

Oklahoma Department of Transportation



Office of Research and Implementation

Research Manual

2017 Edition

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https://ok.gov/odot/Programs_and_Projects/Research_and_Implementation/index.html



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I, David Ooten, State Research Engineer, Office of Research and Implementation, Department of Transportation, of the State of Oklahoma, do hereby certify that the State complies with all requirements of 23 United States Code (USC) 505 and its implementing regulations with respect to the research, development and technology transfer program, and contemplate no changes in statutes, regulations, or administrative procedures that would affect such compliance.

David Ooten
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Preface

The Oklahoma Department of Transportation (ODOT) Office of Research and Implementation (ORI) manages a program to address the research and operational needs across ODOT. ORI, in cooperation with our partners, provides solutions and knowledge that improve Oklahoma's transportation system. These solutions and knowledge in methods, materials, and technologies enable ODOT to promote safety, enhance mobility and sustainability, improve the management of public facilities and services, and protect public investment in transportation infrastructure.

This research manual provides researchers, ODOT staff, academic partners, and others interested in the research program with the information needed to develop, select, fund, perform, manage, and deploy research that benefits the traveling public in Oklahoma. This research manual also fulfills the United States Department of Transportation (US DOT) requirements to ensure the relevancy of ODOT research in meeting national research goals.

An electronic copy of the ODOT Research Manual is available online at:
[https://ok.gov/odot/Programs and Projects/Research and Implementation/index.html](https://ok.gov/odot/Programs_and_Projects/Research_and_Implementation/index.html).

To obtain a copy of this document in an alternate format, please contact:
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Section 1 ODOT Research Program Overview

1.1 The Office of Research and Implementation

The Office of Research and Implementation (ORI) manages a comprehensive program to research, develop, test, evaluate, and implement transportation innovations sought by its customers, most notably Oklahoma Department of Transportation (ODOT) staff and its industry partners, toward enhancing efficiency and effectiveness of the state transportation network.

These innovations in methods, materials, and technologies enable ODOT and its industry partners to promote safety, enhance mobility and sustainability, improve the management of public facilities and services, and protect public investment in transportation infrastructure.

ORI seeks to take full advantage of strategic opportunities by identifying public and private partnering solutions. These partnerships leverage the dollars invested in present and future public infrastructure.

With direction from the ODOT Executive Staff and the Research Steering Committee, ORI:

- Establishes and facilitates the process to identify, select, program, manage, and deploy research
- Meets all federal-aid program requirements, including the preparation and maintenance of this research manual and the State Planning and Research (SP&R) Part 2 Annual Work Program (AWP)
- Establishes the research agenda based on the involvement and participation of its customers
- Develops and performs applied transportation research for all modes of transportation
- Provides technical assistance to its customers to implement transportation research products
- Engages in both short-term and long-term research
- Allocates funding for the research that includes leveraging national research funding from other transportation organizations and pooled funding opportunities

1.1.1 Strategic Approach to Research

The research program development approach provides a framework for ODOT and its partners to collaborate and to ensure research resources are directed to the most crucial needs.

This collaboration allows ODOT to leverage research funds and provides guidance for partnering organizations that have common research needs, such as the Transportation Pooled Fund Program, the Transportation Research Board (TRB), and the American Association of State Highway and Transportation Officials (AASHTO).



1.1.2 Research Results

As a customer focused research program, the research projects will result in deployable products, which are research solutions that can be implemented by ODOT and its partners.

These deployable product types are:

- New or improved technical standard, plan, or specification
- New or improved manual, handbook, guideline, or training
- New or improved policy, rule, or regulation
- New or improved business practice, procedure, or process
- New or improved tool or equipment
- New or improved decision support tool, simulation, model, or algorithm (software)
- Processed data/database
- Evaluation of new commercial products to determine if they meet ODOT needs
- Other

Deployable products of a project may be a single item, multiples of a particular item, or a combination(s) of multiple items and types.

Research projects end with deliverables and/or final reports that document the lessons learned, research results, and facilitate the technology transfer of the results.

1.2 Legal Authority for Research

1.2.1 Federal Laws

The federal law, “Fixing America’s Surface Transportation Act,” also known as the FAST Act, was signed into law on December 4, 2015. It outlines federal priorities for transportation research and authorizes funding for transportation research in the SP&R Parts 1 and 2.

1.2.2 Federal Regulations

The authority for a state research organization to use federal funds is set forth in USC Title 23- Highways, Chapter 5 Research and Technology, Section 505. The authority for a state to administer SP&R funds, Parts 1 and 2, is set forth in the Code of Federal Regulations, (CFR), Title 23, Part 420, Planning and Research Program Administration – 420.117(e), which can be found at <http://bit.ly/e-CFR>.



Section 2 Research Program Development

2.1 Introduction

ODOT has developed and implemented a coordinated process to identify research needs, conduct research, and deploy research results. The coordinated process is iterative and includes input from all functional areas of ODOT and all levels of ODOT and industry partner staff ranging from technical experts to executive management.

2.2 ODOT Executive Staff

ODOT Executive Staff (OES) is the executive level of ODOT administration and provides direction for funding and identification of high-priority areas of interest. The Director of Capital Programs (DCP) represents the ODOT research program at this level.

The OES reviews and prioritizes all topic statement submissions before providing a final list to the Research Steering Committee for consideration with support from ORI staff regarding current and previous ODOT research projects and other known, topic-related efforts. While most topic statements are left unchanged, some are modified, some are pulled and some are combined to better meet the needs of ODOT.

The DCP provides final approval of the recommended annual SP&R Part 2 work program.

2.3 Research Committees and Panels

ORI's research process emphasizes customer participation along with effective implementation through customer ownership of the research products.

The research committees are an important way of involving the customers in the research selection, project management, and implementation process. The related committees and panels are described briefly below.

2.3.1 Research Steering Committee

The Research Steering Committee (RSC) meets annually, usually in February, to discuss and prioritize submitted topic statements approved by the OES. The RSC identifies sponsors and subject matter experts for each approved topic statement.

Membership of the RSC is comprised of a representative of all ODOT Divisions. Generally, this is served by the Division Engineer or Manager, or Assistant Division Engineer or Manager, but can be appointed by the Division Engineer or Manager for that Division.



2.3.2 Research Project Panels

The Research Project Panel (RPP) membership is composed of a sponsor and subject matter experts from ODOT central office and field divisions, ORI and industry partners. The RPP provides technical guidance and assistance throughout the course of a project to assure the research work and project parameters remain consistent with approved project scope and the needs of ODOT.

