

## List of Indiana Department of Transportation (INDOT) FY 2023 Research Needs (as of May 13, 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	Title
1	Awarded	4253	Pavements, Materials,	3Dimensional Laser Pavement Condition Survey Maintenance (Expansion)
2	Awarded	4329	Geotechnical and	Verification of MSE Wall Foundation Bearing Capacity Based on CPT and DCPT (Expansion/extension)
3	Awarded	4450	Construction, <b>PMGC</b>	Visualization of Falling Weight Deflectometer (FWD) Data and Road Imagery for Enhanced Pavement Assessment
4	Proposal Pending	4523	Employees Safety, <b>S</b>	Applied Ergonomics (Expansion)
5	Awarded	4549	Maintenance Operations, <b>MOP</b>	"Salt Monitoring and Reporting Technology (SMART): Development of a Photogrammetric System for Salt Inventory Reporting" - Expansion
6	Awarded	4601	<b>PMGC</b>	INDOT Field Handbook for Maintenance and Preservation Treatments of Concrete Pavements (Expansion)
7	Proposal Pending	4701	Maintenance Operations, <b>MOP</b>	Implementation of Heavy Fleet Routes and Facilities Locations Optimization
8	Proposal Pending	4702		Autonomous Mower Pilot Project
9	Proposal Pending	4703		Brine Making and Storage Standards
10	Proposal Pending	4704		Evaluating Robustness of MDSS Forecast and Compliance with Recommendations (was 4704)
11	Proposal Pending	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)
12	Proposal Pending	4707		INDOT Road Infrastructure Readiness to Accommodate Connected and Automated Vehicles: Identification of Needs, and Evaluation of Opportunities, and Challenges
13	Proposal Pending	4710		INDOT Project Change Orders – Root Causes and Recommendations
14	Proposal Pending	4711		Accessibility, Equity and Environmental Justice Measures of Infrastructure facilities in Indiana
15	Proposal Pending	4713	<b>PMGC</b>	Development of guidelines for compatible sensor installation, data collection, and database-based visualization to INDOT
16	Proposal Pending	4714		Use of Machine Learning Methods to Obtain a Reliable Predictive Model for Resilient Modulus of Subgrade Soil
17	Proposal Pending	4715		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
18	Proposal Pending	4718		Influence of Nanomaterials-based Admixtures on the Entrained Air Void System and Freeze-Thaw (FT) Resistance of Concrete;
19	Proposal Pending	4720		Autonomous Construction Progress Monitoring and Documentation

20	Proposal Pending	4723	PMGC	Investigate resilient modulus improvements to bases and subgrades from geosynthetic reinforcement
21	Proposal Pending	4724		Detection and Assessment of Sulfates in the Pavement Subgrade
22	Proposal Pending	4727		Practical Implementation of Superabsorbent Polymers for Internally Cured Concrete (was 4727)
23	Proposal Pending	4729	Structural, Hydraulics and Environmental, SHE	Evaluation of the Accuracy of Non-Destructive Testing (NDT) Methods for the Condition Assessment of Bridge Decks
24	Proposal Pending	4730		Widening reinforced concrete elements using chemical anchoring systems
25	Proposal Pending	4731		Feasibility of 3D Scanning Technology for Bridge Inspection and Management
26	Proposal Pending	4732		Development of Guidelines for Use and Design of Deep Foundations for Three-Sided Structures (was 4732)
27	Proposal Pending	4735	Traffic Engineering, Safety, Management & Operations, TESMO	Development of Latitude/Longitude (and Route/Milepost) Model for Positioning Traffic Management Cameras
28	Proposal Pending	4736		A Study of Suburban Arterial Safety Performance Based on Median Type
29	Proposal Pending	4737		Development of Business Processes to Prioritize Traffic Signal Re-Timing and Assess Impact of Re-Timing Activities
30	Proposal Pending	4738		Origin-Destination Counts in Weaving Area Utilizing Existing Field Data
31	Proposal Pending	4739		Sinusoidal Rumble Strips Measures of Effectiveness
32	Proposal Pending	4741		Leveraging LiDAR Intensity to Evaluate Roadway Pavement Marking Retro-Reflectivity
33	Under Consideration	Tier 2	PMFAME	Improvements to Indiana's multimodal freight transportation infrastructure and operational policies to mitigate peri-pandemic logistics challenges (was 4712)
34	Under Consideration	Tier 2	PMGC	LESSENING DENSITY REQUIREMENT AND ADJUSTING DENSITY PAY FACTORS FOR ASPHALT PAVEMENTS IN POOR SUBLAYER CONDITIONS (was 4716)
35	Under Consideration	Tier 2		Assessment of Temperature Correction Factors for Falling Weight Deflectometer Deflections (was 4717)
36	Under Consideration	Tier 2		Development of Design Guidelines for Open-Ended Pipe Piles (was 4719)
37	Under Consideration	Tier 2		Assessment of Costs Associated with Utility Coordination and Relocation (was 4721)
38	Under Consideration	Tier 2		AI NLP for a central, always up-to-date digital construction inspection program (was 4725)
39	Under Consideration	Tier 2		Asphalt Mixture Performance Tests: Establishing Links between Laboratory Testing and Field Performance (was 4726)
40	Under Consideration	Tier 2		Stone Mastic Asphalt (SMA) Overlay Performance Evaluation (was 4728)
41	Under Consideration	Tier 2	SHE	Steel Bridge Inspection, Assessment, Repair, and Management under FIRE (was 4733)
42	Under Consideration	Tier 2		Expediting and Enhancing the Hydraulic Site Data Collection Process (was 4734)

