

## List of Indiana Department of Transportation (INDOT) FY 2023 Research Needs (as of November 2, 2022)

Instructions: This listing is for use by Faculty from accredited Indiana Universities. For additional information or to express an interest in a Research Need listed, please contact the JTRP Program Director at [snoueldin@indot.in.gov](mailto:snoueldin@indot.in.gov). If expressing an interest in a Research need, attach your CV/resume to your email response.

#	Status	SPR	Focus Group	RNS Title
1	Awarded	4253	Pavements, Materials, Geotechnical and Construction, <b>PMGC</b>	3Dimensional Laser Pavement Condition Survey Maintenance (Expansion)
2	Awarded	4329		Verification of MSE Wall Foundation Bearing Capacity Based on CPT and DCPT (Expansion/extension)
3	Awarded	4350	<b>TRB</b>	Expansion to SPR-4350 TRB Funding Proposal
4	Awarded	4442	Traffic Engineering, Safety, Management & Operations, <b>TESMO</b>	Highway Lighting Test Bed on INDOT Facility (Off-Roadway)
5	Awarded	4445	Structural, Hydraulics and Environmental, <b>SHE</b>	Long Term Project and Network Level NDT Implementation Plan for Indiana (Expansion)
6	Awarded	4514	<b>PMGC</b>	Material Characterization and Determination of MEPDG Input Parameters for Indiana Superpave 5 Asphalt Mixtures (Expansion)
7	Awarded	4549	Maintenance Operations, <b>MOP</b>	Salt Monitoring and Reporting Technology (SMART): Development of a Photogrammetric System for Salt Inventory Reporting" - Expansion
8	Proposal Pending	4651	Safety, <b>S</b>	Expansion Synthesis Study on Employing Snow Plow Driving Simulators in Training, to include implementation
9	Awarded	4701	<b>MOP</b>	Implementation of Heavy Fleet Routes and Facilities Locations Optimization
10	Awarded	4702		Autonomous Mower Pilot Project
11	Approval Pending	4703	<b>MOP</b>	Evaluating Current INDOT Experiences and Brine Making and Storage Practices
12	Awarded	4704	<b>MOP</b>	Evaluating Robustness of MDSS Forecast and Compliance with Recommendations
13	Awarded	4706	Planning, Multimodal, Finance, Asset Management and Economic Impact, <b>PMFAME</b>	Electric vehicles: public perceptions, expectations, and willingness-to-pay across highway user groups (vehicle classes)

14	Approval Pending	4710	PMFAME	INDOT Project Change Orders – Root Causes and Recommendations
15	Awarded	4711	PMFAME	Addressing Accessibility, Equity and Environmental Justice Measures of Infrastructure facilities in Indiana
16	Awarded	4713	PMGC	Development of guidelines for compatible sensor installation, data collection, and database-based visualization to INDOT
17	Awarded	4714	PMGC	Use of Machine Learning Methods to Obtain a Reliable Predictive Model for Resilient Modulus of Subgrade Soil
18	Awarded	4715	PMGC	Study on the permissible depth of utilities under the MSE walls and means and methods of protecting the MSE walls when the permissible depth cannot be provided
19	Approval Pending	4716	PMGC	LESSENING DENSITY REQUIREMENT AND ADJUSTING DENSITY PAY FACTORS FOR ASPHALT PAVEMENTS IN POOR SUBLAYER CONDITIONS
20	Proposal Pending	4717	PMGC	Assessment of Temperature Correction Factors for Falling Weight Deflectometer Deflections
21	Proposal Pending	4718	PMGC	Influence of Nanomaterials-based Admixtures on the Entrained Air Void System and Freeze-Thaw (FT) Resistance of Concrete;
22	Awarded	4720	PMGC	Autonomous Construction Progress Monitoring and Documentation
23	Awarded	4723	PMGC	Investigate resilient modulus improvements to bases and subgrades from geosynthetic reinforcement
24	Awarded	4724	PMGC	Detection and Assessment of Sulfates in the Pavement Subgrade
25	Awarded	4727	PMGC	Practical Implementation of Superabsorbent Polymers for Internally Cured Concrete
26	Approval Pending	4728	PMGC	Stone Mastic Asphalt (SMA) Overlay Performance Evaluation
27	Awarded	4729	SHE	Evaluation of the Accuracy of Non-Destructive Testing (NDT) Methods for the Condition Assessment of Bridge Decks
28	Awarded	4730	SHE	Widening reinforced concrete elements using chemical anchoring systems
29	Awarded	4731	SHE	Feasibility of 3D Scanning Technology for Bridge Inspection and Management
30	Awarded	4732	SHE	Development of Guidelines for Use and Design of Deep Foundations for Three-Sided Structures
31	Awarded	4733	SHE	Steel Bridge Inspection, Assessment, Repair, and Management under FIRE.
32	Approval Pending	4734	SHE	Expediting and Enhancing the Hydraulic Site Data Collection Process
33	Awarded	4735	TESMO	Development of Latitude/Longitude (and Route/Milepost) Model for Positioning Traffic Management Cameras
34	Awarded	4736		A Study of Suburban Arterial Safety Performance Based on Median Type
35	Awarded	4737		Development of Business Processes to Prioritize Traffic Signal Re-Timing and Assess Impact of Re-Timing Activities

