OKLAHOMA DEPARTMENT OF TRANSPORTATION

State Planning and Research Work Program
FFY 2020
(October 1, 2019 to September 30, 2020)

Part 1
Strategic Asset and Performance Management

Part 2
Office of Research and Implementation

Prepared by the
Oklahoma Department of Transportation
in cooperation with the
US Department of Transportation
Federal Highway Administration

October 2019

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Executive Summary

This document describes the Federal Fiscal Year (FFY) 2020 State Planning and Research Work Program for the Oklahoma Department of Transportation (ODOT). This program is prepared and submitted according to provisions of Title 23, United States Code, regulated under 23 CFR Part 420. Part 1 of the work program describes the Strategic Asset and Performance Management Division (SAPM) and Part 2, the Office of Research and Implementation activities, as well as, national pooled fund studies. The work program is developed and updated annually in cooperation with the Federal Highway Administration.

SAPM activities to be conducted in FFY 2020 include data collection, data analysis, data reporting, and planning coordination. New data collection activities include the implementation of radar technology to collect traffic counts and classifications. This technology is projected to more cost effective as well as provide for much improved safety for ODOT personnel. New planning coordination activities include the creation of a travel demand model to assist decision makers in transportation planning decisions and the development of an updated Long Range Transportation Plan. Funding for Part 1 of the work plan is approximately $13 million in FFY 2020.

Research activities for FFY 2020 will include three new projects and fourteen continuing projects. Some of the focus areas for current research projects include: design/construction/ maintenance of infrastructure and safety. ODOT is participating in thirteen national pooled fund projects, one of which Oklahoma acts as the lead state. Funding for the research program totals approximately $3.8 million in FFY 2020.

The detailed projects for each section are listed by item number and include a description of the purpose and scope of the project, the accomplishments during the current federal fiscal year (FFY 2019) and the proposed activities for the upcoming fiscal year (FFY 2020). In addition, the Financial Section shows the amount programmed for the FFY 2019 in the last work program, an estimate of the total funds that will be expended by the end of FFY 2019, and the projected costs for the upcoming fiscal year (FFY 2020).

U.S. Department of Transportation
Federal Highway Administration

Oklahoma Division

September 20, 2019

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In Reply Refer To:
HDA-OK

Tim J. Gatz
Executive Director
Oklahoma Department of Transportation
200 NE 21st Street
Oklahoma City, OK 73105

Attention Mr. Rick Johnson

Dear Mr. Gatz:

The FHWA-OK Division has completed its review of Fiscal Year 2020 State Planning and Research (SPR) Part I (Planning) and Part II (Research) Work Programs and Budget for the Oklahoma Department of Transportation (ODOT) as submitted by Mr. Rick Johnson, Director of Capital Programs, on September 10, 2019. We hereby approve the FY 2020 SPR Part I & II work programs and budgets.

We commend ODOT for committing more than the federal minimum (25%) in funding required for Research and ODOT's continued support of the Local Technical Assistance Program (LTAP) administered by the Center for Local Government Technology (CLGT) at Oklahoma State University. We note with satisfaction, that the FY 2020 SPR budget includes increases in traffic data collection and other activities that support new USDOT/FHWA priorities such as Transportation Asset Management (TAM), implementation of Transportation Performance Management (TPM) and Performance Based Planning and Programming (PBPP) initiatives.

Our special thanks to the Strategic Asset and Performance Management (SAPM) Division staff who developed this Work Program and later provided detailed information on various Work Program elements requested by FHWA-OK Division staff.

We look forward to our review of the Annual Performance and Expenditure Report (APER) which summarizes products from FY 2019 SPR Work Program, by December 31, 2019.

If you have questions or comments regarding our approval action, please contact Mr. Isaac N. Akem, Community Planner at 405-254-3343 (Part I) or Mr. Waseem Fazal, Pavement and Materials Engineer at 405-254-3332 (Part II).

Sincerely,

Basharat Siddiqi
Division Administrator

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State Planning & Research Program Management

October 1, 2019

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Director of Capital Programs

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SP&R Program Manager
Office of Capital Programs

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OKLAHOMA DEPARTMENT OF TRANSPORTATION
State Planning & Research (SPR) Financial Summary Sheet Federal Fiscal Year 2020
Program Period October 1, 2019 through September 30, 2020

SPR Part 1 - Planning, SPRY-0010(083)PL, JP# 01946(74)

A. Estimated Costs

SPR Part 1 - Planning	$	13,023,850.00
Metropolitan Planning	$	3,658,860.00
Total Estimated Costs	**$**	**16,682,710.00**

B. Available Funds

SPR Part 1 Unobligated Balance	$	13,619,850.00
PL Funding	$	3,658,860.00
Local	$	894,272.00
Total Available Funds	**$**	**18,172,982.00**

C. Proposed Financing

Type	Federal	Rate	State	Local
SPR	$13,023,850	80%	$0.00	$0.00
PL	$3,658,860	80%	$0.00	$894,272

Total Proposed Financing JP 01946(74)	**$**	**13,023,850.00**

SPR Part 2 - Research, SPRY-0010(082)RS, JP# 01946(76)

A. Estimated Costs

SPR Part 2 - Research	$	3,896,000.00
Total Estimated Cost	**$**	**3,896,000.00**

B. Available Federal Funds

SPR Part 2 Unobligated Balance	$	3,300,000.00
SPR Part 1 Unobligated Balance (remainder)	$	596,000.00
Total Available Funds	**$**	**3,896,000.00**

C. Proposed Financing

Type	Federal	Ratio	State
SPR Part 2	$3,896,000	80%	$0.00

Total Proposed Financing JP 01946(76)		**$3,896,000.00**

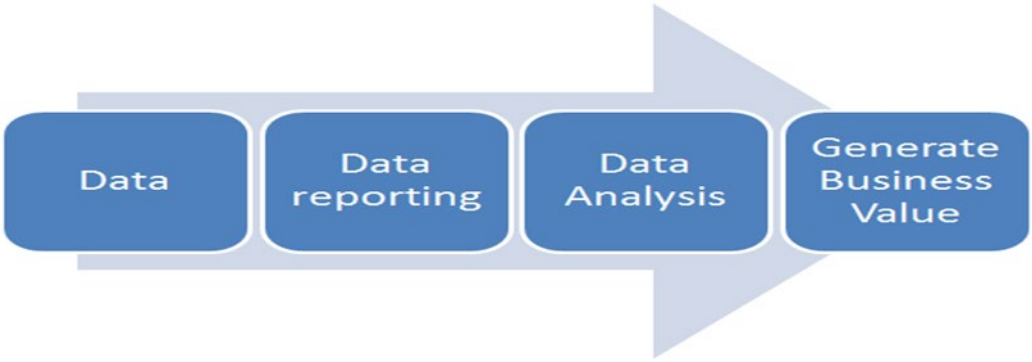
SPR Part 1 & Part 2 Totals

Total SPR Unobligated Balance	$	16,919,850.00
Total Other Funds (PL, State, Local)	$	4,553,132.00
Total Available Funding	**$**	**21,472,982.00**
Total SPR Part 1 and Part 2 Estimated Costs	**$**	**16,919,850.00**
Total SPR Pooled Fund Commitments	**$**	**1,567,000.00**
Total SPR Research Funding		**$5,463,000.00**
% of SPR Funds for Research		**32%**
Total LTAP $ 276,000 SPR PT. 2; $74,000 STATE; $150,000 LTAP	**$**	**500,000.00**

SP&R PART 1 - Planning, SPRY-0010(083)PL, JP# 01946(74)

FEDERAL FISCAL YEAR 2020

			PROGRAMMED				
GIS AND DATA MANAGEMENT			**SP&R**	**State**	**PL**	**Local**	**Total**
1101		Continuing Inventory Data Studies	$950,000.00	$0.00	$0.00	$0.00	$950,000.00
1102		Highway Performance Monitoring System	$133,500.00	$0.00	$0.00	$0.00	$133,500.00
1103		Geographical Information Management System for Transportation	$1,015,000.00	$0.00	$0.00	$0.00	$1,015,000.00
		TOTAL GIS AND DATA MANAGEMENT	**$2,098,500.00**	**$0.00**	**$0.00**	**$0.00**	**$2,098,500.00**
TRAFFIC AND DATA COLLECTION							
1301		Coverage Count Program	$540,000.00	$0.00	$0.00	$0.00	$540,000.00
1302		Permanent Traffic Count Program	$3,808,350.00	$0.00	$0.00	$0.00	$3,808,350.00
1304		Purchase of Traffic Counting Equipment	$225,000.00	$0.00	$0.00	$0.00	$225,000.00
1305		Vehicle Classification Counting Program	$900,000.00	$0.00	$0.00	$0.00	$900,000.00
1308		Traffic Monitoring System	$340,000.00	$0.00	$0.00	$0.00	$340,000.00
1309		Traffic Analysis and Projections	$220,000.00	$0.00	$0.00	$0.00	$220,000.00
1310		Skid Studies Program	$75,000.00	$0.00	$0.00	$0.00	$75,000.00
		TOTAL TRAFFIC AND DATA COLLECTION	**$6,108,350.00**	**$0.00**	**$0.00**	**$0.00**	**$6,108,350.00**
ECONOMIC, SAFETY, AND FISCAL STUDIES							
1405		Motorcycle Safety and Education Program	$46,000.00	$0.00	$0.00	$0.00	$46,000.00
1406		Bridge Health Monitoring	$50,000.00	$0.00	$0.00	$0.00	$50,000.00
1407		McClellan-Kerr Arkansas River Navigation Study	$225,000.00	$0.00	$0.00	$0.00	$225,000.00
		TOTAL ECONOMIC, SAFETY, AND DATA COLLECTION	**$321,000.00**	**$0.00**	**$0.00**	**$0.00**	**$321,000.00**
SYSTEMS AND PROGRAMS							
1601		Federal Aid Systems Coordination	$60,000.00	$0.00	$0.00	$0.00	$60,000.00
1604		Pavement Management Systems	$1,350,000.00	$0.00	$0.00	$0.00	$1,350,000.00
		TOTAL SYSTEMS AND PROGRAMS	**$1,410,000.00**	**$0.00**	**$0.00**	**$0.00**	**$1,410,000.00**
URBAN / REGIONAL TRANSPORTATION PLANNING							
1700		General Urban Transportation Planning Activities	$20,000.00	$0.00	$0.00	$0.00	$20,000.00
1701		Oklahoma City Area Regional Transportation Study (OCARTS)	$25,000.00	$0.00	$2,019,698.00	$403,940.00	$2,448,638.00
1702		Tulsa Metropolitan Area Transportation Study	$25,000.00	$0.00	$1,391,162.00	$278,232.00	$1,694,394.00
1703		Lawton Metropolitan Area Transportation Study	$10,500.00	$0.00	$210,500.00	$42,100.00	$263,100.00
1709		Ft.Smith Transportation Study	$10,500.00	$0.00	$37,500.00	$7,500.00	$55,500.00
1710		Regional Transportation Planning	$700,000.00	$0.00	$0.00	$162,500.00	$862,500.00
1719		Statewide Transportation Improvement Program	$100,000.00	$0.00	$0.00	$0.00	$100,000.00
1720		Statewide Travel Demand Model	$400,000.00	$0.00	$0.00	$0.00	$400,000.00
		TOTAL URBAN TRANSPORTATION PLANNING	**$1,291,000.00**	**$0.00**	**$3,658,860.00**	**$894,272.00**	**$5,844,132.00**
LONG RANGE PLAN / OTHER PLANNING ACTIVITIES							
1902		Statewide Long Range Transportation	$1,300,000.00	$0.00	$0.00	$0.00	$1,300,000.00
1904		Air Quality Transportation Planning	$30,000.00	$0.00	$0.00	$0.00	$30,000.00
1905		Freight Planning	$15,000.00	$0.00	$0.00	$0.00	$15,000.00
1913		Active Transportation Planning	$150,000.00	$0.00	$0.00	$0.00	$150,000.00
1914		Transportation Asset Management Plan	$50,000.00	$0.00	$0.00	$0.00	$50,000.00
1915		Performance Measurement Coordination	$250,000.00	$0.00	$0.00	$0.00	$250,000.00
1916		Oklahoma Archeological Survey GIS Digitization	$0.00	$0.00	$0.00	$0.00	$0.00
		TOTAL OTHER	**$1,795,000.00**	**$0.00**	**$0.00**	**$0.00**	**$1,795,000.00**
						Local	
		GRAND TOTAL SPRY-0010(083)PL	**$13,023,850.00**	**$0.00**	**$3,658,860.00**	**$894,272.00**	**$17,576,982.00**
							Revised 9/24/2019



Field Data Collection

The Field Data Collection Branch manages operations in support of traffic and transportation system data collection, data validation, and data systems installation and maintenance. The traffic data that is collected is used for Annual Average Daily Traffic (AADT) estimation, feasibility studies, design studies, research projects, signal warrant analysis and ongoing planning and engineering activities for ODOT.

Inventory Management

http://gisfiles.odot.ok.gov/HPMS-VIEWS/c_HWY-Stats_V2_all_asset_ron.html

https://www.ok.gov/odot/About_ODOT/Contact_ODOT_Divisions/County_Certification_Information.html

https://www.fhwa.dot.gov/policyinformation/statistics.cfm

https://www.fhwa.dot.gov/policyinformation/index.cfm

The Inventory Management Branch is responsible for maintaining Oklahoma's Network Linear Feature (NLF) on which roadway information in the state is aggregated. This roadway database structure includes state, county, and local databases, and the line-work and geometry associated with that data. This branch is responsible for providing numerous mileage and network reports for state agencies, federal agencies, and the public.

GIS Management

http://okdot.maps.arcgis.com/home/index.html

The GIS Management Branch is responsible for the aggregation and management of the Department's geospatial data. Working closely with other ODOT divisions, local government partners, other state agencies, and the general public, the branch provides a wide variety of innovative web-based, mobile, digital, and paper map products.

Pavement Management

https://www.ok.gov/odot/About_ODOT/Contact_ODOT_Divisions/Pavement_Condition_Data.html

The Pavement Management Branch collects, analyzes, and reports pavement condition data for the State Highway System. Pavement Management is used by decision makers to determine the most cost-effective ways of managing highway pavement assets through pavement deterioration modeling and the optimization of treatment types and costs to determine the right treatment at the right time.

Planning & Performance

https://www.ok.gov/odot/About_ODOT/Contact_ODOT_Divisions/Planning_and_Performance_-_Reports.html

The Planning and Performance Branch is responsible for carrying out a continuing, comprehensive, and cooperative (3C) transportation planning process for the development of all major transportation planning documents, programs and reports at ODOT; as well as providing grant application assistance in accordance with state and federal requirements.

Traffic Management

http://www.odot.org/maps/aadt/index.htm

The Traffic Management Branch receives data that is collected by the Field Data Collection Branch and analyzes and reports Annual Average Daily Traffic (AADT) estimates and as well as truck percentages. Data that is managed by the Traffic Management Branch is used for the traffic monitoring system, engineering and planning studies, roadway and bridge design projects, and system performance.

Statewide Transportation Improvement Plan (STIP)

https://www.ok.gov/odot/Programs_and_Projects/Transportation_Programs/STIP/

The **S**tatewide **T**ransportation **I**mprovement **P**rogram **(STIP)** is a financially constrained program which details the utilization of Oklahoma's federal and state transportation funds appropriated for regionally significant projects requiring federal action. It includes a list of priority transportation projects to be carried out in a four (4) year period. The purpose of the STIP is to educate the public on future transportation projects and to assure that federal funds are spent on projects selected from approved long range plans.

Metropolitan Planning Organization (MPO)

https://www.ok.gov/odot/Programs_and_Projects/Metropolitan_Planning/index.html

In 1962, the United States Congress passed legislation that mandated urban transportation planning as a condition for receiving federal transportation funding in any Urbanized Area (UZA) with a population greater than 50,000. The 1962 Act, along with federal initiatives in the 1970s which established the Metropolitan Planning Organization (MPO), formed the basis for metropolitan transportation planning used in the present day.

The Oklahoma Department of Transportation (ODOT) is the governor's designee to administer the transportation planning process for each of the states MPOs. The MPO is the transportation policymaking organization made up of elected representatives from local government and transportation authorities responsible for all transportation planning activities in their urbanized area. MPOs were developed to ensure that existing and future Federal-aid expenditures for transportation projects and programs are based on the 3-C planning process. Any highway or transit project or program to be constructed or conducted within the Metropolitan Planning Area (MPA) and to be paid for with federal funds, must receive approval by the MPO as being a product of the continuing, comprehensive, and cooperative (3-C) transportation planning process before any federal funds can be expended.

ODOT Long Range Transportation Plan

https://www.ok.gov/odot/Programs_and_Projects/Transportation_Programs/LRTP/index.html

In accordance with federal law, the Department had prepared the 2015-2040 Oklahoma Long Range Transportation Plan. The Plan is a policy document that guides ODOT in the development, management and operation of the State's Transportation System.

The Long Range Transportation Plan will help provide a long-term vision for highways, rural public transit, waterways, state-owned rail, airport access and pedestrian and bicycle facilities. It addresses goals related to safe and secure travel, infrastructure preservation, mobility choice, connectivity and accessibility, freight and economic vitality, environmental responsibility and efficient intermodal system management and operations.

1101 Continuing Inventory Data Studies

PURPOSE AND SCOPE: Catalog physical characteristics of statewide public roads; which are used to update the Department's ESRI Roads & Highways Database. Generate maps to conduct meetings with County Commissioners relating to inventory modifications. Inventory modifications are also based on completed construction projects and County Action Reports. Use SQL queries, procedures and reports to extract inventory data to publish various mileage reports for state, federal and public needs. Maintain data for the National Network of Defense, National Highway System, Control Section and Public Roads. Produce Annual Vehicle Miles traveled figures that will be used to calculate Annual Accident and Fatality Rates. Keep abreast of the latest technological advances through the attendance of seminars and conferences.

ACCOMPLISHMENTS DURING FFY 2019: The County Road inventory procedures were continued with eleven field inventories completed: (Blaine, Cimarron, Greer, Harmon, Kiowa, Logan, Muskogee, Texas, Tillman, Wagoner, and Woods). Five counties were reassessed and updated: (Grant, Harper, Ottawa, Adair, and Muskogee). Verified and processed all Highway construction projects, Open to Traffic Reports, County Action Reports and Graphical Roadway Network (NLF) revisions. The following publications or reports were completed: 2019 Certification of County Road Mileage, 2018 Oklahoma Statewide Statistics Book, 2018 HPMS Report, Travel Summary Tables and 2019 Statewide Mileage Table Book.

PROPOSED ACTIVITIES FOR FFY 2020: Incorporate technological advancements in data collection to streamline field inventory operations. Fifteen counties are scheduled to be inventoried: Sequoyah, Cherokee, Jackson, Custer, Major, Nowata, Latimer, Le Flore, Dewey, Alfalfa, Coal, Caddo, Roger Mills, Craig, and Choctaw. Ten counties are scheduled to be reassessed and coded: Adair, Beckham, Greer, Harmon, Kiowa, Logan, McIntosh, Pontotoc, Atoka, and Cimarron. Continue monitoring all County Action Reports, Highway Construction projects and continue collecting HPMS data items. Compile and publish various state and federal reports including: 2020 Certification of County Road Mileage, 2019 Oklahoma Statewide Statistics Book, 2020 HPMS Mileage and Travel Summary Tables.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$755,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$755,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$950,000	SPR	$0.00	STATE

CONTACT INFORMATION

Samuel Coldiron, Inventory Branch Manager, GIM II 405-522-1066

1102 Highway Performance Monitoring System

PURPOSE AND SCOPE: To collect, process, and compile data and information as needed to prepare and submit an accurate and timely HPMS submission to the Federal Highway Administration (FHWA) according to the reporting requirements established.

ACCOMPLISHMENTS DURING FFY 2019: ODOT adopted a new HPMS Console to accommodate changes occurring to the new FHWA HPMS Version 8 software. New validation constraints from the previous submittal year were added. Field Review documents were produced for 30 sample sections with the primary vicinity located around the north central region of the state. The 2017 HPMS data submittal was completed. New SQL Statements were added to accommodate submitting IRI for the NHS system by a tenth of mile. Continued to update and verify sample items through field inspection, ODOT Video-Log, Google-Street view, Bing-StreetSide, etc. Participated in webinars pertaining to HPMS. Due to Sample adequacy issues, ODOT created 75 additional Samples during the year which addresses required Sampling techniques.

PROPOSED ACTIVITIES FOR FFY 2020: A HPMS sample adequacy review will be conducted and additional samples will be added in the appropriate categories. Any changes in the HPMS data structure and HPMS console interface as required by changing FHWA requirements will be implemented and tested. Field review documents will be generated and a HPMS data field review will be conducted in cooperation with the Local FHWA Division. The 2018 HPMS data submittal will be transmitted to FHWA.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$95,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$89,800	SPR	$0.00	STATE
Projected Cost FFY 2020	$133,500	SPR	$0.00	STATE

CONTACT INFORMATION

Samuel Coldiron, Inventory Branch Manager, GIM II 405-522-1066

1103 Geographical Information Management System for Transportation

PURPOSE AND SCOPE: To design, develop, implement and maintain a Geospatial Information Management System for Transportation (GIMS-T). The system supports transportation related decision making by producing high quality map products and reports generated from enterprise data as well as geospatial data management for various ODOT divisions. The maps convey specific topics of interest that require customer input and the use of complex GIS software. GIS services are offered to ODOT staff as well as customers outside the Department. The system utilizes aerial photography, GPS, and other sources of data. The efficient use of resources requires a considerable investment in hardware, software, and training for GIMS-T staff. New methods and software are continuously being investigated and tested in order to improve the effectiveness, efficiency, and usability of the Departments applications.

ACCOMPLISHMENTS DURING FFY 2019: Generated numerous custom maps and KML files, such as Work plan maps, MAP21, Freight Plan, and Environmental Programs. Improved support to ODOT Map & Data Portal, providing the agency and the general public with a wide range of ODOT GIS data on desktop and mobile. ROW digitization efforts continued. Provided geospatial data management and visualization services for numerous ODOT divisions. Completed Roads & Highways inventory software implementation and network-wide asset inventory data collection. Products provided to Senior Staff, Div. Engineers and others. Continued GIS training and workshops. GIS training workshops were developed and training material for various GIS products. GIS training sessions for various ODOT departments were provided.

PROPOSED ACTIVITIES FOR FFY 2020: Continue to expand the Map & Data Portal. Update Asset Inventory to current year. Continue the ROW digitization effort. Finish converting Bike Map to GIS and other map products where appropriate. Provide support to ODOT personnel, other state agencies and partners with map and other products to assist them in their transportation needs. Coordinate with the Environmental, ROW, Rail, Outdoor Advertising, Facility Management, Project Mgmt., and Traffic Engineering Division to identify needs and develop solutions that will enable them to efficiently and accurately perform their individual needs. Purchase and implement Straight Line Diagram asset viewing software and LIDAR feature extraction software for asset inventory data update and viewing.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$975,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$925,000	SPR	$106,470	STATE
Projected Cost FFY 2020	$1,015,000	SPR	$0.00	STATE

CONTACT INFORMATION

Jeremy Planteen, Assistant Division Manager Phone: 405-521-2729

1301 Coverage Count Program

PURPOSE AND SCOPE: To collect traffic data on state highways, national highways, interstates and the National Functional Classified System for establishing average daily traffic volumes. Approximately 3,300 short duration locations are counted on the highway system and 11,700 on the secondary system that includes the county road coverage and urban city street coverage in cities with populations over 5,000. State highway and interstate locations are counted on a three-year cycle twice a year along with the county and city system coverage once a year. Counts collected on the highway system are incorporated into an Annual Average Daily Traffic (AADT) map published annually for distribution. Counts collected on the county and city systems are then recorded and retained for office and public use. Highway traffic maps are published for public distribution.

ACCOMPLISHMENTS DURING FFY 2019: Short duration traffic counts were completed on the State Highway System, county off-system and small urban system in the 25 counties scheduled for FFY 2019. Continuous updating of the GPS coordinates and site characteristics for all traffic count sites on all systems was performed. An enhanced version of the Oklahoma Traffic Count Management System Web Page was introduced, which will included enhanced maps and report printing.

PROPOSED ACTIVITIES FOR FFY 2020: Continue to analyze all road systems for areas where coverage is deficient, establish new count locations as needed and retire locations that are no longer needed. Collect short duration traffic counts on the State Highway System, county off-system and small urban system in the 27 counties scheduled for FY 2020. Update GPS coordinates and site characteristics for all traffic count sites on all systems as needed. Initiate a contract for the enhancement and maintenance of the Oklahoma Traffic Count Management System. Attend seminars, conferences and workshops to keep abreast of the latest technological advances in traffic counting equipment and data collection processes. Increase in projected cost due to legislative directed state employee pay raises.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$465,000	SPR	-0.00	STATE
Estimated Cost FFY 2019	$440,000	SPR	0.00	STATE
Projected Cost FFY 2020	$540,000	SPR	-0.00	STATE

CONTACT INFORMATION

Name: Aaron Fridrich

Title: Field Data Collection Branch Manager

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1302 Permanent Traffic Count Program

PURPOSE AND SCOPE: To collect hourly and 15 minute increment traffic data by lane for traffic monitoring design needs. There are currently 94 Automatic Vehicle Classification (AVC) station locations in Oklahoma. The traffic data obtained are the basis for seasonal and axle factor variation as recommended for traffic monitoring in FHWA's Traffic Monitoring Guide. A biennial traffic characteristic report is generated from the data collected at these sites. Utilities provided for operational support are maintained for permanent AVC stations through accounts supplied by contractor, at contractors expense.

ACCOMPLISHMENTS DURING FFY 2019: The Traffic Monitoring Systems (TMS) Operations and Maintenance Services are provided through two contracts, the TMS Data Collection Contract and the TMS Site Repair Contract. The contractor provided enhanced services and expertise, particularly in the area of data collection, systems validation and TMS site repair. The TMS site operational rate experienced a marked increase. Improved systems diagnostics and trend analysis provided by contract data systems experts have resulted in a much needed systems approach towards operations and maintenance support as evident in the detailed construction and renovation project coordination executed during this period. The scope of work expected to be accomplished during FFY 2019 included the renovation of twenty (20) existing sites. It is expected that site visits to carry out annual inspections, routine maintenance and equipment testing will be completed at all 94 AVC sites this year. ODOT has installed a "Wavetronics" radar sensing unit at an existing AVC site to evaluate performance. An RFP has been initiated for the purchase of 150 radar classification units and ODOT has installed a "Houston Radar" radar based sensing unit for evaluation before making a decision on the RFP.

PROPOSED ACTIVITIES FOR FFY 2020: The TMS Data Collection Contract will continue to improve data collection efficiency. The TMS Site Repair Contract will commence with ongoing repair and replacement construction projects identified and planned during FFY 2019. Both of these contracts will be rebid in FFY 2022. Execute scheduled maintenance for up to 94 sites. Complete site renovations and repairs to an estimated 30 permanent sites. Increase in projected cost due to site renovations and repairs. ODOT will be replacing all existing AVC site in-road sensors statewide with radar sensors starting with all urban area sites in Oklahoma City and Tulsa then we will begin replacing in-road sensors with radar sensors statewide. In addition to renovating existing AVC sites, we will install approximately 50 new AVC sites with radar sensors statewide including some additional sites in the urban areas.

- *Increase in funding is due to the AVC conversion to a non-obtrusive radar sensor installation contract and associated equipment and is a onetime expense. After the initial cost of installation, we will only require a minimal maintenance/installation contract of $200,000 to $400,000 and the costs associated will stabilize around $800,000.*

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$1,995,200	SPR	$0.00	STATE
Estimated Cost FFY 2019	$875,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$3,808,350	SPR	$0.00	STATE

CONTACT INFORMATION

Aaron Fridrich, Field Data Collection Branch Manager, 405-636-4180 ext. 221

1304 Purchase of Traffic Counting Equipment

PURPOSE AND SCOPE: To improve the efficiency of the traffic counting operation by systematic replacement of older outdated equipment and stolen or damaged equipment as well as support of increased equipment requirements resulting from expanded operations.

ACCOMPLISHMENTS DURING FFY 2019: Equipment purchases executed in FFY 2019 continued to support on-going projects in traffic monitoring systems operations in both permanent sites and short-duration count site locations.

PROPOSED ACTIVITIES FOR FFY 2020: The proposed construction of new traffic monitoring stations and replacement of old equipment comprises the majority of the expenditures for FFY 2020. As older, outdated data recorders become uneconomically repairable and obsolete, timely replacement becomes vital to maintaining data integrity and continuity of operations in the permanent traffic monitoring stations and particularly the short duration count program which depends on hardware availability and continuous replacement of road tubes and accessories.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$180,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$175,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$225,000	SPR	$0.00	STATE

CONTACT INFORMATION

Aaron Fridrich, Field Data Collection Branch Manager, 405-636-4180 ext. 221

1305 Vehicle Classification Counting Program

PURPOSE AND SCOPE: To gather vehicle classification data and develop estimates of the composition of traffic on the various Functional Classifications of roadways in the state and to collect complex traffic data required for planning, traffic and design studies. Data gathered and used to facilitate these studies includes machine counts, vehicle classification counts and turning movement studies with pedestrian counts.

ACCOMPLISHMENTS DURING FFY 2019: Vehicle classification data collection continued at the short term sites in support of the development of updated annual average truck volumes. The vehicle classification counting program for FFY 2019, cycle 2, was completed by contract with Southern Traffic Services (STS) for collection of all classification data statewide including multi-lane urban, multi-lane rural, 2-lane highway and ramp site locations. During FFY 2019, various special studies were conducted throughout the year providing timely data for traffic engineers, planners and designers in the Department's central office divisions as well as for traffic engineers, construction engineers, and maintenance managers in the eight field divisions.

