



OKLAHOMA **Transportation**

State Planning and Research Work Program FFY 2022

(October 1, 2021 to September 30, 2022)

Part 1

Strategic Asset and Performance Management

Part 2

Office of Research and Implementation

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

October 2022

Executive Summary

This document describes the Federal Fiscal Year (FFY) 2022 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 2022 include data collection, data analysis, data reporting, and planning coordination. New data collection activities include ramp counts and classification as well as the continuing implementation of radar technology to collect mainline 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 update to the Transportation Asset Management Plan to assist decision makers in transportation planning decisions. Funding for Part 1 of the work plan is approximately \$10.8 million in FFY 2022.

Research activities for FFY 2022 will include five new projects and six continuing projects. Some of the focus areas for current research projects include: design/ construction/ maintenance of infrastructure and safety. ODOT is participating in twelve national pooled fund projects, two of which Oklahoma acts as the lead state. Funding for the research program totals approximately \$4.6 million in FFY 2022.

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 2021) and the proposed activities for the upcoming fiscal year (FFY 2022). In addition, the Financial Section shows the amount programmed for the FFY 2021 in the last work program, an estimate of the total funds that will be expended by the end of FFY 2021, and the projected costs for the upcoming fiscal year (FFY 2022).



U.S. Department
of Transportation
**Federal Highway
Administration**

Oklahoma Division

September 29, 2021

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In Reply Refer To:
HDA-OK

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

Dear Mr. Gatz:

We have completed our review of the proposed Fiscal Year 2022 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 August 24, 2021. Based on our review we hereby approve the FY 2022 SPR work program and budget.

Following our approval, we will authorize the federal share of funds dedicated to the FY 2022 SPR Part I - Planning Work Program and budget in the amount of \$10,805,971.00 We will also authorize the federal share of funds in the amount of \$2,779,000.00 dedicated to the FY 2022 SPR Part II – Research Program and budget.

Our review has confirmed an ODOT commitment that exceeds the required federal minimum (25%) for Research funding. In addition, ODOT maintains its support for the Local Technical Assistance Program (LTAP) administered by the Center for Local Government Technology (CLGT) at Oklahoma State University. We note that the FY 2022 SPR budget increased slightly over the FY 2021 due to overall increases in GIS/Data Management and Traffic Data Collection subtasks. We request that the tasks for which funding has been eliminated from the SPR budget be closed with a report that provides information about the completed tasks. This includes the McClelland Kerr Arkansas River Navigation Study, The State Rail Plan, and the Skid Studies Program.

We thank ODOT's Strategic Asset and Performance Management (SAPM) Division staff for preparing this FY 2022 SPR Work Program and budget and for assisting our (FHWA-OK Division) staff to understand all the elements associated with the Planning and Research aspects of this Work Program.

We look forward to our review of the Annual Performance and Expenditure Report (APER) summarizing FY 2021 SPR Work Program activities by the December 31, 2021 deadline.

Should you have questions or comments regarding our action on these work programs, please do not hesitate to 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

cc: Rick Johnson, ODOT
Isaac Akem, FHWA
Waseem Fazal, FHWA
Carl Selby, FHWA

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State Planning & Research Program Management

October 1, 2021

Office of Capital Programs

Rick Johnson

Director of Capital Programs

Beckie Lyons, CPO, CPM

SP&R Program Manager

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Office of Research & Implementation SPR Part 2

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SP&R Part 2 Program Administrator

OKLAHOMA DEPARTMENT OF TRANSPORTATION
State Planning & Research (SPR) Financial Summary Sheet Federal Fiscal Year 2022
Program Period October 1, 2021 through September 30, 2022

SPR Part 1 - Planning, SPRY-0010(087)PL, JP# 01946(77)

A. Estimated Costs

SPR Part 1 - Planning	\$ 10,805,971.00
Total Estimated Costs	\$ 10,805,971.00

B. Available Funds

SPR Part 1 Unobligated Balance	\$ 13,345,131.00
Total Available Funds	\$ 13,345,131.00

C. Proposed Financing

<u>Type</u>	<u>Federal</u>	<u>Rate</u>	<u>State</u>	<u>Local</u>	<u>Total</u>
SPR	\$10,805,971		SMC	\$0.00	\$ 10,805,971.00
Total Proposed Financing JP # 01946(77)					\$ 10,805,971.00

SPR Part 2 - Research, SPRY-0010(088)RS, JP# 01946(85)

A. Estimated Costs

SPR Part 2 - Research	\$ 2,752,000.00
LTAP - SPR	\$ 347,882.00
Total SPR Pooled Fund Commitments	\$ 1,555,667.00
Total Estimated Cost	\$ 4,655,549.00

B. Available Federal Funds

SPR Part 2 Unobligated Balance	\$ 2,116,389.00
SPR Part 1 Unobligated Balance (remainder)	\$ 2,539,160.00
Total Available Funds	\$ 4,655,549.00

C. Proposed Financing

<u>Type</u>	<u>Federal</u>	<u>Ratio</u>	<u>State</u>	<u>Local</u>	<u>Total</u>
SPR Part 2	\$4,655,549	80%	SMC	\$0.00	
Total Proposed Financing					\$ 4,655,549.00

SPR Part 1 & Part 2 Totals

Total SPR Unobligated Balance	\$ 15,461,520.00
Total SPR Part 1 and Part 2 Estimated Costs	\$ 13,905,853.00
Total SPR Pooled Fund Commitments	\$ 1,555,667.00
Total SPR Research Funding	\$ 3,126,882.00
Total SPR Research & Pooled Fund Commitments	\$ 4,655,549.00
% of SPR Funds for Research	33%

SP&R PART 1 - Planning, SPRY-0010(087)PL, JP# 01946(77)

FEDERAL FISCAL YEAR 2022

		PROGRAMMED				
GIS AND DATA MANAGEMENT		SP&R	State	PL	Local	Total
1101	Continuing Inventory Data Studies	\$1,072,000.00	\$0.00	\$0.00	\$0.00	\$1,072,000.00
1102	Highway Performance Monitoring System	\$133,500.00	\$0.00	\$0.00	\$0.00	\$133,500.00
1103	Geographical Information Management System for Transportation	\$973,471.00	\$0.00	\$0.00	\$0.00	\$973,471.00
TOTAL GIS AND DATA MANAGEMENT		\$2,178,971.00	\$0.00	\$0.00	\$0.00	\$2,178,971.00
TRAFFIC AND DATA COLLECTION						
1301	Coverage Count Program	\$685,000.00	\$0.00	\$0.00	\$0.00	\$685,000.00
1302	Permanent Traffic County Program	\$1,520,000.00	\$0.00	\$0.00	\$0.00	\$1,520,000.00
1304	Purchase of Traffic County Equipment	\$405,000.00	\$0.00	\$0.00	\$0.00	\$405,000.00
1305	Vehicle Classification Counting Program	\$435,000.00	\$0.00	\$0.00	\$0.00	\$435,000.00
1308	Traffic Monitoring System	\$750,000.00	\$0.00	\$0.00	\$0.00	\$750,000.00
1309	Traffic Analysis and Projections	\$150,000.00	\$0.00	\$0.00	\$0.00	\$150,000.00
TOTAL TRAFFIC AND DATA COLLECTION		\$3,945,000.00	\$0.00	\$0.00	\$0.00	\$3,945,000.00
ECONOMIC, SAFETY, AND FISCAL STUDIES						
1405	Motorcycle Safety and Education Program	\$57,000.00	\$0.00	\$0.00	\$0.00	\$57,000.00
1406	Bridge Health Monitoring	\$10,000.00	\$0.00	\$0.00	\$0.00	\$10,000.00
TOTAL ECONOMIC, SAFETY AND FISCAL STUDIES		\$67,000.00	\$0.00	\$0.00	\$0.00	\$67,000.00
SYSTEMS AND PROGRAMS						
1604	Pavement Management Systems	\$1,500,000.00	\$0.00	\$0.00	\$0.00	\$1,500,000.00
TOTAL SYSTEMS AND PROGRAMS		\$1,500,000.00	\$0.00	\$0.00	\$0.00	\$1,500,000.00
URBAN / REGIONAL TRANSPORTATION PLANNING						
1700	General Urban Transportation Planning Activities	\$50,000.00	\$0.00	\$0.00	\$0.00	\$50,000.00
1701	Oklahoma City Area Regional Transportation Study (OCART)	\$30,000.00	\$0.00	\$2,098,264.00	\$419,653.00	\$2,547,917.00
1702	Tulsa Metropolitan Area Transportation Study	\$30,000.00	\$0.00	\$1,266,500.00	\$253,300.00	\$1,549,800.00
1703	Lawton Metropolitan Area Transportation Study	\$25,000.00	\$0.00	\$325,698.00	\$65,140.00	\$415,838.00
1709	Ft.Smith Transportation Study	\$25,000.00	\$0.00	\$39,000.00	\$7,800.00	\$71,800.00
1710	Regional Transportation Planning	\$755,000.00	\$0.00	\$0.00	\$181,250.00	\$936,250.00
TOTAL URBAN TRANSPORTATION PLANNING		\$915,000.00	\$0.00	\$3,729,462.00	\$927,143.00	\$5,571,605.00
LONG RANGE PLAN / OTHER PLANNING ACTIVITIES						
1719	Statewide Transportation Improvement Program	\$400,000.00	\$0.00	\$0.00	\$0.00	\$60,000.00
1720	Statewide Travel Demand Model	\$100,000.00	\$0.00	\$0.00	0.00	\$100,000.00
1902	Statewide Long Range Transportation	\$20,000.00	\$0.00	\$0.00	\$0.00	\$20,000.00
1904	Air Quality Transportation Planning	\$20,000.00	\$0.00	\$0.00	\$0.00	\$20,000.00
1905	Freight Planning	\$500,000.00	\$0.00	\$0.00	\$0.00	\$500,000.00
1913	Active Transportation Planning	\$500,000.00	\$0.00	\$0.00	\$0.00	\$500,000.00
1914	Transportation Asset Management Plan	\$300,000.00	\$0.00	\$0.00	\$0.00	\$300,000.00
1915	Performance Measurement Coordination	\$360,000.00	\$0.00	\$0.00	\$0.00	\$360,000.00
TOTAL OTHER		\$2,200,000.00	\$0.00	\$0.00	\$0.00	\$2,200,000.00
GRAND TOTAL SPRY-0010(087)PL		\$10,805,971.00	\$0.00	\$3,729,462.00	\$927,143.00	\$15,462,576.00

Revised 8/23/2021

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. 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, NHS System, Control Section and Public Roads. Produce AVMT 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. The staff managing this item now handles workflows from SPR Item 1601.

ACCOMPLISHMENTS DURING FFY 2021: The County Road inventory procedures were continued with 15 field inventories completed. 10 counties were reassessed and updated: (Dewey, Alfalfa, Coal, Caddo, Craig, Choctaw, Roger Mills, Latimer, Le Flore, Cherokee). 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: 2020 Certification of County Road Mileage, 2020 Oklahoma Statewide Statistics Book, 2020 HPMS Report, Travel Summary Tables and 2020 Statewide Mileage Table Book.

PROPOSED ACTIVITIES FOR FFY 2022: Streamline workflows from SPR Item 1601 into this workflow. Incorporate technological advancements in data collection to streamline field inventory operations. Fifteen counties are scheduled to be inventoried. Ten counties are scheduled to be reassessed and coded: (Atoka, Beaver, Beckham, Carter, Ellis, Harmon, Harper, Jackson, Kiowa, Logan). Continue monitoring all County Action Reports, Highway Construction projects and continue collecting HPMS data items. Compile and publish various state and federal reports including: 2022 Certification of County Road Mileage, 2021 Oklahoma Statewide Statistics Book, 2021 HPMS Mileage and Travel Summary Tables.

FINANCIALS	Amount	Fund	Amount	Fund
Programmed Amount FFY 2021	\$ 1,087,500	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$ 1,000,000	SPR	\$0.00	STATE
Estimated Cost FFY 2022	\$ 1,072,000	SPR	\$0.00	STATE

CONTACT INFORMATION

Samuel Coldiron

Inventory Branch Manager / HPMS Coordinator, 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 2021: ODOT continued use of the new HPMS Console to streamline the submittal process and allow better validation and data checks before uploading. New validation constraints from the previous submittal year were added. Field Review documents were produced for 30 sample sections located around the rural areas of the state. The 2020 HPMS data submittal was completed. Continued to update and verify sample items through field inspection, ODOT Video-Log, Google-Street view, Bing-StreetSide, etc. Participated in numerous webinars pertaining to HPMS, NPMRDS and MIRE. Due to Sample adequacy issues, ODOT created 75 additional Samples during the year which brings us in-line with required Sampling techniques.

PROPOSED ACTIVITIES FOR FFY 2022: 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 2021 HPMS data submittal will be transmitted to FHWA using our latest HPMS Console and will be consistent with the latest FHWA Version 8 web-based software. We will also be preparing for the HPMS Version 9 which will be released in the near future.

FINANCIALS	Amount	Fund	Amount	Fund
Programmed Amount FFY 2021	\$ 133,500	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$ 133,500	SPR	\$0.00	STATE
Estimated Cost FFY 2022	\$ 133,500	SPR	\$0.00	STATE

CONTACT INFORMATION

Samuel Coldiron Inventory Branch Manager / HPMS Coordinator, 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 2020: Generated numerous custom maps and KML files, such as Work Plan maps, Long Range Transportation Plan, Environmental Programs. Continued improving and supporting ODOT Map & Data Portal, providing the agency and the general public with a wide range of ODOT GIS data on desktop and mobile. Continued ROW digitization effort. Provided geospatial data management and visualization services for numerous ODOT divisions. Continued improvements of Straight-Line Diagram software. Completed Rail Map update. Completed network-wide asset inventory data collection. Products provided to Senior Staff, Div. Engineers and others. Continued GIS training and workshops. Developed training material for various GIS products. Conducted several GIS training sessions for various Department employees.

PROPOSED ACTIVITIES FOR FFY 2021: Continue to expand the Map & Data Portal. Update Asset Inventory to current year. Continue the ROW digitization effort. Other map products where appropriate. Continue to 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, Facilities Management Project Management, and Traffic Engineering Divisions to identify needs and develop solutions that will enable them to efficiently and accurately perform their individual missions. Continue to utilize training of staff. Continue to coordinate with OTA to merge the GIS needs of both agencies.

FINANCIALS	Amount	Fund	Amount	Fund
Programmed Amount for FFY 2021	\$1,001,202	SPR	\$0.00	STATE
Estimated Cost for FFY 2021	\$1,001,202	SPR	\$0.00	STATE
Estimated Cost for FFY 2022	\$ 973,471	SPR	\$0.00	STATE

CONTACT INFORMATION

Gwen Johnson, GIS Branch Manager, 405-521-4121

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 portions of 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 2021: Short duration traffic counts were completed on the State Highway System, County Off System and City Off System in the 25 counties in Count Cycle 1 scheduled for FFY 2021. Continuous updating of the GPS coordinates and site characteristics for all traffic count sites on all systems was performed. The contract was renewed with Innovative Traffic Systems & Solutions LLC (ITS&S) for enhancements and maintenance of the Oklahoma Traffic Count Management System (OTCMS). Enhancements and maintenance of the OTCMS was performed by ITS&S.

PROPOSED ACTIVITIES FOR FFY 2022: 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 25 counties in Count Cycle 2 scheduled for FFY 2022. Update GPS coordinates and site characteristics for all traffic count sites on all systems as needed. Attend seminars, conferences and workshops to keep abreast of the latest technological advances in traffic counting equipment and data collection processes. The increase in estimated cost for FFY 2022 is due to adding additional personnel and an increase in salaries, benefits and expected travel expenses.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$500,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$575,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$685,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Aaron Fridrich, Field Data Collection Manager, 405-636-4180 or 405-567-7876

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 92 Automatic Vehicle Classification (AVC) and 150 radar station locations in Oklahoma. The traffic data obtained by these AVC sites 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 the contractor, at their expense.

ACCOMPLISHMENTS DURING FFY 2021: 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. Various sensor replacements were made at critical collection sites. Site visits to carry out annual inspections, routine maintenance, and equipment testing were completed at 92 active AVC sites and 150 radar AVC sites. Under the TMS Radar Installation Contract put in place in FFY 2020, 150 radar AVC units were installed statewide. Under the TMS Data Collection Connectivity Contract, 150 radar AVC units were brought online after installation.

PROPOSED ACTIVITIES FOR FFY 2022: Under the TMS Radar Installation Contract put in place in FFY 2020, up to 20 additional radar units will be installed statewide in FY 2022. Under the TMS Data Collection Connectivity Contract, up to 20 additional radar AVC units will be brought online after installation. Under the TMS Site Repair Contract, existing in-ground AVC sensors will be repaired at selected locations. After all radar units are installed and verified fully operation, existing in-ground AVC sites will be phased out as they reach then end of their mechanical life cycles. At this time, the in-ground AVC site will be discontinued, and the radar unit will be the sole permanent data collection mechanism. After the additional 20 radar units are installed, the Connectivity Contract will be reduced by 25% to 50% in order to continue to collect data and maintain the radar systems. The decrease in requested funding is due to the reduction of the Connectivity Contract amount and completion of the installation of the 150 radar units.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$1,600,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$2,570,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$1,520,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Aaron Fridrich, Field Data Collection Manager Phone: 405-636-4180 or 405-567-7876

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 2021: Equipment purchases executed in FFY 2021 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 2022: The proposed construction of 20 new radar traffic monitoring stations, replacement of old equipment and the processing of turning movement counts comprises the majority of the expenditures for FFY 2022. As older, out-dated 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. The increase in estimated cost for FFY 2022 is due to an increase in the number of multiple day turning movement counts along with the proposed purchase of an additional 20 radar units.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$225,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$160,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$405,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Aaron Fridrich, Field Data Collection Branch Manager Phone: 405-636-4180 or 405-567-7876

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 2021: The vehicle classification counting contract was moved to Item 1308. ODOT forces collected all vehicle classification counts on the ramp system sites statewide for Count Cycle 1. Various special studies were conducted throughout the year including 16-hour, 24-hour and multiple day counts, 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 2022: ODOT forces will collect all vehicle classification counts on the ramp system sites statewide for Count Cycle 2. Various special studies will be conducted throughout the year providing timely data for traffic engineers, planners and designers in the department's central office division as well as for traffic engineers, construction and maintenance managers in the eight field divisions. Continue to provide resources to fulfill the requests for various types of traffic studies and produce all reports associated with those studies. The funding increase is due to moving the Field Data Collection Transportation Manager "West" from 1301 to 1305.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$300,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$310,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$435,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Aaron Fridrich, Field Data Collection Manager Phone: 405-636-4180 or 405-567-7876

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 2021: All FHWA Traffic Submitted for 2020 data for HPMS were completed by May 2021. Annual Average Daily Traffic (AADT) estimates including continuous counter analysis, annual factor generation, data validation for the vehicle classification contract and state collected counts were completed for 2020 data, including estimation of the statewide ramp system. Weekly random spot checks of the traffic monitoring count site locations were performed to assess locations and QCQA historical data. 139 additional continuous site locations using radar technology have been added across the state and data from these new locations will start being used for analysis in FFY 2022.

PROPOSED ACTIVITIES FOR FFY 2022: 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 proposed and existing 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. Manage consultant contracts that help Traffic Monitoring System with data collection and data processing. The estimated cost increase for FY 2022 is due to Vehicle Classification Collection, Southern Traffic, and for Traffic Analysis Software, Traffic Analyzer, billed through this item.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$500,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$500,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$750,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Angel Gonzalez, Assistant Division Engineer, 405-437-5688

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 2021: 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 200 requests for design traffic were completed. Several engineering contract consultant design traffic analyses were overseen, edited, and approved at some level of completion.

PROPOSED ACTIVITIES FOR FFY 2022: 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. The estimated cost decrease for FY 2022 is based on staff changes and changes in time charged against this item.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$295,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$205,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$150,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Angel Gonzalez, Assistant Division Engineer, 405-437-5688

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 (SHRP) sites. Conduct special skid resistance testing as requested.

ACCOMPLISHMENTS DURING FFY 2021: Skid Studies Program was abandoned in FY 2021. Skid trailers were surplused and the skid truck was transferred to another ODOT Division. All skid resistance requests now run through SPR Item 2400.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$25,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$1,100	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0 .00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Aaron Fridrich, Field Data Collection Manager Phone: 405-636-4180 or 405-567-7876

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 2021: 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. An annual report of completed training is given to ODOT each fiscal ending year.

PROPOSED ACTIVITIES FOR FFY 2022: The Oklahoma Highway Patrol, in partnership with ODOT, will continue implementation of the statewide motorcycle safety and education program. The program will include 10 classroom and experiential educational training sessions and public outreach and awareness. OHP will use ODOT collision data to examine program effectiveness and use variables such as age, locations, types of crash etc., to further refine program strategies.

