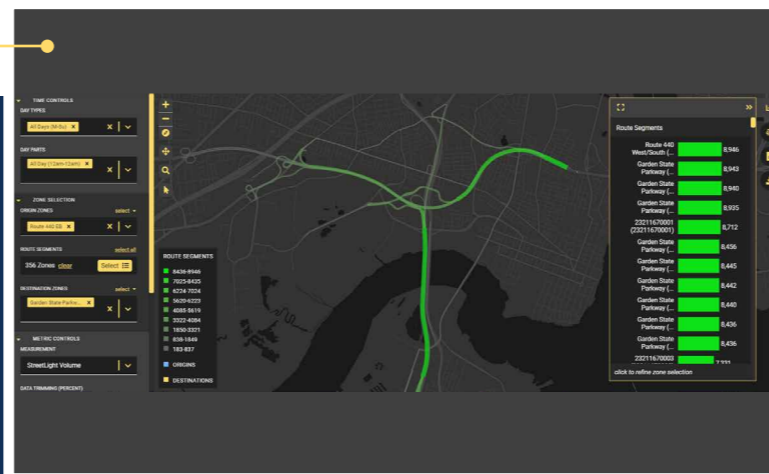
Figure 5: Top Routes analyses can be used to highlight the most highly trafficked routes between specific origins and destinations.

PINPOINT ALTERNATE ROUTES FOR PUBLIC OUTREACH SIGNAGE PRIOR TO ROAD CONSTRUCTION
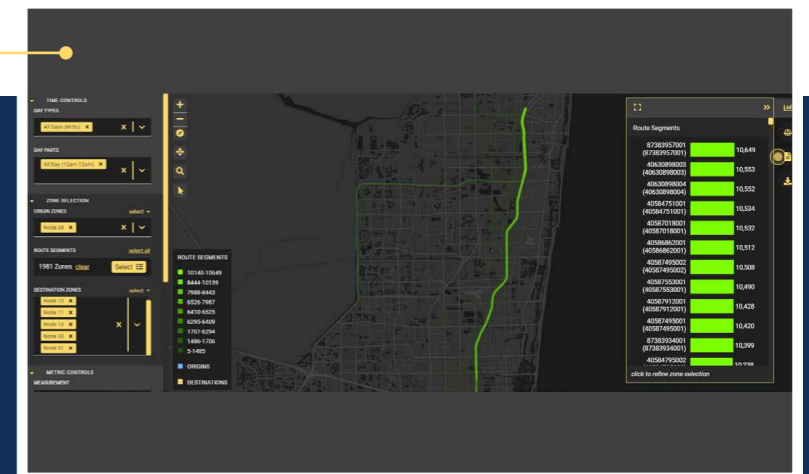
Figure 6: Top Routes analyses can be used to highlight alternate top routes or to assess the diversions made by travelers during Maintenance of Traffic time periods, and how those compare to advertised detours.

[1] U.S. DOT FMCSA, "Work Zones Safety Tips," April 2021

IV. Fulfill MIRE Requirements

By 2026, the FHWA mandates that all state DOTs will be required to collect the Model Inventory of Roadway Elements (MIRE) on all public roads in order to be eligible for Highway Safety Improvement Program (HSIP) funds. With over $2 billion provided each year for the implementation of highway safety improvement projects, these federal HSIP funds are a crucial resource for transportation agencies working to reduce roadway fatalities and injuries.[1]

Released in 2018, MIRE 2.0 lists over 200 recommended roadway characteristics and traffic inventory elements that are critical to safety management. Annual Average Daily Traffic (AADT) is listed among the key elements states must gather by 2026, alongside other recommended elements like hourly traffic volumes and Truck AADT.

Unfortunately, traditional methods for collecting AADT counts have many limitations, including being time-consuming and expensive. With comprehensive AADT transportation analytics, planners and agencies can access AADT counts on virtually every road in the U.S. (and Canada), including smaller roads and arterials in urban and rural areas.

