RESEARCH PROCEDURES MANUAL

Oregon Department of Transportation

Oregon Department of Transportation
Research Section
555 13th St NE
Salem, OR 97301

March 2017

U.S. Department of Transportation
Federal Highway Administration

Oregon Division

March 23, 2017

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Mr. Michael Bufalino
ODOT Research Group Manager
Oregon Department of
Transportation
555 13th St. NE, Ste. 1
Salem, Oregon 97301-6897

RE: Oregon Department of Transportation (ODOT) Research Procedures Manual

Dear Mr. Bufalino:

We have received ODOT's March 2017, Research Procedures Manual. The updated version, among other changes, clarified the Transportation Pooled Fund Program process, added new sections describing ODOT's Library, Local Technical Assistance Program (LTAP), and Tribal Technical Assistance Program (TTAP).

Based on our review of the manual, we find this update acceptable and approve the updated Research Procedures Manual as required in 23 CFR §420.209(b). We appreciate your continued hard work and dedication to improve the Research program. If you have any questions, please contact me at (503) 316-2561 or jasmine.harris@dot.gov.

Sincerely,

Jasmine Harris
Transportation Planner/Civil Rights Specialist

RESEARCH PROCEDURES MANUAL

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LIST OF ACRONYMS

ACRONYM	STANDS FOR:
AASHTO	American Association of State Highway and Transportation Officials
APTA	American Public Transit Association
ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulations
ETG	Expert Task Group
FAST Act	Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
IDEA	Ideas Deserving Exploratory Analysis program
ITS	Intelligent Transportation Systems
LTAP	Local Technical Assistance Program
NAS	National Academy of the Sciences
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NIST	National Institute for Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
ODOT	Oregon Department of Transportation
PI	Principal Investigator
RAC	Research Advisory Committee
RD&T	Research, Development and Technology Transfer
SHRP	Strategic Highway Research Program
SPR	State Planning and Research
T2	Technology Transfer
TAC	Technical Advisory Committee
TCRP	Transit Cooperative Research Program
TDC	Transit Development Corporation
TPF	Transportation Pooled Fund Program
TRB	Transportation Research Board
TRIS	Transportation Research Information Services
TTAP	Tribal Technical Assistance Program
USDOT	United States Department of Transportation
UTC	University Transportation Center

1.0 INTRODUCTION

ODOT's mission is "to provide a safe, efficient transportation system that supports economic opportunity and livable communities for Oregonians." The Research Section at ODOT helps support this mission through robust applied transportation research. This Procedures Manual summarizes the background, organization, and funding of the Research Program, and provides a detailed description of the full cycle of the research process including: 1) program development and review, 2) project oversight and reporting, and 3) implementation and technology transfer. The purpose of this manual is to provide insight into ODOT's Research Program and guide employees through ODOT's research process.

1.1 BACKGROUND

Research, one of the principal missions of the first national highway program in the United States, is the oldest continuous federal highway activity. The Federal Highway Act of 1921 authorized the first sustained fiscal support for highway research. Support for highway research was reaffirmed in the Federal-Aid Highway Act of 1962, which mandated funds for planning and research purposes only. The Intermodal Surface Transportation Efficiency Act of 1991 required a minimum of 25 percent of the State Planning and Research (SPR) funds to be expended on research, development and technology transfer activities. In 1998 Congress passed the Transportation Equity Act for the 21st Century. In 2005 Congress passed the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users. In 2012 Congress passed the Moving Ahead for Progress in the 21st Century Act (MAP-21), reaffirming support for transportation research by continuing mandated funding, and on December 4, 2015, President Obama signed into law Public Law 114-94, the Fixing America's Surface Transportation Act (FAST Act).

The authority for the State research organization to use federal funds is found in Title 23, United States Code, 307(c). The authority for the State to administer the State Planning and Research (SPR) funds in the program is found in Title 23, Code of Federal Regulation, Part 420, Subpart B.

Based on the recognition that research delivers value and the federal mandate for transportation research, the Oregon Department of Transportation (ODOT) created the Research Section within the Agency's Transportation Development Division. In addition to its research function, the Research Section is also responsible for the ODOT Library and the Technology Transfer Center.

1.2 RESEARCH MISSION

The mission of the Research Section is to facilitate improvement in the state transportation system, focusing on the following areas of transportation:

- Safety
- Access and mobility
- Durability and service life
- Environmental impact
- Cost savings and cost avoidance

The Research Section serves within the context of the ODOT mission: “To provide a safe, efficient transportation system that supports economic opportunity and livable communities for Oregonians”, and helps Oregon partner with the FHWA and implement a national mission: “To improve mobility on our Nation's highways through national leadership, innovation, and program delivery”.

2.0 ORGANIZATION

The Research Section manages the Research Program, the ODOT Library, and the Technology Transfer (T2) Center. The Section is comprised of the section manager, eight research coordinators, one librarian, two administrative staff, the T2 Center director, and four part-time staff that provide T2 Center training. The Research Section staff are listed in the Research Section's web page here.

2.1 RESEARCH PROGRAM

2.1.1 Responsibilities

The primary responsibilities of the Research Section are to coordinate, administer, and supervise research activities within the agency; to conduct research projects; to assure the use of proper research methods; to prevent duplication of effort; to cooperate and communicate with other agencies doing transportation research; to assist other transportation providers by sharing and disseminating new technology and research findings; to serve as an information source; and to promote the implementation of research findings. Specific responsibilities of the Section include the following:

- Solicit transportation users for research needs.
- Review all research problem statements and obtain the information necessary to formulate a research program.
- Participate on committees.
- Select principal investigators for each project and the personnel for project oversight.
- Conduct literature searches and reviews.
- Conduct research projects.
- Assist in the preparation of reports covering the results of research, and work with key personnel to identify opportunities for implementation of research results.
- Promote the implementation of the research findings through distribution of research results to appropriate persons for their consideration and use.
- Manage Transportation Pooled Funds.
- Provide expertise for ODOT in specialty areas such as research design, research data management and analysis and research consultant selection.
- Participate in state-sponsored seminars and training meetings to help implement new research findings.