PROPOSED ACTIVITIES FOR FFY 2020: The proposed construction of new traffic monitoring stations and replacement of old equipment comprises the majority of the expenditures for FFY 2020. As older, outdated data recorders become uneconomically repairable and obsolete, timely replacement becomes vital to maintaining data integrity and continuity of operations in the permanent traffic monitoring stations and particularly the short duration count program which depends on hardware availability and continuous replacement of road tubes and accessories.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$295,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$280,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$900,000	SPR	$0.00	STATE

CONTACT INFORMATION

Aaron Fridrich, Field Data Collection Branch Manager, 405-636-4180 ext. 221

1308 Traffic Monitoring System

PURPOSE AND SCOPE: To manage, estimate, report, and publish traffic data estimates as specified in the Highway Performance Monitoring System (HPMS) Manual and the Federal Highway Administration (FHWA) Traffic Monitoring Guide. The program also provides design traffic analysis and forecasts for new highways, planning functions, and improvement of the existing highways. Writing specifications, review and corrections, and approval of consultant engineering contract design traffic projects and research projects are performed as needed. Economic, environmental, and other factors of roadway improvements such as interchanges, realignments, and pedestrian structures are studied for the purpose of determining the economic and engineering feasibility of such proposals.

ACCOMPLISHMENTS DURING FFY 2019: All FHWA Traffic Submittals for 2018 Data for HPMS were completed by June 2019. Annual Average Daily Traffic (AADT) estimates including continuous counter analysis, annual factor generation, data validation for the vehicle classification contract and state collected counts was completed for 2018. Estimation of the statewide ramp system AADT was partially completed for 2018. Traffic monitoring count site locations were assessed and improved upon to better manage, analyze, and report collected data.

PROPOSED ACTIVITIES FOR FFY 2020: Traffic Monitoring System will continue the process of verifying, validating, and analyzing automatic vehicle classifiers and short term traffic counts for AADT estimation and HPMS data submittal. Applications will continue to be researched and developed for an automated estimation process for statewide AADT. Continue assessment of count site locations for coverage of the functional classified roadway system. Remain informed of technological advances and current best practices through attendance of seminars, conferences, and workshops.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$310,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$300,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$340,000	SPR	$0.00	STATE

CONTACT INFORMATION

Matthew Blakeslee, P.E., Traffic Management Engineer 405-522-6713

1309 Traffic Analysis and Projections

PURPOSE AND SCOPE: To provide traffic analysis and forecasts for geometric and structural design of new highways, roadway planning functions, roadway maintenance, and improvement of existing highways. To write specifications and to review, correct, and approve consultant work for engineering contract design traffic projects as well as research projects.

ACCOMPLISHMENTS DURING FFY 2019: Design traffic was provided to city and county governments, design and environmental consultants, and various divisions within ODOT. Information prepared for heavily populated areas was based on site specific special traffic counts and regional transportation studies in those cities. Traffic growth for urban and rural communities as well as small cities was prepared utilizing a linear regression model using historical data. Approximately 160 requests for design traffic were completed. Several engineering contract consultant design traffic analyses were overseen, edited, and approved at some level of completion. A research project for the National Performance Management Research Data Set was continued.

PROPOSED ACTIVITIES FOR FFY 2020: Design traffic data will continue to be furnished for cities, counties, and to ODOT divisions upon approved requests. Consultant design projects as well as feasibility and justification studies will be overseen through completion. Traffic analysis and projections will be completed, as requested for all programmed planning, construction, and maintenance projects. Remain informed of technological advances through attendance of seminars, conferences, and workshops.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$220,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$190,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$220,000	SPR	$0.00	STATE

CONTACT INFORMATION

Matthew Blakeslee, P.E., Traffic Engineer, 405-522-6713

1310 Skid Studies Program

PURPOSE AND SCOPE: To assess the skid resistance for pavement surfaces of Oklahoma's highway system in accordance with the guidelines of the Highway Safety Improvement Program and ASTM standards. The scope of the program includes annual testing of US-69 and all Interstate Highways, as well as the Strategic Highway Research Program sites. Conduct special skid resistance testing as requested.

ACCOMPLISHMENTS DURING FFY 2019: The annual skid resistance test cycle for FY 2019 encompassed pavement friction testing of US 69 and all Interstates and totals 1,800 miles. Skid testing & data collection began in April 2019 and was completed the same month. Special skid resistance testing will be completed in the fall of 2019. Calibration of the skid testing equipment was completed in April 2019.

PROPOSED ACTIVITIES FOR FFY 2020: The FY 2020 skid resistance test cycle encompasses US 69 and all interstates. The goal is to complete the 2020 cycle and special skid resistance testing by the fall of 2020. Calibration of the skid testing equipment is done on a biennial basis and will be scheduled for fall 2021.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$100,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$85,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$75,000	SPR	$0.00	STATE

CONTACT INFORMATION

Aaron Fridrich, Field Data Collection Branch Manager, 405-636-4180 ext. 221

1405 Motorcycle Safety & Education Program

PURPOSE AND SCOPE: The statewide motorcycle safety and education program seeks to reduce motorcycle crashes that result in fatalities and injuries. The program focuses on educating motorcyclists about safe riding habits and techniques to prevent crashes. The Oklahoma Highway Patrol (OHP), in coordination with the ODOT Traffic Engineering Division's Collision Analysis & Safety Branch, conducts motorcycle safety course and participates in education, outreach, and public awareness activities as a means of improving motorcycle user safety on the public roadways.

ACCOMPLISHMENTS DURING FFY 2019: The Oklahoma Highway Patrol, in partnership with ODOT, continued implementation of a statewide motorcycle safety and education program. The program included classroom and experiential educational training and public outreach events. Provided equipment needs, and maintenance on current equipment. OHP provided the program “Share the Road” events throughout Oklahoma utilizing a multimedia mobile classroom that travels throughout the State to provide this classroom training as well as static displays throughout the year. The annual report of completed training is given to ODOT each fiscal ending year.

PROPOSED ACTIVITIES FOR FFY 2020: The Oklahoma Highway Patrol, in partnership with ODOT, will continue implementation of the statewide motorcycle safety and education program. The program will included classroom and experiential educational training and public outreach and awareness. OHP will use ODOT collision data to examine program effectiveness and use variables such as age, locations, and types of crash etc., to further refine program strategies.

FINANCIALS	Amount	Fund	Amount	Fund
Programmed Amount FFY 2019	$47,505	SPR	$0.00	STATE
Estimated Cost FFY 2019	$47,505	SPR	$0.00	STATE
Estimated Cost FFY 2020	$46,000	SPR	$0.00	STATE

CONTACT INFORMATION

David Glabas, Assistant Chief Traffic Engineer, 405-521-2861

1406 Bridge Health Monitoring

PURPOSE AND SCOPE: The purpose and scope of this task is to coordinate initial test of bridge health monitoring in Oklahoma. The data related to over load posted vehicles, bridge load posting and bridge response analysis. The initial trial will be used to analyze the viability for use on other structures in poor condition.

ACCOMPLISHMENTS DURING FFY 2019: Purchase Order was obtained to procure, install and monitor sensors to establish a baseline of response to analyze the Bridge Port Bridge on Historic Route 66 over the Canadian River. Garver along with Burgess and Niple are under contract to do the engineering analysis of the bridge JP # 34058(04) Engineering Contract EC-185013. Due to a programming change of Bridge Port being rebuilt a decision to install the sensors in another location is being evaluated.

PROPOSED ACTIVITIES FOR FFY 2020: Install sensors to establish a baseline of response to analyze the Tower Bridge on Historic Route 66 over the Canadian River. This bridge is on the National Registry of Historic Places and is structurally deficient. Analysis will set a base line before the Bridge Port Bridge is rebuilt.

FINANCIALS	Amount	Fund	Amount	Fund
Programmed Amount FFY 2019	$300,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$140,000	SPR	$0.00	STATE
Estimated Cost FFY 2020	$50,000	SPR	$0.00	STATE

CONTACT INFORMATION

Jared Schwennesen, P.E. Rail Division Manager, 405-521-4203

1407 McClellan-Kerr Arkansas River Navigation System Channel Study

PURPOSE AND SCOPE: The purpose and scope of this study is to partner with the Department of Army, represented by the U.S. Army Corps of Engineers and the Arkansas Waterways Commission implementing a validation study to allow recommendations ,coordinate and implement solutions for navigation, ecosystem restoration, flood risk management, recreation, and other project purposes along the McClellan-Kerr Arkansas River Navigation System (MKARNS) The validation study will show changes that have occurred in the channel and conservation plan.

ACCOMPLISHMENTS DURING FFY 2019: None. New study to begin in 2020.

PROPOSED ACTIVITIES FOR FFY 2020: Begin a feasibility study due to significantly changed physical and economic conditions to evaluate and recommend modifications to the McClellan-Kerr Arkansas River Navigation System with reference to long-term sustainable navigation solutions and improvements in the interest of ecosystem restoration, flood risk management, and recreation; the study should assess the extent of federal interest in participating in a solution to identified problems.

FINANCIALS	**Amount**	**Fund**	**Amount**	**Fund**
Programmed Amount FFY 2019	$0.00	SPR	$0.00	STATE
Estimated Cost FFY 2019	$0.00	SPR	$0.00	STATE
Estimated Cost FFY 2020	$225,000	SPR	$0.00	STATE

CONTACT INFORMATION

Thaddaeus Babb, Waterways Manager, 918-270-5804

1440 Local Technical Assistance Program

PURPOSE AND SCOPE: The Local Technical Assistance Program (LTAP) is an education program contracted through Oklahoma State University's Center for Local Government Technology (CLGT) to provide training and technical assistance to county, municipal, and tribal governments responsible for the planning, maintenance, and construction of transportation systems at the local level. This is accomplished by (1) conducting classes, workshops, conferences, seminars and other training opportunities; (2) providing on-site technical assistance; (3) maintaining a lending library of publications, videotapes, DVDs and other technology resource documents; (4) providing information and technical assistance on new and existing technologies; (5) coordinating with faculty and staff at OSU, ODOT, FHWA and within industry to provide technical expertise and support; (6) providing a website and list-serve; (7) maintaining a database of rural, local and state transportation officials and other resources in Oklahoma and nationwide; and (8) Transportation Intern Program (TIP).

ACCOMPLISHMENTS DURING FFY 2019: Conducted 39 training sessions to 1,005 individuals for a total of 402 training hours up to the time of the completion of this page; awarded 10 Roads Scholar Completion Certificates; conducted the annual LTAP Advisory Meeting and developed and conducted new training courses as requested; conducted training in the FHWA focus areas of Roadway Safety, Worker Safety, Work Zone Safety, Infrastructure Management, and Workforce Development; conducted seminars in conjunction with industry professionals on emerging technologies; maintained the LTAP website and list-serve; published various books, plans and DVDs for distribution; served as chapter headquarters for the American Public Works Association Oklahoma chapter and planned and conducted their annual conference; coordinated activities with CLGT's Transportation Intern Program to include those promoting the use of GIS/GPS technologies; attended various association and professional meetings to include the Association of County Commissioners of Oklahoma, County Officers and Deputies Association, Oklahoma Municipal League, National LTAP Association; provided program progress reports to ODOT and FHWA.

PROPOSED ACTIVITIES FOR FFY 2020: Continue to develop activities to facilitate the implementation of FHWA's Every Day Counts initiatives; continue the Roads Scholar curriculum in conducting at least two of each course offering during the fiscal year; participate in Association of County Commissioners of Oklahoma, County Officers and Deputies Association, Oklahoma Municipal League, National LTAP Association and LTAP Region VI meetings and conferences; continue to teach and develop courses in the FHWA focus areas of Roadway Safety, Worker Safety, Work Zone Safety, Infrastructure Management, and Workforce Development; continue to serve as the state office of the Oklahoma Chapter of APWA; continue to implement principals taught in LTAP courses through the projects conducted by students assisting agencies through the Transportation Intern Program; serve on various local and national committees; provide technical assistance as requested; continue to provide website, list-serve, books, plans, tapes, DVD's, etc. for distribution; conduct LTAP Advisory Meeting and develop requested activities where possible; provide program progress reports to ODOT and FHWA.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$282,969	SPR	$82,048	STATE	$150,000	FHWA
Estimated Cost FFY 2019	$250,000	SPR	$77,400	STATE	$150,000	FHWA
Projected Cost FFY 2020	$276,000	SPR	$74,000	STATE	$150,000	FHWA

CONTACT INFORMATION: Bryan Cooper, Transportation Manager, 405-636-4199

1601 Federal-Aid Systems Coordination

PURPOSE AND SCOPE: To coordinate the States Highway System, Federal-Aid Highway System, National Highway System, and the Functional Classification System in Oklahoma. Coordinate all highway and roadway classification revisions pertaining to these systems. To record, maintain research, and provide any documents and historical data relating or pertaining to these systems. To communicate, inform, and coordinate with city, county, state, and federal officials regarding these systems.

ACCOMPLISHMENTS DURING FFY 2019: Provided coordination of State Highway and Functional Class revisions with the ODOT Central Office, Division Engineers, FHWA and appropriate local, state and federal officials; Highway systems has been coordinated with city, county, state and national officials in regards to designation or alignment changes made to the State Highway System; Highway Removals have been processed in regards to SH-101 to Sequoyah's Cabin, and have been agreed on to remove SH-9B in Gotebo, OK and SH-3A in Oklahoma/Canadian Counties. Mileage and Historical logs have been updated and maintained as functional classification and alignment changes are approved by the ODOT commissioners, FHWA and AASHTO; Highway Systems staff attended conferences, meetings and webinars to prepare for the upcoming 2020 census.

PROPOSED ACTIVITIES FOR FFY 2020: Highway system staff will continue to coordinate with city, county, state and national officials in regards to designation, revisions, or alignment changes made to the State Highway System. There will be continual coordination of Functional Class revisions with the ODOT Central Office, Division Engineers, FHWA and appropriate local, state and federal officials; Mileage and Historical logs will be updated and maintained as functional classification and alignment changes are approved by the ODOT commissioners, FHWA and AASHTO; Highway Systems has compiled a large file of proposed removals from the State Highway System after review of highway connectivity and average daily traffic across the state. This file will be reviewed by appropriate ODOT management prior to progression of this project.

FINANCIALS	Amount	Fund	Amount	Fund
Programmed Amount FFY 2019	$ 85,500	SPR	$0.00	STATE
Estimated Cost FFY 2019	$ 85,000	SPR	$0.00	STATE
Estimated Cost FFY 2020	$ 60,000	SPR	$0.00	STATE

CONTACT INFORMATION

Samuel Coldiron, Inventory Branch Manager, GIM II, 405-522-1066

1604 Pavement Management Systems

PURPOSE AND SCOPE: To develop and implement the Department's Pavement Management System. To maintain a computer database of pavement distresses and other roadway characteristics used for the analysis of pavement condition and performance. Maintain application software necessary to analyze roadway information for pavement management. Supply data for inclusion in the Highway Performance Monitoring System (HPMS). Estimate the current and future needs of the State Highway System by producing a statewide annual condition and needs report. Maintain a database indicating ratings for roadways and bridges with suggested improvements and costs.

ACCOMPLISHMENTS DURING FFY 2019: Performed Pavement Management System analysis of the National Highway System (NHS) and the State Highway System (SHS) in Oklahoma. Technical support for the video log software was provided. Data was collected on all NHS routes, including Turnpike routes on the NHS, and all SHS routes. HPMS reporting was updated in Oracle database. Kept informed of the latest technological advances and practices by attending meetings, webinars, and workshops. Modified the Pavement Performance Data Quality Management Program, submitted to FHWA in 2018, with new control and verification site information. Began the process of updating the dTIMS software needed for analysis to be in line with ODOT's new ESRI Roads and Highways system.

PROPOSED ACTIVITIES FOR FFY 2020: Perform Pavement Management System collection and analysis on all NHS and SHS routes in Oklahoma as well as all non-highway samples required for HPMS. Continue refinement of analysis software for deterioration curves, pavement strategies, and project optimization. Provide technical support for the video log software. Compile Pavement Management System data for the 2020 Field Division Notebooks. Document Pavement Management processes by generating manuals for Collection, Analysis, and Reporting. Keep informed of the latest technological advances and practices by attending meeting, webinars and workshops.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$1,540,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$ 849,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$1,350,000	SPR	$0.00	STATE

CONTACT INFORMATION

Angel Gonzalez, Pavement Management Engineer, 405-522-5904

1700 General Urban Transportation Planning

PURPOSE AND SCOPE: To coordinate transportation planning efforts which cannot be ascribed to specific transportation studies contained in the unified planning work programs of the State Planning and Research Work Program. To provide linkage between transportation planning and project development, environmental review, and other topics as needed.

ACCOMPLISHMENTS DURING FFY 2019: Provided coordination with ODOT Central Office, Field Divisions and local, state and federal officials. Shared pertinent planning data and information as needed. Provided technical assistance concerning transportation planning and the Fixing America's Surface Transportation FAST Act. Attended workshops, seminars, and conferences related to connected and automated vehicles, electric vehicles and alternate energy sources, freight, and statewide transportation planning.

PROPOSED ACTIVITIES FOR FFY 2020: Provide coordination with ODOT Central Office, Field Divisions and local, state and federal officials. Disseminate pertinent planning data and information as needed. Provide technical assistance as requested concerning transportation planning and the FAST Act. Build upon staff knowledge through attendance at workshops, seminars and conferences.

FINANCIALS	**Amount**	**Fund**	**Amount**	**Fund**
Programmed Amount FFY 2019	$7,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$7,000	SPR	$0.00	STATE
Estimated Cost FFY 2020	$20,000	SPR	$0.00	STATE

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-521-2705

1701 Oklahoma City Area Regional Transportation Study

PURPOSE AND SCOPE: Assist and oversee transportation planning processes and coordination with the Association of Central Oklahoma Governments (ACOG) in the execution of the Unified Planning Work Program (UPWP), Transportation Improvement Program (TIP), and Long Range Transportation Planning (LRTP) for the Oklahoma City Area Regional Transportation Study Area (OCARTS).

ACCOMPLISHMENTS DURING FFY 2019: Transportation planning for the OCARTS Area was carried out as described in the FFY 2019 Unified Planning Work Program (UPWP). Accomplishments during FY 2019 included: preparation and finalization of the FY 2020 UPWP; ACOG continued collecting socioeconomic data (land use, population, employment, schools, etc.) for use in the development of the 2045 MTP; Preparations continued for the 2020 Census; ACOG collaborated with several entities in an effort to populate the online traffic count database system and mapping services; ACOG continued implementing projects and work programs identified by the LRTP Encompass 2040; Short-Range Transportation Planning continued in the areas of Urbanized Area Funding, Air Quality, Transit Operations, Active Transportation, Freight and Connected & Autonomous Vehicles

PROPOSED ACTIVITIES FOR FFY 2020: Implementation of Encompass 2040 projects and strategies while also reviewing methodology to evaluate possible changes for the 2045 metropolitan transportation plan; an emphasis will continue to be placed on financial feasibility, public involvement and the economic and environmental impacts of transportation decisions, and performance-based planning; tracking of Encompass 2040 performance measures; continuation of the Regional Transit Authority Task Force activities; update the STBG-UZA evaluation criteria to reflect evolving regional goals and performance measures; short range planning and coordination in addition to preparing for the 2045 long-range MTP; continue coordination with local governments regarding federal transportation funding opportunities; continue work in areas of air quality, ozone reduction and environmental program planning to comply with federal transportation law.

FINANCIALS	**Amount**	**Fund**	**Amount**	**Fund**	**Amount**	**Fund**
Programmed Amount FFY 2019	$25,000	SPR	$3,217,472	PL	$ 643,494	LOCAL
Estimated Cost FFY 2019	$25,000	SPR	$3,217,472	PL	$ 643,494	LOCAL
Estimated Cost FFY 2020	$25,000	SPR	$2,019,698	PL	$ 403,940	LOCAL

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-521-2705

1702 Tulsa Metropolitan Area Transportation Study

PURPOSE AND SCOPE: Assist and oversee transportation planning processes and coordination with the Indian Nations Council of Governments (INCOG) in the execution of the Unified Planning Work Program (UPWP), Transportation Improvement Program (TIP), and Long Range Transportation Planning (LRTP) for the Tulsa Metropolitan Area Transportation Study Area (TMATS).

ACCOMPLISHMENTS DURING FFY 2019: Transportation planning for the Tulsa TMA was carried out as described in the FFY 2019 Unified Planning Work Program (UPWP); Accomplishments during FFY 2019 included: preparation and finalization of the FFY 2020 UPWP; work continued on projects identified in the Connected 2045 Long Range Transportation Plan (LRTP); continued the coordination of the Ozone Alert! Green Traveler Alternative programs; continued to identify the needs of the elderly, disabled, low-income households and under-represented citizens through the Coordinated Public Transit Human Services Transportation Plan; secured funding for the phase II of the grant to expand access to transportation services for Veterans through the FTA funded Veterans Transportation Community Living Initiative.

PROPOSED ACTIVITIES FOR FFY 2020: Continue data collection and monitoring of social, economic and environmental factors that directly relate to the transportation system; address multi-modal transportation issues within the TMA aimed at maintaining a continuing, coordinated and comprehensive planning process; responsible for preparing and maintaining the Regional Transportation Plan (RTP); Focus areas for FY 2020 will include: multimodal connectivity and continued implementation of the GO plan for 'active' transportation; Continued implementation of the LRTP 'Connected 2045' and updates; Update and maintain the TIP for FFY 2018-2021 as needed and prepare for FFY2020-2023; continue coordinating the OZONE ALERT! Program & the Clean Cities Program; Update the Congestion Management Process to adhere to federal requirements within the TMA; continue assisting member governments in the planning, funding and implementation of an alternative transportation system; address transportation needs of the disabled, elderly and low income households; continue the implementation of the Transportation Alternatives (TA) program.

FINANCIALS	**Amount**	**Fund**	**Amount**	**Fund**	**Amount**	**Fund**
Programmed Amount FFY 2019	$25,000	SPR	$ 2,172,408	PL	$ 434,482	LOCAL
Estimated Cost FFY 2019	$25,000	SPR	$ 2,172,408	PL	$ 434,482	LOCAL
Estimated Cost FFY 2020	$25,000	SPR	$ 1,391,162	PL	$ 278,232	LOCAL

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-521-2705

1703 Lawton Metropolitan Area Transportation Study

PURPOSE AND SCOPE: Assist and oversee transportation planning processes and coordination with the Lawton Metropolitan Planning Organization (LMPO) in the Lawton Metropolitan area.

ACCOMPLISHMENTS DURING FFY 2019: Transportation planning for the Lawton Metropolitan Planning Area was carried out as described in the FFY 2019 Unified Planning Work Program (UPWP). Accomplishments during FFY 2019 included: preparation and finalization of the FFY 2018-2021 TIP; preparation and finalization of the FY 2020 UPWP; the FY 2018 Agreement was executed and authorization to expend federal funds were effective on July 1, 2017 through annual transportation planning documents; continued analysis of pedestrian facilities; continued development for a conceptual design of a freight route connecting US 62 to the West Industrial Park; identified streets exceeding level of Service D using 2014 traffic counts; identified priority corridors where access management techniques could improve traffic flow and safety; established performance measures safety targets; continued bicycle safety education campaign; participated in the Lawton Area Transit System's FTA Triennial Review; continued the air quality awareness campaign in cooperation with local media and the Lawton Metropolitan Area Air Quality Committee.

PROPOSED ACTIVITIES FOR FFY 2020: As defined in the FY 2020 UPWP; complete the 2045 Metropolitan Transportation plan and 2045 Land Use Plan; Continued research on the benefits of utilizing roundabouts and identifying areas within the LMPO's boundary they could be utilized; continue research and mapping of right-of-way widths of arterials; analyze pedestrian facilities and identify areas for new pedestrian crossings; monitor and report on performance measures targets; work with consultant hired to prepare design concept of multi-modal transportation transfer center; research and apply for grant opportunities for the construction of a bus transfer center; attend 2020 census trainings, prepare the 2020-2024 TIP and continue the public awareness campaign for air quality.

FINANCIALS	**Amount**	**Fund**	**Amount**	**Fund**	**Amount**	**Fund**
Programmed Amount FFY 2019	$10,000	SPR	$ 232,017	PL	$ 46,403	LOCAL
Estimated Cost FFY 2019	$10,000	SPR	$ 232,017	PL	$ 46,403	LOCAL
Estimated Cost FFY 2020	$10,500	SPR	$ 210,500	PL	$ 42,100	LOCAL

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-521-2705

1709 Ft. Smith Transportation Study

PURPOSE AND SCOPE: Assist and oversee transportation planning processes and coordination with the Frontier Metropolitan Planning Organization in the Ft. Smith Metropolitan Area.

ACCOMPLISHMENTS DURING FFY 2019: Implementation of Encompass 2040 projects and strategies while also reviewing methodology to evaluate possible changes for the 2045 metropolitan transportation plan; An emphasis will continue to be placed on financial feasibility, public involvement and the economic and environmental impacts of transportation decisions, and performance-based planning; Tracking of Encompass 2040 performance measures; Continuation of the Regional Transit Authority Task Force activities; Update the STBG-UZA evaluation criteria to reflect evolving regional goals and performance measures; Short range planning and coordination in addition to preparing for the 2045 long-range MTP; continued coordination with local governments regarding federal transportation funding opportunities; Continue work in areas of air quality, ozone reduction and environmental program planning to comply with federal transportation law.

PROPOSED ACTIVITIES FOR FFY 2020: Frontier will continue to apply performance-based planning, take action to establish opportunities for local, regional and statewide coordination, and advance efforts for transportation connectivity, equity and accessibility by: actively reviewing and updating the 2040 Metropolitan Transportation Plan; continue creating bicycle and pedestrian plans for the region focusing on Pocola and Greenwood; Monitoring safety needs and initiatives in the area; working with local governments to coordinate land use and transportation concerns; implement a study for a regional freight plan; Frontier will continue and analyze and study crash data, demographics and future projections, public transit ridership; Frontier will continue to work in areas of air quality, ozone reduction and environmental program planning to comply with federal transportation law.

FINANCIALS	Amount	Fund	Amount	Fund	Amount	Fund
Programmed Amount FFY 2019	$10,000	SPR	$35,000	PL	$7,000	LOCAL
Estimated Cost FFY 2019	$10,000	SPR	$35,000	PL	$7,000	LOCAL
Estimated Cost FFY 2020	$10,500	SPR	$37,500	PL	$7,500	LOCAL

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-521-2705

1710 Regional Transportation Planning

PURPOSE AND SCOPE: To provide transportation planning assistance for the non-metropolitan areas of the State through the Oklahoma Association of Regional Councils (OARC). The regional transportation planning program will assist ODOT in meeting federal and state requirements for the Statewide Planning Process to address the transportation needs in non-metropolitan areas. Develop and provide ongoing public participation for the transportation planning process.

ACCOMPLISHMENTS DURING FFY 2019: Transportation planning for the four Regional Transportation Planning Organization (RTPO) regions were carried out as described in the RTPO's FFY 2019 Planning Work Program (PWP). Accomplishments during FFY 2019 included continual data collection of social, economic and transportation system data, preparation of the annual planning funding documents, and maintenance and updates of each RTPO website; SORTPO collected socioeconomic and demographic data and completed Long Range Transportation Plans (LRTP) for two counties; NORTPO completed one county's LRTP and has reviewed all TAZ (Traffic Analysis Zone) maps within the NODA (Northern Oklahoma Development Authority) region; CORTPO has been in review of their TAZ Maps and revisions of all current LRTP's as needed; Grand Gateway RTPO has completed two county LRTP's and has been continually collecting socioeconomic and demographic data within their region. The template for the Regional Long Range Transportation Plan for each RTPO has been created and reviewed for work to begin in 2020.

PROPOSED ACTIVITIES FOR FFY 2020: The Oklahoma Department of Transportation will continue coordination with the RTPO's in maintaining the 3-C planning process in non-metropolitan areas. Monitor the transportation planning process for compliance with administrative, financial, and legal requirements to maintain a continuous, cooperative and comprehensive process. Continue staff education, training and attendance at workshops and seminars; assist in data collection and monitoring of social, economic, environmental and transportation system data; continued development of each counties LRTP's and will begin updating and compiling data collected from each county plan, per RTPO region, to develop their Regional Long Range Transportation Plans.

FINANCIALS	**Amount**	**Fund**	**Amount**	**Fund**
Central Oklahoma Economic Development District	$125,000	SPR	$31,250	LOCAL
Grand Gateway Economic Development District	$125,000	SPR	$31,250	LOCAL
Northern Oklahoma Development Authority	$175,000	SPR	$43,750	LOCAL
Southwestern Oklahoma Development Authority & Association of South Central Oklahoma Governments	$225,000	SPR	$56,250	LOCAL

FINANCIALS	**Amount**	**Fund**	**Amount**	**Fund**
Programmed Amount FFY 2019	$700,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$700,000	SPR	$0.00	STATE
Estimated Cost FFY 2020	$700,000	SPR	$0.00	STATE

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-521-2705

1719 Statewide Transportation Improvement Program

PURPOSE AND SCOPE: To develop, administer and revise a financially-constrained federally funded Statewide Transportation Improvement Program (STIP) for the State of Oklahoma in compliance with the Fixing America's Surface Transportation (FAST) Act and in cooperation with the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), the four Metropolitan Planning Organizations (ACOG, INCOG, LMPO, and Frontier MPO), the Bureau of Indian Affairs, and Tribal Governments.