[1] U.S. DOT FHWA, "Federal Aid Essentials for Local Public Agencies," 2014

StreetLight InSight® allows you to:

1. Access AADT and traffic volume Metrics for all road segments on demand, including local and rural roads, to understand the usage of all public roads for MIRE Fundamental Data Elements collection efforts.
(See StreetLight InSight® example in Figure 7)

2. Segment AADT by vehicle type, e.g., light-duty vehicles versus commercial trucks.
(see StreetLight InSight® example in Figure 8)

3. Identify hourly traffic volumes.

4. Optimize traffic count programs by receiving up-to-date road count data for your entire region.

ACCESS AADT FOR ALL ROADS IN A REGION
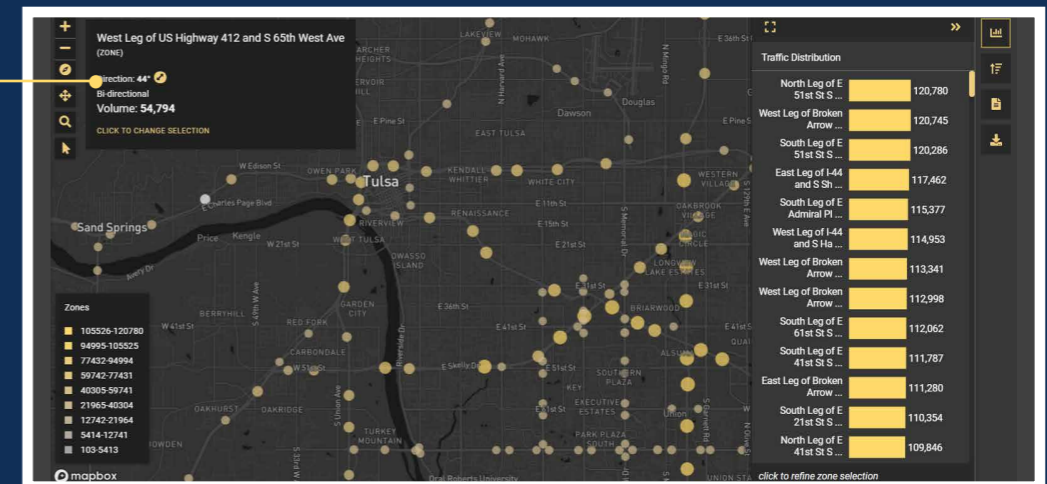
Figure 7: Citywide AADT analyses can be used to understand the usage of all public roads and segments.

SEGMENT AADT AND TRAFFIC VOLUME BY VEHICLE TYPE

Figure 8: Traffic Metrics including AADT can be broken out by personal vehicle volume and commercial truck volume for each road segment.

Case Study

Tulsa MPO Fills Traffic Count Gaps

When jurisdictions in an Oklahoma MPO's region stopped collecting counts, StreetLight provided complete and reliable AADT Metrics for an entire area.

streetlightdata.com/tulsa

2,226

> " Without StreetLight's AADT metrics, we would have no arterial streets data.
>
> – Nimish Dharmadhikari, INCOG

V. Win and Implement Infrastructure Grant Funding

The Infrastructure Investment and Jobs Act (IIJA), also known as the Bipartisan Infrastructure Law (BIL), dramatically increased the availability of federal infrastructure grant funds for safety improvement projects when it was signed into law in November 2021. Between 2022 and 2026, the IIJA/BIL will provide $550 billion in infrastructure funding through a variety of grant programs devoted to safety, equity, sustainability, resilience, and other infrastructure goals.[1] The BIL also prioritizes roadway safety by requiring all states to develop a Vulnerable Road User Safety Assessment in order to receive federal aid through HSIP.

Among the grant programs established under the BIL, the Safe Streets and Roads for All (SS4A) program, Reconnecting Communities Pilot (RCP) program, and Strengthening Mobility and Revolutionizing Transportation (SMART) program are potential sources for transportation agencies looking to fund safety improvement projects.