36	Awarded	4738	TESMO	Origin-Destination Counts in Weaving Area Utilizing Existing Field Data
37	Awarded	4739		Sinusoidal Rumble Strips Measures of Effectiveness
38	Awarded	4741		Leveraging LiDAR Intensity to Evaluate Roadway Pavement Marking Retro-Reflectivity
39	Approval Pending	4742	TESMO	Development of a Web Portal for the Management, Visualization, and Analysis of Collected Mobile LiDAR Data along Indiana's Transportation Corridors
40	Awarded	4743	TESMO	Traffic Management Geocast Study with Connected Cars on Indiana Highways
41	Approval Pending	4744	TESMO	Investigate Safety Performance of Non-Signalized Traffic Control Strategies
42	Under Consideration	Tier 2	PMFAME	INDOT Road Infrastructure Readiness to Accommodate Connected and Automated Vehicles: Identification of Needs, and Evaluation of Opportunities, and Challenges (was 4707)
43	Under Consideration	Tier 2		Improvements to Indiana's multimodal freight transportation infrastructure and operational policies to mitigate peri-pandemic logistics challenges (was 4712)
44	Under Consideration	Tier 2	PMGC	Development of Design Guidelines for Open-Ended Pipe Piles (was 4719)
45	Under Consideration	Tier 2		Assessment of Costs Associated with Utility Coordination and Relocation (was 4721)
46	Under Consideration	Tier 2		AI NLP for a central, always up-to-date digital construction inspection program (was 4725)
47	Under Consideration	Tier 2		Asphalt Mixture Performance Tests: Establishing Links between Laboratory Testing and Field Performance (was 4726)
48	Under Consideration	Tier 2		Performance Based Mixture Design Parameters for Superpave 5 Asphalt Mixtures
49	Under Consideration	Tier 2		Investigate Existing Foundations Geotechnical Design Parameters and Compare These to Strengths, Based on Current LRFD codes
50	Under Consideration	Tier 3	MOP	UAS and Mobile LiDAR for Landslide Monitoring
51	Under Consideration	Tier 3		Generation of 3D Road Maps
52	Under Consideration	Tier 3		Pavement Roughness and Pothole Assessment from Connected Vehicle Data
53	Under Consideration	Tier 3	PMGC	AI enabled automatic structural health monitoring system using multi-functional flexible sensors (was 4722)
54	Under Consideration	Tier 3		Review of Overweight Truck Routes to the Pavement Structural Performance
55	Under Consideration	Tier 3		Intelligent Compaction as Proofrolling Feasibility Study
56	Under Consideration	Tier 3		EFFECTS OF ASPHALT EMULSIONS ON ASPHALT WATER-STRIPPING
57	Under Consideration	Tier 3		Performance Based Mixture Design Parameters for Superpave 5 Asphalt Mixtures