ACCOMPLISHMENTS DURING FFY 2019: Managed the 2018-2021 STIP. Began development of the 2020-2023 STIP. Coordinated with MPO's, FHWA, and FTA to amend and modify the STIP.

PROPOSED ACTIVITIES FOR FFY 2020: Manage the FFY 2020-2023 STIP and amend or modify as necessary. Continue administration of current STIP using approved procedures. Begin planning stages of converting STIP process to an electronic (eSTIP) system.

FINANCIALS	**Amount**	**Fund**	**Amount**	**Fund**
Programmed Amount for FFY 2019	$ 400,000	SPR	$0.00	STATE
Estimated Cost for FFY 2019	$ 50,000	SPR	$0.00	STATE
Estimated Cost for FFY 2020	$ 100,000	SPR	$0.00	STATE

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-521-2705

1720 Statewide Travel Demand Model

PURPOSE AND SCOPE: To develop a statewide travel demand model to determine regional and corridor-based needs. Mode share will be addressed within regional corridors. The project will include network development, traffic analysis zone development, and demographic, mode, network data development, and validation and calibration of a base year model.

ACCOMPLISHMENTS DURING FFY 2019: The knowledge of the staff was enhanced through attending conferences, courses, seminars and training such as technical papers and webinars. Initiated the process of getting a consultant for the Travel Demand Model (TDM). After obtaining the consultant, then manage the contract in order to make sure that the project scope, work plan and schedule were followed.

PROPOSED ACTIVITIES FOR FFY 2020: Manage the consultant contract for the statewide travel demand model to include project scope, work plan and schedule. Enhance staff knowledge through courses, seminars, trainings, and conferences hosted by the Federal Highway Administration, the National Highway Institute, and others.

FINANCIALS	Amount	Fund	Amount	Fund
Programmed Amount for FFY 2019	$ 415,000	SPR	$0.00	STATE
Estimated Cost for FFY 2019	$ 150.000	SPR	$0.00	STATE
Estimated Cost for FFY 2020	$ 400,000	SPR	$0.00	STATE

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-521-2705

1902 Statewide Long Range Transportation Planning

PURPOSE AND SCOPE: To maintain the Oklahoma Long Range Transportation Plan (LRTP) and other associated statewide planning activities in accordance with the provisions of federal law. To develop Oklahoma Public Transit Policy Plan.

ACCOMPLISHMENTS DURING FFY 2019: Completed development of Long Range Transportation Plan manual. Initiated development of 2020-2045 Oklahoma Long Range Transportation Plan (LRTP), including development of solicitation, contract, and scope of work. Early activities included development of proposed goals, coordination of LRTP Advisory Committee, and designing public involvement strategies. Ensured that scope of plan is consistent with Fixing America's Surface Transportation System (FAST) Act and pertinent state rules and regulations. Continued maintenance and implementation of the 2015-2040 LRTP. Continued coordination with ODOT divisions, MPOs and local governments in relation to long range transportation plans.

PROPOSED ACTIVITIES FOR FFY 2020: Complete development of 2020-2045 Oklahoma LRTP in accordance with federal rules. The Plan will include consideration of items such as the ten federal planning factors; performance measures and targets; and non-metropolitan, tribal and metropolitan public comments. Continue maintenance and implementation of the 2015-2040 LRTP. Continue coordination with ODOT divisions, MPOs and local governments in relation to long range transportation plans. Review federal rule making, FAST Act guidance, and pertinent state legislative transportation issues. Keep apprised of possible changes in long range transportation planning requirements as new federal legislation is developed (FAST Act expires September 30, 2020).

Develop an Oklahoma Public Transit Policy Plan (PTPP), as required by and in accordance with Oklahoma Enrolled House Bill No. 1365. The PTPP will reflect the results of the 2018 Oklahoma Transit Needs Assessment, include all applicable stakeholder input, provide for future collaboration and coordination among all public transit agencies and systems across the state, and provide for future collaboration and coordination with all state agencies with an interest in public transit. The Transit Plan will be consistent with the goals and policies of the findings of the Oklahoma Long Range Transportation Plan 2020-2045, as they relate to transit systems.

FINANCIALS	**Amount**	**Fund**	**Amount**	**Fund**
Programmed Amount for FFY 2019	$825,000	SPR	$0.00	STATE
Estimated Cost for FFY 2019	$400,000	SPR	$0.00	STATE
Estimated Cost for FFY 2020	$1,300,000	SPR	$0.00	STATE

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-521-2705

1904 Air Quality Planning

PURPOSE AND SCOPE: Monitor and participate in air quality transportation planning developments relating to requirements of the Clean Air Act Amendments and the FAST Act. Represent the Department in air quality non-attainment and transportation conformity actions. Analyze and comment on air quality non-attainment and transportation regulations and laws. Maintain information flow to and from decision-makers regarding air quality/transportation issues, developments, regulations, and laws. Continue staff education, training and attendance at workshops and seminars. Assist the Department to be a progressive participant in reducing the impacts of transportation-related pollution.

ACCOMPLISHMENTS DURING FFY 2019: Participated in the air quality/transportation planning activities of Lawton Metropolitan Planning Organization (LMPO), Association of Central Oklahoma Governments (ACOG), and Indian Nations Council of Governments (INCOG); Attended air quality meetings with partners at the Federal Highway Administration (FHWA) and Oklahoma Department of Environmental Quality (ODEQ); researched and maintained resource materials on air quality/transportation issues, and reviewed and commented on MPO air quality education programs; Coordinated the planning process for air quality modeling funding and actions between the States, MPOs, ODOT and the ODEQ; monitored regulations on National Ambient Air Quality Standards (NAAQS), Climate Change and Greenhouse Gas Emissions.

PROPOSED ACTIVITIES FOR FFY 2020: Maintain research and participation in air quality/transportation issues, developments, regulations, and laws; continue to develop education materials and resources for Department personnel regarding air quality and transportation; continue to monitor the air quality regulations and impact to the Department; attend air quality/transportation planning activities of the LMPO, ACOG, and INCOG; participate in MPO and ODEQ air quality/transportation initiatives, educational programs, and efforts to reduce pollution; continue partnership with ACOG and INCOG to enhance and extend data collection and modeling outside of the study areas to establish base data for air quality issues in rural/donut areas; coordinate with MPOs to sign federally designated alternate fuel corridors; continue staff education through courses, seminars, and conferences.

FINANCIALS	**Amount**	**Fund**	**Amount**	**Fund**
Programmed Amount FFY 2019	$ 50,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$ 15,000	SPR	$0.00	STATE
Estimated Cost FFY 2020	$ 30,000	SPR	$0.00	STATE

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-521-2705

1905 Freight Transportation Planning

PURPOSE AND SCOPE: To coordinate freight planning and freight data analysis with the Long Range Transportation Plan (LRTP), the Oklahoma State Rail Plan, waterway freight planning reports, performance measurement, and project development processes. To ensure Oklahoma's freight planning efforts are in compliance with federal legislation.

ACCOMPLISHMENTS DURING FFY 2019: Monitored implementation of the Oklahoma Freight Transportation Plan, 2018-2022 and related documentation. Updated Freight Brochure. Coordinated with Metropolitan Planning Organizations regarding urban and state freight transportation planning efforts. Continued communication and analysis regarding freight data, freight congestion, performance measures and multimodal freight.

PROPOSED ACTIVITIES FOR FFY 2020: Monitor implementation of the Oklahoma Freight Transportation Plan, 2018-2022 and related documentation. Keep apprised of possible changes in freight planning requirements as new federal legislation is developed (FAST Act expires September 30, 2020). Coordinate with Metropolitan Planning Organizations regarding urban and state freight transportation planning efforts. Continue communication and analysis regarding freight data, freight congestion, performance measures and multimodal freight.

FINANCIALS	Amount	Fund	Amount	Fund
Programmed Amount for FFY 2019	$50,000	SPR	$0.00	STATE
Estimated Cost for FFY 2019	$15,000	SPR	$0.00	STATE
Estimated Cost for FFY 2020	$15,000	SPR	$0.00	STATE

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-521-2705

1913 Bicycle and Pedestrian Planning

PURPOSE AND SCOPE: To coordinate and develop a bicycle and pedestrian program for the State of Oklahoma in compliance with the provisions of existing federal regulations and FAST Act provisions and all applicable transportation planning regulations and requirements in compliance with the FHWA, FTA, the four Metropolitan Planning Organizations; (ACOG, INCOG, LMPO, and Frontier MPO), and non-metropolitan areas.

ACCOMPLISHMENTS DURING FFY 2019: Attended seminars, workshops, and webinars related to bicycle and pedestrian transportation planning and policies in order to maintain, upgrade, and develop needed experience and expertise; attended public meetings to field and answer questions from staff and citizens; monitored state and local legislation regarding bicyclists and pedestrians; participated in the bicycle and pedestrian transportation planning activities of local communities, ACOG, INCOG, LMPO and Frontier MPO; researched bicycle and pedestrian safety, education, and infrastructure; assisted Department personnel with bicycle and pedestrian related questions; shared training opportunities, information, and guidance to department and outside personnel; made connections with various outside entities to further bicycle and pedestrian initiatives, education, user safety and awareness; continued the Statewide Active Transportation Committee to further the intentions of this position while working closely with Oklahoma MPOs, RTPOs, state departments, and citizens; Fulfilled the Transportation Alternatives Program solicitation and project selection; awarded $7.5 million in project match funds for 21 alternative transportation projects statewide.

PROPOSED ACTIVITIES FOR FFY 2020: Monitor bicycle and pedestrian issues, developments, regulations, and laws. Develop educational materials and resources for Department personnel regarding bicycle and pedestrian safety, infrastructure design, and transportation. Develop the Oklahoma Active Transportation Policy Plan in accordance with state and federal rules and guidance's. The Plan will include consideration of items such as performance measures and targets; and non-metropolitan, tribal and metropolitan public comments. Attend bicycle and pedestrian planning activities of ACOG, INCOG, LMPO and Frontier MPO and other non-metropolitan areas of the State. Participate in bicycle and pedestrian transportation planning initiatives, seminars, workshops and educational programs across the State. Finalize and publish the Oklahoma Bicycle map with cooperation from ODOT staff. Purchase pedestrian counters and implement bicycle and pedestrian counters in coordination with MPO partners as a means to collect and maintain data in accordance with the MAP-21 and FAST Act performance measurers. Coordinate the development of a statewide inventory of existing and proposed bicycle and pedestrian facilities. Enhance staff knowledge through courses, seminars, trainings, and conferences hosted by FHWA, LTAP, and others.

FINANCIALS	**Amount**	**Fund**	**Amount**	**Fund**
Programmed Amount FFY 2019	$120,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$120,000	SPR	$0.00	STATE
Estimated Cost FFY 2020	$150,000	SPR	$0.00	STATE

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-521-2705

1914 Transportation Asset Management Plan

PURPOSE AND SCOPE: To develop a transportation asset management plan (TAMP) for the Oklahoma Department of Transportation. The TAMP is a federal requirement identified in MAP-21 and the FAST Act. The TAMP incorporates many working areas covering target areas of maintenance, construction, financials, inventory, performance data, and programming through the TAMP Steering Committee, the TAMP Working Group, and TAMP Task Forces. The TAMP will meet requirements of the CFR, which was published on October 24, 2016.

ACCOMPLISHMENTS DURING FFY 2019: Executed Task 6 and Task 7. Managed the consultant contract for ongoing activities towards TAMP development. Participated in various activities as they were available including meetings, workshops, webinars, conferences and peer exchanges. Continued to build on the ODOT TAM web page. Researched recommendations for best practices in asset management and performance. Implemented asset management through action oriented tasks. Monitored the rulemaking process related to performance measures. Completed development and submitted the full federally compliant TAMP and implementation and practices document to FHWA in June 2019.

PROPOSED ACTIVITIES FOR FFY 2020: Continue to manage the consultant contract for ongoing activities towards TAMP development. Continue to participate in various activities as they are available including meetings, workshops, webinars, conferences and peer exchanges. Continue to build on the ODOT TAM web page. Keep informed of best practices in asset management and performance management. Implement asset management through action oriented tasks. Monitor the rulemaking process related to performance measures. ODOT will submit its annual asset management implementation and practices by June 2020.

FINANCIALS	**Amount**	**Fund**	**Amount**	**Fund**
Programmed Amount FFY 2019	$125,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$125,000	SPR	$0.00	STATE
Estimated Cost FFY 2020	$50,000	SPR	$0.00	STATE

CONTACT INFORMATION

Matthew Blakeslee, P.E., Traffic Management Engineer, 405-522-6713

1915 Performance Measures Coordination

PURPOSE AND SCOPE: To coordinate data related to performance measures, metrics (quantifiable indicator of performance), thresholds, and targets. To develop ODOT's State Biennial Performance Report.

Performance Measures to be covered in the Biennial Report are described in different Subparts of Title 49 as per the FAST Act. Subpart C concerns Pavement Conditions; Subpart D concerns Bridge Condition; Subpart E concerns System Performance (travel time reliability) of the NHS; Subpart F concerns Freight (Truck) Movement on the Interstate System. Related information for each subpart and related measures, metrics, targets, etc. will be reported annually by the related ODOT "Division Owner", through the Highway Performance Monitoring System (HPMS), the Highway Safety Improvement Program (HSIP), or other processes. Additionally, safety performance data will be reported through the HSIP process.

ACCOMPLISHMENTS DURING FFY 2019: Monitored progress toward targets for Safety Performance Measures (PM1), Pavement and Bridge Performance Measures (PM2), and System Performance Measures (PM3). Coordinated with subject matter experts on safety, bridge, pavement, travel time reliability, and freight performance measure data collection and preparation. Attended National Highway Institute courses to further knowledge of regulations and to ensure compliance. Coordinated with Metropolitan Planning Organizations and other stakeholders as required by regulation.

PROPOSED ACTIVITIES FOR FFY 2020: Continue developing and implementing Department plans for compliance with required performance measurement and reporting. Continue to coordinate with subject matter experts on bridge, pavement, travel time reliability, and freight performance measure data collection and preparation. Complete State Biennial Performance Report and submit to FHWA. Attend seminars and workshops on performance measure topics and reporting techniques.

FINANCIALS	Amount	Fund	Amount	Fund
Programmed Amount FFY 2019	$350,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$350,000	SPR	$0.00	STATE
Estimated Cost FFY 2020	$250,000	SPR	$0.00	STATE

CONTACT INFORMATION

Laura Chaney, Planning and Performance Branch Manager, 405-521-2705

1916 OK Archeological Survey (OAS) GIS Digitization

PURPOSE AND SCOPE: The project purpose is to develop a Geographic Information System (GIS) to store and maintain locational data and relational databases that are drawn from the State's archaeological records and develop a secure, password-protected, web-based interface to facilitate access to these records by staff and various constituents. Providing this type of web-based access to the OAS records will greatly enhance the performance of federal and state agency responsibilities under Section 106 of the National Historic Preservation Act. In order to achieve these goals, several critical objectives will be carried out over the course of the three-year project. These include: 1) the coordinated transfer of OAS' geographical and non-geographical paper records to electronic format through scanning, digitization, and FileMaker Pro database development; 2) the development of procedures and mechanisms to store, maintain, and backup these digital data in a secure fashion; 3) the development of content that may be accessed by the general public; and 4) work with the Center for Spatial Analysis to develop and host the secure, password-protected, web-based GIS project. The resulting secure website will provide access to OAS data on a "sliding scale" depending on the end-user and the need to view restricted information. A total budget of $777,520 is anticipated to be distributed over the course of three phases.

ACCOMPLISHMENTS DURING FFY 2019: Implemented data management plan, began archaeological site database clean-up, researched and designed restricted-access OAS GIS website, training of new GRAs.

PROPOSED ACTIVITIES FOR FFY 2020: Complete site digitization efforts including site geometry and all relevant attribute data, finalize database design and data entry, finalize design and implement secure OAS website.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$254,017	SPR	$0.00	STATE
Estimated Cost FFY 2019	$254,017	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Jeremy Planteen, Assistant Division Manager, 405-521-2729

SPR PART-2

Office of Research and Implementation

SPR Part 2 Financial Summary Sheet

SPR PART 2 - RESEARCH, SPRY-0010(082)RS, JP# 01946(76)

FEDERAL FISCAL YEAR 2020

		SPR	STATE	LOCAL	TOTAL
GENERAL ITEMS					
2100	Transportation Research Board (TRB)	$20,000.00			$20,000.00
2105	Peer Exchange	$50,000.00			$50,000.00
2115	Long Term Pavement Performance (LTPP)	$5,000.00			$5,000.00
2120	Technical Assistance - Special Studies	$25,000.00			$25,000.00
2125	Implementation of Technology Transfer	$25,000.00			$25,000.00
2130	General Research Activities	$225,000.00			$225,000.00
2160	OU Interagency Master Agreement for Research and Investigation Services	$500,000.00			$500,000.00
2161	ODOT Transportation Library Management	$173,000.00			$173,000.00
2400	OSU Interagency Master Agreement for Research and Investigation Services	$500,000.00			$500,000.00
2700	New and Equal Product Evaluation Program	$50,000.00			$50,000.00
	Total General Activities	**$1,573,000.00**			**$1,573,000.00**
CONTINUING RESEARCH PROJECTS					
2156	Roadside Vegetation Management Training & Consultation	$146,000.00			$146,000.00
2157	Roadside Vegetation Management Research	$65,000.00			$65,000.00
2260	Shrinkage Induced Deformations in Steel Bridges - Phase 3	$89,000.00			$89,000.00
2268	Use of a Novel Contr. Release Surf. Curing Agent for Bridge Decks - Phase 2	$93,000.00			$93,000.00
2274	Development of Concrete Mixtures to Mitigate Bridge Deck Cracking	$70,000.00			$70,000.00
2276	Eval. of Ultra-High Perf. Concr. for Use in Bridge Conn. Repair - Phase 2	$41,000.00			$41,000.00
2279	Prob.Approach for the Design of Drilled Shafts Socketed in Weak Rock	$167,000.00			$167,000.00
2281	Evaluating the Performance of Existing Reinforcement for Oklahoma Bridges	$125,000.00			$125,000.00
2284	Prestr. Girder Cont. Joint/End Reg. Rep. using UHPC/Fib. Reinf. SC Concr.	$93,000.00			$93,000.00
	Total Continuing Research Projects	**$889,000.00**			**$889,000.00**
NEW RESEARCH PROJECTS					
2285	Level 1 Input Param. for Common OK Binders Blended with RAP & RAS	$208,000.00			$208,000.00
2286	Compost Filter Socks for Storm Water & Erosion Control in Construction	$60,000.00			$60,000.00
2287	Eval. Exp. Life and Recoat. of Silane Water Repell. Treatm. on Bridge Decks	$65,000.00			$65,000.00
	Total New Research Projects	**$333,000.00**			**$333,000.00**
RESEARCH IMPLEMENTATION PROJECTS					
2300	Interim Research Implementation Projects	$100,000.00			$100,000.00
CONTINUING					
2302	Load Test Monitoring of I-235 Bridge Repairs	$74,000.00			$74,000.00
2304	Rehab. for the Bridge Appr. Slab of the Blue River Site	$80,000.00			$80,000.00
2307	A Syst. Appr. for Des., Constr. and Maint. of Bridges and Adjacent Roadways	$101,000.00			$101,000.00
2308	Demonstr. of the Appl. of the New CPTu/SCPTu Correl. with Soil Param. Eval.	$103,000.00			$103,000.00
2309	Utiliz. Pavem. Frict. and Texture Data for the Reduct. of Traff. Crashes/Delays	$100,000.00			$100,000.00
NEW					
2310	Using X-Ray Fluor. to Assess Soil Subgr. Stabiliz. During Constr. Insp.	$108,000.00			$108,000.00
2311	In-Stream Structures Integrity and Channel Stability Survey and Evaluation	$94,000.00			$94,000.00
2312	1 of 2 Implementation of Precast Concrete Pavement Slabs for Mainline Pavement Sect	$65,000.00			$65,000.00
	Total Research Implementation Projects	**$825,000.00**			**$825,000.00**
	Grand Total SPRY-0010(082)RS	**$3,620,000.00**			**$3,620,000.00**
	LTAP Project Number TTY-LTAP (008) TT JP # 30001(19)				
1440	Local Technical Assistance Program	**$276,000.00**			**$276,000.00**
	TOTAL WITH LTAP	**$3,896,000.00**			
POOLED FUND STUDIES					
TPF-5(288)	Western Road Usage Charging Consortium	$25,000.00			$25,000.00
TPF-5(326)	Dev. and Supp. Transp. Perf. Mgmt. Capac. Dev. Needs for State DOTs	$27,000.00			$27,000.00
TPF-5(335)	Biennial Asset Management Conference and Training 2016-2020	$6,000.00			$6,000.00
TPF-5(372)	Building Information Modeling (BIM) for Bridges and Structures	$20,000.00			$20,000.00
TPF-5(374)	Accel. Perf. Testing on the 2018 NCAT Pavemt. Test Track with MnROAD Researcl	$400,000.00			$400,000.00
TPF-5(375)	Deter. the Benefit of Pavement Preservation Techniques (MnROAD/NCAT Joint Stu	$50,000.00			$50,000.00
TPF-5(380)	Autonomous Maintenance Technology	$25,000.00			$25,000.00
TPF-5(385)	Pavement Structural Evaluation with Traffic Speed Deflection Devices	$45,000.00			$45,000.00
TPF-5(398)	Moving Forward with Next Gen. Travel Behavior Data Coll. and Processing	$25,000.00			$25,000.00
TPF-5(419)	NCHRP	$750,000.00			$750,000.00
TPF-5(###)	TRB Core Progr. Services for a Hwy. RD&T Progr. FFY 2020 (TRB FY 2021)	$137,000.00			$137,000.00
TPF-5(442)	Transportation Research and Connectivity	$25,000.00			$25,000.00
SOL 1500	EconWorks - Improved Economic Insight	$20,000.00			$20,000.00
SOL 1492	Technology Transfer Concrete Consortium	$12,000.00			$12,000.00
	Total Pooled Fund Studies	**$1,567,000.00**			**$1,567,000.00**
	TOTAL RESEARCH FUNDING INCLUDING POOLED FUND STUDIES				**$5,463,000.00**

Edited 9/24/19

SPR Part 2 Financial Summary Sheet Continued

SPR Part 2 - RESEARCH SPRY-0010(071)RS, JP# 01946(70)

SPR Part 2 - Research SPRY-0010(082)RS JP# 01946(76)

ENDING FFY 2019 RESEARCH PROJECTS	
2262	Feasibility Study of GRS Systems for Bridge Abutments in OK - Phase 2
2266	The Use of Resist. Testing for Quality Control of Concrete Mixtures - Phase 2
2277	Compilation of ME Design for Rigid and Flexible Pavem. in OK
2280	Devp. of Eval. & Rehab. Guide. for Prestr. Concr. Bridges Vuln. to Shear
2282	Vehicle Classif. and Bluetooth MAC's for Origin-Destination Measurements
2283	Asset Value Practices and Functionality
PREVIOUSLY COMPLETED RESEARCH PROJECTS	
2272	Perf. of Moisture Barriers to Enhance Pavem. Perf. Over Swelling Soils
2275	Dev. of Aggr. Character-Based Prev. Maint. Using 3D Laser/AIMS Techn.
2278	Recycling and Reuse of Materials in Transportation Projects
ENDING FFY 2019 IMPLEMENTATION PROJECTS	
2301	Improv. the Efficiency and Accuracy of ODOT Temp. Traffic Monitoring System
2303	Develop. Of Intelligent Vehicle Counting and Classifiction Sensor (iVCCS)
2306	Cont. Friction Msmnt. Equip. (CFME) for Highway Safety Mgmt. in Oklahoma
PREVIOUSLY COMPLETED IMPLEMENTATION PROJECTS	
2305	Implement Balanced Asphalt Mix Design in Oklahoma
ACTIVE AND FUNDED POOLED FUND STUDIES	
TPF-5(255)	Highway Safety Manual Implementation
TPF-5(267)	Accelerated Performance Testing for the NCAT Pavement Test Track 2012-2017
TPF-5(343)	Roadside Safety Research for MASH Implementation
TPF-5(357)	Impl. Shakecast Across Mult. State Depts. for Rapid Post Earthquake Response
TPF-5(364)	Utilization of Laser Induced Breakdown Spectroscopy (LIBS)
COMPLETED 2019 POOL FUND STUDIES	
TPF-5(269)	Development of an Improved Design Procedure for Un-bonded Concrete Overlays
TPF-5(297)	Improving Spec. to Resist Frost Damage in Modern Concrete Mixtures
TPF-5(312)	Western Maintenance Partnership
TPF-5(378)	TRB Core Program Services for a Highway RD&T Program FFY 2019 (TRB FY 2020)
TPF-5(418)	NCHRP

2100 Transportation Research Board (TRB) Participation

PURPOSE AND SCOPE: This item covers travel expenses and time for ODOT personnel to attend the annual TRB meeting to advance technical development of topics and issues required to support the Office if Research and Implementation's work program.

ACCOMPLISHMENTS DURING FFY 2019: Three (3) ORI staff members attended the annual TRB meeting. Technical areas covered included bridge monitoring, high performance strength concrete, asphalt design and maintenance, State Transportation Innovation Council/Every Day Counts support and development programs and research program monitoring and development processes.

PROPOSED ACTIVITIES FOR FFY 2020: A request will be made for up to four (4) ORI staff members to attend the 2020 annual TRB meeting.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$20,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$13,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$20,000	SPR	$0.00	STATE

CONTACT INFORMATION

State Research Engineer: David Ooten, 405-521-2671

2105 Peer Exchange

PURPOSE AND SCOPE: This item covers activity related to required peer exchange processes outlined in CFR 420. A state DOT required to host a peer exchange every 3-5 years for the purpose of gaining knowledge that benefit the processes and outcomes of a research program. The peer exchange participants, but not limited to, other state DOTs, FHWA and other federal agencies, academia, industry, and local and tribal partners.

ACCOMPLISHMENTS DURING FFY 2019: New item.

PROPOSED ACTIVITIES FOR FFY 2020: ODOT ORI will host a peer exchange in Spring/Summer for 2020.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$0.00	SPR	$0.00	STATE
Estimated Cost FFY 2019	$0.00	SPR	$0.00	STATE
Projected Cost FFY 2020	$50,000	SPR	$0.00	STATE

CONTACT INFORMATION

State Research Engineer: David Ooten, 405-521-2671

2115 Long Term Pavement Performance (LTPP)

PURPOSE AND SCOPE: The purpose of this project is to maintain LTPP test sites, markings and current status, report maintenance to the new FHWA Contractor Stantec. To assist Stantec with data gathering as necessary and act as the general liaison between Stantec and ODOT. Maintain working knowledge related to SHRP product implementation, act as general liaison between FHWA and ODOT for product implementation activities.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 5 of 5)** - Performed final two rounds of 3D Laser Imaging data collection; facilitated remaining tests of the new Warm Mix Asphalt experiment; performed annual site investigations, recorded observations and reported findings; performed inventory of all signs and pavement markings; obtained information from Stantec for specific continued data collection; arranged for continued testing and monitoring of current SPS and GPS site locations in Oklahoma for FY 2020; performed annual maintenance tour on each site, checking pavement marking and ID sign conditions; produced project progress reports; submission of the final report for the "Long Term Pavement Performance (LTPP) Monitoring of Six LTPP SPS-10 Sections in Oklahoma with 3D Laser Imaging" research study is pending.

PROPOSED ACTIVITIES FOR FFY 2020: Perform annual site investigations, record observations and report findings; perform inventory of all signs and pavement markings; obtain information from Stantec for specific continued data collection; arrange for continued testing and monitoring of current SPS and GPS site locations in Oklahoma for FY 2021.

NOTE: Oklahoma has eleven (11) sites remaining in the study, with one of these test sections falling out at the end of FFY 2019. One (1) test section will fall out at the end of FFY 2021. Nine (9) test sections will remain in the study after FFY 2021, however, no time frame beyond FFY 2021 is known in regards to national data collection support.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$42,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$41,500	SPR	$0.00	STATE
Projected Cost FFY 2020	$5,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Kelvin Wang, Oklahoma State University, 405-744-5189

Transportation Manager: Bryan Cooper, 405-736-9475

2120 Technical Assistance Special Studies

PURPOSE AND SCOPE: Provide ongoing technical support or special investigations to the Department when a full-scale research project is not warranted or when a quick turnaround is required.

ACCOMPLISHMENTS DURING FFY 2019: Visited and photographed EDC Initiative Sites such as: New on-system HFST sites, STEP Projects statewide, GRS Bridges, Diverging Diamond in Elk City; Monitored construction of GTR Project and drafted a construction report; Observed and took video of the 2284 UHPC/MALP application in Beaver County; Performed pipe inspections at Division 7 HQ in Duncan and SH-17 in Rush Springs; continued to serve on the OKTIM Coalition; continued to provide support for the Department with assistance and equipment in special investigations, storm drain inspections, pavement testing, traffic control and any other activities of services as requested; acquired, calibrated, tested and / or compared new equipment or instruments to existing equipment or instruments where necessary.

PROPOSED ACTIVITIES FOR FFY 2020: Continue to monitor new on-system HFST Sites, Monitor the new Diverging Diamond project in Elk City, Monitor the GTR project in Canadian County, along with any other EDC initiative implementations; Continue to serve on the OKTIM Coalition; Continue to provide support for the Department with assistance and equipment in special investigations, storm drain inspections, pavement testing, traffic control and any other activities of services as requested; acquire, calibrate, test and / or compare new equipment or instruments to existing equipment or instruments where necessary.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$50,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$45,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$25,000	SPR	$0.00	STATE

CONTACT INFORMATION

Transportation Manager: Bryan Cooper, 405-736-9475

2125 Support of Innovation Initiatives

PURPOSE AND SCOPE: Innovation has become a critical aspect when considering use of funds, regardless of the source. Innovation is a concept that is demanded of and embraced by all working groups of ODOT. Innovation does not necessarily require that a technology is proven, but that it has the reasonable potential to enhance deliverables in the general areas of lives, time, cost, and environment.