FINANCIALS	Amount	Fund	Amount	Fund
Programmed Amount FFY 2021	\$57,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$57,000	SPR	\$0.00	STATE
Estimated Cost FFY 2022	\$57,000	SPR	\$0.00	STATE

CONTACT INFORMATION

Beckie Lyons APO IV, Director of Capital Programs Division 405-514-1642

1406 Bridge Health Monitoring

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

ACCOMPLISHMENTS DURING FFY 2021: Sensors were installed 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.

PROPOSED ACTIVITIES FOR FFY 2022: Continue to monitor and analyze the bridge in search of strengthening or rebuilding the bridge.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$10,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$ 6,800	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$10,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Rick Johnson, Director of Capital Programs, 405-522-6000

1604 Pavement Management System

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). Maintain a database indicating ratings for roadways with suggested improvements and costs.

ACCOMPLISHMENTS DURING FFY 2021: Performed Pavement Management System collection and analysis of the National Highway System (NHS) and the State Highway System (SHS) in Oklahoma as well as non-highway samples required for HPMS. Technical support for the video log software was provided. Conducted QC testing to ensure pavement data quality. Compiled Pavement Management System data for the 2021 District Notebooks. Kept informed of the latest technological advances and practices by attending meetings, webinars, and workshops.

PROPOSED ACTIVITIES FOR FFY 2022: 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. Conduct data quality testing to ensure pavement data quality. Continue refinement of analysis for deterioration curves, pavement strategies, and project optimization utilized by the pavement management software. Provide technical support for the video log software. Compile Pavement Management System data for the 2022 District 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	\$1,500,000	SPR	\$0.00	STATE
2021 Estimated Cost FFY 2021	\$1,200,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$1,500,000	SPR	\$0.00	STATE

CONTACT INFORMATION

Angel Gonzalez, Assistant Division Engineer, 405-437-5688

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 2021: 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 2022: 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 for FFY 2021	\$50,000	SPR	\$0.00	STATE
Estimated Cost for FFY 2021	\$50,000	SPR	\$0.00	STATE
Estimated Cost for FFY 2022	\$50,000	SPR	\$0.00	STATE

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-819-3719

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 2021: Transportation planning for the OCARTS Area was carried out as described in the FFY 2021 Unified Planning Work Program (UPWP). Accomplishments during FY 2021 included: preparation and finalization of the FY 2021 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. ACOG started on their Encompass 2045 plan. 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 2022: Completion of the LRTP Encompass 2045 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. Continuation of the Regional Transit Authority Task Force activities. Continue utilizing the STBG-UZA evaluation criteria to reflect evolving regional goals and performance measures. 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.

FINANCIALS	Amount	Fund	Amount	Fund	Amount	Fund
Programmed Amount FFY 2021	\$25,000	SPR	\$2,289,602	PL	\$ 457,920	LOCAL
Estimated Cost FFY 2021	\$25,000	SPR	\$2,289,602	PL	\$ 457,920	LOCAL
Estimated Cost FFY 2022	\$30,000	SPR	\$2,098,264	PL	\$ 419,653	LOCAL

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-819-3719

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 2021: Transportation planning for the Tulsa TMA was carried out as described in the FFY 2021 Unified Planning Work Program (UPWP). Accomplishments during FFY 2021 included: preparation and finalization of the FFY 2021 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.

PROPOSED ACTIVITIES FOR FFY 2022: 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 2021 will include: develop framework for a new Regional Transportation Plan with a 2050 horizon year. Multimodal connectivity and continued implementation of the GO plan for 'active' transportation. Update and maintain the TIP for FFY 2022-2025 as needed. The Congestion Management Process will be updated to adhere to federal requirements. INCOG will analyze crash data to study causes and recommend strategies to mitigate all crashes. INCOG will undertake specific defined corridor access feasibility studies with participation from local agencies. 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	\$25,000	SPR	\$ 1,418,575	PL	\$ 283,715	LOCAL
2021 Estimated Cost FFY 2021	\$25,000	SPR	\$ 1,418,575	PL	\$ 283,715	LOCAL
Estimated Cost FFY 2022	\$30,000	SPR	\$ 1,266,500	PL	\$ 253,300	LOCAL

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-819-3719

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 2021: Transportation planning for the Lawton Metropolitan Planning Area was carried out as described in the FFY 2021 Unified Planning Work Program (UPWP). Accomplishments during FFY 2021 included: preparation and finalization of the TIP. Preparation and finalization of the FY 2021 UPWP. The FY 2021 Agreement was executed and authorization to expend federal funds in the LMPO area. 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 using the most current traffic counts. Identified priority corridors where access management techniques could improve traffic flow and safety. Established performance measures and safety targets for the LMPO area. Continued a bicycle safety education campaign for the region. Continued the air quality awareness campaign in cooperation with local media and the Lawton Metropolitan Area Air Quality Committee.

PROPOSED ACTIVITIES FOR FFY 2022: As defined in the FY 2022 UPWP, continue the Feasibility Study and Design Concept for the Extension of Goodyear Boulevard to connect US 62 and the West Lawton Industrial Park. Continued research on the benefits of utilizing roundabouts and identifying areas within the LMPO's boundary they could be utilized to improve traffic flow and safety. Continue research and mapping of right-of-way widths of arterials. Analyze pedestrian facilities and identify areas for new bike and pedestrian crossings. Monitor and report on performance measures and establish targets. Continue efforts working with key entities on the multi-modal transportation transfer center. Research and apply for grant opportunities for the construction of a bus transfer center. Prepare the FFY 2022-2025 TIP and continue the public awareness campaign for air quality.

FINANCIALS	Amount	Fund	Amount	Fund	Amount	Fund
Programmed Amount FFY 2021	\$20,000	SPR	\$ 384,325	PL	\$ 76,865	LOCAL
Estimated Cost FFY 2021	\$20,000	SPR	\$ 384,325	PL	\$ 76,865	LOCAL
Estimated Cost FFY 2022	\$25,000	SPR	\$ 325,698	PL	\$ 65,140	LOCAL

CONTACT INFORMATION

Laura Chaney, Planning & Performance Branch Manager, 405-819-3719

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 2021: Implementation of Encompass 2040 projects and strategies while also reviewing methodology to evaluate possible changes for the 2045 metropolitan transportation plan. An emphasis continued 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 Trask 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 2022: 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. Key activities will include carrying out activities in the 2045 Metropolitan Transportation Plan. Continue creating bicycle and pedestrian plans for the region that will provide bicycle and pedestrian education through public outreach, training opportunities and partnerships with federal, state and local agencies. Monitoring safety needs and initiatives Frontier will coordinate with ARDOT, ODOT on the Toward Zero Deaths program to reduce traffic deaths and improve safety in the area. Work with local governments to coordinate land use and transportation concerns. Frontier will continue to collect and analyze crash data, demographics and future projections within the Frontier area, collect and review public transit ridership. The MPO 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	\$20,000	SPR	\$ 37,500	PL	\$ 7,500	LOCAL
2021 Estimated Cost FFY 2021	\$20,000	SPR	\$ 37,500	PL	\$ 7,500	LOCAL
Estimated Cost FFY 2022	\$25,000	SPR	\$ 39,000	PL	\$ 7,800	LOCAL

CONTACT INFORMATION:

Laura Chaney, Planning & Performance Branch Manager, 405-819-3719

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 2021: Transportation planning for the four Regional Transportation Planning Organization (RTPO) regions were carried out as described in the RTPO's FFY 2021 Planning Work Program (PWP). Continued data collection of social, economic, environmental and transportation system data. Continued development of county LRTP's and began development of their regional LRTP's. Preparation of the annual planning funding documents, and maintenance and updates of each RTPO website.

PROPOSED ACTIVITIES FOR FFY 2022: 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 county LRTP's and will continue to update and compile data collected from each county plan, per RTPO region, to develop their Regional Long Range Transportation Plans.

FINANCIALS	Amount	Fund	Amount	Fund	Amount	Fund
Central Oklahoma Economic Development District	\$125,000	SPR	\$0.00	STATE	\$31,250	LOCAL
Grand Gateway Economic Development District	\$125,000	SPR	\$0.00	STATE	\$31,250	LOCAL
Northern Oklahoma Development Authority	\$175,000	SPR	\$0.00	STATE	\$43,750	LOCAL
Southwestern Oklahoma Development Authority & Association of South Central Oklahoma Governments	\$225,000	SPR	\$0.00	STATE	\$56,250	LOCAL
Southern Oklahoma Development Agency	\$75,000	SPR	\$18,750	STATE	\$18,750	LOCAL
FINANCIALS	Amount	Fund	Amount	Fund	Amount	Fund
Programmed Amount FFY 2021	\$755,000	SPR	\$0.00	STATE	\$181,250	LOCAL
Estimated Cost FFY 2021	\$755,000	SPR	\$0.00	STATE	\$181,250	LOCAL
Estimated Cost FFY 2022	\$755,000	SPR	\$0.00	STATE	\$181,250	LOCAL

CONTACT INFORMATION:

Laura Chaney, Planning & Performance Branch Manager, 405-819-3719

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 2021: Completed the 2020-2023 STIP. Coordinated with MPO's, FHWA, and FTA to amend and modify the STIP. Began development of an electronic STIP in coordination with the MPOs and FHWA.

PROPOSED ACTIVITIES FOR FFY 2022: Update the STIP to include FFY 2022-2025. Manage and amend or modify the STIP as necessary. Continue administration of current STIP using approved procedures. Continue development of an electronic STIP in coordination with the MPOs and FHWA.

	Amount	Fund	Amount	Fund
FINANCIALS				
Programmed Amount for FFY 2021	\$ 300,000	SPR	\$0.00	STATE
Estimated Cost for FFY 2021	\$ 300,000	SPR	\$0.00	STATE
Estimated Cost for FFY 2022	\$ 400,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Laura Chaney, Planning & Performance Branch Manager, 405-819-3719

1720 Statewide Travel Demand Model

PURPOSE AND SCOPE: To use the developed statewide travel demand model to determine regional and corridor-based needs. Mode share will be addressed within regional corridors. The project will use the Statewide Travel Demand Model, which is based on the Oklahoma road network, traffic analysis zone, and demographic, mode, network data, and validation and calibration of a base year model.

ACCOMPLISHMENTS DURING FFY 2021: Attended conferences, courses, seminars and training such as technical papers and webinars. Completed development of the statewide Travel Demand Model (TDM).

PROPOSED ACTIVITIES FOR FFY 2022: Enhance staff knowledge through courses, seminars, trainings, and conferences hosted by the Federal Highway Administration, the National Highway Institute, and others. Initiate models runs to assist in Department planning activities.

FINANCIALS	Amount	Fund	Amount	Fund
Programmed Amount for FFY 2021	\$ 215,000	SPR	\$0.00	STATE
Estimated Cost for FFY 2021	\$ 215,000	SPR	\$0.00	STATE
Estimated Cost for FFY 2022	\$ 100,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Laura Chaney, Planning & Performance Branch Manager, 405-819-3719

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.

ACCOMPLISHMENTS DURING FFY 2021: Completed the 2020-2045 LRTP, which included revising the vision statement and goal areas, conducting Advisory Committee Meetings and public outreach, identifying Existing Conditions, identifying Modal Needs and estimated costs, and fore-casted revenues for the next 25 years. A new requirement of the 2020-2045 LRTP is a System Performance Report. This report evaluates the condition and performance of the transportation system with respect to performance targets. Ensured the scope of the plan is consistent with Fixing America's Surface Transportation System (FAST) Act and pertinent state rules and regulations. Continued coordination with ODOT divisions, MPOs and local governments in relation to long range transportation plans.

PROPOSED ACTIVITIES FOR FFY 2022: Continue maintenance and implementation of the 2020-2045 LRTP. Continue coordination with ODOT divisions, MPOs and local governments in relation to long range transportation plans. Review federal regulations, and pertinent state legislative transportation issues. Keep apprised of possible changes in long range transportation planning requirements as new federal legislation is developed.

FINANCIALS	Amount	Fund	Amount	Fund
Programmed Amount for FFY 2021	\$40,000	SPR	\$0.00	STATE
Estimated Cost for FFY 2021	\$40,000	SPR	\$0.00	STATE
Estimated Cost for FFY 2022	\$20,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Laura Chaney, Planning & Performance Branch Manager, 405-819-3719

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 2021: 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, 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. Coordinated use of federal CMAQ funds through ACOG to build new bus shelters and create new striping to encourage pedestrian travel in the Oklahoma City area.

PROPOSED ACTIVITIES FOR FFY 2022: 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. Continue monitoring attainment status throughout the state and facilitate relationships as necessary pertaining to federal attainment requirements. 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 2021	\$ 20,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$ 20,000	SPR	\$0.00	STATE
Estimated Cost FFY 2022	\$ 20,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Laura Chaney, Planning & Performance Branch Manager, 405-819-3719

1905 FREIGHT TRANSPORTATION PLANNING

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

ACCOMPLISHMENTS DURING FFY 2021: Continued review of proposed federal regulations. Prepared Freight Brochure explaining freight impact on economic and transportation goals of the state.

PROPOSED ACTIVITIES FOR FFY 2022: Update the Oklahoma Freight Transportation Plan in accordance with federal regulations. Review existing and proposed federal regulations as they relate to freight planning. Review and analyze the freight analysis framework (FAF) data, freight congestion, the national performance measures roadway data set, and urban and rural freight transport.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$400,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$400,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$500,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Laura Chaney, Planning Performance Branch Manager, 405-819-3719

1913 Active Transportation 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 Fixing Americas Surface Transportation (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 2021: Attended virtual seminars, workshops, and webinars related to bicycle and pedestrian transportation planning and policies. 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 while working closely with Oklahoma MPOs, RTPOs, state departments, and citizens. Collected the completed research report conducted by the ODOT Research Division related to other state DOT Statewide Bicycle and Pedestrian Master Plans. Assisted with development of the statewide Bicycle App. Began the process of getting USBR 66 through Oklahoma designated through AASTHO as a United States Bicycle Route by conducting Steering Committee and Stakeholder meetings, receiving public input on the route, and preparing the application package and narrative.

PROPOSED ACTIVITIES FOR FFY 2022: 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. 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. Continue working with ODOT GIS on the ODOT Bicycle App. 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. Submit application for USBR 66 through AASHTO requirements and complete the designation process. Work with local communities across the State to install USBR 66 signage along the USBR 66 route. Begin development of the Oklahoma Statewide Active Transportation Plan.

FINANCIALS

	Amount	Fund	Amount	Fund
Programmed Amount FFY 2021	\$ 200,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$ 200,000	SPR	\$0.00	STATE
Estimated Cost FFY 2022	\$ 500,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Laura Chaney, Planning & Performance Branch Manager, 405-819-3719

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 2021: Participated in various activities as they were available including meetings, workshops, webinars, conferences and peer exchanges. Researched recommendations for best practices in asset management and performance. Implemented asset management through action oriented tasks. Submitted the 2021 TAMP Consistency Determination to FHWA in June 2021.

PROPOSED ACTIVITIES FOR FFY 2022: Continue to participate in various activities as they are available including meetings, workshops, webinars, conferences and peer exchanges. 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 2022 TAMP by July 30, 2022.

FINANCIALS	Amount	Fund	Amount	Fund
Programmed Amount FFY	\$50,000	SPR	\$0.00	STATE
2021 Estimated Cost FFY 2021	\$20,000	SPR	\$0.00	STATE
Estimated Cost FFY 2022	\$300,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

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 2021: 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. Completed State Biennial Performance Report and submitted to FHWA.

PROPOSED ACTIVITIES FOR FFY 2022: Continue developing and implementing agency plans for compliance with required performance measures and reporting. Coordinate with subject matter experts on bridge, pavement, travel time reliability, and freight performance measure data collection and preparation. Attend seminars and workshops on performance measures topics and reporting techniques. Participate in NCHRP 23-07 Effective Methods for Setting Transportation Performance Targets. The estimated cost increase for FY 2022 is due to Speed Data Collection, HERE data, collected through this item.

FINANCIALS	Amount	Fund	Amount	Fund
Programmed Amount for FFY 2021	\$100,000	SPR	\$0.00	STATE
Estimated Cost for FFY 2021	\$4,000	SPR	\$0.00	STATE
Estimated Cost for FFY 2022	\$360,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Angel Gonzalez, Assistant Division Engineer, 405-437-5688

1916 OK Archaeological Survey (OAS) GIS Digitization

PURPOSE AND SCOPE: The project purpose is to maintain the hosting and finish final development processes necessary to fully complete the Geographic Information System (GIS) used 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. This system was developed under the previous iteration of this item number.

ACCOMPLISHMENTS DURING FFY 2021: Moved into development and testing phase for web applications.

PROPOSED ACTIVITIES FOR FFY 2022: Complete web application development and move to production deployment.

Project will continue to use funding allocated in previous FYs.

FINANCIALS	Amount	Fund	Amount	Fund
Programmed Amount for FFY 2020	\$0.00	SPR	\$0.00	STATE
Estimated Cost for FFY 2020	\$0.00	SPR	\$0.00	STATE
Estimated Cost for FFY 2021	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

SPR Part 2 Financial Summary Sheet

SPR PART 2 - RESEARCH, SPRY-0010(088)RS, JP# 01946(85)
FEDERAL FISCAL YEAR 2022

		SPR	STATE	LOCAL	TOTAL
GENERAL ITEMS					
2100	Transportation Research Board (TRB)	\$20,000.00			\$20,000.00
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	\$198,000.00			\$198,000.00
2160	OU Interagency Master Agreement for Research and Investigation Services	\$500,000.00			\$500,000.00
2161	ODOT Transportation Library Management	\$175,000.00			\$175,000.00
2400	OSU Interagency Master Agreement for Research and Investigation Services	\$500,000.00			\$500,000.00
2700	Experimental Product Evaluation Program	\$30,000.00			\$30,000.00
Total General Activities		\$1,478,000.00			\$1,478,000.00
CONTINUING RESEARCH PROJECTS					
2156	Roadside Vegetation Management Training & Consultation	\$250,000.00			\$250,000.00
2286	Compost Filter Socks for Storm Water & Erosion Control in Construction	\$36,000.00			\$36,000.00
2287	Eval. Exp. Life and Recoat. of Silane Water Repell. Treatm. on Bridge Decks	\$113,000.00			\$113,000.00
2288	Long Term Perf. and Benefits of Comb. Balanced Mix Des. And Chem. WMA Techn.	\$102,000.00			\$102,000.00
Total Continuing Research Projects		\$501,000.00			\$501,000.00
NEW RESEARCH PROJECTS					
2290	Bond Behavior of Epoxy Coated Reinforcing Bars in Non-Proprietary UHPC	\$119,000.00			\$119,000.00
2291	A Fatig. Assmt. Framew. for Steel Brdgs. using Fiber Optic Sens. & Mach. Learning	\$102,000.00			\$102,000.00
2292	Innov. Multi-Hazard Resistant Bridge Columns for Accelerated Bridge Construction	\$102,000.00			\$102,000.00
Total New Research Projects		\$323,000.00			\$323,000.00
RESEARCH IMPLEMENTATION PROJECTS					
2300	Interim Research Implementation Projects	\$100,000.00			\$100,000.00
CONTINUING					
2302	Load Test Monitoring of I-235 Bridge Repairs	\$86,000.00			\$86,000.00
2313	Design and Monitoring of Non-Proprietary UHPC Joints of Precast Elements	\$72,000.00			\$72,000.00
NEW					
2314	Evaluation and Development of Flood Detection and Prediction System	\$99,000.00			\$99,000.00
2315	Adapting ODOT Radar Traff. Mon. System to Autom. Track Real-Time Traffic Flow	\$93,000.00			\$93,000.00
Total Research Implementation Projects		\$450,000.00			\$450,000.00
Total SPRY-0010(088)RS					\$2,752,000.00
LTAP Project Number TTY-LTAP (010)TT		JP# 30001(21)			
1440	Local Technical Assistance Program	\$347,882.00			\$347,882.00
Grand Total with LTAP		\$3,099,882.00			\$3,099,882.00
POOLED FUND STUDIES					
TPF-5(###)	NCHRP	\$750,000.00			\$750,000.00
TPF-5(###)	TRB Core Progr. Services for a Hwy. RD&T Progr. FFY 2021 (TRB FY 2022)	\$140,000.00			\$140,000.00
TPF-5(326)	Dev.&Support Trans.Perf. Mang. Capacity Devp. Needs for State DOT's	\$27,000.00			\$27,000.00
TPF-5(357)	Impl. Shakecast Across Multiple State Depts. For Rapid Post Earthquake Resp.	\$30,000.00			\$30,000.00
TPF-5(372)	Building Information Modeling (BIM) for Bridges and Structures	\$20,000.00			\$20,000.00
TPF-5(398)	Moving Forward with Next Gen. Travel Behavior Data Coll. and Processing Part A Funds	\$25,000.00			\$25,000.00
TPF-5(437)	Technology Transfer Concrete Consortium (FY20-FY24)	\$12,000.00			\$12,000.00
TPF-5(442)	Transportation Research and Connectivity	\$25,000.00			\$25,000.00
TPF-5(448)	Integrating Construction Practices and Weather Into Freeze Thaw Specifications	\$20,000.00			\$20,000.00
TPF-5(465)	Consortium for Asphalt Pavement Research & Implementation (CAPRI)	\$10,000.00			\$10,000.00
TPF-5(469)	Accel. Perf. Testing on the 2021 NCAT Pavem. Test Track with MnROAD Res. Partner.	\$416,667.00			\$416,667.00
TPF-5(478)	Demonstration to Advance New Pavement Technologies	\$10,000.00			\$10,000.00
TPF-5(484)	Protecting Bridge Girders from overheight Vehicles	\$70,000.00			\$70,000.00
Total Pooled Fund Studies		\$1,555,667.00			\$1,555,667.00
TOTAL RESEARCH FUNDING INCLUDING POOLED FUND STUDIES					\$4,655,549.00

SPR Part 2 Financial Summary Sheet Continued

SPR Part 2 - Research SPRY-0010(088)RS JP# 01946(85)

ENDING FFY 2021 RESEARCH PROJECTS

2268	Use of a Novel Contr. Release Surf. Curing Agent for Bridge Decks - Phase 2
2279	Prob.Approach for the Design of Drilled Shafts Socketed in Weak Rock
2286	Compost Filter Socks for Storm Water & Erosion Control in Constr.
2288	Long Term Perf. & Benefits of Comb. Bal. Mix Des. & Chem. WMA Techn.