But to win grant dollars and satisfy HSIP requirements, transportation agencies must first make a compelling case for funding by demonstrating the potential impact of their project on safety outcomes. For some grant programs, impact on equity, climate, and/or connectivity must also be illustrated.

Transportation analytics can help make the case for funding and guide optimal implementation of grant funds.

[1] U.S. DOT FHWA, "Bipartisan Infrastructure Law," October 2022

StreetLight InSight® allows you to:

1. Prove the potential safety impact of your proposed project with traffic volumes, speed data, congestion Metrics, and more.

2. Access vehicle, pedestrian, and bike Metrics to power multimodal safety solutions.
   (see StreetLight InSight® example in Figure 9)

3. Layer on demographics to diagnose the social equity impact of safety initiatives.
   (see StreetLight InSight® example in Figure 10)

4. Create compelling data visualizations to include in your grant application.

PERFORM MULTIMODAL SAFETY ANALYSES
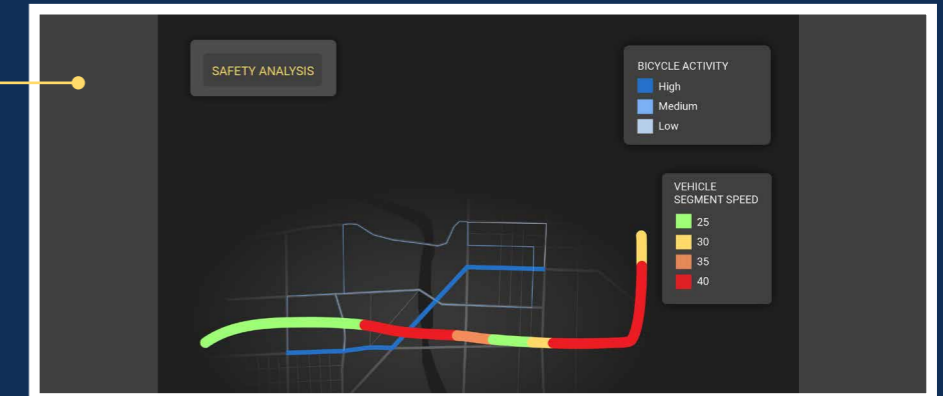
Figure 9: Bike volumes can be compared with vehicle speeds along a segment to identify high-risk corridors and prove the need for safety improvements.

OVERLAY DEMOGRAPHIC INSIGHTS TO DIAGNOSE EQUITY IMPACT

Figure 10: Layer on aggregated traveler demographics, like household income, disability status, and more, to quantify the potential equity impact of a proposed project within the relevant zone(s) or corridor(s).

Case Study

Analytics Secured Federal INFRA Funding for Columbus

The Ohio Department of Transportation (ODOT) sought funding for a multi-year, multi-phase highway restructuring project. Compelling insights from StreetLight helped secure $25 million in INFRA funding.

streetlightdata.com/columbus

> " The data visualization created a light-bulb moment. It helped people see the magnitude of local and national freight moving through this area.
>
> – TIMOTHY NITTLE, CITY OF COLUMBUS

THE CITY OF
COLUMBUS

# VI. Ensure Equitable Outcomes for Vulnerable Communities

To ensure safe transportation for all, safety improvement projects must address existing disparities. For example, the National Safety Council reports that lower-income neighborhoods experience more than twice as many pedestrian fatalities as those with the highest incomes and that drivers are less likely to yield to Black people walking and biking than white people.[1] On top of that, roadway safety challenges can have a disproportionate impact on already vulnerable communities due to differences in financial or legal security, healthcare access, disability, and more.

Quantifying the impact of safety improvement projects on our most vulnerable communities ensures that time, effort, and funds are prioritized where they will have the greatest overall impact. Moreover, it ensures that we do not widen the safety gap between communities, making the safest communities safer while doing little for those who face the greatest road safety risks.