This item will provide support to ODOT innovation initiatives being incorporated into ODOT.

ACCOMPLISHMENTS DURING FFY 2019: New Item.

PROPOSED ACTIVITIES FOR FFY 2020: Develop an innovation communication network across ODOT to centralize information regarding innovation initiatives. Provide support as requested to working units in form of review, monitoring, documentation, and facilitation of outreach materials to include reports, one-pagers and videos.

ORI Staff will continue to support the State Innovation Transportation Council (STIC) in coordination with the FHWA as committee and sub-committee members. ORI will support STIC initiatives through this item as noted above.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$0.00	SPR	$0.00	STATE
Estimated Cost FFY 2019	$0.00	SPR	$0.00	STATE
Projected Cost FFY 2020	$25,000	SPR	$0.00	STATE

CONTACT INFORMATION

State Research Engineer: David Ooten, 405-521-2671

2130 General Research Activities

PURPOSE AND SCOPE: This activity covers various research activities which are necessary for the operation of a research section but which cannot be accurately included in other projects. Examples of this type of activity include: attending quality task force meetings; writing work plans for emerging research projects which have not been assigned an item number; preparing new and continuing research contracts and contract modifications; research project management; maintaining electronic research project records, i.e., project progress, invoicing, contractual deadlines; reviewing final research reports; meeting with university and private researchers regarding proposed projects; attending industry seminars, conferences, etc.

ACCOMPLISHMENTS DURING FFY 2019: Solicited ODOT subject matter experts, field division personnel, university and private industry staff for new research ideas and problem statements for possible FFY 2020 research project funding; received and compiled 28 new research/implementation topic statements; reviewed 10 new research/implementation topic statements for priority ranking; generated and posted 4 FFY 2020 Request for Proposals (RFP's) for research proposal submissions; reviewed 15 new research proposals submitted for possible FFY 2020 project funding; discussed proposed project work with researchers and ODOT subject matter experts; awarded and prepared 12 FFY 2020 continuing research contracts; awarded and prepared 3 new FFY 2020 research contracts; awarded and prepared 5 FFY 2020 continuing research implementation contracts; awarded and prepared 3 new FFY 2020 research implementation contracts; organized initiation and final project meetings; performed technical reviews of final research project reports for formatting and ADA compliance; facilitated project implementation plans and direction; prepared Part 2 of the FFY 2020 SPR Work Program.

PROPOSED ACTIVITIES FOR FFY 2020: Solicit for new research ideas for possible FFY 2021 research project funding; generate and post FFY 2021 RFP's; generate FFY 2021 research/implementation project contracts and modifications; organize initiation and final project meetings; coordinate and assemble research implementation task forces and committees; facilitate project implementation plans and direction; continue to perform technical review of final research project reports for required formatting and ADA compliance; prepare Part 2 of the FFY 2021 SPR Work Program.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$275,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$270,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$225,000	SPR	$0.00	STATE

CONTACT INFORMATION

SPR2 Program Administrator: Bryan Hurst, 405-522-3794

2156 Roadside Vegetation Management (RVM)
Training & Consultation

PURPOSE AND SCOPE: This training and consultation initiative is designed to meet the roadside vegetation management (RVM) needs of ODOT and builds upon the previous years of RVM training offered by Oklahoma State University to ODOT. This service and tasks have been designed based upon knowledge of, and being observant of Federal and State Pesticide Laws and Regulations, communications and feedback from ODOT field and headquarters staff, observing areas of continued consultation needs by networking with RVM industry professionals.

ACCOMPLISHMENTS DURING FFY 2019: Delivered Annual Pesticide Applicator Certified Training and Continuing Education Applicator Workshops for all ODOT field divisions and maintained records on all ODOT certified applicators; provided as needed consultation to ODOT office and field personnel; coordinated Herbicide Application and Equipment Calibration Workshops for new employees; assisted ODOT in updating the Approved Herbicides and Adjuvants List (AHAL); assisted with AHAL contract review; performed survey and review of ODOT field divisions herbicide programs; attended national conferences; produced project progress reports; prepared and submitted FFY 2018 annual research reports; FFY 2019 annual research report submissions are pending .

PROPOSED ACTIVITIES FOR FFY 2020: Deliver Annual Pesticide Applicator Certified Training and Continuing Education Applicator Workshops for all ODOT field divisions and maintain records on all ODOT certified applicators; provide as needed consultation to ODOT office and field personnel; coordinate Herbicide Application and Equipment Calibration Workshops for new employees; assist ODOT in updating the Approved Herbicides and Adjuvants List (AHAL); assist with AHAL contract review; perform survey and review of ODOT field divisions herbicide programs; attend national conferences; produce project progress reports; prepare and submit FFY 2020 annual research reports.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$188,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$148,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$146,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Dennis Martin, Oklahoma State University, 405-744-5419

Project Sponsor: Taylor Henderson, ODOT Maintenance Division Engineer, 405-521-2557

Project Manager: Gary Hook, Implementation Engineer, 405-522-1042

2157 Herbicide Research Program

PURPOSE AND SCOPE: A progressive Roadside Vegetation Management (RVM) program integrates proper vegetation selection, establishment and maintenance. Placing a well-adapted native or introduced species of vegetation on the roadside is the foundation of a successful program but not the end of the required inputs for successful long term roadside beauty and stabilization. The maintenance portion of the RVM program involves a combination of decisions concerning to mow or not mow, specific mowing heights and frequency of mowing, herbicide use or avoidance for weed control in the specific vegetation system at hand. Mowing and herbicide use on roadsides replace fire and herbivore grazing found in rangeland or natural perennial grass ecosystems. Grazing and fire are not considered available management tools in roadside right of way at this time.

ACCOMPLISHMENTS DURING FFY 2019: Continued to perform evaluations of new and generic herbicide formulations and combinations for roadside and cable barrier management and implemented findings in winter training workshops; completed evaluation of adjuvants and recommended herbicides for tank mix compatibility and included findings into the AHAL; evaluated roadside mowing regimes on green antelopehorn milkweed availability; performed evaluation of herbicide tolerance of new candidate roadside bermudagrass varieties; constructed research test plots and completed field experiments, data collection and analysis; began evaluation of select roadside areas containing natural milkweed populations for monarch butterfly utility; produced project progress reports; prepared and submitted FFY 2018 annual reports; FFY 2019 annual report submissions are pending.

PROPOSED ACTIVITIES FOR FFY 2020: Continue to perform evaluations of new and generic herbicide formulations and combinations for roadside and cable barrier management and implement findings in winter training workshops; perform evaluation of tank mix compatibility of adjuvants and herbicides and include findings into the AHAL; continue to evaluate roadside mowing regimes on green antelopehorn milkweed availability; continue to evaluate herbicide tolerance of new candidate roadside bermudagrass varieties; continue to explore select roadside areas containing natural milkweed populations for monarch butterfly utility; produce project progress reports; prepare and submit FFY 2020 annual reports.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$75,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$73,500	SPR	$0.00	STATE
Projected Cost FFY 2020	$65,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Dennis Martin, Oklahoma State University, 405-744-5419

Project Sponsor: Taylor Henderson, ODOT Maintenance Division Engineer, 405-521-2557

Project Manager: Gary Hook, Implementation Engineer, 405-522-1042

2160 The University of Oklahoma Master Agreement for Research and Investigation Services

PURPOSE AND SCOPE: This item will support a task-order based contract for the purpose of providing ODOT the opportunity to address topics and needs that were not brought through the formal annual project selection process and/or were identified outside the formal process. It is anticipated that these projects will range in both scope and financial commitment from simple to complex, but generally be limited to a one-year or less completion cycle. Topics could include traditional research topic areas of interest to the Agency, as well as ancillary effort including education and workforce development and technology transfer through, but not limited to, collaboration, leadership training, addressing student retention and diversity, and internship programs.

ACCOMPLISHMENTS DURING FFY 2019: Continued to support SPTC UTC activities; continued task order contracting mechanism building on FFY 2018 program and further defining processes, procedures and needs for a sustainable UTC.

Completed support to FFY2018 Task Order program addressing short-term research needs and initiated new task orders under the FFY program.

PROPOSED ACTIVITIES FOR FFY 2020: Continue supporting SPTC UTC activities. Continue task order contracting mechanism building on FFY 2018 program and further defining processes, procedures and needs for a sustainable UTC.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$505,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$125,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$500,000	SPR	$0.00	STATE

CONTACT INFORMATION

OU Contact: Musharraf Zaman, The University of Oklahoma, 405-325-4682

Project Manager: David Ooten, State Research Engineer, 405-521-2671

2160-18-01
OU Task Order Contract Administrative Support

PURPOSE AND SCOPE: To provide support and guidance to task order projects at the University of Oklahoma to Principal Investigators and to the Office of Research and Implementation (ORI) in project management.

ACCOMPLISHMENTS DURING FFY 2019: Maintained oversight of all approved OU task orders in monitoring schedules and budgets; assisted PI's and ORI as needed to maintain project scope; assisted ORI as requested with specific projects; worked with PI's to develop new requests; developed initiatives for task order requests toward developing a sustainable program for future University Transportation Center proposals.

PROPOSED ACTIVITIES FOR FFY 2020: Continue to maintain oversight of all approved OU task orders in monitoring schedules and budgets; continue to assist PI's and ORI as needed to maintain project scope; continue to assist ORI as requested with specific projects; continue to work with PI's to develop new requests; continue to develop initiatives for task order requests toward developing a sustainable program for future University Transportation Center proposals.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$40,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$40,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Musharraf Zaman, The University of Oklahoma, 405-325-4

Task Order Sponsor/Manager: David Ooten, State Research Engineer, 405-521-2671

2160-18-02
Inventory of Truck Parking on I-40 in Oklahoma

PURPOSE AND SCOPE: According to the FHWA, truck parking shortages are a national safety concern. Commercial truck drivers need access to safe, secure, and accessible truck parking. With the projected growth of truck traffic, the demand for truck parking will continue to outpace the supply of public and private parking facilities and will only exacerbate the truck parking problems experienced in many regions. Section 1401 of MAP-21 (PL 112-141), also known as "Jason's Law," was established to provide a "national priority on addressing the shortage of long-term parking for commercial motor vehicles on the National Highway System to improve the safety of motorized and non-motorized users and for commercial motor vehicle operators." An inadequate supply of truck parking spaces can adversely impact public safety. Inventory data is in continual demand and desired by ODOT due to safety concerns of the transportation network.

ACCOMPLISHMENTS DURING FFY 2019: Produced a concise literature review/summary report for truck parking locations (TPL); produced excel spreadsheet consisting of a database inventory of the following information for TPL on Interstate 40 in Oklahoma as of October 1, 2018: Name of facility; Physical address of TPL location, latitude and longitude, county; Number of spaces; Hours of operation; Amenities (e.g. food , weigh scales, showers, tire center, EV fast charge, CNG); How many years in operation; Comment on peak hours; Location on/near interstate on/off ramp; Electronic communication to drivers regarding available spaces; produced task order progress reports; submitted final report.

PROPOSED ACTIVITIES FOR FFY 2020: End of task order.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$24,981	SPR	$0.00	STATE
Estimated Cost FFY 2019	$24,980	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Dominique Pittenger, The University of Oklahoma, 405-317-5723

Task Order Sponsor: Laura Chaney, SAPM Division Transportation Manager, 405-521-2705

Task Order Manager: David Ooten, State Research Engineer, 405-521-2671

2160-18-03
Intelligent Compaction Data Analyzing

PURPOSE AND SCOPE: Intelligent Compaction (IC) is emerging nationally as a useful tool for monitoring compaction quality during construction of asphalt pavements. The Oklahoma Department of Transportation (OOOT) has developed special provisions for using the IC technology by paving contractors in Oklahoma. Also, AASHTO has developed guidelines and requirements (AASHTO Designation: PP 81-17) for using the IC technology for projects involving compaction of roadway embankment or asphalt pavement or both. ODOT has let nine projects using the IC technology for asphalt paving projects in Oklahoma. For each project, ODOT paid the contractor to purchase the IC equipment and collect data. The collected IC data was submitted to the ODOT residencies associated with those projects. The purpose of this Task Order is to analyze the collected data from three selected projects using a free IC data management and analysis software. VETA. The data analyses will be focused on the data completeness, missing data, data quality, and data usefulness. Project location, construction time, file name, the IC platform used and other pertinent information will be identified from the data, if available.

ACCOMPLISHMENTS DURING FFY 2019: In consultation with the task order team, three projects were selected from a list of potential projects; analyzed the collected data from the three selected projects using the VETA IC data management and analysis software; produced task order progress reports; submitted final report.

PROPOSED ACTIVITIES FOR FFY 2020: End of task order.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$16,818	SPR	$0.00	STATE
Estimated Cost FFY 2019	$16,800	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Musharraf Zaman, University of Oklahoma, 405-325-4682

Task Order Sponsor: Kevin Suitor, Materials Division Transportation Manager, 405-521-2677

Task Order Manager: David Ooten, State Research Engineer, 405-521-2671

2160-18-04
Developing a Database for Mining of ODOT Research Program Results

PURPOSE AND SCOPE: The Oklahoma Department of Transportation (ODOT) has sponsored research for decades. Results of the research are contained primarily in research reports existing in various forms: paper copy, scanned digital copy, and digital format. While most of these reports can be accessed through the Oklahoma Transportation Library (OTL) or other transportation databases, only limited report metadata can be easily accessed including usual information found on the Technical Report Documentation Page (TRDP). Beyond the abstract, information about the research results, test data and implementation is limited. The proposed work will build a queryable database of ODOT sponsored research that will serve numerous purposes such as a comprehensive, easily accessible source of information about all previously sponsored ODOT research for which records exist. The database will allow the ODOT Office of Research and Implementation (ORI) to avoid duplication of previous work, and to provide historical information for new projects. Additionally, the database will allow ORI and others to quickly determine if results of past research may be useful in addressing a current problem. Research test data will be accessible which will allow researchers to conduct new analyses of existing data and include historical data in the development of new analysis methods and regression analysis of data sets beyond those generated in current research projects. As part of this project, a method for reporting project data and testing results in digital format, and compatible with the new database, will be developed. Reporting of project data using these newly developed reporting methods will be included in future ODOT funded research as part of the project requirements. Project data will be uploaded to the database as part of the final project reporting requirements. Thus, for future project reports the OODT research report database will be self-sustaining through the implementation of the project data management protocols established through this task order.

ACCOMPLISHMENTS DURING FFY 2019: Held meetings with pertinent ODOT and OTL personnel; worked with the OTL to identify all available reports; populated database with information and test results obtained from reports; prepared recommendations for data sharing and publishing; developed database workbook to support and maintain the database; produced task order progress reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$75,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$74,800	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Gerald Miller, The University of Oklahoma, 405-325-4253

Task Order Sponsor: David Ooten, State Research Engineer, 405-521-2671

Task Order Manager: Ron Curb, Asst. State Research Engineer, 405-521-3795

2160-18-05
Premature Pavement Distress or Subgrade Failures Due to Unknown Factors in the Early Stages of Design Life Expectations on SH3E/SH99

PURPOSE AND SCOPE: The southbound lanes and shoulders of SH3E/SH99, about 8 miles north of Ada, Oklahoma, have experienced excessive settlements and distresses (cracking) in the early stages of service life. The stresses and settlements are particularly prevalent between Stations 545+00 and 570+00 (650-ft North and 570-ft South of EW145.5). A preliminary field visit on August 10, 2018 showed a settlement of 2 inches and cracks. The purpose of this task order is to perform forensic investigations following the guidelines noted in OHD L-57 (NCHRP Report 747) to identify the likely causes of these premature distresses and to make recommendations for addressing them in a cost effective manner.

ACCOMPLISHMENTS DURING FFY 2019: Conducted a preliminary investigation and pavement condition survey which included a visual inspection of pavements (lanes, shoulders, and embankments), settlement, crack, and drainage, and collection of other pertinent data; marked cut and fill sections and collected natural subgrade soil and borrowed soil; laboratory tested collected soils for classification, stiffness (resilient modulus), shear strength, volume change potential, and other pertinent properties (e.g., sulphate) which were compared with those in the geotechnical report of the project; produced task order progress reports; submitted final report.

PROPOSED ACTIVITIES FOR FFY 2020: None

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$64,998	SPR	$0.00	STATE
Estimated Cost FFY 2019	$64,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Musharraf Zaman, University of Oklahoma, 405-325-4682

Task Order Sponsor: Kevin Bloss, ODOT Division Three Engineer, 580-332-1526

Task Order Manager: David Ooten, State Research Engineer, 405-521-2671

2160-18-06
Traffic Incident Management (TIM) Report Analysis

PURPOSE AND SCOPE: ODOT is committed to measuring and reporting incident duration, incident clearance, secondary crashes and responder/highway worker struck-by incidents as a way to improve the Traffic Incident Management (TIM) Program. There is a need to create a standardized and efficient reporting system to manage and present the incident data for performance measures, as well as, accurate dissemination to TIM stakeholders. ODOT will benefit by quantifying the TIM Program and training and developing statistical support to justify the value of the Oklahoma TIM Program. The report data will also be used to improve upon the current Oklahoma TIM Program.

This plan for this task order is as follows:
1. Research both the data content and format of other state's TIM data reports.
2. Enumerate the TIM data that ODOT is collecting.
3. Develop a report structure for Oklahoma TIM data reporting based on the TIM data that

ACCOMPLISHMENTS DURING FFY 2019: Determined which data other states collect for their TIM reports; reviewed format and way in which other states present TIM data reports; determined best data presentation practices to follow in presenting Oklahoma's TIM data; enumerated TIM data that ODOT is currently collecting; determined best practices from other states and examined Business Intelligence (BI) tools that other states use to generate their TIM data reports; developed report structure for Oklahoma TIM Data; planned the design for a software tool to generate Oklahoma's TIM Data reports automatically; developed presentation for ODOT and other TIM Stakeholders to present what data is being collected and how it is represented; performed data analysis and graphical visualization of collected Oklahoma TIM data; produced task order progress reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$60,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$59,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Ronald Barnes, The University of Oklahoma, 405-325-1879

Task Order Sponsor: Alan Stevenson, ODOT ITS Engineer, 405-521-6460

2160-18-07
Forensic Investigation - Depressed Transverse Asphalt Pavement Cracking in Division 6

PURPOSE AND SCOPE: Depressed or low cracking in asphalt pavements in the transverse direction is a common problem in many locations in Division 6. Causes and solutions need to be more fully investigated. Three project locations will be selected for the investigation. Some destructive testing to investigate the problem is needed. When possible, non-destructive test methods like Falling Weight Deflectometer (FWD) and Ground Penetrating Radar (GPR) should/will be utilized. Other tests such as resilient modulus of subgrade soil and overlay testing and Hamburg wheel tracking of asphalt layers may be required. Results of this investigation will suggest solutions for future pavements to mitigate or eliminate the problem. When applicable, Life Cycle Cost Analysis (LCA) will be performed for each proposed solution for one mile or seven mile pavement replacement or rehabilitation. This will include the gathering of samples and performing tests and conducting in-situ tests. LCA can more fully detail cost savings for proposed solutions. It is also expected that results will also suggest an optimal 25% savings to ODOT.

ACCOMPLISHMENTS DURING FFY 2019: Performed a preliminary investigation; collected all available documents and records related to pavement design, construction and maintenance; performed systematic pavement survey; performed non-destructive FWD testing; performed GPR testing where applicable/necessary; performed destructive testing collecting core samples; performed various laboratory surface layer tests; performed dynamic cone penetrometer (DCP) tests at selected locations; performed analysis of collected data; proposed possible rehabilitation and replacement solutions; performed LCA for different solutions; produced task order progress reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$69,996	SPR	$0.00	STATE
Estimated Cost FFY 2019	$69,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Musharraf Zaman, University of Oklahoma, 405-325-4682

Task Order Sponsor: Ron McDaniel, ODOT Division 6 Engineer, 580-735-2561

Task Order Manager: David Ooten, State Research Engineer, 405-521-2671

2160-18-08
Establishment of ODOT Knowledge Management Implementation Framework

PURPOSE AND SCOPE: This task order will develop an initial implementation plan addressing knowledge management needs for ODOT. Technical assistance will be secured through the School of Library and Information Science from current contracts. A documented implementation plan for knowledge management will be provided to ODOT detailing steps, parameters and processes. Introduction of formal knowledge management processes will allow ODOT to address long-term plans toward full-scale knowledge management needs, information and data retention and development of necessary agency support mechanisms.

ACCOMPLISHMENTS DURING FFY 2019: Performed literature review; identified Ms. Michelle Farabough to advise ODOT on carrying out a knowledge management plan; developed an initial implementation plan to address knowledge management needs for ODOT; surveyed ODOT stakeholders and coordinated with the ODOT knowledge management task force in establishing an action plan; produced task order progress reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$70,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$69,950	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Michael Molina, Librarian, Oklahoma Transportation Library, 405-325-5960

Task Order Sponsor: David Ooten, State Research Engineer, 405-521-2671

Task Order Manager: Ron Curb, Asst. State Research Engineer, 405-522-3795

2160-18-09
Investigation of Asphalt Pavement Distress on SH-7 in Garvin County

PURPOSE AND SCOPE: Rutting and pushing is observed along the centerline on State Highway 7 from approximately one mile west of I-35 going west 6.7 miles (ODOT Division 7). Causes and solutions need to be fully investigated. Destructive testing investigating the issues will be required. When appropriate, non-destructive tests such as Falling Weight Deflectometer (FWD), Ground Penetrating Radar (GPR), Resilient Modulus of subgrade soils, and Hamburg Wheel Tracking of pavement layers should/will be considered. Results of this investigation will suggest solutions for mitigation and repair. When applicable/necessary, Life Cycle Cost Analysis (LCA) will be performed for each proposed solution for a one mile and 6.7 mile pavement replacement, repair or rehabilitation. LCA can more fully detail cost savings for proposed solutions. It is also expected that results will also suggest an optimal 25% savings to ODOT.

ACCOMPLISHMENTS DURING FFY 2019: Performed a preliminary investigation; collected available documents and records related to pavement design, construction maintenance, environment, etc; performed non-destructive FWD testing; performed GPR testing where applicable/necessary; performed destructive testing collecting core samples; performed various laboratory surface layer tests; performed dynamic cone penetrometer (DCP) tests at selected locations; performed analysis of collected data; evaluated different available techniques to mitigate or eliminate rutting, pushing and cracking on SH-7; proposed possible rehabilitation and replacement solutions; performed LCA for different solutions; produced task order progress reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$70,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$69,980	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Musharraf Zaman, University of Oklahoma, 405-325-4682

Task Order Sponsor: Kevin Suitor, ODOT Assist. Bridge Division Engineer, 405-521-2606

Task Order Manager: David Ooten, State Research Engineer, 405-521-2671

2161 Management of the ODOT Transportation Library

PURPOSE AND SCOPE: The Oklahoma Department of Transportation (ODOT) wishes to maintain and operate a sound, progressive, and flexible transportation library, which is available to ODOT, local, regional and national users. The goal is to keep ODOT staff and their stakeholders informed of recent developments and innovations in transportation technologies, methodologies and programs. A complementary goal is to increase operational efficiency and reduce cost. The Oklahoma Transportation Library (OTL) seeks to integrate with other transportation libraries nationally while moving toward digital contents and an Internet-based service system.

ACCOMPLISHMENTS DURING FFY 2019: Continued to store, maintain, and provide access to the collection of transportation materials; continued to refine the OTL collection regarding donated items; continued collection development; continued to perform traditional library services; continued to organize internal and external outreach efforts including beneficial webinars, workshops, seminars, and lectures on transportation topics; shared resources, abided by WTKN policies, and executed long-term and short-term goals for the group that will enhance and expand ODOT's resources and outreach potential; continued to maintain and update OTL LibGuide and OTL website; coordinated printing, binding and distribution services; continued cataloging process; continued to conduct literature search related services; continued to draft ODOT Research Highlighters developed from completed project summaries; assisted ODOT with accessibility of final research reports; produced project progress reports; prepared and submitted FFY 2019 annual report.

PROPOSED ACTIVITIES FOR FFY 2020: Continue to store, maintain, and provide access to the collection of transportation materials; continue to refine the OTL collection regarding donated items; continue collection development; continue to perform traditional library services; continue to organize internal and external outreach efforts including beneficial webinars, workshops, seminars, and lectures on transportation topics; share resources, abide by NTKN policies, and execute long-term and short-term goals for the group that will enhance and expand ODOT's resources and outreach potential; continue to maintain and update OTL LibGuide and OTL website; participate in promoting membership in the new pooled fund study and assist in executing objectives; coordinate printing, binding and distribution services; continue cataloging process; continue to conduct literature search related services; continue to draft ODOT Research Highlighters developed from completed project summaries; assist ODOT with accessibility of final research reports; produce project progress reports; prepare and submit FFY 2019 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$172,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$171,500	SPR	$0.00	STATE
Projected Cost FFY 2020	$173,000	SPR	$0.00	STATE

CONTACT INFORMATION

Project Contact: Musharraf Zaman, The University of Oklahoma, 405-325-4682

Project Manager: Ron Curb, Asst. State Research Engineer, 405-522-3795

2260 Shrinkage Induced Deformations in Steel Bridges Made Composite with Concrete Deck Slabs – Phase 3

PURPOSE AND SCOPE: Phase 3 of this study builds upon the findings of Phases 1 & 2 research. The goals of Phase 3 research are to develop data to make stronger conclusions regarding Phase 1 & 2 objectives and to develop instrumentation and techniques for long term monitoring of bridges.

The Phase 3 objectives are as follows: 1. Develop new designs and prototypes to ensure proper bracing of formwork and screeds and also provide better elevation controls for new bridge decks, and 2. Develop and demonstrate instrumentation and data acquisition systems for monitoring long term deflections, strains, and temperatures in bridges. Phases 3 is envisioned and developed in order to further the objectives of the research and provide recommendations to ODOT to help mitigate problems with adverse ride quality, or excessive deflections. It is anticipated that overall bridge construction methods and techniques will be improved as a product of this research.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 3 of 3)** - Continued literature review; continued monitoring and measurement of deflections, strains and temperatures; continued to perform laboratory testing, including measurements for compressive strength, tensile strength, elastic modulus and shrinkage; continued instrumentation and monitoring of a bridge in the field; continued computational analysis of shrinkage and other effects; continued to identify causes for excessive or unpredicted deflections; continued the development of refined design and construction methods for ODOT bridges; produced project progress reports; submitted FFY 2018 annual report; FFY 2019 annual report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 4 of 4)** - Continue to monitor deflections, temperatures and strains; continue laboratory testing; continue to monitor short and medium term deflections; produce project progress reports; prepare and submit final report.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$48,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$110,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$89,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Bruce Russell, Oklahoma State University, 405-742-7450

Project Sponsor: Walt Peters, ODOT Assist. Bridge Division Engineer, 405-521-2606

Project Manager: David Ooten, State Research Engineer, 405-521-2671

2262 Feasibility Study of GRS Systems for Bridge Abutments in Oklahoma - Phase 2

PURPOSE AND SCOPE: The primary objective of the proposed project is to carry out a feasibility study to identify the types of bridge projects that would be suitable candidates for the use of Geosynthetic Reinforced Soil (GRS) bridge abutments in Oklahoma. The research team will review the state of the art and practice on the GRS technology and develop guidelines for its adoption and implementation in Oklahoma.

The primary focus of this study will be on bridges that are built on the low-volume and rural roads, (i.e. off the National Highway System, NHS), which can directly and immediately benefit from a viable and speedy bridge construction technology involving recycled girders and bridge abutment construction materials that are produced locally. However, the research team will explore the circumstances in which GRS abutments could also be adopted for bridges on major roads and highways across the state, (i.e. on-NHS system bridges). The Principal Investigators (PIs), in collaboration with ODOT and FHWA-OK engineers, will provide an assessment of the results of the study which will include expected benefits and actions needed for successful implementation of the study to meet the ODOT goals and those of other state transportation agencies.

Phase 2 of this study is to test and quantify the design and construction related factors as a result of using large concrete blocks for the facing of GRS-IBS abutments through large scale laboratory tests and an anticipated field project.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 2 of 2)** - Continued construction and surcharge load testing of instrumented large block GRS abutment model; performed analysis of test results and comparison of large blocks and common blocks; continued reduction and analysis of data; continued drawings development and guidelines for large block abutments; continued to monitor performance of pilot GRS bridge with large block abutments; produced project progress reports; submitted FFY 2018 annual report; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$100,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$99,950	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Kianoosh Hatami, The University of Oklahoma, 405-325-5911

Project Sponsor: Shannon Sheffert, ODOT Local Government Division Engineer, 405-521-2553

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2266 The Use of Resistivity Testing for Quality Control of Concrete Mixtures - Phase 2

PURPOSE AND SCOPE: The objective of Phase 1 of this project was to investigate the potential of resistivity testing in assessing the performance of typical concrete mixtures used in bridge and pavement infrastructure in Oklahoma. The sensitivity and reliability of the method with Oklahoma materials was investigated in order to formulate new guidelines and specification(s) that would allow ODOT to produce high quality concrete. The study evaluated the use of resistivity to evaluate field structures and indicated promise to make great changes to the quality and long term performance of Oklahoma concrete.

