SAFE SYSTEM SUCCESS STORIES

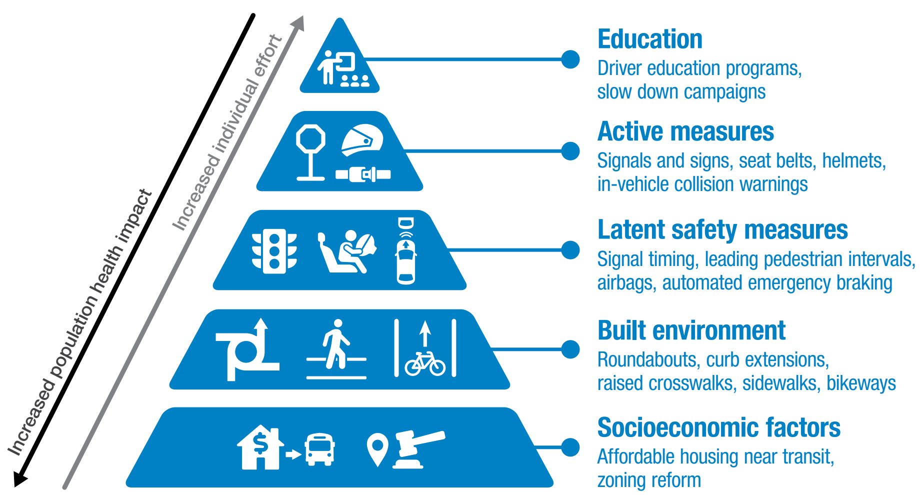
Proactive injury prevention in transportation

Injuries associated with road transportation represent a public health crisis in the United States and an area where we are falling far behind our international peers. Despite decades of incremental improvements, fatal and serious injury crashes remain unacceptably high, especially for pedestrians and others who lack the protection of a vehicle.

Clearly, the current playbook — largely reactive, siloed and site-specific — is not delivering effective population-scale safety results. Decisions about transportation planning, safety and operations and about land development are often made independently of one another, even though they all help shape the fundamental conditions that determine injury risk. To achieve meaningful progress, we must move beyond making changes in response to individual crashes and instead proactively address the underlying causes of traffic deaths and serious injuries.

A clear culprit

Put simply, speed kills. Kinetic energy is the central driver of injury in road collisions. As the amount of kinetic energy in a crash increases, whether through higher velocity or greater mass, the human body is less able to tolerate the forces released. Kinetic energy risk can be managed by reducing how often and how far people drive (**exposure**), limiting operating speeds and vehicle mass (**severity**), and reducing how often road users are placed in conflict (**likelihood of a crash**).



The **Safe Systems Pyramid** developed by [Ederer et al. (2023)] illustrates how system design at the socioeconomic and built environment levels — not individual behavior — sets the stage for these risk conditions and thus offers opportunities for the most impactful interventions.

IIHS HLDI
VISION ZERO NETWORK
ite A Community of Transportation Professionals
THE UNIVERSITY OF NORTH CAROLINA HIGHWAY SAFETY RESEARCH CENTER
Fehr & Peers

Proactive injury prevention therefore starts upstream. One key element is managing exposure through reductions in vehicle miles traveled (VMT) via shifts to shorter trips and away from private motor vehicles. Another is setting and managing context-sensitive target speeds to survivable levels. A third is designing streets and networks that reduce conflicts by separating road users in space or time. With these system-level design improvements, the safe choice becomes the natural choice, strengthening the overall performance of complementary measures such as enforcement and vehicle safety technologies.

Case studies

This compilation of case studies illustrates how state and local agencies are taking a proactive injury prevention approach. They are systematically monitoring and addressing **exposure**, **severity** and **likelihood of a crash** and shifting from isolated fixes toward coordinated, system-level strategies that can prevent severe injuries.

The case studies are designed for agency staff, practitioners, advocates and elected officials. Agency staff and practitioners can draw on them as practical models for justifying and implementing changes in policy, design, operations and planning. Advocates can use them to demonstrate what proactive, multilayered safety improvements look like. Elected officials can use them as models of clear, feasible decisions that reduce serious injuries and advance community goals.

The examples highlight the three main levers agencies can pull to reduce serious injuries. They can reduce injury risk factors by limiting the risk factors described above:

EXPOSURE
how much
people drive

SEVERITY
how fast vehicles travel
and how heavy they are

LIKELIHOOD OF A CRASH
how often road users
come into conflict

Each case study identifies one primary lever that was applied and, where relevant, one or two secondary levers.

1. Arlington, VA — Intersections and speed solutions
2. Austin, TX — Shifting safety decision-making upstream
3. California — Altering development patterns
4. Cleveland — Scaling up speed tables
5. Georgia — Systemic safety strategies
6. Minnesota — Centerline rumble strips
7. Montgomery County, MD — Predictive analysis
8. New York City — Congestion pricing
9. Philadelphia — Redesigning for slower speeds
10. San Francisco — Transit-only lanes
11. Santa Rosa, CA — Institutionalizing Safe System tenets
12. Seattle — Lowering citywide speed limits
13. Washington state — Intelligent speed assistance

Safety multipliers pull all three levers

Some of these case studies share a powerful trait: They address the "trifecta" of exposure, severity, and likelihood simultaneously, producing compounding safety benefits. Fehr & Peers has described these as **safety multipliers** — packages of interventions whose components reinforce each other to deliver outcomes greater than the sum of their parts.

San Francisco's Van Ness Improvement Project is a prime example: Transit-only lanes reduced vehicle volumes (exposure); lane narrowing, median refuges and bulb-outs brought speeds closer to survivable thresholds (severity); and leading pedestrian intervals and turn restrictions reduced the chance that the remaining interactions turned into crashes (likelihood).

Identifying and prioritizing safety multipliers is one of the most important things an agency can do to get more out of limited safety budgets. Strategies that act across multiple safety levers often provide stronger and more resilient returns than those focused on a single lever; the compounding protection means the system keeps working even when individual elements underperform.

Resources

Safety multipliers: How the best transportation safety strategies compound their benefits

This blog post from Fehr & Peers provides an in-depth discussion of safety multiplier strategies, along with real-world examples and implementation guidance.

California's safe system approach

This video from the California State Transportation Agency explains how the state is applying Safe System principles through transportation, housing and land-use policies, as described in the California case study.

CASE STUDY 1

Intersection and speed solutions in Arlington, VA

KEY TAKEAWAY: Arlington proactively addressed pedestrian injury risk by scaling up intersection treatments. The county paired these changes with multiple speed-reduction measures that bring operating speeds closer to survivable levels, reducing the severity of crashes when they occur.

SAFETY LEVERS

Arlington County's Vision Zero program includes multiple efforts to improve pedestrian safety and manage vehicle speeds. The county has expanded the use of centerline hardening and leading pedestrian intervals to manage conflicts at intersections and to slow turning vehicles. Arlington has also implemented roadway reconfigurations, school zone speed safety cameras, lower speed limits and quick-build treatments to reduce speeds.

All photos: IIHS-HLDI

Instead of making isolated fixes …

Piecemeal changes in reaction to crash data or public complaints

This can delay improvements until after crashes occur or concentrate changes where advocacy is strongest, not necessarily where risk is highest.

… Arlington applied solutions proactively

Scaling up changes across the county

- Arlington systemically implemented leading pedestrian intervals (LPIs) combined with no-turn-on-red signs along High Injury Network corridors beginning in 2023. The number of intersections with LPIs in the county more than tripled from 31 to 101 by the end of 2025.
- Arlington piloted the use of centerline hardening at five intersections in 2024. When evaluations showed it improved safety, the county added hardened centerlines into its regular quick-build safety toolbox. As of November 2025, 12 intersections had hardened centerlines.

Arlington is piloting optical speed bars (left) among other tools. Centerline hardening (right) is now used widely after a successful pilot in 2024.

Instead of a piecemeal approach to speed management …

Relying on a single method to address speed

A single speed management tactic, such as changing the speed limit or adding speed safety cameras, will change the behavior of some drivers but not others.

