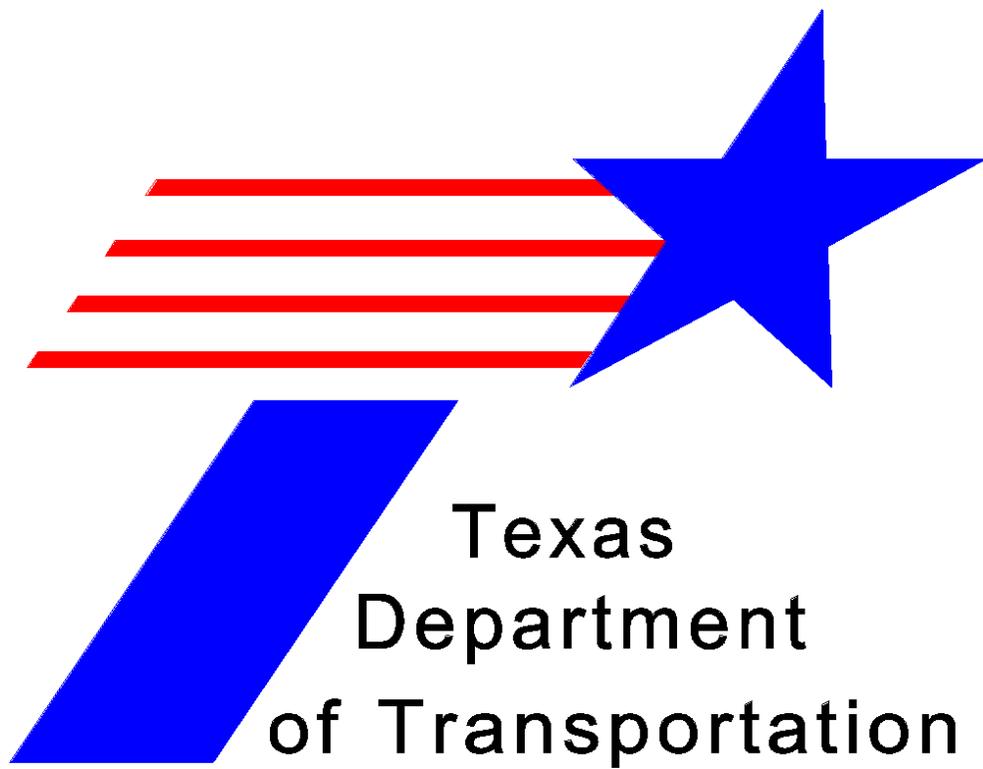


Research Manual



Texas
Department
of Transportation

Revised December 2009

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Manual Notice 2009-2

From: Rick Collins, P.E., Director, Research and Technology Implementation Office

Manual: *Research Manual*

Effective Date: December 01, 2009

Purpose

To update chapters 1, 2, and 5 of the Research Manual.

Changes

Chapter 1, Section 8, [“Forms”](#) – Deleted the list of forms and replaced with an explanation that forms are now listed in the University Handbook.

Chapter 2, Section 3, [“Research Team”](#) – Clarified research team membership.

Chapter 5, Section 3, [“Exhibit B, Project Description”](#) – Updated to reflect the revised contents of Exhibit B - Project Description. [“Background and Significance of Work”](#) is now a separate section of each proposal, and is not included in the final Project Agreement.

Chapter 5, Section 3, [“Research Staff and Facilities”](#) – Updated to reflect that the Research Facilities and Personnel Data Sheet has been replaced by the Research Staff and Facilities form, with updated content.

Chapter 5, Section 4, [“Project Agreements”](#) – Updated to reflect that the Background and Significance of Work section of a proposal is no longer included in the final Project Agreement.

Contact

For more information about this manual, please contact the Research and Technology Implementation Office at 512-416-4730.

Archives

Past manual notices are available in a [pdf archive](#).

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Chapter 1 — Introduction

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Section 1 — About This Manual

General

This manual presents program policies and an overview of the technical research program of the Texas Department of Transportation (TxDOT). This program is managed by TxDOT's Research and Technology Implementation Office (RTI) and includes some separate financial support for implementation of research results. That financial support is provided under what is described in this manual as the Implementation Program.

