Struck-By Sentinel

Executive Summary

Moving Beyond the Tally to Quantify Roadway Occupational Risk

Prepared For:	State Departments of Transportation, Highway Safety Coalitions & National Transportation Safety Stakeholders
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Executive Summary

The Struck-By Sentinel (SBS) is a specialized analytics framework designed to quantify the occupational risks and economic impacts of struck-by incidents involving roadway responders, towing and recovery operators, Safety Service Patrol personnel, DOT crews, public works employees, and authorized roadway contractors.

Moving beyond simple incident tallies, SBS provides state Departments of Transportation and safety coalitions with data-driven evidence to support funding decisions, justify safety countermeasures, and strengthen national Post-Crash Care within the Safe System Approach.

> **Core Positioning:** SBS is intended to function as a secure analytics overlay, not a replacement for existing crash reporting platforms. Its value is in verifying, categorizing, and economically modeling a specialized occupational risk that is often hidden inside broader traffic crash data.

The Problem: Fragmented Data and Rising Risk

- Critical Tipping Point: Responder and roadway worker struck-by incidents continue to expose the limits of traditional crash data, while public compliance with Move Over laws remains a persistent operational concern.
- The Micro-Silo Effect: Current reporting often scatters a single incident across HR, Fleet Maintenance, Risk Management, Operations, and insurance systems, obscuring the total compounded loss.
- Underreporting: Voluntary registries and public-source tracking are valuable early-warning tools, but they cannot alone provide the comprehensive, verifiable record needed for policy-grade analysis and legislative change.

The Solution: A Specialized Analytics Overlay

SBS applies a strict occupational right-of-way boundary. The framework focuses on personnel and operational assets actively performing official duties within the physical roadway, shoulder, or designated work zone environment.

This targeted boundary prevents specialized responder and roadway worker incidents from being diluted by general civilian traffic collisions, while allowing agencies to see the financial and operational burden that is otherwise buried in disconnected systems.

Economic Impact Modeling

SBS uses a unified economic impact framework to organize the true cost of struck-by incidents across direct, indirect, and societal cost categories.

Cost Category	Representative Impacts
Direct Costs	Asset replacement, medical care, scene remediation, recovery operations, and immediate overtime/backfill.
Indirect Costs	Long-term disability, behavioral health support, insurance premium impacts, procurement delays, and loss of institutional knowledge.
Societal Costs	Road user delay, freight disruption, secondary crashes, extended closures, municipal support burden, and LODD logistics.

Quantitative Validation: A January 2026 analysis of 104 U.S. struck-by incidents generated an estimated $248 million in combined economic impact. That figure illustrates why this issue must be treated as an economic, operational, and national safety priority - not only as an awareness campaign.

Technical Architecture

The SBS architecture is designed for audit-grade defensibility, data integrity, and controlled disclosure. The public-facing explanation should provide enough technical confidence for stakeholders without exposing proprietary computational methods or implementation details.

Architecture Element	Why It Matters
Tri-Tier Schema	Separates retrieved, extracted, and estimated data so outputs remain defensible and transparent.
Human-in-the-Loop Review	Requires domain expert verification before a record is finalized for policy-grade analysis.
Deterministic Cost Logic	Uses transparent arithmetic and maintained reference tables rather than opaque early-stage predictive modeling.

Privacy & Governance	Supports a federated, Zero-PII approach that protects agencies, responders, and participating partners.

Strategic Outcome: Return on Safety Investment

By translating roadway occupational struck-by incidents into defensible fiscal data, SBS helps prove the Return on Safety Investment (ROSI) for proactive safety measures. Digital alerting, blocker vehicles, queue warning systems, Safety Service Patrol expansion, enhanced TIM training, and responder protection technologies can be evaluated against the much higher financial liability of preventable struck-by incidents.

This allows agencies and policymakers to shift from reactive justification after a tragedy to proactive investment before the next responder, worker, or motorist is harmed.

Recommended Stakeholder Message

> The Struck-By Sentinel gives transportation agencies a structured, human-verified way to move beyond anecdotal struck-by reporting and toward economically defensible risk intelligence. By combining domain expertise, confidence-labeled data, privacy-conscious governance, and validated cost categories, SBS supports stronger decisions to protect the people working on and responding to our roadways.

Technical Guidance and Data Architecture Support

The Struck-By Sentinel concept has been developed with technical guidance and data architecture support from Kelly Ortega, CEO of Suave Droning. Her contributions have helped shape the system approach to structured data intake, schema discipline, verification workflows, auditability, and future-ready analytics design.

This executive summary intentionally presents SBS at a high level. Detailed computational methods, technical scripts, implementation workflows, and proprietary modeling logic are maintained internally to protect system integrity and future platform development.