Based on Phase 1 research activities, in Phase 2, a systematic approach using resistivity testing for Classes A and AA concrete mixture design compliance control during construction will be developed. Additionally, a temperature correction factor to rectify results of resistivity measurements taken outside of the test method's recommended temperature range will be developed. Within the devised experimental plan, an extensive trial study within ODOT residencies will be conducted. This will help with the validation process of the resistivity method developed and the implementation process within the residencies. Finally, an alternative method will be recommended in the event a sample fails to meet the specification. This aids in evaluating the adequacy of the material constructed onsite. As such, an alternative secondary resistivity testing procedure, in case of failed material compliance test, will be investigated.

The results of this study will aid in devising a strategy for easy implementation of the resistivity method within material quality control and compliance activities.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 3 of 3)** - Completed resistivity model development; completed resistivity model trial study; competed temperature parametric investigations; completed development of temperature correction factor; completed temperature correction factor trial study; completed investigation on in-situ resistivity testing; completed investigation on core resistivity testing; produced project progress reports; submitted FFY 2018 annual report; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$99,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$98,950	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Julie Hartell, Oklahoma State University, 405-744-5222

Project Sponsor: Kenny Seward, Assistant Materials Division Engineer, 405-522-4999

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2268 Use of a Novel Controlled Release Surface Curing Agent for Bridge Decks - Phase 2

PURPOSE AND SCOPE: The durability of concrete bridge decks is critical to the satisfactory long term performance of the Oklahoma highway infrastructure system. It is currently required in Oklahoma to place wet burlap or blankets within 10 minutes of strike off of the concrete surface. The job of these materials is to minimize moisture loss, promote hydration, reduce permeability, increase strength gain, and minimize cracking. Current wet curing techniques are labor intensive, logistically challenging, and quite costly. Also the placement of these materials too early can cause unwanted deformations or damage in the surface of the concrete that may nullify any benefits from the curing.

The objective of the project is to use a novel curing technique that can be rapidly applied to the surface of the fresh concrete and not cause deformations in the concrete surface. This material should show equal or better curing performance then typical wet curing methods and be sustainable and safe for the environment.

The specific objectives for this project include:
1. Develop a field application method for the novel curing material
2. Develop specifications for the quality control and usage of the novel curing material
3. Work with contractors in Oklahoma to implement this technology in the field and evaluate the effectiveness

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 1 of 3)** - Began laboratory study to evaluate timing of wet curing; began field application of curing methods with new materials introduced to the market; assisted contractors in the usage of novel curing materials in the field and evaluation of effectiveness; produced project progress reports; submitted FFY 2018 annual report; FFY 2019 annual report is pending.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 2 of 3) Phase 2** - Continue to perform laboratory studies to evaluate timing of wet curing; continue field applications of curing methods with new materials introduced to the market; continue to assist contractors in the usage of novel curing materials in the field and evaluation of effectiveness; produce project progress reports; prepare and submit FFY 2020 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$80,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$79,500	SPR	$0.00	STATE
Projected Cost FFY 2020	$93,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Tyler Ley, Oklahoma State University, 405-744-5257

Project Sponsor: Walt Peters, ODOT Assist. Bridge Division Engineer, 405-521-2606

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2272 Performance of Moisture Barriers to Enhance Pavement Performance over Swelling Soils

PURPOSE AND SCOPE: The Oklahoma Department of Transportation has invested significant amounts of money on several projects to construct low-permeability barriers to prevent moisture changes in swelling soils beneath pavements. However, there has been relatively little post-construction monitoring of these sites to assess the performance and cost-effectiveness of the moisture barriers and associated pavements. Given the high material cost and additional construction cost associated with installing moisture barriers, there is a need to assess performance relative to reductions in moisture infiltration into swelling subgrades. Additionally, given the current state-of-the-art knowledge in this field, there is a need for laboratory soil testing, field monitoring, and numerical modeling of the problem.

This research will assess the performance of moisture barriers, determine whether these are cost-effective solutions for pavement design over swelling soils, and develop recommendations for enhancing the design of moisture barriers.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 3 of 3)** - Estimated costs are for ODOT Office of Research and Implementation personnel assisting with modifying field test installation and report review; submitted FFY 2018 annual report.

PROPOSED ACTIVITIES FOR FFY 2020: End of project.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$10,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$2,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Rifat Bulut, Oklahoma State University, 405-744-5189

Project Sponsor: Amanda Warren, ODOT Pavement Design Engineer, 405-521-2602

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2274 Development of Concrete Mixtures to Mitigate Bridge Deck Cracking, Validated Using 3D Bridge Deck Surface Evaluations

PURPOSE AND SCOPE: Cracking in concrete is a significant threat to the long term durability of a bridge deck. These cracks allow outside chemicals direct access to the reinforcing steel within the bridge. These outside chemicals can then cause corrosion, which will in turn cause more cracking and will again lead to penetration of more outside chemicals. In addition to corrosion, these cracks can cause or exacerbate many other deterioration mechanisms, including freeze thaw, alkali-silica reaction, and sulfate attack. Cracking of concrete can cause a vicious cycle that can quickly shorten the life of a bridge.

The goals of this project are to use a number of different technologies to help reduce cracking in Oklahoma bridges with economical and practical solutions. It is anticipated that this research will help bring crack-resistant concrete to Oklahoma bridges. This research will not only be completed in the laboratory, but will also be implemented and then evaluated in the field. Furthermore, a specification will be developed that will help ODOT to implement these technologies on their bridges.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 4 of 5)** - Continued evaluations of bridge deck cracking; began the development of an ODOT specification to implement reduced crack bridge decks in Oklahoma; produced project progress reports; submitted FFY 2018 annual report; FFY 2019 annual report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 5 of 5)** - Complete evaluations of bridge deck cracking; finish the development of an ODOT specification to implement reduced crack bridge decks in Oklahoma; produce project progress reports; prepare and submit final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$74,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$73,850	SPR	$0.00	STATE
Projected Cost FFY 2020	$70,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Tyler Ley, Oklahoma State University, 405-744-5257

Project Sponsor: Walt Peters, ODOT Assist. Bridge Division Engineer, 405-521-2606

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2275 Development of Aggregate Characteristics-Based Preventive Maintenance Treatments Using 3D Laser Imaging and Aggregate Imaging Technology for Optimized Skid Resistance of Pavements

PURPOSE AND SCOPE: Skid resistance of pavements plays a significant role in road safety as the friction between tire and pavement surface is a critical contributing factor in reducing potential crashes. The skid resistance of a pavement surface has been related to two main properties of the pavement: microtexture and macrotexture. Microtexture is mainly dependent on aggregate shape, angularity and texture, while macrotexture is a function of asphalt mix properties, compaction method, and aggregate gradation. Many studies in recent years, such as NCHRP 4-30A and NCHRP 4-34 projects, have focused on evaluating and developing comprehensive test methods to measure aggregate shape, texture and angularity. However, none of these studies has clearly established any relationships between the aggregate properties and the ultimate pavement performance.

The most recent developments in 3D laser imaging technology will be used to collect 3D pavement surface texture data at highway speed at 1 mm accuracy. The project also uses several other state-of-the-art laboratory and field data collection instruments, including the Aggregate Imaging System (AIMS) and a portable 3D surface analyzer to collect ultrahigh resolution aggregate morphological characteristics data, including shape, angularity, and surface texture related index properties. Moreover, pavement skid resistance data will be collected using a skid trailer, grip tester, and dynamic friction tester.

This study presents a detailed analysis of aggregate characteristics and its relationship to skid resistance of pavements. An understanding of the relation of the aggregate physical properties and implementing the recommended aggregate selection procedure will result in an immediate improvement in pavement performance, especially for pavement safety.

ACCOMPLISHMENTS DURING FFY 2019: Submitted final report.

PROPOSED ACTIVITIES FOR FFY 2020: End of project.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$0.00	SPR	$0.00	STATE
Estimated Cost FFY 2019	$0.00	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Joshua Li, Oklahoma State University, 405-744-6328

Project Sponsor: Kevin Suitor, Transportation Manager, 405-521-2677

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2276 Evaluation of Ultra-High Performance Concrete for Use in Bridge Connections and Repair - Phase 2

PURPOSE AND SCOPE: Phase 2 of this research will build on results of the Phase 1 examination of available materials and potential applications of UHPC for connections and repairs with the goal of creating specifications for composition and use of UHPC in Oklahoma. The additional information provided by this project will include behavior of partial depth joint replacements, bond behavior of UHPC relative to reinforcing bars and concrete substrate, and corrosion behavior in the vicinity of the joint.

The objectives of the proposed Phase 2 research are designed to further progress toward the goal of using UHPC to construct durable bridge component and deck joints and to create durable repairs for bridges in Oklahoma. The objectives are as follows: 1) Evaluate structural performance of partial depth joint replacement details to identify best practices for bridges in Oklahoma, 2) Evaluate bond performance of reinforcing steel cast in UHPC and the UHPC to substrate interface, 3) Examine corrosion performance of bridge joints incorporating UHPC repair materials, 4) Evaluate long-term performance of trial joints placed in an in-service Oklahoma bridge and at Fears Lab using proprietary and locally designed UHPC mixtures, 5) Create specifications for materials, mixing, quality control, and placing of UHPC in Oklahoma.

The research will result in information and guidance ODOT can use to implement UHPC bridge connections and repairs in the future.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 1 of 2)** - Began partial depth joint testing using laboratory-scale slab joint specimens; began bond tests and evaluated reinforcing bar development length in UHPC; began evaluation of UHPC bond to concrete substrate between plain concrete and UHPC using laboratory specimens; began UHPC durability freeze-thaw and permeability property testing; began joint corrosion testing; monitored performance of replaced field and laboratory bridge joints; submitted FFY 2018 annual report; produced project progress reports; FFY 2019 annual report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 2 of 2)** - Continue evaluation of UHPC bond to concrete substrate between plain concrete and UHPC using laboratory specimens; continue joint corrosion testing; continue to monitor performance of replaced field and laboratory bridge joints; develop specifications for UHPC materials; produce project progress reports; prepare and submit final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$104,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$103,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$41,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Royce Floyd, The University of Oklahoma, 405-325-1010

Project Sponsor: Walt Peters, ODOT Assist. Bridge Division Engineer, 405-521-2606

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2277 Compilation of Local Studies and Regional Calibration of Pavement ME Design for Rigid and Flexible Pavements in Oklahoma

PURPOSE AND SCOPE: The proposed project focuses on the calibration and implementation of Pavement ME Design for applications in Oklahoma. ODOT has funded several research projects in the past that make the pursuit of the proposed study possible and timely. The data collected from numerous LTPP sites shall also be included. These projects have generated a significant amount of data inputs that are required in a successful Pavement ME Design.

The primary objective for the proposed project is to compile information gathered from past studies, supplement as needed, and provide a suitable implementation of the calibration of the Pavement ME Design relative to Oklahoma, divided into two regions (west and east) – and to adjust the distress model coefficients, if necessary, for better prediction of pavement distresses for Oklahoma roadways.

The primary product of the proposed study is a locally-calibrated Mechanistic-Empirical Pavement Design Guide (MEPDG) suitable for use in both routine design and special pavement studies in Oklahoma.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 3 of 3)** - Continued literature review; continued laboratory testing and material characterization analysis; continued to compare ME pavement distress predictions w/LTPP distress data; continued the development of deterioration models; continued to produce recommendations of regional calibration coefficients and determine adequacy of modified models; continued the elimination of bias and reducing the standard error of the estimate; continued database and software interface development; continued the development of a local calibration and implementation guideline; continued the development of a calibration catalog for calibration plan; continued procedures manual preparations; continued the development of a practitioners guideline; produced project progress reports; submitted FFY 2018 annual report; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$105,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$104,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Maryam Sakhaeifar, Texas A&M University, 979-845-9961

Project Sponsor: Amanda Warren, ODOT Pavement Design Engineer, 405-521-2602

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2278 Recycling and Reuse of Materials in Transportation Projects- Current Status and Potential Opportunities Including Evaluation of RCA Concrete Pavements along an Oklahoma Interstate Highway

PURPOSE AND SCOPE: There are widespread benefits of using recycled and reusable waste materials in construction, especially in transportation projects. ODOT is conducting several technical studies to develop some specification and/or methodology incorporating recycled materials. But technical solutions will not be sufficient unless business consideration of the private sector within the state can be better understood and included in the decision making process.

This proposed research project will develop strategies for increasing the use of recycled materials in ODOT transportation construction projects after bringing all the stakeholder perspectives in the decision making. It will be based on available recycled wastes in Oklahoma and neighboring states KS, TX and AR. The second objective of the proposed study is to evaluate the long-term performance of portland cement concrete pavement (PCCP) constructed with recycled concrete aggregate (RCA). A final report will synthesize the results of the recycled materials' availability evaluation and offer insight into the long-term performance of RCA concrete pavements in Oklahoma. Implementation of this information includes knowledge of materials currently available for use and the development of a construction specification(s) to further define the nature and benefits of recycling materials within a construction contract.

Developing strategies for technical and business means will assist ODOT to use more recycled and reusable materials in construction and maintenance of transportation projects which ultimately protect and enhance human and natural environment by providing safe, economical and efficient transportation systems in Oklahoma.

ACCOMPLISHMENTS DURING FFY 2019: Submitted final report

PROPOSED ACTIVITIES FOR FFY 2020: End of project.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$0.00	SPR	$0.00	STATE
Estimated Cost FFY 2019	$0.00	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Anol Mukhopadhyay, Texas A&M University, 979-458-4618

Project Sponsor: Josh Randell, ODOT Pavement Design Engineer, 405-521-2390

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2279 Probabilistic Approach for the Design of Drilled Shafts Socketed in Weak Rock in Oklahoma

PURPOSE AND SCOPE: The proposed scope of work has been specifically developed to produce rational and defensible methods for design of drilled shafts in weak rock. The scope reflects a comprehensive load test program that will also supplement currently available tests, with the additional benefit of characterizing site-specific foundation variability. Furthermore, it will provide greater confidence in the design methods and resistance factors that will be developed from the proposed work.

Results of this study will provide the basis for quantifying the value of site-specific load testing for design and for implementing future improvements to design and construction that are currently being developed by FHWA.

The primary objective for the proposed work is to develop rational and practical Load and Resistance Factor Design (LRFD) methods for design of drilled shafts in weak rock formations that are common in Oklahoma.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 2 of 3) -** Completed sites selection for load testing; completed design of field load tests; continued construction and load testing of test shafts; continued analysis and interpretation of load test measurements; began analysis of collected empirical data for existing and new design methods and, probabilistic characterization of resistance factors for selected design methods; began probabilistic calibration of resistance factors for selected design methods; produced project progress reports; submitted FFY 2018 annual report; FFY 2019 annual report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 3 of 3)** - Continue load testing of test shafts; perform analysis of collected empirical data; perform probabilistic calibration of resistance factors for selected design methods; conduct evaluation of proposed design methods and resistance factors; develop proposed design specifications and guidelines; produce project progress reports; prepare and submit final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$632,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$580,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$167,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Erik Loehr, University of Missouri, 573-882-6380

Project Sponsor: Shon Jesse, ODOT Geotechnical Engineer, 405-522-3414

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2280 Development of Evaluation and Rehabilitation Guidelines for Prestressed Concrete Bridges Vulnerable to Shear

PURPOSE AND SCOPE: Shear capacity of prestressed concrete girder bridges and load rating of these bridges has been studied over the years to better understand their ultimate behavior related to shear. In light of changes to the code since many older girders were designed and constructed, accurate load rating of bridges for shear is important to prevent adequate bridges from being rated deficient. A large number of bridges in Oklahoma were designed and put into service between 1960 and 1990 using the quarter point rule for shear design from the AASHTO Standard Specifications (e.g. AASHTO 1973) which considered the applied shear at the quarter-span point to be the critical value for the design demand. This often resulted in larger shear reinforcement spacings near the beam ends than what is typical for new construction. The current AASHTO LRFD Specifications (2015) consider the critical location for shear to be much closer to the support, which can result in a larger design demand and smaller shear reinforcement spacings. The methods for calculating shear capacity included in the AASHTO LRFD Specifications have also evolved considerably over time and a number of additional methods have been proposed by researchers. According to ODOT engineers, many bridges in Oklahoma may have been designed using the quarter point rule for shear, potentially leaving these bridges vulnerable to a lower load rating compared to newer bridges when evaluated using the current LRFD Specifications.

As the state of Oklahoma pushes to get the number of structurally deficient bridges down to less than 1% of all highway bridges in Oklahoma by the end of the decade, it is important that additional bridges are not labeled structurally deficient or load posted unnecessarily. The objectives of the proposed research are intended to extend the results of previous research sponsored by ODOT related to shear in prestressed concrete bridge girders and evaluation of deterioration in in-service bridges in order to create useful guidelines for providing accurate ratings of older bridges.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 2 of 2)** - Continued to evaluate methods for assessing condition of aged girders using Bond Transfer Inverse Modeling and using Draw-In Data and Piecewise EI Identification techniques; continued Inspection Data Interpretation; continued rating guideline development; created training materials and conducted training on using the guidelines for ODOT personnel; produced project progress reports; submitted FFY 2018 annual report; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$88,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$87,800	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Royce Floyd, The University of Oklahoma, 405-325-1010

Project Sponsor: Walt Peters, ODOT Assist. Bridge Division Engineer, 405-521-2606

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2281 Evaluating the Performance of Existing Reinforcement for Oklahoma Bridges

PURPOSE AND SCOPE: The increasing use of deicing salts in the United States over the past 65 years has resulted in the steady deterioration of roadway bridge decks due the corrosion of reinforcing steel. The annual cost of this corrosion damage was estimated at $13.6 billion in 2012 (NACE 2012), a number that only continues to increase. Designing infrastructure to be resistant to corrosion is, therefore, of utmost importance. Many strategies rely on slowing or preventing the penetration of water, oxygen, carbon dioxide, and salt into the concrete. By its nature, however, bridge decks invariably develop cracks parallel to and directly over the reinforcing bars. These cracks allow corrosive agents to penetrate to the level of reinforcing bars, where chloride contents can be high enough to cause corrosion to initiate in conventional reinforcing steel as early as the first year of service (Lindquist et al. 2006). This behavior makes the use of corrosion resistant/resisting reinforcement mandatory. The proposed research intends to keep abreast of the latest information in the field of reinforcing bar corrosion protection systems, with special emphasis on epoxy-coated, ChrōmX, galvanized, and mild steel reinforcement, where the latter serves as a "control." Field evaluations will be performed on deck panels taken from the I-35 bridge over Cow Creek and the adjacent control bridge, which contains mild conventional reinforcing steel. Visual observations of the performance of the northbound I-35 bridge over the Chickaskia River, which contains ChrōmX reinforcement, will also be used in the study.

The test results and the field observations will be used to estimate the 100-year life cycle cost of bridges containing the four reinforcing steels. Project deliverables include an easy-to-use design table and a final project report describing efforts and results of this study, as well as a color article and technical presentations throughout the course of the study.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 2 of 3)** - Continued visual and laboratory evaluations; continued to perform various corrosion measurement tests; continued accelerated lab testing on reinforcing steel for effects of UV damage; continued life cycle cost analysis for bridge decks in Oklahoma containing epoxy-coated, ChrōmX, galvanized, and mild steel; produced project progress reports; submitted FFY 2018 annual report; FFY 2019 annual report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 3 of 3)** - Continue visual and laboratory evaluations; continue to perform various corrosion measurement tests; continue accelerated lab testing on reinforcing steel for effects of UV damage; continue life cycle cost analysis for bridge decks in Oklahoma containing epoxy-coated, ChrōmX, galvanized, and mild steel; produce project progress reports; prepare and submit final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$174,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$173,950	SPR	$0.00	STATE
Projected Cost FFY 2020	$125,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: David Darwin, University of Kansas, 785-864-3827

Project Sponsor: Walt Peters, ODOT Assist. Bridge Division Engineer, 405-521-2606

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2282 Vehicle Classification and Bluetooth MAC's for Origin-Destination Measurements

PURPOSE AND SCOPE: Designing and planning transportation systems is a complex task that requires extensive analysis of public need. Part of this process is determining the underlying characteristics of traffic patterns, including vehicle classification, purpose for travel, origin/destination (O/D), traffic travel time, and vehicle occupancy, among many other factors. Having a full grasp of this information is an important for traffic projection studies and transportation planning and O/D information is foremost among these characteristics. Bluetooth (BT)- and WiFi-based technologies are currently used to monitor OD routes of various vehicles. Both are able to capture the unique hardware ID—namely medium address control (MAC)—of a BT device in the vehicle whether it is the driver or passenger cellphone or the vehicle's factory installed Bluetooth system.

This project proposes the development of a new device that integrates two systems— namely magnetometer classification and BT identification—for monitoring route choices per vehicle class, as well as targeting system deployment and demonstration. The research objectives of this proposal are four-fold. The study includes BT/class prototype design, BT-vehicle assignment algorithm development, system deployment, and accuracy analysis of detected BT-vehicle assignments.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 2 of 2)** - Continued highway segmentation investigation; continued vehicle roadway sensor highway layout investigation; continued development of BT signals and vehicle assignment algorithms; continued BT-vehicle assignment accuracy evaluation; investigated methods to improve accuracy and reliability of BT-vehicle assignments; produced project progress reports; submitted FFY 2018 annual report; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$91,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$90,800	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Hazem Refai, The University of Oklahoma, 918-660-3243

Project Sponsor: Matthew Blakeslee, ODOT Traffic Management Engineer, 405-522-6713

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2283 Asset Value Practices and Functionality

PURPOSE AND SCOPE: This research project will assist the Oklahoma Department of Transportation (ODOT) in augmenting existing business practices related to asset management. It will provide an understanding of asset valuation as applied in several contexts, including preservation of asset functionality. The project effort includes a workshop and guidebook to foster implementation activities. A gap assessment will be completed to examine current practices and determine the best approaches for lasting effectiveness.

This project's results will provide a better understanding of the value of Oklahoma's transportation assets and the maintenance activities necessary to keep them in a state of good repair. It will enhance asset management planning efforts, ultimately better meeting Federal requirements. The research team will categorize and examine losses to state highway functionality over time, the causes of functionality reduction, and well-define actions that can be taken to preserve, reestablish, improve, and enhance functionality over time. This project will also identify opportunities (related to practice, strategy, and investment) to influence functionality of transportation assets, to enhance user safety, and to reduce future maintenance and investment expenditures.

ACCOMPLISHMENTS DURING FFY 2019: Facilitated kickoff meeting and lead project panel discussions; shared results from literature review; performed survey of state of practice; presented evaluation of multiple asset dimensions at the asset value workshop; performed Life Cycle Planning (LCP) using cause and effect relationships; evaluated a category of assets for planning, construction, operation and maintenance practices and functions; prepared Guidebook Development; produced project progress reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$105,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$104,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Jason Bittner, Applied Research Associates, Inc., 608-274-6409

Project Sponsor: Chelley Hilmes, ODOT Comptroller, 405-521-2591

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2284 Evaluation of Ultra-High Performance Concrete, Fiber Reinforced Self-Consolidating Concrete, and MALP Concrete for Prestressed Girder Repair

PURPOSE AND SCOPE: The objectives of the proposed research are intended to achieve the goal of using UHPC, FR-SCC, and MALP concrete to construct durable repairs to continuity joints and end regions of Oklahoma prestressed concrete bridge girder systems. These objectives consist of the following:

- Identify best practices for mixing and placement of thin encapsulation repairs using UHPC, FR-SCC, and MALP concrete,
- Evaluate cracking resistance and contribution of thin UHPC, FR-SCC, and MALP concrete repairs to structural strength,
- Implement UHPC, FR-SCC, and MALP concrete repairs to an in-service bridge and monitor over time,
- Create specifications for UHPC, FR-SCC, and MALP concrete materials, mixing, placement, and quality control for use in Oklahoma bridge repair.
- The research will directly result in information and guidance ODOT can use to implement UHPC, FR-SCC, and MALP concrete repairs in the future

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 1 of 2):** Examined mixing and placement methods for UHPC, FR-SCC, and MALP repair materials to evaluate feasibility and best practices for relatively thin, encapsulation repairs of girder continuity joints and end regions; evaluated the cracking resistance and contribution of UHPC, FR-SCC, and MALP girder continuity connection repairs to the strength of the joint; evaluated the cracking resistance and contribution of UHPC, FR-SCC, and MALP girder end region repairs to the strength of precast concrete members; produced project progress reports; submitted FFY 2018 annual report; FFY 2019 annual report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 2 of 2):** Perform end region repairs on precast beam specimens following end region testing; perform various corrosion tests; monitor field trial repairs; conduct a cost analysis comparing UHPC, FR-SCC and MALP concrete repairs to traditional repair methods; prepare specification development; produce project progress reports; prepare and submit final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$101,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$105,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$93,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Royce Floyd, The University of Oklahoma, 405-325-1010

Project Sponsor: Walt Peters, ODOT Assist. Bridge Division Engineer, 405-521-2606

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2285 Level 1 Input Parameters for Commonly Used Oklahoma Binders Blended with RAP and RAS Extracted Binders

PURPOSE AND SCOPE: The use of reclaimed asphalt pavement (RAP) and recycled asphalt shingles (RAS) in asphalt pavements have been gaining momentum nationally and globally due to economic and environmental benefits. Typically, RAP and RAS are blended with virgin materials to produce new mix, which affects the rheological properties of the virgin binder and the mechanical properties and performance of the mix. In addition to content, the quality of RAP and RAS plays an important role on the properties of the mix and performance of the constructed pavement. Therefore, it is important to consider the effects of RAP and RAS on the rheological properties using AASHTOWare Pavement ME. Effect of RAP and RAS on the rheological properties and grade of the binder blend will provide a better understanding on binder's performance in the pavement design stage. The results of this study can be used by ODOT engineers and the asphalt industry for improved design of asphalt pavements containing RAP and RAS.

The objectives of this project include 1.) determining the Superpave performance grades of blended binders commonly used in asphalt mixes in Oklahoma and actual field produced material using newly available equipment; 2.) evaluating the environmental benefits of newly available equipment to the laboratory technician, and to the ambient and global environment using a self-contained extraction process; 3.) evaluating the time savings using newly available equipment in contrast to current processes employed by ODOT; 4.) purchase and install an automated binder extraction device (Asphalt Analyzer) and Rotary Evaporator; 5.) transfer the Asphalt Analyzer and the Rotary Evaporator to the ODOT Materials Division at the endo of the project.

ACCOMPLISHMENTS DURING FFY 2019: New Project.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 1 of 2):** Tasks to be performed in FFY 2020 include a literature review, materials collection, equipment acquisition and installation, test sample preparation and testing of samples will begin, produce project progress reports, and prepare and submit FFY 2020 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$0.00	SPR	$0.00	STATE
Estimated Cost FFY 2019	$0.00	SPR	$0.00	STATE
Projected Cost FFY 2020	$208,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: TBD

Project Sponsor: Kevin Suitor, Transportation Manager, 405- 521-2677

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2286 Compost Filter Socks for Storm Water and Erosion Control in Construction

PURPOSE AND SCOPE: An update to the Standards Specifications for Highway Construction of erosion and sediment control measures through the Storm Water Action Team is ongoing. Part of this update includes reviewing and evaluating new erosion control products like compost filter socks. It is not known if compost filter socks can function effectively as an erosion control product without leaching contaminants to the environment. Research in conjunction with laboratory and data analysis are needed to determine if compost filter socks do leach contaminants under conditions identified at transportation construction sites in Oklahoma. This project will develop and refine a simplified laboratory method for determining leaching potential of compost filter socks at Oklahoma construction sites. This new standard will then be utilized to test various compost filter sock compositions for leaching of contaminants. A cost-benefit analysis will be performed to compare the use of compost filter socks to current practices. Results from field monitoring of filter sock implementation will be used to inform the ODOT Storm Water Action Team for development of a standard and specification to use on ODOT construction sites.

ACCOMPLISHMENTS DURING FFY 2019: New Project.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 1 of 2)** - Begin literature review; identify and collect representative OK construction site soil; obtain/make CFS with selected sock properties; conduct laboratory flume experiments and analyze sock properties; interpret results and determine subsequent test designs; begin field monitoring site setup; conduct field tests/monitoring; conduct outreach Workshops; produce project progress reports; prepare and submit FFY 2020 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$0.00	SPR	$0.00	STATE
Estimated Cost FFY 2019	$0.00	SPR	$0.00	STATE
Projected Cost FFY 2020	$60,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Jason Vogel, The University of Oklahoma, 405-325-2826

Project Sponsor: Steven Gauthe, ODOT Assist. Environmental Division Engineer, 405-522-3978

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2287 Evaluation of the Expected Life and Recoating of Silane Water Repellant Treatments on Bridge Decks

PURPOSE AND SCOPE: Field evaluations funded by an ODOT task order to evaluate the effectiveness of silane coatings on bridge decks, shows that the silane is not consistently penetrating to the target depth. Further, this material is not resisting water absorption as outlined in the ODOT specifications. Based on discussions with ODOT Materials Division Engineers, the field testing is showing that one in three bridges are failing these tests. This suggests that these coatings are not effective and this puts the long term performance of the bridge in question. While some results have been obtained with a limited number of bridges, more work is needed to investigate a larger number of bridges and evaluate the current ODOT specification.

This research is timely and will assist ODOT in making sound investments in the long term performance of Oklahoma's bridges. As a result of this research a new specification for ODOT structures will be developed. The results of this research have the potential to greatly extend the service life of bridges and therefore save the state of Oklahoma millions of dollars.

ACCOMPLISHMENTS DURING FFY 2019: New Project.