This manual:

- ◆ describes the various programs and activities, how they are developed, and provides an overview of how they work,
- ◆ describes the individuals and organizations involved in research and their overall responsibilities,
- ◆ describes the legal and policy issues involved in the program, such as authorizing legislation and Federal and state regulations, and
- ◆ summarizes applicable TxDOT information technology (IT) policies and procedures and how they relate to research projects.

This manual supplements the provisions of Cooperative Research and Implementation Agreements (CRIAs) executed between TxDOT and Texas state-supported universities and university systems. By signing the CRIA, each university, or university system, pledged to abide by TxDOT procedures in the conduct of research and implementation projects. This manual provides the framework and policies under which those procedures are developed. The procedures are distributed to universities in a *University Handbook* and associated forms.

This manual, a *Project Director Handbook*, a *University Handbook*, and the forms necessary to manage and administer TxDOT's research and implementation programs are maintained by the Research and Technology Implementation Office of the Texas Department of Transportation.

Section 2 — Research Program Overview

What is the Cooperative Research Program?

The Cooperative Research Program is research and related efforts conducted by Texas state-supported universities for the Texas Department of Transportation (TxDOT). It focuses on technical transportation issues. Its cooperative nature is reflected in:

- ◆ participation of the universities on Technical Assistance Panels and in advising TxDOT Research Management Committees (RMCs) during program planning,
- ◆ close coordination between TxDOT users of research findings and university researchers, and
- ◆ participation of the universities in the partial funding of some projects.

Why is the Research Program Important?

The program is important to **TxDOT** because:

- ◆ the development and application of advanced technology, new knowledge and improved methods and procedures are critical to future TxDOT service quality and operational cost-effectiveness,
- ◆ top-quality university researchers are available to help solve important transportation problems, and
- ◆ university students working on TxDOT research projects may be attracted to TxDOT careers upon graduation.

The program is important to **universities** because:

- ◆ a continuing, adequately-funded research program allows them to build and maintain a high-quality faculty and staff of researchers, and
- ◆ it offers graduate students the opportunity to work on and learn from research projects.

The program is important to the **State of Texas** because:

- ◆ it contributes to the high quality of Texas transportation facilities and services,
- ◆ it assists the state in meeting needs created by growth and changing technologies,
- ◆ it ensures that transportation research funds are available to Texas universities to maintain the high quality of education at those institutions, and
- ◆ it ensures that high-quality transportation talent is available in Texas.

What Kind of Research is Involved?

Topical areas — Senate Bill 698, passed by the 75th Texas Legislature on May 13, 1997, and later included in chapter 150 of the Education Code, provides for research relating to transportation, including:

- ◆ economics,
- ◆ planning,
- ◆ design,
- ◆ construction,
- ◆ maintenance, and
- ◆ operation of transportation facilities.

Transportation facilities are defined as:

- ◆ highways,
- ◆ turnpikes,
- ◆ airports,
- ◆ railroads (including high-speed railroads),
- ◆ bicycle and pedestrian facilities,
- ◆ waterways,
- ◆ pipelines,
- ◆ electric utility facilities,
- ◆ communication lines and facilities,
- ◆ public transportation facilities,
- ◆ port facilities, and
- ◆ facilities appurtenant to other transportation facilities.

Applied and Basic Research — The program has traditionally been drawn from problems that need solutions, and as such, concentrates on achieving results that can be applied rapidly to improve procedures and materials. Basic research, to understand underlying processes and phenomena, is also important and is supported in the research program. A proper balance of basic and applied research serves to keep Texas' transportation system among the best in the world.

What if the Research Involves Information Technologies?

Many research projects include the development of simple automated tools to be delivered to TxDOT, much like an advanced end-user might develop for themselves. Some projects include the

development or acquisition of more robust information technology (IT) components, including computer hardware and software, for TxDOT's use.

While automated tools and applications are a natural outcome of some research projects, the purpose of the research program is not to fund projects whose sole or predominant objective is the acquisition, development, maintenance, or enhancement of new or existing hardware or software.

Projects with IT deliverables are developed and administered consistently with:

- ◆ TxDOT's information technology architecture and standards,
- ◆ TxDOT's IT project approval process, and
- ◆ the operating goals and long-term support / maintenance commitments from the TxDOT division or district that will receive each IT deliverable.

Who May Perform Research for TxDOT?

