U.S. DOT's Small Business Innovation Research (SBIR) Program

SBIR Fiscal Year 2025 Phase II Awards

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Red Equation Corporation DBA:OpenBrIM Platform (Commack, NY)

OpenBrIM OmniInfra: A Field-Ready, Multi-Format-to-IFC Open-Standards Platform for Highway Construction

PI Name: Cagan Yakar **PI Email:** cyakar@openbrim.org

Abstract: OpenBrIM OmniInfra is a field-ready, multi-format-to-IFC open-standards platform for U.S. highway construction. Phase I delivered OmniDataView, a working proof-of-concept that loads, validates, and queries production IFC 4.3 models from FHWA ADCMS-funded pilot projects, generates 3D saved views with annotations, performs construction segmentation and quantity take-off directly from IFC geometry, and exposes data through an AI agent grounded in model content.

Phase II converts that prototype into a production-deployable platform reorganized into four role-specific products on a shared open core: OmniInfra Hub (open-standards CDE for owners and DOTs), OmniInfra Bid (model-based bidding with free bidder access), OmniInfra Field (offline-first, cross-platform field app), and an optional OmniInfra Agent AI layer that can be disabled where agency policy requires. The 24-month effort delivers a validated, agency-deployable platform with an open-source viewer core to prevent proprietary lock-in.

Company Website: https://openbrim.org

TGIAS, LLC (Beckley, WV)

Lightweight IFC Model Browser for Efficient Rendering: A Mobile-Optimized Viewer for Infrastructure Construction

PI Name: Bethel Quick **PI Email:** bethel.quick@tgias.com

Abstract: State DOTs are investing in Building Information Modeling (BIM) for highway and bridge construction, but field personnel lack practical tools to view IFC models on job sites. Existing solutions are too complex, too expensive, or incompatible with the open IFC standard for practical use.

Phase II will develop a production-ready, offline-capable IFC viewer purpose-built for transportation infrastructure. The effort will complete geometric coverage of the IFC specification, add measurement, annotation, and markup tools for field use, and conduct pilot deployments with state DOT partners on active construction projects.

Phase I established the technical foundation: 49% of the IFC geometric specification implemented (95 of 195 element types); six-platform delivery from a single codebase (iOS, Android, Windows, macOS, Linux, and web); 60+ frames per second on current tablets; scalability to 253,000 components; and 0.1% measurement accuracy. All Phase I milestones were completed on schedule and within budget.

Phase II will deliver a fully IFC-compliant viewer deployable across five platforms, validated by state DOT pilot partners, and positioned for commercial availability in 2027. The result will give construction field crews field access to infrastructure models on their own hardware.

Company Website: www.tgias.com

Insight Rail, LLC (Columbia, SC)

RNT-Interceptor™: A Mobile, Non-Contact System for RNT and Rail Stress Measurements

PI Name: Brennan Gedney **PI Email:** bgedney@insight-rail.com

Abstract: Continuous Welded Rail track, despite the significant advantages, is prone to buckling and rail breaks due to the inability to expand and contract freely to temperature changes, compromising, thus, the integrity and safety of the track. Currently, there is no robust way to measure or monitor the rail longitudinal stress or the stress-free temperature (RNT) without disturbing the railroad track. The proposed RNT Interceptor(TM) is a mobile system for RNT and rail stress measurements that is free of the shortcomings of existing and competing techniques. It uses 3D imaging technology for rail shape measurements along with a patented technology that correlates the shape changes and deformations of the rail during temperature changes to the RNT and the longitudinal rail stress. The RNT Interceptor(TM) is the only technology that determines the RNT and stress of the rail in a single acquisition without disturbing the track structure. It does not require a known zero-reference, it operates regardless of the track type, track alignment, the state of stress (tension/compression) in the rail and the ambient temperature at testing. It acquires measurements in less than 15 minutes per location, in a spot checking, or “stop & go” mode by a two-member nominally trained crew.

