# **Recommendations of the Safe System Consortium (JHU)**

Frustrated that conventional safety approaches have not shifted the rank of traffic deaths as the leading cause of death for young people and with the associated endemic inequities rooted in our road transportation system, this group of engineers, scientists, public health professionals, and safety experts considered the potential of an emerging concept—the Safe System approach—for changing the way roads affect our lives and communities.

Equity differs from equality. A system can achieve equality if each individual or group are given the same resources or opportunities. But a system that is equitable goes further. Equity requires recognizing that communities have been differentially impacted by a variety of circumstances, structures, and historical contexts that have unjustly advantaged some, while unjustly disadvantaging others. Hence, communities that have been disadvantaged require a differential allocation of resources and opportunities to eventually reach an equal outcome. In the U.S., the recognition that certain groups—because of their race, ethnicity, or ability, for example—have not enjoyed the same access to resources and opportunities must be accounted for through equitable decision-making.

Text

Description automatically generated

Laws, enforcement, and adjudication have improved safety, but are only marginally effective in reducing risk when roads are designed to encourage high speeds and require errorfree use. Walkers, bicyclists, drivers, passengers, children, young people, disabled people, and the elderly have been killed in the same ways during each of the past 100 years. To expect that it will be different next year, or in the next 100 years, is unreasonable.

Graphical user interface

Description automatically generated

No nation claims to yet have a fully comprehensive Safe System. However, Australia, New Zealand, Spain, Sweden, and The Netherlands each have more than 20 years of experience with the approach. While it is difficult to evaluate the effects of the Safe System approach in isolation from other factors, a number of nations that have implemented a Safe System have shown sharp reductions in traffic deaths. During this same period, 1990–2017, traffic deaths in the U.S. dropped by 16% (AU: 47% reduction, NZ: 48% reduction). Looking more closely at methods, there is ample evidence that the types of interventions used to achieve Safe System objectives are effective in reducing death and injury.

Transitioning to a Safe System provides opportunities to address a range of safety consequences in communities that have long been underserved and marginalized. Road system owners—including state and local governments and metropolitan planning organizations—will need to select locations for Safe System investments as they work toward widespread implementation. If locations are prioritized thoughtfully, using data that are sensitive to local needs and capture not only the immediate impacts of crashes but also their second- and third-order effects, such as limiting opportunities for physical activity and access to jobs and education, then we can implement the Safe System approach in an equitable way. We can invest first in areas most in need, closing gaps between the well-served and underserved and improving equity as we move forward.

In a Safe System, roads are designed such that the intuitive behavior is the safe behavior. Designers adjust lane width, sight distance, and other roadway cues so that drivers find the speed at which they feel comfortable driving is within the safe speed limit. Pedestrian crossings and bike paths are designed so that walkers and cyclists find that the easiest way to get across traffic is the safe way.

The Consortium identified three essential areas for change that will set a course for achieving a Safe System—Safety Across the System, Equity by Investment, and Progress by Design—and urge unanimous dedication to reaching this goal.

Recommendations

* Change the FHWA Highway Safety Improvement Program (HSIP) project selection criteria to prioritize reducing gaps in safety—for people walking and bicycling as well as vehicle occupants—between well served and underserved communities.
* Develop and disseminate new materials to define the relationship of traffic safety culture to a Safe System.
* Develop a road safety gap analysis tool covering walkers, bicyclists, and vehicle occupants, including the capability to assess injury risk in crashes based on kinetic energy levels in predicted crash types.
* Work with road infrastructure constituents to integrate the Safe System approach, including setting safe speed limits based on evidence of injury tolerance, in key foundational tools such as the AASHTO Policy on Geometric Design, the Highway Safety Manual, and the Manual on Uniform Traffic Control Devices, as well as state and local design and operation manuals.

Safety equity

# **Improving the Performance of Safe System Infrastructure: AustRoads (2015)**

Figure 3.2 shows these three elements plus various groups of factors which feed into them. Some of the factor groups have influence across more than one element. Recognizing this transiency helps to explain why some road safety questions do not have simple answers (e.g. the role of speed in crash likelihood and severity).