43	Under Consideration	Tier 2	TESMO	Development of a Web Portal for the Management, Visualization, and Analysis of Collected Mobile LiDAR Data along Indiana's Transportation Corridors (was 4742)
44	Under Consideration	Tier 2		Traffic Management Geocast Study with Connected Cars on Indiana Highways (was 4743)
45	Under Consideration	Tier 2		Investigate Safety Performance of Non-Signalized Traffic Control Strategies (was 4744)
46	Under Consideration	Tier 3	MOP	UAS and Mobile LiDAR for Landslide Monitoring
47	Under Consideration	Tier 3		Generation of 3D Road Maps
48	Under Consideration	Tier 3		Pavement Roughness and Pothole Assessment from Connected Vehicle Data
49	Under Consideration	Tier 3	PMGC	AI enabled automatic structural health monitoring system using multi-functional flexible sensors (was 4722)
50	Under Consideration	Tier 3		Review of Overweight Truck Routes to the Pavement Structural Performance
51	Under Consideration	Tier 3		Intelligent Compaction as Proof rolling Feasibility Study
52	Under Consideration	Tier 3		EFFECTS OF ASPHALT EMULSIONS ON ASPHALT WATER-STRIPPING
53	Under Consideration	Tier 3		Performance Based Mixture Design Parameters for Superpave 5 Asphalt Mixtures
54	Under Consideration	Tier 3	SHE	Active Sensor-enabled Structural Health Monitoring Systems for INDOT Bridges: A Synthesis Study and Cost-Benefit Analysis
55	Under Consideration	Tier 3		Assessing economic, environmental and structural performance of Indiana bridge restoration with carbon fiber-reinforced polymer
56	Under Consideration	Tier 3		Long-Term Durability of Externally Bonded FRP Reinforcement Exposed to Harsh Environmental Conditions
57	Under Consideration	Tier 3		Automatic detection of low-head dams in Indiana using publicly available geospatial data
58	Under Consideration	Tier 3		Accelerated corrosion and rapid assessment of reinforced concrete bridge decks
59	Under Consideration	Tier 3		Structural Health Monitoring of Prestressed Girders Approaching Service Life.
60	Under Consideration	Tier 3		Developing Advanced AI Tools for Bridge Management Data Analysis
61	Under Consideration	Tier 3		Potential use of the existing BrR models and AASHTOWare 7.2 IFC functionality for the development of INDOT digital twins.
62	Under Consideration	Tier 3		Artificial Intelligence for Network-level Data Organization and Analysis
63	Under Consideration	Tier 3	TESMO	Unmanned Aerial Systems and Mobile LiDAR for Work zone Mapping
64	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
65	Under Consideration	Tier 3		Safety Analysis of Major Diverge and Branch Connection Junctions at System Interchanges
66	Under Consideration	Tier 3		Evaluating the Effectiveness of Traffic Citations in Reducing Crashes on Indiana Interstates
67	Under Consideration	Tier 3		INDOT as an Advisory Board Member of the NSF-Sponsored Industry-University Collaborative Research Center (IUCRC) Focusing on Geospatial Technologies