- Provide a liaison with FHWA, universities, consultants, and other agencies conducting and supporting research for the ODOT.
- Provide a continuous liaison and monitoring of progress and expenditures for all research projects.
- Provide liaison with the Transportation Research Board and the Cooperative Research Programs (NCHRP, TCRP).
- Prepare annual and biennial budgets for federally supported research activities.

A principal implementing document for the Research program is the Biennial Work program, "State Planning and Research: Part II - Research." This document describes how the ODOT Research Section uses FHWA funds provided under Title 23, Code of Federal Regulations, Part 420. This and other sources of funds are described more completely in Section 3.

2.1.2 Program Oversight Committee Structure

Like most applied research programs, one key to success is effective problem identification. Research ideas are presented to the Research Section in the form of written problem statements. Two tiers of committees are primarily responsible for decisions related to prioritizing and choosing how to address transportation problems faced by ODOT. These committees work together to review, refine and prioritize ODOT's research needs. They are structured to effectively solicit and incorporate input from within ODOT as well as from key partner organizations such as Oregon counties, Metropolitan Planning Organizations, Oregon Universities, and cities.

2.1.3 Research Advisory Committee (RAC)

2.1.3.1 Membership

Committee membership is drawn from high-level ODOT management partner universities, University Transportation Consortiums, the Research Section and the Federal Highway Administration . The RAC membership is provided on the Research Section's web page here.

2.1.3.2 Responsibilities

The RAC advises the research manager on the overall direction and conduct of the ODOT Research program. The RAC reviews pooled fund investments and sets strategic direction for the Program. It also reviews and prioritizes problem statements in the final stage of project selection.

2.1.3.3 Meeting Frequency

The committee meets at least once a year to select projects. A policy oriented meeting is sometimes scheduled for the fall. The RAC also conducts business via email related to pooled fund participation, review of research priorities, and other ad hoc business.

2.1.4 Expert Task Groups (ETGs)

2.1.4.1 Membership

The ETGs consist of a research coordinator, a FHWA representative, and three to seven technical experts. Committee membership is drawn from within the agency, Oregon universities, the FHWA, and occasionally representatives from the private sector. Members are selected based on their knowledge and experience in the ETG topic areas. The research coordinator chairs the ETG. The ETG categories and membership are provided online.

2.1.4.2 Responsibilities

ETGs establish research priorities for their technical areas. ETG research priorities are reviewed annually and revised as appropriate. ETG research priorities should be consistent with the overall direction and priorities set by the RAC. The RAC's priorities are published annually at the same time as the research project solicitation to encourage project submittals in the areas of interest.

Each ETG reviews problem statements received during project solicitation that pertain to transportation issues relevant to that particular ETG. Each ETG recommends two to three problem statements for further development, which are then reviewed by the RAC during the final project selection. The ETGs also recommend which projects should consider alternate funding sources. ETG members are invited to participate in annual NCHRP research project balloting.

2.1.4.3 Meeting Frequency

The ETGs typically meet once a year to review and nominate problem statements in their areas. Prior to each annual problem statement solicitation, ETGs review and, if necessary, update their priorities. This review may be done through a meeting or by email.

2.2 LIBRARY

2.2.1 Responsibilities

The ODOT Library provides resources and research assistance to members of the Research Section, as well as other portions of the Dept. of Transportation, various public agencies, and the general public. These resources may include articles and publications (either hard-copy or electronic), topical research and literature reviews. Interlibrary loans are used to access items that are not directly available through the library collection. Additionally, the library networks with other transportation libraries worldwide to provide a broad spectrum of resources for patron use.

2.3 TECHNOLOGY TRANSFER CENTER

The Local Technical Assistance Program (LTAP) and Tribal Technical Assistance Program (TTAP) are composed of a network of 58 Centers – one in every state, Puerto Rico and regional centers serving tribal governments. The LTAP/TTAP Centers enable local counties, parishes, townships, cities and towns to improve their roads and bridges by supplying them with a variety of training programs, an information clearinghouse, new and existing technology updates, personalized technical assistance and newsletters.

2.3.1 Purpose

Through these core services, Centers provide access to training and information that may not have otherwise been accessible. Centers are able to provide local road departments with workforce development services; resources to enhance safety and security; solutions to environmental, congestion, capacity and other issues; technical publications; and training videos and materials.

The purpose of the Oregon Technology Transfer (T2) Center is to help local transportation agencies obtain information and safety training on transportation technology relating to roads, bridges and public transportation. More information is available here.

2.3.2 Responsibilities

The primary responsibilities of the T2 Center is to coordinate and deliver training classes and technical assistance related to maintenance activities to public agencies throughout Oregon including current research and findings. The T2 Center advises on the transfer of research findings to practice and disseminates new practices to customers.

3.0 RESEARCH FUNDING PROGRAMS AND RESOURCES

3.1 FUNDING

Several funding programs are available to the Research Section. The largest source is the State Planning and Research (SPR) program. The second source is the State program, which is generally used to address smaller but more urgent problems. Other programs are also used and are described in more detail in the following sections.

3.1.1 SPR Funds

The ODOT SPR Research program supports research, development and technology transfer (RD&T) activities relating to highway, public transportation and intermodal transportation systems. Requirements for the SPR program are described in 23 CFR 420.

These funds require 20 percent local participation or match. The ODOT Research Advisory Committee provides general oversight of ODOT's SPR Research program, and in particular, to decide how these funds shall be utilized by prioritizing research needs and selecting projects.

No more than five percent of funds in each annual work program are set aside for small, quick hit projects. Through the course of the fiscal year the Research Section receives requests for information and a variety of other requests to perform research on emerging issues, often with short timelines and requiring a quick response. The quick hit project fund provides greater funding flexibility to take advantage of these opportunities when they arise. Quick hit projects generally receive no more than $20,000 in a year. Projects funded through the discretionary fund do not require specific approval from the Research Advisory Committee.