… Arlington took a comprehensive approach

Layering multiple tools to address speed

Around schools:

- In 2024, Arlington began using speed safety cameras on arterials in school zones. There were 28 cameras in use by the end of 2025.
- Speed limits were lowered to 20 mph at all times on neighborhood streets within 600 feet of school access.
- In 2023, Arlington piloted the installation of tactical speed humps in three school zones where the introduction of the 20 mph speed limit did not effectively reduce actual speeds. When this was successful, they expanded the speed hump pilot to cover a total of 13 total locations by the end of 2025.

Elsewhere on arterials:

- From 2018 to 2022, the county reconfigured 14 corridors by reducing the number or width of lanes or repurposing lanes.
- During the same time period, speed limits were reduced on 14 different corridors, either from 35 mph to 30 mph or to 25 mph from prior limits of 30 or 35 mph.
- In 2025, Arlington began piloting additional speed management tools on arterials, including wider edge lines, optical speed bars, transverse markings, rumble strips, speed limit pavement markings and physical narrowing with flexible posts along the edge or center of roadways.

What levers did these interventions pull?

PRIMARY: Arlington's expanded use of LPIs and centerline hardening reduced the **likelihood of pedestrian crashes** by increasing the visibility of crossing pedestrians to turning drivers.

SECONDARY: Arlington's speed management efforts reduced **severity** by lowering speeds to levels that are more survivable for all road users.

State and local DOTs can reduce crash injuries by lowering one or more of the following **SAFETY LEVERS**:

EXPOSURE	how much people drive
SEVERITY	how fast vehicles travel and how heavy they are
LIKELIHOOD OF A CRASH	how often road users come into conflict

What were the results?

- Corridors with roadway reconfigurations saw the 85th percentile speed fall an average of 6%.
- After centerline hardening was installed at five pilot intersections, the percentage of cars turning at speeds below 10 mph rose 16%.
- After tactical speed humps were installed, the 85th percentile vehicle speed fell 11-36% on six pilot corridors.

What else can be done?

Rapid-deployment steps: Expand already successful quick-build pilots, such as centerline hardening and tactical speed humps, countywide.

Policy/process trigger: Expand existing efforts to increase transit speed and reliability, to support mode shift and reduce exposure. Arlington has deployed bus-priority strategies on a limited basis, including bus-only or peak-period bus lanes and transit signal priority. These could be extended to more corridors.

Continued data collection: Track conflicts with pedestrians at intersections with crossing treatment improvements. Continue to track operating speeds as well as high-end vehicle speeds.

CASE STUDY 2

Making safe streets the goal in Austin, TX

KEY TAKEAWAY: Austin is reducing opportunities for high-risk conflicts by updating design standards, reframing mobility goals and aligning development review with safety outcomes. Systemic engineering treatments, paired with dedicated Vision Zero staffing and bond-funded investments, shift safety from reactive fixes to routine practice.

SAFETY LEVERS

Austin advanced from vehicle-centric planning and fragmented safety efforts to a more fully institutionalized Safe System approach by embedding safety into design manuals, long-range planning, development review and funding structures. Through updates to its design manual — known as the Transportation Criteria Manual — adoption of the Austin Strategic Mobility Plan and creation of a dedicated Vision Zero division, the city moved safety considerations upstream in the decision-making process. These changes emphasize preventing severe crashes through speed management, conflict reduction and systemwide consistency rather than relying on isolated or grant-dependent interventions.

City of Austin

Austin went from designing streets to move cars …

Old street design standards

- *Earlier versions of Austin's design manual optimized streets for vehicle throughput and travel speed, with pedestrian and bicycle facilities added only when required or convenient.*
- *One example was the use of channelized right-turn islands, which allow vehicles to make wide, fast turns while creating long pedestrian crossings and poor visibility.*

… to designing streets to prevent serious crashes

New street design standards

- The updated manual centers multimodal safety, traffic calming, reduced vehicle operating speeds and multiple layers of protection for vulnerable road users. Street designs are evaluated based on their ability to prevent serious crashes and protect vulnerable users.
- Newly adopted "smart" right turns have tighter radii, shorter and raised crossings, and pedestrian refuges. Turning speeds are slowed and sightlines are improved.

Austin went from planning for traffic flow …

Long-range plans for vehicle capacity

Planning documents emphasized roadway capacity expansion and congestion management.

… to planning around where people need access

Long-range plans for meeting mobility needs

The Austin Strategic Mobility Plan reframes mobility around safety, multimodal access, climate goals and mode shift. Each travel mode has a priority network, and these networks clarify locations throughout the city where access to destinations takes priority over maximizing travel speed and throughput. This shift led to bond approval for rail and bus service expansion.

Austin went from checking a box on right-of-way decisions…

Similar right-of-way requirements for all projects

During development review, safety needs were rarely considered as part of right-of-way acquisition discussions.

… to using them to deliver better street designs

Right-of-way acquisition tailored to safety and multimodal outcomes

This ensures new development contributes to safer street cross sections, protected facilities and future Vision Zero corridors. The focus is now on transportation demand management strategies.

Austin went from scattered, short-term safety efforts …

Lack of an institutional home for Vision Zero

Vision Zero efforts were scattered across departments and dependent on intermittent grants or temporary funding.

… to dedicated staff with consistent funding

Creation of a Vision Zero division within the transportation department

The new division has built internal expertise and accountability. Using bonds beginning in 2016, Austin established stable, recurring funding for systemic safety projects.

What levers did this intervention pull?

PRIMARY: Austin's design and planning changes reduced the **likelihood of crashes** by simplifying intersections, improving visibility and embedding conflict-reduction principles into manuals, priority networks and development review.

SECONDARY: The changes reduced **severity** by managing turning and operating speeds through tighter geometry, traffic calming and speed-focused design thresholds.

SECONDARY: The new principles reduced **exposure** by focusing on transit expansion and reliability, people-centered development and place-making, and transportation demand management strategies in development review.

State and local DOTs can reduce crash injuries by lowering one or more of the following **SAFETY LEVERS**:

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What else can be done?

Rapid-deployment steps: Accelerate the use of temporary protected bike lanes, pedestrian refuges and raised crossings along priority networks in high-injury areas.

Policy/process trigger: Use bond programs, corridor reconstructions and design manual updates as triggers to require Safe System treatments on arterial streets and at high-risk intersections.

Continued data collection: Track operating speeds, conflict rates at redesigned intersections and completion gaps in protected bike and pedestrian networks. This information should be tracked overall and separately for equity priority areas.

CASE STUDY 3

Altering development patterns in California

KEY TAKEAWAY: California reduced systemwide injury risk by aligning environmental review and housing policy with Safe System principles, shifting development toward higher density and away from roadway expansion that increases exposure and crash severity.

SAFETY LEVERS

Metropolitan Transport Commission, San Francisco

The Safe Systems Pyramid, grounded in public health and injury-prevention principles, shows that interventions at the socioeconomic level deliver the greatest population-wide safety gains. These strategies reshape exposure by influencing where people live, how far they travel and the transportation options available to them. Recent reforms to the California Environmental Quality Act (CEQA) have strengthened these base-of-the pyramid approaches by aligning development impact review with climate and safety goals. Replacing level-of-service (LOS) analysis with vehicle miles traveled (VMT) metrics and streamlining the process of adding more low-VMT housing reduces overall driving and supports abundant, affordable and transit-proximate housing, lowering systemwide exposure. The Joint Secretary's Policy on Road Safety, led by the state's transportation and health and human services agencies, further strengthens these principles. See this video from the California State Transportation Agency.

California went from mitigating driving delays …

Planning and evaluating projects using LOS and roadway widening

Under LOS-based CEQA analysis, vehicle delay was treated as an environmental impact, incentivizing roadway widening and intersection expansions to mitigate congestion. These actions increased vehicle speeds, added conflict points and induced additional VMT. LOS-based analysis also penalized infill, transit and active transportation projects by applying uniform mitigation requirements regardless of safety outcomes.