2.3.2.1 Research Project Sponsor

The Research Project Sponsor acts as chair of the RPP and is generally an ODOT Division Engineer or Manager, or Assistant Division Engineer or Manager. Some complex projects may require co-sponsors to appropriately address technical issues required of the project.

A sponsor oversees technical guidance of a research project and provides the formal position of the Research Project Panel to ORI on issues regarding technical direction of the project during development phase or during the course of an on-going project.

The Research Project Sponsor is also responsible to act as the priority division for implementation of research results.

Additionally, the sponsor are also asked to communicate project and implementation plans and activity to their peers through the normal course of business.

2.3.2.2 Research Project Subject Matter Experts

Research Project Subject Matter Experts (SME) are ODOT and transportation industry members that possess technical knowledge of the research project parameters and provide input on the project development, proposal acceptance, project activity through progress, annual and final reports, meetings and on-site demonstrations, and with implementation plans and activity.

ODOT SMEs are encouraged to provide opportunities for implementation of research results, although an SME may not be able to directly authorize this activity.

SMEs are also asked to communicate project and implementation plans and activity to their peers through the normal course of business.

2.4 Research Program Development Responsibilities

In support of the research program development, ORI coordinates the selection process of the annual program of projects. Some of the responsibilities include:

- Providing staff support to the OES, DCP, RSC and RPPs
- Preparing Part 2 of the annual SP&R work program
- Managing the contingency approval process
- Soliciting research topic statements and proposals
- Coordinating ODOT research activities with research institutions



- Participating in research efforts conducted by FHWA, TRB, AASHTO and other organizations
- Leveraging partnered-research activities through Transportation Pooled Fund research
- Ensuring the effectiveness and efficiency of the Research program
- Avoiding duplication of research efforts with other state or national programs
- Coordinate and oversee administrative functions related to the SP&R Part 2 Work Program

2.5 Funding Sources for the Research Program

The research program is funded by state and federal funds, reimbursed work, and grant funds.

2.5.1 State Funds

The principal source of state funding for ODOT research is Oklahoma's portion of the transportation funding source generated from the state tax on motor vehicle fuels.

2.5.2 Federal Funds

The Federal Highway Administration (FHWA) SP&R Part 2 is the main federal funding source for ODOT research. SP&R Part 1 funds may also be used to fund research program activities, as deemed necessary. SP&R Parts 1 and 2 are regulated by Title 23, CFR Part 420, which identifies the administrative requirements that apply to the use of FHWA planning and research funds.

2.5.3 Reimbursed Work

Research projects are sometimes reimbursed through the request of a partner agency. Normally, this work is performed in conjunction with a state project or activity for the mutual benefit of the State and the partner agency.

2.5.4 Grant Funds

The FHWA, Federal Transit Administration (FTA), or other federal agency acting as research contracting parties, may negotiate with ODOT (as the contractor) to conduct research through grant processes. Agreements of this kind typically provide 50 percent to 100 percent federal reimbursement of ODOT costs.

2.6 State Planning and Research, Part 2 Annual Work Program

In order for the research program to expend federal funds, FHWA approval is required through the SP&R Part 2 Annual Work Program (AWP).

2.6.1 SP&R Overview

USC Title 23 Highways, Chapter 5 Research and Technology, provides for SP&R funding. Two percent of the total funds apportioned to each state annually are designated for planning and research activities.

Of this amount, not less than 25 percent must be spent on research, development, and technology transfer activities relating to highway, public transportation, and intermodal transportation systems.



Federal funds typically provide for 80 percent of the cost of the research projects in the SP&R Part 2 AWP, and state funds provide for the remaining 20 percent. FHWA has the ability to waive the state match if the interests of the Federal aid highway programs are met by Title 23 CFR 420.119(d).

2.6.2 ODOT SP&R, Part 2 AWP

ORI reports to FHWA on the research projects and administrative costs that will be funded using the SP&R Part 2 AWP, as required by Title 23, CFR Section 420.111.

The SP&R Part 2 AWP is developed and approved before the beginning of each new Federal fiscal year. It describes the research work to be performed, estimated costs for that year and accomplishments from the previous year.

Modifications to the SP&R Part 2 AWP may occur as a result of project scope and/or funding level changes. These modifications are transmitted to FHWA through amendment requests.

2.6.3 AWP Approval

The SP&R Part 2 AWP is submitted to the local FHWA Division Administrator for review and approval. No work shall begin prior to having approval by the FHWA.

2.7 Additional Research Resources

ODOT utilizes the Transportation Pooled Fund Program and the National Cooperative Research Programs to leverage its financial and staff resources.

2.7.1 Transportation Pooled Fund Program

When significant or widespread interest is shown in solving transportation-related problems, research and technology transfer activities may be jointly funded by several federal, state, regional, and/or local transportation agencies, academic institutions, foundations, or private firms as a Transportation Pooled Fund study (TPF). Additional information on the TPF Program can be found at: <http://www.pooledfund.org>.

2.7.2 National Cooperative Highway Research Program

National Cooperative Highway Research Program (NCHRP) is administered by the TRB and sponsored by the member departments (i.e., individual state departments of transportation) of AASHTO in cooperation with FHWA.

NCHRP was created in 1962 as a means to conduct research in acute problem areas that affect highway planning, design, construction, operation, and maintenance nationwide.

Each state's allocation amounts to five and one half percent of its total SP&R apportionment and is set forth in supplementary tables issued with each year's Federal-Aid Highway apportionments.

Additional NCHRP information can be found at: <http://www.trb.org/NCHRP>.



2.7.3 Transit Cooperative Research Program

The Transit Cooperative Research Program (TCRP) was established under FTA sponsorship in July 1992.

The nation's growth and the need to meet mobility, environmental, and energy objectives place demands on public transit systems. Current systems, some of which are old and in need of upgrading, must expand service area, increase service frequency, and improve efficiency to serve these demands.

Research is necessary to solve operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the transit industry. The TCRP serves as one of the principal means by which the transit industry can develop innovative near-term solutions to meet demands placed on it.

Additional TCRP information can be found at: <http://www.trb.org/TCRP>.

2.7.4 Airport Cooperative Research Program

The Airport Cooperative Research Program (ACRP) was authorized in December 2003 as part of the Vision 100-Century of Aviation Reauthorization Act.

The ACRP is sponsored by the Federal Aviation Administration and managed by the National Academies, acting through TRB, with program oversight and governance provided by representatives of airport operating agencies.

ACRP is an industry-driven, applied research program that develops near-term, practical solutions to problems faced by airport operators.

Additional ACRP information can be found at: <http://www.trb.org/ACRP>.

2.7.5 Hazardous Materials Cooperative Research Program

The Hazardous Materials Cooperative Research Program (HMCRP) focused on hazardous materials transportation was authorized in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users.

