



# OHIO DEPARTMENT OF TRANSPORTATION

## **Research Program**

**Office of Statewide Planning and Research**

**State Fiscal Year**

**2011**

**Annual Report**



### **Contents**

Program Overview .....	2
Strategic Research Plan .....	3
Work Program Budget.....	3
Program Development .....	3
New Projects .....	4
Continuing Projects .....	5
Active Project Investment .....	6
Pooled Fund Projects.....	8
Allocations by Contractor .....	10
Allocations by Subject Area ..	11
Research Staff .....	11
Final Reports Published .....	12

## 2011 Research Program

### Why Research?

Ohio's transportation system is aging; projects and maintenance are both becoming more expensive. ODOT must invest thoughtfully in our statewide network, and research is an effective tool for us to evaluate policies, materials and processes. Past research projects have helped us define specifications, improve safety by predicting weather hazards, and evaluate new processes such as warm mix asphalt. The research project methodology allows us to consider improvements from multiple perspectives (e.g., operational, financial and environmental). Research investments help ODOT become the long-term, reliable, professional and highly productive organization we strive to be.

### Activities

This annual report is designed to share program activities and results for Ohio Department of Transportation's research program. In addition to work on the projects shown in the body of the report, 2011 accomplishments include:

- increasing engagement of District Research Liaisons (DRL's) in the development and evaluation of research;
- presenting the Research Summit, the Ohio Bridge Rideability Research Seminar, and the Requests for Proposal development training;
- producing a new Research, Development & Technology Transfer (RD&T<sup>2</sup>) Manual of Procedures and the 2012 to 2014 Strategic Research Plan; and
- partnering with Ohio LTAP to provide Continuing Professional Development Credits to engineers for participating in our annual project review and research results presentation meetings.

State fiscal year 2011 brought about numerous administrative, personnel, and strategic changes to the Program. However, ODOT's research vision remained constant throughout the year — "Invest in innovative research that develops, maintains and assists Ohio in establishing a world class transportation system." We welcomed the Transportation Library into the research section, and with them we continue to develop a broader understanding of research methods and tools we can use to assist the Department and our citizens.

I am grateful for the continuing engagement and support of so many personnel within ODOT and our research community, and most especially my team — who believe in the value that we provide to ODOT and have worked tirelessly through our transition.

Cynthia Gerst  
Research Program Manager



## Strategic Research Plan

### Strategic Focus Areas

1. Transportation Safety — “Target Zero”
2. Transportation Policy and Organizational Transformation
3. Innovative Transportation Financing and Business Practices
4. Infrastructure Preservation Management
5. Transportation Shipping and Logistics
6. Livable Communities
7. Public/Mass Transportation
8. Green Energy Technology

### Strategic Goals

1. Expand and Leverage Partnerships
2. Conduct more Policy and Innovative Research
3. Align Research to Promote Department’s Goals and Objectives
4. Promote Transparency of the Program
5. Improve Project Management and Coordination
6. Increase Technology Transfer and Timely Implementation of Research Findings

Note: these focus areas and goals were replaced mid-fiscal year due to a department-wide directional shift.

## Work Program Budget

Available project funding in state fiscal year 2011 was significantly underutilized due to a department-wide strategic realignment. As seen in the partial budget below, only 65% of the anticipated funds for new single-state research projects were used, and 87% of potential pooled fund contributions were made.

	Anticipated Expenditure	Actual Spending	% of Plan (Actual/Anticipated)
New research projects.....	\$1,785,423	\$1,163,842	65%
Pooled fund projects.....	\$400,000	\$346,500	87%
Continuing research projects.....		\$1,455,236	
NCHRP contribution .....		\$1,392,403	
Research correlation services (TRB-TRIS & RIP) .....		\$223,540	
LTAP match.....		\$140,000	

For ODOT’s 45 single-state projects active in state fiscal year 2011 (see pages 6 & 7), a significant portion (69%) of the funding had already been invested prior to the fiscal year. Research anticipated almost \$2 million in future-year funding commitments for these projects.

## Program Development

### Strategic Research Projects

Projects solicited internally to address problems identified by ODOT offices, divisions and/or districts

Problem statements submitted:	32
RFPs solicited:	11
Proposals received:	21
Projects initiated:	7

### Student Studies

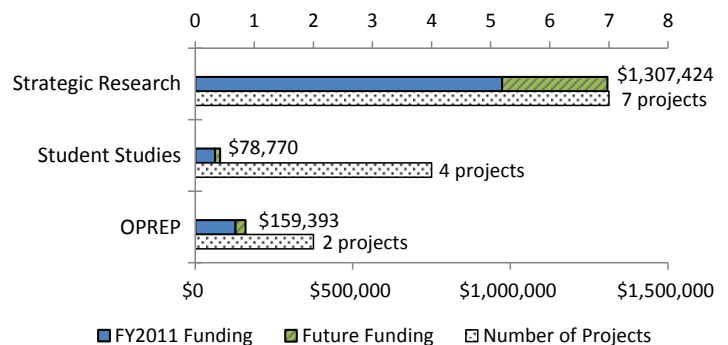
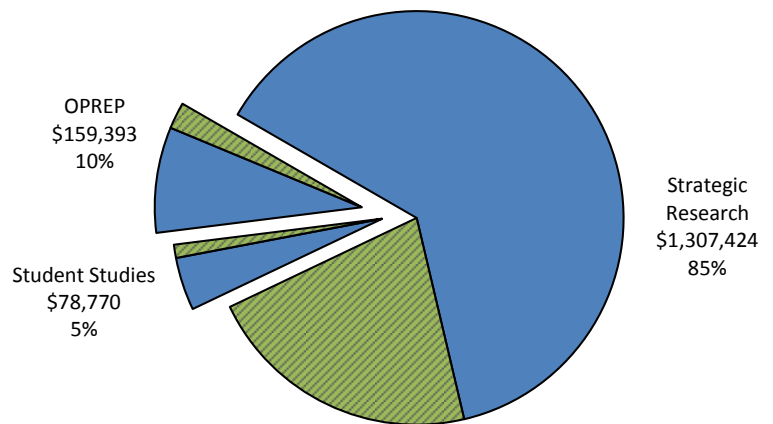
Small research studies that provide quick solutions to immediate problems