PREVIOUSLY COMPLETED RESEARCH PROJECTS

2260	Shrinkage Induced Deformations in Steel Bridges - Phase 3
2274	Development of Concrete Mixtures to Mitigate Bridge Deck Cracking
2276	Eval. Of Ultra-High Perf. Concr. For Use in Bridge Conn. Repair - Phase 2
2281	Evaluating the Performance of Existing Reinforcement for Oklahoma Bridges
2284	Prestr. Girder Cont. Joint/End Reg. Repair using UHPC/Fib. Reinf. SC Concr.

ENDING FFY 2021 IMPLEMENTATION PROJECTS

2307	A Systems Approach for Design, Construction, and Maintenance of Bridges and Adjacent Roadways
2308	Demonstration of the Applicability of the New CPTu/SCPTu Correlations with Soil Parameter Evaluation
2310	Using X-Ray Fluorescence to Assess Soil Subgrade Stabilization Competency During Construction Inspection
2311	In-Stream Structures Integrity and Channel Stability Survey and Evaluation

PREVIOUSLY COMPLETED IMPLEMENTATION PROJECTS

2309	Utilizing Pavem. Friction and Texture Data for the Reduction of Traffic Crashes and Delays
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ENDING TASK ORDERS

2160-20-01	OU Task Order Contract Administrative Support
2160-20-02	Repair Evaluations of Depressed Transverse Cracks in Asphalt Pavements in District 6
2160-20-04	Data Analytics for the Prediction of DBE Expenditures
2160-20-06	I-35/SH-7 Subsurface Investigation
2160-20-07	Further Implementation of ODOT Knowledge Management Framework
2160-20-08	Monitoring of UHPC Connections on Eufaula Spillway Bridge
2160-20-09	Development of a Transportation Workforce Development Program for Oklahoma
2160-21-01	OU Task Order Contract Administrative Support
2160-21-02	Crane Loading on Bridge Abutments During Construction
2160-21-03	Developm. of an Interactive Datab. for Soil for Design of New Pavems. and Rehab. of Existing Pavems. in Oklahoma
2160-21-04	Data Analytics for the Prediction of DBE Expenditures
2160-21-05	Evaluation of High-Performance Thin Overlays for Extended Pavement Life
2160-21-06	Workforce Development: Performance Metrics, and Processes and Procedures Improvement
2160-21-07	ODOT Special Provisions for High-Strength Geotextiles and Geogrids-Phase I
2160-21-09	Development of a DIGGS-Compatible Geotechnical Database From Existing Geotechnical Reports – Phase I
2400-20-01	OSU Task Order Contract Administrative Support
2400-20-07	Civil Engineering Education Outreach: Transportation Infrastructure Activities
2400-20-08	Variation of Shear Wave Velocity Due to Moisture Changes
2400-21-01	OSU Task Order Contract Administrative Support
2400-21-02	Load Testing and Long-Term Monitoring of SH 4 Bridge in Canadian Co.
2400-21-03	On-Demand Support of the ODOT Skid Program
2400-21-05	Analysis of ODOT's Traffic Speed Deflection Device Data for Pavement Structural Evaluation
2400-21-06	I-235 Viaduct Bridge Monitoring System Installation
2400-21-09	Bridge Approach Evaluation and Management
2400-21-10	Civil Engineering Education Outreach: Transportation Infrastructure Activities
2400-21-11	Data Preparation for Implementing Pavement ME Design in Oklahoma

SPR Part 2 Financial Summary Sheet Continued

SPR Part 2 - Research SPRY-0010(088)RS JP# 01946(85)

PREVIOUSLY COMPLETED TASK ORDERS

2160-19-01	OU Task Order Contract Administrative Support
2160-19-02	Extraction, Recovery and PG Grading of AC Binder from Provided HMA/WMA
2160-19-03	Durability of Recycled Aggregate for Use in Aggregate Base Construction
2160-19-04	Investigation of Pavement Distresses in Logan County on SH-74
2160-19-05	Forensic Investigation of Pavement Distresses in Noble County on US-412
2160-19-06	Machine Learning for Transportation Short Course
2160-19-07	Implementgation of ODOT Knowledge Management Framework
2160-19-08	Develpoment of Enhanced Data Mining Capabilities for the ODOT Research Report Database (ODOT-RRD)
2160-20-03	Oklahoma Statewide Bicycle and Pedestrian Plan
2160-20-05	Comparison of Construction Times and Costs Between GRS-IBS and Conventional Bridges in Oklahoma
2400-19-01	OSU Task Order Contract Administrative Support
2400-19-03	ODOT Involvement with the NCAT Test Track and Task Groups
2400-19-04	Ground Tire Rubber (GTR), (dry process), Experiment Pavement Surface Evaluation
2400-19-06	Screening Tools for Considering Grade Separation of Rail-Highway Crossings in Oklahoma
2400-19-08	Sub-mm 3D Laser Imaging for Bridge Deck Surveys
2400-20-02	Development of Construction Specifications for Cold In-Place (CIR) and Cold Central Plant Recycling (CCPR)
2400-20-03	Evaluation of AASHTO T 324
2400-20-04	Instrumentation in End Regions of Prestressed Concrete (PC) Bridge Girders
2400-20-05	Eval. of the Effect. of Surface Appl. Corr. Inhibitors for Trtmt. of Reinf. Concr. Substr. in Poor Cond.
2400-20-06	Verification and Correlation of 0.1mm 3D Safety Sensor

ACTIVE AND PAID POOLED FUND STUDIES

TPF-5(255)	Highway Safety Manual Implementation
TPF-5(313)	Technology Transfer Concrete Consortium
TPF-5(326)	Dev. and Supp. Transp. Perf. Mgmt. Capac. Dev. Needs for State DOTs
TPF-5(335)	Biennial Asset Management Conference and Training 2016-2020
TPF-5(343)	Roadside Safety Research for MASH Implementation
TPF-5(364)	Utilization of Laser Induced Breakdown Spectroscopy (LIBS)
TPF-5(380)	Autonomous Maintenance Tectnology
TPF-5(431)	Appl of Enterprise GIS for Transportation
TPF-5(451)	Road Usagee Charge West
TPF-5(456)	EconWorks - Improved Economic Insight - THE WAIVER IS FOR SPR-A FUNDS ONLY

COMPLETED 2021 POOLED FUND STUDIES

TPF-5(288)	Western Road Usage Charging Consortium
TPF-5(374)	Performance testing at NCAT test Track
TPF-5(375)	MnRoad/NCAT Joint Study
TPF-5(385)	Pavement Structure Evaluation with Traffic Deflection Devices
TPF-5(439)	Technology Exchange on Managing Pavements

1440 Local Technical Assistance Program

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

ACCOMPLISHMENTS DURING FFY 2021: 45 training sessions to 627 individuals for a total of 357 training hours; 4,991 participant hours; 11 Roads Scholars; Annual LTAP Advisory Meeting and developed and conducted new training courses; Training in the FHWA focus areas of Roadway Safety, Worker Safety, Work Zone Safety, Infrastructure Management, and Workforce Development; Maintained the LTAP website; started a Facebook OSU LTAP Page; implemented a texting service to provide information and training directly to phones of constituents; Provided virtual training due to COVID-19; Conducted Every Day Counts (EDC) trainings; Served as chapter headquarters for the American Public Work Association Oklahoma chapter and planned and conducted their annual conference; Coordinated activities with Transportation Research Intern Program (TRIP); Attended various association and professional meetings to include the Association of County Commissioners of Oklahoma (ACCO), County Officers and Deputies Association (CODA), Oklahoma Municipal League (OML), National LTAP Association (NLTAPA); Provided progress reports to ODOT and FHWA.

PROPOSED ACTIVITIES FOR FFY 2022: Planning for Equipment Rodeo for 40th Anniversary celebration; Provide more virtual training and recorded training sessions with an emphasis toward bridge issues; Continue to develop activities to facilitate the implementation of EDC Initiatives; Continue the Roads Scholar curriculum in conducting at least two of each course offering during the fiscal year; Participate in ACCO, CODA, OML, NLTAPA and LTAP Region VI meetings; Continue to teach and develop courses in the FHWA focus areas; Continue to serve as the state office of the Oklahoma Chapter of APWA; Continue assisting agencies through the TRIP; Serve on various local and national committees; Provide technical assistance as requested; Continue to provide website, newsletter, books, plans, 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 2021	\$268,564	SPR	\$79,318	STATE	\$150,000	FHWA
Estimated Cost FFY 2021	\$268,655	SPR	\$79,335	STATE	\$150,000	FHWA
Projected Cost FFY 2022	\$268,740	SPR	\$79,142	STATE	\$150,000	FHWA

CONTACT INFORMATION: Bryan Cooper: Transportation Manager, 405-305-1963

2100 Transportation Research Board (TRB) Participation

PURPOSE AND SCOPE: This item covers employee time travel expenses and time for ODOT ORI personnel to attend the annual TRB meeting to advance technical development of topics and issues required to support the Office of Research and Implementation's work program. Many TRB related activities are either fully covered or discounted as a result of being a TRB Sponsor (see list below). This SPR item may also be used for expenses not covered by TRB, such as employee time, travel to and registrations and/or discounted registrations for TRB related annual technical committee conferences and workshops. This item's funds may not be used for what is already covered in the sponsorship (see list).

Some Major Benefits of Being a \$75,500+ Sponsor of TRB's Core Programs:

- Unlimited registrations to the TRB Annual Meeting for all Sponsor ODOT employees.
- Meeting facilities and an exhibit booth at the Annual Meeting (based on availability).
- Sponsors are represented on the TRB Executive Committee.
- TRB maintains standing committees in subject areas of interest to Sponsors.
- TRB standing technical committees currently sponsor or co-sponsor 25-30 conferences and more than 100 workshops annually on a wide range of subjects. Sponsor employees are eligible for discounted registration fees for many of these conferences.
- Sponsor employees are eligible for free registration for TRB sponsored webinars on a wide range of transportation topics.
- TRB operates a staff Field Visit Program to facilitate the exchange of relevant information and increased participation of our Sponsors on committees and programs of NAS/TRB. TRB will schedule visits with Sponsors and establish liaison representatives as appropriate. A summary of the results of these visits is printed annually in the TR News - which is distributed to around 10,000 subscribers, including Sponsors.

More TRB sponsorship benefits (covered resources) can be found under SPR Item 2161

ACCOMPLISHMENTS DURING FFY 2021: Two (2) ORI staff members attended the 2021 virtual annual TRB meeting in January.

PROPOSED ACTIVITIES FOR FFY 2022: A request will be made for up to three (3) ORI staff members to attend the 2022 annual TRB meeting. Other requests may be made for other TRB committee meetings, webinars and workshops. There may be a return to in-person meetings.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$20,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$3,500	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$20,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Ron Curb, Senior Engineering Manager, 405-420-9163

2105 Peer Exchange

PURPOSE AND SCOPE: This item covers activity related to required peer exchange processes outlined in CFR 420. A state DOT is required to host a peer exchange every 3-5 years for the purpose of gaining knowledge that benefits the processes and outcomes of a research program. The peer exchange participants may include other state DOTs, FHWA, other federal agencies, academia, industry, and local and tribal partners. The requirement may be met by a state DOT that participates fully in the exchange. The number of states that can claim “full participation” is limited to four per event. The host state usually pays for all expense of all participants including travel, lodging, and meals,

ACCOMPLISHMENTS DURING FFY 2021: No peer exchange was held.

PROPOSED ACTIVITIES FOR FFY 2022: No funds needed for FFY22. Oklahoma has participated in two peer exchanges since 2016, one in 2021.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$50,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Ron Curb, Senior Engineering Manager, 405-420-9163

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 Oklahoma Transportation. Maintain working knowledge related to SHRP product implementation, act as general liaison between FHWA and Oklahoma Transportation for product implementation activities.

ACCOMPLISHMENTS DURING FFY 2021: Performed annual site investigations; recorded observations and reported findings; performed inventory of all signs and pavement markings; performed testing with Stantec at US-75, Washington County, US-412, Mayes County, and US-69, Pittsburg County sites.

PROPOSED ACTIVITIES FOR FFY 2022: Perform annual site investigations; record observations and report findings; perform inventory of all signs and pavement markings; obtain; arrange for continued testing and monitoring of current SPS and GPS site locations in Oklahoma for FFY 2022.

NOTE: Oklahoma has ten (10) sites remaining in the study, with one of these test sections falling 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 2021	\$5,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$5,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$5,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Project Manager: Bryan Cooper, Transportation Manager, 405-305-1963

2120 Technical Assistance Special Studies

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

ACCOMPLISHMENTS DURING FFY 2021: Monitored the construction of the new Diverging Diamond project in Elk City with photos, visited and photographed the new proposed Diverging Diamond sites in Edmond and Tulsa County; monitored the GTR project in Canadian County by conducting a condition survey with Crack Mapping, Rutting and IRI survey through OSU's On-Demand Skid Study contract; and produced a Two-Year Condition Report; 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 or services as requested; acquired, calibrated, tested and / or compared new equipment or instruments to existing equipment or instruments where necessary.

PROPOSED ACTIVITIES FOR FFY 2022: Continue to monitor the GTR project in Canadian County through the performance of condition surveys, monitor any new EDC initiative implementations; continue to serve on the OKTIM Coalition; begin serving on the ABC-UTC; continue to monitor any SPR Project field activities; 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 2021	\$25,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$25,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$25,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Project Manager: Bryan Cooper, Transportation Manager, 405-305-1963

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 2021: Developed an innovation communication network across ODOT to centralize information regarding innovation initiatives; provided 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 continued to support the State Innovation Transportation Council (STIC) in coordination with the FHWA as committee and sub-committee members. ORI supported STIC initiatives through this item as noted above. ORI completed the Final Report to satisfy the requirements of the AID grant utilized to construct the Diverging Diamond Interchange in Elk City.

Surveyed and gathered photos and videos of Homegrown Innovations and submitted to FHWA for the EDC-6 Virtual Summit for the Homegrown Innovation Showcase.

PROPOSED ACTIVITIES FOR FFY 2022: Continue to monitor the implementation of new Diverging Diamond Projects in Oklahoma, along with any other EDC implementation and report progress to the STIC; Continue support for CAV efforts and Unmanned Aerial Systems in Traffic Collision Investigation; support and monitor a demonstration of Fiber Reinforced Asphalt Concrete project using Aramid fibers; Support and monitor a bridge deck cure and seal project; support and monitor the use of an innovative piece of equipment that will test the concrete water/cement ratio at a project site or in the lab. Develop and implement a website and produce and present webinars that will highlight EDC efforts in Oklahoma. Monitor any new STIC Incentive and AID Demonstration Projects that are awarded through the STIC Network in the new FY. Continue to serve on the STIC Standing Committee on Special Initiatives (SCSI).

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$25,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$25,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$25,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Project Manager: Teresa Stephens, Research Engineer, 405-415-5825

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 2021: Solicited for new research ideas for possible FFY 2022 research project funding; generated and posted FFY 2022 RFP's; generated FFY 2022 research/implementation project contracts and modifications; organized initiation and final project meetings; coordinated and assembled research implementation task forces and committees; facilitated project implementation plans and direction; continued to perform technical review of final research project reports for required formatting and ADA compliance; prepared Part 2 of the FFY 2022 SPR Work Program.

PROPOSED ACTIVITIES FOR FFY 2022: Solicit for new research ideas for possible FFY 2023 research project funding; generate and post FFY 2023 RFP's; generate FFY 2023 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 2023 SPR Work Program.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$225,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$225,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$198,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

SPR2 Program Administrator: Bryan Hurst, bhurst@odot.org

**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 2021: Delivered Annual Pesticide Applicator Certified Training and Continuing Education Applicator Workshops for ODOT field divisions, utilizing a virtual meeting format due to the Covid-19 pandemic. 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; provided monthly reports; prepared and submitted FFY 2019 annual reports; FFY 2020 annual reports submissions are pending; FFY 2021 annual report submissions are pending.

PROPOSED ACTIVITIES FOR FFY 2022: 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; provide monthly reports; prepare and submit FFY 2022 annual reports.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$151,540	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$150,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$250,000	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, 405-420-2596

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 2021: 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; continued evaluation of select roadside areas containing natural milkweed populations for monarch butterfly utility; provided monthly reports; prepared and submitted FFY 2020 annual reports; FFY 2021 annual report submissions are pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$70,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$68,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	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, 405-420-2596

**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 2021: Continued to support SPTC UTC activities; continued task order contracting mechanism building on FFY 2020 program and further defining processes, procedures and needs for a sustainable UTC.

Completed support to FFY2020 Task Order program addressing short-term research needs and initiated new task orders under the FFY program.

PROPOSED ACTIVITIES FOR FFY 2022: Continue supporting SPTC UTC activities. Continue task order contracting mechanism building on FFY 2021 program and further defining processes, procedures and needs for a sustainable UTC.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$500,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$500,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$500,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

OU Contact: Musharraf Zaman, The University of Oklahoma, 405-401-3096

Task Order Program Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2160-20-01

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 2021: This task order received an approved No Cost Extension through September 30, 2021. Final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Musharraf Zaman, The University of Oklahoma, 405-401-3096

ODOT Sponsor / Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2160-20-02

Repair Evaluations of Depressed Transverse Cracks in Asphalt Pavements in Division 6

PURPOSE AND SCOPE: US-270 in Harper county in Division 6 has experienced severe transverse cracking. Recent field measurements (ODOT Task Order 2160-18-07) indicate cracks of up to four-inch width at some locations in the asphalt pavement. A number of repair options including Polypatch have been previously used by Division 6, however, these have not performed well over time. Therefore, finding and evaluating a cost-effective and durable repair method or methods is important to ensure freight flow and safety of travelling public and goods. Based on the findings of the Task Order 2160-18-07, a new repair method using Fibrecrete was recommended for US-270. Fibrecrete has been used by other state DOT's with success. Based on input from Division 6 staff, another repair method using hot-mix asphalt (HMA) will be investigated as well.

The purpose of this Task Order is to evaluate the effectiveness of these two repair methods, namely (1) trenching and patching using Fibrecrete and (2) trenching and patching using HMA for transverse cracks observed in US-270. Performance of these repair methods will be investigated periodically using falling weight deflectometer (FWD), ground penetrating radar (GPR) and PaveVision 3D. An evaluation of the "do no repair or do nothing" scenario will help document the improvement of the proposed repair methods.

ACCOMPLISHMENTS DURING FFY 2021: Performed Evaluation No.3 of the repaired sections; analyzed GPR, Straightedge, and FWD data; provided monthly reports. This task order received an approved No Cost Extension through August 31, 2021. Final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Musharraf Zaman, The University of Oklahoma, 405-401-3096

ODOT Sponsor: Ron McDaniel, ODOT District 6 Engineer, 580-735-2561

Task Order Manager: Bryan Cooper, Transportation Manager, 405-305-1963

2160-20-03

Oklahoma Statewide Bicycle and Pedestrian Plan

PURPOSE AND SCOPE: The State of Oklahoma does not currently have a comprehensive plan guiding bicycle and pedestrian facility implementation for cities and communities across the state. Therefore, there is a need to research best practices and how a plan such as this would be initiated. This project will focus on a comprehensive review of statewide and national efforts/plans pertaining to existing bicycle and pedestrian facilities. Desired benefits of ODOT include delivery of guidance and an informed framework that is built upon best practices for creation and implementation of statewide plans from other DOTs and organizations.

ACCOMPLISHMENTS DURING FFY 2021: Submitted final report.