3.1.2 State Funds

It is important to distinguish between state funds per se, and Oregon State Highway Funds. In this section, unless otherwise noted, the phrase "state funds" is used to designate funds from any State of Oregon source.

State funds are used primarily in three ways by ODOT's Research program. First, state funds are used to cover indirect costs.

Second, state funds are used as the primary source of matching funds to cover the 20 percent share required for the SPR program. It should be noted, however, that the Oregon State Highway Fund is dedicated for highway use, and thus is not always eligible to be used as match for research projects that focus on public transit or non-highway transportation systems. In such cases care needs to be taken to assure that a compatible non-federal source of matching funds is obtained.

Finally, there is a State Research program, funded specifically with Oregon Highway Funds. The level of funding available for this Program varies. There are two primary differences between the SPR and State Research programs. First, the State program is exclusively for highway research. Second, the research manager, not the ODOT Research Advisory Committee, selects projects for the State Research program.

3.1.3 FHWA Transportation Pooled Fund Program (TPF)

The TPF program is not a separate source of funds, but a program through which funds from multiple states can be leveraged to solve common problems in transportation. A pooled fund project is initiated when a lead agency circulates a proposal and invites other states to contribute funds. The lead agency may be FHWA, or any state DOT.

Once the lead agency has gathered enough commitments to make the project financially viable, FHWA reviews the proposal for compliance with requirements and approves the project to go forward, and may waive the 20 percent match requirement, if asked to do so. Each participating state designates a financial and a technical contact for the project. The technical contact serves on a Technical Advisory Committee (TAC) which finalizes a work plan, review proposals, and reviews reports and other work products. The TAC is the vehicle through which each participating state has a role in oversight of the project.

The key advantage offered by a pooled fund project is the streamlining of financial administration. FHWA plays a role in every pooled fund project analogous to that of a bank account or an escrow fund. Also, while every state has its own financial standards, in Oregon, obligating Federal funds to a TPF project led by another agency has no budget impact, because Oregon neither receives nor spends those Federal funds.

Pooled fund solicitations are posted at any time. The ODOT research manager may independently commit up to $10,000 to a specific pooled fund project. For commitments greater than $10,000, the Research Advisory Committee must be consulted. RAC pooled fund commitment decisions are usually made via e-mail.

FHWA maintains a website dedicated to the selection and administration of pooled funds. ODOT will follow the published federal procedures for initiating a pooled fund, recording a commitment of funds, and transferring funds to a TPF lead agency. More information and program guidance for the pooled fund program can be found here.

3.1.4 Other Funding Sources

3.1.4.1 Cooperative Research Programs

There are five Cooperative Research Programs managed by the Transportation Research Board (TRB), these include:

- National Cooperative Highway Research Program (NCHRP)
- Transit Cooperative Research Program (TCRP)
- Airport Cooperative Research Program (ACRP)
- Hazardous Materials Cooperative Research Program (HMCRP)
- National Cooperative Rail Research Program (NCRRP)

With the exception of NCHRP, which is funded voluntarily by state departments of transportation based on a percentage of their SPR funding, these programs are funded directly by the USDOT. Each program accepts problem statements and selects projects annually. Projects are carried out by contractors with the oversight of TRB Cooperative Research program's staff and a panel made up of interested and knowledgeable stakeholders.

NCHRP is by far the largest of these programs. Also of note, there are several sub-programs within NCHRP. Of particular interest are the NCHRP Syntheses and NCHRP IDEA Programs, both funded with a set-aside from NCHRP. The Synthesis program selects and carries out small projects which gather data from the 50 states on current practices in a defined area, to produce a "synthesis of current and best practices." The NCHRP IDEA (Innovations Deserving Exploratory Analysis) develops transportation related inventions and other intellectual property for the benefit of the transportation industry as a whole.

3.1.4.2 University Transportation Centers Program

University Transportation Centers (UTCs) receive annual funding from the USDOT Research and Innovative Technologies Administration (RITA). The ODOT Research program seeks opportunities to jointly fund projects with University Transportation Centers.

The goals of University Transportation Centers are not perfectly aligned with state DOT programs. Each UTC has a stated theme which concentrates their research efforts in a specified area within transportation, whereas DOT research programs tend to be eclectic, at least in the long run. Second, UTC research is expected to emphasize basic and advanced research, whereas DOT research programs tend to have a much more applied emphasis. Consequently, working with a UTC can be a challenge, and not every project is suitable for UTC/DOT collaboration. The two main UTC's we work with are NITC (National Institute for Transportation and Communities), which PSU is a member of, and PACTRANS (Pacific Northwest Transportation Consortium), of which OSU is a member

3.1.4.3 Experimental Features Program

The FHWA Experimental Features program affords state DOTs the opportunity to test and evaluate new technology on Federal Aid highway projects. Experimental Features does not fund research. Instead, it will provide funds to replace the "feature" with conventional technology if and when the new technology fails.

An Experimental Features project can be initiated through the FHWA Oregon Division Office. The main requirement is that the feature be installed on a federally funded highway project. The "research" usually takes the form of a monitoring project which entails careful documentation of the construction/installation process in a Construction Report, followed by ongoing monitoring of performance in the field, concluding with an evaluation report. Funding for the research itself generally comes from the Research Discretionary Fund or the State Research program.

3.1.4.4 Miscellaneous Funding Sources

In any Federal Transportation Authorization bill there are programs, funding grants and cooperative agreements that may be of interest to ODOT Research. ODOT Research will evaluate these funding opportunities based on the goals of the research program as compared to the intended purpose of the grant program. Any application for grant funds will consider agency resources and the need for state legislative action to accept and spend additional funds. There is a requirement to obtain both Oregon Transportation Commission (OTC) and legislative approval to apply for Federal grants.