Proposals received:	6
Projects initiated:	4

### ODOT’s Partnered Research Exploration Program (OPREP)

Encourages partnerships with research community and addresses research needs identified outside of ODOT

Proposals received:	5
Projects initiated:	2



## New Projects

ODOT research projects initiated in state fiscal year 2011, sorted by problem statement number

State Job No.	Problem Statement	Project Title	Contractor	Principle Investigator	Subject Matter Expert	Primary Subject Area	Start Date	End Date	Total Budget	FY2011 Budget	
<b>Strategic Research</b>											
134556	2011-02	Green Noise Wall Construction and Evaluation	University of Akron	Ala R. Abbas	Noel Alcalá	Environmental	11/26/10	8/31/11	\$106,998	\$106,998	
134517	2011-03	Development of a Flood-Warning System and Flood-Inundation Mapping in Licking County, Ohio	U.S. Geological Survey	Chad Ostheimer	Bill Krouse	Hydraulics	8/1/10	6/30/12	\$236,000	\$152,000	
134567	2011-08	Application of Bluetooth Technology to Rural Freeway Speed Data Collection	University of Akron	Bill Schneider	George Saylor	Traffic	3/25/11	7/25/12	\$99,019	\$79,215	
134576	2011-10	Determining the Limitations of Warm Mix Asphalt by Water Injection in Mix Design, Quality Control and Placement	University of Akron	Ala R. Abbas	David Powers	Materials	4/25/11	8/25/13	\$250,556	\$143,219	
134559	2011-11	Development of Opportunity Zones Utilizing Transportation Assets	The Ohio State University	Gregory Washington	Brandon Perkins	Planning	12/29/10	4/29/12	\$132,934	\$106,347	
134577	2011-15	Developing a Methodology for School Travel Plan Development for Large School Districts	TranSystems	David Shipps	Julie Walcoff	Planning	4/25/11	10/25/12	\$253,513	\$202,810	
134571	2011-17	Ohio Mobility Improvement Study	RLS & Associates Inc.	Robbie Sarles	Marianne Freed	Planning	4/18/11	8/18/12	\$228,404	\$182,723	
7 Projects									\$1,307,424	\$973,312	
<b>Student Studies</b>											
134515	10-05	Verification of Rut Depth Collected with the INO Laser Rut Measurement System (LRMS)	Ohio University	Shad Sargand	Dan Radanovich	Pavement	7/25/10	11/25/11	\$20,000	\$16,000	
134563	2011-04	Nighttime Visibility of 3M All Weather Paint (AWP) and 3M 380WR ES Durable Tape Under Dry, Wet and Rainy Conditions	University of Akron	Ala R. Abbas	Inder Paul Singh	Traffic	2/4/11	6/4/12	\$20,000	\$16,000	
134564	2011-05	Quantification of Cracks in Concrete Bridge Decks in Ohio District 3	University of Akron	Anil Patnaik	Perry Ricciardi	Structures	2/13/11	6/13/12	\$20,000	\$16,000	
134573	2011-06	L&D Manual Turn Lane Storage Validation/Update	University of Dayton	Deogratias Eustace	Dirk Gross	Roadway	4/25/11	8/25/12	\$18,770	\$15,016	
4 Projects									\$78,770	\$63,016	
<b>OPREP</b>											
134516	10-OPREP2	Validating the Performance of Vehicle Classification Stations	The Ohio State University	Benjamin A. Coifman	Lindsey Pflum	Planning	7/29/10	5/29/12	\$84,949	\$67,959	
134557	2011-OPREP	Improved Characterization of Truck Traffic Volumes and Axle Loads for Mechanistic Empirical Pavement Design	University of Akron	Ala R. Abbas	Roger Green	Pavement	11/26/10	11/26/12	\$74,444	\$59,555	
2 Projects									\$159,393	\$127,514	
<b>Total New</b>									<b>13 Projects</b>	<b>\$1,545,587</b>	<b>\$1,163,842</b>



## Continuing Projects

Active ODOT research projects initiated prior to the start of state fiscal year 2011, sorted by project start date