Any Texas state-supported senior college or university — It is TxDOT policy that research projects be open to competition among all Texas state-supported senior colleges, universities, and research agencies, referred to collectively in this manual as universities, that have an interest and expertise in a specific project.

The Research and Technology Implementation Office maintains a list of Texas state-supported universities who have named research liaisons, and sends requests for proposals (RFPs) and other program announcements to those liaisons. Joint projects, in which two or more universities pool expertise on a single project, are encouraged.

Other Texas state and local agencies — Texas state and local agencies may conduct projects for which they have expertise, if the expertise is not otherwise available at a Texas state-supported university.

Federal agencies — Federal agencies may conduct research projects for TxDOT.

Private firms, private universities, and other private entities — Private sources are rarely requested to conduct research projects for TxDOT. The Texas Legislature provided for the development of the cooperative programs between TxDOT and Texas state-supported universities. The intent was to develop a program that would benefit the State of Texas as a whole through the strengthening of both TxDOT and the participating universities. Therefore, it has been TxDOT policy to honor the intent of the legislature and restrict the majority of the program to our university partners.

In the event that expertise is not available at a Texas state-supported university, or at a Texas state agency, the Research Oversight Committee (ROC) may approve contracting with the private sector, under provisions for consultant or professional services contracts, or other procurement procedures.

What Oversight is there of the Research Program?

The Federal Highway Administration (FHWA) provides program-level oversight of TxDOT's research program, because it is federally funded. FHWA employees also serve on several of TxDOT's research committees, providing federal oversight and their technical expertise.

Federal regulations, 23 CFR Part 420.209, include the requirement that each state periodically conduct a review, termed a "peer exchange", of its research program, and that the state participate in similar reviews of other states' programs.

Section 3 — Authority and References

When Did the Research Program Start?

The earliest program of cooperation between TxDOT and a university is described in Vernon's Texas Civil Statutes (VTCS), Article 6671, Laboratories, as legislated in 1917 by the 35th Legislature. This law stated that the laboratories of Texas A&M University and The University of Texas would be at the disposal of the Highway Engineer for testing and analyzing road and bridge material.

Commission Minute Order No. 25396 was passed on September 29, 1948, providing for a research program between the Agricultural and Mechanical College of Texas (now Texas A&M University) and the Texas Highway Department (now TxDOT).

On May 24, 1963, Commission Minute Order No. 52742 was passed, authorizing the State Highway Engineer to enter into agreement with such other qualified Texas schools and universities under the terms of Minute Order No. 25396.

On May 13, 1997, the Texas Legislature passed Senate Bill 698, which broadened TxDOT's authority to contract with Texas colleges and universities for transportation-related research.

Authority for the Research Program

State of Texas — Authority for the program is found in the following statutes:

- ◆ *VTCA Education Code*, Section 85.29, which provides for research and experimentation in transportation (as revised by S.B. 698) between TxDOT and the Texas A&M University System. It refers to Minute Order 25396.
- ◆ *VTCA Education Code*, Section 67.24, which provides for research and experimentation in transportation (as revised by S.B. 698) between TxDOT and The University of Texas.
- ◆ *VTCA Education Code*, Subtitle H, Title 3, Chapter 150 (as enacted by S.B. 698), which provides for research and experimentation in transportation between TxDOT and Texas public senior colleges and universities.

Federal Highway Administration (FHWA) — The research program is conducted under the provisions of 23 CFR Part 420 - Planning and Research Program Administration.

Section 4 — Research Funding and Budgeting

General

The discussion in this section is limited to work that:

- ◆ meets the definition of “research”, “implementation”, or “technology transfer” presented later in this chapter, and
- ◆ is contracted or managed through the Research and Technology Implementation Office (RTI).

Federal Funding of the State Planning and Research (SPR) Program

Source of SPR Funds — Title 23, “Highways”, Chapter 5, “Research, Technology, and Education”, of the US Code provides for SPR funding. Of the total funds apportioned to states, it authorizes 2% of most apportionment categories to be used only for planning and research activities. These funds are administered and accounted for as a single fund, regardless of the category of Federal-aid highway funds from which they were derived.

The 25 Percent Rule — Chapter 5 of the US Code further states that not less than 25% of the SPR funds apportioned to a state for a fiscal year shall be used for research, unless the state meets the requirements for a waiver of this rule.