HMCRP is sponsored by the U.S. Department of Transportation (US DOT) Pipeline and Hazardous Materials Safety Administration and managed by the National Academies, acting through the TRB.

The HMCRP is intended to complement other US DOT research programs as a stakeholder-driven, problem-solving program, researching real-world, day-to-day operational hazardous waste transportation issues with near - to mid- term time frames.

Additional HMCRP information can be found at: <http://www.trb.org/HMCRP>.



2.7.6 National Cooperative Rail Research Program

The National Cooperative Rail Research Program (NCRRP) was authorized as part of the Passenger Rail Investment and Improvement Act of 2008. Program oversight and governance are provided by representatives of rail operating agencies, state departments of transportation and others.

NCRRP conducts applied research on problems important to freight, intercity and commuter rail operators. Research is necessary to solve common operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the rail industry.

The NCRRP is sponsored by the Federal Railroad Administration and managed by the National Academies, acting through the TRB, with program oversight provided by an independent governing board including representatives of rail operating agencies, state departments of transportation, and others. Additional NCRRP information can be found at: <http://www.trb.org/NCRRP>.

2.8 Peer Exchange of the Research Program

Peer exchanges, as required under 23 CFR, Section 420.205(b), are a practical and effective tool to foster excellence in Research and Technology (R&T) program management. Peer exchanges provide an opportunity for participants to share best practices and management innovations through an open exchange of ideas, knowledge, and brainstorming.

A peer exchange is an information exchange among transportation research colleagues through which a host state may find the means to restructure or fine tune research program processes.

Both staff and management from the host state and a group of invited top-level state and federal managers exchange information particularly relevant to the host state's R&T program over two to four days.

With periodic peer exchanges, a State's Department of Transportation (DOT) helps ensure that its research program remains viable, vibrant, and productive. When invited, ODOT also participates in peer exchanges for other states and the FHWA.

2.9 FHWA Review of the Research Program

FHWA reviews all state programs for effectiveness and compliance with Federal-aid requirements for continued state certification. FHWA also ensures compliance with all federal laws, regulations, and policies.

ODOT cooperates with the FHWA to ensure that these research program criteria meet the requirements under CFR, Title 23, Part 420, for the administration of planning and research funds.



Section 3 Research Project Development

3.1 Introduction

ORI provides research solutions to Oklahoma's transportation problems through its research projects. The goal of research projects is to develop solutions that directly provide or lead to deployable products that can be implemented by ODOT or other public agencies. Each research problem, project, and solution is sponsored and supported by an ODOT central office or field division.

3.2 Research Projects

A research project typically consists of a sequence of tasks that result in a deployable product, as defined in Section 1.1.2. These projects can be formal in nature to include basic or applied research and implementation activity, implementation in nature only if a deployable product deemed viable for use already exists, or knowledge-based only toward gathering extensive information on a particular subject or issue.

3.3 Project Selection Process

The research selection process is composed of annual and contingency components.

3.3.1 Annual Research Cycle

Research funding requests are reviewed, prioritized, and approved during the annual research selection cycle. The annual research cycle provides an opportunity to reassess the strategic alignment of ongoing and planned research.

3.3.2 Contingency Approval Process

The contingency process provides an opportunity to consider research requests that are outside of the annual research selection cycle. This option provides opportunity to address ODOT issues of need or significance that present themselves outside the normal review process.

Such requests are reviewed on a case-by-case basis for immediate funding approval, incorporation in the next regular review cycle or rejected for funding.

3.4 Project Preparation

3.4.1 Topic Appraisals

Prior to initiating a research project, a topic appraisal (TA) is performed. A data-driven TA is a literature review and identification of best practices in a specific field and function of the transportation system. The TA provides a comprehensive overview of historical and on-going national and international work on a potential research problem through various databases including, but not limited to, the Transportation Research Board's Transportation Research Information Services and Research-in-Progress databases, the International Transport Research Documentation database, and previous ODOT research efforts.



Findings of a TA will indicate whether or not a solution is available, relevant research is in progress that can be built upon, or new research is required. When new or additional research is needed, a research project is created.

3.4.2 Research Project Manager and Research Project Panel Roles

All research projects have a Research Project Panel (RPP). The role of the RPP is to guide the research project. The membership of the RPP is flexible and varies by the size and complexity of the project. At a minimum, the RPP consists of the Research Project Manager (RPM) and the sponsor, generally an ODOT central office or field division staff member.

If a project involves several functional areas or requires special expertise, the RPP should also include other experts to guide the project during the research activities. The RPP may have representation from academia, industry, non-government organizations, and local, state, and federal government.

Activities

Research Project Panel activities may include:

- Developing the Project Plan
- Developing the scope of work for each task
- Working with researchers to monitor progress and facilitate the resolution of problems or delays
- Making recommendations to the RPM regarding the selection of the contractor
- Project scope, budget, time modifications, and continuation of studies
- Reviewing the annual, draft and final reports
- Recommending an implementation plan for research products

3.4.3 Project Plan

Definition

A Project Plan is a dynamic tool that guides the RPM and the stakeholders of the project in execution of the project. This plan explains why the research is being conducted, the anticipated outcome of the project, the perceived benefits of the project, and identifies what deployable product is anticipated, as defined in Section 1.1.2.

The Project Plan also conveys the current planning decisions made related to cost, schedule and scope, together with the constraints facing the project and what additional resources the project will require.

For large and complex projects, the plan may evolve over time, based on completed project work, technology shifts, or social trends.



Purpose

The purpose of a Project Plan is to answer fundamental questions about the scope, cost, and schedule of the project, including, but not limited to the following:

- Why is the project necessary?
- Will there be any deployable products upon completion of this project?
- What tasks are necessary to complete the project?
- What are the benefits upon completion of the project?
- How much will the project cost?
- How much time will the project require?
- Who are the project champion(s) and/or sponsor(s)?
- Will ODOT resources/staff be required to accomplish project tasks?
- When will the deployable product be ready to use?

Section 4 Research Project and Task Management

4.1 Management of Research

4.1.1 Research Project Manager

Responsibilities

The purpose of project management in ORI is to achieve the objectives of a research project on schedule and within budget. This project management process starts before any resources are committed and continues until all work is finished and the project is closed.

The RPM is an ORI employee with authority to manage all aspects of an approved project. The RPM is responsible for delivering the product on schedule, within budget, and to the satisfaction of the Research Project Panel and end users.

Modifying a Research Project

The need for a modification in a research project can happen at any time after the project's initiation.