PROPOSED ACTIVITIES FOR FFY 2020: (Yr. 1 of 2) - Begin core collection sampling from 40 different bridges in Oklahoma from different regions and contractors; initiate series of laboratory testing; begin investigation on how cracking, change in w/cm, and different depths of penetration impact the performance of silane coatings; begin determination of the effectiveness of applying silane to extend existing silane coatings; begin investigation of the performance of unique surface sealers; begin the development of a decision flow chart for crack sealing and silane application for ODOT specifications; produce project progress reports; prepare and submit FFY 2020 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$0.00	SPR	$0.00	STATE
Estimated Cost FFY 2019	$0.00	SPR	$0.00	STATE
Projected Cost FFY 2020	$65,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Tyler Ley, Oklahoma State University, 405-744-5257

Project Sponsor: Walt Peters, ODOT Assist. Bridge Division Engineer, 405-521-2606

Project Manager: Teresa Stephens, Research Engineer, 405-522-1062

2300 Research Implementation

PURPOSE AND SCOPE: Implementation is the incorporation of research results into everyday practices of the organization and is a crucial stage in the research process. Research findings from national and regional studies are also considered for implementation. No matter how the research is derived, it is of little importance if it is not implemented. The budget for this item is prepared to support multiple implementation projects and/or various professional services contracts for research projects which fill needs of the Department but were not foreseen when the SPR budget was written, and therefore were not included as separate items. This may include special technical assistance on multiple projects, and providing matching funds for leveraging research program funds resulting in knowledgeable outcomes significant to the Department. Those projects and/or studies identified at SPR Work Program development that are supported by this item are represented in the following pages.

ACCOMPLISHMENTS DURING FFY 2019: Funds were used to support four research projects that required additional funding during FFY 2019.

PROPOSED ACTIVITIES FOR FFY 2020: Support implementation project modification needs, mid-year research program needs and general implementation project support activity personnel needs.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$120,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$120,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$100,000	SPR	$0.00	STATE

CONTACT INFORMATION

State Research Engineer: David Ooten, 405-521-2671

2301 Improving the Efficiency and Accuracy of ODOT Temporary Traffic Monitoring System

PURPOSE AND SCOPE: For many years ODOT has used an exclusively manual process to collect and enter temporary vehicle data (e.g., vehicle count, site information, device used, collection date and time, ODOT operator, and other vital data) into a computer database. This process is slow and inefficient. The outcome of this project intends to replace manual data handling with machine handling, eliminating the potential of data recording and/or entry errors and improving data collection/entry efficiency. This implementation proposal aims to accomplish several objectives with an overall goal to demonstrate possible advantages achieved using vehicle classification Road Runner 3 (RR3) designed by Diamond Traffic Inc. and the Temporary Count Management System (TCMS) developed by Innovative Traffic Systems & Solutions (ITSS), LLC.

The proposed work will extend the project, investigating the possibility of replacing cables attached to RR3 with a wireless interface for data exchange; implementing data entry automation for highway sites; supporting ODOT data collection activities for a full year, using the developed system; modifying software per ODOT request; and developing simple machine learning techniques to discover faulty data collection equipment.

ACCOMPLISHMENTS DURING FFY 2019: **(1 Yr. Ext.)** - Investigated the development of wireless interface for replacing cables to Road Runner 3 (RR3); developed database scripts for separating sites; developed webserver site modification tools; developed webserver real-time duplex communication tools; developed webserver count tools; developed automatic validation algorithms; finalized over-the-air application updates; maintained android software application and webserver; conducted training sessions for ODOT data collectors; produced project progress reports; FFY 2018 annual report submission is pending; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None. Any activity performed in FFY 2020 and going forward will be a maintenance activity, and not necessarily research, and will be shifted to the SPR1 Work Program.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$87,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$40,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Hazem Refai, The University of Oklahoma, 918-660-3243

Project Sponsor: Aaron Fridrich, Transportation Manager II, 405-736-9466

Project Manager: Gary Hook, Implementation Engineer, 405-522-1042

2302 Load Test Monitoring of I-235 Bridge Repairs

PURPOSE AND SCOPE: In response to national issues with grouting errors, FHWA has required all of the state DOTs to inspect their post tensioned grouted tendons. Based on these inspections ODOT discovered some issues with the I-235 bridge west of the state capitol. Older methods used during construction of this bridge led to some problems in the post-tensioning ducts. Not until relative recent years have DOT's required the use of thixotropic grouts for post-tensioning. Older grouts did not perform as well as the thixotropic grouts and tended to flow away from the high points leaving only water. Newer designs require additional vents especially at the high points. This project was directed at filling grout voids but stumbled into a few locations that did not have any grout. Due to concerns with section loss of the previously exposed prestressing strands, ODOT restricted permit traffic from travelling over the bridge. However, ODOT calculations show that a posting is not required. The approximate replacement cost for the bridge including the on-ramp is estimated to be $50 million. As such, health monitoring of the bridge is justified. The research team at OSU can help ODOT in the assessment of these repairs by performing an array of nondestructive tests including live load testing, strain monitoring, and acoustic emissions monitoring.

The objective of the project is to assess and monitor the repairs to the regrouted post tensioned tendons in the I-235 bridge. The anticipated benefit of the project is that it will provide insight into the effectiveness of the regrouted tendon repairs and monitor their behavior over time. This knowledge will be valuable in future decisions on safety and maintenance of the monitored bridge members.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 3 of 5)** - Performed load testing and compared to initial load tests performed in year 2; performed a static load test representative of worst case loading scenarios and permit load scenarios. (The purpose of this load test is to conduct a comparative analysis with that of a structural model developed concurrently by Dr. Mohamed Soliman as part of FFY 2018 ODOT Task Order 2400-18-06); performed year-long monitoring of crack patterns and data analysis; performed non-destructive survey to estimate concrete material strength; produced project progress reports; submitted FFY 2018 annual report; prepare and submit FFY 2019 annual report.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 4 of 5)** - Conduct non-load-test monitoring and inspections; perform annual monitoring of crack patterns and data analysis; produce project progress reports; prepare and submit FFY 2020 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$140,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$139,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$74,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Robert Emerson, Oklahoma State University, 405-744-5259

Project Sponsor: Walt Peters, ODOT Assist. Bridge Division Engineer, 405-521-2606

Project Manager: Gary Hook, Implementation Engineer, 405-522-1042

2303 Development of Intelligent Vehicle Counting and Classification Sensor (iVCCS)

PURPOSE AND SCOPE: Traffic monitoring is an integral part of any transportation system network. Providing reliable, real-time traffic surveillance is crucial for such 21st century systems. Timely data facilitates instantaneous decision-making; maximizes existing transportation infrastructure capacity; and improves roadway efficiency, making transportation systems safe, efficient, and more reliable for the anticipated rapidly approaching era of smart cities. The proposed research aims at developing and implementing a novel intelligent wireless sensor for vehicle counting and classification which integrates state-of-the-art embedded wireless sensor networks (WSN) and smart sensors for implementation of various traffic monitoring applications.

The proposed work extends the development work begun last year for developing an intelligent vehicle count and classification sensor.

ACCOMPLISHMENTS DURING FFY 2019: **(1 Yr. Ext.)** - Modified the enclosure design to proof against weather; evaluated the impact of embedding the sensor in the roadway; tested sensor range; collected accelerometer data for vehicle axle counting and spacing; developed and implemented vehicle axle counting algorithms; evaluated developed algorithms in real-world scenarios; collected and developed dataset of vehicle signatures from both magnetometer and accelerometer; investigated deep learning algorithms for vehicle classification according to FHWA schemes; developed and implemented low-complexity algorithms on iVCCS for real-time vehicle classification; evaluated implemented algorithms; produced project progress reports; submitted FFY 2018 annual report; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None. Any activity performed in FFY 2020 and going forward will be a maintenance activity, and not necessarily research, and will be shifted to the SPR1 Work Program.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$89,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$88,950	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Hazem Refai, The University of Oklahoma, 918-660-3243

Project Sponsor: Aaron Fridrich, Transportation Manager II, 405-736-9466

Project Manager: Gary Hook, Implementation Engineer, 405-522-1042

2304 Rehabilitation for the Bridge Approach Slab of the Blue River Site Using Precast Concrete Pavement - Phase 2

PURPOSE AND SCOPE: Field observations performed at the Blue River site on US-70 in Bryan County revealed that serious settlement issues have occurred at the junction between the bridge approach slab (BAS) and the oncoming lanes of asphalt pavement. Other concerning problems worth noting; site grading concentrated runoff flows at the PCC/AC transition; longitudinal cracking; deteriorated joint sealant; differential settlement discovered at the connection between the BAS structure and the attached wing walls; water stains found at the face of the abutment wall. The research team decided to perform rehabilitation for the distressed BAS and asphalt pavement section based on, and following, the design guideline developed for recently completed research project SPR item number 2265, "Precast Prestressed Concrete Pavement to Abate Settlement Problems Under Bridge Approach Slabs"**.** Research is needed to validate the approach to design and the installation process and then to develop training materials to build the confidence and skills of practicing engineers to use the technology to the benefit of the State of Oklahoma.

As part of an implementation effort, Phase 2 of this project is outlined to follow up on the installation to track performance of the Blue River bridge approach repair.

ACCOMPLISHMENTS DURING FFY 2019: **(1 Yr. Ext.)** Configured and installed communications and solar panel system to monitor the approach slab instrumentation; installed vibrating wire strain gauges and thermistor gauges on precast panels; subsoil stabilization performed by URETECH; produced project progress reports; submitted FFY 2018 annual report; prepare and submit FFY 2019 annual report.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 1 of 2) Phase 2** - Monitor the installation and behavior of the newly placed approach slab panels; document and analyze collected instrumentation data; identify and plan a precast pavement repair project; revise and update guidelines and workshop materials for rapid repair of approach slabs; conduct workshops; produce project progress reports; prepare and submit FFY 2020 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$20,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$87,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$80,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Dan Zollinger, Texas A&M Transportation Institute, 979-845-9918

Project Sponsor: Walt Peters, ODOT Assist. Bridge Division Engineer, 405-521-2606

Project Manager: Gary Hook, Implementation Engineer, 405-522-1042

2305 Implement Balanced Asphalt Mix Design in Oklahoma

PURPOSE AND SCOPE: Oklahoma Department of Transportation (ODOT) uses a volumetric asphalt mix design method based on AASHTO R35. Like many agencies, ODOT uses the Hamburg Wheel Test (HWT) to screen mixtures for rutting potential; however, they have no current test for evaluating fatigue resistance. There is a national effort to move toward a Balanced Mix Design (BMD) approach for design of asphalt mixtures. BMDs incorporate two or more mechanical tests such as a rutting test and a cracking test to assess how well the mixture will resist common forms of distress. Adopting a BMD design approach in Oklahoma should lead toward a less prescriptive approach to mix design and longer lasting, better performing asphalt pavements.

The objectives of this study are to review the available literature and select the best Semi-Circular Bend (SCB) test for use in a BMD for Oklahoma and to evaluate selected ODOT mixtures to assist with determining test procedures, specifications and special provisions for evaluation and eventual adaptation in a BMD procedure for ODOT. Development of draft specifications and draft supplemental specifications for a balanced mix design procedure for ODOT will move ODOT away from a voids based mix design procedure, allowing more innovative design concepts and producing longer lasting more durable and rut resistant pavements.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 1 of 1)** - ODOT approved a five (5) month no-cost time extension modification through August 31, 2019 for the completion of the final report; produced project progress reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$0.00	SPR	$0.00	STATE
Estimated Cost FFY 2019	$0.00	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Stephen Cross, Oklahoma State University, 405-744-7200

Project Sponsor: Kevin Suitor, Transportation Manager, 405- 521-2677

Project Manager: Gary Hook, Implementation Engineer, 405-522-1042

2306 Continuous Friction Measurement Equipment (CFME) for Highway Safety Management in Oklahoma

PURPOSE AND SCOPE: Pavement frictional properties play a significant role in road safety. It has long been recognized that adequate friction between the tire and pavement is a critical factor in reducing crashes and improving roadway safety. Therefore, it is important that Departments of Transportation (DOTs) monitor the friction of their pavement networks frequently and systematically by establishing Pavement Friction Management (PFM) programs. The aim of this program is to minimize friction-related vehicle crashes by ensuring that pavements provide adequate friction properties throughout their lives.

The main objective of this study is to evaluate the capabilities of the Grip Tester, one type of CFME device, and its ability to provide information useful for supporting PFM programs. Fixed slip devices offer a practical alternative for network-level pavement friction data collection at highway speeds. The application of CFME based technology allows network screening to identify locations with low friction or vulnerable accident sites at both the project and network levels, and to determine safety impacts of design changes and effects of engineering treatments. The developed methodology contributes to the development of enhanced safety performance function to better predict crash rate and the potential establishment of pavement friction management programs in Oklahoma by providing an objective method for the equipment users to compare and process their friction measurements.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 2 of 2)** - Continued literature review; collected operating condition friction data at different speeds and water film thicknesses for each site; completed development of improved crash rate prediction models using CFME data; completed development of data processing and analysis software for CFME; proposed a pavement friction management and design framework for ODOT; produced project progress reports; submitted FFY 2018 annual report; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$95,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$94,850	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Joshua Li, Oklahoma State University, 405-744-6328

Project Sponsor: Aaron Fridrich, Transportation Manager II, 405-736-9466

Project Manager: Gary Hook, Implementation Engineer, 405-522-1042

2307 A Systems Approach for Design, Construction, and Maintenance of Bridges and Adjacent Roadways

PURPOSE AND SCOPE: Previous research projects funded by the Oklahoma Department of Transportation (ODOT), Federal Highway Administration (FHWA) and other agencies have revealed that many problems faced by bridges, such as expansion joints closing, are related to how the interfaces between a bridge and the adjacent roadway are designed, constructed, and maintained. The current design practice views the bridge and the adjacent roadway as separate components. Therefore, a systems-based approach is needed that considers the important interactions of the bridge and adjacent roadways in a holistic manner. The proposed research will utilize the knowledge gained from the previous studies and develop implementable strategies for improving design, construction, and maintenance of bridges and adjacent roadways.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 1 of 3)** - Performed literature review; reviewed practices used by ODOT and other states; implemented specifications and guidelines; began design and construction of bridges using systems approach; produced project progress reports; submitted FFY 2018 annual report; FFY 2019 annual report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 2 of 3)** - Continue the design and construction of bridges using systems approach; begin monitoring the performance of bridges where new specifications and guidelines are implemented; begin the development of a design decision flow chart; produce project progress reports; prepare ad submit FFY 2020 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$105,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$104,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$101,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Kanthasamy Muraleetharan, Oklahoma University, 405-325-4247

Project Sponsor: Walt Peters, Asst. Bridge Engineer, 405-521-2606

Project Manager: Gary Hook, Implementation Engineer, 405-522-1042

2308 Demonstration of the Applicability of the New CPTu/SCPTu Correlations with Soil Parameter Evaluation

PURPOSE AND SCOPE: The most accurate determination of seismic site class is achieved with in situ measurement of shear wave velocities. A seismic cone penetration test with pore water pressure measurement (SCPTu) can perform all of the functions of the CPTu, but has added capability to measure shear wave velocity at discrete depths. Shear wave velocities are not only useful for accurate determination of seismic site class, they can also be used to estimate other soil properties such as the small strain shear modulus (G_{v0}). The objectives of this research project are: To demonstrate the applicability of various CPT, CPTu, SCPTu correlations to a broad range of Oklahoma soils. To develop Oklahoma specific correlations based on laboratory and CPT, CPTu and SCPTu data collected. To develop recommendations for addressing the impact of partial saturation on CPT, CPTu and SCPTu results and estimated soil properties. To produce a comprehensive set of guidelines in a manual of practice for application of CPT, CPTu and SCPTu for geotechnical engineers in Oklahoma.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 1 of 3) -** Began literature review; identify nine test sites representing a broad range of Oklahoma soils of interest; began cone penetration testing; began supplemental drilling and sampling; began laboratory testing; began data analysis; produced project progress reports; FFY 2019 annual report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 2 of 3) -** Continue literature review; continue cone penetration testing; continue supplemental drilling and sampling; continue laboratory testing; continue data analysis; begin manual of practice development; produce project progress reports; prepare and submit FFY 2020 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$105,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$104,850	SPR	$0.00	STATE
Projected Cost FFY 2020	$103,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Gerald Miller, Oklahoma University, 405-325-4253

Project Sponsor: Scott Garland, ODOT Geotechnical Engineer, 405-522-4998

Project Manager: Gary Hook, Implementation Engineer, 405-522-1042

2309 Utilizing Pavement Friction and Texture Data for the Reduction of Traffic Crashes and Delays

PURPOSE AND SCOPE: Better utilizing the available pavement friction, surface texture, roadway safety data and relevant results, along with other necessary ODOT data sets could result in significant benefits to reduce traffic fatalities, serious injuries, and traffic delays in Oklahoma. The geospatial database technology provides an ideal alternative for ODOT to integrate these different data sets with spatial components to explore the relationship between pavement surface characteristics and roadway crashes. With the geospatial and statistical analysis tools, the critical influencing factors contributing to roadway crashes for the selected pavement sections will be identified. Subsequently, the appropriate safety countermeasures can be applied to improve roadway safety and further reduce traffic delays.

ACCOMPLISHMENTS DURING FFY 2019: **(Yr. 1 of 2) -** Conducted literature review; performed data acquisition and preprocessing; performed statistical analysis; development of friction models and demands; began pavement maintenance strategies for safety; began software development; produced project progress reports; FFY 2019 annual report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 2 of 2) -** Continue pavement maintenance strategies for safety; continue software development; produce project progress reports; prepare and submit final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$99,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$98,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$100,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Qiang Li, Oklahoma State University, 405-744-6328

Project Sponsor: Angel Gonzalez, Pavement Management Engineer, 405-521-2704

Project Manager: Gary Hook, Implementation Engineer, 405-522-1042

2310 Using X-Ray Fluorescence to Assess Soil Subgrade Stabilization Competency During Construction Inspection

PURPOSE AND SCOPE: Currently, ODOT does not have the technology to assess subgrade stabilization content and distribution during construction, prior to pavement laying. Adequate subgrade stabilization is paramount to quality pavement performance. X-Ray Fluorescence (XRF) has been shown to accurately measure the amount of stabilization in soil and, when using proper sampling and testing protocols, can provide an excellent assessment of the spatial distribution of a soil additive. This information can be used to make recommendations to transportation officials on how to employ the portable handheld XRF (PHXRF) and implement laboratory XRF testing protocol on job-sites for quality control applications or during forensic investigations. This technology would help DOTs to more efficiently and effectively build subgrades that would last longer, require less maintenance, and lower the cost of roadway construction. In addition, PHXRF may be a viable solution in sulfate testing in soil subgrades and environmental applications. PHXRF can, potentially, serve several purposes on site, since sulfate detection changes any stabilization protocol because of the threat of ettringite formation.

ACCOMPLISHMENTS DURING FFY 2019: New Project.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 1 of 2)** - Refine and optimize sampling and testing PFXRF protocols on stabilized subgrade soils at five construction projects; begin examination of innovative methods for pulverizing samples; begin soil sample collection; begin testing treated soils and manufactured samples with known additives; record equipment and techniques contractors use for job-specific stabilization and assess effectiveness; craft and implement a remediation plan and then retest to determine if the mixing procedures and outcomes are more acceptable; investigate the detection accuracy of PFXRF on soil sulfate; produce project progress reports; prepare and submit FFY 2020 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$0.00	SPR	$0.00	STATE
Estimated Cost FFY 2019	$0.00	SPR	$0.00	STATE
Projected Cost FFY 2020	$108,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Amy Cerato, The University of Oklahoma, 405-313-8937

Project Sponsor: Scott Garland, ODOT Geotechnical Engineer, 405-522-4998

Project Manager: Gary Hook, Implementation Engineer, 405-522-1042

2311 In-Stream Structures Integrity and Channel Stability Survey and Evaluation

PURPOSE AND SCOPE: In order to reduce impacts on infrastructure within river floodplains, particularly bridges and hydraulic structures, river control or in-stream structures are installed to reduce the impact of peak flows from large flood events. Many of these structures were installed over 50 years prior, but are not routinely evaluated for effectiveness and/or integrity after large storm events, (100-500 year storms). Previously, two ODOT studies (1971 and 1989) have compared the effectiveness of over 20 river-control and streambank-stabilization structures near transportation infrastructure. The results of these studies provide a unique opportunity to build on and enhance the present-day understanding of long-term effectiveness of these structures to limit channel migration and maintain structural function. The proposed project would add to and enhance previous studies through geomorphic surveys and in-depth analysis of the characteristics of installed in-stream structures and stream geomorphology to inform ODOT engineers on causes of survival or failure due to large flooding events over the long term. This information will improve ODOT's understanding of the effectiveness and integrity of river control structures and inform development of standard characteristics and methods for design and installation of resilient in-stream structures for protection of transportation infrastructure.

ACCOMPLISHMENTS DURING FFY 2019: New Project.

PROPOSED ACTIVITIES FOR FFY 2020: **(Yr. 1 of 2)** - Begin literature review; begin field surveys and assessments though site selection, remote data collection and field evaluations; begin interpretation and analysis of collected data; conduct first outreach and demonstration event; produce project progress reports; prepare and submit FFY 2020 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$0.00	SPR	$0.00	STATE
Estimated Cost FFY 2019	$0.00	SPR	$0.00	STATE
Projected Cost FFY 2020	$94,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Jason Vogel, The University of Oklahoma, 405-325-2826

Project Sponsor: Leslie Lewis, ODOT Bridge Division Hydraulics Engineer, 405-521-6500

Project Manager: Gary Hook, Implementation Engineer, 405-522-1042

2312 Implementation of Precast Concrete Pavement Sections for Mainline Pavement Sections

PURPOSE AND SCOPE: Maintenance and construction activities are always of concern for the disruption to the mobility and safety of the traveling public. The ability to efficiently and cost-effectively replace concrete slabs and reduce potential safety hazards to the traveling public through precast concrete panel installation has shown to be a viable option for the industry. However, this technique has not been used in Oklahoma and local designers and contractors are unfamiliar with the processes required for this construction method.

This project will identify a candidate project(s) and research will validate the mainline pavement design and the installation processes. Training materials will be developed and at least one workshop will be held for pavement designers, contractors and practicing engineers regarding parameters of this technique and highlight the work performed with the research effort.

ACCOMPLISHMENTS DURING FFY 2019: New Project.

PROPOSED ACTIVITIES FOR FFY 2020: (Year 1 of 2) – Perform and submit a literature review of current precast pavement sections design and construction activity and results; begin developing design processes using Oklahoma DOT standards; select a project site(s) and perform condition assessments required for design input; initiate processes to construct determined precast concrete panels; produce project progress reports; prepare and submit FFY 2020 annual report.

CONTRACTING – A Request for Proposal solicitation is scheduled to be released by November 1, 2019, with project initiation beginning March 1, 2020 or after. This project is expected to be a 2-year project.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$0.00	SPR	$0.00	STATE
Estimated Cost FFY 2019	$0.00	SPR	$0.00	STATE
Projected Cost FFY 2020	$65,000	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: To Be Determined

Project Sponsor: Randle White, Division 8 Engineer, 918-838-9933

Project Manager: Gary Hook, Implementation Engineer, 405-522-1042

2400 Oklahoma State University Master Agreement for Research and Investigation Services

PURPOSE AND SCOPE: This item will support a task-order based contract for the purpose of providing ODOT the opportunity to address topics and needs that were not brought through the formal annual project selection process and/or were identified outside the formal process. It is anticipated that these projects will range in both scope and financial commitment from simple to complex, but generally be limited to a one-year or less completion cycle. Topics could include traditional research topic areas of interest to the Agency, as well as ancillary effort including education and workforce development and technology transfer through, but not limited to, collaboration, leadership training, addressing student retention and diversity, and internship programs.

ACCOMPLISHMENTS DURING FFY 2019: Continued to support SPTC UTC activities; continued task order contracting mechanism building on FFY 2018 program and further defining processes, procedures and needs for a sustainable UTC.

Completed support to FFY2018 Task Order program addressing short-term research needs and initiated new task orders under the FFY program.

PROPOSED ACTIVITIES FOR FFY 2020: Continue supporting SPTC UTC activities. Continue task order contracting mechanism building on FFY 2018 program and further defining processes, procedures and needs for a sustainable UTC.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$505,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$367,195	SPR	$0.00	STATE
Projected Cost FFY 2020	$500,000	SPR	$0.00	STATE

CONTACT INFORMATION

OSU Contact: Kelvin Wang, Oklahoma State University, 405-744-5189

Project Manager: David Ooten, State Research Engineer, 405-521-2671

2400-18-01
OSU Task Order Contract Administrative Support

PURPOSE AND SCOPE: To provide support and guidance to task order projects at Oklahoma State University to Principal Investigators and to the Office of Research and Implementation (ORI) in project management.

ACCOMPLISHMENTS DURING FFY 2019: Maintained oversight of all approved OSU task orders in monitoring schedules and budgets; assisted PI's and ORI as needed to maintain project scope; assisted ORI as requested with specific projects; worked with PI's to develop new requests; developed initiatives for task order requests toward developing a sustainable program for future University Transportation Center proposals.

PROPOSED ACTIVITIES FOR FFY 2020: Continue to maintain oversight of all approved OSU task orders in monitoring schedules and budgets; continue to assist PI's and ORI as needed to maintain project scope; continue to assist ORI as requested with specific projects; continue to work with PI's to develop new requests; continue to develop initiatives for task order requests toward developing a sustainable program for future University Transportation Center proposals.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$40,943	SPR	$0.00	STATE
Estimated Cost FFY 2019	$40,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Kelvin Wang, Oklahoma State University, 405-744-5189

Project Manager: David Ooten, State Research Engineer, 405-521-2671

2400-18-02
Development of Maintenance Equipment Rental Rates for ODOT

PURPOSE AND SCOPE: When utilizing equipment or vehicle fleet assets for maintenance operations, the Oklahoma Department of Transportation (ODOT) must be able to accurately measure the monetary effects on depreciable equipment budgets. These budgets have been primarily used for the purchase or replacement of the equipment within ODOT to keep the equipment operating in the most cost-effective and productive conditions. The equipment "rental rates" have been internally adopted as a crucial instrument to track and adjust this depreciable equipment budget.

However, the rates have not been updated since Fiscal Year 2010. Furthermore, there is no established best management practice for analyzing and adjusting equipment rental rates for reporting and budget forecasting. This exposes the Department to data inaccuracies that could compound upon the Department annually. Therefore, standard practices and a guide are needed to help the Department use existing equipment inventory and operation data as well as internal policies and State regulations to update its equipment rental rates on a regular basis.

ODOT stands to benefit substantially from the adoption of this practice by being able to accurately forecast the depreciable equipment budget that can range between $15M to $20M annually as well as optimally allocate the budget among the eight field offices and central offices by developing a guide to calculate equipment "rental rates" as well as a methodology to continuously update the rate for the Department's use.

ACCOMPLISHMENTS DURING FFY 2019: Conducted literature review to synthesize the current practices of calculating equipment rental rates; compared existing practices and identified implementable best practices for ODOT's use; worked with ODOT’s Maintenance Division to obtain the equipment inventory, operation and maintenance activity data, and other data that are essential for the calculation of rental rates; developed algorithms and tools to query data for the calculation and continuous update of equipment rental rates; conducted a workshop to demonstrate the developed tool to engineers in ODOT’s Maintenance Division; produced task order progress reports; submitted final report.

PROPOSED ACTIVITIES FOR FFY 2020: End of task order.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$76,452	SPR	$0.00	STATE
Estimated Cost FFY 2019	$76,400	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Yongwei Shan, Oklahoma State University, 405-744-7073

Project Sponsor: Taylor Henderson, ODOT Maintenance Division Engineer, 405-521-2557

Project Manager: David Ooten, State Research Engineer, 405-521-2671

2400-18-03
FAST Act Emergency Vehicle (EV3) Load Rating

PURPOSE AND SCOPE: The Fast Act made certain emergency vehicles including fire trucks legal on the interstate and within reasonable access to the interstate. These vehicles can generate greater load effects in bridges as compared to other legal vehicles. These emergency vehicles (EVs) now must be considered when load rating and posting bridges on the interstate and within the range of reasonable access to the interstate. The EV3s are significantly larger than typical legal tandem axle loads. The existing bridge in the lab at OSU in Stillwater provides a unique opportunity to study the actual stresses and strains on a full scale load from an EV3 loading. OSU will provide research staff and equipment to apply shear and moment loads to the existing 40'-0 span bridge in the lab at OSU in accordance with the Fast Act EV-3 loading.

ACCOMPLISHMENTS DURING FFY 2019: Provided ODOT assurance that AASHTO load rating equations for LFR and LRFR are appropriate for larger EV axle loadings; implemented findings into the ODOT Bridge Inventory and Operating Ratings for H and HS trucks on Steel Girder Bridges; provided presentation materials to summarize findings of testing; produced task order progress reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$79,996	SPR	$0.00	STATE
Estimated Cost FFY 2019	$79,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Bruce Russell, Oklahoma State University, 405-742-7450

Project Sponsor: Steve Jacobi, ODOT Bridge Division Engineer, 405-521-2606

Project Manager: David Ooten, State Research Engineer, 405-521-2671

2400-18-04
Review of Silane Program for Acceptance Testing

PURPOSE AND SCOPE: Recent evaluations of the effectiveness of silane coatings on bridge decks show that the material is penetrating into the concrete but not resisting water absorption. The field testing is showing that one in three bridges are failing these tests. This suggests that these coatings are not effective and this puts the long term performance of the bridge in question. This is causing contractors to not be paid the full amount and it is not clear why this is happening. Testing is needed to determine what is causing these issues. This work will aim to verify the performance of the silane in bridge structures that ODOT has identified as failing the silane testing and also those that have been observed to have passed. This investigation will include the evaluation of eight bridges; four bridges will have a silane treatment that has passed the ODOT inspection and four of them will have failed inspection. Three 1" diameter cores will be taken from each bridge and will be evaluated with several different methods that were previously developed by Oklahoma State from previous funding from ODOT. This testing will independently validate the presence of silane on the surface of the sample and determine if it is effectively resisting penetration. This work also allows the bulk of the sample to be investigated. By investigating the bulk it can be determined if there is a drastic difference in the quality of the concrete.

