



NATIONAL SAFETY COUNCIL

Position/Policy Statement

Safe Systems

POSITION / POLICY:

The National Safety Council supports the application of the Safe Systems approach to road safety in local, state, federal, and private sector transportation policies.

DEFINITION:

The Safe Systems approach is a roadway safety strategy that focuses on five action areas: safe roads, safe speeds, safe road use, safe vehicles, and effective post-crash care. The approach requires the participation of all participants in the roadway transportation system in safety efforts, and seeks to strengthen safety in all aspects of the roadway transportation system so that if one part fails, the others will still protect people from death or serious injury on the roadways.

JUSTIFICATION:

In the United States, crashes and collisions on the roadways cost an estimated \$416.2 billion per year,¹ accounted for over 2.5 million injuries² and 40,000 deaths in 2017,³ and are the leading cause of death for people between the ages of 5 and 24.⁴ These figures are unacceptable, and indicate that existing efforts to ensure roadway safety are insufficient. Moreover, roadway crashes can be the result of an array of factors, to include: human error, infrastructure design and operations, vehicle defects, and environmental conditions. A responsible approach to roadway safety must take all of these potential risk factors into account. The Safe Systems approach has been used by other countries to mitigate risk factors on the roadways with great success. Countries that have utilized the Safe Systems approach achieved both the lowest rates of traffic fatalities and the largest reductions in traffic fatalities over a 20-year period.⁵ The World Resources Institute has calculated “[m]ore than one million deaths

¹ <https://injuryfacts.nsc.org/motor-vehicle/overview/introduction/>

² <https://www.cdc.gov/vitalsigns/crash-injuries/index.html>

³ <https://www.nhtsa.gov/press-releases/usdot-releases-2016-fatal-traffic-crash-data>

⁴ <https://crashstats.nhtsa.dot.gov/Api/Public/Publication/812297>

⁵ http://wriorg.s3.amazonaws.com/s3fs-public/17_Report_Safe_Systems_final.pdf

could be avoided every year if the rest of the world achieved levels of road safety comparable to these best-performing countries”⁶

BACKGROUND:

Over the past several decades, there has been a substantial decline in the number of roadway deaths in the United States.⁷ Recently, however, this progress has reversed; approximately 5,000 more people died on the roadway in 2016 than in 2014.⁸ In 2017, more than 40,000 people were killed and another 4.5 million were injured on American roadways.⁹ This figure includes pedestrians, who are 1.5 times more likely to be killed in a motor vehicle crash than passenger vehicle occupants, and bicyclists, who are also at greater risk of harm in traffic crashes.¹⁰ In recent years, pedestrian fatalities have reached their highest levels in over a quarter of a century.¹¹

Motor vehicle crashes are the leading cause of death for people ages 5-24. The roadway death rate in the United States was more than twice the average of other high-income countries in 2013.¹² The Safe Systems approach has been successfully utilized to reduce roadway fatalities in countries like Sweden, the Netherlands, and New Zealand. More recently, an increasing number of cities in the U.S. have integrated the Safe Systems approach into their roadway safety and transportation policies. To make truly meaningful progress towards a vision of zero roadway fatalities, however, the Safe Systems approach needs to be implemented nationwide by all components of the transportation system.

The Safe Systems Approach

The Safe Systems approach fundamentally shifts the way we think about transportation safety by affirming that deaths and severe injuries on the roadways can be prevented when safety is prioritized across all components of the road system. The Safe Systems approach rejects the notion that individuals bear the sole responsibility for road safety and instead highlights four key principles:

- (i) human bodies have a limited ability to withstand crash forces;
- (ii) humans and systems are fallible, so some crashes are inevitable;
- (iii) system designers, policymakers, and road users share responsibility for safety; and
- (iv) all aspects of the roadway system must be strengthened with safety in mind.

Taken together, these principles advocate for the involvement of all participants in the roadway system, to include: planners, engineers, parents, policy makers, enforcement officers, educators, utility providers, insurers, vehicle manufacturers and importers, car seat manufacturers, the media, fleet managers, road users, and many more.¹³ The Safe Systems approach emphasizes that only when **all** participants share a responsibility for and commitment to roadway safety can traffic fatalities be eliminated.

⁶ <http://www.wri.org/blog/2018/01/we-know-how-save-millions-dying-world%E2%80%99s-roads>.

⁷ <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811346>.

⁸ National Highway Traffic Safety Administration (NHTSA), Fatality Analysis Reporting System (FARS).

⁹ <https://www.nsc.org/road-safety/safety-topics>.

¹⁰ https://www.cdc.gov/motorvehiclesafety/pedestrian_safety/index.html.