A research project may need to be changed due to new information being discovered, modifications in funding possibilities, or modifications in research priorities. The steps to modifying a research project include:

- A request from the Principal Investigator/contracting institution
- Recommendation from the Research Project Panel
- Approval from the State Research Engineer (scope and tasks)
- Approval from the Director of Capital Programs (fiscal)
- Updating the Project Plan

Resource approval may also be necessary if additional time or funding is needed.

Canceling a Research Project

A project's circumstances can be significant enough to cancel a project. Such circumstances may include, but not be limited to, the inability to locate acceptable projects for field testing, discovery of new information that eliminates the need for the research project, or project data analysis that is contrary to anticipated results yielding remaining work of little or no value.

A decision to cancel a project is not easily made and must be approved by the Research Project Panel, State Research Engineer and the Director of Capital Programs. Cancellation can happen at any time during the course of a project.

Project Execution

There are four mechanisms used to conduct research tasks within an ORI research project. The four methods are:

- Contract Research
- In-House Research



- Transportation Pooled Fund Research
- National Cooperative Research Programs

Each method has its own execution criteria. See Sections 4.2, 4.3, 4.4, and 2.7, respectively, for additional information.

Project Reporting and Distribution

Monthly progress reports for all active projects are required throughout the life of the project. This report is submitted by the Principal Investigator (PI) and accompanies each invoice from the contracting institution.

An annual report are required for continuing projects and is reviewed and accepted by the Research Project Panel.

A final report is submitted at the conclusion of each research project and is reviewed and accepted by the Research Project Panel.

The final report is distributed to State, Federal, and National Depository Libraries through the Oklahoma Transportation Library: www.ou.edu/oktl.

4.2 Management of Contracted Research

4.2.1 Introduction to Research Contracts

The research contract allows ODOT to utilize the expertise of universities and other transportation consultants.

The ORI Contract Administrator (CA) is typically responsible for all of the Contract Management duties for the contracts within their task. The various types of research contracts are:

- Standard Agreements
- Interagency Agreements
- Task Order Agreements

4.2.2 Executing Research Contracts

ORI awards research contracts in accordance with approved ODOT contracting procedures. The CA prepares all the documents necessary to execute each type of research contract. Contract language and execution is approved by the SPR Program Manager.

4.2.3 Managing Contracted Research

Research contract management responsibilities extend from contract development to contract completion.

The ORI CA is responsible for administrative details of each contract. The ORI RPM is responsible for technical oversight of the project and works closely with the ORI CA to verify invoices and any approved project modifications that require contractual changes.



4.3 Management of In-house Research

4.3.1 In-house Research

In-house research differs from contracted research in that the researcher is an employee of ODOT. The in-house researcher most generally is the RPM.

In-house research enables ODOT to:

- Give transportation administrators and managers accurate and substantive advice quickly, during emergencies or where problems being researched have safety implications
- Assess emerging research results and determine appropriate solutions to benefit Oklahoma transportation programs
- Evaluate field-implemented transportation innovations for cost saving implications
- Provide a professional knowledge base to solicit, award, monitor, and evaluate the quality and cost-effectiveness of research

4.3.2 Requirements for In-house Research

Approval by ORI management is required prior to starting in-house research. In house researchers should possess the following:

- Expertise in the subject area of the research and the techniques to be used in the proposed research project
- Ability to dedicate the required amount of time to the research during the life of the project
- Ability to serve as liaison with the committees and panels identified in this research manual
- Approved work plan by ORI management

4.4 Management of Transportation Pooled Fund Research

4.4.1 Introduction to TPF Research

The TPF Program allows federal, state and local agencies, and other organizations to combine resources to support transportation research studies.

The TPF Program is a popular means for State DOT, commercial entities, and FHWA program offices to combine resources and achieve common research goals.

Pooling resources reduces costs and provides efficient use of taxpayer dollars. It also provides greater benefits to participating interests as compared to individual entities conducting or contracting research on their own.



4.4.2 Involvement in Transportation Pooled Fund Research

When significant or widespread interest is shown in solving transportation-related problems, research, planning, and technology transfer activities may be jointly funded by federal, state, regional, and/or local transportation agencies, academic institutions, foundations, or private firms as a pooled fund study.

A federal or state transportation agency may initiate pooled fund studies. Regional and local transportation agencies, private companies, foundations, and colleges/universities may participate in pooled fund projects. TPF studies must be sponsored by either a state DOT or the FHWA.

General information on Pooled Fund Projects is on the TPF website at:

<http://www.pooledfund.org>.



Section 5 Research Evaluation

5.1 Introduction

ORI uses research project evaluation to more efficiently manage the research program and determine the program's overall effectiveness.

5.2 Research Program Evaluation

The continuing research program is evaluated annually by ORI and the DCP. Input from the Research Project Panel (RPP) through the RPM is also taken into consideration.

The research program is reviewed to determine and verify that projects and activities remain consistent with the needs of ODOT and that the likelihood of implementation of program results remains high.

5.3 Research Project Evaluation

Every research project will be subject to continual evaluation, but evaluation will be formally considered annually and when completed. The two major areas of the ORI research project evaluation are continuing project evaluation and final project evaluation.

5.3.1 Continuing Project Evaluation

Continuous project oversight occurs throughout the life of every ORI project and is formally performed monthly by the RPP and RPM through progress reports.

The purpose is to ensure that a project is achieving its stated objectives by remaining within scope, on schedule and within budget to the satisfaction of the RPP.

5.3.2 Annual Project Evaluation

The RPP and RPM review the Annual Report to ensure that a project is achieving its stated objectives by remaining within scope, on schedule and within budget to the satisfaction of the RPP.

If the RPP determines that a project is not meeting the noted criteria, the Research Project Sponsor(s) will work with the RPM to determine what actions are necessary to re-orient the project within desired guidelines.

If the RPP determines that results-to-date of a project indicate a poor likelihood of implementation, the Research Project Sponsor(s) will work with the RPM to determine if the project can be re-oriented to meet ODOT needs or if the project should be canceled.



5.3.3 Final Project Evaluation

The RPP and the RPM shall meet following the acceptance of a project final report. The RPM will use the following questions as guidelines to determine the lessons learned and success of the project:

- Were the objectives of the project met to the satisfaction of the customer and other stakeholders?
- Did the project produce all of the expected products?
- Have the customers formally verified and accepted the products produced during the research?
- Did the products meet all functional, performance, and quality specifications?
- Was the final research report written and accepted by ODOT and the FHWA?
- Has the research report been distributed to appropriate depositories and stakeholders?
- Were the research methodologies used appropriate for the subject area?
- Was the project completed within the approved schedule?
- Was the project completed within the approved budget?
- If appropriate, are the research results in the process of being published in a peer reviewed journal?
- Are the anticipated benefits of the research being realized?
- Is the product being implemented by ODOT, or by others?