68	Under Consideration	Tier 3	TESMO	UAS Topographic Mapping for Project Scoping and Preliminary Engineering
69	Under Consideration	Tier 3		Sustainable E-mobility Transportation Feasibility Study for Integrated Solar Roads with Wireless Charging and Applicability of Vortex Bladeless.
70	Under Consideration	Tier 3		Agile Workzone Geometric Analysis and Dynamic Layout
71	Under Consideration	Tier 3		Improving Mobile Work Zone Safety and Roadway Mobility with Advanced Warning Information
72	Under Consideration	Tier 3		Effect of Driver Experience on Driver Behavior and Traffic Safety
73	Under Consideration	Tier 3		Readiness of Indiana Highway System for Automated Vehicles
74	Under Consideration	Tier 3		Analysis of the state highway system for detour route suitability
75	Under Consideration	Tier 3		Self Enforcing Work Zones
76	Under Consideration	Tier 3		Implementation of Back-of-Queue Alerting System for Truck Fleet at Work Zones
77	Under Consideration	Tier 3		Data driven modeling of Electric Vehicle Impacts on Traffic Safety
78	Under Consideration	Tier 3		Impacts of COVID-19 on driver behavior: Safety Implications for Indiana
79	Under Consideration	Tier 3		Addressing the Safety Needs of Older Road Users in Indiana -
80	Under Consideration	Tier 3		Analysis and Advancement of Transportation Safety Equity in Indiana
81	Under Consideration	Tier 3		A Practical Method of Monitoring the Retro-reflectivity of Road Signs, Co-PI - Mario Romero
82	Under Consideration	Tier 3		Techno-economic Modeling, and Implementation for Electric Bus Dynamic Charging including Soft-Shut-Down Tactic.
83	Under Consideration	Tier 3		Inspecting Temporary Traffic Control Devices using Deep Learning Approach
84	Under Consideration	Tier 3		Pavement Marking Inspection and Maintenance using Location-Based Visual Data and Computer Vision Technology
85	Under Consideration	Tier 3		Automated vehicle-to-driver transitions of control in construction zones
86	Under Consideration	Tier 3		Development of Design Guidelines for Noise Barriers to Reduce Noise and Air Pollution Impacts of Vehicles on Communities Living Nearby Highways
87	Under Consideration	Tier 3	Predictive Traffic Modelling for Impact of Sustainability and Environmental Issues along with COVID-19, and Similar Pandemics on Mobility.	

88	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)
89	Not approved for funding	Tier 4		Strategic Planning and Design of Highway Photovoltaic Noise Barriers (PVNBs)
90	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
91	Not approved for funding	Tier 4		Life Cycle and Cost Effectiveness of Concrete median barrier walls
92	Not approved for funding	Tier 4	<b>PMFAME</b>	Analysis of Electric, Hybrid, Hydrogen Powered Vehicles & Connected Vehicle Usage to Identify Strategic Location for Investing in Charging Infrastructure. Identifying EV Charging Corridors in Indiana considering Urban-rural interfaces and growth. Identifying opportunities for electrifying commercial fleet freight transportation (was SPR 4705)
93	Not approved for funding	Tier 4		Investigation of reinstating the Hoosier State passenger train between Indianapolis and Chicago (was 4708).
94	Not approved for funding	Tier 4		Identifying opportunities for electrifying commercial fleet freight transportation (was 4709)
95	Not approved for funding	Tier 4		EV Energy Demand Assessment of Charging Stations along the Interstate Highways in Indiana (follow-up study of SPR-4509)
96	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).
97	Not approved for funding	Tier 4		Identifying EV Charging Corridors in Indiana considering Urban-rural interfaces and growth
98	Not approved for funding	Tier 4		Evaluating the long-term impact of autonomous vehicles
99	Not approved for funding	Tier 4		Model, Design, and Implementation for In-Motion Charging (IMC) of Electric and Hybrid Buses in Indiana
100	Not approved for funding	Tier 4		Application of Strain Sensors for Early Detection of Bottom-up Fatigue Cracks
101	Not approved for funding	Tier 4		Methods to deal with down-drag in bridge foundation piles
102	Not approved for funding	Tier 4	<b>PMGC</b>	Pavement Roughness and Pothole Assessment from Connected Vehicle Data
103	Not approved for funding	Tier 4		Expanded Implementation of a Friction Performance Test for Compacted Asphalt Mixtures
104	Not approved for funding	Tier 4		Evaluating Flexible Pavement Skid Resistance Using a 3D Scanner
105	Not approved for funding	Tier 4		Analysis Tools and Guidelines to Implement Traffic Speed Deflectometer Device (TSDD) Measurements into Network Level Pavement Management
106	Not approved for funding	Tier 4		GIS System for all Indiana historical projects.
107	Not approved for funding	Tier 4		Developing Automated Testing Methods for Identifying Delamination of Pavement Structure
108	Not approved for funding	Tier 4		Developing the best practice of concrete mixing process for optimized air voids
109	Not approved for funding	Tier 4		Automated Pavement Core Sample Analysis