… to taking steps to reduce driving

Planning and evaluating projects using VMT and systemwide risk

Beginning in 2020, California replaced LOS with VMT as the transportation impact metric under CEQA. This shift links project review to changes in total driving rather than delay, supports infill and multimodal development, reduces incentives to widen roads or increase speeds and prioritizes operational and design strategies that lower crash likelihood and severity. Local agencies have adopted VMT thresholds, screening maps and mitigation programs that redirect resources toward Safe System-aligned projects rather than additional lane miles.

California went from onerous approvals for infill development …

Treating infill and affordable housing the same as greenfield development

Traditional CEQA processes and discretionary approvals created delays and uncertainty for low-VMT development projects. These obstacles limited new housing near jobs and transit, increasing long-distance driving and reinforcing auto-dependent growth served by high-speed, high-risk arterials.

… to encouraging new housing near jobs and transit

Streamlining processes to encourage low-VMT development patterns

California enacted a series of housing reforms (e.g., SB 35, SB 79, SB 423, AB 2011, AB 253, AB 1061, SB 9, AB 1154, AB 1308, SB 543, AB 130) that remove CEQA barriers for qualifying projects, expand ministerial (streamlined) approvals for infill and transit-proximate development, accelerate affordable housing production and reduce pressure for fringe growth. These changes alter fundamental system inputs — where people live and how far they travel. Making nonvehicle trips more viable for more people lowers exposure at the population scale.

California went from making fixes in response to crashes and complaints ...

Reacting to safety challenges site-by-site

Project-by-project safety responses prioritize politically vocal locations and miss widespread systemic risk created by land use patterns and high-speed roadway design.

... to proactively managing system risk

Preventing risk through coordinated, upstream policy

The shift to VMT-based analysis allows agencies to anticipate exposure during planning, identify high-VMT and high-risk areas proactively and deploy safety strategies earlier in the development process, before roadway design and land use decisions lock in elevated injury risk. This shift, along with the reforms around housing construction, also help align housing, transportation and environmental goals.

California went from agencies working in silos ...

Transportation, housing and environmental decisions moving on their own tracks

This separation reinforced patterns that increased VMT, conflict points and speed systemwide.

... to agencies working together for safety

Cross-agency collaboration to reduce system risk

Implementation of VMT metrics and housing reforms required coordination among the California State Transportation Agency, planning officials in the governor's office, local planning and public works departments, metropolitan planning organizations and housing agencies. This alignment is reshaping safety outcomes at the system level.

What levers did this intervention pull?

PRIMARY: By reducing VMT through infill, transit-oriented development and policies to improve jobs-housing balance, California's reforms lower the amount of time people spend in high-risk travel environments, reducing **exposure** at a population scale.

SECONDARY: The changes reduced **severity** by shifting away from peak-hour, delay-based mitigation. Previous practices had resulted in an overbuilt system with higher operating speeds, especially during off-peak periods.

SECONDARY: California lowered the **likelihood of a crash** by reducing the number of roadway widenings and high-speed arterials. This has led to fewer uncontrolled conflict points and simplified street networks.

State and local DOTs can reduce crash injuries by lowering one or more of the following **SAFETY LEVERS**:

EXPOSURE	how much people drive
SEVERITY	how fast vehicles travel and how heavy they are
LIKELIHOOD OF A CRASH	how often road users come into conflict

What else can be done?

Rapid-deployment steps: Localities can pair streamlined infill development with quick-build multimodal access improvements (e.g., crossing enhancements, curb management, protected bikeways) and speed management to reduce severity and likelihood risks that may otherwise increase when housing is developed on high-injury corridors in infill areas. Potential tensions between evacuation concerns and Complete Streets designs can be addressed through collaboration with emergency response leaders, including preapproval of quick-build interventions.

Policy/process trigger: Localities can embed Safe System principles, including target speeds, speed management, VMT mitigation and conflict reduction, into comprehensive land use and transportation plans (such as general plan circulation and housing elements), capital improvement programs, transportation impact assessments and transportation impact fees. State and regional funding incentives can reward Safe System-consistent design aligned with frameworks such as Caltrans' DIB 94 Complete Street Design standards and the San Francisco Bay Area Metropolitan Transportation Commission Transit Oriented Communities parking reform for local jurisdictions.

Data collection: Track changes in VMT per capita, development location relative to high-injury networks and the share of mitigation funding directed toward demand management and first- and last-mile safety improvements.

CASE STUDY 4

Scaling up speed tables in Cleveland

KEY TAKEAWAY: Cleveland's speed table program demonstrates proactive injury prevention. By scaling up speed table implementation citywide after a successful pilot program, the city reduced vehicle speeds through design instead of waiting for serious injuries and fatalities to trigger action.

SAFETY LEVER

Cleveland is demonstrating how shifting from reactive traffic safety responses to proactive, design-based speed management can deliver meaningful safety results. In 2022, the city piloted speed tables on residential streets where, based on crash data and reports of dangerous speeding, vehicle speeds posed everyday risks. The pilot delivered clear safety results, reducing average vehicle speeds by nearly 8 mph. Building on this success, Cleveland expanded the program citywide, installing more than 100 speed tables in 2024 and continuing to add more in 2025 and 2026. Cleveland's experience demonstrates how pilot projects can generate data-driven momentum, allowing cities to move from testing solutions to scaling what works to improve safety.

City of Cleveland

Instead of reacting to serious crashes …

Waiting to install traffic calming until after a serious crash or fatality occurs

This delays action and leaves known risks unaddressed.

… Cleveland was proactive

Installing speed tables at locations with documented speeding concerns

Acting quickly to bring vehicle speeds below targets likely to be survivable for pedestrians addresses a known safety risk before it claims a life.

Instead of relying on enforcement alone …

Police enforcement as the only tool to change individual behavior

While enforcement can influence safety outcomes, it is highly resource-intensive and may be applied inconsistently. It does not address the underlying street design factors that contribute to speeding.

… Cleveland designed for safety

Investing in permanent, self-enforcing infrastructure improvements

Speed tables physically deter high speeds, helping ensure that safe behavior is encouraged by the roadway environment without depending on punitive measures.

Instead of being stymied by lack of evidence …

Avoiding new solutions

Delaying design changes because they are perceived as disruptive, expensive or difficult to justify allows serious crashes to continue.

… Cleveland used a pilot to build evidence

Testing promising interventions

Pilot projects are a low-cost way to demonstrate effectiveness and strengthen the case for a design change.

Instead of fixing the squeaky wheel …

Deploying safety interventions piecemeal or purely in response to complaints

When fixes are triggered primarily by petitions or similar initiatives, that can prioritize influence and resources over actual safety needs. The result is that many neighborhoods, especially historically underserved ones, are left without improvements and citywide safety gains are limited.

… Cleveland deployed a proven solution citywide

Advancing strategies that work

Building on the success of the pilot, Cleveland expanded its efforts citywide, installing 100 speed tables in 2024 and dedicating funding to add more in 2025 and 2026.

What lever did this intervention pull?

PRIMARY: Cleveland's speed table program reduced **severity** by reducing vehicle speeds through proactive, design-based solutions. Because speed tables are self-enforcing, they also reduce reliance on costly, intermittent enforcement and help ensure more equitable, consistent safety outcomes.

State and local DOTs can reduce crash injuries by lowering one or more of the following **SAFETY LEVERS**:

EXPOSURE	how much people drive
SEVERITY	how fast vehicles travel and how heavy they are
LIKELIHOOD OF A CRASH	how often road users come into conflict

What was the result?

- The 10 locations that received speed tables as part of the initial pilot saw average speeds decline by nearly 8 mph.

What else can be done?

Interim step: Communities can establish survivable target speeds and use systemwide speed data to identify corridors with the largest gaps between operating speeds and safe thresholds, allowing agencies to act on risk before serious and fatal injury crashes occur.

Policy/process trigger: Adopt policies that support safe streets, such as a residential slow streets program, lower speed limits near schools and areas where people walk and bike, and traffic calming guidelines that support the use of speed tables; update street design standards to emphasize self-enforcing designs; prioritize safety within capital improvement programs.