¹¹ <https://www.ghsa.org/sites/default/files/2018-02/pedestrians18.pdf>

¹² <https://www.cdc.gov/vitalsigns/motor-vehicle-safety/index.html>.

¹³ <https://www.saferjourneys.govt.nz/about-safer-journeys/the-safe-system-approach/>

Five Action Areas

A comprehensive policy to promote safety in the roadway transportation system that is consistent with the Safe Systems approach involves action in five key areas: safe roads, safe speeds, safe road use, safe vehicles, and effective post-crash care.¹⁴ The Safe Systems approach requires all participants in the roadway transportation system to do their part to improve safety in each of these areas. The Safe Systems approach creates a forgiving roadway transportation system because when human error occurs in one area (which the Safe Systems principles acknowledge is inevitable), safety measures in the other areas will compensate to ensure safety and mitigate the risk of injury. For instance, if a driver exceeds the speed limit, safe roadway designs, vehicle safety features, and effective post-crash care would still combine to lessen the likelihood of a crash, or mitigate potential injury or death in the event of a crash. Improving safety in each of the five actions areas can take many different forms, and implementation will vary according to the unique needs of a particular roadway system. Below is a sampling of policies, strategies, and technologies have been demonstrated to be particularly effective at improving safety within each action area.

Action Area 1: Safe Roads

Planners, engineers, and roadway designers must design and operate roads that reduce the likelihood of crashes and limit the potential for injuries or death when crashes do occur. A variety of mechanisms can be used to help achieve this goal, including:

- Separating different types of road users (i.e. bicyclists, pedestrians, and drivers) with designated pedestrian walkways and bikeways.
- Installing crash barriers and other physical measures to separate traffic moving in opposite directions or at different speeds. Importantly, these measures must be designed to give in the event of a crash, so that injuries are minimized.
- Using consistent signage, road markings, and lighting to give clear instructions to road users, so that they know what is expected of them.
- Incorporating rumble strips, wider shoulders, and safety barriers on roadways to better accommodate driver error.
- Replacing intersections with roundabouts, which reduce vehicle speeds and force all vehicles to move in the same direction, thereby lessening the severity of collisions.



Figure 1: Protected bike lanes and traffic circles are two examples of safer road design.

¹⁴ <http://www.pacts.org.uk/safe-system/>

Action Area 2: Safe Speeds

Speed is a leading cause of serious injuries and fatalities on the roadways. Managing speeds for safety is a core tenet of the Safe Systems approach. Well-proven strategies include:

- Establishing safe and appropriate speed limits that take into account road function and design, all types of road users (including bicyclists and pedestrians), land usage, and the physical tolerances of road users.
- Enforcing speed limits with traditional police enforcement, and new measures like automatic traffic enforcement (i.e. speed cameras), or through community enforcement in conjunction with local police.
- Designing roadways for safe speeds, which may include installing traffic calming measures to reduce vehicle speeds (e.g. speed bumps, median islands, and curb extensions) and narrowing lanes.
- Educating road users about speed limits and the potential dangers of speeding with clearer signage and public information campaigns.
- Installing speed limitation devices on fleet vehicles.



Figure 2: Median islands and curb extensions are two examples of traffic calming measures.

Action Area 3: Safe Road Use

Individual road users also play a critical role in roadway safety, and the Safe Systems approach suggests several strategies for promoting safer road use, such as:

- Reducing traffic on roadways by offering safe and viable alternatives like public transportation.
- Educating drivers about roadway risks and the dangers of driving while impaired, drowsy, distracted, speeding, or engaging in other unsafe behaviors.
- Utilizing technology to provide safety feedback to drivers and identify potential risks like driver drowsiness or impairment.
- Incorporating instruction about sharing the road with commercial vehicles (e.g. vehicle size, braking capabilities, stopping distance, and blind spots) into all new driver's education curricula.
- Mandating additional driver safety trainings and preventative measures like ignition interlocks for drivers who violate traffic laws or are found to practice unsafe driving.

- Coordinating with school officials to ensure safe walking routes for children, and sufficient crossing guards or safety patrols before and after school.¹⁵
- Ensuring frequent drivers (including professional drivers, commercial drivers, and fleet managers) and those driving large vehicles are well-trained, well-rested, fit for duty, and are provided with top-notch safety equipment.

Action Area 4: Safe Vehicles

The Safe Systems approach recognizes the importance of safe vehicles for both minimizing the occurrence of crashes and improving collision survivability. As with all components of the transportation system, responsibility for safe vehicles is shared by various stakeholders, including state and federal government, personal vehicle owners and corporate fleet managers. Strategies for improving vehicle safety include:

- Developing, improving, and implementing vehicle safety features like seatbelts, airbags, collision avoidance systems, automatic braking systems, and autonomous or semi-autonomous vehicles.
- Purchasing vehicles equipped with the best available safety features.
- Maintaining vehicles to ensure they meet the highest standards of roadworthiness and safety.
- Providing independent government oversight of the development, testing, and implementation of new safety technologies.
- Designing vehicles with advanced materials that mitigate injury when interacting with roadway users.