Sharing of SPR Program Funds — Federal SPR funds are shared between RTI and the Transportation Planning and Programming Division (TPP).

Obligation of SPR Funds — RTI requests obligation of federal SPR funds before each annual program is initiated, based on 80% of the total Legislative appropriation for that program. Obligation of SPR funds for projects which are not part of an annual program are handled individually for each project.

Federal SPR Work Program

Requirements for an SPR Work Program — Title 23, Section 420.111 of the Code of Federal Regulations (CFR) requires that the proposed use of FHWA Planning and Research funds be documented by TxDOT in a work program “acceptable to the FHWA”. This work program must be approved by FHWA before SPR funds can be obligated.

Separate Work Programs for Planning and Research — RTI prepares an SPR Part II (research) annual work program, including quarterly updates, separate from the SPR Part I (planning) work program prepared by TPP. The Part II work program includes information on TxDOT’s research and implementation programs. RTI and TPP work together to provide any summary information requested by FHWA.

Budgeting for Research

Where Funds Are Budgeted — Funds for research are budgeted under TxDOT Strategy 116, “Research,” in several budget accounts. Implementation funding is included in Strategy 101, “Highway Design,” in budget account 0138, “Research Implementation.”

Components of the Research Budget — RTI develops a research budget each year composed of funds for:

- ◆ program administration (RTI staff and office expenses),
- ◆ program and project management performed by TxDOT research committees,
- ◆ TxDOT’s cost for TRB membership and participation in NCHRP, and
- ◆ research contracted to Texas state-supported universities.

Components of the Implementation Budget — RTI develops an implementation budget each year for:

- ◆ assisting TxDOT in implementing research results and products,
- ◆ technology transfer activities and support, and
- ◆ implementation program administration and management.

Determination of Program Size — Funding available for research and implementation programs is set by TxDOT’s Administration through the department’s normal budgeting process, and is adjusted as necessary depending upon state and federal appropriations.

The Use of Additional Federal Funds — Research and implementation budgets reflect approximately 80% federal SPR funds and 20% state matching funds. Estimated federal funds are included in TxDOT’s Legislative Appropriations Request (LAR) to assist lawmakers in appropriating adequate state funds to match the federal funds. The final state appropriation includes those estimated federal funds. If federal funds in excess of those identified in the LAR become available during the fiscal year (such as through work orders issued by FHWA), the research budget may be increased by the amount of new federal funds available.

RTI’s cash budget is only increased when total research expenditures, including for projects funded with these additional federal funds, exceed RTI’s original cash budget. At that point the Finance Division works with RTI to identify the additional funds available and needed, and adjusts RTI’s budget.

Other Funds Used for Research — Research or implementation funding can come from sources other than TxDOT state funds or federal SPR funds apportioned to Texas. For example, funds may be made available:

- ◆ **from other state agencies** – Occasionally, other state agencies offer to contribute money to TxDOT to fund research of mutual interest, which TxDOT is managing. An example is the

funding of a series of recycling projects by the Texas Natural Resource Conservation Commission (TNRCC). TNRCC contributed the state's 20% share to match the 80% Federal SPR share of project costs.

- ◆ **from Federal agencies** – FHWA, for example, often contributes up to 100% of the budget for specific research or demonstration projects that it believes have a compelling national importance. FHWA issues a work order for each project, which approves the funding. If a university will be performing the work, a contract is executed by RTI in accordance with established research contracting procedures.
- ◆ **from SPR funds apportioned to other states** – FHWA recognizes a type of project called a Pooled Fund project. For these projects, one or more states and FHWA pool together to conduct research of regional or national significance. FHWA may waive the usual 20% non-federal match on these projects. When Texas leads one of these projects, all the expenditures on the project flow through RTI's cash budget because the work on the project is all contracted by RTI. SPR funds from other states are recovered as discussed above under "The Use of Additional Federal Funds."
- ◆ **from other agencies or entities** (including private institutions) – Under certain circumstances, projects of mutual benefit may be developed with agencies in addition to those mentioned above. Joint-funded projects with private entities are possible under certain circumstances, and within strict guidelines to protect the public interest.
- ◆ **but not from other TxDOT sources** – Current department policy requires all research work to be funded through RTI's budget. (Such a restriction is not placed on implementation work.) Additional TxDOT funds for research can come only from the Finance Division increasing RTI's budget upon approval by TxDOT's Administration.

