AKD20 Research Priorities

1. Using simulation to understand the role vehicle type plays in barrier compatibility to inform future MASH protocols (23/38 votes) 2 years, $300,000

   Recent tests of electric vehicles have indicated that factors other than mass and Center-of-gravity height can contribute to barrier compatibility. In addition, the vehicle fleet in the US have shifted from sedans to compact utility vehicles (CUVs). The purpose of this study is to understand the effects of vehicle class on the performance of existing barriers. This project may include simulations of small cars, large sedans, crossovers, CUVs, SUVs, or pickups. The results of this project will provide an understanding which geometry features are important for barrier performance and provide recommendations to ensure the robustness of MASH tests.

2. ISPE investigation of guardrail beams on a horizontal curve (20/38 votes) 3 years, $700,000

   Guardrails that are curved to align with the road's horizontal curvature may have different impact conditions than guardrails installed along straight roads. In particular, the impact angles on roads with a curve to the left may be increased. This study aims to use ISPE methods to investigate crashes with barriers installed on curves. Key aspects of this research will focus on barrier ruptures, vehicle penetration, and vehicle rollover. In addition, this work will use these assessments to recommend action for barriers on curves.

3. Investigate the effect vehicle active safety technologies have on roadside barrier impact conditions and identify avenues for improved vehicle technologies for roadway departure crashes (18/38 votes) 2 years, $300,000

   Based on recent data from IIHS/HLDI, lane departure warning (LDW) or lane keeping assist (LKA) are equipped on over 25% of the current vehicle fleet. LDW systems alert the driver of a lane departure event and LKA systems accompany the alert with an automated steering maneuver back toward the roadway. The Partnership for Analytics Research in Traffic Safety (PARTS) study estimated that these systems reduced the number of single vehicle road departure crashes by 8%. Aside from preventing crashes, these systems, the activation of these systems could lead to lower impact angles with longitudinal barriers. The purpose of this study is to quantify any differences in impact conditions among vehicles with LDW/LKA and identify roadside features that could further improve the effectiveness of active safety technologies.

4. Guidelines on the use of flexible barriers in the centerline on roads with narrow widths (18/38 votes) 3 years, $700,000

   This topic came out of the head-on workshop and is inspired by some of the installations in Australia and Sweden. Data from these countries have shown a significant reduction of head-on crashes. This project would involve understanding the current practice for the installation of centerline barriers in other countries. This research would produce a

guideline to states on the effectiveness of centerline barriers and how to prioritize installation locations. This project could also include a test to demonstrate the efficacy of centerline barriers on US roads.

5. Compare the MASH large truck requirements to the current fleet (CG height, geometry, etc) (17/38 votes) 2 years, $300,000

   The vehicle fleet is ever changing in terms of new vehicle geometrics. Contemporary research has focused on updating MASH requirements for passenger vehicles, but little focus has been given to larger commercial vehicles. The SUT and tractor-trailer requirements have not been reviewed in detail since the publishing of MASH. Recent research has shown some of the MASH requirements may not currently reflect the current vehicle fleet. Specifically, in recent TL-6 barriers, it was not possibly to perfectly match the center-of-gravity height of the tanker truck. Therefore, a research project is needed to review the MASH requirements for large commercial vehicles. This includes, but is not limited to, weight, center-of-gravity, ballasting requirements, and geometrics.

6. Risk analysis of objects placed within the Working Width of barrier systems (17/38 votes) 2 years, $500,000

   There are many instances where competing requirements and limited space available on the roadside necessitate the placement of crashworthy and non-crashworthy objects within the as-tested working width of longitudinal roadside barrier. Objects commonly placed within the working width include sign supports, luminaire and traffic signal poles and electrical hardware such as controller cabinets. Limited full-scale testing has been conducted and decisions on placement of such objects within the working width is often left to the judgement of the designer or is simply made at the field level. This research project proposes to develop guidelines for road design practitioners on evaluating the relative risk of placement of objects within the working width of longitudinal barriers, building on the research of Burbidge and Troutbeck in their 2014 paper Development of a Flexible Design Approach for the Deflection Zone Behind Road Safety Barriers presented at the TRB Annual Meeting in 2014. Research may consist of the following: (1) Literature review and DOT summary of current practice, (2) Establishment of critical cases of objects placed within working widths of rigid, semi-rigid and flexible barriers, (3) Finite element simulation of selected critical cases to determine associated outcomes and risks, and (4) Synthesis of findings into recommendations for designers on placement of objects within working width with respect to object type (i.e. crashworthy vs non-crashworthy, size, mass, etc.) and associated recommended offsets by barrier type, design speed, traffic volume and other roadway aspects.

Full list of research ideas (in no particular order)
AKD20 voted for top seven ideas.

- Using simulation to understand the role vehicle type plays in barrier compatibility to inform future MASH protocols
- Developing a method for monitoring effect of roadside traffic calming measures and speed management technologies
- Optimizing traffic signal timing for reducing speed to protect pedestrians and lower speeds
- Investigation of support structures (signs and poles) installed on slopes or behind curbs/sidewalks
- Using traffic cameras to monitor intersections and use near-crashes (vehicles or pedestrians) to identify emerging issues before a serious crash occurs
- Investigate the effect vehicle active safety technologies have on roadside barrier impact conditions and identify avenues for improved vehicle technologies for roadway departure crashes
- Identify and develop methods for estimating the volume of pedestrian and cyclists on roadways
- Investigate methods for accurately measuring and monitoring motorcycle and powered-two-wheeler traffic volume
- ISPE to quantify difference in longitudinal barrier penetration by test level and vehicle type
- Applicability of the available roadside countermeasures for the ADAS/ADS vehicles
- Safety Effectiveness of Barrier Striping/Linear Delineation
- Process Improvements (training or certification) to Barrier Design and Installations
- Compare the MASH large truck requirements to the current fleet (CG height, geometry, etc)
- Risk analysis of objects placed within the Working Width of barrier systems
- Evaluation of trade-offs of clear zones versus continuous barrier specifically including the risk of rollover
- Management of Roadside Design Information for improved inventory management and ISPE
- Development of a standard practice for Improved Communication of Roadside Design Issues with stakeholders
- Guidelines for Incorporating Emergency Response Needs in Roadside Design
- Resilience of roller barrier compared to traditional w-beam guardrail and cable barrier
- ISPE of Guardrail beams on a horizontal curve
- Rumble Strips for narrow roads
- Design guidelines for safe stormwater treatment in the roadside clear zone
- ISPE on the performance of luminaire poles
- Guidelines on the use of flexible barriers in the centerline on roads with narrow widths
- Guidelines of using narrow median barriers on currently undivided roadways