58	Under Consideration	Tier 3	SHE	Active Sensor-enabled Structural Health Monitoring Systems for INDOT Bridges: A Synthesis Study and Cost-Benefit Analysis
59	Under Consideration	Tier 3		Assessing economic, environmental and structural performance of Indiana bridge restoration with carbon fiber-reinforced polymer
60	Under Consideration	Tier 3		Long-Term Durability of Externally Bonded FRP Reinforcement Exposed to Harsh Environmental Conditions
61		Tier 3		Automatic detection of low-head dams in Indiana using publicly available geospatial data
62	Under Consideration	Tier 3		Accelerated corrosion and rapid assessment of reinforced concrete bridge decks
63	Under Consideration	Tier 3		Structural Health Monitoring of Prestressed Girders Approaching Service Life.
64	Under Consideration	Tier 3		Developing Advanced AI Tools for Bridge Management Data Analysis
65	Under Consideration	Tier 3		Potential use of the existing BrR models and AASHTOWare 7.2 IFC functionality for the development of INDOT digital twins.
66	Under Consideration	Tier 3		Artificial Intelligence for Network-level Data Organization and Analysis
67	Under Consideration	Tier 3		TESMO
68	Under Consideration	Tier 3	To implement a dashboard to track congestion costs due to INDOT work zones to increase travel time reliability, work zone TMP performance, and stakeholder collaboration	
69	Under Consideration	Tier 3	Safety Analysis of Major Diverge and Branch Connection Junctions at System Interchanges	
70	Under Consideration	Tier 3	Evaluating the Effectiveness of Traffic Citations in Reducing Crashes on Indiana Interstates	
71	Under Consideration	Tier 3	INDOT as an Advisory Board Member of the NSF-Sponsored Industry-University Collaborative Research Center (IUCRC) Focusing on Geospatial Technologies	
72	Under Consideration	Tier 3	UAS Topographic Mapping for Project Scoping and Preliminary Engineering	
73	Under Consideration	Tier 3	Sustainable E-mobility Transportation Feasibility Study for Integrated Solar Roads with Wireless Charging and Applicability of Vortex Bladeless.	
74	Under Consideration	Tier 3	Agile Workzone Geometric Analysis and Dynamic Layout	
75	Under Consideration	Tier 3	Improving Mobile Work Zone Safety and Roadway Mobility with Advanced Warning Information	
76	Under Consideration	Tier 3	Effect of Driver Experience on Driver Behavior and Traffic Safety	
77	Under Consideration	Tier 3	Readiness of Indiana Highway System for Automated Vehicles	
78	Under Consideration	Tier 3	Analysis of the state highway system for detour route suitability	
79	Under Consideration	Tier 3	Self Enforcing Work Zones	
80	Under Consideration	Tier 3	Implementation of Back-of-Queue Alerting System for Truck Fleet at Work Zones	