Section 5 — Research Library

Location

Under an outsourcing contract, the Center for Transportation Research (CTR) Library, at The University of Texas at Austin is now the official depository for TxDOT's research library collection. The CTR library contains materials previously housed at TxDOT and many additional transportation related materials, from many different sources.

Services Available to TxDOT Employees

CTR library staff maintain and operate the library as a reference and lending library, with all materials available for loan to TxDOT employees free of charge. The library's lending policies and an on-line catalog can be found at library.ctr.utexas.edu/index.html.

Library staff are available at this email address, ctrlib@uts.cc.utexas.edu, to:

- ◆ help employees learn how to effectively use the on-line catalog,
- ◆ answer queries for employees without Internet access to the catalog,
- ◆ fulfill requests for items found through the on-line catalog,
- ◆ search for relevant material that may be housed at CTR, but not yet listed in the on-line catalog, and
- ◆ search other transportation related reference sources.

Section 6 — Definitions

Research

Research is a systematic controlled inquiry, often involving analytical or experimental activities, which seeks to gain new knowledge and which may involve development of new or revised products. Research includes:

- ◆ **Basic Research:** which is the study of phenomena to gain knowledge. Specific application may not have been identified.
- ◆ **Applied Research:** which is a project directed at solving a specific current problem and which usually results in the development of products ready for implementation.
- ◆ **State-of-the-Art or Practice Surveys and Studies:** which are studies used to gather existing information relative to an existing problem to assist in implementation or to better plan, direct, or focus research.
- ◆ **Development:** which is the translation of new knowledge into a product, and which may include:
 - **Research Field Testing:** which is to develop or modify a product at a test facility, or in TxDOT's operational environment.

Software program development which solely automates the use of existing technology, formulae, knowledge, and methods is specifically excluded from the definition of research.

Implementation

Implementation is the adoption of a product for use, including Technology Transfer activities that promote adoption, such as:

- ◆ **Information dissemination:** which includes the development and distribution of brochures, manuals, articles, reports, videos, and other materials which provide product descriptions and instructions to enable and promote use.
- ◆ **Training:** which includes training course development and conduct necessary to enable and promote use.
- ◆ **Demonstration:** which is the placing of a product into TxDOT's operational environment to demonstrate its use, which includes:
 - **Deployment:** which is the initial procurement and dissemination of a product to users.
 - **Implementation Field Testing:** which is the demonstration or verification of product performance in TxDOT's operational environment.

Product

A product of the research program may be a new or revised procedure, process, field guide, design, standard detail or drawing, device, material, standard test method, specification, video, computer hardware or software, data collections, training material, or training class.

Field Testing

Field Testing is placing a product into a test facility or TxDOT's operating environment for further development (research), or into TxDOT's operating environment to demonstrate performance (implementation).

FHWA Definitions (23 CFR 420.203)

Research means a systematic, controlled inquiry involving analytical and experimental activities which primarily seeks to increase the understanding of underlying phenomena. Research can be basic or applied.

Basic research means the study of phenomena, and of observable facts, without specific applications towards processes or products in mind; the primary purpose of this kind of research is to increase knowledge.

Applied research means the study of phenomena to gain knowledge or understanding necessary for determining the means by which a recognized need may be met; the primary purpose of this kind of research is to solve a problem.

Development means the systematic use of the knowledge or understanding gained from research, directed toward the production of useful materials, devices, systems, or methods, including design and development of prototypes and processes.

Technology transfer means those activities that lead to the adoption of a new technique or product by users, and involves dissemination, demonstration, training, and other activities that lead to eventual innovation.

Research, Development, and Technology Transfer (RD&T) activity means a basic or applied research project or study, development, or technology transfer activity.

Section 7 — Acronyms

Acronyms and Definitions

CRIA – Cooperative Research and Implementation Agreement

DDO – Refers to TxDOT districts, divisions, and offices.

FPAA – Federal Project Authorization & Agreement, issued by FHWA to obligate funds to TxDOT projects and work programs.

IPR – Implementation Project Recommendation.

