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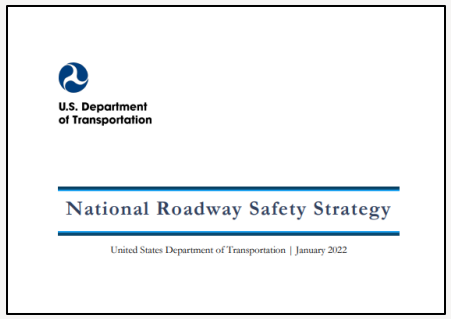
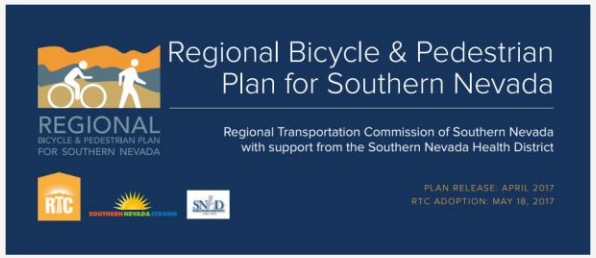
ITS Countermeasures Mapped to Safe Systems and SHSPs

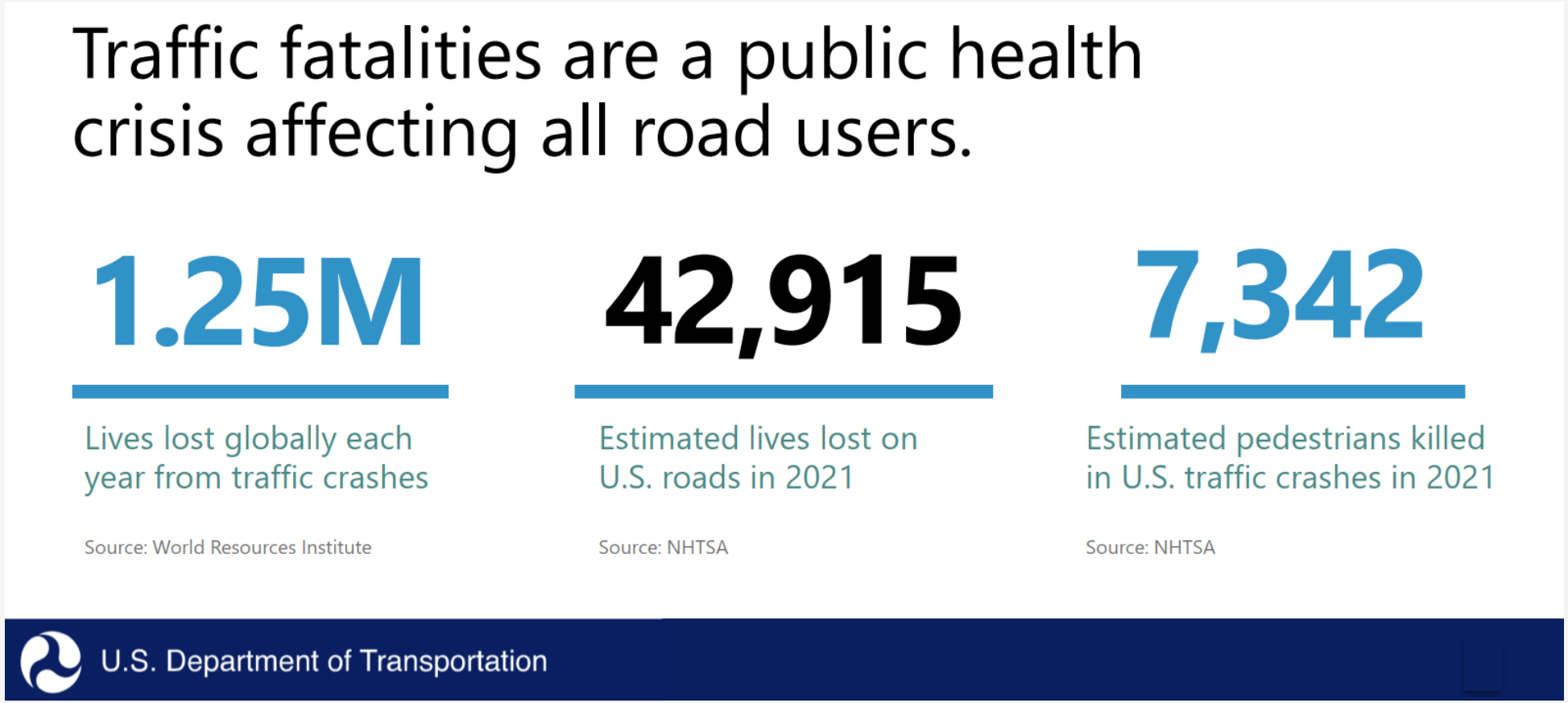
2022 Nevada Traffic Safety Summit
Sparks, NV

