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| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **NCHRP 17-101 [Pending]**  **Applying the Safe System Approach to Transportation Planning, Design, and Operations in the United States**   |  |  | | --- | --- | | **Project Data** | | | **Funds:** | $450,000 | | **Contract Time:** | 24 months | | **Staff Responsibility:** | David M. Jared | |   **BACKGROUND**    “Safe System” has been defined in various ways by the transportation community. The Organization for Economic Co-operation and Development’s (OECD) defined it as “[t]he basic strategy…to ensure that, in the event of a crash, the impact energies remain below the threshold likely to produce either death or serious injury” (OECD International Transport Forum, 2008). This definition acknowledges that road users make mistakes. In the Safe Road Transport System Model, safe speeds represent the primary pathway towards a safer system, followed by safe vehicles, safe roads, and safe road users. The Institute of Transportation Engineers (ITE) explains the Safe System approach as differing from conventional safety practice by “being human-centered, i.e., seeking safety through a more aggressive use of vehicle or roadway design and operational changes rather than relying primarily on behavioral changes – and by fully integrating the needs of all users (pedestrians, bicyclists, older, younger, disabled, etc.) of the transportation system” (<https://www.ite.org/technical-resources/topics/safe-systems/>).    Literature shows that countries using the Safe System model have outpaced the United States in reducing traffic-related deaths. Some Safe System strategies are included in zero fatality efforts around the United States, such as multidisciplinary implementation to promote safer roads, vehicles, and road users and promote safety culture. Even with increased interest, little guidance exists for transportation planning, design, and operations; policy makers; public health practitioners; and law enforcement for implementing a Safe System. Decision-makers in the transportation community are faced with challenges to adoption and implementation of primary elements of Safe System, such as traditional design processes and legal constraints.    To be successful and adaptable to future changes, a Safe System approach must address not only infrastructure design but also such factors as vehicle design, policies and laws, recognition of shared safety responsibility, road user behavior, and public culture. For Safe System to be fully implemented, all of these factors need some degree of change. Research is needed to begin providing practical resources for transportation planners, designers, and operations managers to consult during problem identification, project development, and countermeasure selection.    **OBJECTIVES**    The objectives of this research are the following:    1. Identify tools, practices, policies, and prioritization methods that can be tailored for supporting implementation of Safe System at both institutional and project levels.    2. Evaluate current Safe System approaches in anticipation of technological advances such as connected and autonomous vehicles (CAV) and automated speed enforcement.    3. Identify and document Safe System (a) implementation gaps and challenges in the United States, (b) research needs, and (c) challenges and barriers and remedies thereto.    4. Develop practical, data-driven implementation guidelines for Safe System that (a) are scalable to transportation agencies of various sizes and maturities, and (b) consider various road contexts.      Accomplishment of the project objectives will require at least the following tasks.    **TASKS**    *Task descriptions are intended to provide a framework for conducting the research. The NCHRP is seeking the insights of proposers on how best to achieve the research objectives. Proposers are expected to describe research plans that can realistically be accomplished within the constraints of available funds and contract time. Proposals must present the proposers’ current thinking in sufficient detail to demonstrate their understanding of the issues and the soundness of their approach to meeting the research objectives.*    *Task 1*. Literature review and practitioner survey design.    *Task 1a*. Review literature. The review shall include Safe System and similar approaches and consider related research in progress and possible research gaps.    *Task 1b*: Design practitioner survey. The survey shall include early adopters of Safe System and related approaches as applied to planning, design, and operations. Survey participants shall also include agencies that have tried Safe System but have not yet adopted it.    Submit a technical memorandum summarizing the findings from Tasks 1a and 1b. Following NCHRP review, the memorandum shall be discussed via conference call. NCHRP approval of the memorandum is required before work may begin on Task 2.    *Task 2*. Conduct practitioner survey and develop guidelines outline.    *Task 2a*. Conduct practitioner survey. The survey shall initially be distributed electronically with follow up by phone as necessary. The survey shall be sent to all pertinent personnel within an agency, to include but not be limited to leadership, planning, design, and operations.    *Task 2b*. Develop annotated outline of guidelines. The outline shall include, at minimum, consideration of the following:   * Practicability of roadmap elements * Data-driven aspects * Scalability to transportation agencies of various sizes and maturities * Consideration of various road contexts * Barriers and challenges to the Safe System approach, including legal constraints, organizational issues, and perceived freight and economic impacts * Proposed solutions to the barriers and challenges identified * Integration of Safe System with other current and forthcoming policies * Project development processes and project-specific assessments * Knowledge gaps potentially necessitating research * Safe System training within organizations    Submit a technical memorandum summarizing the results of Task 2a for NCHRP review. NCHRP approval of the memorandum must be received before work on Task 2b is finalized.  *Task 3*. Submit Interim Report. The report shall summarize the findings from Tasks 1-2 and include the guidelines outline from Task 2b. Following NCHRP review, the report shall be discussed by the project panel, in-person if possible at the TRB offices in Washington, D.C. NCHRP approval of the guidelines outline is required before proceeding with Task 4.    *Task 4*. Present guidelines outline to practitioners. Obtain feedback on the guidelines outline from practitioners familiar with Safe System and similar approaches. Coordinate with the panel for identifying appropriate practitioners to participate. The practitioner feedback on the presentation may be obtained via web conference. Submit a technical memorandum summarizing the results of the presentation for NCHRP review. NCHRP approval of the memorandum is required before work may begin on Task 5.    *Task 5*. Complete proposed guidelines. The guidelines shall be separate from the conduct of research report, either as an appendix thereto or as a standalone document. The guidelines shall consider all aspects of the Safe System process and be modular enough for agencies to easily select and prioritize material most pertinent to them, e.g., policy, planning, design, and/or operations.    *Task 6*. Submit final report and project deliverables. Project deliverables shall include the guidelines, implementation memorandum, slide summary, and a conduct of research report documenting the entire research effort. The slide summary shall serve as an overview of the roadmap rather than the research effort and be geared toward promoting Safe System within agencies.      **STATUS:** Proposals have been received in response to the RFP. The panel will meet to select a contractor to perform the work.  To create a link to this page, use this URL: <http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=5088> |

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| Safe Systems in the U.S. – Finding a Path for Road Designers and Transportation Planners and Engineers | | |
| **Description:** | In 2001, the “Geometric Design Practices for European Roads” scan tour report indicated that the U.S. delegation found potentially transferable practices regarding public involvement in project planning; self-explaining, self-enforcing rural roads; design flexibility; area-wide traffic calming measures; intersection control through roundabouts; and integration of bicyclists and pedestrians. Many of these concepts have been shared across countries and the underlying philosophy is commonly called a “safe systems” approach.  “Safe Systems” has been defined in various ways in the transportation profession as a whole, even in the more focused transportation safety community. Sweden was one of the first adopters of a Safe Systems approach with its Vision Zero program. The Safe Road Transport System Model and the safe system definition were presented by the Organization for Economic Co-operation and Development’s (OECD) International Transport Forum in 2008 as: “The basic strategy of a Safe System approach is to ensure that in the event of a crash, the impact energies remain below the threshold likely to produce either death or serious injury.” This definition acknowledges road users make mistakes even though for the most part, they act rationally. In the model, safe speeds represent the primary pathway towards a safer system, and it further includes: 1) safe vehicles; 2) safe roads; and 3) safe road users. The SUN countries, Sweden, the United Kingdom and Norway, based their improvements in road safety at least in part on the Safe Road Transport System model and Australia attributes its successes to the safe system approach. These countries have outpaced the United States in driving down traffic related deaths and are arguably “safer” than the U.S. (Marshall, 2017.)  In the United States, The Road to Zero and Vision Zero national initiatives promote “Safe System” principles as the preferred path to reducing traffic fatalities in the United States. Towards Zero Deaths (TZD) includes some of the Safe System strategies through traditional and innovative approaches including multi-disciplinary implementation that includes safer roads, vehicles, road users as well as safety culture. The Vision Zero Network in particular has been aggressive about including safe system principles, most specifically speed reduction, in its work with the more than 30 local communities that have committed to Vision Zero since 2014. According to Vision Zero proponents, in spite of “increased interest, little guidance exists for local transportation planners, policy makers, public health practitioners, police and others working” to advance the U.S. Vision Zero and its safe systems approach (Fleisher, Wier, and Hunter, 2016.) The same may be said for guidance to the state and national engineering, design, and planning communities. Professionals in the road planning, design and engineering community are faced with legacy design processes and standards as well as legal constraints which prohibit rapid adoption of a more aggressive approach to implementing some of the hallmarks of Safe Systems. Many of the Safe Systems design and operational concepts require a shift in the culture and approach to roadway use and design including the increased consideration of all road users.  OECD stressed in the 2008 report that a Safe Systems approach is “the only way to achieve the vision of zero road fatalities and serious injuries and it requires that the road system be designed to expect and accommodate human error.” It continues that a Safe System approach is appropriate for countries at all levels of road safety performance, with specific interventions likely to differ from country to country. The tension to operationalize Safe Systems approaches for use in the project delivery processes for all projects, as well as safety countermeasure application specifically is heightened by the undisputed and alarming increasing in traffic related fatalities in the past several years. Indeed, after years of decreases the number of deaths has risen from 32,744 in 2014 to 37,461 in 2017 (NHTSA, 2018.)  Transportation safety is a complex issue and a true safe system approach must address many factors to be successful and must be adaptable in anticipation of future change (e.g. autonomous and connected vehicles). At a minimum these include the role of the road user in behaving properly, vehicle design, policy and laws, public and organizational and public cultures, etc. For Safe Systems to be fully implemented, all of these will have to change. This synthesis is proposed as a starting point to provide practical and effective information for the engineering, design, and planning communities to consult during project development and countermeasure selection processes. |  |