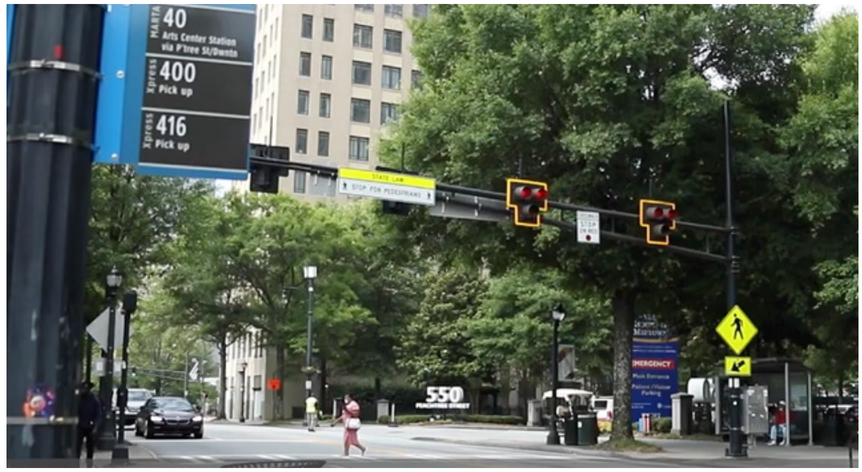
CASE STUDY 5

Systemic safety strategies in Georgia

KEY TAKEAWAY: Georgia's approach to injury prevention goes beyond focusing on known hot spots. The state uses network screening and near-miss data to proactively deploy countermeasures. Interventions happen earlier and more consistently across the network, preventing severe injuries and fatalities at locations that might otherwise be overlooked.

SAFETY LEVERS

The Georgia Department of Transportation (GDOT) is increasingly adopting a systemic, or risk-factor-based, safety approach, rather than traditional hot-spot analysis. Instead of waiting to implement countermeasures at isolated high-injury locations, GDOT uses proactive, data-driven methods to prevent fatal and serious injury crashes before they occur. Examples of tools that Georgia has deployed systemically include curve treatments, bus stop assessments, all-way stop-controlled upgrades and conflict analysis for pedestrian safety.



Georgia Department of Transportation

Instead of being reactive …

Waiting for crashes to occur before addressing safety gaps

With this approach, improvements occur inconsistently, allowing severe crashes to continue to happen in locations with known risk factors.

… Georgia is proactive

Implementing safety countermeasures systemically based on measurable risk

GDOT and Georgia Tech developed a statewide inventory of horizontal roadway curves and categorized them into five risk levels. This inventory is used to guide the deployment of proven safety countermeasures based on the level of risk. For example, Risk Level V curves may be equipped with flashing beacons. Other countermeasures include curve warning signs, enhanced pavement markings, optical speed bars and high-friction surface improvements.

Instead of relying on inadequate data about pedestrians …

Using only pedestrian crash history and volume counts to identify safety gaps and justify the costs of improvements

Pedestrian crashes are rare, underreported and unpredictable, and pedestrian volume data are often unavailable. Using these data alone can leave locations with known exposure risks unimproved.

… Georgia uses other clues to identify risks

Using land use and transit activity to identify where people are likely to walk

GDOT and the Metropolitan Atlanta Rapid Transit Authority (MARTA) conduct proactive safety reviews of bus stops. The reviews incorporate factors such as ridership, roadway width, traffic volumes, speed limits, medians and a social vulnerability index. This approach uses data to predict crash frequency and severity in benefit-cost and risk analyses and directs investments to locations with clear pedestrian exposure, not just documented crashes.

Supplementing crash data with video-based conflict and near miss analysis

GDOT uses post-encroachment-time and time-to-collision metrics from video analytics. These metrics quantify pedestrian risk by evaluating the time separation between vehicles and pedestrians and are used to support the justification and placement of midblock crossings.

Instead of waiting for intersection crashes …

Upgrading intersections only when crash frequency reaches a warrant

This delays improvements at many high-risk intersections, particularly rural or low-volume sites with small but potentially severe crash samples.

… Georgia prioritizes high-risk intersections

Using a risk-factor-based scoring method for all-way stop-controlled (AWSC) intersections

The scores weight geometry, presence of curves, driveway density, lighting, speed and predicted crash rate. Intersections are prioritized based on risk, not only historical crash occurrence. This enables earlier, more cost-effective interventions across a large network of intersections. Common countermeasures include oversized signs, rumble strips, reflective tape and "STOP AHEAD" pavement markings.

Instead of maintaining silos …

Addressing safety problems agency by agency

Safety initiatives are implemented separately and inconsistently, limiting systemic gains.

… Georgia fosters cooperation

Addressing safety as a shared responsibility and prioritizing multi-agency partnerships

GDOT works with Georgia Tech, MARTA, local governments and consultant partners to operationalize new tools to proactively identify and address likely problem locations. These collaborations help institutionalize Safe System processes statewide.

What levers did this intervention pull?

PRIMARY: Georgia's network screening approach promotes a variety of countermeasures that can be systemically applied to reduce the **likelihood of a crash**. Enhanced signage, optical speed bars, and friction treatments reduce the likelihood of roadway departures on sharp curves. Conflict analysis identifies locations where pedestrians frequently interact with vehicles, allowing earlier interventions that reduce the likelihood of pedestrian-vehicle conflicts. The proposed countermeasures at midblock crossings, including pedestrian hybrid beacons, rectangular rapid flashing beacons and raised crosswalks, have been documented to reduce crashes with pedestrians. AWSC prioritization reduces the likelihood of intersection crashes.

SECONDARY: Some proposed treatments, such as optical speed bars on curves and raised crosswalks, also reduce **severity** by lowering vehicle speeds.

State and local DOTs can reduce crash injuries by lowering one or more of the following **SAFETY LEVERS**:

EXPOSURE	how much people drive
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What else can be done?

Rapid-deployment steps: Expand systemic treatments that manage kinetic energy. While GDOT's current approach is largely focused on conflict management, additional speed management and user separation strategies would help ensure crashes occur within survivable limits, particularly for vulnerable road users.

Policy/process trigger: Institutionalize Safe System principles, embedding them into policies, guidance, design manuals and training to ensure consistent application rather than project-by-project adoption.

Continued data collection: Build on existing use of video analytics by tracking operating speeds and assessing whether they align with survivable energy limits. Network-wide speed management assessments could be conducted to proactively identify and address high-speed safety concerns.

CASE STUDY 6

Centerline rumble strips in Minnesota

KEY TAKEAWAY: Treating centerline rumble strips as a default systemwide treatment, rather than a spot fix, reduces the risk of serious injuries and fatalities from head-on collisions on rural roads throughout Minnesota.

SAFETY LEVER

Since 2012, the Minnesota Department of Transportation (MnDOT) has required that centerline rumble strips be placed on all rural, undivided roads with speed limits of 50 mph or greater whenever the pavement is constructed, reconstructed or overlaid.

A traditional rumble strip IIHS-HLDI

A Minnesota "mumble strip" MnDOT

Instead of adding rumble strips on a case-by-case basis …

Implementing centerline rumble strips selectively

Risky roadway environments go unaddressed until enough crashes accumulate. Priorities can be driven by random crash variation rather than by underlying injury risk.

… Minnesota made rumble strips the default

Systematic implementation of centerline rumble strips

The potential for head-on crashes is proactively reduced throughout the network of rural, undivided, high-speed roads, rather than waiting for seemingly random crashes to accumulate. Traffic volume can help prioritize placement of centerline rumble strips. MnDOT found that above 2,300 vehicles per day, severe crashes shift from mostly road departure to head-on.

Instead of giving up when faced with objections …

Removing a treatment when residents complain

Community pushback sometimes overrides the use of proven countermeasures. Safety improvements depend on who objects rather than on injury risk.