State Job No.	Problem Statement	Project Title	Contractor	Principle Investigator	Subject Matter Expert	Primary Subject Area	Start Date	End Date	Total Budget	FY2011 Budget
148050	02-15	Instrumentation of the US Grant Bridge for Monitoring of Fabrication, Erection, In-Service Behavior, and to Support Management, Maintenance, and Inspection	University of Cincinnati	Arthur Helmicki	Greg Baird	Structures	6/1/02	12/31/13	\$903,100	\$107,160
134141	04-B	Operation & Maintenance of a Statewide Crest-Stage Stream Gauging Network in Ohio	Ohio Dept. of Natural Resources	Andrew Ebner	Bill Krouse	Hydraulics	8/7/03	8/7/2021	\$1,106,056	\$52,141
426354	04-14	Instrumentation of the Maumee River Crossing	University of Cincinnati	Arthur Helmicki	Tim Keller	Structures	12/15/03	6/15/11	\$459,766	\$0
134258	06-01	Development of Degradation Rates for Various Ohio Bridge Types	University of Cincinnati	Arthur Helmicki	Amjad Waheed	Structures	9/15/05	7/15/10	\$243,104	\$0
134267	06-16	Forces on Wingwalls from Thermal Expansion of Skewed Semi-Integral Bridges	Ohio University	Eric Steinberg	Jawdat Siddiqi	Structures	10/1/05	12/31/10	\$274,272	\$0
134280	06-08	Forensic Investigation of AC and PCC Pavements with Extended Service Life	Ohio University	Bill Edwards	Roger Green	Pavement	1/15/06	9/15/10	\$404,666	\$20,477
134326	07-OPREP1	Performance of GEOID03 for Height Conversion in Ohio	The Ohio State University	Dorota Brzezinska	John Ray	Aerial	11/15/06	8/31/10	\$70,509	\$0
134330	07-22	Phase 2 - A Comparison of Optical Gradation Devices to Current Test Methods	INFRAME	Arudi Rajagopal	Jeff Wigdahl	Materials	1/17/07	12/31/10	\$114,121	\$0
134348	07-15	Verification and Calibration of the Design Methods for Rock Socketed Drilled Shafts for Lateral Loads	E. L. Robinson Engineering	Jamal Nusairat	Jawdat Siddiqi	Structures	8/14/07	2/14/11	\$449,746	\$0
134349	07-20	Vegetated Bio-Filter For Post Construction Storm Water Management for Linear Transportation Projects	Ohio University	Gayle Mitchell	Rob Lang	Hydraulics	10/15/07	12/31/10	\$433,922	\$0
134371	08-07	Evaluation of Cone Penetrometer Testing (CPT) for use with Transportation Projects	The Ohio State University	Carolyn Merry	Kirk Beach	Geotechnical	12/1/07	12/31/10	\$683,304	\$0
134364	08-09	Crack Sealing: Database Analysis and Effects on Pavement Serviceability and Life	INFRAME	Arudi Rajagopal	Roger Green	Pavement	2/1/08	12/31/10	\$224,689	\$0
134363	08-01	Benefit Cost Models to Support PMS Decisions	University of Toledo	Eddie Y. Chou	Andrew Williams	Pavement	2/1/08	8/31/12	\$380,884	\$51,948
134387	08-13	Summer Ecology of Indiana Bats in Ohio	The Ohio State University	Stan Gehrt	Matt Raymond	Environmental	4/15/08	6/30/11	\$192,009	\$38,402
134384	07-21	Exfiltration Trenches for Post Construction Storm Water Management for Linear Transportation Projects	Ohio University	Gayle Mitchell	Jeff Syar	Environmental	5/1/08	5/1/12	\$585,873	\$426,372
134381	08-11	Structural Evaluation of LIC-310-0396 Box Beams with Advanced Strand Deterioration	Ohio University	Eric Steinberg	Mike Loeffler	Structures	5/1/08	10/1/11	\$556,429	\$0
134374	08-OPREP1	Field Monitoring of Scour Critical Bridges: A Pilot Study of Time Domain Reflectometry for Real-Time Automatic Scour Monitoring Systems	Case Western Reserve University	Bill Yu	Bill Krouse	Structures	5/5/08	9/5/10	\$84,079	\$0
134394	08-04	Development of a TL-3 Deep Beam Tubular Backup Bridge Rail	Texas A&M University	Akram Abu-Odeh	Sean Meddles	Structures	5/5/08	2/5/11	\$184,798	\$0
134375	08-03	Identification Evaluation of Pavement-Bridge Interface Ride Quality Improvement and Corrective Strategies	Iowa State University	Brent Phares	Brian Schleppe	Pavement	8/7/08	6/1/11	\$120,316	\$0

continued →

State Job No.	Problem Statement	Project Title	Contractor	Principle Investigator	Subject Matter Expert	Primary Subject Area	Start Date	End Date	Total Budget	FY2011 Budget	
134368	08-02	Sensitivity to Four-Step Versus Activity Based Models to Transportation System Changes	University of Texas at Austin	Chandra Bhat	Greg Giaimo	Planning	8/7/08	11/30/10	\$183,150	\$0	
134421	09-07	GPS-Based Household Interview Survey for the Cincinnati Ohio Region	Abt SRBI	Laurie Wargelin	Greg Giaimo	Planning	10/17/08	6/30/11	\$1,299,919	\$259,984	
134414	09-04	Rapid Orthophoto Development System	Ohio State University	Charles Toth	Michael Bline	Aerial	12/1/08	4/1/12	\$1,492,492	\$0	
134396	09-01	Evaluation of Geotextile Fabric in Undercut on MSE Wall Stability	Cleveland State University	Lutful Khan	Peter Narsavage	Structures	3/1/09	12/31/10	\$19,849	\$0	
134415	09-14	Prediction of Pile Set-up for Ohio Soils	Cleveland State University	Lutful Khan	Jawdat Siddiqi	Structures	6/1/09	2/28/11	\$19,849	\$0	
134433	09-OPREP1	Optimum Loop Placement that Balances Operational Efficiency and Dilemma Zone Protection	University of Cincinnati	Heng Wei	Kevin Duemmel	Traffic	8/13/09	12/13/10	\$78,060	\$15,612	
134465	10-01	Study of Bankfull Culvert Design Effectiveness	Cleveland State University	Mark A. Tumeo	Matt Raymond	Environmental	8/23/09	6/30/11	\$20,000	\$3,999	
134464	10-06	Bioasphalt from Urban Yard Waste Carbonization	Case Western Reserve University	Aaron Jennings	David Powers	Materials	9/4/09	1/4/11	\$19,900	\$3,980	
134476	10-07	Mechanical Properties of Warm Mix Asphalts Prepared Using Foamed Asphalt Binders	University of Akron	Ala R. Abbas	David Powers	Materials	11/14/09	3/14/11	\$20,000	\$4,000	
134413	09-06	Long Term Validation of an Accelerated Polishing Test Procedure for HMA Pavements	University of Akron	Robert Liang	David Powers	Materials	12/1/09	12/1/12	\$277,454	\$68,691	
134481	10-OPREP1	An Efficient and Accurate Genetic Algorithm for Backcalculation of Flexible Pavement Layer Moduli	University of Akron	Ernie Pan	Roger Green	Pavement	12/20/09	12/20/12	\$157,382	\$45,876	
134489	10-08	Ice Prevention or Removal on the Veteran's Glass City Skyway Cables	University of Toledo	Douglas K. Nims	Mike Gramza	Structures	3/7/10	1/31/14	\$584,644	\$59,916	
426835	10-10	Veteran's Glass City Skyway Solar Array Field Demonstration	University of Toledo	Richard Martinko	Mike Gramza	Structures	3/7/10	6/30/12	\$1,745,352	\$296,678	
<b>Total Continuing</b>									<b>32 Projects</b>	<b>\$13,389,694</b>	<b>\$1,455,236</b>
<b>Total ODOT</b>									<b>45 Projects</b>	<b>\$14,935,281</b>	<b>\$2,619,078</b>