PROPOSED ACTIVITIES FOR FFY 2022: End of task order.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor: Shelby Templin, ODOT Active Transportation Coordinator, 405-521-2694

Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2160-20-04

Data Analytics for the Prediction of DBE Expenditures

PURPOSE AND SCOPE: The Oklahoma Department of Transportation (ODOT) is interested in tracking and predicting Disadvantage Business Enterprise (DBE) expenditures. Awarded contracts include funds allocated to businesses that are DBE certified. These funds fall under either race conscious or neutral. Race conscious expenditures must be met on annual bases. The project is to analyze past contracts, especially expenditure data available at ODOT, to develop a tracking and predictive model to monitor DBE expenditures.

ACCOMPLISHMENTS DURING FFY 2021: A software application (named DBETF) was developed to track and predict DBE expenditures while contracts are progressing. The application implements multiple models that are developed using historical dataset of past contracts to perform the prediction. The models provide insights on worst and best performances expected by each contractor working on active contract. The application also offers many analysis and statistical tools to process expenditures at various levels: contracts, vendor, subcontractors, county, item, etc. The current version of the application is being prepared to directly access the ODOT database to automate the process of data analysis without the need for manual import of data as it is the case in the version. Provided monthly reports. This task order received an approved No Cost Extension through September 30, 2021. Final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor: Jenny Allen, Division Manager, Civil Rights Division, 405-521-3186

Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2160-20-05

Comparison of Construction Times and Costs Between GRS-IBS and Conventional Bridges in Oklahoma

PURPOSE AND SCOPE: Several pilot GRS-IBS projects have recently been constructed in Oklahoma (i.e. since 2014) following FHWA’s multi-year EDC initiatives, and efforts by the Oklahoma Department of Transportation (ODOT) Local Government division and the BIA Office in Anadarko, OK. The PI’s research team has also completed ODOT-sponsored, full-scale laboratory and field studies in which GRS abutments have shown robust structural performance and construction speed at reduced costs. Meanwhile, ODOT is currently working on the design and construction of 25-30 GRS-IBS projects in Grant County, which is a significant advancement in the use of GRS-IBS to replace structurally deficient and functionally obsolete bridges in Oklahoma. However, there are currently no direct comparisons available between GRS-IBS and conventional bridges in Oklahoma relative to their construction time, labor requirements and costs that could help stakeholders make better-informed decisions on their choice of bridge for a given set of project constraints and requirements. This task-order is aimed to address this research need to serve as a resource in planning for bridge construction projects on the local and county roads in Oklahoma. A costs and performance data database will be developed to enable various stakeholders including the ODOT Bridge and Local Government divisions, counties and municipalities to compare actual construction times and costs of GRS-IBS with those of comparable conventional bridges in Oklahoma. This database will help stakeholders in their decision on the type, size and number of bridges they need to plan for in future reconstruction and replacement projects within their budgetary and construction time constraints.

ACCOMPLISHMENTS DURING FFY 2021: Developed a database of construction times, costs and performance-to-date on existing GRS-IBS in Oklahoma; developed a database of construction times, costs and performance-to-date on select conventional bridges comparable to the above GRS-IBS cases relative to their span, traffic, geographical location, and other relevant factors; provided monthly reports; submitted final report.

PROPOSED ACTIVITIES FOR FFY 2022: End of task order.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

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

Task Order Manager: Teresa Stephens, Research Engineer, 405-415-5825

2160-20-06
I-35/SH-7 Subsurface Investigation

PURPOSE AND SCOPE: A section of I-35 beginning at the Carter/Murray county line (Mile Post 45) and extending north to Mile Post 59.5 has experienced longitudinal depression, transverse cracking, and block cracking (Figure 1). Also, longitudinal depressions in the form of rutting near the centerline have been observed on State Highway 7 (SH-7). As a part of a pooled fund study, TPF-5(385): Pavement Structural Evaluation with Traffic Speed Deflection Devices (TSDDs), the pavement conditions of both I-35 and SH-7 sections are being assessed using a TSDD. The TSDD can evaluate pavement condition by measuring near continuous surface deflections at traffic speed. In this Task Order (2160-20-06), subsurface investigations of the entire sections of I-35 and SH-7 noted above will be conducted using a specialized ground penetrating radar, a rapid FWD device, and selective coring and laboratory testing. The goal is to identify distressed locations, identify causes and make data-driven recommendations for future maintenance and surface treatments, as well as repair/reconstruction strategy, for both pavement sections. Ground Penetrating Radar (GPR) is a powerful investigation tool which provides a rapid assessment of pavement subsurface condition. Texas A&M Transportation Institute (TTI) has developed a unique subsurface data collection and processing system using a 1-GHz. The purpose of this Task Order is to generate data on acceptable range of resilient modulus values for commonly available recycled aggregates in Oklahoma through laboratory testing and AASHTO Ware simulations. It is expected that this Task Order will identify the number of revolutions in LA Abrasion test that is representative of the resilient modulus range required for a given level of service life.

ACCOMPLISHMENTS DURING FFY 2021: Collected previously extracted cores from ODOT; conducted subsurface investigations of selected locations on I35 and SH7 using GPR and analyzed results; fast falling eight deflectometer test were conducted along the I35 and SH7 locations; fourteen samples were collected from distressed locations along SH7 and I35 and analyzed; provided monthly reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Musharraf Zaman, The University of Oklahoma, 405-401-3096

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

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

2160-20-07

Further Implementation of ODOT Knowledge Management Framework

PURPOSE AND SCOPE: Knowledge management is the efficient handling of information and resources within an organization. In the transportation field, this can mean preserving and streamlining best practices, enhancing technology transfer, and recording institutional knowledge from experienced professionals. Knowledge management also assists in standardization, improved decision-making, record keeping, maintaining capabilities over time, and speeding up the learning curve of an organization's employees. With these ideas in mind, knowledge management has become a key issue for state DOTs across the country. Several organizations are already attempting to incorporate these practices and create their own "knowledge books" to help streamline processes and aid in knowledge retention and dissemination. ODOT has become increasingly interested in this topic and has an opportunity to become a national leader in this field. Build on the previous task order and continue implementation of the knowledge management framework in the most efficient way possible. Target areas will include the Human Resources Department at ODOT while working towards expanding contacts and liaisons across all other ODOT divisions.

ACCOMPLISHMENTS DURING FFY 2021: Previous work completed under 2160-19-07 and 2160-18-08. This task order's deliverables were: Conducted interviews with ODOT employees who leave and new hires who replace them to identify gaps in knowledge and document in the KM Microsoft Teams website; identified who has critical knowledge in various divisions (for example: Human Resources, Office of Research Services, Bridge Division) at ODOT; conducted interviews with these individuals and documented information in the KM MS Teams website; worked towards establishing a KM liaison network among branches to communicate changes in processes and procedures; fostered a culture of KM by expanding usage of MS Teams among Engineers In Training (EITs); created a draft of a project completion summary (i.e., lessons learned) for use as ODOT projects are closed; worked with advisory and consultation agency Guidehouse to help identify and advance further KM objective; provided monthly reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Michael Molina, Librarian, Okla. Transportation Library, 405-420-1003

ODOT Sponsor / Task Order Manager: Ron Curb, senior Engineering Manager, 405-420-9163

Monitoring of UHPC Connections on Eufaula Spillway Bridge

PURPOSE AND SCOPE: The project is part of implementation of ultra-high-performance concrete during replacement of the Eufaula Spillway Bridge by the U.S. Army Corps of Engineers with ODOT as an interested party. The bridge will be replaced using precast concrete panels with UHPC connections. This will be the first time UHPC is used in this application in Oklahoma. This project will allow an expert from the University of Oklahoma to be on site during UHPC placement, provide input during the process, and monitor performance.

Task 1. Provide input to the contractor and USACE officials during the planning process:

The OU research team will participate in meetings between the USACE and the bridge contractor to provide input on best practices for UHPC formwork, placement, and curing.

Task 2. Instrument the mock-up test joints before placement of UHPC material:

Vibrating wire strain gages will be placed in the mockup joint material and will be connected to a data collector to obtain temperature and shrinkage strain data over time. These data will help assess performance of the joint.

Task 3. Monitor mock-up joint performance:

In addition to internal instrumentation, detailed pictures of the joint will be taken immediately after placement and used as a basis of monitoring performance. The mock-up joint will be reassessed at increments over time to identify potential cracks and locations that may be of concern on the full bridge.

Task 4. Observe UHPC placement:

Dr. Floyd will be present during placement of the UHPC for the mock-up and Dr. Floyd or the graduate student working on the project will be present during placement of the bridge connections. The OU research team will provide input on placement methods, issues that come up during placement, and will inspect joints after casting, if accessible.

Task 5. Conduct compressive strength and material testing of UHPC material:

The OU research team will collect samples from the mockup UHPC batch to test compressive strength. Additional material property tests will be conducted if required.

Task 6. Monthly and final reports:

Monthly progress reports will be prepared and a final report detailing observations made during construction.

ACCOMPLISHMENTS DURING FFY 2021 As of April 30th, 2021: Task 1. 20% Complete; Task 2. 3% Complete; Task 3. 0% Complete; Task 4. 0% Complete; Task 5. 0% Complete; Task 6. 10% Complete. Project scheduled for completion September 30, 2021. Provided monthly reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

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

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

2160-20-09

Development of a Transportation Workforce Development Program for Oklahoma

PURPOSE AND SCOPE: With accelerated retirement from DOTs and rapidly changing technologies, tools and practices, workforce development and outreach are getting an increasing attention of many DOTs, including Oklahoma Department of Transportation (ODOT). Workforce development is an integral part of all University Transportation Centers (UTCs). Since its inception as a Regional UTC, the Southern Plains Transportation Center (SPTC) has pursued impactful workforce development and outreach activities including Transportation Regional Internship Program (TRIP), short courses, seminars, workshops, Transportation Leadership Council, Transportation Leadership Forum, and research assistantships. Many undergraduate and graduate students and professionals working in the transportation sector have benefitted from these activities, including receiving professional development hours (PDHs). The primary goal of this Task Order is to take the workforce development programs to a new level. It is expected that SPTC’s experience and collaborative role will be important to achieving this goal. The actual tasks of this Task Order will be developed in close collaboration with the Office of Research and Implementation (ORI).

ACCOMPLISHMENTS DURING FFY 2021: Identified Workforce Development and Outreach Needs; reviewed UTC Workforce Development Plans and Priorities; selected Workforce Development and Retention Activities; established Framework for Outreach to Identified Groups Toward Workforce Development Needs; provided monthly reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Musharraf Zaman, The University of Oklahoma, 405-401-3096

ODOT Sponsor / Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2160-21-01

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 2021: 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; final report submission is pending.

PROGRAMMED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$40,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$40,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor / Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2160-21-02

Crane Loading on Bridge Abutments During Construction

PURPOSE AND SCOPE: ODOT does not allow cranes on the backfill behind bridge abutments during construction. Yet contractors need to place their cranes on the backfill to set bridge beams. There is concern because it is not clear what impact, if any, the crane loading has on the bridge abutment and wing walls. In this project the impact of crane loading on the backfill, abutments, and wing walls will be studied using numerical modeling of the backfill/abutment system under the loading produced by a crane in various positions atop the backfill.

ACCOMPLISHMENTS DURING FFY 2021: Interviewed contractors, engineers and ODOT personnel to better understand the nature of the problem and concerns; visited bridges under construction to observe and record cranes in action; conducted laboratory tests to characterize the material properties of backfill materials (CLSM and granular backfill) needed for modeling; conducted finite element (FE) modeling of cranes on bridge abutment backfill to study stresses and deformations in the backfill and abutments/wing walls; provided monthly reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$75,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$74,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

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

Task Order Manager: Wayne Rice, Transportation Manager, jrice@odot.org

2160-21-03

Development of an Interactive Database for Soil for Design of New Pavements and Rehabilitation of Existing Pavements in Oklahoma

PURPOSE AND SCOPE: Geotechnical data have been collected by ODOT as part of many construction projects involving bridges, pavements, and embankments. Soil properties data in these reports can be a great resource for pavement design, if they are organized in an interactive and easy to use database. Coupling such a database with GIS will allow pavement designers in retrieving the necessary data efficiently. Also, coupling with a GIS platform makes interpolation of soil properties data from nearby sites easier than currently possible. Interpolated properties are expected to be particularly helpful for short duration projects where geotechnical investigations are not feasible because of time and budgetary constraints. This Task Order seeks to address this gap.

ACCOMPLISHMENTS DURING FFY 2021: Collected soil investigation reports from ODOT, extracted necessary geotechnical properties of soil for pavement design/rehabilitation; developed a GIS-based interactive soil database using the data from Task (2); developed an interactive searching tool to extract soil properties for locations of interest using interpolation; trained ODOT staff to use the database; provided monthly reports which included engineering properties such as soil classification, liquid limit, plastic limit, plasticity index, moisture content, resilient modulus and/or California bearing ratio (CBR), sulfate content and other necessary design values; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$75,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$74,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Musharraf Zaman, The University of Oklahoma, 405-401-3096

ODOT Sponsor: Amanda Warren, Roadway Design, 405-521-2602

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

2160-21-04

Data Analytics for the Prediction of DBE Expenditures

PURPOSE AND SCOPE: The objective of this project is to develop a model to track and predict DBE expenditure to ensure contract and agency goal is met per federal fiscal year. The tracking model will monitor DBE expenditure collectively and per contractor. The model processes information automatically obtained from ODOT directory including proposed projects (construction, repairs, etc.), winning bid vendors, and the bi-monthly progress reports to accurately estimate progress toward meeting the annual race conscious and race neutral goal.

Project activities will consist of five main threads: Interface the DBETF software application with ODOT O-database for automatic DBE expenditure imports, Interface the DBETF to ODOT DBE database to automatically update certified DBE vendor list, enhance visualization and reporting tools, develop tools to early predict contractors failing to meet their target DBE expenditures, and modify or add features per ODOT requests. A Software application, namely DBETF, that will run on an individual PC's to automatically import and process data from an ODOT O-database, incorporating many analysis, forecasting, and reporting tools, will be developed to determine ODOT's current DBE goal attainment and forecast the agency's yearly attainment. It will be featured with the following functionalities: Analysis, Forecasting, and Reporting.

Outline of the functionalities are as follows.

Under Analysis, the functions are as follows:

Selected and total DBE Expenditures> per Prime Vendor, Prime Vendor per Contract, Category, Contract Type, County, County on Map, District/Division, Contract, Contract per Items.

Stats Type:

Based on DBE Expenditure> Top Prime Vendor, Top Subcontractor, Top Contract Type, Top County, Top Division, Top Contract, Top Item, and Top Category Based on Frequency in Contracts, and DBE Item Expenditure Histogram

DBE Vendor Type:

Distribution per State, Distribution per Ok. County, as Prime Vendor, per County, per Prime Contractor

Under Forecasting DBE Payments, the functions are as follows:

Confidence Analysis, Error Analysis, Contract Forecast - per Contract, Contractor Forecast - All, Pay Item Forecast per contract.

Under Reports, the functions are as follows:

Reports per contractor, per DBE vendor, per item.

ACCOMPLISHMENTS DURING FFY 2021: Meetings held to discuss revisions. Task approved March 11, 2021. Project scheduled for completion September 30, 2021. Final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$66,426	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$66,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor / Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

Evaluation of High-Performance Thin Overlays for Extended Pavement Life**PURPOSE AND SCOPE:**

The purpose of this Task Order is to evaluate field performance of two high performing thin overlays with two different surface conditions. The selected mixes may be an S5 or an S6 mix and a TOM-C mix. One surface condition will involve micro-milling while the other will not involve any milling. A layer thickness of 1.25-in. for the S5 mix or 1-in. for the S6 mix may be used. The second mix may be an optimized TOM-C mix with 1-in. layer thickness. An optimized balanced mix design (BMD) with focus on cracking and rutting performance will be used in designing these mixes. Quadrant plots, similar to Figure 1, will be used to identify mixes with optimized performance. Similar to other balanced mix designs, some variance from standard Superpave mix type S5 or S6 may be needed to satisfy all required criteria. It typically involves increasing the binder content to achieve mid-point in quadrant plots. ODOT's rich intermediate layer (RIL) mixes are designed using a similar concept. Also, field performance will be monitored and compared. In addition, life cycle cost analysis will be performed to evaluate cost-benefit aspects.

ACCOMPLISHMENTS DURING FFY 2021: A Zoom Kick-Off meeting was held on April 16, 2021. It was decided the pavement thickness would be 1.25" and a PG 70-28 binder would be used. It was decided that the project location would be on SH-99 in Seminole County. Three project specific draft Special Provisions were developed and submitted to ODOT. These are: Micro-Milling Pavement, Balanced Mix Design (BMD) Requirements, and BMD Type B1, being the TOM-C Mix Specifications; provided monthly reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: Produce lab mixes to compare with plant produced field mixes; OU will monitor the construction of 4 test sections; collect mix samples at test sections during construction and evaluate in the Broce Laboratory at OU; Monitor and test the performance of test sections in the field; Perform Life Cycle Cost Analysis for both high performance thin overlays with no milling and micro milling surface conditions; provide monthly reports; prepare and submit final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$75,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$74,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Kenneth Hobson, Oklahoma University, 405-323-5669

ODOT Sponsor: Ron Brown, ODOT District 3 Engineer, 580-332-1526

Task Order Manager: Teresa Stephens, Research Engineer, 405-415-5825

2160-21-06

Workforce Development: Performance Metrics, and Processes and Procedures Improvement

PURPOSE AND SCOPE: During workforce development meetings between ODOT and The University of Oklahoma, specific needs have been identified that, if addressed, could streamline and enhance ODOT employees' engagement, efficiency, and retention. These include improving existing performance metrics for ODOT employees, as well as incorporating knowledge management best practices to identify/document up-to-date processes and procedures for critical operational functions. The PI will contract with a consultant who will a) make recommendations for improvements to performance metrics and b) develop a strategy and begin identifying and documenting critical processes and procedures for ODOT employees.

ACCOMPLISHMENTS DURING FFY 2021: New task order April, 2021.

Delivered a literature review on similar initiatives in other states, including transportation agencies; the librarian and consultant formed a team with ODOT representatives, (e.g., Human Resources, Office of Research) and developed/implemented a strategy to complete task order objectives; the task order team reviewed current job descriptions and performance evaluations, and then prepared recommendations for timely and needed updates to employee performance metrics for ODOT employees; the task order team implemented knowledge management best practices and drafted a documentation system guidebook and strategic plan for recording up-to-date processes and procedures; the task order team recommended a digital repository for documenting up-to-date processes and procedures, performance metrics, and performance evaluations; provided monthly reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$75,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$74,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Musharraf Zaman, The University of Oklahoma, 405-401-3096

ODOT Sponsor / Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2160-21-07

ODOT Special Provisions for High-Strength Geotextiles and Geogrids–Phase I

PURPOSE AND SCOPE: The purpose of this project is to develop a Special Provision to establish an Approved Products List within the Materials Division to accommodate the use of the products in the interim. Testing of these various products will eventually lead to a Standard Specification.

ACCOMPLISHMENTS DURING FFY 2021: Identified a select group of high-strength products suitable for reinforcement application in ODOT projects; obtained samples for testing; conducted tensile strength tests to compare properties in machine and cross-machine directions; compared test data with corresponding data sheets from manufacturers and the AASHTO M288-17 requirements; provided monthly reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$47,221	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$46,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Kianoosh Hatami, The University of Oklahoma, 405-325-3674

ODOT Sponsor: Matt Romero, ODOT Materials Division Engineer, 405-436-0028

Task Order Manager: Bryan Cooper, Transportation Manager, 405-305-1963

2160-21-09

Development of a DIGGS-Compatible Geotechnical Database From Existing Geotechnical Reports – Phase I

PURPOSE AND SCOPE: The Oklahoma Department of Transportation (ODOT) has been collecting geotechnical data for many years as part of the construction projects undertaken by the agency. The Geotechnical Engineering Branch, Bridge Division, and Roadway Division together possess 50 or more years' worth of geotechnical data. Accessing these data for the purpose of design, analysis, and reporting is time-consuming and difficult because currently they are stored as hard copies, scanned images and digital files (.pdf). Geotechnical properties contained in these reports can be a great resource if they are organized in an easily accessible database. With advances in computing capabilities and software, tools are now available that can help with the data collection, archiving, and map-based retrieval/reporting. Several state DOTs are converting their geotechnical reports into Data Interchange for Geotechnical and Geoenvironmental Specialists (DIGGS) format, which utilizes an Extensible Markup Language (XML) structure and labeling convention with elements of Geography Markup Language (GML). Conversion of existing hard copies and PDF reports to DIGGS format will help access, analyze, filter, and report geotechnical information efficiently both time and effort wise. Also, it will help plot and visualize data using web-based GIS tools. Additionally, the proposed database will reduce the need for new soil borings and help save taxpayers' money.