… Minnesota found a solution

Addressing community concerns while preserving safety treatments

When some communities objected to the noise from centerline rumble strips, MnDOT did not discontinue the treatment. Instead, they tested and adopted sinusoidal "mumble" strips, which reduce exterior noise. This shift allowed MnDOT to preserve systemwide deployment of an effective safety countermeasure.

What lever did this intervention pull?

PRIMARY: Adding centerline rumble strips reduced the **likelihood of a crash** by alerting drivers when they drift over the centerline, allowing them to steer back into their lane and avoid a collision. This intervention is known to cut head-on impacts, a crash type that commonly results in serious injuries.

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What else can be done?

Policy/process trigger: When rumble strip installation is triggered, consider widening centerline pavement markings to 6 inches to improve delineation. Where further reductions in head-on collisions are needed, raised tube delineators, 2-12-foot centerline buffers, or cable barriers could be a next step.

Data collection: Track reductions in head-on collisions on roads where centerline rumble strips have been installed. Investigate whether surrogate data on lane departures is available from telematics data.

CASE STUDY 7

Predictive analysis in Montgomery County, MD

KEY TAKEAWAY: Montgomery County developed a predictive, systemwide analysis tool that identifies where crash risk exists across the road network, rather than relying solely on past crash history. By highlighting expected crash patterns, the tool can support earlier, more targeted safety decisions focused on reducing both crash likelihood and injury severity.

SAFETY LEVERS

As part of Montgomery County's Vision Zero program, the county's planning department collaborated with researchers at the University of North Carolina Highway Safety Research Center to develop a predictive, systemic safety tool that can be used to identify locations where severe and fatal crashes are likely to occur based on roadway, crash and land use data. County staff and researchers examined the potential for severe crash reduction in underinvested areas, finding that some of the biggest gains in road safety could be made in those locations that had been most neglected. The tool can also be used to identify the most appropriate countermeasures to maximize the reduction of severe and fatal crashes, allowing for smarter investment of capital improvement funds.

Montgomery Planning

Instead of focusing only on known problem spots …

Directing safety improvements only where injury crashes occur or where the public requests them

"Chasing crashes" can cause agencies to leave the same general situations with similar risks at other locations.

… Montgomery County looked for known risk factors

Assessing where serious crashes are likely to occur across an entire roadway network

The predictive, systemic safety tool enables county staff to identify and address the highest-risk locations across the entire roadway network, even if crashes haven't occurred there. This approach is a proactive step toward systemwide change.

Instead of being reactive…

Using only crash data for analysis

Crash data can help us understand where people are killed and injured, but crash data alone cannot tell us where risks exist.

… Montgomery County was proactive

Using hundreds of variables to understand why and where severe crashes occur

The research team worked with the county to aggregate 170 segment variables and 282 intersection variables and then analyzed and modeled those data to better understand why and where severe and fatal crashes occur. Using the analytical tool, the team identified the 200 sites across the network with the highest risk for key crash types. At intersections, these included crashes involving bicyclists, pedestrians at night, and vehicles turning left or traveling straight through. On roadway segments, they included pedestrian crashes and other single-vehicle crashes.

Instead of a narrow approach …	***Focusing only on certain roads*** *Examining high-injury networks highlights only a subset of roads.*
… Montgomery County took a broad approach	**Looking at all roads** The team examined all land use area types in the county's Complete Streets Design Guide to identify locations with high numbers of expected crashes across downtown, town center, suburban and country roads.

What levers did this intervention pull?

PRIMARY: The predictive analysis tool identified locations where countermeasures aimed at reducing the **likelihood of crashes** may be most beneficial. Countermeasures matched with locations identified by the analysis include pedestrian crossing improvements (e.g., high-visibility or raised crossings), intersection control changes (e.g., all-way stop control, traffic signals), signal timing strategies (e.g., leading pedestrian intervals, protected left turns, increased all-red clearance intervals) and treatments like improved lighting or centerline rumble strips.

SECONDARY: The predictive analysis tool also identified locations for speed management countermeasures, which reduce the **severity** of crashes that do occur. These include speed cameras, speed humps and lower speed limits.

State and local DOTs can reduce crash injuries by lowering one or more of the following **SAFETY LEVERS**:

EXPOSURE	how much people drive
SEVERITY	how fast vehicles travel and how heavy they are
LIKELIHOOD OF A CRASH	how often road users come into conflict

What else can be done?

Rapid-deployment steps: Increase implementation of low-cost or rapid-deployment treatments identified in the analysis, such as increasing use of all-red clearance intervals or installing quick-build versions of treatments like speed humps.

Policy/process trigger: Embed the predictive safety analysis into the project prioritization processes so countermeasures are applied systematically at identified high-risk locations.

Additional policy/process trigger: Build on the tool by identifying locations with a high risk of serious or fatal injury crashes, beyond crashes of all severities.

CASE STUDY 8

Congestion pricing in New York City

KEY TAKEAWAY: New York City is reducing injury risk by lowering exposure at scale through congestion pricing, which reshapes when and how people travel. By making driving less attractive in the target area, the city has reduced vehicle volumes and crash risk through a robust demand management strategy.

SAFETY LEVERS

New York City launched its congestion pricing program on Jan. 5, 2025. The program charges a fee for vehicles to enter Manhattan south of 60th Street, an area known as the Congestion Relief Zone. The size of the fee varies by vehicle type and time of day. The peak rate applies from 5 a.m. to 9 p.m. on weekdays and from 9 a.m. to 9 p.m. on weekends. The fee is 75% lower at other times. Multiunit trucks and tour buses pay the highest rates. The program's aim is to reduce traffic in the zone and raise funds for public transit in the city.

IIHS-HLDI

Instead of accommodating more vehicles …

Expanding road capacity in response to present and projected vehicle traffic estimates

Adding vehicle lanes tends to induce driving demand. An increase in vehicles results in higher long-term maintenance obligations and costs, exacerbates air and noise pollution and increases the potential for conflicts, especially for people walking and biking.

… New York City reduced driving demand

Making public transit and active transportation the more practical choice

In a walkable city with robust public transit and bike lanes, a modest fee can nudge people to change their commuting routines.

Instead of forcing transit to compete for scarce funding …

Relying solely on general revenues to fund transportation

When dollars are scarce, the majority of funding frequently gets directed to roadway expansion.

… New York City created a dedicated funding stream

Directing congestion pricing revenues to public transit improvements

Reinvesting the funds in multimodal travel options further supports the mode shift away from driving.

What levers did this intervention pull?

State and local DOTs can reduce crash injuries by lowering one or more of the following **SAFETY LEVERS**:

EXPOSURE	how much people drive
SEVERITY	how fast vehicles travel and how heavy they are
LIKELIHOOD OF A CRASH	how often road users come into conflict

PRIMARY: The congestion pricing policy reduced **exposure** by reducing the number of vehicle trips during peak periods. It did so by making public transit use relatively more attractive and driving into the Congestion Relief Zone less attractive.

SECONDARY: In combination with city freight and curb management policies, congestion pricing reduced **severity** by encouraging shifts from heavier delivery vehicles that are subject to high congestion pricing fees toward smaller, lighter vehicles, including e-cargo bikes, for last-mile freight. Lower vehicle mass reduces kinetic energy in crashes, decreasing the potential for severe injuries.

SECONDARY: This policy reduced the **likelihood of crashes** by enabling street space to be repurposed for bicycle and pedestrian infrastructure. Such infrastructure separates pedestrians and cyclists from motor vehicles, reducing opportunities for conflicts.

Severity and **likelihood of crashes** were further reduced in New York City by the widespread use of speed safety cameras and reinvestment in multimodal facilities and enhanced transit service.

What were the results?

Six months after congestion pricing began, New York City's Metropolitan Transportation Authority found:

- The number of vehicles entering the Congestion Relief Zone fell 11%. There was an 8.4% increase in pedestrian activity within the zone relative to 2024.
- Traffic delays were down 25% in the zone and 9% across the entire metropolitan region.
- MTA express buses were traveling 24% faster than in 2024.