The RPM is encouraged to use quantitative analyses, such as cost reduction or crash reduction when appropriate, to evaluate the success of a completed project. As part of the evaluation and with input from the RPP, the RPM may recommend further research to ORI management, if needed.

A summary of the final project evaluation meeting will be prepared by the RPM.

Section 6 Research Implementation

6.1 Introduction

ORI places emphasis on applied research as the means of developing products, processes and innovations that can solve the problems facing the transportation infrastructure owners, operators, and users.

ORI research also addresses transportation trends and policies that are driven by increasing demands, limited resources, and greater stakeholder expectations. Research results are most effective when completely implemented in the intended transportation environment.

Towards that goal, a well-developed research implementation strategy is needed to maximize the likelihood of implementing products of completed research. Implementation planning is incorporated through each project plan and is considered an integral part of the research process.

6.2 Roles

6.2.1 ORI Research Implementation Responsibilities

The RPM, together with the RPP and the researcher(s), guide the eventual implementation of research products throughout the research process.

6.2.2 Research Project Manager

The Research Project Manager works with the implementing division representative, Research Project Panel and researcher to enact the implementation plan, per the project proposal. The implementation plan provides the means for the representative to identify the necessary resources, processes, and requirements that will be needed to implement the product of the research.

The RPM reviews and coordinates revisions, as necessary, to the Implementation Plan during the research process and throughout the life of the project, based on research findings, and works with representatives to evaluate and place the research in context with ODOT operations.

6.2.3 Researcher

The researcher plays an important role in the preparation of information, materials, and mechanisms needed to implement the research findings from the research project.

The researcher works with the RPM to confirm that the proposed implementation plan provides suitable mechanisms for implementation, and participates in technology transfer activities, based on results of the project.

The researcher may also participate in the development of marketing brochures, user manuals or other mechanisms appropriate for the implementation of the research results.



6.2.4 Implementing Division Representative

The implementing division representative, typically the Research Project Sponsor or a RPP SME, engages in the project throughout the research process. Their participation is critical since the representative needs to assure that resources will be available to implement the new policy, practice, product, or service. Representatives may be the end-user, a sponsor or a champion on behalf of another public entity.

6.3 Approach

The ORI implementation approach is based on a gradual increase in customer involvement and ownership as the research moves through its progressive phases over time as it leads to the final product.

6.3.1 Implementation

Implementation describes the various activities that are required to put the product of a research project into widespread use. Implementation mainstreams a technology or innovation into an organization's standard operating procedure.

In the context of the ORI research development process, implementation is the adoption of research products within support of the Oklahoma transportation system infrastructure.

6.3.2 Implementation Plan

The implementation plans is a component of the Project Plan for applied research and may be considered a stand-alone Project Plan when used to implement existing research results.

Implementation plans help the RPM and the RPP to identify the expected outcome and to develop a clear implementation strategy at the outset of the research process.

The scope, content and extent of the implementation plan is dependent upon a number of factors, including complexity of research, costs, risks, uniqueness, etc. For simpler projects, the Implementation Plan may be a few pages, whereas for more complex projects, it will be more detailed.

6.3.3 Technology Transfer

Technology Transfer is the process by which research knowledge is communicated or shared by ODOT.

Technology Transfer includes those activities that lead to the adoption of a new technique or product and can involve implementation, dissemination, presentation, demonstration, and training.

Appendix A: Initialisms and Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ACRP	Airport Cooperative Research Program
AWP	Annual Work Program
CFR	Code of Federal Regulations
DOT	Department of Transportation
FAST Act	Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
NCHRP	National Cooperative Highway Research Program
NCRRP	National Cooperative Rail Research Program
ODOT	Oklahoma Department of Transportation
ORI	Office of Research & Implementation
PI	Principal Investigator
R&T	Research and Technology
RPM	Research Project Manager
RPP	Research Project Panel
RSC	Research Steering Committee
SHA	State Highway Account
SME	Subject Matter Expert
SP&R	State Planning and Research
TA	Topic Appraisal
TCRP	Transit Cooperative Research Program
TPF	Transportation Pooled Fund
TRB	Transportation Research Board
US	United States
USC	United States Code
US DOT	United States Department of Transportation
UTC	University Transportation Center

Appendix B: Definitions

Deployable Product:

A deployable product is a research solution that can be implemented by ODOT and its partners.

Implementation:

The various activities that are required to put the product of a research project into widespread use. Implementation mainstreams a technology or innovation into an organization's standard operating procedure.

In the context of the ORI research development process, implementation is the adoption of research products supporting the Oklahoma transportation system infrastructure.

Implementation Plan:

Implementation plans is a section of the project plan that will be used to guide ORI research towards the implementation of the research products.

In-house Research:

In-house research differs from contracted research in that the researcher is an employee of ODOT. The in-house researcher often also serves as the RPM.

Peer Exchange:

An information exchange among transportation research colleagues through which a host State may find the means to restructure or merely fine tune research program processes.

Principal Investigator:

The lead researcher of an approved research project. The PI is responsible for development of the Project Plan. The PI may be an ORI or ODOT staff member, an industry partner staff member or contractor from academia or consultant entity.

Project:

A research project typically consists of a sequence of tasks that results in a deployable product(s) that can be implemented by ODOT and its partners.

Project Plan:

A Project Plan is a dynamic tool that guides the RPM and the stakeholders of the project in execution of the project. This plan explains why the research is being conducted, the anticipated outcome of the project, the perceived benefits of the project, identifies what deployable product is anticipated, and identifies the implementation plan for the deployable product.

The Project Plan also conveys the current planning decisions made related to cost, schedule and scope, together with the constraints facing the project and what additional resources the project will require.



Research Project Manager:

The individual in ORI assigned with technical oversight of a research project, effort or initiative, and who supports the project in coordination of research activity and needs between the Principal Investigator and the Project Panel.

Research Project Panel:

The Project Panel is flexible and varies by the size and complexity of the project. At a minimum, the Project Panel consists of the Research Project Manager and the Research Project Sponsor. The Project Panels' purpose is to guide the research project.

Research Steering Committee:

The Research Steering Committees are representatives from various ODOT working units that prioritize the submitted Topic Statements for the upcoming annual work program.

Subject Matter Expert:

An individual who possesses in-depth technical and/or practical experience and knowledge of a particular subject or topic area.

Technology Transfer:

Technology Transfer is the process by which research knowledge is communicated or shared by ODOT. Technology Transfer includes those activities that lead to the adoption of a new technique or product and can involve information dissemination, demonstration, and training.