This work will verify the evaluations that ODOT made previously and show that these methods are useful to evaluate silane performance.

ACCOMPLISHMENTS DURING FFY 2019: Performed preferential staining of the silane coating to validate its presence; investigated the ion penetration at the surface where the silane was applied; investigated the ion penetration in the bulk of the sample' produced task order progress reports; submitted final report.

PROPOSED ACTIVITIES FOR FFY 2020: End of task order.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$60,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$59,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Norbert Delatte, Oklahoma State University, 405-744-7554

Project Sponsor: Walt Peters, ODOT Assist. Bridge Division Engineer, 405-521-2606

Project Manager: David Ooten, State Research Engineer, 405-521-2671

2400-18-05
Investigation of Slag Cement Effects on High Sulphate Soils in Oklahoma

PURPOSE AND SCOPE: It has been determined that utilizing slag-cement in order to control sulfate induced heave as a stabilizing agent will help the Department establish new protocols in this troublesome area. This project is needed for an investigation into slag-cement and its effects on high sulfate soils found in Oklahoma.

ACCOMPLISHMENTS DURING FFY 2019: Performed literature review; selected materials and identified two sources of slag cement to be studied; identified two soil series types to study; performed laboratory program testing; performed data analysis; produced task order progress reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$74,990	SPR	$0.00	STATE
Estimated Cost FFY 2019	$74,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Rifat Bulut, Oklahoma State University, 405-744-5189

Project Sponsor: Scott Garland, ODOT Geotechnical Engineer, 405-522-4998

Project Manager: Gary Hook, Gary Hook, Implementation Engineer, 405-522-1042

2400-18-06

Global Computer Analysis to Include Hinge Crack and Thermal Stresses on the I-235 Bridge in Oklahoma City

PURPOSE AND SCOPE: Under this task order, the Principal Investigator will Investigate hinge cracking on the I-235 bridge in Oklahoma City to determine source causes of this originating from the hinges within the I-235 bridge. The assessment should integrate a review of bridge data, computer analysis, Services Description: and the results of the ongoing structural health monitoring of the bridge. Bridge data (e.g., sectional dimensions, reinforcement details, paste tensioning attributes) will be extracted from as-built drawings and inspection/repair reports.

Details from this analysis will provide necessary information toward maintenance needs of this critical structure.

ACCOMPLISHMENTS DURING FFY 2019: Performed analysis of bridge data, available as-built structural drawings, inspection/repair reports, and structural health monitoring data; conducted a site investigation to measure crack information which was coordinated with an existing monitoring effort led by Dr. Robert Emerson under ongoing research project SPR2 item number 2302; performed global finite element modelling to establish the reactions, internal stresses, and global deformations under service loads; performed detailed modelling of end regions (i.e., hinge) to quantify internal stresses and strains at the end regions, reinforcement adequacy, and the effect of thermal gradients; organized quarterly meetings; recommended the optimum management strategy for the I-235 bridge; produced task order progress reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$59,941	SPR	$0.00	STATE
Estimated Cost FFY 2019	$59,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Mohammed Soliman, Oklahoma State University, 405-744-9777

Project Sponsor: Walt Peters, ODOT Assist. Bridge Division Engineer, 405-521-2606

Project Manager: David Ooten, State Research Engineer, 405-521-2671

2400-18-07

Development of Pay Item Categories and Special Provisions for Erosion and Sediment Control Devices to be Used by ODOT

PURPOSE AND SCOPE: The Oklahoma Department of Transportation (ODOT) is responsible for managing thousands of bridges and culverts across the state. ODOT road and bridge rehabilitation and construction activities often utilize equipment that causes erosion and bank and slope loss.
The ODOT Bridge and Roadway Design Divisions are currently interested in developing pay item categories of erosion and sediment control (ESC) items and/or groups to be used for construction and or maintenance projects. The goal of the proposed task order is to conduct an internet search of all ESC items available and organize in a logical way so that pay items and special provisions can be developed.

Pay items will be developed in tiered groups in compliance with current ODOT standards. For each pay items group, a description of the group, materials description, methods of measurement and basis of payment (pay item names, and units of measurement and payment) and construction method will be provided.

ACCOMPLISHMENTS DURING FFY 2019: Performed literature review and survey of the Transportation Research Board, Erosion Control Technology Council, Federal Highway Administration and the American Association of State Highway and Transportation Officials guidance documents to determine potential approaches; surveyed existing specifications from other state transportation departments to assess potential approaches for ODOT; assessed performance data on the ESC items for potential applicability to ODOT projects; coordinated task order meetings; produced task order progress reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$65,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$64,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: David Lampert, Oklahoma State University, 405-744-9302

Project Sponsor: Leslie Lewis, ODOT Bridge Division Hydraulics Engineer, 405-521-6500

Project Manager: David Ooten, State Research Engineer, 405-521-2671

2400-19-01
OSU Task Order Contract Administrative Support

PURPOSE AND SCOPE: To provide support and guidance to task order projects at Oklahoma State University to Principal Investigators and to the Office of Research and Implementation (ORI) in project management.

ACCOMPLISHMENTS DURING FFY 2019: Maintained oversight of all approved OSU task orders in monitoring schedules and budgets; assisted PI's and ORI as needed to maintain project scope; assisted ORI as requested with specific projects; worked with PI's to develop new requests; developed initiatives for task order requests toward developing a sustainable program for future University Transportation Center proposals.

PROPOSED ACTIVITIES FOR FFY 2020: Continue to maintain oversight of all approved OSU task orders in monitoring schedules and budgets; continue to assist PI's and ORI as needed to maintain project scope; continue to assist ORI as requested with specific projects; continue to work with PI's to develop new requests; continue to develop initiatives for task order requests toward developing a sustainable program for future University Transportation Center proposals.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$40,943	SPR	$0.00	STATE
Estimated Cost FFY 2019	$40,900	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Kelvin Wang, Oklahoma State University, 405-744-5189

Project Manager: David Ooten, State Research Engineer, 405-521-2671

2400-19-02
Updating ODOT's Contract Time Determination System

PURPOSE AND SCOPE: Establishing contract time is an integral part of the highway project development process as contract time plays a significant role in determining the expected project delivery date as well as the overall cost of a project. The 23 CFR requires State DOTs to have adequate written procedures for the determination of contract time. ODOT's existing contract time determination system is no longer functioning because of the upgrade of computer operating systems and software updates as well as personnel turnover. Therefore, there is a need to upgrade and improve the existing system.

ACCOMPLISHMENTS DURING FFY 2019: Produced a synthesis of the state-of-the-art literature that summarizes the current contract time determination systems used by various DOTs across the country; prepared an updated computerized contract time determination tool for Tier II and Tier III projects; developed a list of contract time contribution curves for Tier II and Tier III projects classified by project types; provided statistical models to determine contract time for Tier 1 projects; produced training materials for the updated system in PowerPoint slides; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$82,331	SPR	$0.00	STATE
Estimated Cost FFY 2019	$82,300	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Yongwei Shan, Oklahoma State University, 580-744-7073

Project Sponsor: Phil Loafman, Pre-Construction Program Manager, 405-522-1959

Project Manager: David Ooten, State Research Engineer, 405-521-2671

2400-19-03
ODOT Involvement with the NCAT Test Track and Task Groups

PURPOSE AND SCOPE: Provide a comprehensive report detailing ODOT involvement from 2000 forward including the 2018-2020 test cycle. To date, ODOT participation has been followed but not documented in a single place. ODOT participation is approximately $500k per year and while ODOT is receiving benefits from the testing, it needs to be documented and reported.

Using data and information from ODOT Materials, NCAT, personal interviews and published reports, this study intends to develop a report including participation, materials, research statements, results/conclusions and potential benefits and implementation of results.

ACCOMPLISHMENTS DURING FFY 2019: Met with ODOT and obtained several computer files with information on ODOT's participation in the NCAT Test Track; gathered the NCAT Test Track Summary Reports from the web covering the 6 phases of the test track; attended the NCAT professor Training Class and met with the Test Track Director and was given access to the test track data base so data could be reviewed to determine what data that may be beneficial to ODOT; obtained additional data and reports from ODOT on their participation in the NCAT Test Track; produced task order progress reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$52,372	SPR	$0.00	STATE
Estimated Cost FFY 2019	$52,300	SPR	$0.00	STATE
Projected Cost FFY 2020	$0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Steve Cross, Oklahoma State University, 405-744-7200

Project Sponsor: Kevin Suitor, Transportation Manager, 405- 521-2677

Project Manager: David Ooten, State Research Engineer, 405-521-2671

2400-19-04
Ground Tire Rubber (GTR), (dry process) Experiment Pavement Surface Evaluation

PURPOSE AND SCOPE: Using STIC funding, ODOT is placing a Ground Tire Rubber (GTR) test section on a county/state highway in early 2019. This project will gather surface data from both the GTR and control sections of pavement, including but not limited to, cracking and surface texture at intervals of pre placement, post placement, 3 months, 6 months and 12 months. Pavement cracking and rutting will be collected by PaveVision3D Ultra System and Pavement macro-texture will be collected by AMES Profiler, LS-40 Surface Scanner of GTR surface and control surface. Using GTR in a surface pavement adds strength and crack resistance. This project will verify the crack resistance of the GTR product. Additionally the GTR becomes a modifier of the liquid. GTR can reduce the cost significantly while providing the strength and flexibility of the higher grade AC. This study intends to provide comparative analysis of the two pavements in time order detailing extent of cracking and surface texture changes for the period.

ACCOMPLISHMENTS DURING FFY 2019: Determined pavement location(s); performed field data collection using 3D laser imaging technology, grip tester and other OSU instruments for surface characterization and friction measurements; conducted pavement friction and surface texture data analysis; produced task order progress reports; submitted final report.

PROPOSED ACTIVITIES FOR FFY 2020: End of task order.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$60,278	SPR	$0.00	STATE
Estimated Cost FFY 2019	$60,200	SPR	$0.00	STATE
Projected Cost FFY 2020	0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Kelvin Wang, Oklahoma State University, 405-744-5189

Project Sponsor: Kevin Suitor, Transportation Manager, 405- 521-2677

Project Manager: David Ooten, State Research Engineer, 405-521-2671

2400-19-05

Review and Analysis of Current Environmental-DNA Methodologies being Developed and Used

PURPOSE AND SCOPE: ODOT projects must meet requirements to minimize and avoid disturbances to endangered and threatened species to comply with the Endangered Species Act. Accurately determining the activity and location of these species at and near project sites is important with regards to construction planning and management, and whether additional requirements are needed in the project for critical habitat protection. Currently, methods to determine endangered species presence are expensive, intrusive, and often have inconclusive results. Using environmental DNA to detect the presence in a non-intrusive, quick-yet-sensitive, and relatively inexpensive manner is relatively new.

This task order will include compilation of complete review and analysis of environmental-DNA methodologies being developed and used. The review will determine where and by whom are these methods being developed, for what targets and purposes, and how are they being deployed in the field. This review will identify the real and potential limitations of the methods. This will also identify any methods that could be immediately adopted by ODOT, and analyze the ability to produce similar methodologies for any other Oklahoma endangered species that could be used by ODOT.
A method which detects the DNA 'fingerprints' of endangered and threatened species has high potential to provide a quicker, cheaper, and more determinative analysis with regards to presence and absence of endangered species.

ACCOMPLISHMENTS DURING FFY 2019: Performed extensive environmental DNA (eDNA) literature search on endangered Oklahoma aquatic species such as Skates, Asian Carp and Invasive Mosquito Vectors; collected three soil types to determine the biodiversity of earthworms and performed soil analysis; collected fecal samples (birds and bats) and performed fecal analysis; identified false positives in literature search; produced task order progress reports; a presentation to the ODOT Environmental Programs Division and US Fish and Wildlife Services with a summary analysis and recommendation on whether environmental DNA methods appear to have a high likelihood of success for ODOT operations is pending; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2020: None.

FINANCIALS	**AMOUNT**	**FUND**	**AMOUNT**	**FUND**
Programmed Amount FFY 2019	$26,271	SPR	$0.00	STATE
Estimated Cost FFY 2019	$26,200	SPR	$0.00	STATE
Projected Cost FFY 2020	0.00	SPR	$0.00	STATE

CONTACT INFORMATION

Principal Investigator: Mark Krzmarzick, Oklahoma State University, 405-744-9308

Project Sponsor: Siv Sundaram, ODOT Environmental Division Engineer, 405-522-3791

Project Manager: David Ooten, State Research Engineer, 405-521-2671

2700 New and Equal Product Evaluation Program

PURPOSE AND SCOPE: This project was established to provide ODOT with a means of providing for the (experimental) use, monitoring, evaluation and implementation of products for highway and bridge construction where the products do not meet current ODOT standards and specifications, or have not yet been approved for identified qualified product lists.

ACCOMPLISHMENTS DURING FFY 2019: Provided ODOT Divisions regarding new product information, use, trails, results, and modifications to standards for product use in construction and maintenance. Worked to establish communication mechanisms regarding new and equal product use across ODOT.

PROPOSED ACTIVITIES FOR FFY 2020: Continue working with ODOT Divisions regarding new project information, use, trails, results, and modifications to standards for product use in construction and maintenance. Review and develop plan regarding central new products database that can provide information and guidance to ODOT.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2019	$55,000	SPR	$0.00	STATE
Estimated Cost FFY 2019	$18,000	SPR	$0.00	STATE
Projected Cost FFY 2020	$50,000	SPR	$0.00	STATE

CONTACT INFORMATION

Project Manager: Gary Hook, Implementation Engineer, 405-522-1042

TPF-5 (255) Highway Safety Manual Implementation

PURPOSE AND SCOPE:
AASHTO published the 1st Edition of the Highway Safety Manual in 2010. The primary focus of the HSM is the introduction and development of analytical tools for predicting the impact of transportation project and program decisions on road safety. The HSM provides the best factual information and tools to facilitate roadway planning, design, operations, and maintenance decisions based on precise consideration of their safety consequences.
Goals of the AASHTO Standing Committee on Highway Traffic Safety include:

- Institutionalize the AASHTO Highway Safety Manual (HSM) and its associated analytical tools to make data-driven decisions, advance the science of safety, and to ultimately reduce fatalities and serious injuries.
- Establish and maintain an HSM Implementation Transportation Pooled-Fund Study.

OBJECTIVES:
The objectives of the study are to: advance ongoing efforts by lead states to implement the HSM, expand implementation to all states as well as coordination with projects that develop content for future editions of the HSM including NCHRP Project 17-45 "Enhanced Safety Prediction Methodology and Analysis Tool for Freeways and Interchanges" NCHRP Project 17-54 "Consideration of Roadside Features in the Highway Safety Manual" and Transportation Pooled-Fund Study TPF-5(099) "Evaluation of Low Cost Safety Improvements."

PARTNERS:
Louisiana Transportation Research Center, CA, ID, IL, KS, KY, LA, MI, MO, MS, NC, NJ, NV, OH, OK, OR, PA, UT, WA, WI, WV

OKLAHOMA INVOLVEMENT:
Accelerate implementation of the HSM. Representative for the Technical Working Group would identify and prioritize specific tasks and products. Specific tasks may include developing: (1) a calibration manual to accompany the HSM that provides practical advice and examples on how best to adapt HSM calibration procedures, (2) technical guidance for developing safety performance functions, and (3) guidance for assembling and managing the data needed for safety analyses. Exchange information, best practices, lessons learned, and remaining challenges in implementing the HSM. These exchanges would feed an annual process through which the Technical Working Group identifies and prioritizes future tasks to be conducted under the study.

Study Period	2012	2013	2014
State Contribution ($)	25,000	25,000	25,000

ESTIMATED COMPLETION DATE: December 2019

POINTS OF CONTACT:
Lead: Jerry Roche, (515) 233-7323
ODOT: David Glabas, (405) 521-4157
FHWA: Jerry Roche, (515) 233-7323

TPF-5 (267) Accelerated Performance Testing for the NCAT Pavement Test Track 2012-2017

PURPOSE AND SCOPE:
State Departments of Transportation (DOTs) constructed the National Center for Asphalt Technology (NCAT) Pavement Test Track with the goal of reducing and predicting distresses in their flexible pavements. The Alabama Department of Transportation (ALDOT) funding commitment reduced the cost for other states to sponsor the construction, testing, trucking and evaluation of experimental pavements.

The first test phase studied surface mix performance on forty-six 200-foot test sections of perpetual pavement. Adding instruments for high-speed response to each pavement facilitated the study of Mechanistic-Empirical (M-E) pavement design. During each cycle, experimental pavements were subjected to 10 million Equivalent Single Axle Loads (ESALs) of heavy truck traffic.

OBJECTIVES:
- State sponsors secure material donations, with the pooled fund covering reasonable hauling expenses. NCAT administers competitively bid subcontracts for procuring supply and grade control of subgrades and bases, aggregate hauling, liquid asphalt supply and delivery, plant production, and mix placement.
- Construct 200-foot test sections on the existing 1.7 mile NCAT test oval that represent in-service roadways on the open transportation infrastructure. Install both environmental (i.e., multi-depth pavement temperature probes) and response instrumentation (i.e., high speed stress and strain gages) in new experimental sections.
- Once construction is complete, apply accelerated performance truck traffic for two years. Develop performance model based on laboratory testing of basic material and mix performance properties. Use pavement surface condition, pavement load response, precise traffic and environmental logging, and cumulative damage to validate/calibrate new and existing M-E approaches to pavement analysis and design.
- In a highly controlled experiment, use actual pavement management performance data to refine maintenance programs. Correlate field results with laboratory data for both mechanistic and preservation applications. Answer practical questions posed by research sponsors through formal (i.e., reports and technical papers) and informal (e.g., one-on-one responses to sponsor inquiries) technology transfer.

PARTNERS:
AL, CO, FHWA, FL, GA, IL, KY, MD, MI, MN, MS, MI, NY, NC, SC, TN, VA, WI

OKLAHOMA INVOLVEMENT:
Oklahoma currently has one section and is involved in two other studies at NCAT. Oklahoma is involved in section N9 and is in the Cracking Study and the preservation Study. NCAT runs on a three year cycle, which ends this year and states and their sections and projects will be up for renewal in 2018.

Study Period	2012	2013	2014	2015	2016	2017
State Contributions ($)	400,000	370,000	370,000	360,000	360,000	720,000

ESTIMATED COMPLETION DATE: March 2020

POINTS OF CONTACT:
Lead: Michelle Owens, (334) 353-6942
ODOT: Kevin Suitor, (405) 521-2677
FHWA: Christopher Wagner, (404) 562-3693

TPF-5 (269) Development of an Improved Design Procedure for Unbonded Concrete Overlays

PURPOSE AND SCOPE:
One pavement rehabilitation option that has been gaining popularity in the U.S. recently is unbonded concrete overlays of existing concrete or composite pavements (UCOCP). While thicker (greater than 7 inches) unbonded concrete overlays have performed very well in many states, current economic restrictions, as well as an interest in using less materials (sustainability), are guiding agencies toward optimizing concrete overlays.. One area of deficiency in the application of unbonded concrete overlays is the lack of a rational design procedure that addresses all components of the structure and their interaction.

While several design procedures have been formulated by local agencies and the concrete paving industry, few are based on detailed research and actual long term field performance.. Overall guidance on the economics and design of such features as pavement widening, super elevations, and safety features (raising guardrails) are covered in publications like the National Concrete Pavement Technology Center's (NCPTC) "Guide to Concrete Overlays" (Harrington, et al. 2008). Similar to the AASHTO method, the MEPDG does not consider friction or bond between the overlay and the interlayer. This again can lead to conservative designs. Characterization of the behavior and performance of the interlayer is critical in the design of unbonded concrete overlays.

OBJECTIVES:
The primary purpose of this project is to create a unified national design guide for unbonded concrete overlays of existing concrete and composite pavements. This consists of the following distinct objectives:

1. Study and understand the field performance history of UCOCP as demonstrated by various test sections and in-service pavements.
2. Determine suitable separator layer (interlayer) materials and properties to insure long term performance of UCOCP systems.
3. Develop a design procedure for unbonded concrete overlays of existing concrete and composite pavements utilizing existing validated performance models, as well as new analytical models derived to address deficient or missing design parameters in existing methods.

PARTNERS:
AZ, CA, CO, HI, ID, MT, ND, NM, NV, OK, OR, TX, UT, WA

OKLAHOMA INVOLVEMENT:
Project currently on hold, pending contract approval w/ the Principal Investigator.

Study Period	2012	2013	2014
State Contribution ($)	20,000	20,000	20,000

ESTIMATED COMPLETION DATE: December 2020

POINTS OF CONTACT:
Lead: Tom Burnham, (651) 366-5452
ODOT: Josh Randell, (405) 521-2390
FHWA: Angela Jacobs, (202) 366-0076

TPF-5 (288) Western Road Usage Charging Consortium

PURPOSE AND SCOPE:
Members of this voluntary consortium are interested in collaborative research and development of a potential new transportation funding method that would mean collecting a Road Usage Charge (RUC) from drivers based on actual road usage.

Members of the consortium would choose how they pay without requirements to adopt the system(s) used by other Members. The new funding method would include:

- Readily-available and affordable consumer products and technologies (such as smartphones, in-vehicle navigation systems, and other data-dependent vehicle technologies)
- Funding for roadway maintenance and improvements

OBJECTIVES:
The Membership of the Western Road Usage Charge Consortium has adopted an organizational Charter and developed a Work Plan. The Consortium Members share the following goals:

• Explore the technical and operational feasibility of a multi-jurisdictional road usage charge system.
• Investigate criteria for acceptance; share experience and lessons learned to foster positive outcomes.
• Develop standards and protocols for how road use charges could best be collected and remitted among the various jurisdictions.
• Develop preliminary operational concepts for how a multi-jurisdictional road usage charge system would be administered.
• Develop a model for regional cooperation and interoperability that can be used in the Western region and potentially across North America.
• Engage the automotive manufacturing and technology sector to encourage the ability for mileage reporting to occur in conjunction with other products and services the sector provides in the marketplace.
• Share knowledge to maximize the preparedness for and efficiency of policy and program development for road usage charging among the members.

PARTNERS:
AZ, CA, CO, HI, ID, MT, ND, NM, NV, OK, OR, TX, UT, WA

OKLAHOMA INVOLVEMENT:
Oklahoma participates and supports this consortium and incorporates processes and standards into ODOT, as appropriate.

Study Period	2019	2020
State Contribution ($)	25,000	25,000

ESTIMATED COMPLETION DATE: September 2020

POINTS OF CONTACT:
Lead: Randal Thomas, (971) 240-7094
ODOT: Dawn Sullivan, (405) 521-4768
FHWA: Angela Jacobs, (202) 366-0076

TPF-5 (297) Improving Specifications to Resist Frost Damage in Modern Concrete Mixtures

PURPOSE AND SCOPE:
Concrete can be damaged when it is sufficiently wet (has a high degree of saturation) and when it is exposed to temperature cycles that enable freezing and thawing. Damage due to freezing and thawing often leads to premature deterioration, costly repairs, and premature replacement of concrete infrastructure elements. Providing a consistent air void system in hardened concrete is challenging due to numerous variables during the batching, mixing, and placement that impact how AEAs perform in concrete.

OBJECTIVES:
The goal of the research is to produce improved specifications, and test methods; while, improving the understanding of the underlying mechanisms of frost damage. Specifically, this work will seek to develop new test procedures that may be faster and/or more reliable than the existing methods. An important objective of this project would mean establishing new test methods and specifications for fresh and hardened concrete to determine frost durability and field performance.

PARTNERS:
AK, CO, CT, FHWA, IA, ID, IL, IN, KS, MI, MN, ND, NE, NJ, NY, OK, PA, RI, WI

OKLAHOMA INVOLVEMENT:
Research at Oklahoma State University has shown that current frost damage specifications may not always be adequate for mixtures with some modern water reducers. Results from recent studies suggest that frost damage can be reduced through new tests and improved specifications, leading to extended service life of concrete infrastructure.

Understanding the research on freeze-thaw mechanisms is important for two main groups:
1) practicing professionals
2) graduating undergraduate and graduate students

Practicing professionals frequently require information in a short time frame to respond to practice-based problems. Developing a strong educational technology transfer program would include a short course that utilizes a DVD/streaming video approach for use by practitioners as needed.

Study Period	2014	2015	2016	2017	2018	2019
State Contributions ($)	17,500	17,500	17,500	$0.00	17,500	17,500

ESTIMATED COMPLETION DATE: February 2019

POINTS OF CONTACT:
Lead: Ron Curb, (405) 521-3795
ODOT: Ron Curb, (405) 521-3795
FHWA: Richard Meininger, (202) 493-3191

TPF-5 (312) Western Maintenance Partnership

PURPOSE AND SCOPE:
In the 1980's the Rocky Mountain Maintenance Tour established a highly effective forum for the exchange of information, techniques, policies and strategies for the maintenance of the Highway System. Since then, the role of Maintenance has shifted from new construction/major rehabilitation to cost effective infrastructure preservation/asset management.

The Western Maintenance Partnership (WMP) previously ran from 2006-2014 as TPF-5(145). Many of the WASHTO states have expressed interest in continuing the WMP. During this 5-year continuation of the WMP, participating agencies will focus on Maintenance, partnering with WASHTO states to share experiences, innovations, expertise and solutions to the complex management of highway assets.

OBJECTIVES:
Continue to provide a partnering forum for promoting effective maintenance strategies.
The minimum funding contribution is necessary to:

- manage the WMP's operations, including management support of WMP
- maintain a web site for displaying meeting reports, state guidelines and specifications
- implement task orders, as designated by the WMP members
- provide travel reimbursement funds for annual meeting

The minimum funding contribution would include reports of the proceedings from the annual conferences and annual workshops.

During the annual workshop, the WASHTO Committee on Maintenance would present formal training. Sharing technology and field experience would include: policies, practices, specifications, field investigations, applied research, materials, and training.

PARTNERS:
CA, ID, MT, NV, TX, UT, WA

OKLAHOMA INVOLVEMENT:
This fund primarily serves the WASHTO Standing Committee on Maintenance (SCOM) which is basically the same group of maintenance engineers that make up the Western Maintenance Partnership (WMP). WMP's primary function is to provide funds for an annual scan tour by a WASHTO member State. ODOT recently hosted the event in 2015. This study could run through FY19.

Study Period	2015	2016	2017
State Contribution ($)	5,000	5,000	5,000

ESTIMATED COMPLETION DATE: June 2019

POINTS OF CONTACT:
Lead: David Stevens, (801) 589-8340
ODOT: Alex Calvillo, (405) 521-2557
FHWA: Arlene Kocher, (202) 366-4612

TPF-5 (326) Develop and Support Transportation Performance Management Capacity Development Needs for State DOTs

PURPOSE AND SCOPE:
Moving Ahead for Progress in the 21st Century (MAP-21) establishes a broad performance-based approach to the Federal Highway Program. MAP-21 identifies seven performance areas in which the US DOT, in consultation with their stakeholders, will develop performance measures. Under MAP-21, State Transportation Agencies (STAs), Metropolitan Planning Organizations (MPOs), and public transit providers are required to develop strategies and targets for each of the performance measures established by USDOT. The focus of this pooled-fund project will be to determine and support participating State's, MPO's, and Public Transportation providers Transportation Performance Management (TPM) Capacity Development needs.

OBJECTIVES:
This pooled fund project will focus on research, assess training and educational needs of contributing members, develop and deliver training, and facilitate the sharing and retention of performance management best practices.

Funding will be used to:

- Identify Gaps in TPM Knowledge, Skills and Abilities—Conduct a needs analysis for learning and capacity development of contributing members resulting in a short and long-term capacity building roadmap;
- Develop and Deliver Learning and Capacity Development Resources—Develop training and educational material to meet the gaps identified in the knowledge, skills and abilities;
- Establish a TPM Information Clearinghouse—The TPM Information Clearinghouse will be used to showcase PM best practices, foster collaboration, and serve as a repository for PM resources; and
- Support Knowledge Transfer Among Pooled Fund States

PARTNERS:
AL, AR, AZ, CA, CO, CT, DE, FHWA, GDOT, HI, IA, IL, KS, KY, LA, MDOT SHA, MI, MN, MO, MS, ND, NHDOT, NJ, NV, Oahu MPO, OH, OK, PA, RI, SD, TN, TX, UT, VT, WA, WI, WV

OKLAHOMA INVOLVEMENT:
Participate in monthly/quarterly conference calls; Oklahoma is a voting member of this study.

Study Period	2016	2017	2018	2019	2020	2021	2022	2023
State Contribution ($)	10,000	10,000	10,000	27,000	27,000	27,000	27,000	27,000

ESTIMATED COMPLETION DATE: September 2023

POINTS OF CONTACT:
Lead: Lori Fisette, (401) 222-6940
ODOT: Matthew Blakeslee, (405) 522-6713
FHWA: Michael Nesbitt, (202) 366-1179

TPF-5 (335) 2016 through 2020 Biennial Asset Management Conference and Training on Implementation Strategies

PURPOSE AND SCOPE:
Section 1203 of the MAP-21 stipulates USDOT to promulgate performance measures in the areas of the National Highway Performance Program (NHPP), Highway Safety Improvement Program (HSIP), the Congestion Mitigation and Air Quality Improvement Program (CMAQ), and the National Freight Movement (Freight) within 18 months after the date of enactment of the MAP-21. State Department of Transportation (DOT)s are tasked with developing performance measures plans, which include asset management plans. The focus of this pooled fund project will be in the area of the NHPP.