Serious injuries fell more inside the zone than citywide during the first year, but it is not yet clear how much of these changes reflect congestion pricing versus broader citywide trends and ongoing safety efforts.

What else can be done?

Dynamic pricing schemes: Consider introducing dynamic pricing similar to Singapore's Electronic Road Pricing model, which adapts driver tolls according to time, location and real-time congestion conditions.

Use revenue for engineering measures: Leverage program revenues to systematically implement traffic calming near transit stops and stations as well as on additional high-priority corridors where legally permitted. In New York City, revenues must be dedicated to transit under state law, but other jurisdictions may have broader flexibility.

Use revenue for safety operations: Program revenues in other jurisdictions considering congestion pricing could also support the reallocation of travel lane space to transit and active travel modes, the unbundling of motor vehicle and active transportation networks, dynamic curb-space management (e.g., freight delivery windows, priced loading zones, commercial microhubs), and the equitable deployment of speed and red light safety cameras.

Vehicle fleet policies: Enact policies requiring city-owned and contracted fleets to meet pedestrian- and cyclist-safe front-end design standards; build on the city's existing intelligent speed assistance pilot program for fleets.

CASE STUDY 9

Redesigning for slower speeds in Philadelphia

KEY TAKEAWAY: By reshaping streets to manage speed and simplify conflicts —and pairing those changes with speed safety cameras — Philadelphia reduced the most severe crash outcomes and also lowered overall crash risk.

SAFETY LEVERS

Philadelphia demonstrates how moving from reactive, piecemeal safety interventions to a proactive Safe System approach can significantly reduce traffic deaths and serious injuries. Rather than waiting for tragedies to occur, the city has reshaped the built environment through road diets, separated bike lanes, Neighborhood Slow Zones and traffic calming while also deploying speed safety cameras on its highest-risk corridors to prevent serious injuries and fatalities before they happen.

Office of Transportation and Infrastructure Systems

Instead of relying on driver compliance ...

Using only signs, warnings or enforcement to change behavior

Police enforcement in particular requires significant, ongoing funding and staffing. It also can be inconsistently applied and doesn't address the underlying street design conditions that contribute to serious injuries and fatalities.

... Philadelphia designed streets for safety

Building permanent, self-enforcing infrastructure that delivers lasting safety improvements

Philadelphia built separated bike lanes and redesigned streets using road diets to reallocate space for walking, biking and transit.

Instead of relying on a single solution ...

Treating any single approach as sufficient to manage safety on high-risk corridors

Speed safety cameras are an effective and cost-efficient tool, but on their own don't address the full range of factors that influence operating speeds and crash outcomes.

... Philadelphia layered multiple tools

Pairing safety cameras with physical changes

Corridors targeted for speed safety cameras should also be prioritized for more permanent approaches, such as street design changes and traffic calming. On Philadelphia's Roosevelt Boulevard, the city deployed speed safety cameras and then planned additional corridor redesign projects to bolster the safety gains. These included reconfiguring crossover lanes, improving intersections and pedestrian crossings, and adding bus priority lanes to better separate traffic.

Instead of allowing lack of local authority to hinder progress ...

Limiting action to what local agencies can implement on their own

When tools such as speed safety cameras require state legislative approval, progress can stall without intentional coordination beyond the city level.

... Philadelphia partnered with state lawmakers to gain approval

Cooperating across levels of government to enable effective safety action

Facing longstanding safety concerns on Roosevelt Boulevard, Philadelphia worked with state leaders to secure legislative authorization for speed safety cameras. Deployment was later expanded to additional corridors.

Instead of deploying safety fixes piecemeal ...

Leaving some neighborhoods behind

If certain neighborhoods, especially those disproportionately exposed to high-risk built environments, are left without improvements, that limits citywide safety gains.

... Philadelphia scaled up proven solutions

Widespread deployment for broader impact

Across the city, Philadelphia scaled up bike lanes, road diets and Neighborhood Slow Zones, which have 20 mph limits and traffic calming features.

What levers did this intervention pull?

PRIMARY: Philadelphia reduced **severity** by lowering vehicle speeds on high-risk streets through road diets, traffic calming, Neighborhood Slow Zones and speed safety cameras. By bringing operating speeds closer to survivable thresholds, these measures made crashes less likely to result in death or serious injury.

SECONDARY: Changes that reshaped how road users move and interact reduced the **likelihood of a crash**. Road diets and separated bike lanes reduced conflict points and physically separated people walking and biking from motor vehicles.

State and local DOTs can reduce crash injuries by lowering one or more of the following **SAFETY LEVERS**:

EXPOSURE	how much people drive
SEVERITY	how fast vehicles travel and how heavy they are
LIKELIHOOD OF A CRASH	how often road users come into conflict

What were the results?

- On Roosevelt Boulevard, speed safety cameras drove a 50% reduction in traffic deaths, a 36% reduction in crashes, and a 90% reduction in extreme speeding within the first seven months.
- Neighborhood Slow Zones produced 75% fewer crashes.
- Injury crashes were 17% lower after road diets and 18% lower after separated bike lane installation compared with trends on the rest of the High Injury Network. In addition, the number of people biking on corridors with separated bike lanes increased significantly.

What else can be done?

Interim approach: Low-cost, quick-build tools such as paint, delineators and planters can be used to create temporary versions of road diets, curb extensions or protected bike lanes, allowing residents and decisionmakers to experience safe street designs before permanent investment. Even modest upgrades such as daylighting or leading pedestrian intervals can reduce speeds and conflict points. Community-led efforts such as walk audits, near-miss mapping and simple speed studies can also help identify risk areas and build evidence for future improvements.

Policy/process trigger: Update design standards to prioritize self-enforcing features, aligning resurfacing projects with opportunities to narrow lanes or add markings and integrating safety into capital improvement programs.

Additional policy/process trigger: Expand on the High Injury Network, which Philadelphia uses today to prioritize street redesigns and speed management, by creating a risk-based network that directs those same treatments to corridors with similar risk characteristics before serious injuries occur.

CASE STUDY 10

Transit-only lanes in San Francisco

KEY TAKEAWAY: San Francisco reduced population-level injury risk by prioritizing transit-only lanes, lowering operating speeds through corridor design, and reducing and simplifying conflict points. This project demonstrates how exposure, severity and likelihood can be addressed simultaneously.

SAFETY LEVERS

San Francisco's Van Ness Improvement Project demonstrates how transit-priority design and street reallocation can reduce injury risk at a population scale by lowering VMT, managing speeds and eliminating high-risk conflicts. The centerpiece of the project was the creation of dedicated bus rapid transit (BRT) lanes. While the project was initiated to improve transit reliability and person throughput, the resulting changes to street geometry, operations and mode share substantially reduced kinetic-energy risk along one of the city's highest-injury corridors. The project also secured strong support from emergency responders by providing a reliable, unobstructed access lane, illustrating how sustainability, safety, multimodal mobility and emergency response goals can be aligned.

Instead of focusing on moving vehicles …

Prioritizing vehicle throughput on a major cross-city corridor

Before the redesign of Van Ness Avenue, buses ran in the outside lane, in mixed-flow traffic. Three wide, general-purpose lanes per direction and permissive left turns created frequent conflicts for all users, particularly for pedestrians and buses. The avenue was part of San Francisco's High-Injury Network.

… San Francisco focused on moving people

Reallocating street space to safer, high-capacity modes, reducing exposure and conflict

Van Ness BRT created dedicated, center-running transit lanes, reduced general-purpose lanes from three to two in most segments, narrowed lane widths, added median pedestrian refuges, programmed signals with leading pedestrian intervals, and restricted left turns for private vehicles at most intersections. These changes reduced conflict points, shortened pedestrian crossings, improved transit operating speeds and increased person throughput without roadway expansion.

Instead of mixing modes …

Requiring transit to operate in mixed flow with frequent merging and weaving

Before the project, buses were required to pull in and out of curbside stops, mix with general traffic and navigate turning vehicles. This increased conflict points and degraded transit reliability.