ACCOMPLISHMENTS DURING FFY 2021: (1) Collect geotechnical reports from ODOT; (2) Develop a standard excel template for geotechnical properties of soil that can be converted to DIGGS; (3) Extract geotechnical information from the collected reports in excel format and develop a geotechnical information database; (4) Convert excel database into XML database; (5) Verify the compatibility of the XML database for DIGGS; (6) Integrate DIGGS XML database with ODOT GIS system; (5) Train ODOT staff to use the DIGGS XML database.

PROPOSED ACTIVITIES FOR FFY 2022: Phase II (two) to be covered by task order 2160-22-03.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$46,350	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$46,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Syed Ashik Ali, The University of Oklahoma, 405-325-5911

ODOT Sponsor: Scott Garland, ODOT Geotechnical Branch Manager

Task Order Manager: Teresa Stephens, Research Engineer, 405-415-5825

2160-22-01

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 2021: New task order.

PROPOSED ACTIVITIES FOR FFY 2022: Maintain oversight of all approved OU task orders in monitoring schedules and budgets; assist PI's and ORI as needed to maintain project scope; assist ORI as requested with specific projects; work with PI's to develop new requests; develop initiatives for task order requests toward developing a sustainable program for future University Transportation Center proposals; prepare and submit final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$40,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Musharraf Zaman, The University of Oklahoma, 405-401-3096

ODOT Sponsor / Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2160-22-02

Feasibility of Blast Furnace Slag for Stabilizing Sulfate Bearing Soil

PURPOSE AND SCOPE: Blast Furnace Slag by itself or when mixed with Portland cement can improve the strength of sulfate-bearing clay soils without unacceptable swelling behavior. Currently there are no chemicals listed on the OHD L-50 stabilization chart that can be safely used for stabilizing sulfate bearing fine grained soils due to the potential for inducing unwanted swelling behavior. This study will systematically evaluate the feasibility of BFS alone and mixed with other material, as a stabilizer for clayey soil sulfate bearing soil.

ACCOMPLISHMENTS DURING FFY 2021: New task order.

PROGRAMMED ACTIVITIES FOR FFY 2022: The following activities will occur to this study. during FY22 relating to this study. After a literature review the primary work will involve testing the unconfined compression strength and swelling behavior of the gypsiferous clay soil mixed with varying concentrations of BFS alone and with supplemental additives. Two manufactured soils will be used in this study including a moderately and highly plastic soil. The study will include conducting basic index, physical and chemical property tests on the tested soil and stabilizing chemicals. Laboratory data demonstrating whether BFS is a feasible material for stabilizing sulfate bearing soils will be provided. Monthly progress reports will also be provided.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$75,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor: Ron Curb, Senior Engineering Manager, 405-420-9163

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

2160-22-03

Development of a DIGGS-Compatible Geotechnical Database from Existing Geotechnical Reports

PURPOSE AND SCOPE: The Geotechnical Engineering Branch, Bridge Division, and Roadway Division together possess 50 or more years' worth of geotechnical data. Accessing these data for the purpose of design, analysis, and reporting is time-consuming and difficult because currently they are stored as hard copies, scanned images and digital files (.pdf). Geotechnical properties contained in these reports can be a great resource if they are organized in an easily accessible database. With advances in computing capabilities and software, tools are now available that can help with the data collection, archiving, and map-based retrieval/reporting. Several state DOTs are converting their geotechnical reports into Data Interchange for Geotechnical and Geoenvironmental Specialists (DIGGS) format, which utilizes an Extensible Markup Language (XML) structure and labeling convention with elements of Geography Markup Language (GML). Conversion of existing hard copies and PDF reports to DIGGS format will help access, analyze, filter, and report geotechnical information efficiently both time and effort wise. Also, it will help plot and visualize data using web-based GIS tools. Additionally, the proposed database will reduce the need for new soil borings and help save taxpayers money.

ACCOMPLISHMENTS DURING FFY 2021: New task order.

PROGRAMMED ACTIVITIES FOR FFY 2022: The following tasks will be performed: (1) Collect geotechnical reports from ODOT; (2) Develop a standard excel template for geotechnical properties of soil that can be converted to DIGGS; (3) Extract geotechnical information from the collected reports in excel format and develop a geotechnical information database; (4) Convert excel database into XML database; (5) Verify the compatibility of the XML database for DIGGS; (6) Integrate DIGGS XML database with ODOT GIS system; (5) Train ODOT staff to use the DIGGS XML database, and (6) Prepare monthly progress reports and a final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$28,650	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Syed Ali, The University of Oklahoma, 405-325-4253

ODOT Sponsor: Scott Garland, ODOT Geotechnical Branch Manager, 405-522-4998

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

ODOT Social Network Analysis Toward Critical Process and Procedure Identification and Improvement

PURPOSE AND SCOPE: Since 2018, the Oklahoma Department of Transportation (ODOT) and the Oklahoma Transportation Library (OTL) have been working on developing and implementing a knowledge management (KM) project to increase KM practices agency wide. The project has developed information gathering techniques and drafts of new forms, as well as a sample KM platform to store knowledge using MS Teams. The next stage will involve an organization-wide social network analysis, mapping departments and creating a sociogram network map documenting the flow of information. The resulting network map will identify where key subject matter experts/gatekeepers and knowledge repositories are located to increase efficiency, accessibility, and reuse of information. Additionally, the social network analysis will identify critical processes and procedures, IDing and interviewing division heads, and recording the difference between processes that should happen compared to what processes actually occur.

Conducting a social network analysis documenting accurate flow of information will help identify key holders/repositories of knowledge and information across the agency. This group can be implemented into the KM liaison network developed during the last task order to increase efficiency in flow and accessibility of information. Interviewing division heads will also lead to improved clarity on what processes and procedures are being performed and which should be documented as part of ODOT organizational knowledge.

ACCOMPLISHMENTS DURING FFY 2021: New task order.

PROGRAMMED ACTIVITIES FOR FFY 2022: The PI will contract with a KM consultant to research and implement the project deliverables.

1. Conduct a social network analysis of ODOT to map the flow of knowledge and information.
2. Interview division heads to identify critical processes and procedures and compare recommended procedures with actual procedures.
3. Build on KM liaison networks created in previous task orders to facilitate knowledge sharing.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$75,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor, April Meadows, HR Programs Manager 405-706-2534

Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

Knowledge Management Awareness and Information Storage/Retrieval

PURPOSE AND SCOPE: Since 2018, the Oklahoma Department of Transportation (ODOT) and the Oklahoma Transportation Library (OTL) have been working on developing and implementing a knowledge management (KM) project to increase KM practices agency wide. The project has developed information gathering techniques and drafts of new forms, as well as a sample KM platform to store knowledge using MS Teams. The next stage will involve conducting a concerted awareness campaign to inform ODOT employees, agency-wide, of KM best-practices to increase efficiency, as well as continuing to survey employees on their ideal method for accessing and using critical information. Specifically, if they are wanting to find information, what methods and repositories do they prefer and currently use? Results from this survey will be used to refine the selection process of a technology platform that can deliver information employees need and meet Guidehouse recommendations to establish “process and performance enterprise-side process documentation catalog, standards, and repository.

A concerted KM awareness campaign will inform ODOT employees of KM best practices, helping them increase operational efficiency. Drafting a survey and recommending a content storage and accessibility platform will also assist in cost savings, reducing the time it takes for employees to locate information.

ACCOMPLISHMENTS DURING FFY 2021: New task order.

PROGRAMMED ACTIVITIES FOR FFY 2022: The PI will contract with a KM consultant to research and implement the project deliverables.

1. Draft a KM awareness campaign to inform ODOT employees about KM best practices, in concert with the ongoing modernization plan.
2. Draft a survey of how employees find information, and what their ideal method would be for accessing task-critical information.
3. Research and recommend an organization-wide KM delivery system to facilitate knowledge storage and retrieval.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$75,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor, April Meadows, HR Programs Manager 405-706-2534

Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2160-22-06

Effect of Compaction During Construction on Stiffness and Drainage Characteristics of Recycled Aggregate Base

PURPOSE AND SCOPE: Use of recycled aggregates in pavement construction is getting increased attention due to cost saving, conservation of natural resources, and environmental benefits. In a recent Task Order (2160-19-03), durability of two recycled aggregates and one commonly used virgin aggregate were investigated through laboratory testing and simulations using the AASHTOWare Pavement ME software. In this complementary Task Order, effect of gradation changes due to construction of aggregate base using recycled aggregates will be investigated with respect to corresponding changes in M_R and hydraulic conductivity. Also, changes in index properties pertaining to shape and texture will be investigated. Use of recycled aggregates from an actual construction site will validate findings of Task Order 2160-19-03 and generate useful data toward developing specifications for recycled aggregates.

ACCOMPLISHMENTS DURING FFY 2021: New task order.

PROGRAMMED ACTIVITIES FOR FFY 2022: : (1) Targeted literature review on state DOT specs on recycled aggregates; (2) Collect recycled aggregates from uncompacted (either from the stockpile or the transporting truck) and compacted aggregate base from the site for laboratory testing; (3) Collect field density data as a function of roller passes; (4) Determine changes in gradation between uncompacted and compacted aggregates; (5) Conduct LA Abrasion testing on uncompacted aggregates with varying number of cycles and determine the number of cycles corresponding to the changes in gradation due to construction; (6) Determine the corresponding changes in index properties related to shape and texture; (7) Conduct M_R testing and determine changes in M_R values due to construction; (8) Conduct permeability test on compacted specimens reflecting field densities and determine corresponding changes in hydraulic conductivity; (9) Compile data along with specs used by other state DOTs for possible spec for recycled aggregate; (10) Submit monthly progress reports and a final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$75,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor: Ben Rojas, ODOT Aggregates Branch Manager, 405-522-4987

Task Order Manager: Wayne Rice, Transportation Manager, jrice@odot.org

2160-22-08

Evaluating the Impact of Various Asphalt Rejuvenating Agents on the Performance of Asphalt Binders

PURPOSE AND SCOPE: The use of stiff binders from reclaimed asphalt pavement (RAP) in an asphalt mix can cause premature pavement distresses in the form of fatigue cracking, reflection cracking, low-temperature cracking and accelerated aging. In order to avoid these issues, rejuvenators are often used in asphalt mixes to soften the stiff, oxidized RAP binders. The aim of this Task Order is to evaluate the effect of different rejuvenators on the high and low temperature performance of a commonly used binders. Also, the impact of PAV-aging on the low-temperature performance and Delta Tc (ΔT_c) of rejuvenated binders will be evaluated.

ACCOMPLISHMENTS DURING FFY 2021: New task order.

PROPOSED ACTIVITIES FOR FFY 2022: (1) Select and collect a commonly used asphalt binders from Oklahoma sources. Collect five rejuvenators commonly used. (2) Prepare binder blends by incorporating RAP binder and rejuvenator. (3) Add rejuvenators into binder blends at three different rates. The rates will be decided in consultation with ODOT. (4) Simulate short-term aging on the binder blends using a rolling thin film oven (RTFO) following AASHTO T240. Using a pressure-aging vessel (PAV), perform 20 hours of PAV-aging using AASHTO R28 standard. (5) Evaluate the high-temperature performance grades of the binder blends using AASHTO M320. (6) Conduct bending beam rheometer (BBR) test, following AASHTO T313, on the PAV-aged binders. Determine low-temperature PG and ΔT_c . (7) Evaluate the effect of additive rates on the PG of the binders. Also, investigate the effects of different rejuvenators on the PG of the binder. (8) Identify the effects of extended PAV-aging on the performance of binder blends by comparing ΔT_c values.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$60,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Kenneth Hobson, The University of Oklahoma, 405-325-5911

ODOT Sponsor: Kevin Suitor, ODOT Asphalt Branch Manager, 405-TBD

Task Order Manager: Teresa Stephens, Research Engineer, 405-415-5825

2160-22-09

Title to be determined

PURPOSE AND SCOPE: OU and OSU Joint Project for District 8 Problem Solving. Co-funded with 2400-22-07.

ACCOMPLISHMENTS DURING FFY 2021: New task order

PROPOSED ACTIVITIES FOR FFY 2022: An exploratory meeting was held on August 18, 2021 with District 8 Construction and Maintenance Engineers and OU and OSU Research Offices to discuss complex problems dealing with vegetation management, bridge approach slabs, pavements, and a social issue regarding homelessness; provide monthly reports; prepare and submit final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$60,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor: Trapper Parks, District 8 Maintenance Engineer, 918-838-9933

Task Order Manager: Bryan Cooper, Transportation Manager, 405-305-1963

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.

More Major Benefits of Being a \$75,500+ Sponsor of TRB's Core Programs:

- Nearly unlimited delivery of all TRB hard copy publications (~100 per year).
- Sponsor employees receive full online access to all the Transportation Research Records: Journal of the Transportation Research Board papers published since 1999.
- Sponsor employees are eligible for free access to all collected Annual Meeting PowerPoint presentations, posters, and the Annual Meeting Compendium of Papers.
- Sponsor employees have access to TRB's Library and to TRID, an integrated database of TRB's Transportation Research Information Services (TRIS) Database and International Transport Research Documentation (ITRD) Database. TRID is also indexed with the Transportation Research Thesaurus (TRT) and the Research in Progress (RiP) records.

ACCOMPLISHMENTS DURING FFY 2021: Stored, maintained, and provided access to the collection of transportation materials; refined the OTL collection using donations; continued collection development; performed traditional library services; organized internal and external outreach efforts; shared resources, abided 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; maintained and updated OTL LibGuide and website; coordinated printing, binding and distribution services; cataloged process; conducted literature search related services; drafted ODOT Research Highlighters (summaries); assisted ODOT with accessibility of final research reports; launched new virtual library; submitted monthly reports; FFY 2021 annual report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: Continue to: store, maintain, and provide access to the collection of transportation materials; refine the OTL collection regarding donated items; develop collection; perform traditional library services; 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 library expansion and outreach goals; maintain and update OTL's virtual library, LibGuide and website; coordinate report printing, binding and distribution services; catalogue; conduct literature search related services; draft ODOT Research Highlighters (summaries). Provide occasional accessibility checks of final research reports. Submit monthly reports. Prepare and submit FFY 2022 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$174,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$173,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$175,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Musharraf Zaman, The University of Oklahoma, 405-401-3096

OTL Librarian: Michael Molina, The University of Oklahoma, 405-420-1003

ODOT Sponsor / Project Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

**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 2021: Phase 3 of this study ends on December 31, 2021. Final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	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: Teresa Stephens, Research Engineer, 405-425-5825

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 than 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 2021: (Yr. 3 of 3) Phase 2 of this study ends on September 30, 2021. Attempt to continue field applications of curing methods with new materials introduced to the market; complete the development of new specifications for the mixing, application, and evaluation of novel curing materials; continue to assist contractors in the usage of novel curing materials in the field and evaluation of effectiveness; provide monthly reports; prepare and submit final report.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$95,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$94,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	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, 405-415-5825

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 2021: Submitted final report.

PROPOSED ACTIVITIES FOR FFY 2022: End of project.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	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, 405-415-5825

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 2021: Submitted final report.

PROPOSED ACTIVITIES FOR FFY 2022: End of project.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$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, 405-415-5825

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 2021: Submitted final report. Once software is transferred, a training session is expected to be held with the Pavement Design Team.

PROPOSED ACTIVITIES FOR FFY 2022: End of project.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$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, 405-415-5825

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 2021: (Yr. 4) Due to the COVID-19 pandemic, the University of Missouri has prohibited travel for their staff, thus preventing the PI from completing the lateral load testing. All of the axial load testing has been completed and the PI continued to analyze and interpret the axial load test measurements. This study ends on September 30, 2022. Final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: The remaining tasks for the project include completing lateral load tests for all test shafts at the Minco and Edmond test sites; completing analysis and interpretation of the axial and lateral load tests to establish unit side and tip resistance for all axial tests and p-y model parameters for all lateral tests; performing collective analysis and interpretation of the test results from tests at Minco and Edmond with other collected load tests to evaluate existing design methods, and develop new design methods if appropriate; probabilistically characterize the selected design methods and calibrate resistance factors for use with the selected design methods; and develop the final technical report and proposed design specifications for consideration by ODOT.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$344,245	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$580,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	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, 405-415-5825

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, ChrömX, 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 ChrömX 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 2021: Submitted final report.

PROPOSED ACTIVITIES FOR FFY 2022: End of project.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	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, 405-415-5825

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 2021: Submitted final report.

PROPOSED ACTIVITIES FOR FFY 2022: End of project.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$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, 405-415-5825

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 2021: (Yr. 2 of 3) Continued literature review; identified and collected representative OK construction site soil; obtained CFS with selected sock properties; completed laboratory flume experiments and analyzing of sock properties; began results interpretation and determined subsequent test designs; completed I-235/I-44 field monitoring site setup and field tests/monitoring; planning for outreach workshops; provided monthly reports; submitted FFY 2020 annual report; FFY 2021 annual report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: (Yr. 3 of 3) Complete laboratory flume experiments and analyzing of sock properties; complete results interpretation and determined subsequent test designs; complete laboratory column tests and benchtop methods; complete results evaluation and develop standard test method; complete field tests/monitoring at Midwest City site; develop a cost-benefit analysis; develop CFS design specs for ODOT Standards; develop CFS implementation matrix for ODOT construction; complete outreach Workshops; provide monthly reports; prepare and submit FFY 2022 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$86,645	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$85,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$36,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

Project Sponsor: Siv Sundaram, ODOT Environmental Division Engineer, 405-522-3978

Project Manager: Teresa Stephens, Research Engineer, 405-415-5825

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 2021: (Yr. 2 of 4) – Continued determination of the effectiveness of applying silane to extend existing silane coatings; continued investigation of the performance of unique surface sealers; began collecting samples from different regions and contractors for testing; provided monthly reports; submitted FFY 2020 annual report; FFY 2021 annual report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: (Yr. 3 of 4) – Continue core collection sampling from 40 different bridges in Oklahoma from different regions and contractors and complete a series of laboratory testing; continue investigation on how cracking, change in w/cm, and different depths of penetration impact the performance of silane coatings; continue determination of the effectiveness of applying silane to extend existing silane coatings; continue investigation of the performance of unique surface sealers; provide monthly reports; prepare and submit FFY 2022 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$110,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$109,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$113,000	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, 405-415-5825

2288 Long Term Performance and Benefits of Combined Balanced Mix Design and Chemical WMA Technology

PURPOSE AND SCOPE: Asphalt mix durability has been a serious concern in Oklahoma for a long period of time. To address this and other issues (such as binder source variability, new binder modification materials, and recycled materials), balanced mix design (BMD) approach is being adopted by many state agencies. Different measures and additives have been tried to make the mixes pass rutting, cracking, and moisture damage requirements. One factor which has not been well investigated is chemical warm mix asphalt (WMA) technology when combined with BMD. Compared to hot mix asphalt (HMA), WMA is produced at the temperature of 275 F or lower. Consequently, significant amount of lighter oil component of asphalt binder is kept in the asphalt mix, which is beneficial to asphalt mix durability. However, combining BMD and chemical WMA technology has not been comprehensively evaluated in either laboratory or field. Thus, it is critical to evaluate the long-term performance and benefits of the combined BMD and chemical WMA technology, considering the potential of substantially extended pavement life with such technology.

ACCOMPLISHMENTS FOR FFY 2021: (Yr. 1 of 3) Held kick-off meeting, performed literature review; quantified long-term binder performance and benefits of using chemical WMA technology; provided monthly reports; FFY 2021 annual report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: (Yr. 2 of 3) Continue to quantify long-term engineering properties and benefits of asphalt mixtures produced with BMD and chemical WMA technologies and write a special provision/specification for implementation; provide monthly reports; prepare and submit FFY 2022 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$100,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$99,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$102,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Debakanta (Deb) Mishra, Oklahoma State University, 405-744-3332

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

Project Manager: Bryan Cooper, Transportation Manager: 405-305-1963

2290 Bond Behavior of Epoxy Coated Reinforcement Bars in Non-Proprietary UHPC

PURPOSE AND SCOPE: Develop non-proprietary UHPC mixtures using ODOT specified materials along with comparisons with other non-proprietary UHPC mixtures developed for bridge deck applications. Mixtures will be used to construct pull-out and beam-splice specimens for testing to investigate the effects of bar size and spacing, splice/embedment length, cover, fiber content, compressive strength, and bar coatings, including a new textured coating, on the bond strength between reinforcing bars and non-proprietary UHPC mixtures. A performance-based tension test using a notched specimen will be evaluated to determine applicability for use in design. Test results will be used to develop guidelines for splice design, with special emphasis on using UHPC in closure strips between reinforced concrete members.

ACCOMPLISHMENTS FOR FFY 2021: New project.