Topic Appraisal:

A topic appraisal is a comprehensive overview of historical and on-going national and international work on a potential research problem.



Appendix C: Flow Charts, Schedules and Forms



Figure 1 ~ Office of Research & Implementation Decision Tree / Work Flow Diagram

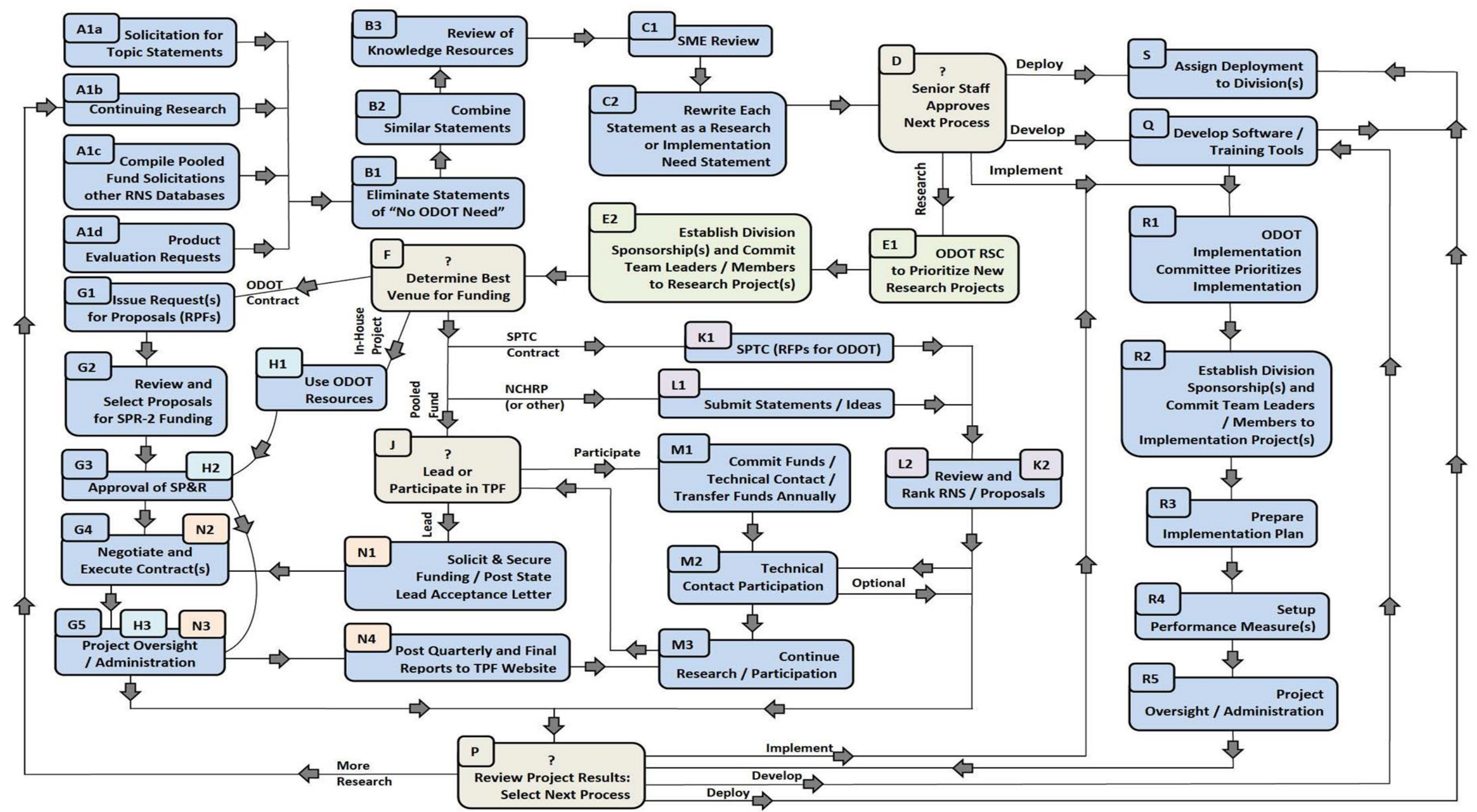


Figure 2 ~ Office of Research & Implementation SP&R Part 2 Activities Timeline

State Planning & Research (SP&R) Part-2 ACTIVITIES TIMELINE													
Milestone A	Establish Research Needs	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	Transportation Research Day												
2	External/Internal Research Topics Solicitation		30th										
3	Categorization and Combination of Research Topics												
4	Research Topics Shortlist w/ Director of Capital Programs												
5	Literature and Database Searches (TRIS, RIP, Pooled Fund Studies,...)				31st								
6	Distr. and Review of Research Topics w/References to ODOT RSC Subject Matter Experts				31st								
7	ODOT RSC Meeting - Discuss/Rank Research Topics Based on Implementation Potential					Mid	Research Steering Committee (RSC) Meeting						
8	Compile Reviews and Rankings					"							
9	Prioritization of Research Topics					"							
10	Request ODOT Senior Staff Concurrence of Research Topics Recommended for Funding					28th							
11	Postings and Notifications RFP's (Submission Forms/Guidelines)												
12	Assignment of ODOT Division Sponsor & Subject Matter Project Panel												
Milestone B	Selection and Approval of Proposals	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	Proposals Submitted w/Sponsoring Division Letter								31st				
2	Distribution of Proposals to ODOT RSC Subject Matter Experts								"				
3	ODOT Subject Matter Expert(s) Review of Proposals									15th			
4	Obtain Commitment of Division Resources (Sponsorship Form)									30th			
5	PI Proposal Revisions (if any)										15th		
6	Approval from Subject Matter Expert(s)										"		
7	Director of Capital Programs Approval										"		
Milestone C	Federal Highway Administration Approval	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	Federal SP&R Part 2 Work Plan Preparation										15th		
2	Submission of SP&R Work Plan - FHWA Concurrence										30th		
3	Federal SP&R Work Plan Approval											31st	
Milestone D	Execution of Contracts	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	Generate Contract w/Proposal attached; No Cost Time Extension's (NCTE)										30th		
2	Transmittal to Contractor for Partial Contract Execution											15th	
3	Route for ODOT Full Contract Execution												
4	Transmittal of Contract Package to Contractor												30th
Milestone E	Project Administration	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	Research In Progress (RIP) Entries & Removals												
2	Project Initiation Meeting - w/Project Panel Members & PI												
3	Invoices w/Progress Reports Processing (Compliance / % complete)												
4	Annual Project Status / Draft Final Reports Submittal												
5	Engineering, Document Formatting & ADA Review of Annual, Draft Final or Final Reports												
6	Project Panel Member Comments for Report Revisions												
7	Distribution of Final Report w/Revisions												