Current Paradigm

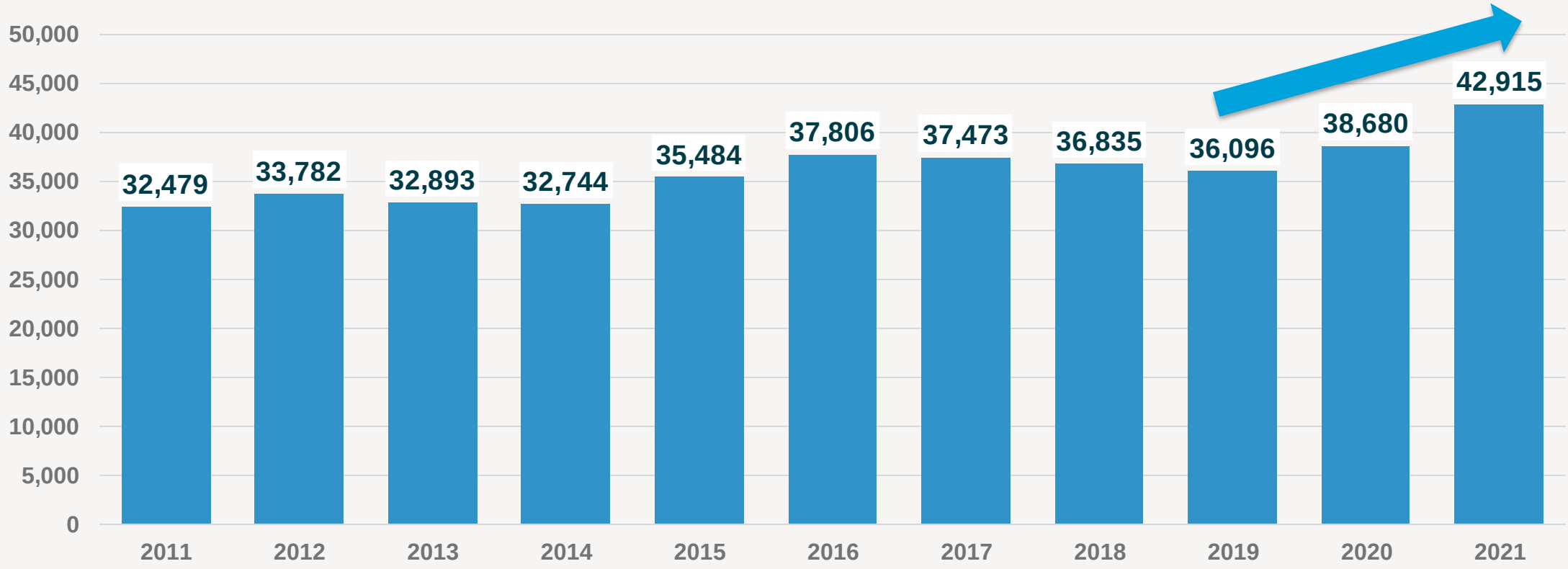




Our Current Reality

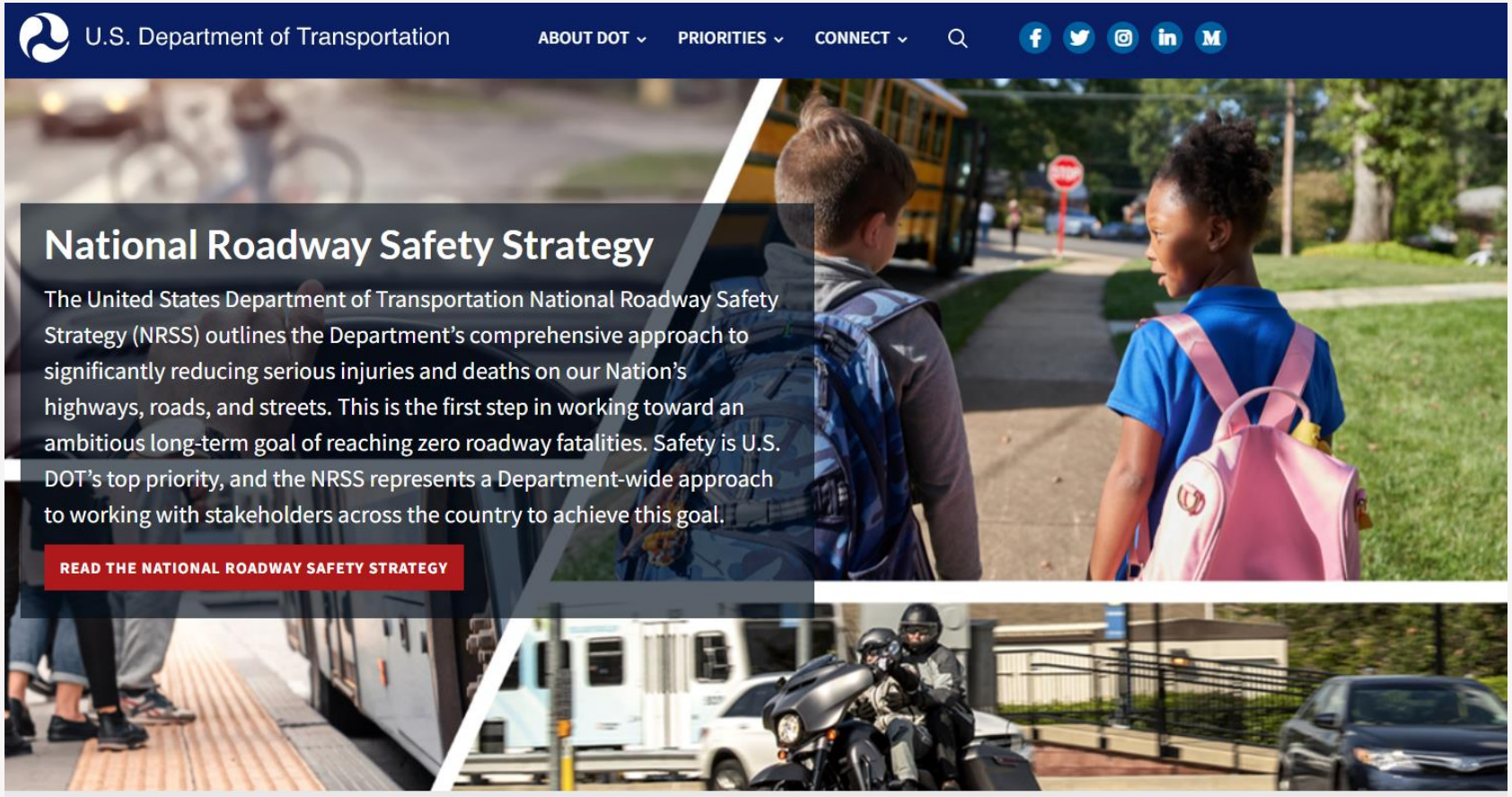


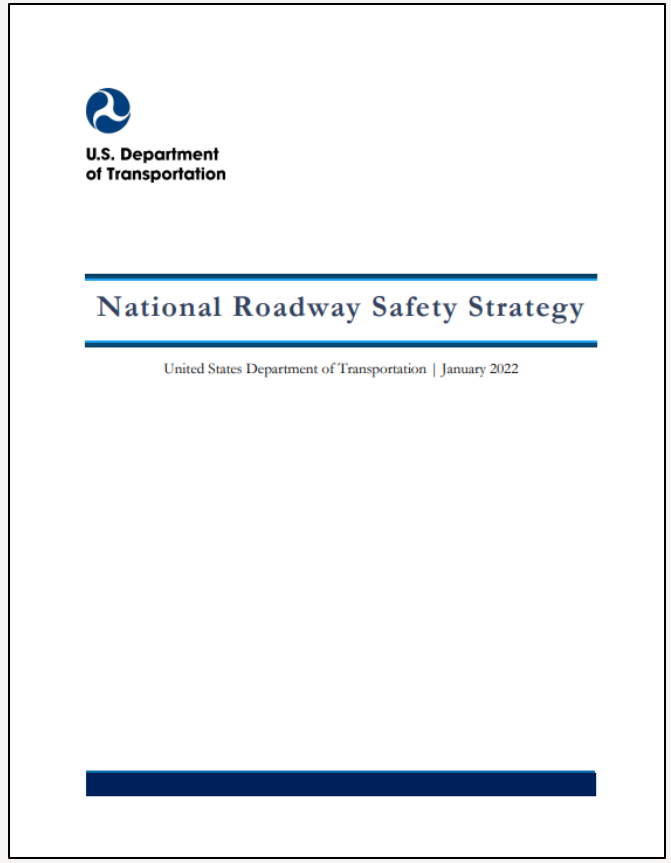
Total US Traffic Fatalities (2011 – 2021)



Source: NHTSA

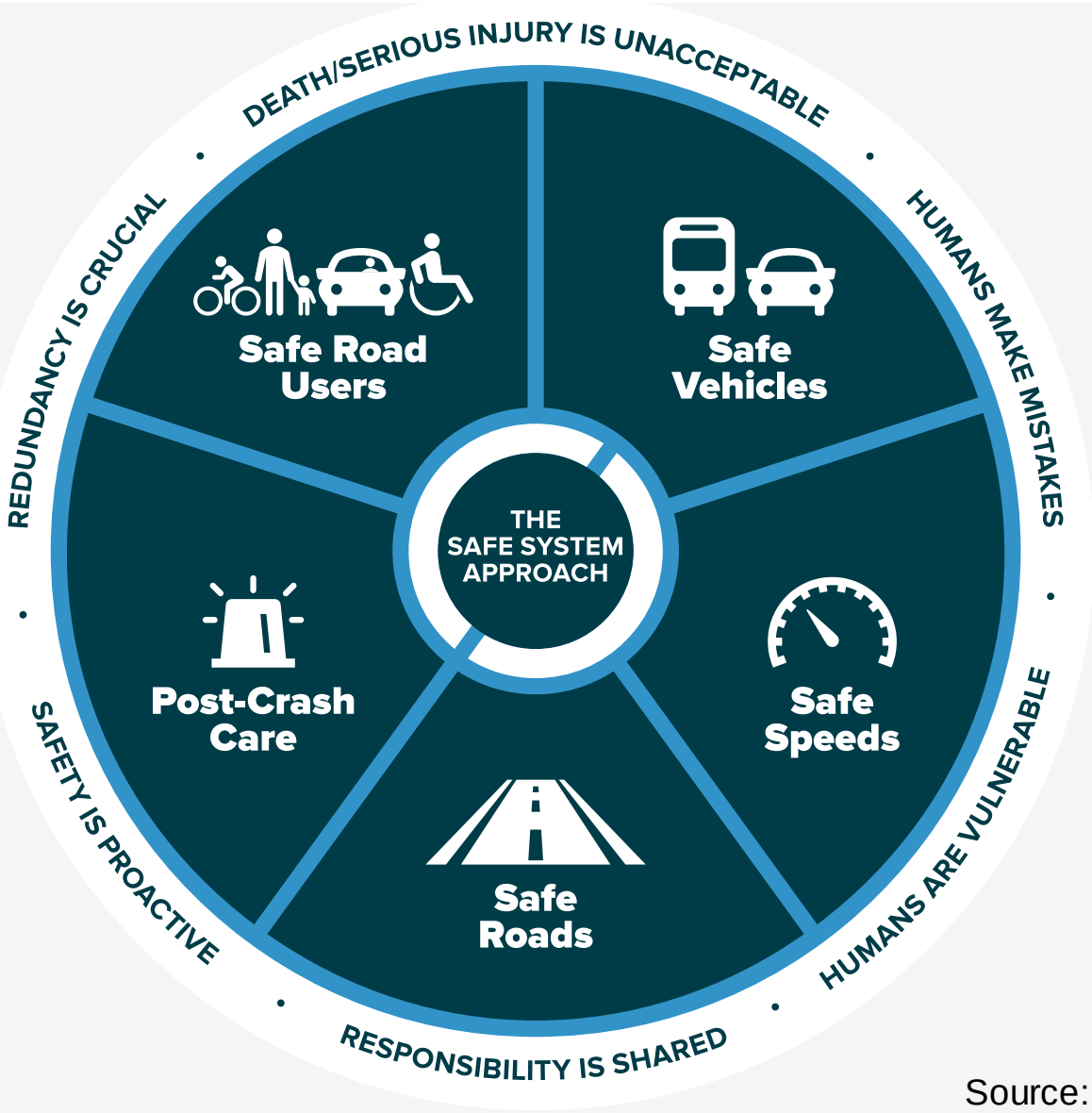
National Roadway Safety Strategy (USDOT, 2022)





