

SUPPLEMENT TO TRAFFIC SAFETY SYSTEMS MANUAL:

Traffic Safety Systems Designs and National Traffic Safety System Crash Testing Guidelines

Choosing not to upgrade to the Manual for Assessing Safety Hardware (MASH) safety standards for safety systems and hardware, such as barriers, guardrails, or crash cushions, can be a significant decision. Justification to upgrade or not will typically depend on technical, financial, or contextual factors.

The followings are some key factors to consider and use for documentation when using engineering judgement to not upgrade to MASH approved safety hardware:

1. Compatibility with Existing Infrastructure

- Existing Standards Compliance: The current devices may already meet prior safety standards (e.g., NCHRP 350) and have proven effective over time. Upgrading to MASH may require redesigning other infrastructure elements, creating compatibility issues.
- Operational Effectiveness: If the existing hardware continues to perform reliably in reducing crash severity and protecting road users, an upgrade may not yield significant improvements.

Generally, collision analysis would be used to justify not upgrading under this condition.

Cost Constraints

- Budget Limitations: Upgrading safety hardware is a resource-intensive process, including costs for replacement, installation, and possible redesign. If budgets are constrained, resources may be prioritized for higher-impact projects.
- The types of constraints factors that may lead to a cost increase that cannot be covered within the scope of the project or why the changed elements are not within scope should be documented by the engineer.

Lifecycle Considerations: If existing devices are still within their functional lifespan, immediate replacement might not be economically justifiable. A phased replacement approach can optimize resource allocation. This will generally apply to NCHRP 350 crash test standard approved devices. NCHRP

230 crash test standard devices and prior are not included for this analysis and justification.

Many NCHRP 350 systems have been installed throughout the SHS. These systems are still highly functional for many collisions. For systems that are in low impact potential locations, have not experienced any collisions, have not been maintained or repaired, and are configured with original design and construction may not require upgrade to MASH. These factors should be considered and documented within an exception to justify not upgrading to MASH compliant systems.

2. Low-Risk Context

- Traffic Patterns: In low-traffic or low-speed areas where crash risk is minimal, the incremental safety benefit of upgrading to MASH may be marginal.

This exception can generally be used after assessing traffic volume data and crash history as noted below.

- Crash History: If historical crash data indicates that current safety measures are adequate for the location, an upgrade may not be necessary.

An exception under this section can be used after analyzing Traffic Collision Reports for damage to impact vehicles and analysis of injury levels of vehicular occupants. If systems, primarily NCHRP 350 approved systems, are functioning as designed and collision analysis shows little or no risk to impacting vehicles over a period of documented impacts this may be used as documentation for an exception.

A review of IMMS records for Maintenance can also be used to evaluate performance of a system and damage to systems along with repair costs and time to repair. Systems that experience significant damage, are time consuming to repair or increase exposure time of Maintenance crews should be considered for upgrade to a MASH system. Furthermore, systems that are performing well, and are preferred by Maintenance crews to repair and replace may be a candidate for an exception.

The factors as listed above should be documented within the exception to justify not upgrading to a MASH compliant system.

3. Implementation Challenges

- Installation Constraints: Retrofitting new hardware to fit existing road configurations might require significant modifications, posing logistical challenges.

Regulatory and Policy Flexibility

- Exceptions and Variances: Some regulatory frameworks allow for exceptions in certain conditions, such as rural roads or legacy projects.

Projects that are working in historical areas, environmentally sensitive areas or areas where connecting new safety hardware to older historical features may not be practical may justify an exception.

Documentation to not upgrade these types of systems should be obtained from the appropriate authority that states upgrading will not be feasible or allowed. The Coastal Commission and not approving upgrades is one example.

Documentation of such should be obtained and included within any exception under this category from the authority not approving the upgrade.

Evaluation and Testing Needs

- Custom Solutions: If unique conditions exist (e.g., extreme climates or specific site constraints), the engineer may focus on custom solutions rather than adopting generalized standards. The engineering documentation for the custom design should be included in an exception.

Prioritization of Other Safety Improvements

- Holistic Safety Strategy: Resources might be redirected toward other safety initiatives, such as improved signage, lighting, or road design, which could provide a greater overall benefit.

Engineering judgement should be well documented in these cases. Justification can generally use collision data and analysis, Department goals or challenge area priorities and need to meet a safe system approach within a corridor that does not require upgrades to safety systems or hardware to meet that goal.

While delaying or forgoing an upgrade to MASH can be justified, such decisions should be supported by rigorous safety, financial, and operational assessments to ensure continued protection of road users and compliance with overarching safety goals.

This is simply a guide and there may be many other reasons to use for justification to not upgrade to MASH compliant safety hardware. All considerations, when using engineering judgement, should be documented in writing through the approved exception process.