4.0 RESEARCH PROGRAM DEVELOPMENT AND REVIEW

4.1 PROBLEM STATEMENT SOLICITATION

4.1.1 Purpose

Federal regulations, specifically 23 CFR 420.205 (c), states that "states are encouraged to develop, establish and implement an RD&T program…that anticipates and addresses transportation concerns before they become critical problems." The ODOT Research program has developed an approach to accomplish this objective.

Research priorities are developed through annual review by Research Advisory Committee and the Expert Task Groups. This process helps to identify areas for concern, but it is difficult to translate those areas of concern into viable research projects.

In the fall of each year the Research program issues an open call for research ideas, or research problem statements. Participation is open to anyone. Typically 100 or more new problem statements are received every year. For the most part, problem statements are prepared by ODOT employees, university researchers, other state and local transportation agencies, other research organizations, or consultants, emphasizing the "bottom up" approach.

The ODOT Research Section believes that the integration of the "top down" process of priorities development and the "bottom up" process of an open problem statement solicitation adds value to the problem identification process in several important ways. First, alignment with high priorities is not the only important criteria in research project selection. Considerations of cost, risk, and researchability are at least as important. By drawing from among 100 or more problem statements, it is often possible to find ideas that not only address important priorities, but also are affordable, researchable, and have a reasonable probability of success.

Second, the process of identification of priorities is biased toward the perspectives of middle and upper management. The open solicitation engages the views and taps the knowledge of people on the front lines. The Research Section believes that to be successful, one needs to find common ground by engaging both perspectives. A top down process runs the risk of committing to research nobody will use. It also tends to lead to selection of high risk/high reward projects, and consequently, a high rate of failure. A strictly bottom up approach runs the risk of finding effective solutions to relatively trivial problems.

Finally, the Research Section firmly believes that the key to successful research implementation is to engage the primary agents of implementation in the research from the very beginning. This approach is well suited to ODOT because of issues of scale. In terms of key technical, professional and engineering staff, ODOT is frequently limited in staffing capacity for particular technical skills. In many ways this is a key area of vulnerability, but from the standpoint of research implementation, it means the institutionalization of innovations can usually be carried out by engaging a small group.

It is therefore through a process that combines aspects of a "top down" and a "bottom up" approach to project selection that the ODOT Research program can meet multiple objectives of addressing strategic priorities, select projects with a high probability of success, and greatly increase the likelihood that results from successful projects will be implemented.

4.1.2 Procedures

4.1.2.1 Participants

In the spirit of integrating the top-down and bottom-up approach to selecting research anyone is welcome to submit a research problem statement. The primary customers for research are the managers, engineers, planners and other transportation professionals within the agency who have the responsibility to plan, design, construct, operate and maintain Oregon's transportation systems. Annual solicitation requests are forwarded to all ODOT units, encouraging all staff to submit problem statements.

Participation is also welcome from partner organizations such as the FHWA, universities with civil engineering and graduate transportation programs, private transportation associations, local governments, public transit agencies, trucking associations and associations representing contractors and suppliers. Some of these organizations have research capabilities; others contribute expertise and diversity of perspective that is invaluable in the process of transportation problem identification. From experience, one key to success is to facilitate collaboration between ODOT staff and professional researchers. These collaborations tend to yield problem statements that are more likely to be viable in terms of research ability, while also addressing a well-defined ODOT need.

Solicitation & Award Process of Research funds to Colleges/Universities – Not only must the process be implemented in a non-discriminatory manner, the process must also identify and ensure that Minorities In Higher Education institutions (including Hispanic Serving Institutions and Tribal Serving Institutions) are afforded opportunities to compete for the award of Research funds. ODOT will check the U.S. Department of Education list on an annual basis for Oregon schools prior to advertising our annual solicitation for project proposals.

4.1.2.2 Methodology

4.1.2.2.1 Solicitation and Stage 1 Review

Annual requests for problem statements (Stage 1 proposals) are sent to internal and external participants. The current Stage 1 problem statement format can be found online.

Upon receipt, the problem statements are assigned to a research coordinator, representing a specific ETG, to review based on the topic area of the submissions. Projects related to more than one ETG topic area are reviewed by the research coordinators chairing each of the appropriate ETGs. It is the responsibility of

each research coordinator to review the Stage 1 problem statements in time for their respective winter ETG meeting.

Research coordinators may need to meet to discuss a problem statement with a submitter in order to obtain more information about the problem. This information is used in discussions with the affected units and to conduct a scan of the literature. A follow-up discussion may then be held with the submitter to refine the problem statement as needed. Sometimes further discussion leads to withdrawal or deferral of a problem statement.

The research coordinator discusses the effect of research on the problem with other key staff and managers to determine the extent of agreement about the nature and severity of the underlying issue and to assess support for implementing a potential solution. This is particularly important if the problem statement originated outside ODOT.

After discussing the problem with the submitter and the affected units, the research coordinator, in collaboration with submitter when appropriate, conducts a brief literature search. This helps avoid duplication and often provides information about methods, pitfalls, and closely related topics that is of value in preparing a Stage 2 problem statement.

Stage 1 problem statements are reviewed by the ETGs in meetings that are generally held in December and January. Each ETG member ranks or rates the proposals. Methods of prioritization may vary at the discretion of each ETG. Discussions include project need, whether the approach is viable, related to completed or in-progress research, risk, cost, and alternative funding. Up to three projects are selected by each ETG for Stage 2 problem statement development and RAC consideration. Problem submitters and other interested parties may contact the research coordinator following the ETG meeting for feedback on specific problem statements.

4.1.2.2.2 Stage 2 Development

For each problem statement selected by the ETGs for further consideration, the research coordinators work with proposal submitters and ODOT personnel to develop a Stage 2 problem statement. Key components include the research objectives, a brief summary of work tasks, cost estimate, duration, implementation plan, and potential benefits. ETG members are given the option to review the Stage 2 problem statement for completeness and quality. When complete the Stage 2 problem statements are available online.