… San Francisco separated modes

Providing dedicated transit lanes with coordinated signals

The BRT project added more than four lane-miles of center-running transit lanes. It also retimed signals and reprogrammed them to give buses priority. These measures reduced lane-changing and weaving, eliminated friction between buses and general traffic, shortened the time buses spent at stops and improved bus reliability. Eighty-six percent of surveyed bus riders reported faster trips.

Instead of encouraging high speeds …

Leaving wide, multilane roads that make it easy to speed

Although Van Ness Avenue had long been intended to be a transit-priority street, there were few features to keep speeds in check. Fast-moving vehicle traffic increased the risk of severe crashes on a street with frequent pedestrian crossings.

… San Francisco designed for appropriate speeds

Using physical design to keep speeds in check

The redesign reduced the number and width of the lanes and incorporated median refuges and curb extensions. These elements help bring operating speeds down to the target speed for crash survivability in this multimodal context.

What levers did this intervention pull?

PRIMARY: BRT reduces **exposure** by shifting trips from private vehicles to high-capacity transit, lowering vehicle miles traveled. Fewer vehicle trips reduce the opportunities for high-energy crashes.

SECONDARY: The project reduced **severity** by reducing speeds and the involvement of heavy vehicles — in this case buses — in crashes. Changes in street design slowed traffic, especially during off-peak hours. Buses were separated from general traffic.

SECONDARY: The project reduced the **likelihood of a crash** by reducing and simplifying conflict points.

State and local DOTs can reduce crash injuries by lowering one or more of the following **SAFETY LEVERS**:

EXPOSURE	how much people drive
SEVERITY	how fast vehicles travel and how heavy they are
LIKELIHOOD OF A CRASH	how often road users come into conflict

These safety gains were achieved while improving emergency response reliability.

What were the results?

- Transit ridership along Van Ness rebounded to 103% of prepandemic levels, outpacing the systemwide recovery of 70%. Among surveyed riders, 52% reported riding more often.
- Transit-involved collisions declined 82%.
- Overall collisions declined 33% in multiyear before and after comparisons.

What else can be done?

Rapid-deployment steps: Extend hardened or restricted left-turn treatments, pedestrian refuges and leading pedestrian intervals to similar corridors using quick-build materials. Consider “Safe Waves” signal timing adjustments to reduce pedestrian delay and manage speed through shorter cycle lengths and coordinated progression designed for slower operating speeds.

Policy/process trigger: Expand center-running transit-only lanes to other high-injury corridors where transit carries a large share of people, using person throughput rather than vehicle throughput as the governing performance metric.

Continued data collection: Track corridor-level changes in transit ridership, general-purpose vehicle volumes, operating speeds and severe crash rates to monitor kinetic-energy risk over time. This is especially important as additional treatments and conditions, such as speed safety cameras and autonomous vehicles, are added in the city.

CASE STUDY 11

Adopting Safe System tenets in Santa Rosa, CA

KEY TAKEAWAY: Santa Rosa institutionalized serious injury and fatality prevention at scale by shifting from project-by-project safety fixes to embedding Safe System principles across capital planning, street design and development review.

SAFETY LEVERS

Santa Rosa used its Capital Improvement Program (CIP), street design standards, speed management practices and development review processes to shift from fragmented, vehicle-oriented decision-making toward a more institutionalized Safe System approach. Rather than relying on isolated safety projects or enforcement, the city embedded safety priorities — particularly within its High Injury Network (HIN) — into routine planning, design and maintenance processes. These changes reflect an evolution from reactive, project-by-project fixes to systemic, self-enforcing design and policy alignment that supports Vision Zero outcomes across agencies and programs.

City of Santa Rosa

Santa Rosa went from approving siloed projects …

Old capital investment planning process

The Capital Improvement Program (CIP) functioned as a collection of General Plan, Specific Plan, and one-off projects with no central mission. Individual projects sometimes conflicted with adopted safety policies.

… to following a cohesive strategy

Improved planning process

The CIP was updated to prioritize pavement maintenance and safety projects, especially within the HIN and transit network. Projects that were not explicitly aligned with Vision Zero and community priorities for safer streets were canceled or updated.

Santa Rosa went from focusing on vehicle capacity …

Old development review and design standards

- *Traditional impact analysis in development review focused on congestion, vehicle delay and capacity, often incentivizing vehicle-oriented development and higher crash risks.*
- *Design standards prioritized vehicle throughput and operational efficiency, often producing street geometries that encouraged higher driving speeds.*

… to prioritizing safety and access for all

Improved development review and design standards

- Development assessments focus on safety outcomes, multimodal access and complete-street compatibility. Level-of-service requirements have been removed, although they may be requested by staff.
- Updated design standards default to self-enforcing safety features such as narrower lanes, curb extensions and raised crossings. This creates consistency and ensures utility and third-party projects restore streets to safer designs. Design waivers require justification to make streets *less* safe instead of *more* safe.

Santa Rosa went from high speed limits with limited enforcement …

Traditional speed management

The previous state-required practices for setting speed limits resulted in higher, less survivable speeds. Police resources for enforcement were limited, and there were no available speed safety cameras or other automated tools.

… to lower speed limits bolstered by design changes

New approach to speed management

Speed limits were reduced through aggressive application of a new state law allowing an additional 5 mph reduction, particularly on the HIN. Physical design changes made the new limits self-enforcing. Core commercial areas are now signed at 20 mph, and will be regularly evaluated for further speed reductions as necessary.

Santa Rosa went from no cohesive plans for active transportation and transit …

One-off projects without prioritization

Long-term bicycle and pedestrian plans lacked prioritization and accountability. Projects were not network-based and often infeasible without drastic right-of-way acquisition. Transit upgrades were planned and funded separately.

… to preparing for the future needs of walkers, cyclists and transit riders

Adopting an Active Transportation Plan and including dedicating transit funding in the CIP

The Active Transportation Plan prioritizes projects that are feasible and vetted for vehicle lane changes, transit network coordination, surrounding land uses and right-of-way impacts. CIP spending now includes dedicated funding for transit-supportive infrastructure and exclusively addresses safety and pavement maintenance.

Santa Rosa went from making isolated fixes …

Isolated improvements in response to crashes

Spot, permanent fixes treated individual segments and intersections with a history of fatal and serious injury crashes and caused concern for the city attorney by highlighting the need for fixes.

… to making fast, scalable changes

Frequent, quick safety enhancements

High-risk locations are improved via quick-build projects, pilot treatments and community-led engagement (e.g., “chalk the street”) to rapidly test, refine and scale improvements via a dedicated funding stream.

What levers did this intervention pull?

PRIMARY: These changes reduced the **severity** of crashes by lowering vehicle speeds. The changes help keep speeds below 30 mph, the level at which the risk of serious injury to pedestrians and bicyclists increases rapidly.

SECONDARY: These changes reduced **exposure** by shifting investment and development patterns toward safer corridors and modes, reducing vehicle miles traveled and high-speed interactions. Moving away from congestion-focused land use analysis discourages development that increases high-risk driving.

SECONDARY: By prioritizing HIN corridors within the CIP and applying updated design standards by default, Santa Rosa reduced conflict points and created more forgiving street environments to reduce the **likelihood of a crash**.

State and local DOTs can reduce crash injuries by lowering one or more of the following **SAFETY LEVERS**:

EXPOSURE	how much people drive
SEVERITY	how fast vehicles travel and how heavy they are
LIKELIHOOD OF A CRASH	how often road users come into conflict

What else can be done?

Rapid-deployment steps: Expand rapid deployment of temporary curb extensions, speed humps and protected crossings on additional high-risk corridors.

Policy/process trigger: Integrate Safe System criteria explicitly into maintenance schedules, CIP scoring and development review.

Continued data collection: Track operating speeds, serious injury crashes and quick-build-to-permanent project conversions on HIN streets to celebrate successes and calibrate future street changes.

CASE STUDY 12

Lowering citywide speed limits in Seattle

KEY TAKEAWAY: Seattle's speed management strategy treats serious injury as a predictable, preventable outcome. By applying survivable speed limits systematically across the network, the city reduces the most dangerous speeding before crashes occur, rather than waiting to respond after people are hurt.