THE SAFE SYSTEM APPROACH

Zero is our goal. A Safe System is how we get there.

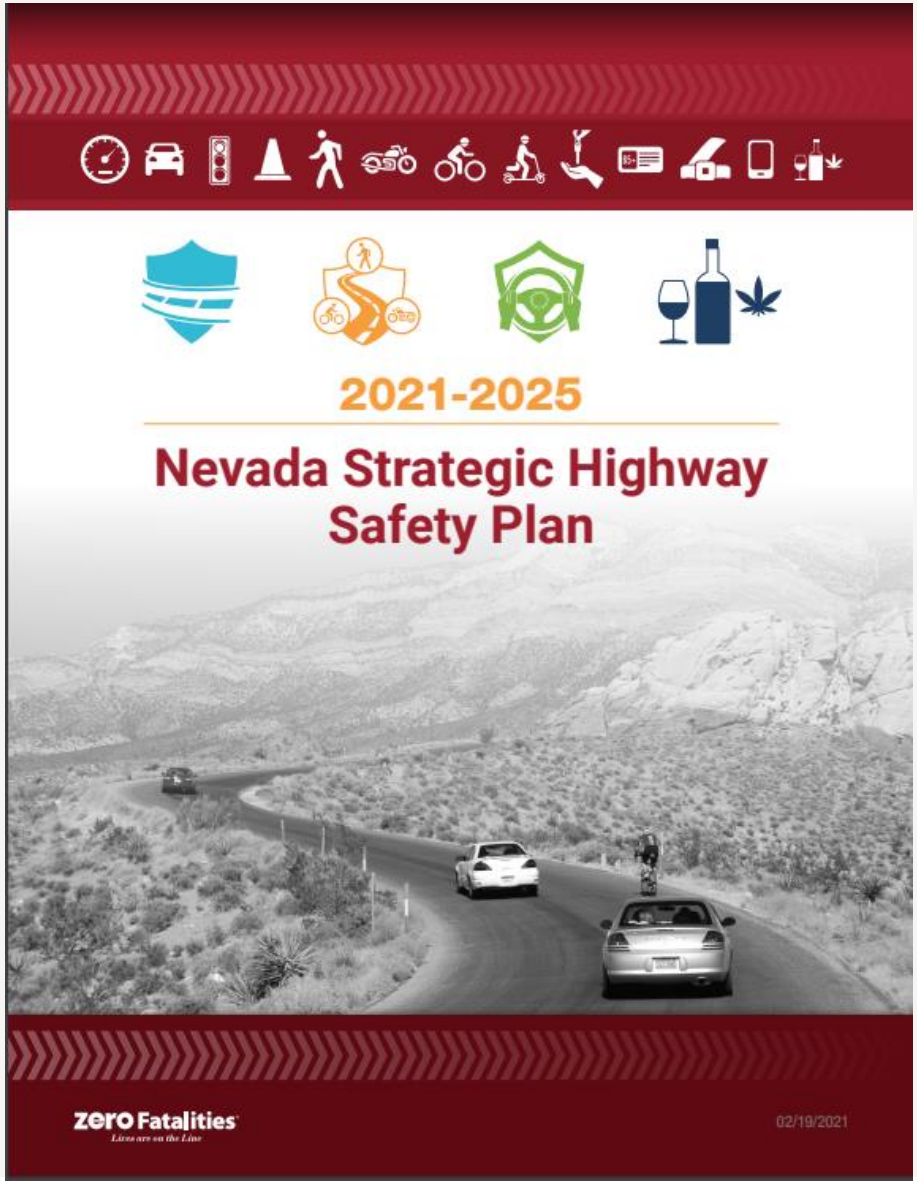


Source: FHWA

Nevada

- Nevada focusses on “Zero Fatalities” initiative
- With technology-based safety improvements, several opportunities to leverage existing infrastructure (lower cost, faster deployment)
- ***“No safety-based improvement is too small when working towards zero…”***