## Active Project Investment

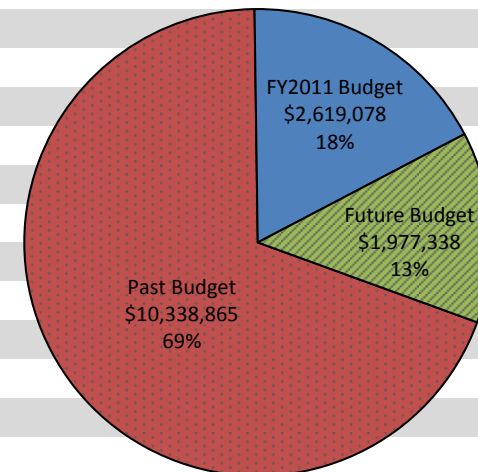
Investment distribution over time for ODOT research projects active in state fiscal year 2011, sorted by total project budget

SJN	Project Title	Duration (months)	Total Project Budget
426835	Veteran's Glass City Skyway Solar Array Field Demonstration	27	\$1,745,352
134414	Rapid Orthophoto Development System	40	\$1,492,492
134421	GPS-Based Household Interview Survey for the Cincinnati Ohio Region	32	\$1,299,919
134141	Operation & Maintenance of a Statewide Crest-Stage Stream Gauging Network in Ohio	216	\$1,106,056
148050	Instrumentation of the US Grant Bridge for Monitoring of Fabrication, Erection, In-Service ...	138	\$903,100
134371	Evaluation of Cone Penetrometer Testing (CPT) for use with Transportation Projects	36	\$683,304
134384	Exfiltration Trenches for Post Construction Storm Water Management for Linear ...	48	\$585,873
134489	Ice Prevention or Removal on the Veteran's Glass City Skyway Cables	46	\$584,645

134381	Structural Evaluation of LIC-310-0396 Box Beams with Advanced Strand Deterioration ...	41		\$556,429
426354	Instrumentation of the Maumee River Crossing	90		\$459,766
134348	Verification and Calibration of the Design Methods for Rock Socketed Drilled Shafts for ...	42		\$449,746
134349	Vegetated Bio-Filter For Post Construction Storm Water Management for Linear ...	38		\$433,922
134280	Forensic Investigation of AC and PCC Pavements with Extended Service Life	56		\$404,666
134363	Benefit Cost Models to Support PMS Decisions	54		\$380,884
134413	Long Term Validation of an Accelerated Polishing Test Procedure for HMA Pavements	36		\$277,454
134267	Forces on Wingwalls from Thermal Expansion of Skewed Semi-Integral Bridges	62		\$274,272
134577	Developing a Methodology for School Travel Plan Development for Large School Districts	18		\$253,513
134576	Determining the Limitations of Warm Mix Asphalt by Water Injection in Mix Design, Quality ...	28		\$250,556
134258	Development of Degradation Rates for Various Ohio Bridge Types	58		\$243,104
134517	Development of a Flood-Warning System and Flood-Inundation Mapping in Licking County, ...	22		\$236,000
134571	Ohio Mobility Improvement Study	16		\$228,404
134364	Crack Sealing: Database Analysis and Effects on Pavement Serviceability and Life	34		\$224,689
134387	Summer Ecology of Indiana Bats in Ohio	38		\$192,009
134394	Development of a TL-3 Deep Beam Tubular Backup Bridge Rail	33		\$184,798
134368	Sensitivity to Four-Step Versus Activity Based Models to Transportation System Changes	27		\$183,150
134481	An Efficient and Accurate Genetic Algorithm for Backcalculation of Flexible Pavement Layer ...	36		\$157,382
134559	Development of Opportunity Zones Utilizing Transportation Assets	16		\$132,934
134375	Identification Evaluation of Pavement-Bridge Interface Ride Quality Improvement and ...	33		\$120,316
134330	Phase 2 - A Comparison of Optical Gradation Devices to Current Test Methods	47		\$114,121
134556	Green Noise Wall Construction and Evaluation	9		\$106,998
134567	Application of Bluetooth Technology to Rural Freeway Speed Data Collection	16		\$99,019
134516	Validating the Performance of Vehicle Classification Stations	22		\$84,949
134374	Field Monitoring of Scour Critical Bridges: A Pilot Study of Time Domain Reflectometry for ...	28		\$84,079
134433	Optimum Loop Placement that Balances Operational Efficiency and Dilemma Zone Protection	16		\$78,060
134557	Improved Characterization of Truck Traffic Volumes and Axle Loads for Mechanistic Empirical ...	24		\$74,444
134326	Performance of GEOID03 for Height Conversion in Ohio	45		\$70,509
134476	Mechanical Properties of Warm Mix Asphalts Prepared Using Foamed Asphalt Binders	16		\$20,000
134564	Quantification of Cracks in Concrete Bridge Decks in Ohio District 3	16		\$20,000
134563	Nighttime Visibility of 3M All Weather Paint (AWP) and 3M 380WR ES Durable Tape ...	16		\$20,000
134465	Study of Bankfull Culvert Design Effectiveness	22		\$20,000
134515	Verification of Rut Depth Collected with the INO Laser Rut Measurement System (LRMS)	16		\$20,000
134464	Bioasphalt from Urban Yard Waste Carbonization	16		\$19,900
134415	Prediction of Pile Set-up for Ohio Soils	22		\$19,849
134396	Evaluation of Geotextile Fabric in Undercut on MSE Wall Stability	21		\$19,849
134573	L&D Manual Turn Lane Storage Validation/Update	16		\$18,770

Average: 38

Total: \$14,935,281



## Pooled Fund Projects

Transportation Pooled Fund (TPF) research projects active in state fiscal year 2011, sorted by TPF number