4.1.2.3 Literature review

Every problem statement should be the subject of at least a brief literature search. It is particularly important that a literature search be completed on a problem statement selected for Stage 2 development. The purpose of a literature review is to assure that the proposed research does not duplicate other efforts, but it is also useful in developing and

refining a research approach by adopting methods and avoiding pitfalls encountered by others during the conduct of closely related research. The Transportation Research Information Database (TRID) or Transportation Research in Progress (TRIP) provided by the Transportation Research Board is the primary source for these literature reviews. Other sites useful for finding previous literature include websites such as Sciencedirect.com and Google Scholar.

4.2 PROJECT SELECTION

Problem statements received during the annual solicitation are taken through a highly structured review process. Steps in that process are listed below.

1. New problem statements are grouped by subject, according to the subject areas identified for the Expert Task Groups (ETGs).
2. Research coordinators give each problem statement an initial read, conduct a brief scan of the literature usually based on a TRID, TRIP, Science Direct, etc. search, and may contact the submitter to get more information if the objectives of the problem statement are not clear. A step in this process involves determining how the research would likely be implemented, and working with the problem statement submitter and the affected units to gain some assurance that the proposed research has the support of key agents of implementation. Contact the project sponsors to make sure they are aware of this project, support it and are interested in implementing it.
3. Research coordinators meet and briefly discuss each problem statement. The primary purpose of this meeting is to determine whether a problem statement should be reviewed by more than one ETG.
4. ETG meetings are scheduled and problem statements to be reviewed by each ETG are sent to ETG members at least several days prior to the meeting. ETGs typically review between 10 and 30 problem statements.
5. ETG members are asked to give the problem statements a preliminary ranking. They are instructed to consider their Group's stated priorities when ranking problem statements.
6. ETGs meet and discuss preliminary rankings. They use a variety of methods to achieve consensus, but in the end, each ETG nominates two problem statements to continue to compete for funding.
7. The research coordinator, in consultation with the project submitter and other pertinent ODOT personnel and sometimes with a potential investigator, works to develop a Stage 2 problem statement. It is also at this point that the research coordinator must decide whether to seek University Transportation Center (UTC) participation and funding. If the decision is yes, an investigator is brought on board and a Stage 2 problem statement is developed along with a UTC proposal.
8. Completed Stage 2 problem statements are sent to the ODOT Research Advisory Committee (RAC) at least one week prior to the RAC Meeting. RAC members

receive rating instructions and review and rate the problem statements. They return their preliminary ratings to the Research Section manager.

9. During the first portion of the RAC meeting, each Stage 2 problem statement is summarized, and RAC members are given the opportunity to discuss the problem statement.
10. After discussions are completed, a list of projects is provided to the RAC, with projects listed in order of their preliminary ratings. Discussion continues, and RAC members are given an opportunity to revise their preliminary ballots based on new information obtained from the discussion. Revised project ratings are then averaged and there is continuing discussion of the new list.
11. At this point in the year, funding available for new projects is only a very crude estimate, so there is discussion of funding, and where the cut is likely to fall. Subsequent discussion focuses on 3-4 projects likely to be at the margin. If necessary a third ballot may be taken to resolve ties in that range.
12. Minutes of the RAC meeting are drafted and reviewed by all in attendance, then published.

4.3 STRATEGIC PLANNING

4.3.1 Purpose

Strategic planning is one tool (the other is the Peer Exchange) to periodically revitalize some selected aspect of ODOT's Research program. For this process, program stakeholders are brought together for a structured activity, usually a facilitated meeting, designed to consider and weigh the benefits of alternative ways of doing business. Potential topics for strategic planning include revamping research priorities, or improving some aspect of Research program management such as problem identification and selection, project management, research implementation or research marketing.

4.3.2 Procedures

The Research Section initiates strategic planning sessions as needed, but generally they occur every five years. Participants include research staff, all ETG and RAC members, selected TAC members, selected executive level managers, academics and other key program stakeholders. A meeting venue is selected which is typically off-site, in part because ODOT has few meeting rooms that can accommodate a large group, and in part to encourage fresh perspectives and independent thought. The meeting is structured with a detailed agenda, breakout sessions and involvement of one or more facilitators, with the specific structure adapted to the focus and goals of the meeting. Duration of the meeting is typically 4-6 hours.

4.4 FHWA OVERSIGHT

4.4.1 Conditions for Grant Approval

On July 23, 1994, FHWA issued a final rule for 23 CFR Parts 420, Subpart B and 511, State Planning and Research program Administration that set administration of the SPR program. The regulations in 23 CFR Part 420 were further amended on July 18 (Link to document).

23 CFR Part 420 Subpart A identifies the administrative requirements that apply to use of FHWA planning and research funds both for planning and for research, as well as for development and technology transfer (RD&T) activities. Subpart B describes the policies and procedures that relate to the approval and authorization of RD&T work programs. Section 420.209 in Subpart B contains the conditions that ODOT must comply with in order to receive grant approval from the FHWA.

Research section work is completed in partnership with the FHWA. This includes regular coordination with the FHWA Oregon Division office. Regular programmatic coordination includes the development of an annual SPR research work program (Section 4.4.2) an annual report of progress (Section 4.4.3), and the hosting of a multi-state peer exchange (Section 4.5.1) once every five years. The Research Section sends a request to the Oregon Division Office for a FHWA representative on project advisory committees (Section 5.3.2) The Oregon Division Office revives quarterly progress reports for each active research project.

4.4.2 Work Program Requirements

4.4.2.1 Purpose

There are many documents assembled by the Research Section that help define and justify the expenditure of resources. The *Research Work Program* is the single document that concisely describes all the research activities undertaken both on a technical and financial basis for the State Planning and Research Part 2 program.