10 YEAR ANNIVERSARY
zero Fatalities
Lives are on the Line



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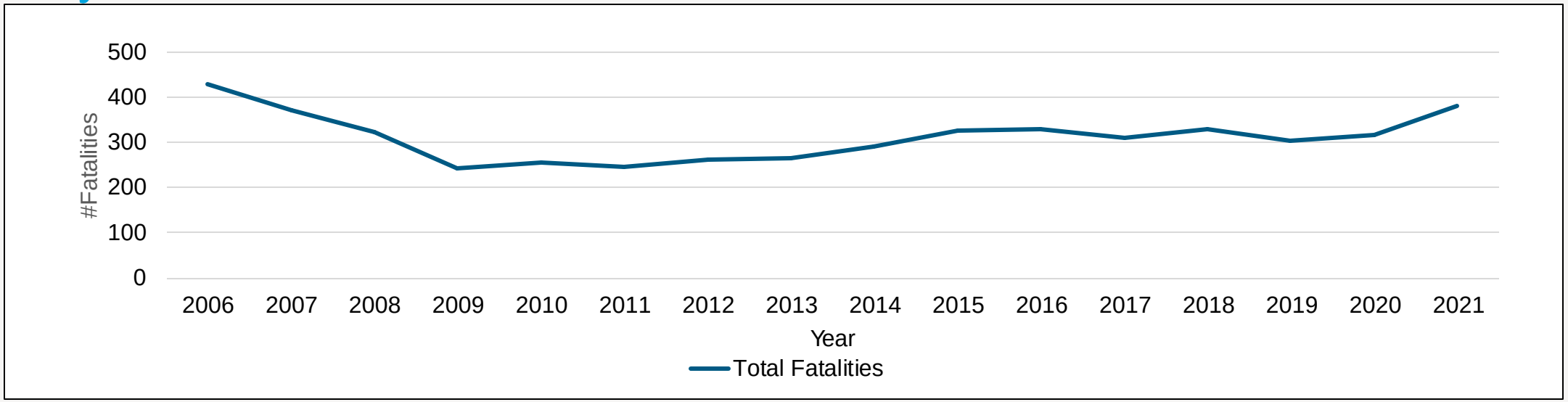
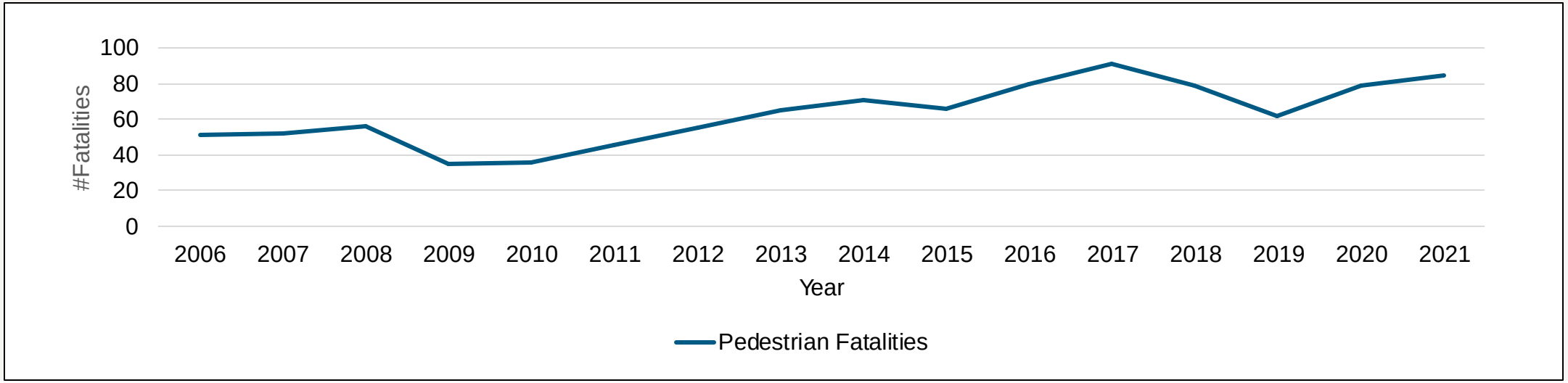
Fatality Trends in Nevada





Source: FARS

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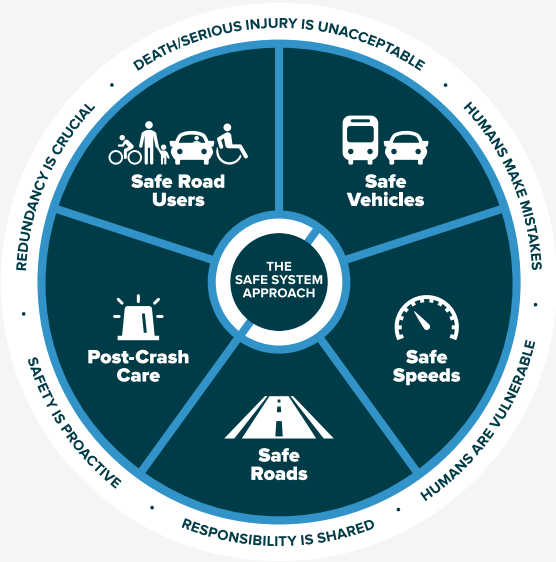
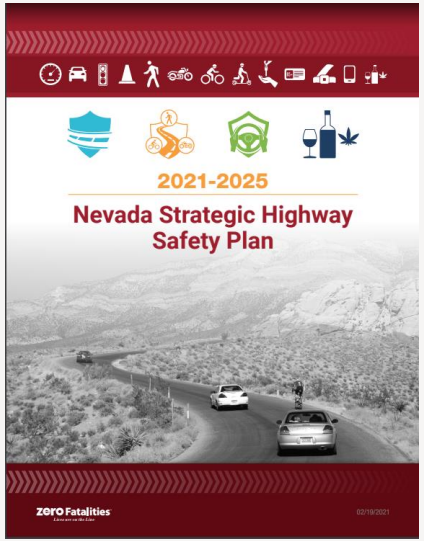
Technology Based Safety Experience

Atkins delivered several projects with technology-based safety improvements for all road users and modes.

The following provides a "catalog" of potential strategies to apply to specific sites for opportunities to improve safety.





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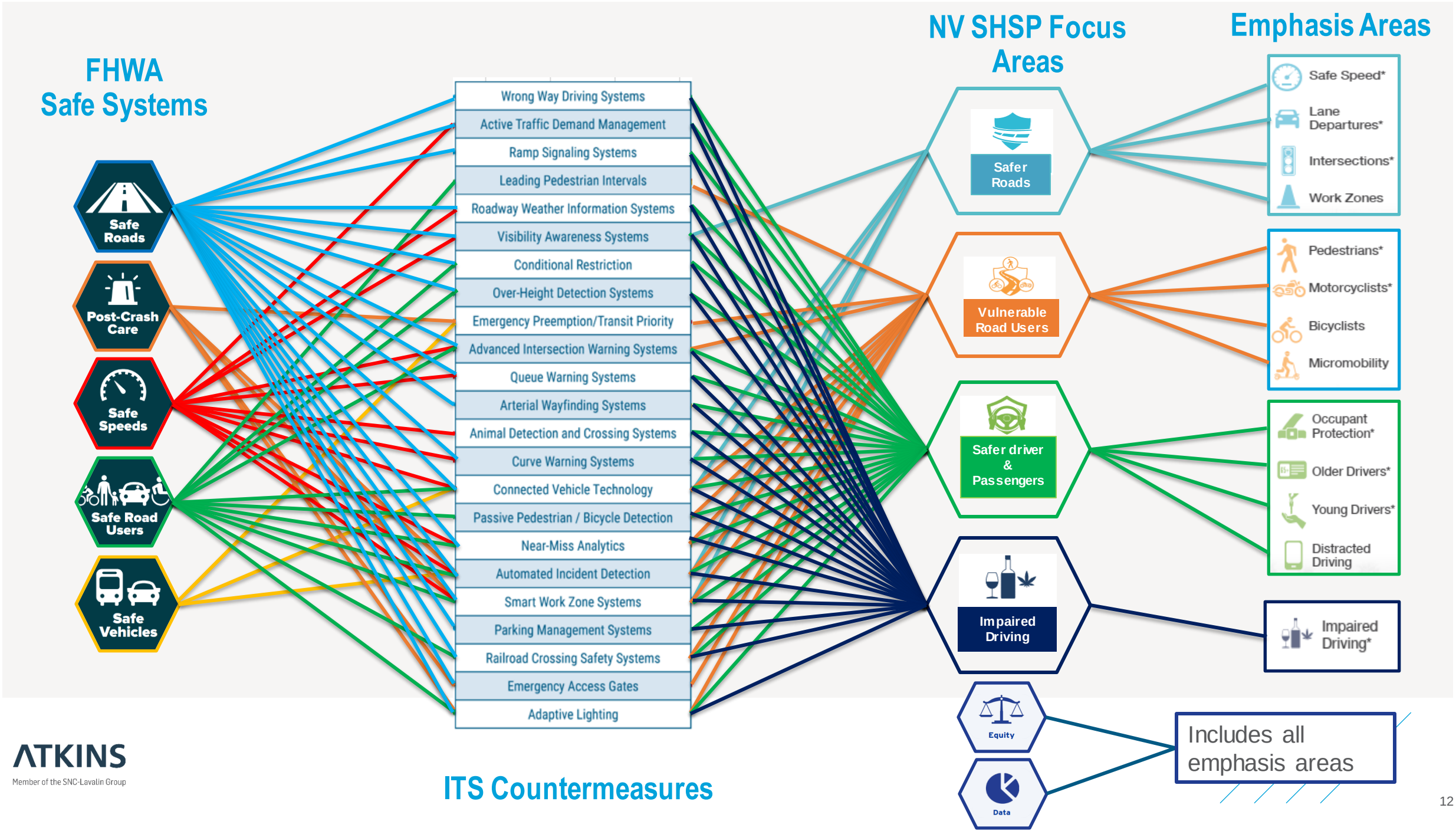