81	Under Consideration	Tier 3	TESMO	Data driven modeling of Electric Vehicle Impacts on Traffic Safety
82	Under Consideration	Tier 3		Impacts of COVID-19 on driver behavior: Safety Implications for Indiana
83	Under Consideration	Tier 3		Addressing the Safety Needs of Older Road Users in Indiana -
84	Under Consideration	Tier 3		Analysis and Advancement of Transportation Safety Equity in Indiana
85	Under Consideration	Tier 3		A Practical Method of Monitoring the Retro-reflectivity of Road Signs
86	Under Consideration	Tier 3		Techno-economic Modeling, and Implementation for Electric Bus Dynamic Charging including Soft-Shut-Down Tactic.
87	Under Consideration	Tier 3		Inspecting Temporary Traffic Control Devices using Deep Learning Approach
88	Under Consideration	Tier 3		Pavement Marking Inspection and Maintenance using Location-Based Visual Data and Computer Vision Technology
89	Under Consideration	Tier 3		Automated vehicle-to-driver transitions of control in construction zones
90	Under Consideration	Tier 3		Development of Design Guidelines for Noise Barriers to Reduce Noise and AirPollution Impacts of Vehicles on Communities Living Nearby Highways
91	Under Consideration	Tier 3		Predictive Traffic Modelling for Impact of Sustainability and Environmental Issues along with COVID-19, and Similar Pandemics on Mobility.
92	Not approved for funding	Tier 4	Deputy Commissioners & District Deputy Commissioners, <b>DDC</b>	Synthesis Study on the Impact of Legislative Selection of Capital Projects (was SPR 4700)
93	Not approved for funding	Tier 4		Strategic Planning and Design of Highway Photovoltaic Noise Barriers (PVNBs)
94	Not approved for funding	Tier 4		Development of a Capital Efficiency Evaluation Tool/Scorecard for INDOT to evaluate the ROI of District operations over the Project Lifecycle with respect to Business objectives, Performance measures, and Long-term plans
95	Not approved for funding	Tier 4		Life Cycle and Cost Effectiveness of Concrete median barrier walls
96	Not approved for funding	Tier 4	PMFAME	Analysis of Electric, Hybrid, Hydrogen Powered Vehicles & Connected Vehicle Usage to Identify Strategic Location for Investing in Charging Infrastructure
97	Not approved for funding	Tier 4		Investigation of reinstating the Hoosier State passenger train between Indianapolis and Chicago (was 4708).
98	Not approved for funding	Tier 4		Identifying opportunities for electrifying commercial fleet freight transportation (was 4709)
99	Not approved for funding	Tier 4		EV Energy Demand Assessment of Charging Stations along the Interstate Highways in Indiana
100	Not approved for funding	Tier 4		Timing of Emerging Vehicle and Other Transportation Technologies and Rational Corrections to INDOT's Planning Practices and Models (4611).
101	Not approved for funding	Tier 4		Identifying EV Charging Corridors in Indiana considering Urban-rural interfaces and growth
102	Not approved for funding	Tier 4		Evaluating the long-term impact of autonomous vehicles
103	Not approved for funding	Tier 4		Model, Design, and Implementation for In-Motion Charging (IMC) of Electric and Hybrid Buses in Indiana

104	Not approved for funding	Tier 4	PMGC	Application of Strain Sensors for Early Detection of Bottom-up Fatigue Cracks
105	Not approved for funding	Tier 4		Methods to deal with downdrag in bridge foundation piles
106	Not approved for funding	Tier 4		Pavement Roughness and Pothole Assessment from Connected Vehicle Data
107	Not approved for funding	Tier 4		Expanded Implementation of a Friction Performance Test for Compacted Asphalt Mixtures
108	Not approved for funding	Tier 4		Evaluating Flexible Pavement Skid Resistance Using a 3D Scanner
109	Not approved for funding	Tier 4		Analysis Tools and Guidelines to Implement Traffic Speed Deflectometer Device (TSDD) Measurements into Network Level Pavement Management
110	Not approved for funding	Tier 4		GIS System for all Indiana historical projects.
111	Not approved for funding	Tier 4		Developing Automated Testing Methods for Identifying Delamination of Pavement Structure
112	Not approved for funding	Tier 4		Developing the best practice of concrete mixing process for optimized air voids
113	Not approved for funding	Tier 4		Automated Pavement Core Sample Analysis
114	Not approved for funding	Tier 4		Direct CPT Interpretation Method for Pile Design using Artificial Intelligence Engine
115	Not approved for funding	Tier 4		3D sensor for MSE wall panel inspection and ground reinforcement installation inspection.
116	Not approved for funding	Tier 4		Improved Tools for Diagnosis of Maintenance and Repair Needs in Concrete Pavement Joints
117	Not approved for funding	Tier 4		Enhanced Methods to Evaluate Interface Bonding Conditions Using Falling Weight Deflectometer and 3D Ground Penetrating Radar
118	Not approved for funding	Tier 4		Self-Healing Electrified Induction-Heating Asphalt System
119	Not approved for funding	Tier 4		Developing Superpave 5 Long-term Aging Laboratory Protocols
120	Not approved for funding	Tier 4		EXPLORING NEW STRUCTURAL LAYERS FOR FLEXIBLE PAVEMENT
121	Not approved for funding	Tier 4		Non-destructive methods to determine geometry of unknown foundations
122	Not approved for funding	Tier 4		AI-based Scan-to-As-builts for Bridges and MSE Walls
123	Not approved for funding	Tier 4		Monitoring road pavement quality with crowdsourced mobile sensing
124	Not approved for funding	Tier 4		Local Calibration for AASHTOWare Pavement ME
125	Not approved for funding	Tier 4		Biomimetic Asphalt Pavement Crack Prevention
126	Not approved for funding	Tier 4		Evaluation of Utilizing Self-Healing Asphalt Pavements in Indiana and Adjustment of the Mixture Design to Indiana's Weather Condition
127	Not approved for funding	Tier 4		Verification of TSR Values on DMF and Modification of TSR Test Method Appropriate for Superpave 5 Mix Design