PROPOSED ACTIVITIES FOR FFY 2022: Develop non-proprietary UHPC mixtures using ODOT specified materials, establishing performance-based measures; Evaluate UHPC mixtures in modified pull-out or beam-end specimens; and construct and test beam splice specimens; provide monthly reports; prepare and submit annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$119,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

Project Sponsor: Walt Peters, Engineering Manager, 405-521-2606

Project Manager: Teresa Stephens, Research Engineer: 405-415-5825

2291 A Fatigue Assessment Framework for Steel Bridges using Fiber Optic Sensors and Machine Learning

PURPOSE AND SCOPE: The main goal of the proposed research is to develop a machine learning (ML) assisted structural health monitoring (SHM) approach that employs fiber optic sensors (FOS) to enable (a) the assessment of the fatigue life of steel bridge details and (b) the accurate detection of the presence of damage under normal traffic loading conditions. In more detail, the proposed research aims at:

- Constructing a monitoring system based on FOS to enable accurate strain quantification for efficient fatigue assessment and performance evaluation of steel bridge components. The FOS are chosen given their accuracy, low noise level, and durability. The developed monitoring system will be suitable for long-term field application under aggressive environmental conditions.
- Formulating an approach that utilizes data from the FOS for damage detection in steel bridge components. The approach should detect and localize the damage without requiring detailed finite element modeling of the structure or detailed vehicular loading data. These requirements ensure its applicability for automated damage detection for existing bridges without the need for intensive post-processing data analysis.
- Characterizing the effect of key operational parameters on the efficacy of the damage detection algorithm. These include the effect of loading conditions, temperature variations, type of damage, and boundary conditions.

The proposed project will include the design of an instrumentation system for field application and validating its damage detection capabilities using large-scale laboratory testing.

ACCOMPLISHMENTS DURING FFY 2021: New project.

PROPOSED ACTIVITIES FOR FFY 2022: (Yr. 1 of 3) Conduct a literature review; with the help of bridge division of Oklahoma DOT identify the bridge types that represent a large percentage of the structurally deficient steel bridges within the state; conduct a comprehensive analysis on the most critical bridges to identify the structural details that are prone to fatigue failure in these bridges; design a monitoring system with fiber optic sensors (FOS); specimen design, load frame capacity check, and test matrix design for large scale experiments; provide monthly reports; prepare and submit FFY 2022 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$102,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

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

Project Manager: Wayne Rice, Transportation Manager, jrice@odot.org

2292 Innovative Multi-Hazard Resistant Bridge Columns for Accelerated Bridge Construction

PURPOSE AND SCOPE: The Federal Highway Administration (FHWA) and state departments of transportation (DOTs) are actively promoting accelerated bridge construction (ABC) to minimize construction costs and time and to enhance work-zone safety. While several techniques are available to accelerate bridge superstructures, limited techniques are available to accelerate bridge substructures. This proposal focuses on accelerating substructure construction using an innovative multi-hazard resistant bridge column. The column consists of a concrete core sandwiched between an outer fiber-reinforced polymer (FRP) tube and an inner steel tube. Both tubes will act as stay-in-place forms and confine the concrete core. The inner steel tube will be embedded into the footing and will provide flexural and shear reinforcement. The outer FRP tube will protect the concrete and steel materials from corrosion and will provide flexural and shear reinforcement. Both high-strength self-consolidating concrete (SCC) and ultra-high-performance concrete (UHPC) will be investigated for potential use as the concrete core material.

ACCOMPLISHMENTS DURING FFY 2021: New project

PROPOSED ACTIVITIES FOR FFY 2022: (Yr. 1 of 2) Design and construct half-scale HC-FCS columns; test half-scale HC-FCS columns under cyclic lateral load and constant axial load; design and construct small-scale HC-FCS column-footing and column-girder connections; test small-scale HC-FCS column-footing and column-girder connections under cyclic lateral load; perform parametric finite element study of HC-FCS columns; provide monthly reports; prepare and submit FFY 2022 annual report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$102,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Jeffery Volz, Oklahoma University, (405) 301-5922
 Project Sponsor: Walt Peters, ODOT Assist. Bridge Division Engineer, (405) 521-2606
 Project Manager: Gary Hook, Implementation Engineer, (405) 420-2596

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 2021: During 2021 there were 9 implementation project that were in some phase of implementation. Five of the nine studies closed out some time during this time period. Also, during the FY21 timeframe a project was conducted for the removal of the instruments from the Tower Bridge using 2300 money, these instruments were then placed on the I235 Bridge.

PROPOSED ACTIVITIES FOR FFY 2022: Support implementation project modification needs, mid-year research program needs and general implementation project support activity personnel needs. We have developed two new implementation RFPs to post for 2022 activity. We are currently in the process to determine the cost benefit/saving of projects that have been implemented.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$50,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$50,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$100,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

ODOT Sponsor: Ron Curb, Senior Engineering Manager, 405-420-9163

Project Manager: Gary Hook, Implementation Engineer, 405-420-2596

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 regouted 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 regouted 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 2021: (Yr. 5 of 5) Installed the instruments from the Tower Bridge onto the I235 Bridge. Conducted load-test monitoring and inspections; performed annual monitoring of crack patterns and data analysis; provided monthly reports; submitted FFY 2020 annual report; FFY 2021 annual report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: (Yr. 6) This study was awarded a one (1) year, (Year 6), FY22 contract. Complete a non-load testing and compare to initial load tests performed in years 2 and 3; complete 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); complete monitoring of crack patterns and data analysis; complete non-destructive survey to estimate concrete material strength; provide monthly reports; prepare and submit final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$101,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$100,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$86,000	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, 405-420-2596

**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 2021: Submitted final report.

PROPOSED ACTIVITIES FOR FFY 2022: End of project.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	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, 405-420-2596

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 2021: (Yr. 3 of 3) Completed the design and construction of bridges using systems approach; completed monitoring the performance of bridges where new specifications and guidelines are/were implemented; development of a design decision flow chart; submitted FFY 2020 annual report; provided monthly reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$102,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$101,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	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, 405-420-2596

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_{vo}). 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 2021: (Yr. 3 of 3) Dropped site number 3 and added Fears Lab in its place. Continued cone penetration testing; continued supplemental drilling and sampling; completed laboratory testing to determine gravimetric moisture content and suction profile; completed data analysis; completed manual of practice development; provided monthly reports; submitted FFY 2021 annual report; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$102,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$101,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	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, 405-420-2596

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 2021: Submitted final report.

PROPOSED ACTIVITIES FOR FFY 2022: End of project.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	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, 405-420-2596

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 2021: (Yr. 2 of 2) - Refined and optimize sampling and testing PFXRF protocols on stabilized subgrade soils at five construction projects; completed examination of innovative methods for pulverizing samples; completed soil sample collection; completed tests of treated soils and manufactured samples with known additives; began recording of equipment and techniques contractors use for job-specific stabilization and assess effectiveness; began to craft and implement a remediation plan and retest to determine if mixing procedures and outcomes are more acceptable; began investigation of detection accuracy of PFXRF on soil sulfate; completed the implementation of a remediation plan and retest to validate mixing procedures; provided monthly reports; submitted FFY 2020 annual report. This study received an approved No Cost Extension through December 31, 2021. Final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$104,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$103,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	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, 405-420-2596

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 instream structures for protection of transportation infrastructure.

ACCOMPLISHMENTS DURING FFY 2021: (Yr. 2 of 2) - Completed literature review; completed field surveys and assessments though site selection, remote data collection and field evaluations; completed interpretation and analysis of collected data; conducted outreach and demonstration event; completed recommendations for in-stream structures, conducted final outreach and demonstration event; provided monthly reports; submitted FFY 2020 annual report; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$94,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$93,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	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, 405-420-2596

2313 Design and Monitoring of Non-Proprietary UHPC Joints of Precast Elements

PURPOSE AND SCOPE: The purpose of this study is to take the results of the 2276 study entitled “Evaluation of Ultra-High Performance Concrete for Use in Bridge Connections and Repair” and implement and monitor the effects of the UHPC process on various bridge deck joints throughout the state. Deterioration of bridges can often be related to poor performance of longitudinal connections between precast members or transverse deck joints. Ultra-high performance concrete (UHPC) is a cementitious composite with mechanical and durability properties far exceeding those of conventional concrete, which makes it an ideal material for bridge deck joints. UHPC is a relatively expensive material and is most economical when use of a small quantity can have a large impact on overall performance of a structure.

ACCOMPLISHMENTS DURING FFY 2021: (Yr. 1 of 2) Selected various bridge joints for replacement using the UHPC joint process; identified two bridges in Grant County for UHPC joints and performed replacement; provided monthly reports; FFY 2021 annual report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: (Yr. 2 of 2) Provide training to design, construction, and inspection personnel on use of commercial and non-proprietary UHPC; instrument selected bridges during and after construction; monitor bridge performance; document the results of study; provide monthly reports; prepare and submit final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$100,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$99,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$72,000	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: Gary Hook, Implementation Engineer, 405-420-2596

2314 Evaluation and Development of Flood Detection and Prediction System

PURPOSE AND SCOPE: The purpose of this project is to evaluate systems for the rapid detection of flash flooding in problem areas through a weather station platform deployed at an ODOT site and integrate system evaluation in a real-world setting, to develop a prediction model, and to develop a warning system to alert the public of impending flood waters.

ACCOMPLISHMENTS FOR FFY 2021: New project.

PROPOSED ACTIVITIES FOR FFY 2022: (Yr. 1 of 1) Acquire sensors and devices; design and construct a lab testbed flooding emulator; design and install a flood station; establish real-time access to NWS data; generate short and long-term prediction models; evaluate flood prediction accuracy; evaluate the information delivery system; provide monthly reports; prepare and submit final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$99,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Hazem Refai, University of Oklahoma, 405-660-3234

Project Sponsor: Alan Stevenson, Engineering Manager, 405-521-6460

Project Manager: Bryan Cooper, Transportation Manager, 405-305-1963

2315 Adapting ODOT Radar Traffic Monitoring System to Automatically Track Real-Time Traffic Flow

PURPOSE AND SCOPE: The Oklahoma Department of Transportation is in the process of installing 150 radar sites across the State, with most radars deployed on major highways and roadways in the OKC and Tulsa metropolitan areas. The radar units monitor traffic flow and collect information including volume, speed, and vehicle classification. High resolution cameras are installed on the radar and can be configured to take a picture at regular intervals. This project is comprised of three major activities. First is to develop an interface to the radar data to allow real-time sharing of data and pictures with the Intelligent Transportation System group in ODOT Maintenance Division. The system will report speed information as well as pictures. Second is to compare the collected speed data with that obtained from commercial companies. Currently, the State spends large sum of funds to secure annual contract with such companies. Third is to investigate the use of speed data to rapidly detect roadway incidents.

ACCOMPLISHMENTS DURING FFY 2021: New project.

PROPOSED ACTIVITIES FOR FFY 2022: (Yr. 1 of 1) Build an interface to make radar data available to share with okroads.org; assign each radar site to an HPMS and TMC OK National Highway System segments; collect traffic data from HERE, NPMRDS, AVC, Radar Camera's, and Radar systems; compare the four sets of data in terms of speed, vehicle class, and volume; compare NOAA data with radar weather data and camera images of road conditions; provide radar and camera images to OKRoads.org system and investigate the difference among the four sets; evaluate multiple machine learning algorithms to develop a travel time prediction model that uses Radar, and NPMRDS data; develop a website integrating all four data sets; provide monthly reports; prepare and submit final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$93,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Hazem Refai, University of Oklahoma, 405-660-3234

Project Sponsor: Angel Gonzalez, Assistant SAPM Engineer, 405-521-2704

Project Manager: Gary Hook, Implementation Engineer, 405-420-2596

**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 2021: Continued to support SPTC UTC activities; continued task order contracting mechanism building on FFY 2020 program and further defining processes, procedures and needs for a sustainable UTC.

Completed support to FFY2020 Task Order program addressing short-term research needs and initiated new task orders under the FFY program.

PROPOSED ACTIVITIES FOR FFY 2022: Continue supporting SPTC UTC activities. Continue task order contracting mechanism building on FFY 2021 program and further defining processes and needs for a sustainable UTC.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$500,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$500,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$500,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

Task Order Program Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

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 2021: Continued 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. Submitted annual report.

PROPOSED ACTIVITIES FOR FFY 2022: End of task order.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor / Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2400-19-06

Screening Tools for Considering Grade Separation of Rail-Highway Crossings in Oklahoma

PURPOSE AND SCOPE: The Oklahoma Department of Transportation (ODOT) plays a key role in addressing grade crossing safety issues by allocating federal funding through the Railway-Highway Crossing Program. At-grade rail-highway crossings lead to economic losses due to vehicle delays and potential train-vehicle collisions. To consider the need and priorities for grade separation at crossings, data-driven screening methodology and tools are required.

The objective of this task order is to develop a data-driven evaluation process for ODOT to identify, evaluate, and prioritize potential road-rail crossings as candidates for grade separations in the state of Oklahoma.

ACCOMPLISHMENTS DURING FFY 2021: Submitted final report.

PROPOSED ACTIVITIES FOR FFY 2022: End of task order.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor: Jim Hatt, ODOT Rail Programs Division, 405-522-0287

2400-19-08

Sub-mm 3D Laser Imaging for Bridge Deck Surveys

PURPOSE AND SCOPE: Survey the outside lane on approximately 50 mainline bridge decks for a section A Gen 3D laser imaging technology, determine a base line deck condition documenting cracks, spalls, patches, and joint condition. Using survey data, determine skid resistance and potential for hydroplaning. Document change conditions noted in surveys between summer and winter. Using sub-mm 3D laser imaging system collect very-high quality 2D and 3D surface data on the designated ODOT bridges at highway speeds without any traffic control. Develop viewer software that is available to ODOT staff upon project completion with capability to view surface characteristics of bridges decks including cracks, spalls, patches, and joint condition, and associated quantities – percent of deck (lane) with patching, spalls, and total crack lengths in ranges as specified in the ODOT BrM Bridge Inspection Field Manual. Using survey data determine skid numbers and associated hydroplaning risk. If possible, use survey data to determine bridge smoothness data. Research will demonstrate the *feasibility* of using sub-mm 3D laser surveys to (1) survey deck condition states at highway speeds without traffic control documenting cracks, spalls, patches, and joint conditions, (2) develop viewer showing deck condition and associated quantities, (3) determine skid numbers and hydroplaning risk, and (4) evaluate deck smoothness. Provide guidance for deck replacements or overlays.

ACCOMPLISHMENTS DURING FFY 2021: The team completed data collection of bridge decks on I-35 with Pave3D 8K sensors and AMES profile sensor; friction data collection was also completed using the Grip Tester on some of the bridges; data for the 0.5 mm 3D images were analyzed; provided monthly reports; submitted final report.

PROPOSED FOR FFY 2022: End of task order.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

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

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

2400-20-01

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 2021: 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; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor / Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2400-20-02

Development of Construction Specifications for Cold In-Place Recycling (CIR) and Cold Central Plant Recycling (CCPR)

PURPOSE AND SCOPE: CIR is a process that recycles, in-place, the upper three to four inches of an existing asphalt pavement. CIR is an excellent treatment for rehabilitation of cracked pavements with sound bases. CCPR uses a similar process as CIR but use existing stockpiles of RAP to produce an asphalt base layer. Both processes are cost effective, sustainable techniques. Agency specifications and trade association best practice guidelines for CIR and CCPR will be reviewed. A draft special provision/specification will be prepared for review and comments by ODOT. The specification will include equipment, mix design, construction, and QC requirements.

ACCOMPLISHMENTS DURING FFY 2021: Developed a draft special provision/specification and provided to ODOT; final deliverables submitted.

PROPOSED ACTIVITIES FOR FFY 2022: End of task order.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

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

Task Order Manager: Teresa Stephens, Research Engineer, 405-415-5825

2400-20-03
Evaluation of AASHTO T 324

PURPOSE AND SCOPE: ODOT currently has two Hamburg Wheel-Track Tested (HWTT) devices that do not necessarily meet all AASHTO T 324-99 requirements. However, ODOT has an extensive database with HWTT results for commonly used mixes in the state of Oklahoma. Making modifications to the existing equipment (estimated at ~\$20k per device) will not only require significant financial investments, but it will also make any newly generated test data “different” from what is already available in the database. This will create significant challenges as ODOT will not be able to directly compare results for the newly tested mixes to those in the existing database.

ODOT and OSU are collaborating to undertake the current study that will test typical asphalt mixes used in the state of Oklahoma using a new (AASHTO T 324-19 compliant) equipment being procured at Oklahoma State University with the ones currently available in the ODOT labs.

The primary objective of this research effort will be to assess how the recent changes incorporated into the AASHTO T 324 “Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures” specification alters mix performance test results compared to the older method.

ACCOMPLISHMENTS DURING FFY 2021: Final report submitted.

PROPOSED ACTIVITIES FOR FFY 2022: End of task order.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Debakanta Mishra, Oklahoma State University, 405-744-3332

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

Task Order Manager: Teresa Stephens, Research Engineer, 405-415-5825

2400-20-04

Instrumentation in End Regions of Prestressed Concrete (PC) Bridge Girders

PURPOSE AND SCOPE: End regions of prestressed concrete (PC) girders are susceptible to cracking. The cracking of end regions is a problem for many states nationally; in general, the experience in Oklahoma has been better than other states because of the adoption of fully-tensioned top strands and horizontal reinforcing details through the web regions of pretensioned I-shaped girders. In order to address this problem, proposed new standards use a distributed strand pattern and new details for end zone reinforcement including bundled bars.

It is proposed that the effectiveness of new standard details be evaluated through instrumentation and observation on test girders. Under this task order, two Type IV Bridge girders (one exterior and one interior) will be instrumented with strain gages attached to reinforcing steel and other instruments in end regions of the PC girders. It is believed that this will help mitigate the width and number of cracks that occur in end regions.

ACCOMPLISHMENTS DURING FFY 2021: Submitted final report.

PROPOSED ACTIVITIES FOR FFY 2022: End of task order.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	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

Task Order Manager: Teresa Stephens, Research Engineer, 405-415-5825

2400-20-05

Evaluation of the Effectiveness of Surface Applied Corrosion Inhibitors for Treatment of Reinforced Concrete Substructures in Poor Condition

PURPOSE AND SCOPE: Surface applied corrosion inhibitors are a dual-phase process for treating steel reinforced concrete. These products include an organofunctional silane to mitigate moisture ingress into the concrete and a latent-phase corrosion inhibitor to provide protection in cracked concrete and/or other locations where moisture ingress occurs. Patching materials, especially high strength rapid setting materials, tend to shrink resulting in cracks to the new concrete patches potentially compromising the durability of the patch. While the inhibitor products typically do well in the FHWA cracked beam tests, it is questionable whether these products adequately penetrate. Research is needed to determine if there is value in these products for treating concrete in poor condition and how to write more effective specifications.

ACCOMPLISHMENTS DURING FFY 2021: ODOT is using a combined corrosion inhibitor on their bridge substructure repairs to extend the bridge life. Evaluations of the depth penetration of been conducted for the corrosion inhibitor and silane. Specifications for use of combined corrosion inhibitor and silane have been developed. Submitted final report.

PROPOSED ACTIVITIES FOR FFY 2022: End of task order.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

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

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

2400-20-06

Verification and Correlation of 0.1 mm 3D Safety Sensor with Traditional Texture and Friction Devices

PURPOSE AND SCOPE: Determine existing practices across the United States used for pavement safety data collection and benefits of using emerging non-contact/non-water based 3D sensors to collect both texture and friction information. Literature review (TRB, AASHTO, ASTM, FHWA, FAA, and state DOTs) for practices of pavement safety data collection and desired new technologies that can overcome repeatability problems in traditional data collection methods. The new 0.1mm 3D sensor hardware is to be used for correlation and comparison study with traditional texture and friction devices at ODOT (locked-wheel) and OSU (grip-tester, & dynamic friction tester).

ACCOMPLISHMENTS DURING FFY 2021: A literature review of practices, and data analysis of collected pavement surface information based on the OSU 0.1 m 3D sensor(s) and traditional devices from ODOT and OSU was completed. Based on data Deliverables: collected at ODOT test sections, results of design of experiments was included in the report regarding benefits of using non-contact technology and recommended further work on both hardware and software solutions of using the 0.1 mm 3D sensors in Oklahoma. Submitted final report.

PROPOSED ACTIVITIES FOR FFY 2022: End of task order.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor: Angel Gonzalez, Assist. SAPM Engineer, 405-521-2704

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

2400-20-07

Civil Engineering Education Outreach: Transportation Infrastructure Activities

PURPOSE AND SCOPE: This task order requests ODOT funding for a year-long outreach program. The proposed program includes activities aimed at K-12 students, incoming engineering freshmen at Oklahoma State University, as well as practicing professionals. Though targeted toward a wide range of audiences, all of the activities share the purpose of informing the broader public about transportation infrastructure.

ACCOMPLISHMENTS DURING FFY 2021: Conducted OSU Summer Bridge Program for incoming freshmen; conducted Oklahoma Summer Transportation Symposium in coordination with SPTC (OU); provided monthly reports. This task order received a No Cost Extension through September 30, 2021. Final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Robert Emerson, Oklahoma State University, (405) 334-1439

ODOT Sponsor / Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2400-20-08

Variation of Shear Wave Velocity Due to Moisture Changes

PURPOSE AND SCOPE: This study will assess the potential of shear wave velocity data to simulate the climate-related variations in mechanical properties of subgrade soils using SCPTu field equipment owned by Dr. Jim Nevels. The basic parameters to be measured with depth are shear wave velocity and moisture content.