Figure 3 ~ Office of Research & Implementation SP&R Part 2 Implementation Sequence

ODOT IMPLEMENTATION SEQUENCE for Completed Transportation Research													
Milestone A	Selection / Integration of Implementation Statements	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
1	Solicitation for Implementation Statements (I.S.) from Transportation Stakeholders												
2	Select Most Prudent and/or Economically Feasible Implementation Statements												
3	Conduct a Professional Literature Review of Select, I.S. Related, Completed Research												
4	Integration of Implementation Statements												
Milestone B	Preparation / Review of Implementation Plans	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
1	Prepare Implementation Plans with Trackable Performance Measures												
2	Distribution of Implementation Plans w/Synthesis of Literature to ODOT Research Implementation Committee (RIC)												
3	Review Implementation Plans												
4	Revise Implementation Plans												
Milestone C	Approval of Implementation Plans	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
1	ODOT RIC Meeting - Discussion and Approval of Implementation Plans												
2	Submission of Implementation Plans to FHWA												
3	Receive FHWA Concurrence												
Milestone D	Execution of Implementation Plan(s)	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
1	Form Research Implementation Task Group(s) (RITG)												
2	Coordinate Input from stakeholders												
3	Prepare Documentation for Implementation Plan Performance Measures												
4	Setup Budget and Timeline for Implementation Tasks												
5	Initiate Implementation Tasks												
6	Monitor Implementation Performance Measures												
7	Analyze Results of Performance Measures												
8	Prepare Final Research Implementation Report(s)												
Milestone E	Review and Revision of Implementation Report(s)	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
1	Engineering, Documentation & ADA Review of Final Research Implementation Report(s)												
2	Revise Final Research Implementation Report(s)												
3	Distribute Final Research Implementation Report(s)												
		JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY



Figure 4 ~ ORI Research/Implementation Topic Statement



OKLAHOMA DEPARTMENT OF TRANSPORTATION <http://www.ok.gov/odot/>

RESEARCH / IMPLEMENTATION TOPIC STATEMENT

Please submit no later than **November 30th** of current year to be considered for **NEXT FFY** funding.

<input type="text"/>	<input type="text"/>	<input type="text"/>
NAME	TITLE	EMAIL
<input type="text"/>	<input type="text"/>	<input type="text"/>
INSTITUTION	DATE	PHONE NUMBER

TOPIC AREA (CHECK EACH APPLICABLE BOX)

- | | | | | | |
|--|--------------------------------------|---|------------------------------------|--|-----------------------------------|
| <input type="checkbox"/> Admin. / Law | <input type="checkbox"/> Bridge Des. | <input type="checkbox"/> Asphalt Des. | <input type="checkbox"/> PC Design | <input type="checkbox"/> Other Design | <input type="checkbox"/> Freight |
| <input type="checkbox"/> Energy / Envir. | <input type="checkbox"/> Maintenance | <input type="checkbox"/> Mat'ls / Constr. | <input type="checkbox"/> Waterways | <input type="checkbox"/> Soils / Geology | <input type="checkbox"/> Planning |
| <input type="checkbox"/> Rail | <input type="checkbox"/> Safety | <input type="checkbox"/> Traffic | <input type="checkbox"/> Transit | <input type="checkbox"/> Other | <input type="text"/> |

PROPOSED PROJECT INFORMATION

(ONLY A BRIEF DESCRIPTION IS NECESSARY. THOSE THAT SUBMIT THIS FORM MAY BE CONTACTED BY ODOT PERSONNEL FOR FURTHER CLARIFICATION)

<input type="text"/>
PROPOSED PROJECT TITLE

STATEMENT OF PROPOSED NEED: (CHECK ONE) IMPLEMENTATION ☐ RESEARCH ☐

PROPOSED SCOPE OF PROJECT

PROPOSED PROJECT TASKS optional (PLEASE USE A NUMBERED LIST FORMAT)



Figure 4 – ORI Research/Implementation Topic Statement (cont)



**OKLAHOMA DEPARTMENT OF TRANSPORTATION
RESEARCH / IMPLEMENTATION TOPIC STATEMENT**

POTENTIAL BENEFITS

IMPACTED AREAS OF IMPLEMENTATION

ESTIMATED TIME TO COMPLETE (INVESTIGATION, MONITORING, ANALYSIS AND REPORTING)

ADDITIONAL COMMENTS

FORM SUBMISSION

Please submit your Topic Statement form to:

Oklahoma Department of Transportation
Office of Research & Implementation
200 N.E. 21st St. Room G-18
Oklahoma City, OK 73105-3204
(405) 522-3795 Email: ODOT-spr@odot.org

PRINT FORM

RESET FORM


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REVISION: 16.09.2015



Figure 5 ~ ORI Research Project Proposal



OKLAHOMA DEPARTMENT OF TRANSPORTATION <http://www.ok.gov/odot/>
RESEARCH PROJECT PROPOSAL

Please submit no later than May 29th OF THE CURRENT YEAR to be considered for NEXT FFY funding

Click here to enter text.
NAME

Click here to enter text.
TITLE

Click here to enter text.
EMAIL

Click here to enter text.
INSTITUTION

Click here to enter a date.
SUBMISSION DATE

Click here to enter text.
PHONE NUMBER

NOTE: Preparers of this form should be thorough and include detail. Include images, charts, graphs, figures, tables, etc. that describe the proposed project in as much detail as possible. This form is not restricted to a certain number of pages and will be distributed to the ODOT Research Steering Committee (RSC) for review. Incomplete or elementary proposal forms will not be considered. This form should be submitted through the preparer's research administration personnel & the ODOT Materials & Research Division, Research & Implementation Office.

Click here to enter text.
PROJECT TITLE (NOTE: Use the title of the RFP as it appears on the website.)

INTRODUCTION:
Click here to enter text.

OBJECTIVES:
Click here to enter text.

BACKGROUND:
Click here to enter text.

WORK PLAN:
Click here to enter text.

TASKS TO BE PERFORMED:
(NOTE: Each proposed task should include a task number, a brief title and a description of the task)
Click here to enter text.

ANTICIPATED BENEFITS:
Click here to enter text.

IMPLEMENTATION:
Click here to enter text.

EXPECTED DELIVERABLES:
Click here to enter text.

TIME SCHEDULE:
(NOTE: Must be in "chart" form)
Click here to enter text.