NCHRP – National Cooperative Highway Research Program, administered by the Transportation Research Board.

OPR – Office of Primary Responsibility.

PA – Project Advisor, an individual who provides additional expertise on a PMC to assist the Project Director.

PD – Project Director, the TxDOT person in charge of project oversight.

PMC – A Project Monitoring Committee (see chapter 2 for information on research committee membership and responsibilities).

RD&T – Research, Development, and Technology Transfer activity.

RMC – A Research Management Committee.

ROC – The Research Oversight Committee.

RS – Research Supervisor.

RTI – TxDOT’s Research and Technology Implementation Office, responsible for managing TxDOT’s research and implementation programs.

SPR – State Planning and Research Program.

TAP – Technical Assistance Panel, affiliated with each RMC to provide input to research planning and technical expertise to assist in program development.

TxDOT – Texas Department of Transportation.

Section 8 — Handbooks and Forms

Overview

This section lists handbooks and forms most often used by personnel who interact with the research and implementation programs. They are listed here as a convenient overview, and identified later in this manual, where related topics are discussed. RTI maintains several additional forms that are distributed only as needed, along with specific instructions.

RTI handbooks provide the detailed discussions and procedures necessary to implement policies presented in this manual.

Where to Find Handbooks and Forms

TxDOT employees may find handbooks and forms on RTI's Crossroads (Intranet) site.

RTI sends the *University Handbook* and relevant forms to university liaisons as they are updated. Current forms are also sent to liaisons with each annual request for proposal.

Handbooks

- ◆ *Project Director Handbook*
- ◆ *University Handbook*

Forms

See chapter 1 of the *University Handbook* for a list of forms maintained by RTI, including those forms required to prepare proposals. RTI sends forms to University Liaisons as they are updated.

Chapter 2 — Roles and Responsibilities

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Section 1 — Research Committees

Research Oversight Committee (ROC)

ROC membership:

- ◆ Assistant Executive Director for District Operations, Chair,
- ◆ Assistant Executive Director for Engineering Operations, Vice-Chair,
- ◆ Assistant Executive Director for Innovative Project Development,
- ◆ five district engineers, appointed on a rotating basis, and
- ◆ other members of TxDOT's Administration, as appointed by the Executive Director.

The Research Oversight Committee:

- ◆ approves research and implementation program policies,
- ◆ periodically reviews the status of the research and implementation programs,
- ◆ approves new research projects for each annual request for proposal (RFP), and
- ◆ approves Project Agreements for funding for the annual research program.

The ROC Chair:

- ◆ approves new research projects not included in the annual RFP,
- ◆ approves the use of research contingency funds when the contingency balance is below \$300,000, and
- ◆ approves requests to sole-source research projects.

Assistant Executive Directors:

- ◆ approve Implementation Project Recommendations (IPRs) in their functional areas, including authority for sole-source proposals.

Research Management Committees (RMCs)

The membership of each RMC includes:

- ◆ five district engineers, one serving as Chair, appointed on a rotating basis,
- ◆ division directors of the areas within the RMC's scope, as non-rotating members, and
- ◆ an FHWA representative, as an advisory (non-voting) member.

Each RMC:

-
- ◆ provides program oversight for research and implementation activities within that RMC's scope,
 - ◆ establishes research priorities for development of new Problem Statements,
 - ◆ reviews Technical Assistance Panel (TAP) results and recommends new research Problem Statements to be presented to the ROC for approval for the annual program,
 - ◆ reviews proposal selections and recommends Project Agreements for funding, and
 - ◆ reviews the implementation approach for terminating research projects.

The RMC Chair:

- ◆ recommends new research projects not included in the annual RFP, and
- ◆ approves modifications to active research and implementation projects that exceed \$100,000, 25% of the total project budget, or increase the scope of the project.