Action Area 5: Effective Post-Crash Care

The Safe Systems approach acknowledges human fallibility and therefore accepts that some collisions are inevitable. As a result, a final but equally important component of the Safe Systems approach is effective post-crash care. A variety of new technologies and policies can improve outcomes for road users involved in collisions, including:

- Equipping vehicles with automatic crash notification systems that can transmit critical information about the vehicle, occupants, and crash immediately, so that dispatchers can provide first responders with more detailed information prior to arriving on scene.
- Improving medical records management systems so that critical information can be seamlessly transmitted to pre-hospital care providers and health care providers at the hospital even if the patient is unresponsive.
- Automatically dispatching drones to crash scenes to provide first responders with a video feed of the accident scene to allow quicker and better scene assessment.¹⁶

Action Area 6: Strong Laws

While not directly a part of the safe systems approach for decades, we have known that strong laws and publicity of these laws reduce roadway fatalities and are an important strategy to reach zero. The United States experiences recurring fatalities in the following areas where more can be done to enforce existing laws:

¹⁵ <https://www.saferjourneys.govt.nz/about-safer-journeys/the-safe-system-approach/>

¹⁶ <https://www.nsc.org/Portals/0/Documents/DistractedDrivingDocuments/Driver-Tech/Road%20to%20Zero/The-Report.pdf?ver=2018-04-17-111652-263>

- Alcohol-impaired driving is responsible for about one-third of roadway fatalities in the U.S. and has been stubbornly stuck at this level for years. Please view the NSC policy on lowering the blood alcohol concentration for steps to create change [here](#).
- Speeding is responsible for about 30% of fatalities on roadways. [Here](#) is a link to the NSC policy position on speeding and [automated enforcement](#).
- About half of all roadway fatalities are unbelted. [Primary](#) enforcement seat belt [laws](#) save lives.

An Adaptable Framework

The action items proposed in this policy represent merely a sampling of the innovative and proactive strategies that can be pursued to increase safety within each of the five key action areas of the Safe Systems approach. Depending on the specific safety challenges and transportation needs of a given jurisdiction, specific policies might vary. However, all transportation policies must prioritize increasing safety in all five action areas in order to be consistent with the Safe Systems approach.

Proven Results

Countries that have implemented transportation policy based on the Safe Systems approach have seen significant improvements in roadway safety. For example, in the 1990s, Sweden routinely experienced well over 500 traffic fatalities a year, but since implementing Safe Systems policies, they have seen a significant decrease to just 253 fatalities in 2017.¹⁷ The Netherlands also adopted the Safe Systems approach, and studies by the SWOV Institute for Road Safety research “suggest a positive effect on the number of crashes and casualties in the Netherlands.”¹⁸

The Safe Systems approach has since realized much wider adoption, with numerous countries incorporating the tenets of the Safe Systems approach into their transportation policies and practices in recent years. The World Resources Institute analyzed traffic fatalities in 53 countries between 1994 and 2015 and found that countries that have adopted a Safe Systems approach had both the lowest rates of fatalities per 100,000 inhabitants and the fastest rate of change in traffic fatality levels.¹⁹ Both the World Health Organization and the Organization of Economic Cooperation and Development recommend that all countries implement the Safe Systems approach.²⁰

Conclusion

Aggressive action is needed to improve safety on American roadways, and the Safe Systems approach to roadway safety provides a blueprint for this action. By emphasizing a comprehensive approach to roadway safety in which all participants in the roadway system work actively to improve safety across five key action areas, the Safe Systems approach creates a forgiving roadway system that mitigates injury and death. Besides being theoretically sound, the Safe System approach has a record of proven effectiveness in other countries. As a result, the National Safety Council strongly supports the adoption of a Safe Systems approach to roadway

¹⁷ <https://www.trafa.se/en/road-traffic/road-traffic-injuries/GetMoreDownloadItems/?pageTake=2>

¹⁸ <https://www.swov.nl/sites/default/files/publicaties/rapport/r-2005-05.pdf>.

¹⁹ <https://www.wri.org/publication/sustainable-and-safe-vision-and-guidance-zero-road-deaths>

²⁰ <http://www.brake.org.uk/facts-resources/15-facts/1484-safe-systems-facts-page>.

transportation safety at all levels of government in order to achieve a vision of zero roadway fatalities.

This position statement reflects the opinions of the National Safety Council but not necessarily those of each member organization.

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