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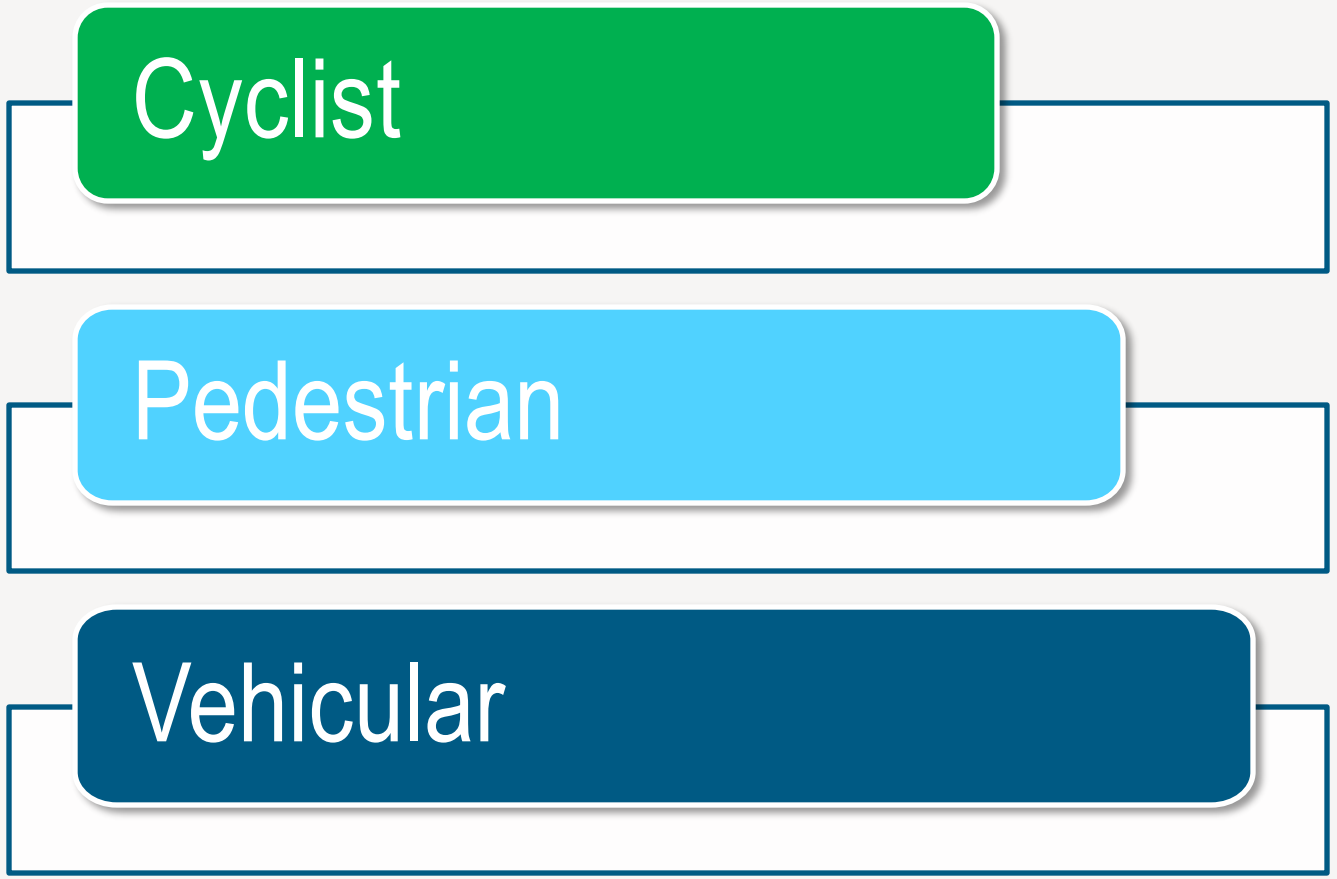
Technology-Based Safety Experience

Atkins provides real-world project experience in delivering technology-based safety improvements for all road users and modes.

The following provides a “catalog” of potential strategies to apply to specific sites for opportunities to improve safety.



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MATURITY	COST	TIME
Current state of technology, readiness of deployment.	Estimated unit cost to furnish and install complete system.	Estimated deployment time; necessary infrastructure work.
Low – infancy stages, likely will require development, modifications, or testing; lacks significant proven history	**$** – Less than $50,000	**Short** – 0 to 6 months; little to no infrastructure needed, use existing
Fair – recognized and accepted technology, may require additional development, modifications, or testing	**$$** – Ranging between $50,000 and $200,000	**Mid** – 6 to 15 months; moderate infrastructure required
High – well-proven system with long history of successful deployments	**$$$** – Greater than $200,000	**Long** – Greater than 15 months; requires significant infrastructure

Effective Safety Technologies used in Nevada by Atkins

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Vehicular

Active Traffic Demand Management

Strategy for the deployment of a system allowing for lane-by-lane management, including variable speed limits and changing lane status (e.g., open, close, reversible). Typical deployments include gantries with **variable speed limit signs, DMS displays, vehicle detection sensors,** and **verification cameras**

Example projects:

- Project NEON, I-15 at Tropicana – Nevada DOT
- Project I-15 at Tropicana – Nevada DOT
- US 95 – Nevada DOT
- I-285 in Atlanta – Georgia DOT
- I-4 in Orlando – Florida DOT
- I-77 in Charlotte – North Carolina DOT

MATURITY	High
COST	$$$
TIME	Long

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Safe Roads | Safe Speeds | Safer driver & Passenger | Impaired Driving | Data | Equity | Safer Roads

Vehicular

Ramp Signaling System

Strategy for the deployment of specific signal systems on limited-access corridor ramps to control the metering of vehicles entering into traffic to only available gaps. This strategy improves traffic flow and eliminates congestion-related crashes as vehicles "force merge" into the mainline. Typical deployments include **two-head signals, controller cabinet assemblies, advanced warning beacons, static signing, verification cameras,** and **network communications**.

Example projects:

- I-540 Beltway – North Carolina DOT
- I-15 and Tropicana – Nevada DOT
- SR 826 (Palmetto Expy) – Florida DOT