4.4.2.2 FHWA requirements

The RD&T work program requirements needed to meet the FHWA regulations defined in Section 23 CFR 420.207 are as follows:

"(a) The State DOT's RD&T work program must, as a minimum, consist of a description of RD&T activities to be accomplished during the program period, estimated costs for each eligible activity, and a description of any cooperative activities including the State DOT's participation in any transportation pooled fund studies and the NCHRP. The State DOT's work program should include a list of the major items with a cost estimate for each item. The work program should also include any study funded under a previous work program until a final report has been completed for the study.

(b) The State DOT's RD&T work program must include financial summaries showing the funding levels and share (Federal, State, and other sources) for RD&T activities for the

program year. State DOTs are encouraged to include any activity funded 100 percent with State or other funds for information purposes.

(c) Approval and authorization procedures in § 420.115 are applicable to the State DOT's RD&T work program."

4.4.2.3 Equipment Purchase Requirements

Projects requiring the purchase of equipment will have a list of anticipated equipment to be purchase in the Work Program description of the project. The Research Section will work with ODOT Financial Services to set up an appropriate expenditure account for the purchase of equipment.

4.4.3 Annual report

An annual report summarizing the previous year's RD&T program shall be completed after the end of the State fiscal year. It is intended to be retrospective, focusing on highlights of ongoing and completed projects, and other research results and accomplishments. The report is intended for a broad audience of non-technical users. The target for completion of each fiscal year's Annual Report is December 1 of the following year.

4.5 PROGRAM EFFECTIVENESS

4.5.1 Peer Exchange

4.5.1.1 Purpose

The performance of a research program is measured by its implementation of results and its timely solutions to agency problems. One technique designed to improve the quality of the program is a peer exchange of the management process. A team with knowledge of state research programs can bring its expertise to provide recommendations to enhance the Research Section's performance. 23 CFR 420.209 requires that a peer exchange be completed on a periodic basis. FHWA interprets that to mean that a peer exchange shall be completed approximately every three years.

4.5.1.2 Procedure

4.5.1.2.1 Team Members

The team includes representatives of FHWA, universities, TRB, the private sector, other agencies and transportation research program managers from other states. The ODOT Research Section budgets travel and expenses from SPR funds for the peer exchange team. Organizations furnishing the peer exchange team members are responsible for their salaries.

4.5.1.2.2 Peer Exchange Agenda and Process.

The peer exchange team spends at least two days with ODOT staff and Research Program stakeholders. Although the items on the agenda may vary due to requests of the team, the typical agenda may cover a wide range of topics, or they may choose to focus on a short list of issues. The focus of a peer exchange is at the discretion of the host program. A peer exchange consists of a fact finding phase and a summation and reporting phase.

Fact finding begins with written information provided to members of the peer exchange panel prior to the peer exchange for their review. This information typically includes a copy of the host program's procedures manual, examples of forms and reports, more general information about the agency, and possibly reports from previous peer exchanges.

Fact finding continues with a series of interviews with groups of Research Program stakeholders and other interested parties. These interviews are conducted by the peer exchange panel, and may be scripted using a series of discussion questions designed to elicit information relevant to the focus of the exchange.

Summation and reporting begins with a work session involving members of the peer exchange team. The work session has three objectives. The first objective is to attempt to synthesize and summarize the insights and action items that have been gleaned from the fact finding phase. The second objective is to incorporate those findings into a written peer exchange report. The third objective is to prepare a presentation to be delivered at the peer exchange close-out meeting.

Summation and reporting concludes with the close-out meeting. The ODOT Research Advisory Committee, key representatives from the Agency's upper management, and Research Section staff are invited. The peer exchange team presents the findings and recommendations of the panel, along with the written peer exchange report.

4.5.2 Performance Measures

4.5.2.1 Purpose

The Research Section relies on two performance measures. One focuses on timeliness, and the second on project outcomes and implementation. These measures are updated and reported quarterly for use in the Transportation Development Division's Quarterly Business Review (QBR). The Quarterly Business Review is the Transportation Development Division's quarterly report to the ODOT Director. On a biennial basis, the research performance measures are used to support and help to justify the Research budget in presentations to the Department of Administrative Services Budget and Management Division and to the Oregon Legislative Assembly. Finally, they are used to track and manage the Research program on an ongoing basis.

4.5.2.1.1 Timeliness

This measure is based on the percent of projects that are either completed or on schedule as a percentage of all projects identified in the Annual Work Program. This measure is compiled quarterly.

4.5.2.1.2 Outcomes

This measure is based on the percentage of research projects ending during the prior 12 months that either: (1) resulted in a change to current ODOT practice or (2) validated current ODOT practice. This measure is also compiled quarterly, on the basis of a rolling 12 month reporting period.

5.0 PROJECT OVERSIGHT AND REPORTING

5.1 RESEARCH PROJECT WORK PLAN

A project work plan is the guiding document for a research project. The work plan builds upon the Stage 2 problem statement by detailing the objectives, tasks, implementation, schedule, and budget for a research project. The project work plan also serves as a statement of work for contracts and agreements with external investigators. Consequently, a work plan may be amended to show changes in work, budget, or schedule to correspond with agreement amendments. A concerted effort in preparing work plans assures focused objectives, improved research, and a high potential for implementation of the project results. The content and format for a research work plan are provided in online.

5.2 RESEARCH STAFF OVERSIGHT

The research coordinator is responsible for organizing a Technical Advisory Committee (TAC), identifying a prospective principal investigator, developing and refining a work plan, executing a contract, monitoring and overseeing the conduct of the project, and reviewing deliverables for acceptability. The research coordinator also assists in implementing research findings.

5.2.1 Project Development

The first steps in project development are to organize a TAC and identify a prospective principal investigator. The TAC plays a major role in reviewing the research work plan to ensure that the research objectives are relevant to the problem and that the project will accomplish the objectives.