TPF #	State Job No.	Problem Statement	Project Title	Contractor	Principle Investigator	Subject Matter Expert	Primary Subject Area	Start Date	End Date	Project Budget	ODOT Budget	ODOT FY2011 Budget
<b>ODOT-Led</b>												
TPF-5 (111)	134254	05-17	Development of Standards for Geotechnical Management Systems	University of Florida	Marc Hoit	Kirk Beach	Geotechnical	8/10/05	6/30/12	\$644,639	\$60,000	\$0
TPF-5 (121)	134287	06-13	Monitoring and Modeling of Pavement Response and Performance	Ohio University	Shad Sargand	Roger Green	Pavement	5/1/06	5/1/12	\$1,584,958	\$785,129	\$0
TPF-5 (188)	134411	09-13	Evaluation of Fiber Reinforced Composite Dowel Bars and Stainless Steel Dowel Bars	Applied Pavement Technology	Roger Larson	Roger Green	Pavement	10/17/08	10/17/11	\$54,000	\$21,600	\$0
3 Projects										\$2,283,597	\$866,729	\$0
TPF #	Project Title	Lead Agency	ODOT Subject Matter Expert	Primary Subject Area	Start Date	End Date	Project Budget	ODOT Budget	ODOT FY2011 Budget			
<b>Participating</b>												
SPR-3 (042)	Aurora Program	Iowa Department of Transportation	Abner Johnson	Maintenance	10/1/03	N/A	\$3,122,500	\$75,000	\$0			
TPF-5 (004)	Long Term Pavement Performance (LTPP) Specific Pavements Study (SPS) Traffic Data Collection	FHWA	Lindsey Pflum	Planning	8/7/03	8/7/09	\$14,676,285	\$154,594	\$0			
TPF-5 (063)	Improving the Quality of Pavement Profiler Measurement	FHWA	Brian Schleppe	Pavement	5/1/03	9/30/11	\$1,277,656	\$141,600	\$15,000			
TPF-5 (068)	Long-Term Maintenance of Load and Resistance Factor Design Specifications	Iowa Department of Transportation	Jawdat Siddiqi	Structures	7/15/02	1/1/10	\$980,000	\$80,000	\$0			
TPF-5 (070)	Second International Conference on Accelerated Pavement Testing	Minnesota Department of Transportation	Roger Green	Pavement	9/1/04	2/1/09	\$130,000	\$5,000	\$0			
TPF-5 (088)	NDE/NDT for Highways and Bridges	New York Department of Transportation	Mike Loeffler	Structures	N/A	N/A	\$75,000	\$10,000	\$0			
TPF-5 (101)	Evaluation of Applications of Mechanistic Prediction Modeling Tools	New York Department of Transportation	Roger Green	Pavement	1/1/08	1/1/12	\$505,000	\$100,000	\$0			
TPF-5 (106)	Guidelines for Designing Bridge Piers and Abutments for Vehicle Collisions	Texas Department of Transportation	Sean Meddles	Structures	3/26/07	2/28/10	\$574,689	\$50,000	\$0			
TPF-5 (108)	Software Tools for Sharing and Integrating GIS Data	Washington State Department of Transportation	Dave Blackstone	Planning	6/27/05	6/27/09	\$250,000	\$90,000	\$0			
TPF-5 (112)	Midwest States Pooled Fund Pavement Preservation Partnership	Michigan Department of Transportation	David Humphrey	Pavement	1/1/06	8/24/08	\$220,000	\$15,000	\$0			
TPF-5 (120)	Deer Vehicle Crash Information and Research (DVCIR) Center	FHWA	Michelle May	Safety	1/30/07	N/A	\$260,000	\$50,000	\$0			
TPF-5 (127)	Consortium of Accelerated Pavement Testing (CAPT) and Technical Exchange Partnership	Kansas Department of Transportation	Roger Green	Pavement	6/28/05	6/28/08	\$225,000	\$25,000	\$0			
TPF-5 (129)	Recycled Unbound Pavement Materials	Minnesota Department of Transportation	Lloyd Welker	Materials	5/1/08	5/1/13	\$375,000	\$75,000	\$15,000			
TPF-5 (135)	Tire/Pavement Noise Research Consortium	Washington State Department of Transportation	Noel Alcala	Environmental	7/1/06	6/30/11	\$150,000	\$10,000	\$0			
TPF-5 (151)	Subsurface Drainage for Landslide and Slope Stabilization	Washington State Department of Transportation	Gene Geiger	Geotechnical	3/1/07	8/31/11	\$310,000	\$50,000	\$10,000			



TPF-5 (153)	Optimal Timing of Preventive Maintenance for Addressing Environmental Aging in HMA Pavements	Minnesota Department of Transportation	Roger Green	Pavement	5/1/09	5/1/14	\$375,000	\$75,000	\$15,000
TPF-5 (156)	Mississippi Valley Freight Coalition	Wisconsin Department of Transportation	Mark Locker	Planning	2/1/07	1/31/09	\$850,000	\$150,000	\$25,000
TPF-5 (158)	FHWA Traffic Noise Model: Version 3.0 Software and Training	FHWA	Noel Alcala	Environmental	1/1/08	1/1/12	\$166,500	\$30,000	\$0
TPF-5 (159)	Technology Transfer Concrete Consortium	Iowa Department of Transportation	Bryan Struble	Materials	2/15/08	2/15/13	\$244,000	\$25,000	\$5,000
TPF-5 (169)	Investigation of Curved Girder Bridges with Integral Abutments	Iowa Department of Transportation	Tim Keller	Structures	6/1/08	5/31/13	\$325,000	\$37,500	\$7,500
TPF-5 (171)	Evaluation of Non Intrusive Traffic Detection Technologies Phase III	Minnesota Department of Transportation	Lindsey Pflum	Planning	7/1/08	1/1/10	\$150,000	\$15,000	\$0
TPF-5 (174)	Construction of Crack-Free Bridge Decks, Phase II [Formerly TPF-5(051)]	Kansas Department of Transportation	Scott Seeley	Structures	9/1/07	3/1/13	\$975,000	\$100,000	\$25,000
TPF-5 (176)	Traffic Analysis and Simulation	FHWA	James Young	Roadway	7/15/08	7/15/12	\$435,000	\$200,000	\$50,000
TPF-5 (182)	SafetyAnalyst Support [Formerly SPR-2(210)]	FHWA	Jennifer Townley	Safety	10/1/08	6/30/09	\$1,053,828	\$50,000	\$0
TPF-5 (192)	Loop and Length Based Classification Pooled Fund	Minnesota Department of Transportation	Lindsey Pflum	Planning	12/31/08	12/31/11	\$365,000	\$75,000	\$25,000
TPF-5 (193)	Midwest States Crash Testing Program [Formerly SPR-3 (017)]	Nebraska Department of Roads	Michael Bline	Roadway	7/1/08	6/30/10	\$600,000	\$116,000	\$67,000
TPF-5 (198)	Urban Mobility Study, 2009 Continuation [Formerly SPR -3(049)]	Texas Department of Transportation	Mark Byram	Planning	5/1/03	5/1/10	\$310,000	\$150,000	\$25,000
TPF-5 (202)	HY-8 Culvert Analysis Program - Phase Three of Development Efforts	FHWA, HRTM-2	John Stains	Structures	N/A	N/A	\$110,000	\$15,000	\$5,000
TPF-5 (218)	Clear Roads Winter Highway Operations Pooled Fund [Formerly TPF-5(092)]	Minnesota Department of Roads	Abner Johnson	Maintenance	7/31/09	7/31/11	\$525,000	\$50,000	\$25,000
TPF-5 (220)	Accommodating Oversize/Overweight Vehicles at Roundabouts	Kansas Department of Transportation	James Young	Safety	1/1/10	12/31/11	\$195,000	\$30,000	\$0
TPF-5 (233)	Technology Transfer Intelligent Compaction Consortium (TTICC)	Iowa Department of Transportation	Peter Narsavage	Construction	N/A	N/A	\$345,000	\$35,000	\$7,000
TPF-5 (243)	Support of the Motorcycle Crash Causation Study	FHWA	Michelle May	Safety	N/A	N/A	\$700,000	\$75,000	\$25,000
32 Projects							\$30,855,458	\$2,159,694	\$346,500