110	Not approved for funding	Tier 4	<b>PMGC</b>	Direct CPT Interpretation Method for Pile Design using Artificial Intelligence Engine
111	Not approved for funding	Tier 4		3D sensor for MSE wall panel inspection and ground reinforcement installation inspection.
112	Not approved for funding	Tier 4		Improved Tools for Diagnosis of Maintenance and Repair Needs in Concrete Pavement Joints
113	Not approved for funding	Tier 4		Enhanced Methods to Evaluate Interface Bonding Conditions Using Falling Weight Deflectometer and 3D Ground Penetrating Radar
114	Not approved for funding	Tier 4		Self-Healing Electrified Induction-Heating Asphalt System
115	Not approved for funding	Tier 4		Developing Superpave 5 Long-term Aging Laboratory Protocols
116	Not approved for funding	Tier 4		EXPLORING NEW STRUCTURAL LAYERS FOR FLEXIBLE PAVEMENT
117	Not approved for funding	Tier 4		Non-destructive methods to determine geometry of unknown foundations
118	Not approved for funding	Tier 4		AI-based Scan-to-As-builts for Bridges and MSE Walls
119	Not approved for funding	Tier 4		Monitoring road pavement quality with crowdsourced mobile sensing
120	Not approved for funding	Tier 4		Local Calibration for AASHTOWare Pavement ME
121	Not approved for funding	Tier 4		Biomimetic Asphalt Pavement Crack Prevention
122	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
123	Not approved for funding	Tier 4		Verification of TSR Values on DMF and Modification of TSR Test Method Appropriate for Superpave 5 Mix Design
124	Not approved for funding	Tier 4		Base Course Construction Improvements and Performance Monitored via Instrumented Bender Element Sensors and APLT Testing
125	Not approved for funding	Tier 4		Use of Geothermal Energy in Transportation Infrastructure
126	Not approved for funding	Tier 4		Health Monitoring of bridges and their foundations in Indiana
127	Not approved for funding	Tier 4		Construction Inspection Improvement towards Maximizing the Lifetime Value of Infrastructure
128	Not approved for funding	Tier 4		Feasibility and Cost Effectiveness of Available Measures to Protect Construction Sites from Floods
129	Not approved for funding	Tier 4		Establishing Superpave 5 Ndesign Values Based on Asphalt Mixture Type
130	Not approved for funding	Tier 4	Establishment of Relationships between the Composition the Fly Ashes and their Reactivity in the Portland Limestone Cement Systems	
131	Not approved for funding	Tier 4	Implementation of High Polymer Modified Asphalt Binder to Improve Pavement Maintenance System	
132	Not approved for funding	Tier 4	Cost-effective and Eco-friendly Surface Patching Material for Indiana Highways	
133	Not approved for funding	Tier 4	Improved interpretation of FWD Test results for PCCP pavements	

134	Not approved for funding	Tier 4	<b>PMGC</b>	Rheological models enhanced by data-driven approaches for predicting plastic viscosity and yield stress of fresh cement and concrete
135	Not approved for funding	Tier 4		Development of Design Methods for Piles in Gravelly Soils
136	Not approved for funding	Tier 4		Use of Bio-cementation for Landslide Prevention and Erosion
137	Not approved for funding	Tier 4		Construction risk assessment under multiple hazards using GIS-based statistical and CFD models
138	Not approved for funding	Tier 4		Improving the inspection efficiency of concrete pavement construction by optimizing work orders for smoothness quality control
139	Not approved for funding	Tier 4		Feasibility of implementing blockchain technology to improve asset sustainability
140	Not approved for funding	Tier 4		Using Glass Particles (GP) in Hot Mix Asphalt (HMA)
141	Not approved for funding	Tier 4		Revised and Customized Resilient Modulus Test
142	Not approved for funding	Tier 4		Techno-economic analysis for road pavement options: testing asphalt and concrete pavements
143	Not approved for funding	Tier 4		Model-based Decision for Optimizing Precast Concrete Pavement (PCP) Panels
144	Not approved for funding	Tier 4	<b>SHE</b>	Strategic assessment of economic and infrastructure resilience for Indiana's bridges
145	Not approved for funding	Tier 4	<b>TESMO</b>	Sinusoidal Rumble Strip Measures of Effectiveness
146	Not approved for funding	Tier 4		Return of Investment of INDOT R & D Specialized Testing Program. How much the agency have saved as against if the work would have been done by Consultants. Testing includes: FWD, Forensic Investigation, Friction, GPR, Impact Echo, IRI Smoothness Test. The study could also do a survey on other States Testing Program and how we could improve ours based on the findings. (was SPR 4745).