Generally, a work plan is developed jointly by the research coordinator and the prospective investigator with input from key, knowledgeable personnel (usually TAC members). Investigators may be employees of public universities or of state or federal agencies. Whenever the Research Section plans to contract with a public entity, the Section is able to award a contract non-competitively, through an intergovernmental agreement. In these instances it is both expedient and appropriate to involve the investigator in developing the work plan prior to signing the contractual agreement. When the expertise from the private sector is sought, the contract must be awarded competitively. In that case, the work plan may be completed by the research coordinator and key personnel prior to hiring the consultant. Alternatively, a Request for Proposal may include that the consultant who is hired assist in drafting the work plan after the contractual agreement is signed. Private-sector consultants who compete for a specific research project should have no intentional, direct input to the project's work plan prior to having a signed agreement in place.

In considering a principal investigator for the project, individuals with specialized expertise and research experience in the subject area of the research, as well as a good track record in

performing sponsored or contract research are desired. Be sure to request and record a current CV of each principle investigator.

The research coordinator may also call upon the expertise of other research staff in addressing the research design. The research coordinator works closely with the prospective principal investigator and the TAC to ensure that all components of the work plan satisfactorily address the research problem before the work plan is accepted.

The Research Section maintains flexible services agreements with Oregon State University and Portland State University that allows the Section to issue a work order for a project rather than creating an intergovernmental agreement. The website here includes template materials, forms and procedures for executing work orders under these flexible services agreements. Examples of completed work plans can be found in the shared SPR folder.

5.2.2 Project Execution

The research coordinator provides ongoing monitoring of the principal investigator's progress and timeliness in carrying out the work plan. The research coordinator convenes the Technical Advisory Committee at regular intervals to review progress and project deliverables and provide guidance on the direction of the project. Site visits from the research coordinator can also be performed for continued project engagement. The research coordinator records and reviews invoices for accuracy and checks reasonable billing for work completed.

In the event that any components of the research project are conducted by ODOT personnel (e.g., test site installation, instrumentation, data gathering activities, report preparation, etc.), the research coordinator assumes the primary responsibility to provide oversight for these research activities to ensure that the provisions of the work plan are followed.

5.3 TECHNICAL ADVISORY COMMITTEE (TAC) OVERSIGHT

5.3.1 Purpose

A Technical Advisory Committee (TAC) is formed at the outset of each new project. Technical Advisory Committees provide technical input and guidance to research projects. To the extent that project scope and objectives have budget implications, the TAC may only make recommendations. Final authority for the conduct of any research project resides with the research manager. However, in all but relatively rare instances, the views and recommendations of the TAC are to be respected. The TAC has the following roles and responsibilities:

- Objectives
  The committee develops, reviews and establishes or revises recommended project objectives.
- Work Plan
  The committee recommends approval of the work plan before the start of the project.
- Project Progress
  Quarterly reports are distributed by the Research Section to keep each TAC member informed about research progress, problems, finances, and work planned for the next quarter.

The committee reviews the progress of the project and may recommend changes of direction or termination.

- Deliverables
  The committee reviews the project deliverables (reports, etc.) and may recommend revisions. Note: It is critical that the TAC review all project deliverables, including interim reports, the final report, and results summaries (such as a Research Note), so that the ODOT personnel most likely to be affected by the research findings are aware of them and have an opportunity to comment on them prior to publication.
    - Any project material or deliverable labeled as confidential shall not be distributed to any person who is not a member of the TAC. Materials or deliverables labeled as "draft" shall not be distributed to any person who is not a member of the TAC without the permission of the research coordinator.
- Implementation
  Committee members are expected to sponsor implementation of the research findings. The committee prepares an implementation plan and assists in implementing the research recommendations. The research coordinator prepares an implementation memo for the project file summarizing the discussion and the implementation actions and timetable identified.

5.3.2 Membership

A TAC typically has four to seven members. There may be fewer members for small projects. The TAC has the following composition.

- *Research Proposer*
  The research proposer is the person who submitted the original proposal. He/she is invited to participate on the TAC and provide technical input and guidance.
- *Project Coordinator*
  The project coordinator is assigned by the Research Section. He/she works with principal investigator(s) (PI) to develop the work plan and contract and provides technical and administrative assistance to the committee. The coordinator also monitors funding, chairs the TAC, and monitors project progress.
- *Principal Investigator (PI)*
  The principal investigator is the one person responsible for proper conduct and completion of the research project and may be from a contracted organization or ODOT. In the event of co-principal investigator, one will be designated as the key contact for administration purposes.
- *Project Champion*
  The project champion is an individual within ODOT with a business interest in the project and sufficient authority to help overcome impediments to the project and to influence implementation. Project champions may or may not attend TAC meetings, because they tend to be busy, hard to schedule people. However, they should be frequently briefed on project progress and problems. It is critical that individuals selected are aware of the duties and responsibilities of a project champion and that they accept those responsibilities.

- *Oregon FHWA Division Representative*
  Each TAC includes a representative from the FHWA Oregon Division Office. By including a division representative among the membership, TAC decisions have implicit Division concurrence. In case a FHWA representative declines, keep a record of communication for documentation purposes.
- *Other Technical Experts*
  The TAC may include a number of other technical experts not meeting the definition of one of the members listed above. These can include people from inside and outside the agency.

5.3.2.1 Friends of the Committee

Sometimes a research project generates considerable interest to a point that the number of people interested in participating exceeds practical limits. A "friend of the committee" receives TAC communication, but generally does not attend TAC meetings or review work products.

The Research Section does not cover salary or expenses for committee members.