<b>Total Pooled Fund</b>	<b>35 Projects</b>	<b>\$33,139,055</b>	<b>\$3,026,423</b>	<b>\$346,500</b>
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When significant or widespread interest is shown in solving transportation-related problems, research, planning, and technology transfer activities may be jointly funded by several federal, state, regional, and local transportation agencies, academic institutions, foundations, or private firms as a pooled fund study. The Transportation Pooled Fund (TPF) Program allows federal, state, and local agencies and other organizations to combine resources to support transportation research studies.

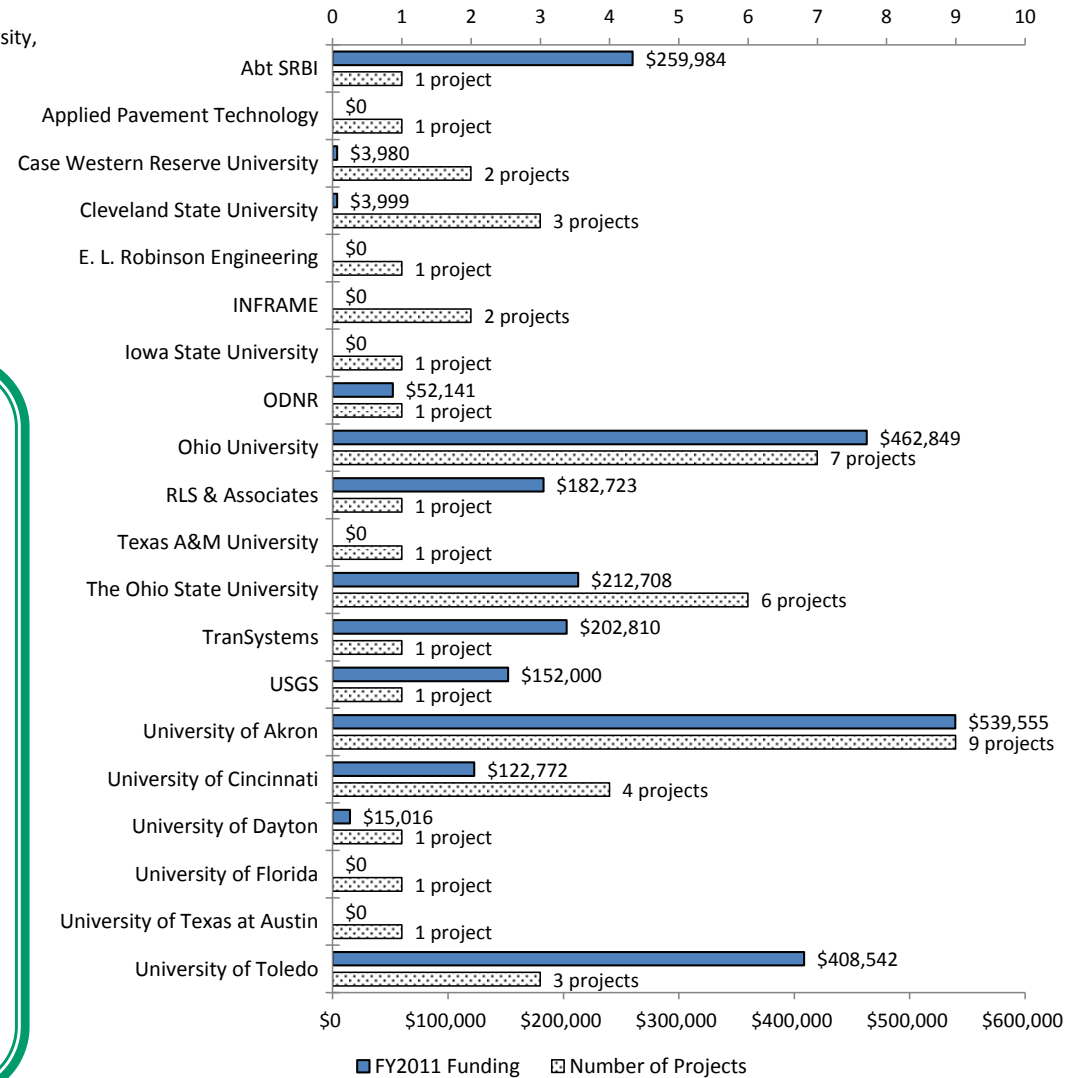
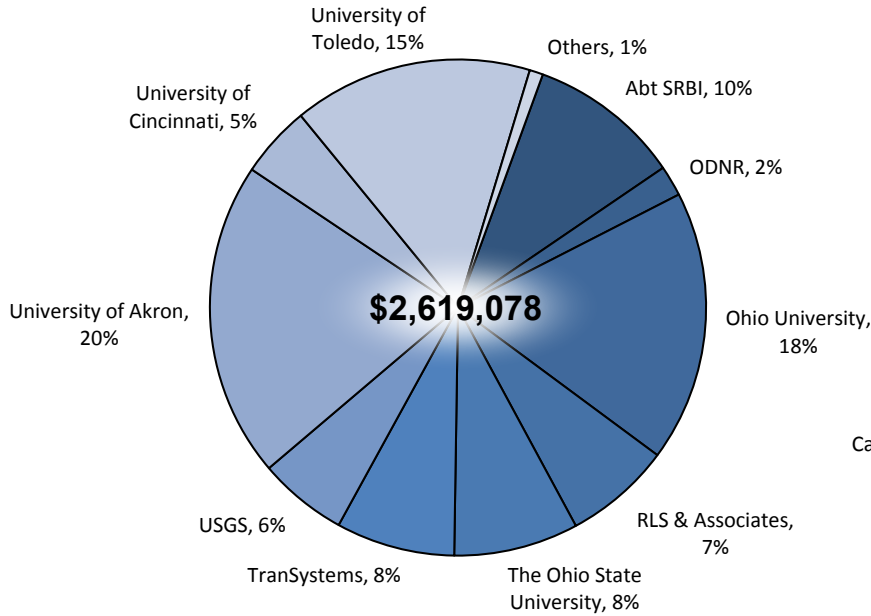
—Transportation Pooled Fund Program