128	Not approved for funding	Tier 4		Base Course Construction Improvements and Performance Monitored via Instrumented Bender Element Sensors and APLT Testing	
129	Not approved for funding	Tier 4		Use of Geothermal Energy in Transportation Infrastructure	
130	Not approved for funding	Tier 4		Health Monitoring of bridges and their foundations in Indiana	
131	Not approved for funding	Tier 4		Construction Inspection Improvement towards Maximizing the Lifetime Value of Infrastructure	
132	Not approved for funding	Tier 4		Feasibility and Cost Effectiveness of Available Measures to Protect Construction Sites from Floods	
133	Not approved for funding	Tier 4		Establishing Superpave 5 Ndesign Values Based on Asphalt Mixture Type	
134	Not approved for funding	Tier 4		Relationships between the Composition the Fly Ashes and their Reactivity in the Portland Limestone Cement Systems	
135	Not approved for funding	Tier 4		Implementation of High Polymer Modified Asphalt Binder to Improve Pavement Maintenance System	
136	Not approved for funding	Tier 4		Cost-effective and Eco-friendly Surface Patching Material for Indiana Highways	
137	Not approved for funding	Tier 4		Improved interpretation of FWD Test results for PCCP pavements	
138	Not approved for funding	Tier 4	PMGC	Models enhanced by data-driven approaches for predicting plastic viscosity and yield stress of fresh cement and concrete	
139	Not approved for funding	Tier 4		Development of Design Methods for Piles in Gravelly Soils	
140	Not approved for funding	Tier 4		Use of Bio-cementation for Landslide Prevention and Erosion	
141	Not approved for funding	Tier 4		Construction risk assessment under multiple hazards using GIS-based statistical and CFD models	
142	Not approved for funding	Tier 4		Inspection efficiency of concrete pavement construction by optimizing work orders for smoothness quality control	
143	Not approved for funding	Tier 4		Feasibility of implementing blockchain technology to improve asset sustainability	
144	Not approved for funding	Tier 4		Using Glass Particles (GP) in Hot Mix Asphalt (HMA)	
145	Not approved for funding	Tier 4		Revised and Customized Resilient Modulus Test	
146	Not approved for funding	Tier 4		Techno-economic analysis for road pavement options: testing asphalt and concrete pavements	
147	Not approved for funding	Tier 4		Model-based Decision for Optimizing Precast Concrete Pavement (PCP) Panels	
148	Not approved for funding	Tier 4		Acoustic Treatments in Sound Barrier Walls	
149	Not approved for funding	Tier 4		Autonomous Culvert Inspection with UAV-miniUGV Hybrid Systems	
150	Not approved for funding	Tier 4		SHE	Strategic assessment of economic and infrastructure resilience for Indiana's bridges
151	Not approved for funding	Tier 4		TESMO	Sinusoidal Rumble Strip Measures of Effectiveness
152	Not approved for funding	Tier 4	Return of Investment of INDOT R & D Specialized Testing Program		