ACCOMPLISHMENTS DURING FFY 2021: A comprehensive literature search and review was conducted; a site on the Oklahoma State University campus was identified for this study; the soils on the north side of the campus were identified as a Kirkland soil series; a new field test site was located at the southeast intersection of I-35 and SH-15; SCPTu equipment was utilized on a frequent basis to obtain shear wave velocities with depth and time; block specimens and/or disturbed samples were obtained from the site for laboratory testing; water content measurements were also obtained for the same field test location; a comprehensive data analysis was conducted for correlations between shear wave velocity and water content (both for wetting and drying cycles); the relationship between the shear wave velocity and water content measurements were evaluated; provided monthly reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Rifat Bulut, Oklahoma State University, 405-744-7436

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

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

2400-21-01

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 2021: Continued 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. Final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$40,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$39,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor / Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2400-21-02

Load Testing and Long-Term Monitoring of SH 4 Bridge in Canadian Co.

PURPOSE AND SCOPE: Two Prestressed Concrete (PC) Bridge girders were instrumented under an FY2020 Work Order. The instrumentation measures concrete temperatures, and concrete and steel strains at both midspan and end regions. Data was collected throughout each Girder's fabrication including casting, curing, de-tensioning, hauling, and erection. We also collected data during the casting of the bridge deck slabs. Monitoring was continued through October 31, 2020 under the previous work order.

This work order will continue monitoring the performance of PC Girders for one year. In addition, load testing will be performed on Spans 9 and 14. The instruments already installed provide real-time and unprecedented strain data and temperature data. Also, deformations can be measured under truck loading. The instrumentation provides data at both midspan (for critical flexural performance) and at End Regions (critical shear performance). Additionally, the work order will purchase and install LVDT's for the load tests, and accelerometers to provide vibration data, short and long-term deflections, and bridge condition assessment data.

ACCOMPLISHMENTS DURING FFY 2021: Performed structural health monitoring for a period of twelve months. Added to the instrumentation package accelerometers to enable the measurement of vibrations and impact. Assessed the Impact Factor, IM, that is required in design. Performed static load testing of Spans 9 and 14 on the SH4 Bridge. Measured and recorded stresses, strains, and deformations. Compared results to current design methods, and assessed the load rating of PC beams in flexure and shear. Evaluated the distribution factor for PC girders as required by LRFD Bridge Specifications. Provided monthly reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$76,404	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$75,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

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

Task Order Manager: Wayne Rice, Transportation Manager, jrice@odot.org

2400-21-03

On-Demand Support of the ODOT Skid Program

PURPOSE AND SCOPE: Perform on-demand services for the ODOT skid program, the base cost is estimated to be \$5,000 per on-demand service per daily trip. For the most of in state work, a daily trip should be adequate to finish the work. If the data collection of one service requires multiple days, PI should report to ODOT in advance. For each additional workday, the extra cost is estimated to be \$2,500, plus lodging and per diem for the testing crews.

ACCOMPLISHMENTS DURING FFY 2021: Numerous skid tests were performed during 2021 which were provided on a flash drive; prepared a data analysis summary report for each test that included surface texture and roadway geometry data analysis; a summary of each service trip will be provided to SAPM; provided monthly reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$40,018	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$40,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor: Angel Gonzalez, SAPM Asst Division Engr, 405-522-2704

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

Analysis of ODOT's Traffic Speed Deflection Device Data for Pavement Structural Evaluation

PURPOSE AND SCOPE: Traffic Speed Deflection Devices (TSDDs) that measure surface deflection at traffic speeds have recently gained a significant popularity among pavement researchers/engineers as well as state highway agencies. TSDDs, provide a rapid and continuous “picture” of the pavement condition, thereby, significantly enhancing the amount of information available related to the pavement condition as compared to FWDs. This project will analyze the TSDD data being collected by ODOT as part of Transportation Pooled Fund Project TPF-5(385) and identify different approaches to integrate the data into ODOT’s pavement management decisions.

ACCOMPLISHMENTS DURING FFY 2021: Performed analysis on TSDD data collected by ODOT under the FHEA Pooled Fund Study TPF-5(385), “Pavement Structural Evaluation with Traffic Speed Deflection Devices; reviewed datasets in discussions with Mr. Angel Gonzalez of ODOT; back calculated individual pavement layer modulus values from TSSD data using pavement layer thickness data obtained from ODOT records; used (GPR) data obtained from a predefined section of I-35 in conjunction with TSDD data to illustrate how GPR and TSDD data can be used together for in-depth structural evaluation at a network level; a power point slide set summarizing the project findings was delivered; conducted a presentation showing the benefits of TSDD data analysis for pavement condition evaluation; provided monthly reports; final report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$39,852	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$39,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Deb Mishra, Oklahoma State University, 405-744-6328

ODOT Sponsor: Angel Gonzalez, SAPM Asst Division Engr, 405-522-2704

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

2400-21-06

I-235 Viaduct OKC Bridge Monitoring System Installation

General

PURPOSE AND SCOPE: This task will involve taking the instrumentation from the Tower bridge and installing it on the I-235 SB bridge over 23rd St. and RR (NBI 22426). Installation will involve the following items:

- •One (1) LifeSpan controller with twenty-four (24) sensor slots.
- •One (1) surge protector/battery back-up power supply system.
- •Twelve (12) LifeSpan TA sensors, and three (3) temperature sensors.

Additionally, the installation will require access provided by OSU, labor needed to install the instrumentation supplied by White Electrical, and cables to hook up the instrumentation. The instrumentation will be used to collect data at critical locations for approximately one year and to collect data on the load test planned for late Spring. It should be noted that the removal of the instruments from the Tower bridge will be done by White Electric and funded through 2300 funds.

ACCOMPLISHMENTS DURING FFY 2021: All instruments were removed from the Tower Bridge and installed on the I235 bridge as spelled out in the contract. The new instruments are providing data to OSU so the bridge condition can be monitored. Final Report submission is pending.

PROPOSED ACTIVITIES FOR FFY 2022: None.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$85,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$84,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

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

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

2400-21-09

Bridge Approach Evaluation and Management

PURPOSE AND SCOPE: Bridge deck approaches at ODOT were mostly constructed with concrete slabs. Certain approaches were overlaid with thin asphalt mix materials due to settlement after construction. Approach quality directly affects the dynamic impact of truck load on both the approaches themselves, and the user cost of all vehicles. This task order will use current ODOT inspection process and the AASHTO Manual of Bridge Evaluation (2018) as guides to evaluate selected number of bridges on I-35 in District 4 using the OSU sub-mm 3D laser imaging technology, and provide recommendations to ODOT in both data collection and management of approaches in the future.

ACCOMPLISHMENTS DURING FFY 2021: The OSU team will start to review previously collected bridge deck data that was taken from I-35 in both 2D and 3D from the OSU sub-mm 3D laser imaging system. The OSU team will review previously collected bridge deck data on I-35 in both 2D and 3D formats from the OSU sub-mm 3D laser imaging system. In consultation with both ODOT Bridge Division and District 4, a number of potential bridges with potential approach quality issues will be selected for further study. The OSU team will gather ODOT bridge approach design plans, standards, and inspection records of the selected bridge approaches if such data are available from ODOT sources, and plan a new round of data collection with the 3D imaging technologies available to OSU. Faulting, Roughness, other general distresses will be monitored on the approaches. Specific software module for bridge deck assessment will be developed in the task order.

PROGRAMMED ACTIVITIES FOR FFY 2022: Scheduled completion July 31, 2022 using FFY21 task order funds.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$100,032	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$99,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

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

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

2400-21-10

Civil Engineering Education Outreach: Transportation Infrastructure Activities

PURPOSE AND SCOPE: One year-long outreach program. The proposed program includes activities aimed at K-12 students, incoming engineering freshmen at Oklahoma State University, as well as practicing professionals. Though targeted toward a wide range of audiences, all of the activities share the purpose of informing the broader public about transportation infrastructure.

ACCOMPLISHMENTS DURING FFY 2021: This broad outreach program includes the following three major activities: K-12 Outreach Activities, OSU Summer Bridge Program (incoming freshman) and the Oklahoma Summer Transportation Symposium (in coordination with the SPTC (OU). These programs include various levels of service including, but not limited to, face-to-face site visits at OSU and remote site, workshops, camps, and networking opportunities.

The deliverables of this work include the following:

- Monthly reporting required by ODOT.
- Summary report documenting the outreach activities and outcomes.
- Assessment surveys of various activities will be performed during selected activities

PROPOSED ACTIVITIES FOR FFY 2022: Scheduled completion October 31, 2021 using FFY21 task order funds.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$22,129	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$22,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor / Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2400-21-11

Data Preparation for Implementing Pavement ME Design in Oklahoma

PURPOSE AND SCOPE: ODOT owns rich data sources that are valuable for the Pavement ME Design, including the county level Mesonet climatic data, a large amount of subgrade/base sampling and testing data, a comprehensive traffic data collection program with hundreds of permanent traffic counters (71 AVC, 21 WIM, and 150 new radar-based units), and extensive testing of surface pavement materials. This task order will utilize these state-specific data sets to prepare the critical inputs for the implementation of ME Design at ODOT, and develop an AASHTOWARE Pavement ME Design Implementation Guide for Oklahoma.

ACCOMPLISHMENTS DURING FFY 2021: This service includes (1) gathering and processing climatic, subgrade/base testing, traffic classification, and weight, and pavement surface materials testing data in Oklahoma for the ME Design, (2) developing an ME Design Implementation Guideline for ODOT and generating related input files per the ME Design formats, (3) providing technical assistance in pavement design and analysis with the Pavement ME Design at ODOT

PROGRAMMED ACTIVITIES FOR FFY 2022: Scheduled completion July 29, 2022 using FFY21 task order funds.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$85,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$84,000	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor: Amanda Warren, ODOT Pavement Design Engineer, 405-521-2390

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

2400-21-12

Structural Health Monitoring

PURPOSE AND SCOPE: The I-235 bridge over 16th St., 23rd St., & RR (NBI 22426) has been instrumented with One (1) LifeSpan controller with twenty-four (24) sensor slots, One (1) surge protector/battery back-up power supply system, Twelve (12) LifeSpan TA sensors, and three (3) temperature sensors. However, for ODOT/OSU to receive data from this instrumentation, it is necessary to pay the subscription fee.

ACCOMPLISHMENTS DURING FFY 2021: LifeSpan's Dual Channel PeakStrain™ sensor was designed to be highly versatile; capable of use in a variety of manual and automatic monitoring applications, such as measuring strain, crack width changes/propagation, out-of-plane bending, and certain displacements. The key feature of LifeSpan's sensor is its ability to capture and retain peak displacement/strain data without power. The contract was in place and the Bridge is being monitored.

PROGRAMMED ACTIVITIES FOR FFY 2022: The bridge will be monitored and data provided to OSU and ODOT through August of 2022 using FFY21 funds.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$7,913	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$7,900	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$0.00	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

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

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

2400-22-01

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 2021: New task order.

PROPOSED ACTIVITIES FOR FFY 2022: Maintain oversight of all approved OSU task orders in monitoring schedules and budgets; assist PI's and ORI as needed to maintain project scope; assist ORI as requested with specific projects; work with PI's to develop new requests; 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 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$45,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor / Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2400-22-02

Civil Engineering Education Outreach: Transportation Infrastructure Activities

PURPOSE AND SCOPE: Includes activities aimed at K-12 students, incoming engineering freshmen at Oklahoma State University, as well as practicing professionals. Though targeted toward a wide range of audiences, all of the activities share the purpose of informing the broader public about transportation infrastructure.

ACCOMPLISHMENTS DURING FFY 2021: New task order.

PROPOSED ACTIVITIES FOR FFY 2022: This broad outreach program includes the following three major activities:

- **K-12 Outreach Activities:** This component will include a variety of activities designed to introduce civil engineering and transportation infrastructure topics to prospective pre-college-aged students in a variety of settings including.
- **OSU Summer Bridge:** This component will be a part of the existing Summer Bridge program currently presented by the OSU College of Engineering, Architecture, and Technology. It involves a 2-week summer camp for in-coming freshman to the college. The focus of the camp is on preparation for engineering, science, and math coursework, including mini-courses designed to give these students a running start to their education. One of the modules will be focused on civil engineering in general and transportation infrastructure in particular.
- **Oklahoma Summer Transportation Symposium:** The summer symposium serves as a forum to network, discuss, and understand transportation issues we face in Oklahoma for engineers interested in addressing some of these challenges, as well as to gain a better understanding of career options for civil engineering students. Symposium topics covers bridges, pavements, materials, planning, construction, geotechnical, and environmental issues. The symposium will include both podium and poster sessions.

The deliverables of this work include the following:

- Monthly reporting required by ODOT.
- Summary report documenting the outreach activities and outcomes.

The activities aimed at the younger audiences of course also have the goal of encouraging students to consider careers in civil engineering, while those aimed at professionals have the goal of ensuring Oklahoma's transportation industry has access to the latest information. All of the activities are focused on solving Oklahoma's future transportation challenges.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$70,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Robert Emerson, Oklahoma State University, 405-334-1439

ODOT Sponsor / Task Order Manager: Ron Curb, Senior Engineering Manager, 405-420-9163

2400-22-03

Evaluation of a Continuous Reinforced Concrete Pavement and the Design of a Bonded Overlay

PURPOSE AND SCOPE: There are 29 lane miles of continuous reinforced concrete pavement on I-35 between SE 15th and SE 89th in Oklahoma City that are showing signs of deterioration because the steel is placed in the wrong location. This task order will provide assistance in documenting the steel location, suggesting repair areas, and also suggesting the mixture design for the overlay.

ACCOMPLISHMENTS DURING FFY 2021: New task order.

PROPOSED ACTIVITIES FOR FFY 2022: As part of this effort, the following deliverables will be composed:

- A GPR survey of the region completed by Infrasense.
- Suggested areas for the overlay.
- Suggested overlay mixture design.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$86,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor: Trenton January, Field District Engineer (Dist. 4), 580-336-7340

Task Order Manager: Teresa Stephens, Engineering Manager, 405-415-5825

Quality Control and Assurance Guide for Maintenance Equipment Fleet Management Data

PURPOSE AND SCOPE: The Oklahoma Department of Transportation (ODOT) has collected maintenance equipment fleet management data, including equipment inventory, fueling records, maintenance and repair records, and equipment operation logs, for decades. To keep its equipment operating in cost-effective and productive conditions, this data has been traditionally used as the basis for establishing equipment “rental rates” that have been used as a crucial instrument to track and adjust depreciable equipment budget. However, all of these data-driven decisions hinge on the quality of the equipment management data. The ODOT’s current equipment data management practices have not implemented a quality control and quality assurance (QA/QC) process. As a result, the poor-quality data can compromise the Division’s ability to make accurate forecasts and economic decisions. Therefore, a data quality control and assurance process will be developed through this proposed task order.

ACCOMPLISHMENTS DURING FFY 2021: New task order.

PROPOSED ACTIVITIES FOR FFY 2022: Conduct a literature review; Work with Maintenance Division to obtain equipment inventory, operation and maintenance activity data, and other data that are essential for the proposed project; Transfer the obtained data to a non-proprietary database management tool for data processing and analysis; Define a set of data quality metrics for the equipment management data; Develop data quality assurance (QA) processes (algorithms) to identify data records with quality issues and provide suggestions; Develop a quality control (QC) process for ODOT’s consideration for future implementation; Develop a final report to document the entire research process and a PowerPoint presentation to document the implementation of the practices established in the proposed project.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$70,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor: Alex Calvillo, ODOT Asst. Div. Eng. for Operations and Maint., 405-521-2557

Task Order Manager: Wayne Rice, Transportation Manager, jrice@odot.org

2400-22-05

Incremental Creep for Cracking at Low Temperature (ICCL)

PURPOSE AND SCOPE: The Oklahoma Transportation Materials Division currently uses a test called the Bending Beam Rheometer (BBR) that is labor intensive and time consuming, taking about 2 days to complete. There is now a device called the Dynamic Shear Rheometer (DSR) that is portable and takes about 5 minutes to complete. The new test can be performed in the field, rather than the lab. It is a surrogate test to determine the continuous low temperature performance grade.

ACCOMPLISHMENTS DURING FFY 2021: New task order

PROPOSED ACTIVITIES FOR FFY 2022 Select and collect asphalt binders from Oklahoma binder sources and ODOT; Acquire the Anton Paar Dynamic Shear Rheometer; Perform testing; Evaluate the results from the testing with the BBR values (S and m values) provided with the samples; Determine the low-temperature PG and ΔT_c of both the test result and BBR results; Compare ΔT_c values; provide monthly reports; prepare and submit final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$90,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Principal Investigator: Mohamed Elkashef, Oklahoma State University, 405-744-1149

ODOT Sponsor: Kevin Suitor, Transportation Manager, 405- 923-5897

Task Order Manager: Bryan Cooper, Transportation Manager, 405-305-1963

Load Testing and Structural Monitoring of SH 4 and SH 11 Bridges in Canadian and Kay Cos.

PURPOSE AND SCOPE: In prior research work, Bridges in Kay County (SH 11) and Canadian County (SH 4) were instrumented during construction (SH 4, 2020) and rehabilitation (SH 11, 2019). Under a FY 2021 Task Order, SH 4 Bridge is being load tested and monitored. Work remains to evaluate the performance of the PC Bridge Girders in SH 4, and to evaluate the response to load of the SH 11 bridge. This FY22 Task Order will perform Static Load and Moving Load Tests on SH 11 Bridge in Kay County, continue monitoring both bridges for temperatures, strains and accelerations, and evaluate relative performance of PC Bridge Girders on SH 4 Bridge through crack mapping and Finite Element Analysis.

Assess and make recommendations for load distribution factors, impact factors, reinforcement details in end regions (how much vertical steel?), the use of mild reinforcement at midspan and other factors that affect the performance of ODOT Bridges.

ACCOMPLISHMENTS DURING FFY 2021: New task order.

PROGRAMMED ACTIVITIES FOR FFY 2022: The following activities will be performed during this study. Add accelerometers to the SH 11 instrumentation package to enable the measurement of vibrations and impact. Assess the Impact Factor, *IM*, and the distribution factors, *mg*, that are used in design calculations and load rating. Perform static load and moving load testing of SH 11 Bridge. Stresses, strains, and deformations will be measured and recorded, and used for assessing various design parameters and load rating. Perform structural health monitoring on both SH 4 and SH 11 bridges for a period of twelve months. Refine the FEM's to assess IM and distribution factors, and load rating. Perform Crack Mapping at End of PC Girders in SH 4 Bridge. Continue to evaluate processes and procedures to help mitigate cracking in end regions.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$80,000	SPR	\$0.00	STATE

CONTACT INFORMATION

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

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

Task Order Manager: Gary Hook, Implementation Engineer, 405-420-2596

2400-22-07

Title to be determined

PURPOSE AND SCOPE: OU and OSU Joint Project for District 8 Problem Solving. Co-funded with 2160-22-09.

ACCOMPLISHMENTS DURING FFY 2021: New task order

PROPOSED ACTIVITIES FOR FFY 2022: An exploratory meeting was held on August 18, 2021 with District 8 Construction and Maintenance Engineers and OU and OSU Research Offices to discuss complex problems dealing with vegetation management, bridge approach slabs, pavements, and a social issue regarding homelessness; provide monthly reports; prepare and submit final report.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$0.00	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$59,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

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

ODOT Sponsor: Trapper Parks, District 8 Maintenance Engineer, 918-838-9933

Task Order Manager: Bryan Cooper, Transportation Manager, 405-305-1963

2700 Experimental 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 2021: No money was spent on this project during 2021.

PROPOSED ACTIVITIES FOR FFY 2022: Continue working with ODOT Divisions regarding experimental product information, use, trials, results, and modifications to standards for product use in construction and maintenance. Track experimental products through ODOT implementation. Review and develop plan regarding central experimental products database that can provide information and guidance to ODOT.

FINANCIALS	AMOUNT	FUND	AMOUNT	FUND
Programmed Amount FFY 2021	\$50,000	SPR	\$0.00	STATE
Estimated Cost FFY 2021	\$0.00	SPR	\$0.00	STATE
Projected Cost FFY 2022	\$30,000	SPR	\$0.00	STATE

CONTACT INFORMATION:

Project Manager: Gary Hook, Implementation Engineer, 405-420-2596

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 coordinate 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 31, 2022

POINTS OF CONTACT:

Lead: Jerry Roche, (515) 233-7323

ODOT: Ed Dührberg, (405) 521-2146

FHWA: Jerry Roche, (515) 233-7323

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	2017	2018	2019	2020	2021	2022
State Contribution (\$)	25,000	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 (313) Technology Transfer Concrete Consortium

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. One of the strategies for achieving longer life pavements is to use innovative materials and construction optimization technologies and practices. In order to foster new technologies and practices, experts from state DOTs, Federal Highway Administration (FHWA), academia and industry must collaborate to identify and examine new concrete pavement research initiatives. The purpose of this pooled fund project is to identify, support, facilitate and fund concrete research and technology transfer initiatives.