OBJECTIVES:
1. Provide communication and information sharing among member states. Discuss research needs and provide research ideas to TRB.
2. Provide a technology and knowledge exchange forum to enhance the practical knowledge of member states concerning asset management implementation.
3. Enhance the working knowledge of the asset management community.

SCOPE OF WORK:
The Iowa DOT) will serve as lead state for this Pooled Fund project. The principle tasks are:

1. Coordinate a Technical Advisory Committee meeting (i.e. workshop or webinar) for member states to learn and review issues associated with implementation of asset management. Member states share best practices and strategies for overcoming certain challenges.
2. Coordinate an annual survey of state DOT asset management practices to help states evaluate their asset management status. Support development of content for the conference and training activities.
3. Provide a Biennial Asset Management Conference for member states to exchange information on the challenges to asset management implementation.
4. Training – Post wrap-up "Implementation Strategies" webinar for partner states. Deliverables will include quarterly report updates and survey results as well as a webinar and a final summary report following each conference.

PARTNERS:
AR, CA, CO, CT, IA, IL, LA, MI, MN. MS, NC, ND, NJ, NV, OH, OK, TX, UT, VA, WI

OKLAHOMA INVOLVEMENT:
Attend annual conference; member of the conference planning committee.

Study Period	2016	2017	2018	2019	2020
State Contribution ($)	12,000	6,000	6,000	6,000	6,000

ESTIMATED COMPLETION DATE: June 2021

POINTS OF CONTACT:
Lead: Brian Worrel, (515) 239-1471
ODOT: Matt Swift, (405) 521-2704
FHWA: Stephen Gaj, (201) 366-1336

TPF-5 (343) Roadside Safety Research for MASH Implementation

PURPOSE AND SCOPE:
This solicitation will create a consortium of states that will cooperatively fund and oversee MASH implementation and roadside safety research needs identified and prioritized by its representatives. The pooled fund research program will identify, analyze, and develop solutions for roadside safety problems with the goal of reducing the tremendous loss of life that occurs on our highways each year as a result of roadway departure crashes. Specific research activities addressed within the program will include the design, analysis, testing, and evaluation of roadside safety hardware, and the development of guidelines for the use, selection, and placement of these features.
Research problem statements will be developed by participating member state representatives. The members will rank and select specific projects to be funded each fiscal year. Additionally, member states may independently develop and fund research projects through the Roadside Safety Pooled Fund Program through a reimbursable agreement with Washington DOT.

OBJECTIVES:
The objective of the Roadside Safety Pooled Fund Program is to provide a cooperative approach to conducting research on roadside safety hardware. Emphasis will be placed on assisting State DOTs with their implementation of MASH and addressing other roadside safety needs of common interest. Another objective of this pooled fund research is to provide each participating state an opportunity to send a representative to an annual meeting to collaborate with other state DOT safety engineers to assess best practices, new regulatory issues, risk management strategies, and other matters pertaining to roadside safety. Participation in this meeting is funded through the state's annual program contribution.

PARTNERS:
AK, AL, CA, CO, CT, DE, FL, ID, IL, LA, MA, Maryland DOT, MI, MN, MO, OK, OR, PA, TN, TX, UT, WA, WI, WV

OKLAHOMA INVOLVEMENT:
Oklahoma participates and supports this consortium and incorporates processes and standards into ODOT, as appropriate.

Study Period	2017	2018	2019
State Contribution ($)	10,000	10,000	10,000

ESTIMATED COMPLETION DATE: December 2021

POINTS OF CONTACT
Lead: Rhonda Brooks, (360)705-7945
ODOT: David Glabas, (405) 521-2861
FHWA: Will Longstreet, (202)366-0087

TPF-5 (357) Implement Shakecast across Multiple State Departments for Rapid Post Earthquake Response

PURPOSE AND SCOPE:
When an earthquake occurs, the U. S. Geological Survey (USGS) ShakeMap portrays the extent of potentially damaging shaking. As a freely-available, post-earthquake situational awareness application, the ShakeCast system automatically:

- retrieves earthquake shaking data from USGS ShakeMap
- analyzes shaking intensity data against users' facilities (e.g., bridges, buildings, roads) sends notifications of potential impacts
- generates maps and other web-based products for emergency managers and responders

The recently released ShakeCast V3 system utilizes State's existing NBI databases to implement shaking-based inspection priority and impact assessments. ShakeCast is particularly suitable for earthquake planning and response purposes by Departments of Transportation (DOTs).

OBJECTIVES:
Since major earthquakes cross state borders, bringing this technology to all states with seismic hazards is a long-term goal. The project will provide a mechanism to actively engage representatives from state DOTs with the common interests in implementing and expanding the application of ShakeCast technologies to improve emergency response capabilities.

The project is comprised of two primary focus areas:

(1) Provide support for participating DOTs to deploy operational ShakeCast systems.
(2) Develop, modify, and customize ShakeCast features to the meet the needs of the state DOTs.

Once project representatives meet at the start of the project, annual meetings will be convened to update the participating agency representatives on the status of the project and to provide a forum for information sharing, training, and feedback. This collaborative effort will bring participating DOTs into full ShakeCast operation for post-earthquake assessment of state and local bridge inventories.

PARTNERS:
CA, ID, MO, MS, OK, OR, SC, TX, UT, WA

OKLAHOMA INVOLVEMENT:
Attended the kickoff meeting for this project Jul 18 – July 21, 2017. ODOT has incorporated ShakeCast into ODOT processes.

Study Period	2016	2017	2018
State Contribution ($)	15,000	15,000	15,000

ESTIMATED COMPLETION DATE: July 2020

POINTS OF CONTACT:
Lead: Loren Turner, (916) 229-7173
ODOT: Walt Peters, (405) 521-2606
FHWA: Wen-Hue, (292) 493-3056

TPF-5 (364) Utilization of Laser Induced Breakdown Spectroscopy (LIBS) for Real-Time Testing and Quality Control Monitoring of Aggregate Materials used in Highway Construction

PURPOSE AND SCOPE:
Phase II of TPF 5 (278) is proposed in order to continue and finalize the pooled funded laser scanning research investigation (TPF-5(278)) that began on June 1, 2013 with five participating State Agencies: KS, NY, OH, OK, and PA. Phase II extends involvement for additional State Agencies wanting to take part in this study. This solicitation continues the work and success of the NCHRP 150 Proof of Concept Study, the NCHRP 168 prototype development and the current TPF-5(278) which has shown the potential and success of this technology. Reports from these studies are included in the Documents Section.

OBJECTIVES:
The overall objective is to upgrade QC/QA in the industry by developing a real-time laser scanning system to rapidly classify aggregates used in highway construction. The intent is to employ this classification process to:

- Quantify specific engineering properties (e.g., specific gravity, acid insoluble residue, Microdeval loss, etc.),
- Assess whether an aggregate source will pass or fail a defined engineering property test,
- Identify and/or quantify the presence of deleterious materials (e.g., reactive aggregates, cherts, etc.),
- Determine whether aggregate composition or quality is changing during production, and
- Determine the source material or sources of blended production materials.

An aggregate laser scanning system has the potential to be employed in private and government material testing laboratories, where laser scanning of aggregate samples can be undertaken, providing multiple engineering parametric results in near real time.

PARTNERS:
KS, MDOT SHA, NM, NY, OH, OK

OKLAHOMA INVOLVEMENT:
Continue development of the laser scanning system, data analysis software and expand testing effort to enlarge the database. Anticipated tasks include:

1. Each agency participates in Sample Collection, Scanning and Modeling of Test Parameters
2. Incorporate methods for modifying Hardware, Software and Data Handling, and Modeling
3. Coordinate and prepare AASHTO Standard of Practice
4. Coordinate Project Management, Reporting and Annual Review Meetings
5. Schedule Technology Transfer Meeting for team members to present their research

Study Period	2014	2015	2016	2017	2018	2019
State Contribution ($)	75,000	75,000	75,000		96,000	48,000

ESTIMATED COMPLETION DATE: December 2022

POINTS OF CONTACT:
Lead: Susan Baker, (785) 291-3847
ODOT: Kenny Seward, (405) 521-2186
FHWA: Richard Meininger, (202) 493-3191

Note: Contribution in 2014-2016 under TPF-5(278)

TPF-5 (372) Building Information Modeling (BIM) for Bridges and Structures

PURPOSE AND SCOPE:
Building information modeling (BIM) has been widely used in the commercial sector and vertical construction to manage projects from conception through design, fabrication, construction and for future maintenance. Following the conclusion of the NCHRP study and after extensive discussions, T-19 identified a path forward for BIM implementation. The initiative involved the following key decisions:

- Identity: The initiative is being named BIM for Bridges and Structures, as it encompasses the goal of this endeavor without potentially violating trademark rights.
- Governance and Stewardship Framework: The roadmap involves the identification of a governance structure. The selected model will be overseen by T-19 with collaboration with AASHTO Technical Joint Committee on Electronic Standards, FHWA, and various stakeholders.
- Data Exchange Schema: Multiple schemas for the governance structure of BIM for Bridges and Structures were discussed, with the decision being made to develop an MVD (Model View Definition) compliant with IFC (Industry Foundation Classes) data models. Some consideration was given to OpenBridge model, with the biggest benefit being more control of the governance model.
- Funding Mechanism for Support: FHWA and pooled fund study.

OBJECTIVES:
The pooled fund project will provide the primary funding mechanism for AASHTO SCOBS T-19 to perform the duties of governance and stewardship of BIM for Bridges and Structures**.**

PARTNERS:
CA, DE, FHWA, FL,IL, IA, KS, MI, NC, MS, NJ, NY, NC, OH, OK, PA, TX, UT, VM, WI

OKLAHOMA INVOLVEMENT:
Oklahoma provides data input for the studies; participate in quarterly meetings via conference call; attend annual meetings.

Study Period	2020	2021	2022
State Contribution ($)	20,000	20,000	20,000

ESTIMATED COMPLETION DATE: March 31, 2023

POINTS OF CONTACT:
Lead: Khyle Clute, (515) 239-1646
ODOT: Steve Jacobi, (405) 521-2606
FHWA: Brian Kozy, (202) 493-0341

TPF-5 (374) Accelerated Performance Testing for the NCAT Pavement Test Track 2018-2020

PURPOSE AND SCOPE:
State Departments of Transportation (DOTs) funded construction of the National Center for Asphalt Technology (NCAT) Pavement Test Track with the goal of reducing and predicting distresses in flexible pavements. A total of forty-six 200-foot test sections of perpetual pavement were constructed in 2001 on a 1.7 mile oval and have been maintained or reconstructed since 2001. Research cycles are run over three years, with two years of accelerated loading and pavement monitoring resulting in 10 million Equivalent Single Axle Loads (ESALs) of heavy truck traffic applied to the test sections.

OBJECTIVES:

- State sponsors secure material donations, with the pooled fund covering reasonable hauling expenses. NCAT administers competitively bid subcontracts for procuring supply and grade control of subgrades and bases, aggregate hauling, liquid asphalt supply and delivery, plant production, and mix placement.
- Construct new or apply maintenance treatments to the test sections that represent in-service roadways on the open transportation infrastructure. Install both environmental (i.e., multi-depth pavement temperature probes) and response instrumentation (i.e., high speed stress and strain gages) in new or maintained experimental sections.
- Apply accelerated performance truck traffic for two years. Develop performance model based on laboratory testing of basic material and mix performance properties. Use pavement surface condition, pavement load response, precise traffic and environmental logging, and cumulative damage to validate/calibrate new and existing approaches to pavement analysis and design.
- In a highly controlled experiment, use actual pavement management performance data to refine maintenance programs. Correlate field results with laboratory data for both mechanistic and preservation applications. Answer practical questions posed by research sponsors through formal (i.e., reports and technical papers) and informal (e.g., one-on-one responses to sponsor inquiries) technology transfer.

PARTNERS:
AL, CO, FHWA, FL, GA, IL, KY, MD, MI, MN, MS, MI, NY, NC, OK, SC, TN, VA, WI

OKLAHOMA INVOLVEMENT:
Oklahoma currently has one section (N9) programmed for maintenance and continuing monitoring and is involved in two other NCAT group studies – Cracking Group and Pavement Preservation Group. Oklahoma is proposing a new section, N6, for construction and monitoring to address balance mix design research.

Study Period	2018	2019	2020
State Contributions ($)	400,000	400,000	400,000

ESTIMATED COMPLETION DATE: September 2020

POINTS OF CONTACT:
Lead: Michelle Owens, (334) 353-6942
ODOT: Kevin Suitor, (405) 522-4986
FHWA: Christopher Wagner, (404) 562-3693

TPF-5 (375) National Partnership to Determine the Life Extending Benefit Curves of Pavement Preservation Techniques (MnROAD/NCAT Joint Study – Phase II)

PURPOSE AND SCOPE:
The Minnesota DOT Road Research Project (MnROAD) and National Center for Asphalt Technology (NCAT) formed a partnership in 2015 to evaluate Pavement Preservation treatments on a national scale. Preservation treatment studies were also initiated previously which included crack seals, fog seals, chip seals, cape seals, microsurfacing, thinlays and different combinations of each of them. Initial monitoring has started but additional time is required to determine the benefits of each treatment over time. That is the main purpose of the second phase of this research. The initial pooled fund was for 3 years from 2015-2018 and was led by NCAT and phase-2 will be over the next five years lead by MnROAD with MnDOT being the lead state.

OBJECTIVES:
MnROAD and NCAT are seeking organizations to join the partnership for the second phase of research efforts.

Main objectives include:

- Determining the life cycle cost of various pavement preservation alternatives in a highly controlled experiment that will provide state Departments of Transportation (DOTs) with the financial foundation to begin to build a decision tree for their own maintenance program.
- Develop quality assurance QA field testing protocols to correlate construction practices with long term performance of pavement preservation techniques.
- Technology transfer - Answering practical questions posed by research sponsors through formal (i.e., reports & technical papers) & informal (e.g., one-on-one responses to sponsor inquiries) technology transfer on how these life extending benefits can be best utilized in each state expenses. NCAT administers competitively bid subcontracts for procuring supply and grade control of subgrades and bases, aggregate hauling, liquid asphalt supply and delivery, plant production, and mix placement.

PARTNERS:
AL, AR, CO, FHWA, FP2, GADOT, IL, KS, KY, MDOT SHA, MI, MN, MO, MS, NC, NY, OK, PADOT, SC, TN, TX, WI, WV

OKLAHOMA INVOLVEMENT:
Oklahoma currently participates in two group studies – Cracking Group and Pavement Preservation Group.

Study Period	2018	2019	2020
State Contributions ($)	50,000	50,000	50,000

ESTIMATED COMPLETION DATE: September 2020

POINTS OF CONTACT:
Lead: Michelle Owens, (334) 353-6942
ODOT: Kevin Suitor, (405) 522-4986
FHWA: Christopher Wagner, (404) 562-3693

TPF-5(380) Autonomous Maintenance Technology (AMT)

PURPOSE AND SCOPE:
Reducing hazard to roadway workers and achieving a safer working environment for both CDOT employees and the public remains a key and critical strategic priority for CDOT. The advent of new technologies in the form of autonomous and connected vehicles presents a path for using technical advances to potentially reduce or eliminate threat to employees and maintaining public safety, with initial demonstration conducted with CDOT's Autonomous Truck Mounted Attenuator/Impact Protection Vehicle. CDOT believes that this technology presents considerable potential to remove workers from risk, and the expansion of this technology both inside and outside of Colorado would be of benefit and therefore interest of the department. CDOT's trial implementation and testing program for the ATMA/AIPV has generated interest and questions from other DOTs, motivating the need to develop a cooperative arrangement and agreement to spread and further research autonomy in maintenance applications. This effort aims to address these challenges by forming a coalition of transportation related groups with interest in autonomous maintenance technology research, and create a pooled fund to provide a single source of funding for unified research efforts that will benefit all contributing parties. This will allow for larger and more significant research projects to be undertaken and will lead to an overall cost savings by consolidating many different DOTs' research efforts in the same field.

OBJECTIVES:
The mission of this study is to support and promote collaborative research efforts in the field of autonomous technologies in work zone applications, with the goal of improving the safety, efficiency and quality of work efforts, along with providing better solutions and valuable lessons learned for the integration of new technologies to further these goals. The participation of many transportation related agencies in this study furthers the cooperation in this industry, leading to improved future development of beneficial technologies and improved sharing of information and lessons learned. This is intended to further safety, efficiency, and quality of work done in this field for all relevant agencies.

PARTNERS:
AL, CA, CO, IL, KS, MN, MO, OH, OK, TX, WA

OKLAHOMA INVOLVEMENT:
Develop technology findings for ODOT needs; incorporate appropriate findings into construction and maintenance safety programs.

Study Period	2019	2020	2021
State Contribution ($)	25,000	25,000	25,000

ESTIMATED COMPLETION DATE: December 2022

POINTS OF CONTACT:
Lead: David Reeves, (303) 757-9518
ODOT: David Glabas, (405) 522-2861
FHWA: Todd Peterson, (202 366-1988

TPF-5 (385) Pavement Structural Evaluation with Traffic Speed Deflection Devices (TSDDs)

PURPOSE AND SCOPE:
Research has shown that incorporating pavement structural condition along with pavement surface condition in a pavement management decision-making process leads to better-informed decisions, and more cost-effective pavement rehabilitation and preservation strategies. Recognizing this, some highway agencies have investigated the use of Falling Weight Deflectometer (FWD) for pavement management applications. This requires lane closures that disrupt traffic and traffic control, which limits the productivity and the number of discrete points where measurements can be obtained. Over the last 15 years, traffic speed deflection devices (TSDDs) that can near-continuously measure pavement structural condition while traveling at traffic speed have been developed. The Greenwood Engineering TSD (Traffic Speed Deflectometer) and the ARA RWD (Rolling Wheel Deflectometer) are two such devices that were discussed by the SHRP2 R-06(F) project "Assessment of Continuous Deflection Measuring Technologies" and thoroughly evaluated in a recently completed FHWA project "Pavement Structural Evaluation at the Network Level." More recently, Dynatest has also developed a new device named RAPTOR (Rapid Pavement Tester®).

OBJECTIVES:
The objective of the proposed pooled-fund project is to establish a research consortium focused on providing participating agencies guidelines on how to specify collection and use data collected with TSDDs for network- and project-level (if feasible) pavement management applications. Specific tasks within this multi-year program will be developed in cooperation with the consortium participants. In addition, the consortium will also provide participating agencies with a mechanism to conduct pilot demonstration testing in their respective networks.

PARTNERS:
ID, IN, LA, OK, PA, VT, VA

OKLAHOMA INVOLVEMENT:
Support of project will be used to obtain guidelines on how to use structural condition data collected from Traffic Speed Deflection Devices (TSDDs) for supporting project level decisions, and to develop guidelines on how to incorporate pavement structural condition data into agency network level pavement process.

Study Period	2019	2020	2021
State Contribution ($)	45,000	45,000	45,000

ESTIMATED COMPLETION DATE: December 2021

POINTS OF CONTACT:
Lead: Bill Kelsh, (434) 293-1934
ODOT: Angel Gonzalez, (405) 522-2704
FHWA: Nadarajah Sivaneswaran, (202) 493-3147

TPF-5 (398) Moving Forward with Next Generation Travel Behavior Data Collection and Processing

PURPOSE AND SCOPE:
Since 1969, the Federal Highway Administration has been collecting travel data to answer evolving questions related to how, why, when and where people travel through a probability based random sampling survey. Given the current challenges and opportunities in collecting travel behavior data, FHWA is launching the Next Generation Travel Behavior Data Initiative to establish a continuous travel monitoring program that will provide annual national and local data. The work plan for the next 5 years is to gather and publish annual national travel behavior data and offer opportunities for States, MPOs, and other entities to obtain agency-specific data.

OBJECTIVES:

The objectives of the Next Generation Travel Behavior Data Initiative are as follows:

1) Establish the Next Generation Travel Behavior Data program to collect, process, estimate, and report national, state and local travel behavior data on an annual basis.

2) Enable and facilitate State transportation departments, MPOs, and other entities' participation in the new local data gathering program with high efficiency and great flexibility

PARTNERS:
This study is currently in the solicitation phase

OKLAHOMA INVOLVEMENT:
ODOT will use the results of this study to enhance planning and programming input parameters in support of the Agency's construction and maintenance programs.

Study Period	2019	2020	2021	2022
State Contribution ($)	25,000	25,000	25,000	25,000

ESTIMATED COMPLETION DATE: December 2022

POINTS OF CONTACT:
Lead: Wenjing Pu, (202) 366-5024
ODOT: Laura Chaney, (405) 521-2704
FHWA: Daniel Jenkins, (202) 366-1067

TPF-5 (419) National Cooperative Highway Research Program (NCHRP)

PURPOSE AND SCOPE:
The National Cooperative Highway Research Program (NCHRP) is a national research program carried out through the collaborative efforts of the Federal Highway Administration (FHWA), the National Academy of Sciences, Engineering, and Medicine (NASEM), and the American Association of State Highway and Transportation Officials (AASHTO). Created in 1962 as a means to conduct research in acute problem areas that affect highway planning, design, construction, operation, and maintenance nationwide, the NCHRP is administered by the Transportation Research Board (TRB) and sponsored by the individual State Departments of Transportation (DOTs) of the AASHTO in cooperation with the FHWA.

The NCHRP is a voluntary program funded by the States on an annual basis. Funding for NCHRP comes to 5.5 percent of the 2 percent State planning and research (SP&R) funding set-aside from the Federal-aid highway program. Participation in the NCHRP allows the States to leverage their research funding with that of other States to achieve similar research objectives without duplication of effort. This program affords a unique partnership between State, Federal, and private sector transportation experts.

NCHRP primarily focuses on the following research areas: pavements; economics; operations and control; general materials; illumination and visibility; snow and ice control; traffic planning; forecasting; bituminous materials; specifications, procedures, and practices; law; bridges; equipment; maintenance of highways and structures; general design; roadside development; safety; concrete materials; finance; special projects; testing and instrumentation; vehicle barrier systems; mechanics and foundations; and impact analysis. Information on NCHRP projects can be found at the NCHRP Web site at http://www.trb.org/NCHRP/Public/NCHRP.aspx.

OBJECTIVES:
To provide a mechanism for State transportation departments to support the TRB's Core Program and Services.

PARTNERS:
All states participate in this program.

OKLAHOMA INVOLVEMENT:
Serve as NCHRP Project Panel members when called upon, respond to study surveys and provide other support to projects as appropriate.

Study Period	2020
State Contribution ($)	750,000

ESTIMATED COMPLETION DATE: July 2020

POINTS OF CONTACT:
Lead: Jean Landolt, (202) 493-3146
ODOT: David Ooten, (405) 521-2671
FHWA: Jean Landolt, (202) 493-3146

TPF-5 (442) Transportation Research and Connectivity

PURPOSE AND SCOPE:
The primary goal is to enhance the services which transportation libraries provide through the development of new procedures and technologies for transportation research findability and connectivity. The work plan will be developed based on recommendations by members of the pooled fund study.

OBJECTIVES:
To support coordinated development of transportation libraries as well as research organizations without dedicated libraries. The noted objectives will be accomplished through member activities and partnerships with professional groups such as the Transportation Research Board (TRB) Library and Information Science for Transportation Committee (LIST), the Special Libraries Association (SLA) Transportation Division, and the National Transportation Knowledge Network (NTKN). Completed projects will be stored permanently at the NTKN and the National Transportation Library (NTL) for public use and will be completed within the three-year span of the pooled fund study. The specific objectives are listed below:
1. Develop a toolkit of recommendations and best practices for transportation research organizations that do not have a transportation librarian.
2. Partner with the NTKN to analyze effectiveness of libguides, identify gaps in coverage, and survey the needs of DOTs.
3. Develop a white paper analyzing the current condition of transportation information infrastructure, including review of pertinent knowledge management resources.
4. Develop a cooperative digitization project among members, in partnership with the NTL, to convert copies of older materials to digital formats, as well as providing ADA compliance support for digital documents.
5. Enhance communication between group members.

PARTNERS:
ADOT, ID, MO, NC, NJ, NV, NY, OK, TX

OKLAHOMA INVOLVEMENT:
ODOT will contract with the Board of Regents of The University of Oklahoma to lead this study. The contractor will facilitate monthly/quarterly conference calls and annual in-person meetings as scheduled. A subcontractor may be used for special efforts such as digitization of publications and/or toolkit development. Primary funding will be provided via transfers from other states.

Study Period	2020	2021	2022
State Contribution ($)	25,000	25,000	25,000

ESTIMATED COMPLETION DATE: December 2022

POINTS OF CONTACT:
Lead: Ron Curb, (405) 521-3795
ODOT: Ron Curb, (405) 521-3795
FHWA: Richard Meininger, (202) 493-3191

TPF-5 (###) TRB Core Program Services for a Highway RD&T Program – FFY 2020 (TRB FY 2021)

PURPOSE AND SCOPE:
This solicitation will cover the period of TRB's fiscal year 2020 that begins July 1, 2019, and ends June 30, 2020. Funds committed by participating States will be from their Federal fiscal year 2019 funding.

This pooled fund study permits States to make their contributions to the TRB Core Program instead of sending their contributions to the TRB directly. The TRB Core Program provides support funding for the TRB annual meeting, the committee structure, State visits by TRB, and the TRB publication program.

OBJECTIVES:
To provide a mechanism for State transportation departments to support the TRB's Core Program and Services.

PARTNERS:
All states participate in this program.

OKLAHOMA INVOLVEMENT:
Support TRB activities including, but not limited to, TRB State Visit, remain abreast and act as appropriate of requests made to TRB State Representative, support ODOT staff who are members of TRB Standing Committee or NCHRP Project Panels, and inform ODOT Staff of TRB webinar and report releases.

Study Period	2020
State Contribution ($)	137,000

ESTIMATED COMPLETION DATE: July 2020

POINTS OF CONTACT:
Lead: Jean Landolt, (202) 493-3146
ODOT: David Ooten, (405) 521-2671
FHWA: Jean Landolt, (202) 493-3146

Note: TPF Number is unknown at time of publication.

SOL 1492 Technology Transfer Concrete Consortium (TTCC) (FY20–FY24)

PURPOSE AND SCOPE:
Increasingly, state departments of transportation (DOTs) are challenged to design and build longer life concrete pavements that result in a higher level of user satisfaction for the public.
Collaboration between experts from state DOTs, Federal Highway Administration (FHWA), academia and industry is important for identifying and examining new concrete pavement research initiatives.

Pooled fund activities and budgets are discussed at the semi-annual meetings. Partners often present proposals for minor research, synthesis studies, and/or training for discussion and voting at the semi-annual meetings. NCC members may propose needed research and/or training, however they may not vote on how to utilize the federal pooled funds. Occasionally e-mail discussions and votes are warranted.

OBJECTIVES:
The Iowa DOT, through the National Concrete Pavement Technology Center (CP Tech Center) at Iowa State University, will serve as the lead state, handling all administrative duties associated with the project. The CP Tech Center will also serve as the lead research institution for the project.

Efforts for the TTCC include these examples:

- Maintain the TTCC pooled fund listserv and website with current activities and deliverables
- Guide the development of technology transfer materials (tech brief summaries and training materials)
- Contribute to a technology transfer newsletter for the CP Road Map project website
- Publish electronic quarterly reports following lead state guidelines
- Submit a final report to participants that documents the results of the entire project

The TTCC has designed SOL 1492 to foster new technologies and practices by identifying, supporting, facilitating and funding concrete research and technology transfer initiatives. The TTCC is open to any state agency desiring to be a part of new developments in concrete.

PARTNERS:
CA, CO, IADOT, ID, IL, IN, MI, MO, MT, NC, NE, NY, OK, PADOT, TX, UT, WA

OKLAHOMA INVOLVEMENT:
Oklahoma provides data input for the studies; participate in quarterly meetings via conference call; attend annual meetings.

Study Period	2020	2021	2022	2023	2024
State Contribution ($)	12,000	12,000	12,000	12,000	12,000

ESTIMATED COMPLETION DATE: August 2024

POINTS OF CONTACT:
Lead: Khyle Clute, (515)-239-1646
ODOT: Kenny Seward, (405) 521-4999
FHWA: Mike Praul, (207)-512-4917

SOL 1500 EconWorks - Improved Economic Insight

PURPOSE AND SCOPE:
The scope of work to operate, maintain and improve the EconWorks website over a five-year period (2019 to 2024) includes the following:
• Host the website and ensure EconWorks tools are operational for all users.
• Provide technical assistance to users utilizing the EconWorks website and tools.
• Develop and add new case studies for inclusions into the EconWorks database.
• Provide webinars and other outreach efforts to ensure all target audiences understand the benefits of EconWorks and are kept up to date on user tips.
• Provide oversight and management of the Econ-Works website. Provide for ongoing support of the site after the termination of the pooled fund study.

OBJECTIVES:
The focus of this pooled fund project will be to support transportation planners with a better understanding of the economic impact of transportation projects by continuing the overall operation, maintenance and improvement to the EconWorks website, and completing and adding additional case studies to provide more robust economic analysis.

PARTNERS:
IL, OK, TN, TX, VI

OKLAHOMA INVOLVEMENT:
Oklahoma provides data input for the studies; participate in quarterly meetings via conference call; attend annual meetings.

Study Period	2020	2021	2022	2023	2024
State Contribution ($)	20,000	20,000	20,000	20,000	20,000

ESTIMATED COMPLETION DATE: August 2024

POINTS OF CONTACT:
Lead: Jessie Jones, Jessie.Jones@ardot.gov
ODOT: Laura Chaney, (405) 521-2705
FHWA: Not identified