| **Objective:** | A discussion among transportation professionals in the United States revealed that there is no clear understanding of the “Safe Systems” approach. The purpose of this proposed research provide practitioners a clearer picture of what a “Safe Systems” approach would involve. This research is focused on providing data based support to the transportation engineering, design, and planning communities to ensure when road users make inevitable mistakes, they encounter “error tolerance” (Johansson, 2008) and as a result of their mistakes do not experience serious injury or death. The proposed research should also be forward thinking when evaluating current approaches in anticipation of technological advances. The scope includes the task to identify opportunities for the road design, planning, and engineering communities in the U.S. and abroad to accelerate implementation of appropriate safe system infrastructure and Human Factors interventions and countermeasures by identifying available tools and gaps in guidance.  To help agencies achieve the Road to Zero goal of zero deaths and serious injuries in the United States by 2050, agencies will need to modify their processes for completing roadway projects. This research supports the AASHTO Strategic Plan for the Committee on Safety Goal 1, Strategy 1.1, “Lead in the Implementation of Toward Zero Deaths: A National Strategy on Highway Safety. In an ideal world, any project concept would include elements related to context, evaluation of operations, safety, human factors, and public health as part of a safe transportation system. Each iteration of the project from planning through final design would depend on this multiple lens approach. The following questions will be investigated as related to a Safe Systems approach.   1. What is a Safe Systems approach in the context of developing a transportation project and how does it differ from the current project development process? 2. What kinds of plans and planning processes do the Safe Systems countries use? 3. How can the U.S. planning process more effectively implement a Safe Systems approach? 4. How would a Safe Systems approach look in the future with technological advances such as autonomous/connected vehicles, transportation-as-a-service, or micromobility? 5. What are the differences in various contexts (e.g. urban core, general urban, suburban, rural, etc.)? 6. What is the approach to design standards prevalent in countries that have adopted a Safe Systems approach such as Sweden and Norway and can they be mapped to current U.S. standards particularly in regard to speed management and other key Safe System components or is a new approach recommended? 7. What are the guidelines and policy constraints on roadway designers and operators in Sweden or other European counties and Australia? 8. What exists today in the way of tools that result in a Safe Systems approach in the U.S.? Consider major design guides, NACTO, new and alternate guidelines, context sensitive solutions, Human Factors, etc. 9. What gaps exist? 10. What tools are needed in the various processes including concept, planning, data, analysis, design, and construction? 11. How do the Human Factors, Safety Culture, and Public Health sectors fit in with the Safe Systems approach? 12. What public agency policies may need to be changed/modified? 13. What legal challenges exist in the U.S. that would have to be addressed prior to changing the approach? 14. What are the research needs associated with a transition? 15. What is the effect of a Safe Systems approach on freight transit and economic development? 16. What role does mass public transit play in a Safe Systems approach? |  |
| **Benefits:** | This research will result in a report that provides an overview of available U.S. and international guidelines to implement Safe Systems well as a description of how these can be currently utilized in the project development and delivery process at DOTs and other transportation agencies. As important, gaps for additional tools will be identified and future research suggested. |  |
| **Related Research:** | University of North Carolina (UNC) Highway Safety Research Center - Safe Systems Synthesis: An International Scan for Domestic Application (June 2018) conducted a literature and policy scan of international practices associated with Safe Systems. UNC also has an ongoing project – Defining Safe Systems: A Review of the state-of-the-Practice and Leadership Summit. This project will develop a single, working definition of the “safe systems” concept. A second activity is to host a safe systems summit. The proposed research will build off these earlier research efforts. |  |
| **Implementation:** | At a minimum, implementation of this study will require:   * State transportation departments will need broad recommendations on next steps including future research and data needs; * Outreach materials and widespread publication of results for transportation professionals; * Alternative pathway projections based on potential investment; * Reasonable time-based goals and performance measures for successful implementation (% of fatality reduction, % of infrastructure updated, etc) |  |
| **Sponsoring Committee:** | [**ACS10, Transportation Safety Management Systems**](https://rns.trb.org/search/search.aspx?f1=&ddlType=RNS&orgid=2817&orgType=A&txtOrgs=ACS10%2c+Transportation+Safety+Management+Systems&sc=xx%3A%3AAll+Categories) |  |
| **Research Period:** | 12 - 24 months |  |
| **Research Priority:** | High |  |
| **RNS Developer:** | Dan Magri, Chad Winchester, Marie Walsh, Adriane McRae, Jessica DeVille |  |
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