MATURITY	High
COST	$$
TIME	Long

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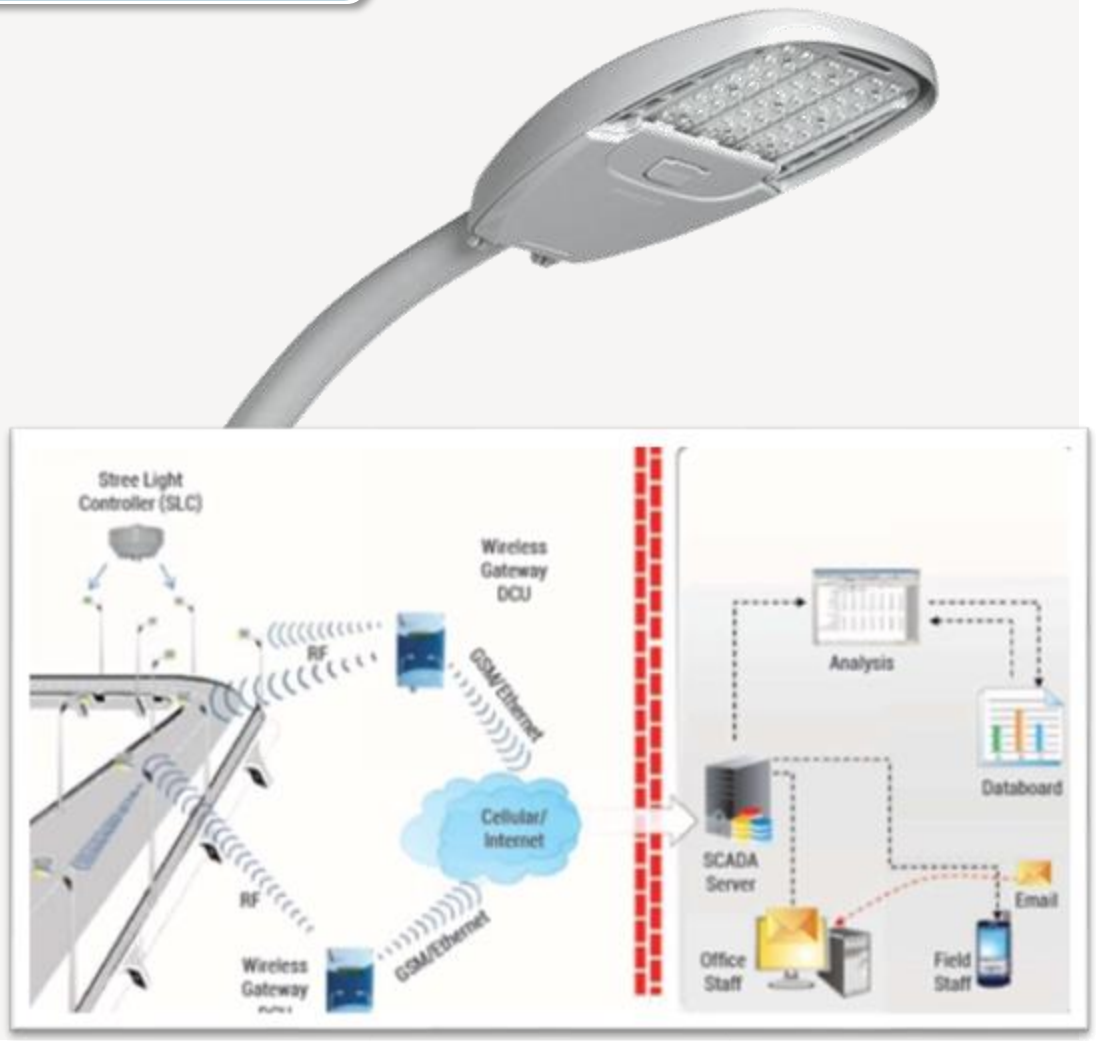
Safe Roads | Safer driver & Passenger | Impaired Driving | Data | Equity

Cyclist | Pedestrian | Vehicular

Adaptive Lighting

Strategy for the deployment of an intelligent lighting system that automatically adjusts luminance levels based on need generated from detection systems. Adaptive lighting helps to emphasize lighted objects with increased brightness, reduces energy consumption, minimize light pollution, and is scalable for vehicle and pedestrian applications. Typical deployments include **dimmable luminaires, detection systems, lighting management software platform,** and **network communications.**



Example projects:

- Statewide Standards, Practice Development – Nevada DOT
- I-580 Adaptive Lighting Pilot (two projects) – Nevada DOT

MATURITY	Low
COST	$$
TIME	Long

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Safe Roads | Post-Crash Care | Safe Road Users | Safer Roads | Vulnerable Road Users | Safer driver & Passenger | Impaired Driving | Data | Equity

Effective Safety Technologies used in Other States by Atkins

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Vehicular

Wrong Way Detection Systems

Strategy to identify and alert motorists of an improper movement, as well as notify operational teams of the event (e.g., TMC). Typical deployments include **vehicle sensors, verification cameras, logic controllers, motorist information systems, cloud-hosted software, Connected Vehicle equipment,** and **network communications.**

Example projects:

- I-295 S&CC No. 1 – New Jersey DOT
- I-95, I-4 – Florida DOT
- 45SW – Central Texas Regional Mobility Authority

MATURITY	High
COST	$$
TIME	Mid

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Safe Roads | Safer driver & Passenger | Impaired Driving | Data | Equity

Vehicular

Roadway Weather Information Systems

Strategy for the deployment of multi-sensor systems to monitor real-time weather and roadway surface conditions and provide information driving operational decisions (e.g., bridge closed). Typical deployments include assemblies with **environmental sensors (e.g., wind speed, ambient temperature, road surface temperature, precipitation type, intensity and surface flooding levels), central processing unit, verification camera(s), network communications,** and **backend software platforms.**

Example projects:

- Regional RWIS Deployment (Bay, Metro) – Michigan DOT
- I-10 Bridge Monitoring Systems – Florida DOT

MATURITY	High
COST	$
TIME	Short

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Safe Roads | Safe Speeds | Safer Roads | Safer driver & Passenger | Impaired Driving | Data | Equity

Vehicular

Visibility Awareness Systems

Strategy for the deployment of roadside sensors capable of determining low-visibility conditions (e.g., smoke, fog) in real-time and disseminate this information to motorists to alert of potentially dangerous situations. Typical deployments include **visibility sensors (e.g., infrared), motorist information systems, central processing unit, verification camera(s), upstream dynamic message signs (DMS),** and **network communications.**

Example projects:

- I-95, I-75 Visibility Awareness System – Florida DOT

MATURITY	High
COST	$
TIME	Short

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Safe Roads | Safe Speeds | Safer Roads | Safer driver & Passenger | Impaired Driving | Data | Equity

Vehicular

Over-Height Detection Systems

Strategy to detect and warn taller vehicles of upcoming dangerous height condition, such as low clearance overpass bridges. Typical deployments include **two-point sensor system, logic controller, motorist information system (e.g., flashing beacons),** and **advanced static signing.**

Example projects:

- SR 115 / US 1 – Florida DOT
- US 27 (Apalachee Pkwy) – Florida DOT

MATURITY	High
COST	$
TIME	Short

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Safe Roads | Safe Road Users | Safer driver & Passenger | Impaired Driving | Data | Equity

Vehicular

Emergency Vehicle / Transit Priority

Strategy to detect emergency and transit vehicles at signalized intersections to trigger high-priority re quests to promote safe and efficient travel through the intersection. This improves response times for emergencies and helps to maintain transit vehicles on schedule. Systems typically includes **sensors, in-cabinet equipment,** and **controller modules.**

Example projects:

- Gwinnett County SRTA Upgrades – Georgia DOT
- Signalization Upgrades – City of Durham
- US 98 Smart Bay – Florida DOT

MATURITY	High
COST	$
TIME	Short

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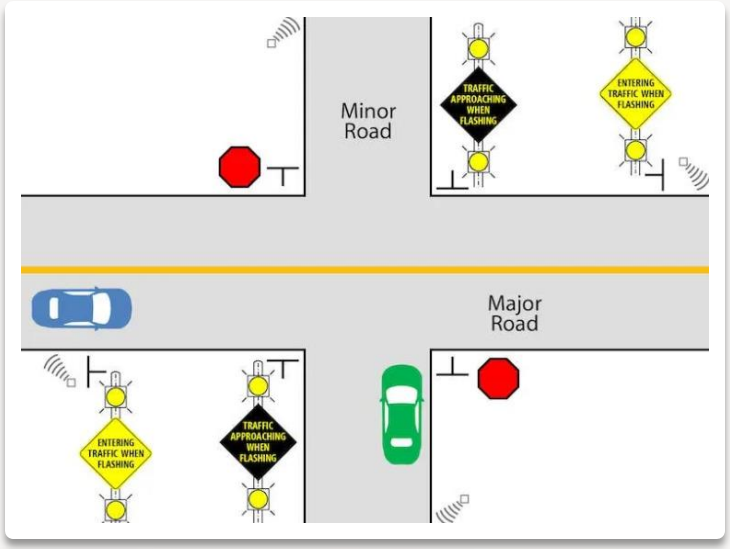
Post-Crash Care | Safe Vehicles | Vulnerable Road Users | Data | Equity

Vehicular

Advanced Intersection Warning Systems

Strategy to alert motorists of the conditions upstream of the intersection for increased driver awareness. System may include detection of pedestrians, bicyclist, and vehicles within the intersection or adjacent streets and provide notification to motorists in the approach. Systems typically include **motorist information systems, sensors, logic controller, Connected Vehicle technology,** and **network communications.**



Example projects:

- FHWA Driver Simulator Research, TFHRC, McLean, VA
- Districtwide Safety Improvements (multiple projects) – Florida DOT

MATURITY	High
COST	$
TIME	Short

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Safe Roads | Safe Speeds | Safe Road Users | Vulnerable Road Users | Safer driver & Passenger | Impaired Driving | Safer Roads | Data | Equity

Vehicular

Queue Warning System

Strategy for the deployment of a system capable of detecting slowed (e.g., congestion) or stopped (e.g., queue) traffic and providing advanced notice to downstream drivers to modify driver behavior. This strategy is available as either site-specific or corridor wide. Typical deployments include **vehicle detection systems, motorist information systems, network communications,** and **advanced static signing**.