[www.pooledfund.org](http://www.pooledfund.org)



## Allocations by Contractor

In state fiscal year 2011, the 48 active ODOT research projects and ODOT-led pooled fund studies contracted with 20 research institutions. Of those institutions, 13 were provided funds in FY2011. The charts on this page show the distribution of funds among the various research institutions.



### Universities (12)

- Case Western University  
[www.case.edu](http://www.case.edu)
- Cleveland State University  
[www.csuohio.edu](http://www.csuohio.edu)
- Iowa State University  
[www.iastate.edu](http://www.iastate.edu)
- Ohio University  
[www.ohio.edu](http://www.ohio.edu)
- Texas A&M University  
[www.tamu.edu](http://www.tamu.edu)
- The Ohio State University  
[www.osu.edu](http://www.osu.edu)
- University of Akron  
[www.uakron.edu](http://www.uakron.edu)
- University of Cincinnati  
[www.uc.edu](http://www.uc.edu)
- University of Dayton  
[www.udayton.edu](http://www.udayton.edu)
- University of Florida  
[www.ufl.edu](http://www.ufl.edu)
- University of Texas at Austin  
[www.utexas.edu](http://www.utexas.edu)
- University of Toledo  
[www.utoledo.edu](http://www.utoledo.edu)

### Private Firms (7)

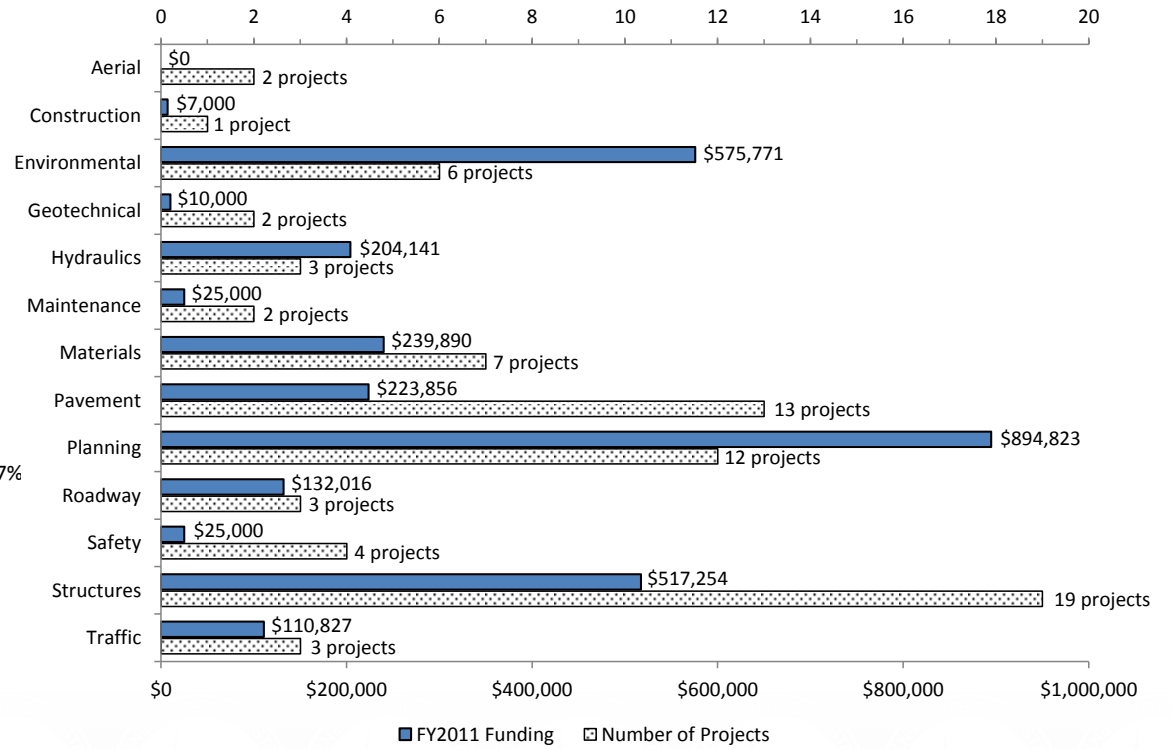
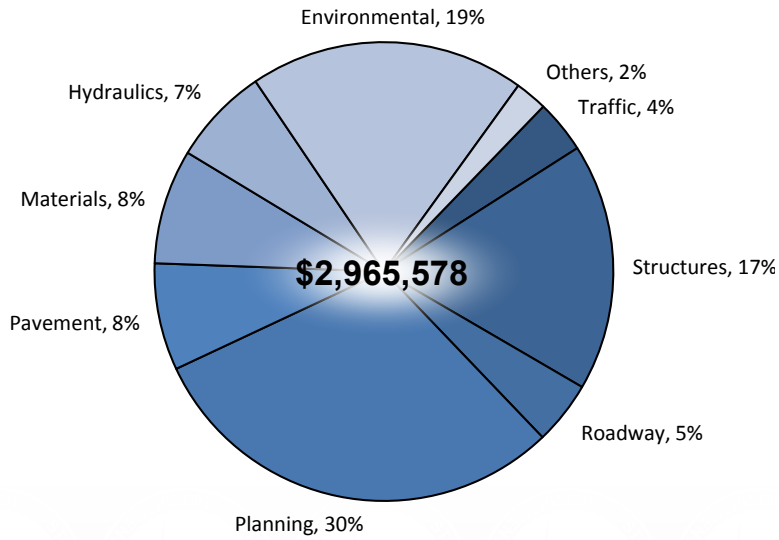
- Abt SRBI Inc. [www.srbi.com](http://www.srbi.com)
- Applied Pavement Technology, Inc. [www.appliedpavement.com](http://www.appliedpavement.com)
- E.L. Robinson Engineering  
[www.elrobinson.com](http://www.elrobinson.com)
- Infrastructure Management & Engineering (INFRAME)  
[www.inframeinc.com](http://www.inframeinc.com)
- RLS & Associates, Inc.  
[www.rlsandassoc.com](http://www.rlsandassoc.com)
- TranSystems  
[www.transystems.com](http://www.transystems.com)
- U.S. Geological Survey (USGS)  
[www.usgs.gov](http://www.usgs.gov)