Table

Description automatically generated

**Public Roads: Winter 2022**

MAKING OUR ROADS SAFER through a Safe System Approach: C. Ngo

The Safe System Approach is being applied with great success in a growing number of nations and cities around the world and has now taken hold in the United States. Numerous transportation agencies across the United States have already begun to implement and institutionalize Safe System principles. While these agencies are at different stages of implementation, they all have pivoted to this approach with the goal of making positive and significant differences in safety. Three initiatives are below:

* The California Department of Transportation (Caltrans) introduced a new safety paradigm in 2020. The agency established the new Division of Safety Programs and incorporated four safety-focused initiatives or pillars into its SHSP. One of the pillars calls for implementation of a Safe System Approach. The institutional commitment to the Safe System Approach has been the foundation for many positive cultural and programmatic changes within the agency, one of which is the establishment of the Pedestrian Systemic Safety Improvement Program that had been started as a pilot in 2016. The program integrates Safe System elements and principles into a systemic approach to further the goal of zero deaths.

A picture containing diagram

Description automatically generated

* The Florida Department of Transportation (FDOT) and its safety partners work toward their Vision Zero goal of zero fatalities and serious injuries through the State SHSP, which serves as the overall framework of efforts and activities to improve safety toward that ultimate goal. Florida’s 2021–2025 SHSP introduced the Safe System Approach to address safety in an integrated manner with a collective commitment of time, talent, and resources to new priorities, strategies, and enhanced partnerships. Because Florida experienced a 27-percent increase in fatalities at intersections between 2015 and 2019, intersections are identified as an emphasis area within the SHSP. Among the focused strategies identified in the SHSP is the systematic use of Intersection Control Evaluations to implement innovative designs such as roundabouts and reduced left-turn conflict intersections on projects that offer opportunities to make intersection improvements.
* The Washington State Department of Transportation (WSDOT) recognized that to achieve its zero-deaths goal, appropriate policies must be in place to implement a Safe System Approach throughout the planning, programming, design, and operations sections of its department. WSDOT leverages its SHSP and Target Zero efforts to align Safe System principles across discipline areas and provide direction throughout capital and operational program elements. WSDOT changed the safety subprogram to emphasize proactive safety projects; 70 percent of its funds are targeted towards the crash prevention category.

THE HIGHWAY SAFETY IMPROVEMENT PROGRAM: Paving the Road to a Safer Future: K. Scurry

Integrating the Safe System Approach with the Highway Safety Improvement Program (FHWA-SA-20-018), the Federal Highway Administration identified opportunities and noteworthy practices to align the Safe System principles with the foundational elements of the HSIP, SHSPs, and States’ HSIPs.Diagram

Description automatically generated

“For the first time, New Jersey Department of Transportation (NJDOT) is recognizing equity as a priority in highway safety as part of our Strategic Highway Safety Plan,” says NJDOT Commissioner Diane Gutierrez-Scaccetti. “NJDOT is working diligently to ensure that all strategies and activities emanating from the plan fairly consider the needs of all users and all communities—particularly minority populations, economically depressed communities, and those that are differently abled.”

Graphical user interface, application, Word, Teams

Description automatically generated

The Minnesota Department of Transportation (MnDOT) created the Suitability of Pedestrian and Cyclist Environment (SPACE) tool, an index of 19 publicly available data measures from the U.S. Census and State agencies that includes measures of demographic populations, environmental justice factors, latent demand, and trip generator factors. Layering the SPACE score with crash data revealed that communities with a SPACE score greater than 50 represent 71 percent of crashes at 15 percent of road miles in the State. This demonstrates that an equity index, like the SPACE score, can be used as an effective predictive risk factor tool for crashes that result in fatalities and serious injuries. “The SPACE score has helped us prioritize nonmotorized scoping efforts and understand the latent demand in the community,” says Sonja Piper, a pedestrian and bicycle safety engineer at MnDOT. “Additionally, the systemic risk attributed to the score has helped us rate HSIP projects. We’re looking at ways that SPACE can help prioritize our overall program delivery and have used the concepts of leveraging public Chart, bar chart