Example projects:

- I-75 at US 301 interchange – Florida DOT
- US 31 Charlevoix Drawbridge – Michigan DOT

MATURITY	High
COST	$$
TIME	Short

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Safe Roads | Safe Speeds | Safer driver & Passenger | Impaired Driving | Data | Equity

Vehicular

Animal Detection and Warning Systems

Strategy for the deployment of systems in environmentally strategic areas to detect large animals attempting to cross the roadway and alert the motorist upstream to proceed with caution. This system can also aid in the verification and tracking of species in partnership with wildlife / environmental agencies. Typical deployment includes **sensor technology, motorist information systems, solar-power array, cellular modem, verification camera(s),** and **RFID tag readers.**

Example projects:

- Roadside Animal Detection System (RADS) (US 41) – Florida DOT

MATURITY	High
COST	$
TIME	Short

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Safe Speeds | Safer driver & Passenger | Impaired Driving | Data | Equity

Vehicular

Curve Warning System

Strategy to detect vehicles entering into curves to determine potentially dangerous situations and alert drivers. These syste ms determine vehicle speed, height, roadway conditions, and other pertinent factors to identify potential roll over crashes and trigger a motorist inform ation system. Typical deployments include **vehicle detection systems, motorist information system,** and **logic controller**.

Example projects:

- Rail Crossing Safety Program – North Carolina DOT
- Jacksonville Video Analytics Pilot – Florida DOT
- Purple Line – Maryland State Highway Authority

MATURITY	Fair
COST	$
TIME	Short

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Safe Roads | Safe Speeds | Safer Roads | Safer driver & Passenger | Impaired Driving | Data | Equity

Vehicular

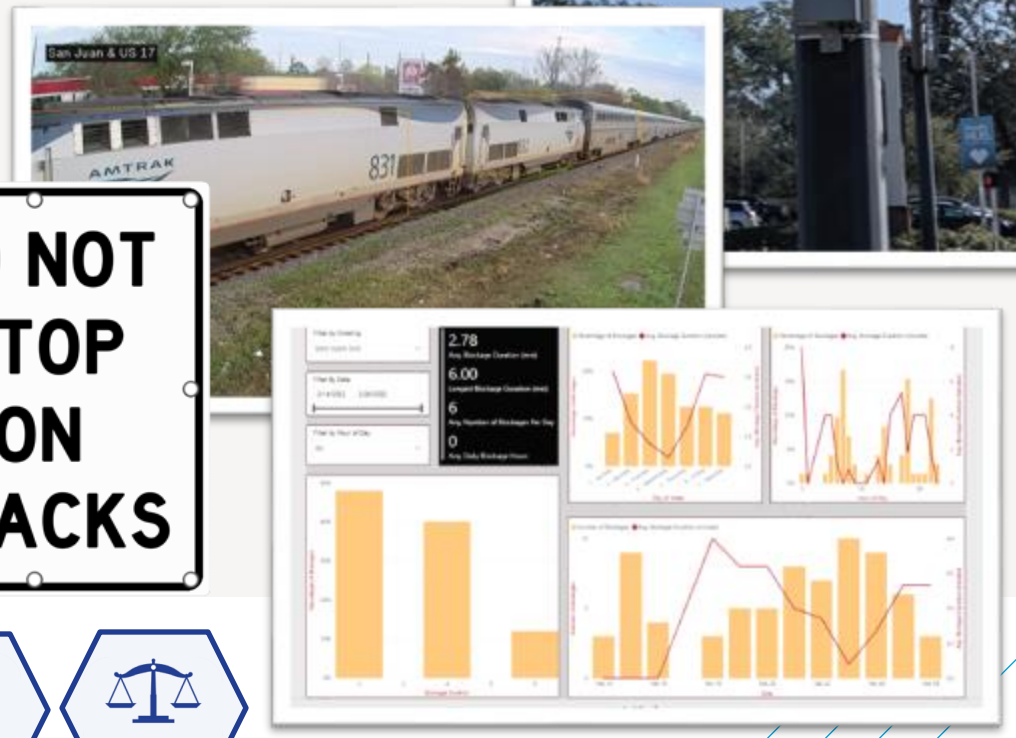
Railroad Crossing Safety Systems

Collection of strategies used to determine position, trajectory, heading, and status of trains and vehicles to identify potential conflict points and alert motorists ahead of decision points. Triggered outcomes may include alternative route information, warnings to clear crossing, preemption request to nearby signalized intersections, and advance gate down advisory. Deployments may include **verification cameras, vehicle detection systems, motorist information systems,** and **network communications.**

Example projects:

- Rail Crossing Safety Program – North Carolina DOT
- Jacksonville Video Analytics Pilot – Florida DOT
- Purple Line – Maryland State Highway Authority

MATURITY	Low – Fair
COST	$$
TIME	Short



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Safe Roads | Safe Road Users | Vulnerable Road Users | Safer driver & Passenger | Impaired Driving | Data | Equity