OBJECTIVES:

The objectives of this study are to, identify needed research projects, develop pooled fund initiatives, provide a forum for technology exchange between participants, develop and fund technology transfer materials, provide on-going communication of research needs faced by state agencies to the FHWA, industry, and CP Tech Center, provide guidance on priorities for the Next Gen CP Road Map, provide assistance as requested by the Next Gen CP Road Map Executive Committee on other select tracks as needed, provide technical leadership for the national initiative to develop performance engineered concrete mixes.

PARTNERS: AL, CA, CO, FHWA, FL, GADOT, IADOT, ID, IL, IN, KS, KY, LA, MA, MI, MN, MO, MT, NC, ND, NE, NV, NY, OH, OK, OR, PADOT, RI, SC, SD, TN, TX, UT, WA, WI, WV

OKLAHOMA INVOLVEMENT:

Provide monthly data as requested, attend quarterly virtual meetings and attend the yearly meeting on this pooled fund study.

Study Period	2016	2017	2018	2019	2020	2021	2022
State Contribution (\$)	12,000	12,000	12,000	16,000			

ESTIMATED COMPLETION DATE: September 2021

POINTS OF CONTACT:

Lead: Kyle Clute, (515) 239-1646

ODOT: Kenny Seward, (405) 522-4999

FHWA: Mike Praul, (207) 512-4917

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: December 2023

POINTS OF CONTACT:

Lead: Lori Fiset, (401) 222-6940

ODOT: Angel Gonzalez, (405) 522-5904

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'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	2021	2022
State Contribution (\$)	12,000	6,000	6,000	6,000	6,000		

ESTIMATED COMPLETION DATE: December 2022

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. Recently subject reviews were conducted on bridge rails, cable barriers, and breakaway hardware.

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	2020	2021	2022
State Contribution (\$)	10,000	10,000	10,000			

ESTIMATED COMPLETION DATE: December 2021

POINTS OF CONTACT

Lead: Mustafa Mohamedali, (360)704-6307

ODOT: Ed Dhrberg, (405) 521-2146

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 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 yearly meeting in California, participate in quarterly meetings and provide data input.

Study Period	2016	2017	2018	2019	2020	2021	2022
State Contribution (\$)	15,000	15,000	15,000	15,000			30,000

ESTIMATED COMPLETION DATE: September 2022

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	2017	2018	2019	2020	2021	2022
State Contribution (\$)		96,000	48,000			

ESTIMATED COMPLETION DATE: December 2022

POINTS OF CONTACT:

Lead: David Behzadpour, (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: January 31, 2024

POINTS OF CONTACT:

Lead: Kyle Clute, (515) 239-1646
ODOT: Walt Peters, (405) 521-2606
FHWA: Brian Kozy, (202) 493-0341

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:

Virginia DOT, AL, CA, CO, IL, IN, KS, MI, MN, MO, ND, NV, 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 2024

POINTS OF CONTACT:

Lead: David Reeves, (303) 757-9518

ODOT: Alan Stevenson, (405) 919-6573

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 Sivanewaran, (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:

Virginia DOT, Maricopa Association of Governments, EPA, Metropolitan Washington Council of Governments, AAA Foundation for Traffic Safety, Atlanta Regional Commission, AZDOT, CAMPO, GADOT, HI, MDOT SHA, MI, NC, NY, Oahu MPO, OH, OK, OR, SC, TN, WI

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: Daniel Jenkins, (202) 366-1067
ODOT: Laura Chaney, (405) 521-2704
FHWA: Daniel Jenkins, (202) 366-1067

TPF-5 (###) 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 NCHRP 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	2022
State Contribution (\$)	750,000

ESTIMATED COMPLETION DATE: July 2022

POINTS OF CONTACT:

Lead: Jean Landolt, (202) 493-3146

ODOT: Ron Curb, (405) 420-9163

FHWA: Jean Landolt, (202) 493-3146

TPF-5 (431) Applications of Enterprise GIS for Transportation, Guidance for a National Transportation Framework

PURPOSE AND SCOPE:

Perform self-assessment of existing data policies to determine if they support data quality and sharing. Identify common needs for state and local government transportation agencies responsible for data collection. Define the role of LRS in data collection and establish core requirements for LRS. Establish guidelines for transportation mapping practices.

OBJECTIVES:

This pooled fund study project will assist the state DOT's and local governments to create enterprise GIS data management systems based on data governance best practices that support collaboration through shared business rules and standards. The goal is to have a single roadway dataset that meets the needs of multiple groups. The first phase of this project will be to develop guidance to be named, a document that will guide the DOTs to one geospatial standard.

PARTNERS: ADOT, CA, FHWA, FL, GADOT, ID, MA, NC, NM, OH, OK, PADOT, TN, WA, North Dakota Department of Transportation

OKLAHOMA INVOLVEMENT:

ODOT will be providing data throughout the study as requested and attend the quarterly virtual meeting, and annual meetings as required.

Study Period	2020	2021	2022
State Contribution (\$)	50,000	50,000	

ESTIMATED COMPLETION DATE: December 2022

POINTS OF CONTACT:

Lead: Noel Alcala, (614)466-2848

ODOT: Ron Maxwell, (405) 521-2728

FHWA/Lead: Joseph Hausman, (202) 366-9629

TPF-5 (437) 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 this study 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:

AL, CA, CO, FL, GADOT, IADOT, ID, IL, IN, KS, KY, MA, MI, MN, MO, MT, NC, ND, NE, NV, NY, OH, OK, OR, PADOT, SC, TN, TX, UT, WA, WI, WV, WY

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 2025

POINTS OF CONTACT:

Lead: Khyle Clute, (515)-239-1646
ODOT: Kenny Seward, (405) 521-4999
FHWA: Mike Praul, (207)-512-4917

TPF-5 (439) Technology Exchange on Managing Pavements

PURPOSE AND SCOPE:

Scope of Work:

Coordinate a workshop Technical Advisory Committee meeting for member states to learn and review issues associated with implementation of pavement management. This is an opportunity to share best practices and strategies for overcoming certain challenges. This meeting may be planned as a separate webinar or may be held in conjunction with the conference. 11th International Conference on Managing Pavement Assets (ICMPA11) – Provides a venue for the member states to exchange information on the challenges to pavement management development and implementation. The pooled fund will help support conference state and local participants travel and expenses. Because the pooled fund will be a primary funding source for the conference and associated workshops and speakers, the number of partner states will directly influence the number of expert speakers and related conference sessions and workshops. It is anticipated that the pool fund will fund two conference participants from each member agency. Post wrap-up “Strategies for developing and implementing the next generation pavement management approaches and systems” webinar for partner states. Additional webinar training from conference highlights may be provided as funds allow.

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.

1. Provide communications and information sharing regarding pavement management practices and innovation 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 pavement management implementation and how to support asset management activities.
3. Enhance the working knowledge of the pavement management community.

PARTNERS:

CA, CT, IADOT, ID, IL, KS, MS, NM, OK, TX

OKLAHOMA INVOLVEMENT:

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

Study Period	2019	2020	2021	2022	2023
State Contribution (\$)		12,500	12,500		

ESTIMATED COMPLETION DATE: April 30, 2023

POINTS OF CONTACT:

Lead: Khyle Clute, (515) 239-1646
ODOT: Kenny Seward, (405) 521-4999
FHWA: Mike Praul, (207) 512-4917

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:

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:

Northwestern University Transportation Library, Maggie Sacco Curcio, MLS, AZDOT, CA, ID, IL, MO, NC, NJ, NV, NY, OK, OR, TX, UT, WI, WY

Primary funding will be provided via transfers from other states.

OKLAHOMA INVOLVEMENT:

ODOT has contracted with the Board of Regents of The University of Oklahoma to lead this study. The contractor will continue to facilitate monthly/quarterly conference calls and annual in-person meetings as scheduled. A subcontractor, CTC & Associates, Inc., is handling selected tasks. Oklahoma's financial commitments:

Study Period	2020		2021	2022
State Contribution (\$)	25,000		25,000	25,000

ESTIMATED COMPLETION DATE: February 28, 2023

POINTS OF CONTACT:

Lead: Ron Curb, (405) 414-9163

ODOT: Ron Curb, (405) 414-9163

FHWA: Richard Meininger, (202) 493-3191

TPF-5 (448) Integrating Construction Practices and Weather into Freeze Thaw Specifications

PURPOSE AND SCOPE:

Current design practices for freeze thaw durability are not based on actual weather conditions and are instead based on artificial conditions created in ASTM C 666 testing of concrete. While these conditions seem to have been conservative, a better answer could be obtained if there was more information about how concrete wetted and dried in different environments. This research will use a novel way to measure this by combining low-cost data loggers to measure the moisture and temperature changes in a concrete sent to a number of different environments. This information will be combined with new models that account for the rate that concrete reaches a critical degree of saturation.

OBJECTIVES:

The ultimate goal of this work is to build on previous research efforts to produce improved specifications and advance existing test methods; while, improve the underlying understanding of freeze thaw damage. This work will specifically focus on construction practices and the impact of weather. Quantify how different weather conditions impact the freeze thaw performance of concrete with low-cost data loggers. Investigate the freeze thaw performance of existing structures in different climates with different air void qualities. Expand the freeze thaw model to a larger range of mixtures to see if the trends still hold. Better understand the damage propagation after critical saturation is reached. Develop freeze thaw specifications based on concrete quality, air void system, and local weather conditions.

PARTNERS:

CA, CO, IADOT, ID, IL, KS, MN, MO, ND, NE, NY, OK, PADOT, WI, FHWA

OKLAHOMA INVOLVEMENT:

Provide test data to the lead team as requested, visit lab as requested, attend virtual meeting and provide input for quarterly and yearly reports.

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

ESTIMATED COMPLETION DATE: December 2022

POINTS OF CONTACT:

Lead: Ron Curb, (405) 522-3795

ODOT: Kenny Seward, (405) 522-4999

FHWA: Ahmad Ardani (202) 493-3422

TPF-5 (451) Road Usage Charge West

PURPOSE AND SCOPE:

RUC West is a voluntary coalition of state DOTs and provincial Ministries of Transport that are committee to collaborative research and development of a potential new funding method that would collect a road usage charge (RUC) based on actual road usage. Subject to available Transportation Pooled Fund resources and separate funding from consortium members the work plan will undertake select topics, research projects and activities that relate to RUC.

OBJECTIVES:

Explore the technical and operational feasibility of a multi-jurisdictional road usage charge system. Investigate public and key decision maker criteria for acceptance and 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 could 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:

AK, AZDOT, CA, CO, HI, ID, KS, MT, ND, NE, NM, NV, OK, OR, TX, UT, WA, WY

OKLAHOMA INVOLVEMENT:

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

Study Period	2021
State Contribution (\$)	\$25,000

ESTIMATED COMPLETION DATE: September 2022

POINTS OF CONTACT:

Lead: Randal Thomas, (971) 240-7094

ODOT: Dawn Sullivan, (405) 521-4768

TPF-5 (456) 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:

AR, CT, GADOT, IL, KS, MA, MN, ND, NE, NJ, OK, OR, SC, TN, TX, VA, 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	2023	2024
State Contribution (\$)	20,000	(\$4,000>	Per yr.>	Pre-Paid through>	2024)

ESTIMATED COMPLETION DATE: August 2024

POINTS OF CONTACT:

Lead: Chris Dailey, Chris.Dailey@ardot.gov

ODOT: Laura Chaney, (405) 521-2705

FHWA: Not identified

TPF-5 (465) Consortium for Asphalt Pavement Research and Implementation (CAPRI)

PURPOSE AND SCOPE: To continue fostering the development of new technologies and practices, this pooled fund study will identify and address national priority research and implementation needs for asphalt pavements that state DOTs face today and in the future. The goals of CAPRI are to, provide technical guidance on current and evolving specifications for asphalt materials, develop asphalt pavement research needs, conduct small-scale studies to address knowledge gaps or explore new topics, foster the implementation of practical research findings to help improve the performance, sustainability, value, and safety of asphalt pavements.

OBJECTIVES: The objectives of CAPRI are to, provide technical guidance on current and evolving specifications for asphalt materials, develop asphalt pavement research needs, conduct small-scale studies to address knowledge gaps or explore new topics, foster the implementation of practical research findings to help improve the performance, sustainability, value, and safety of asphalt pavements. As a consortium of all asphalt pavement stakeholders, CAPRI will be a key resource to the AASHTO Committee on Materials and Pavements, state DOTs, FHWA, and industry.

SCOPE OF WORK: Activities related to the above goals will be developed through semi-annual meetings rotated among participating organizations. CAPRI meetings will serve as a forum to facilitate knowledge sharing among participants. Outcomes of CAPRI meetings will include technical guidance articles on high profile issues, and research need statements (RNSs) organized into a new National Asphalt Research Roadmap (NARR) that will be made public through a website managed and maintained by NCAT.

PARTNERS:

AL, CO, FL, GADOT, IADOT, ID, IN, KY, MO, MS, NC, NY, OH, OK, PADOT, SC, TN, TX, WI

OKLAHOMA INVOLVEMENT: Provide input to the CAPRI through the in-person meetings, through sharing ideas in asphalt pavement design and research, providing problem statements to the group.

Study Period	2022	2023	2024
State Contribution (\$)	10,000	10,000	10,000

ESTIMATED COMPLETION DATE: October 2025

POINTS OF CONTACT:

Lead: Virgil Clifton, (334) 353-6944

ODOT: Kevin Suitor, (405) 923-5897

FHWA: David Mensching, (206) 336-1286

TPF-5 (469) Accelerated Performance Testing on the 2021 NCAT Pavement Test Track with MnROAD Research Partnership

PURPOSE AND SCOPE:

The scope of work for the pooled fund project will include:

1. Hauling materials to the project from offsite locations.
2. Rebuilding sections in accordance with sponsors' directives via competitively bid subcontracts administered by NCAT.
3. Installing both environmental and response instrumentation in new experimental sections.
4. Operating a 5-truck heavy triple-trailer fleet in order to apply accelerated truck traffic on the NCAT test oval following the completion of construction. Human drivers operate NCAT vehicles in order to best induce representative vehicle wander.
5. Safely measuring field performance (e.g., rutting, roughness, texture, cracking, deflection, friction, etc.) on a regular basis. Pavement response will also be measured on a routine basis.
6. Conducting laboratory testing to quantify basic material and mix performance, which will serve as the basis of performance model development.

OBJECTIVES:

The primary objectives of the pooled fund project described herein will be: Constructing experimental pavements on the existing 1.7-mile NCAT test oval and the MnROAD mainline bypass that are representative of in-service roadways on the open transportation infrastructure; Applying accelerated performance truck traffic after construction for the duration of the 3-year research cycle; Assessing/comparing the functional and structural field performance of trafficked sections on a regular basis via surface and subsurface measures; Validating/calibrating new and existing methodologies for analysis and design using pavement surface condition, pavement load response, precise traffic and environmental logging, and cumulative damage; Correlating field results with laboratory data for both mix and structural performance; and Answering 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. For example, can pavement thickness be reduced as a result of the addition of premium mix additives, and if so, does the thickness reduction offset the additional cost of construction?

PARTNERS:

Virginia DOT, AL, FHWA, FL, GADOT, KY, MS, NC, NY, OK, SC, TN, TX

OKLAHOMA INVOLVEMENT:

Oklahoma had sections and support from 2018-2020 for the following areas: N9, S1, the Preservation Group, and the Cracking Group under TPF-5(374) and (375). From 2021 thru 2023 Oklahoma will sponsor the following sections: N9, S1 and N8 (NCAT, but not MnROAD).

Study Period	2021	2022	2023
State Contribution (\$)	466,667	416,667	416,666

ESTIMATED COMPLETION DATE: January 31, 2024

POINTS OF CONTACT:

Lead: Virgil Clifton, (334) 353-6944
ODOT: Kevin Suitor, (405) 521-2677
FHWA: Derek Nener-Plante, (202) 763-4017

TPF-5 (478) Demonstration to Advance New Pavement Technologies Pooled Fund

PURPOSE AND SCOPE: FHWA will collaborate with the Technical Advisory Committee (TAC) and the contributing State DOTs to define the parameters of each of their state's demonstration project. The FHWA contribution will be used to provide up to \$250,000, up to 100 hours of technical assistance, and resources for developing case study reports and videos for each selected demonstration project. The amount of support that will be contributed to each project will vary and ultimately be decided by the TAC. Additionally, FHWA will host a website for publishing case studies and other relevant project documents, as well as peer exchanges for showcasing lessons learned and best practices from the projects. Each state DOT will be expected to participate in pooled fund meeting opportunities and actively collaborate with other states and FHWA to advance these initiatives. The state DOT will complete a report documenting the initiative and outcomes of selected state DOT demonstration projects by using a standard reporting template provided by FHWA.

OBJECTIVES: This pooled fund seeks to support and showcase the implementation of innovative pavement technologies, products, and processes by State DOTs by leveraging of Federal investments with State DOT partnerships.

PARTNERS:

AZDOT, CO, GADOT, HI, IADOT, ID, IL, MO, MS, OK, PADOT, TX, WI

OKLAHOMA INVOLVEMENT:

Oklahoma will provide data for this study, they will also provide a project for the pool fund study, attend meetings as requested.

Study Period	2022	2023	2024	2025	2026
State Contributions (\$)	10,000	10,000	10,000	10,000	10,000

ESTIMATED COMPLETION DATE: September 2025

POINTS OF CONTACT:

Lead: Sharon Snead, 202-366-1553

ODOT: Kevin Sutor, (405) 522-4986

FHWA: Sharon Snead, 202-366-1553

**TPF-5 (###) TRB Core Program Services for a Highway RD&T Program –
FFY 2021 (TRB FY 2022)**

PURPOSE AND SCOPE:

This solicitation will cover the period of TRB's fiscal year 2022 that begins July 1, 2021, and ends June 30, 2022. Funds committed by participating States will be from their Federal fiscal year 2021 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.

Note: TPF Number is unknown at time of publication.

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	2022
State Contribution (\$)	140,000

ESTIMATED COMPLETION DATE: July 2022

POINTS OF CONTACT:

Lead: Jean Landolt, (202) 493-3146

ODOT: Ron Curb, (405) 420-9163

FHWA: Jean Landolt, (202) 493-3146

TPF-5 (484) Develop Countermeasure Strategies for Protecting Bridge Girders against Over-Height Vehicles Impact

PURPOSE AND SCOPE:

The innovative steel beam/honeycomb protective system is anticipated to dissipate a large portion of the energy from the colliding truck by crushing/deforming the honeycombs. The effectiveness of this device has been investigated recently by large-scale testing in collaboration with the researchers at Hunan University, where over-height impact was simulated through a drop hammer system. With the success of the large-scale testing program, the actual field installation of full-scale model is deemed necessary to validate its effectiveness to protect existing bridge structures. In particular, this project aims at the following: design of the full-scale testing program and selection of bridge site for the field installation; custom construction and installation of the full-scale model of the prototype attaching to the existing facial girder of the selected structure; full scale testing and evaluation of the system with actual over-height truck impact on site.

OBJECTIVES:

This project will carry out in two phases which include the following eleven (11) main tasks: 1. Develop an over-height impact program for outdoor full scale testing including site & vehicles selection and logistics. 2. Investigate the protection system extensively through numerical simulations on different impact scenarios. 3. Design an effective installation of the proposed protective system including supporting systems, connections, the protective system and means for easy replacement of damaged components. 4. Design the entire setup for full-scale prototype testing including the girders to be impacted or a system supporting girder to be impacted that can represent the behavior of an actual bridge through numerical simulations. 5. Prepare and publish the Phase I report including outcomes of the tasks carried out in this phase. 6. Conduct full-scale prototype testing to demonstrate the effectiveness of the proposed protective system. 7. Perform parametric studies on the impact performance of the protection devices installed on the prestressed /steel girders. 8. Develop a design method for proportioning the protective system to achieve a specific performance (performance-based approach). 9. Develop design examples and templates to illustrate the design of the protective system for different impact scenarios. 10. Develop new design guidelines for fascia girder to resist the impact loads due to over-height heavy vehicles without protection system. 11. Prepare and publish the final report including findings and outcomes of all the tasks completed in this project.

PARTNERS:

Virginia Department of Transportation, AK, FHWA, LA, NJ, NY, OK

OKLAHOMA INVOLVEMENT:

Oklahoma will provide input data as requested and will attend either in person or virtually the quarterly and yearly meetings.

Study Period	2022	2023	2024
State Contribution (\$)	70,000	70,000	70,000

ESTIMATED COMPLETION DATE: September 2024

POINTS OF CONTACT:

Lead: Vincent Chiarito, (202) 366-4621

ODOT: Matt Casillas, (405) 521-2606

FHWA: Waider Wong, (410) 215-8778