SAFETY LEVER

In November 2016, an ordinance took effect in Seattle lowering default speed limits from 30 mph to 25 mph on arterials and from 25 mph to 20 mph on residential roads unless otherwise posted. The Seattle Department of Transportation (SDOT) also increased the density of speed limit signs on arterials throughout the city. In addition to adjusting speed limits, SDOT layered signal timing changes, traffic calming and speed safety cameras to comprehensively approach speed management.

Seattle Department of Transportation

Instead of basing speed limits on traffic flow …

Setting speed limits using engineering methods, such as the 85th percentile speed

This can result in speed limits that match traffic flow but not the surrounding context and do not meet the safety needs of everyone who uses the streets.

… Seattle based speed limits on safety needs

Setting speed limits based on the road's purpose, the types of crashes likely to occur and the speeds at which people can survive them

Seattle's reduced limits reflect speeds that are more survivable for the pedestrians and bicyclists who use its urban streets. A pedestrian struck at 25 mph or below faces less than a 5% risk of death. That risk rises sharply as impact speeds increase — for example, reaching nearly 40% at 40 mph.

Instead of being reactive …

Making piecemeal changes in reaction to crash data or public complaints

This can delay improvements until after crashes occur or concentrate changes where community voices are loudest, not where the actual risk is highest.

… Seattle was proactive

Scaling up successful interventions citywide based on where risk of serious injuries or fatalities is high

- In 2016, Seattle posted new 25 mph signs on downtown arterials.
- In 2017, 25 mph signs were expanded to neighborhood business districts. By the end of 2019, 8 of the city's 32 urban villages were signed at 25 mph.
- In 2020, Seattle began updating its speed limit policy to place 25 mph signs on most arterial streets.
- Currently, 90% of Seattle's arterials are signed at 25 mph.

Instead of a narrow approach …

Relying on a single method to address speed

Lowering speed limits alone will change the behavior of some drivers but not others.

… Seattle took a broad approach

Layering multiple tools to address speed

SDOT complemented speed limit changes with design and operational strategies that reduce speeding.

- Prior to modifying speed limit signs, SDOT retimed downtown signals to support 25 mph travel speeds.
- Seattle has installed traffic calming countermeasures on approximately 10 arterial streets a year. These include speed cushions, street striping changes to narrow field of vision, median islands, speed feedback signs and intersection daylighting.
- Seattle expanded the number of school zones with speed safety cameras.
- Seattle increased the density of speed limit signs to ¼ mile intervals in each direction to improve driver awareness. Previously, signs were 1 to 1½ miles apart, and some streets were unsigned.

Instead of maintaining silos …

Addressing safety problems agency by agency

No single agency has the authority or capacity to achieve safety goals on its own.

… Seattle fostered cooperation

Addressing safety as shared responsibility and prioritizing multi-agency partnerships

- SDOT worked with the City Council to pass an ordinance lowering default speed limits in October 2016.
- Without this ordinance, SDOT would have needed to complete time-consuming and costly engineering studies to implement widespread speed limit changes.
- SDOT also worked with the Washington DOT to reduce speed limits to 25 mph on several state-owned arterials.

What lever did this intervention pull?

PRIMARY: Seattle reduced **severity** by lowering vehicle speeds and in particular the proportion of vehicles traveling at speeds that carry a high injury risk to pedestrians and bicyclists.

State and local DOTs can reduce crash injuries by lowering one or more of the following **SAFETY LEVERS**:

EXPOSURE	how much people drive
SEVERITY	how fast vehicles travel and how heavy they are
LIKELIHOOD OF A CRASH	how often road users come into conflict

What were the results?

- SDOT documented speed reductions. Median speed fell 10% and the 85th percentile speed fell 7%. In addition, 54% fewer drivers exceeded 40 mph on roads previously signed for 30 mph.
- Crash injuries also went down, according to an IIHS evaluation. The study found a 20% reduction in odds a crash resulted in injuries on arterials downtown and an 11% reduction in those odds outside of downtown.

What else can be done?

Rapid-deployment steps: Seattle already uses some quick-build treatments, but wider application of quick-build curb extensions, median islands or speed cushions could strengthen speed management.

Policy/process trigger: Seattle's speed limit changes have been applied more broadly and consistently than its traffic calming efforts. The city could strengthen its approach by adopting policies that support more systematic deployment of traffic calming or roadway reconfigurations across a larger share of the network.

Continued data collection: Continue to track changes in vehicle speeds in corridors where speed management strategies have been applied with a particular focus on extreme speeds, which carry the highest risks.

CASE STUDY 13

Intelligent speed assistance in Washington

KEY TAKEAWAY: Washington state's intelligent speed assistance law is an example of acting on known risk patterns to prevent future injuries. Washington will use the technology to limit vehicle speeds for certain convicted drivers for whom repeated enforcement actions have not reliably changed behavior.

SAFETY LEVER

Washington adopted Intelligent Speed Assistance (ISA) as a tool for courts to help break the cycle of unsafe speeding, fines, arrests, license suspensions and recidivism among high-risk drivers. Through its ISA law, the state demonstrates how policy can be used to limit vehicle speeds for drivers convicted of criminal traffic offenses or repeat infractions involving excessive speeding. This more targeted and preventative tool can be applied when enforcement alone has not been sufficient to change behavior.

IIHS-HLDI

Instead of relying on the same enforcement tools …

Handing out more tickets and fines

Traditional speeding enforcement and sanctions have not been successful in changing behavior for some high-risk drivers. These drivers continue to speed excessively even after receiving a ticket, fine or other penalty.

… Washington is using a new tool to address persistent speeding

Mandatory ISA after high-risk speeding offenses

Washington's law, which passed in 2025, will require drivers convicted of a criminal offense involving excessive speeding or with multiple violations within a certain period that include at least one excessive speeding offense to install an ISA device that limits their vehicle's speed to the posted speed limit. Judges may also impose ISA as a condition of probation or pretrial release.

Instead of repeating the cycle …

Persistent speeding despite enforcement

Some high-risk drivers continue to speed excessively despite repeated tickets and fines. Even license suspensions have not always been enough to prevent future violations.

… Washington is focusing on preventing future speeding

Making excessive speeding much less likely

ISA can help break the cycle of repeated speeding offenses by preventing high-risk drivers from routinely exceeding speed limits. Rather than relying solely on penalties after violations occur, the technology ensures these drivers generally drive the speed limit.

Instead of burdening low-income drivers …

Inequitable and ineffective punishment

Escalating fines and fees disproportionately burden low-income drivers and can lead to debt-based license suspensions without producing meaningful, lasting safety improvements. At the same time, higher-income drivers may simply absorb fines without changing behavior, limiting the effectiveness of this approach in reducing excessive speeds.

… Washington helps prevent high-risk drivers from continuing to speed, regardless of income

Limiting speeds without financial hardship

The use of ISA reduces reliance on officers making traffic stops and diminishes the disproportionate impacts that escalating fines and fees cause for low-income road users. Washington's ISA law requires drivers to pay for the device but allows costs to be waived for people with financial hardships.

What lever did this intervention pull?

PRIMARY: By directly limiting vehicle speeds for the riskiest drivers, the law enabling ISA reduces severity by cutting down on extreme speeding.

State and local DOTs can reduce crash injuries by lowering one or more of the following **SAFETY LEVERS**:

EXPOSURE	how much people drive
SEVERITY	how fast vehicles travel and how heavy they are
LIKELIHOOD OF A CRASH	how often road users come into conflict

What else can be done?

Interim step: States and local jurisdictions can build up to this approach by piloting active or passive ISA within their government fleet vehicles to lead by example and reinforce a culture of safety. This is a low-cost, low-hassle strategy, as ISA can be added as an aftermarket retrofit or during regular fleet turnover every few years.

Policy/process trigger: Local governments can advocate for and support state policies enabling ISA to curb excessive speeding behaviors. This tool fits into the "Safe Vehicles" component of a Safe System approach.