### Government Agencies (1)

- Ohio Department of Natural Resources (ODNR)  
[www.ohiodnr.com](http://www.ohiodnr.com)

## Allocations by Subject Area

In state fiscal year 2011, ODOT research projects and all pooled fund studies (80 total) covered 12 subject areas. While some projects apply to multiple subject areas, only the projects' *primary* subject areas are represented in the charts on this page. These charts show how funding was allocated.



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## Final Reports Published

All final reports published since 2000 are available on our website. Prior reports can be requested by contacting the ODOT Library at 614-466-7680. On the web version of this document, click on the report number for a link to the report.

Report Number	Report Title	Contractor	PI	SME	Topic Area(s)
FHWA/OH-2010/4	Forensic Investigation of AC and PCC Pavements with Extended Service Life Volumes 1-3	Ohio University	Bill Edwards	Roger Green	Pavement
FHWA/OH-2010/10	Evaluation of Rubblization Projects in Ohio	INFRAME	Arudi Rajagopal	Roger Green	Pavement
FHWA/OH-2010/13	Performance of GEOID09 for Height Conversion in Ohio	The Ohio State University	Dorota Brzezinska	John Ray	Aerial
FHWA/OH-2010/14	Field Monitoring of Scour Critical Bridges: A Pilot Study of Time Domain Reflectometry Real Time Automatic Bridge Scour Monitoring System	Case Western Reserve University	Bill Yu	Bill Krouse	Hydraulic, Structures
FHWA/OH-2010/15	Field Instrumentation, Monitoring of Drilled Shafts for Landslide Stabilization and Development of Pertinent Design Method	University of Akron	Robert Liang	Chris Merklin	Geotechnical
FHWA/OH-2010/16	Forces on Wingwalls from Thermal Expansion of Skewed Semi-Integral Bridges	Ohio University	Eric Steinberg	Jawdat Siddiqi	Structures
FHWA/OH-2010/17	Optimum Loop Placement That Balances Operational Efficiency and Dilemma Zone Protection	University of Cincinnati	Heng Wei	Kevin Duemmel	Safety, Traffic
FHWA/OH-2010/18	Development of a TL-3 Deep Beam Tubular Backup Bridge Rail	Texas A&M University	Akram Abu-Odeh	Sean Meddles	Roadway, Safety, Structures
FHWA/OH-2011/1	Identification and Evaluation of Pavement-Bridge Interface Ride Quality Improvement and Corrective Strategies	Iowa State University	Brent Phares	Brian Schleppei	Construction, Geotechnical, Pavement, Policy, Structures
FHWA/OH-2011/2	Evaluation of Geofabric in Undercut on MSE Wall Stability	Cleveland State University	Lutful Khan	Peter Narsavage	Structures
FHWA/OH-2011/3	Prediction of Pile Set-Up for Ohio Soils	Cleveland State University	Lutful Khan	Jawdat Siddiqi	Structures
FHWA/OH-2011/4	Sensitivity of Four-Step Versus Tour-Based Models to Transportation System Changes	University of Texas at Austin	Chandra Bhat	Greg Giaimo	Planning
FHWA/OH-2011/5	Verification and Calibration of the Design Methods for Rock Socketed Drilled Shafts for Lateral Loads	E. L. Robinson Engineering	Jamal Nusairat	Jawdat Siddiqi	Structures
FHWA/OH-2011/6	Mechanical Properties of Warm Mix Asphalts Prepared Using Formed Asphalt Binders	University of Akron	Ala R. Abbas	David Powers	Materials, Pavement
FHWA/OH-2011/7	Evaluation of Cone Penetration Testing (CPT) for Use with Transportation Projects	The Ohio State University	Carolyn Merry	Kirk Beach	Geotechnical
FHWA/OH-2011/8	Sonar Imaging of Flooded Subsurface Voids	The Ohio State University	Patrick J. Fox	Kirk Beach	Geotechnical, Structures
FHWA/OH-2011/9	Development of Degradation Rates for Various Bridge Types in the State of Ohio	University of Cincinnati	Arthur Helmicki	Amjad Waheed	Structures
FHWA/OH-2011/11	Summer Ecology of Indiana Bats in Ohio	The Ohio State University	Stan Gehrt	Matt Raymond	Environmental
FHWA/OH-2011/12	A Study of Bankfull Culvert Design Effectiveness	Cleveland State University	Mark A. Tumeo	Matt Raymond	Environmental
FHWA/OH-2011/13	Bioasphalt from Urban Yard Waste Carbonization: A Student Study	Case Western Reserve University	Aaron Jennings	David Powers	Materials
FHWA/OH-2011/14	Effectiveness of Crack Sealing on Pavement Serviceability and Life	INFRAME	Arudi Rajagopal	Roger Green	Pavement



<http://www.dot.state.oh.us/research>