5.3.3 Operation

- Chairperson
  Typically, the research coordinator chairs the committee. The chair is responsible for scheduling meetings and distributing agendas and minutes for each meeting. The chair also orients the committee to the project by providing key information, including:
  - A review of project objectives
  - A discussion of the milestones and general progress of the project
  - A discussion of project problems and their solution
  - A review of the implementation process and any impediments to it
- Meetings
  The committee meets on an as-needed basis. Typically much of the review process is carried out by e-mail.
- Agenda
  Agenda items are provided by the principal investigator and/or committee members and sent to the chairperson.
- Confidential Material
  Research draft reports are considered confidential documents. It is highly inappropriate and disrespectful of intellectual property to copy or distribute research reports before they are final. TAC members are expected to respect the confidential nature of draft research reports and draft project materials.

5.4 QUARTERLY REPORTS

A quarterly report is intended to be a clear, concise and complete summary of current project status, detailing progress, problems and work planned. In addition to documenting progress

being made on individual research projects, quarterly reports also satisfy the FHWA requirement for performance and expenditure reporting contained in 23 CFR 420.117. All projects using SPR funds shall produce a quarterly report.

Quarterly reports are due by the 15th of the month following the end of each quarter. This report is distributed to the TAC. Quarterly reports for all active SPR projects are compiled by the Research Section and sent to the FHWA Oregon Division Office. The most recent quarterly report for each active project is published online

5.5 PROJECT REPORTS

5.5.1 Purpose

Project reports are prepared to document the research work and recommend further research. In regard to research that is federally funded, a provision of the Federal-aid Project Agreement requires both the preparation of suitable reports to document the results of activities performed with FHWA State Planning and Research funds and FHWA approval prior to the publishing of such reports. Since a representative of the FHWA Oregon Division serves as a member of each research project TAC and participates in the review of reports prior to publication, the requirement for prior approval is waived by the Division Office.

5.5.2 Types of Reports

5.5.2.1 Construction Report

Construction reports are completed for projects where an item is built or a product is installed. The construction report includes a brief description of what was built and why there was a necessity to build it. The report includes a project description showing the general area of the construction on a state map and the construction plans. The materials used are listed along with the placement. Any unforeseen problems are documented. The conclusion includes any recommendations for further monitoring of the project.

5.5.2.2 Interim Report

Projects that are expected to take more than two years to complete or are expected to have a significant accomplishment during the course of the research may warrant an interim report. The interim report uses the same format and includes the same material as a final report. Each section of the report indicates the relative completeness of the research. The interim report is distributed to members of the TAC and other interested individuals.

5.5.2.3 Final Report

The TAC is made aware of the findings before the final report is published. The research community and operational units affected by the work must also be informed. The final report is the most complete record of the research and is carefully assembled to include the following information:

- Title page
- Technical documentation page with abstract
- Acknowledgements/Disclaimer
- Table of contents
- Introduction
- Literature review
- Methodology
- Conclusions and recommendations
- Findings
- References
- Appendices (as needed)

The final report receives the widest possible distribution. It is forwarded to the TAC, affected operations units, potentially affected customers outside ODOT, other state research units, TRID and other national research collections and archives.

An acceptable alternative to publishing a final report, in some instances, is to publish an article in a journal or other recognized publication.

Report publishing information and guidelines are prepared by the Research Section and can be found here. Forwarding of the final report to the TAC and friends of the committee is the responsibility of the research coordinator.

5.5.2.4 Termination without Report

In rare instances when a project is clearly not progressing in a direction that would yield information useful to include in a final report, a letter of termination without report may be appropriate. This is a brief but concise letter that includes a project description with reference to any data collected and analyses performed, conclusions (reason for termination) and recommendations (lessons learned). This satisfies the FHWA requirement of a suitable report to document results of activities performed with State Planning and Research Funds. The draft letter should be sent to the TAC for review prior to forwarding to the FHWA Division Office.

6.0 IMPLEMENTATION AND TECHNOLOGY TRANSFER

6.1 IMPLEMENTATION

Implementation is the critical link between research results and practical application. Planning implementation starts as early as the problem statements, which are assessed for implementation potential.

As projects near completion or are close to producing results, the Research Section evaluates them for applicability to ODOT practice. In conjunction with potential users and the TAC, the Research Section prepares an implementation plan to ensure effective and timely application of the research results throughout ODOT. Implementation activities, methods, and actions required by the numerous technologies with which ODOT deals are broad and flexible.

A project implementation memo is prepared for the project file and saved in the project directory. This memo is a written documentation of the specific implementation activities expected to be undertaken, and outlines who is/are the responsible party(ies), and the time frame in which the activities are expected to be completed.

Some funding for implementation may be included in the project budget. Funding for additional implementation activities comes from a specific expenditure account set aside in the SPR work program called Research Implementation. This line item reserves funds for the testing, adaptation, packaging and promotion of new technology. If other implementation resources are required (e.g. facilities, staff or other items), they should be identified in the project implementation memo.

Implementation is primarily the responsibility of users. Monitoring and follow-up of implementation progress is performed periodically by the Research Section. Implementation progress for projects ending during the prior fiscal year is summarized in a section of the Annual Work program on Implementation under "Accomplishments."

6.2 TECHNOLOGY TRANSFER

The Research Section performs technology transfer activities for ODOT and transfers the technology developed through the efforts of the Research program. A few methods used by research to transfer technology are as follows:

- Website – an active website is maintained with links to published reports and research notes, staff, and information on submitting problem statement forms. The published research reports and notes can be found here.
- Training courses – training courses are either developed in conjunction with a specific research project or through the National Highway Institute or other education and

development avenues. Each project will be assessed on a case-by-case basis as to whether or not the research will be implemented by the T2 Center.

- Agency library – an extensive collection of transportation-related literature and capabilities for data search and retrieval (for research as well as ODOT) are maintained in the agency library.
- Report and publication distribution – research reports and other materials generated by RD&T activities are distributed according to FHWA requirements.
- Research Notes – research notes provide a one to four page project summary.
- Promotion and sponsorship of seminars, conferences, exhibitions and other opportunities for disseminating research, either in-house or outside of ODOT. An example is the biennial Northwest Transportation Conference.
- Journal articles and conference papers originating from research activities are prepared and submitted by university and other investigators.