Company Website: https://insight-rail.com/

Emprise Concepts, LLC (Evergreen, CO)

Geohazard Susceptibility and Risk Forecasting Tool for Railroads

PI Name: Noah Kimmes **PI Email:** noahk@empriseconcepts.com

Abstract: Geohazards, including landslides, debris flows, rockfall, and avalanches, cost the Federal Railroad Administration $1.0M–$1.2M per event in direct costs alone. Existing monitoring tools remain site-specific, sensor-dependent, and proprietary. Phase I of USDOT SBIR Topic 25-FR3 developed the Geohazard Susceptibility Assessment Tool (GSAT) and proved feasibility of the Geohazard Risk Forecasting Tool (GRFT). Together, these tools form a physics-based software framework that operates on exclusively free public data sources and railroad operator owned data. The framework produces quantitative risk outputs for discrete (e.g., 50-meter-long) track segments across an entire railroad corridor. Deployed across the 656-mile Alaska Railroad Corporation (ARRC) corridor during Phase I, GSAT achieved a Total Expected Economic Loss (EEL) ROC AUC of 0.859 with the top 5% of ranked alignment capturing 43.8% of historical slide zones. Phase I established the project's steering finding: short-term, large magnitude precipitation events amplify EEL by 12.7x (landslide) to 14.4x (rockfall) over everyday operating (“dry”) conditions. Phase II will operationalize these findings as a corridor-portable, forecast-driven monitoring and early-warning service, validated through a 12-month live pilot deployment on the Alaska Railroad and prepared for transition to commercial use by railroads, transportation agencies, pipeline operators, and other owners of linear infrastructure.

Company Website: https://www.empriseconcepts.com/

Flexlynqs, LLC (Fremont, CA)

FleetLynq: AI-driven Decision Support Solution for Transit Fleet

PI Name: Santosh Mishra **PI Email:** santosh.mishra@flexlynqs.com

Abstract: Transit agencies connect millions of Americans daily to essential services, yet fleet reliability remains a persistent challenge. Aging fleets, low spare ratios, and shortages of skilled technicians compound recurring mechanical failures, driving high downtime costs and cascading service disruptions. Vehicle Health Monitoring (VHM) solutions deployed over the past two decades often suffer from false positives and limited agency configurability. Recent Predictive Maintenance (PdM) products are promising but depend on continuous connectivity, rely on models transferred from heavy-duty trucking, and provide limited transparency into transit-specific failure patterns. FleetLynq addresses these gaps as an AI-driven decision support platform built on an edge-first, transit-trained architecture. Phase I established the scientific and engineering feasibility of the three-tier FleetLynq architecture and delivered a working laboratory prototype. Phase I advanced the technology to TRL 5 and produced the requirements, design, and synthetic-data foundation required for field deployment.

Phase II will harden the Phase I prototype to deployment readiness, validate predictive performance across a mini-fleet of revenue-service vehicles at partner transit agencies over a six-month valuation window, and produce the field evidence required for Phase III commercialization. Phase II will advance FleetLynq from TRL 5 toward TRL 8.

Company Website: https://www.flexlynqs.com

New Math Data PubSec, LLC (Houston, TX)

VALAR: An AI-driven Approach to Transforming Crash Reporting for Law Enforcement Agencies

PI Name: Bernard Hatch **PI Email:** thatch@newmathdata.com

Abstract: Crash reports are foundational to roadway safety analysis, yet records are routinely incomplete, inconsistent, and slow to produce. Adoption of the Model Minimum Uniform Crash Criteria (MMUCC) varies across jurisdictions, weakening downstream datasets. Phase II advances VALAR (Verifiable AI Lens for Accurate Reporting) from a Phase I proof of concept to a pilot-ready, MMUCC-aligned crash reporting platform. Five objectives organize the work: harden the platform for multitenant operation with field-level provenance; measure AI extraction performance across collection methods; formalize reconciliation and supervisory review with auditable officer identification; validate the state-agency export pathway end-to-end; and generate operational evidence from a 90-day, two-agency pilot. A 24-month program builds the platform, recruits and onboards two police agencies, runs the operational pilot with baseline, midpoint, and endpoint measurements, and delivers a defensibility review and a Phase III transition package. Anticipated results include stratified AI performance metrics, operational effect sizes against agency baselines, and a defensibility review tied to provenance. Applications include state and local law enforcement, state Departments of Transportation, and federal safety analytics.

Company Website: https://www.newmathdata.com