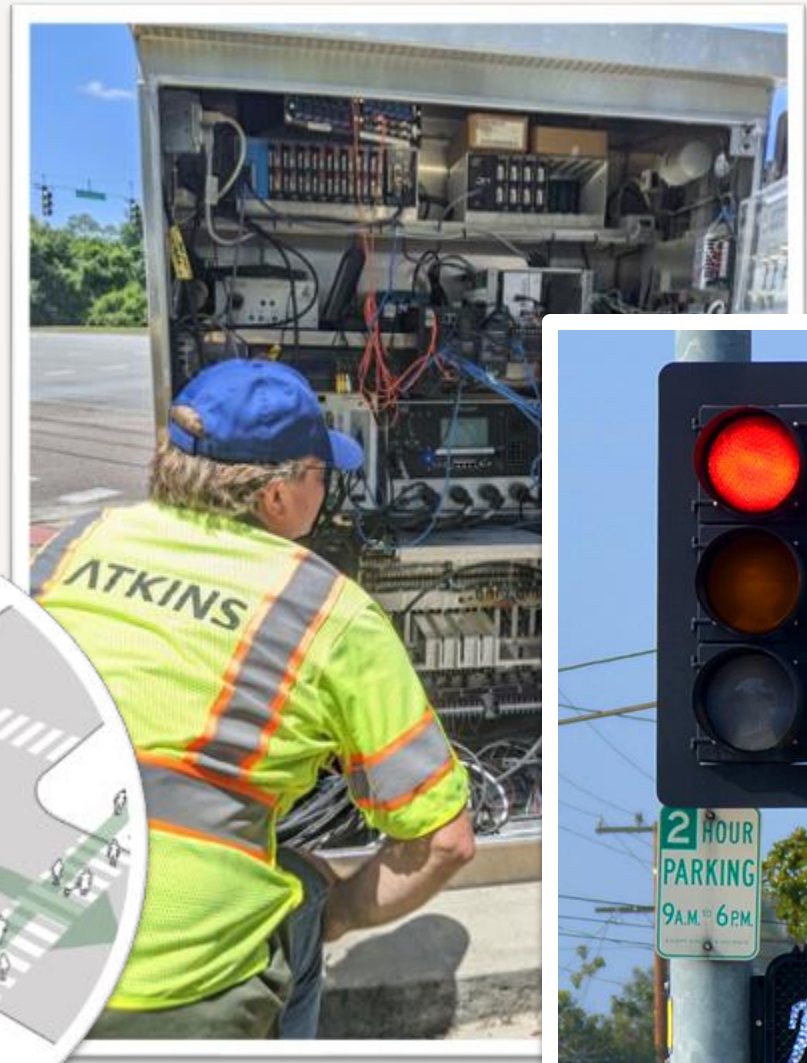
Pedestrian

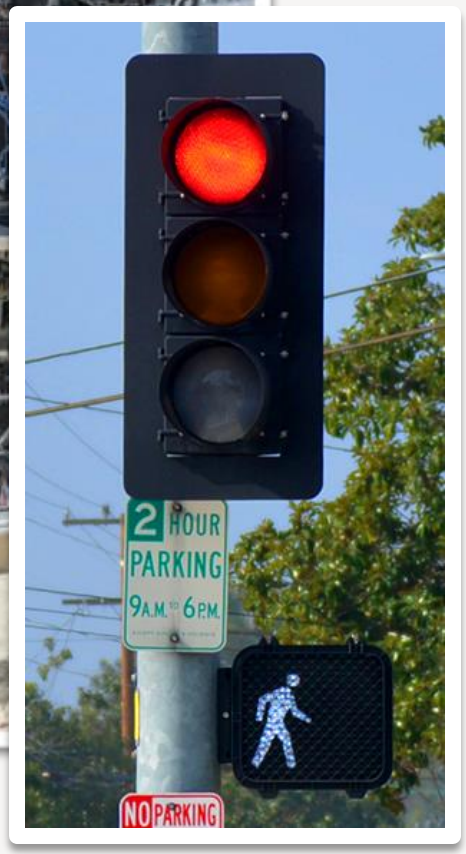
Leading Pedestrian Intervals

Strategy to detect pedestrians to trigger an outcome without action from the pedestrian. Outcomes may include actuating ped crossing phase, broadcast Traveler Information Message (TIM), start flashing sequence for beacon. System typically includes **sensors, logic controller,** and **motorist information systems.**

Example projects:

- Accessible Pedestrian Signal Upgrades – Florida DOT
- SR 50, SR 483 Retiming – Florida DOT





MATURITY	High
COST	$
TIME	Short

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Safe Road Users | Vulnerable Road Users | Safer Roads | Data | Equity

Cyclist

Pedestrian

Conditional Restriction

Strategy to detect bicyclists and/or pedestrians at intersections and prohibit specific turning movements that may result in a conflict, but otherwise maintain normal operations. Typical deployments include **LED blankout signs, controllers, detection system(s),** and **Connected Vehicle technology.**

Example projects:

- North Region Signalization Modernization - Michigan DOT
- Citywide Signal Modernization – City of Detroit
- 27th Street E Widening – Manatee County, FL

MATURITY	High
COST	$
TIME	Short

ATKINS
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Safe Roads | Safe Road Users | Vulnerable Road Users | Safer driver & Passenger | Impaired Driving | Data | Equity

Cyclist | Pedestrian | Vehicular

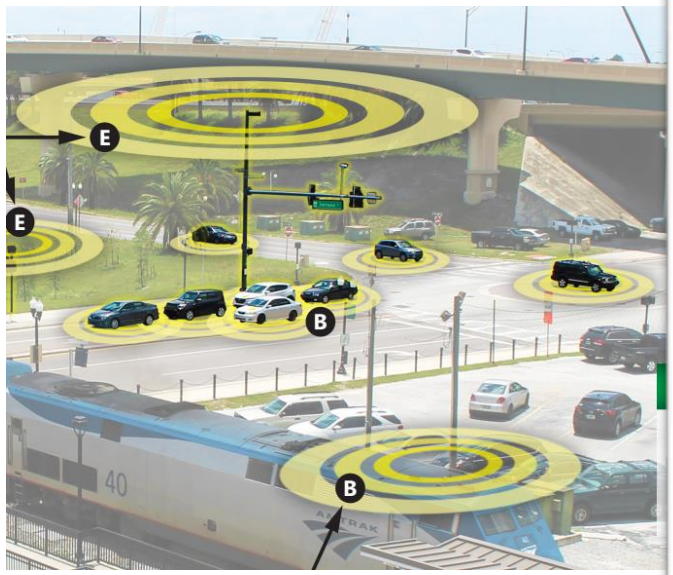
Connected Vehicle Technology

Strategy for establishing communication between roadside infrastructure, vehicles, and road users enabling a variety of applications—including in-vehicle advisory messages, special detection requests, and more. Typical deployments include **roadside units (RSU), onboard units (OBU), edge-processing units, power distribution units, network communications,** and **application specific technology.**

Example projects:

- I-295 S&CC No. 1; Rt 18, 38, 73 ATSC – New Jersey DOT
- Statewide SPaT Deployment – Georgia DOT
- I-75 FRAME – Florida DOT
- PedSafe/Greenway Deployment – Florida DOT
- PedSafe II – Florida DOT

MATURITY	Fair
COST	$$
TIME	Short



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Safe Roads | Safe Speeds | Safe Road Users | Safe Vehicles | Safer Roads | Vulnerable Road Users | Safer driver & Passenger | Impaired Driving | Data | Equity

Pedestrian

Passive Pedestrian Detection

Strategy to detect pedestrians to trigger an outcome without action from the pedestrian. Outcomes may include actuating pedestrian crossing phase, broadcast Traveler Information Message (TIM), start flashing sequence for beacon, send information to a mobile application, and more. System typically includes **sensors, logic controller,** and **motorist information systems.**

Example projects:

- PedSafe/Greenway Deployment – Florida DOT
- PedSafe II – Florida DOT

MATURITY	Low – Fair
COST	$$
TIME	Mid

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Safe Road Users | Vulnerable Road Users | Safer driver & Passenger | Impaired Driving | Safer Roads | Data | Equity

Cyclist | Pedestrian | Vehicular

Automated Incident Detection

Strategy for the deployment of a software-based system capable of automatically identifying and alerting on incidents based on configurable business rules without manual intervention. Incidents may include crashes, stalled vehicles, wrong way events, debris on roadway, pedestrian in roadway, and more. Typical deployments include **fixed cameras, network communications,** and **cloud-hosted software platform**.

Example projects:

- 45SW, MoPac Expy – Central Texas Regional Mobility Authority
- I-75 – Georgia DOT

MATURITY	Low – Fair
COST	$$
TIME	Short

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Safe Roads | Post-Crash Care | Safe Speeds | Safe Road Users | Safe Vehicles | Safer Roads | Vulnerable Road Users | Safer driver & Passenger | Impaired Driving | Data | Equity

Cyclist | Pedestrian | Vehicular

Smart Work Zone Systems

Strategy to deploy temporary, mobile systems to detect and warn motorist of changing conditions in construction work zones (e.g., congestion, new traffic pattern). Typical deployments include **vehicle sensor, surveillance cameras, edge or backend control logic, portable changeable message signs, speed feedback signs, Connected Vehicle equipment,** and **cellular communications.**

Example projects:

- US 27 (Okeechobee Rd) – Florida DOT
- Central Florida Region Wide – Florida DOT
- US 231 – Florida DOT

MATURITY	Low – High
COST	$$
TIME	Mid

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Safe Roads | Post-Crash Care | Safe Speeds | Safe Road Users | Safer Roads | Vulnerable Road Users | Safer driver & Passenger | Impaired Driving | Data | Equity

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Questions?

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