Transportation analytics can help ensure that your road safety project serves all communities.

[1] National Safety Council, "A Safe Mobility System is the Cornerstone of an Equitable Mobility System," 2022
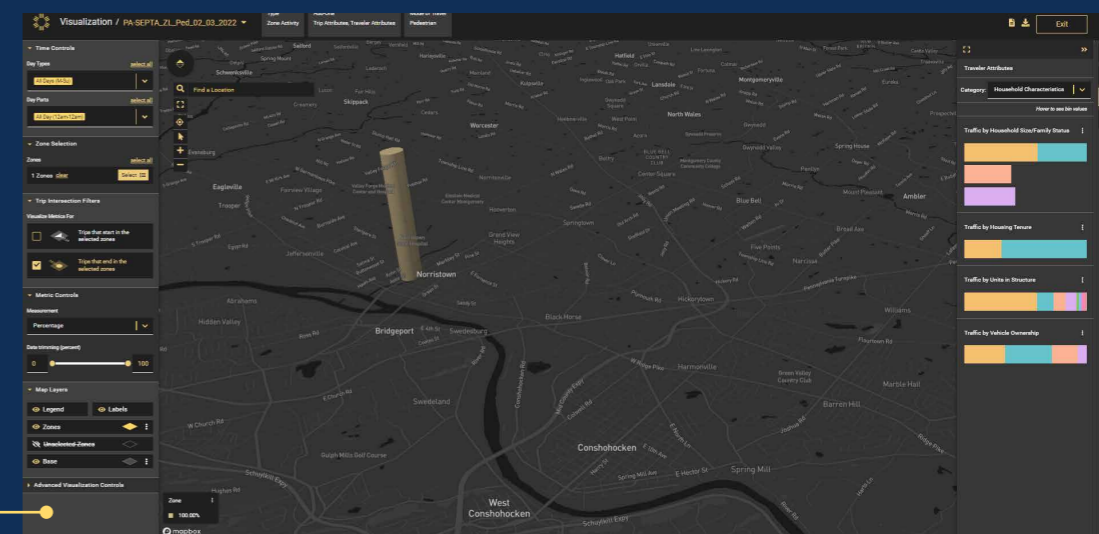
Figure 11: Demographic Metrics can be used to reveal which transit stations vulnerable communities use most and how traveler needs may differ from station to station, including where infrastructure serving the needs of parents may be in high demand.

StreetLight InSight® allows you to:

1. Overlay traffic Metrics with demographic information to see which roads, routes, and transit stations are most used by members of vulnerable communities.
(see StreetLight InSight® example in Figure 11)

2. Contextualize crash data and trip speeds with demographic information to investigate where vulnerable communities are most at risk.

3. Identify where non-English roadway signage, accessible safety communications, or other infrastructure improvements focused on vulnerable communities may be most needed.

Case Study

Active Transportation Plan for Sarasota

Sarasota/Manatee MPO wanted an Active Transportation Plan to guide decisions and funding for transit, bicycle, and pedestrian facilities. This multimodal network would make these modes safer, more affordable, and more convenient for all users.

streetlightdata.com/sarasota

"

These data enable a clear understanding of how to address people's travel needs efficiently with fixed-route and, in some cases, flexible services.

– SARASOTA/MANATEE MPO REPORT

STREETLIGHT

StreetLight pioneered the use of Big Data analytics to shed light on how people, goods, and services move, empowering smarter, data-driven transportation decisions. StreetLight applies proprietary machine-learning algorithms and its vast data processing resources to measure travel patterns of vehicles, bicycles, and pedestrians, accessible as analytics on the StreetLight InSight® SaaS platform. Acquired by Jacobs as a subsidiary in February 2022, StreetLight provides innovative digital solutions to help communities reduce congestion, improve safe and equitable transportation, and maximize the positive impact of infrastructure investment. For more information, please visit:

STREETLIGHTDATA.COM