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FORM-RPP-TRPS-MRD

REVISION: 10.31.2012

Figure 5 – ORI Research Project Proposal (cont)



OKLAHOMA DEPARTMENT OF TRANSPORTATION <http://www.ok.gov/odot/>

RESEARCH PROJECT PROPOSAL

LITERATURE CITED / REFERENCES:

Click here to enter text.

BUDGET & JUSTIFICATION:

(Facilities and Administrative Costs of 26% are allowed)

Click here to enter text.

PERSONNEL QUALIFICATIONS:

Click here to enter text.

LAB QUALIFICATIONS / QUALITY MANAGEMENT SYSTEM (QMS):

(NOTE: Attach QMS or QMS letter of Exemption Request here. Proposals will not be considered by the ODOT Research Steering Committee (RSC) without a QMS or a QMS letter of Exemption Request attached to this proposal.)

Click here to enter text.


Will this project conform to the strategic plan of the
Southern Plains Transportation Center?

YES ☐ NO ☐ N/A ☐

Additional information pertinent to the proposed project described in this document may be attached to the end of this form.



Figure 6 ~ ORI Implementation Project Proposal



OKLAHOMA DEPARTMENT OF TRANSPORTATION <http://www.ok.gov/odot/>

IMPLEMENTATION PROJECT PROPOSAL

Please submit no later than **May 29th OF THE CURRENT YEAR** to be considered for **NEXT FFY** funding

Click here to enter text.

Click here to enter text.

Click here to enter text.

NAME

TITLE

EMAIL

Click here to enter text.

Click here to enter a date.

Click here to enter text.

INSTITUTION

SUBMISSION DATE

PHONE NUMBER

NOTE: Preparers of this form should be thorough and include detail. Include images, charts, graphs, figures, tables, etc. that describe the proposed project in as much detail as possible. This form is not restricted to a certain number of pages and will be distributed to the ODOT Implementation Steering Committee (ISC) for review. Incomplete or elementary proposal forms will not be considered. This form should be submitted through the preparer's research administration personnel & the ODOT Materials & Research Division, Research & Implementation Office.

Click here to enter text.

PROJECT TITLE (NOTE: Use the title of the RFP as it appears on the website.)

INTRODUCTION:

OBJECTIVES:

BACKGROUND:

WORK PLAN:

TASKS TO BE PERFORMED:

(NOTE: Each proposed task should include a task number, a brief title and a description of the task)

ANTICIPATED BENEFITS:

PERFORMANCE MEASURES:

EXPECTED DELIVERABLES:

TIME SCHEDULE:

(NOTE: Must be in "chart" form)

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REVISION: 5.18.2015

Figure 6 – ORI Implementation Project Proposal (cont)



OKLAHOMA DEPARTMENT OF TRANSPORTATION <http://www.ok.gov/odot/>

IMPLEMENTATION PROJECT PROPOSAL

LITERATURE CITED / REFERENCES:

Click here to enter text.

BUDGET & JUSTIFICATION:

(Facilities and Administrative Costs of 26% are allowed)

Click here to enter text.

PERSONNEL QUALIFICATIONS:

Click here to enter text.


LAB QUALIFICATIONS / QUALITY MANAGEMENT SYSTEM (QMS):

(NOTE: Attach QMS or QMS letter of Exemption Request here. Proposals will not be considered by the ODOT Implementation Steering Committee (ISC) without a QMS or a QMS letter of Exemption Request attached to this proposal.)

Click here to enter text.

Additional information pertinent to the proposed project described in this document may be attached to the end of this form.

Figure 7 ~ ORI Project Progress Report



OKLAHOMA DEPARTMENT OF TRANSPORTATION <http://www.ok.gov/odot/>
RESEARCH PROJECT PROGRESS REPORT

<div>Click here to enter text.</div> <div>PRINCIPAL INVESTIGATOR</div>	<div>Click here to enter text.</div> <div>INSTITUTION</div>	<div>Click here to enter text.</div> <div>SP&R ITEM NUMBER</div>
<div>Click here to enter a date.</div> <div>WORK PERIOD FROM</div>	<div>Click here to enter a date.</div> <div>WORK PERIOD TO</div>	

Click here to enter text.

PROJECT TITLE

ACCOMPLISHMENTS BY TASK NUMBER:
(Include every task, corresponding task number, title, description, reporting period accomplishments and an estimated % complete)

Click here to enter text.

PROBLEMS ENCOUNTERED:

Click here to enter text.

PLANNED WORK ACTIVITIES:

Click here to enter text.

REVISIONS TO TIMELINE:

Click here to enter text.

ADDITIONAL COMMENTS:

Click here to enter text.

Additional information pertinent to the project described in this document may be attached to the end of this form.

Figure 8 ~ ORI Division Sponsorship / Research



OKLAHOMA DEPARTMENT OF TRANSPORTATION <http://www.ok.gov/odot/>
DIVISION SPONSORSHIP / NEW RESEARCH

Click here to enter text.

DESIGNEE

Click here to enter text.

PHONE

Click here to enter text.

E-MAIL

Click here to enter text.

DIVISION ENGINEER / HEAD

SIGNATURE

Click here to enter text.

PROJECT TITLE

NUMBER OF HOURS AVAILABLE PER MONTH:

Click here to enter text.

NUMBER OF TRAVEL DAYS AVAILABLE PER YEAR:

Click here to enter text.

WILL LEAD OR ASSIST:

Click here to enter text.

WILL REVIEW REPORTS (PROGRESS/DRAFT/FINAL):

Click here to enter text.

ADDITIONAL COMMENTS:

Click here to enter text.

Additional information pertinent to the project described in this document may be attached to the end of this form.

spr@odot.org

*Ron F. Curb, P.E., CPM
Engineering Manager
Research & Implementation
Materials & Research Division*

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FORM-DS-RIG-MRD

REVISION: 02.10.2015



Figure 9 ~ ORI Division Sponsorship / Implementation



OKLAHOMA DEPARTMENT OF TRANSPORTATION <http://www.ok.gov/odot/>
DIVISION SPONSORSHIP / IMPLEMENTATION

DESIGNEE

PHONE

E-MAIL

DIVISION ENGINEER / HEAD

SIGNATURE

PROJECT TITLE

NUMBER OF HOURS AVAILABLE PER MONTH:

NUMBER OF TRAVEL DAYS AVAILABLE PER YEAR:

WILL LEAD OR ASSIST:

WILL REVIEW REPORTS (PROGRESS/DRAFT/FINAL):

ADDITIONAL COMMENTS:

Additional information pertinent to the project described in this document may be attached to the end of this form.

spr@odot.org

*Ron F. Curb, P.E., CPM
Engineering Manager
Research & Implementation
Materials & Research Division*

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FORM-DS-RIG-MRD

REVISION: 02.10.2015