Description automatically generatedText

Description automatically generateddata to generate similar analysis for other processes. Chart, funnel chart

Description automatically generated

There are many free, publicly available, and easily accessible data sources to use to conduct equity analysis and target investment to address disparities in crash fatalities and serious injuries. These data include: (1) public health models in State and local agencies; (2) the **Environmental Protection Agency’s Environmental Justice Screening and Mapping Tool,** available at *https://ejscreen.epa.gov/mapper*; and (3) U.S. Census data. Agencies can then layer these models with crash data, infrastructure data, or transportation safety funding data to determine which communities are experiencing disparities and target HSIP funding in those locations. Engaging with State and local stakeholders such as departments of health will help to better understand what data are available to support safety data analysis.

THE SAFE SYSTEM PARADIGM: J. Shaw and R.J.

FHWA sponsored the effort to develop a Safe System for Intersections (SSI) framework and methodology, which represents a first step toward the development of objective and implementable analyses that reflect key Safe System concepts. As a complement to aggregate crash-based findings such as CMFs, the SSI method provides an approach to characterize intersection alternatives with respect to the Safe System principles of managing impact angles and speeds and simplifying decision making, with the goal of reducing traffic fatalities and serious injuries. The method is applied at the conflict point level and incorporates the characteristics of different movements through the intersection for all road users. The SSI method is sensitive to volumes, vehicle speeds, potential collision angles, and geometry.

THE SAFE SYSTEM APPROACH: How States and Cities Are Saving Lives: C. Ngo

Inspired by peer exchanges with Sweden and the Netherlands as well as Australia’s integration of Vision Zero and sustainable safety into the Safe System Approach, the Washington State Department of Transportation (WSDOT) developed its first SHSP, Target Zero, in 2000. In doing so, Washington became the first State in the Nation to set the goal of zero traffic fatalities. The multidisciplinary Safe System Approach was a natural next step in WSDOT’s progression to performance-based planning, design, and operations (practical solutions) within a multimodal system.

Early on, WSDOT focused on gaining leadership buy-in and support. Significant change initiatives often require leadership from the top to be effective. WSDOT adopted the use of executive orders to drive transformational changes. In 2013, WSDOT developed the Sustainable Highway Safety Program Executive Order. Moving Washington Forward: Practical Solutions followed in 2014 and led to changes in WSDOT engineering practices, providing significant design flexibility and including modal priority and design context in decision making.

Table

Description automatically generated

A recent update to the State’s active transportation plan, available at *https://wsdot.wa.gov/construction-planning /statewide-plans/active-transportation-plan*, discusses these issues and provides the underlying methodology for identifying and prioritizing infrastructure gaps on State routes.

SS in the World: Sweden, Australia, NZ

A full decade after the adoption of the Safe System Approach, the vision for the Safe System strategy was clearer, but the steps required to reach these objectives were less understood. For example, there was no clear, practical guidance on embedding Safe System principles into the provision of new infrastructure or the upgrading of existing infrastructure. In the first years of Australia’s Safe System Approach, a lot of time was spent trying to define what was meant by a “Safe System,” and many debates occurred about the theoretical interpretation (for example, the role of road user responsibility).

As for road infrastructure, the emergence of tools to help assess Safe System impacts from projects as part of design has been beneficial, including the **Safe System Assessment Framework (SSAF), and the Extended Kinetic Energy Management Model for Intersections framework (X-KEMM-X).** SSAF provides information about whether road design options are aligned with Safe System outcomes, guidance on ways to improve the design, and impact of this improvement on death and serious injury. This tool is now compulsory for certain projects in several Australian states.

Compared to 2019, fatalities increased:

* 7.2% overall
* 23% per mile driven
* 23% among Black people
* 20% involving persons ejected from a vehicle
* 18% among ages 25-34
* 15% among passenger vehicle occupants not wearing seatbelts
* 15% among ages 16-24
* 14% among ages 35-44
* 11% in speeding-related crashes
* 9% in crashes with police-reported alcohol involvement
* 9% among motorcyclists