Focus areas under each RMC's scope are:

- ◆ RMC 1 – Construction and Maintenance
 - Construction Materials
 - Construction Operations
 - Construction Contracting
 - Maintenance Materials
 - Maintenance Operations
 - Maintenance Contracting
 - Pavement Design
 - Pavement Management
 - Vegetation Management
- ◆ RMC 2 – Planning and Environment
 - Aviation System Planning
 - Environmental Affairs Management
 - Hazardous Materials
 - Multi-modal and Inter-modal Freight Planning
 - Ports and Waterways Planning
 - Public Transportation
 - Railway Planning
 - Right of Way Planning, Acquisition and Management
 - Roadway Planning

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- Statewide, Regional, and Local Transportation System Planning
 - Traffic Data Collection
 - ◆ RMC 4 – Safety and Operations
 - Geometric Design
 - Illumination
 - Pavement Marking
 - Railroad Crossing Safety
 - Roadside Safety
 - Roadway Signing and Delineation
 - Traffic Control Devices
 - Traffic Management and Operations
 - Work Zone Safety
 - ◆ RMC 5 – Structures and Hydraulics
 - Bridge Rails and Transitions
 - Geotechnical Issues
 - High Mast Illumination Poles
 - Hydraulics and Hydrology
 - Overhead Sign Bridges
 - Structures Construction and Maintenance
 - Structures Design and Analysis
 - Structures Management
 - Structures Materials

Technical Assistance Panels (TAPs)

The membership of each TAP includes:

- ◆ TxDOT employees, one serving as Chair,
- ◆ an FHWA representative, and
- ◆ university employees, as selected by each university, as non-voting members.

TxDOT membership includes an employee from the Technology Services Division (TSD) who provides special expertise to identify and address IT development issues and requirements.

The RTI Director may approve members from local governments, trade groups, or other organizations, on a specific-need basis. Private industry members are selected from trade groups rather than

individual companies to provide an industry-wide perspective, and prevent providing advantage to one company over others.

Each TAP:

- ◆ provides technical support and assistance to their RMC,
- ◆ develops, reviews, and refines Problem Statements to address research priorities established by their RMC, and
- ◆ recommends Problem Statements to their RMC for the next annual research program.

RTI may provide funding for TxDOT and university TAP member travel. Travel costs are subject to state reimbursable limits and TxDOT policy. Private industry TAP members are not eligible for reimbursement of travel expenses.

Project Monitoring Committee (PMC)

A Project Monitoring Committee is appointed for each research or implementation project and is composed of:

- ◆ a Project Director, who chairs the PMC, and
- ◆ Project Advisors.

The Project Director is a TxDOT employee, selected for project management and technical expertise and interest in the project.

Project Advisors provide additional or special expertise needed, and may be selected from:

- ◆ TxDOT (ensuring that the Office of Primary Responsibility is represented),
- ◆ federal agencies,
- ◆ state, county, and municipal bodies,
- ◆ private industry trade groups, and
- ◆ other organizations.

The Project Director (PD):

- ◆ may help select the appropriate Project Advisors for the project,
- ◆ objectively reviews university proposals,
- ◆ makes the final decision and recommendation for proposal selection to the RMC,
- ◆ manages day-to-day project activities,
- ◆ reviews project invoices,
- ◆ reviews specific researcher requests for:

- out-of-state travel,
- equipment purchases not itemized in the original project budget,
- changes in the professional research team, including adding a subcontractor(s), and
- approval of surveys and questionnaires,
- ◆ recommends approval or denial of modifications to Project Agreements,
- ◆ approves project deliverables or recommends other action to RTI,
- ◆ helps develop an implementation plan for project results, and
- ◆ may oversee the implementation of project results.

Project Advisors (PAs):

- ◆ objectively review university proposals,
- ◆ provide support and advice to the PD while the project is on-going, and
- ◆ assist in the implementation of project results, as needed.

A Project Advisor from the Technology Services Division (TSD) serves on the PMC for projects with IT deliverables, as deemed necessary by TSD, to:

- ◆ assist in obtaining appropriate TxDOT or state approvals for the project,
- ◆ assist in the development and implementation of IT deliverables and products, and
- ◆ assist in the development of IT documentation, as needed or required.

Conflict of Interest

Members of research committees may have no direct or indirect financial interest in any project they are evaluating or managing. Nor may they have family, personal, or business relationships with university employees that would create a conflict of interest, or the appearance of a conflict of interest, between their duties as a member of a research committee and their personal or business interests.

Section 2 — Other TxDOT Personnel

Office of Primary Responsibility (OPR)

The Office of Primary Responsibility is the TxDOT district, division, or office (DDO) under whose purview the implementation of project results will fall. A representative from the OPR is generally assigned to the PMC, to provide expertise from the TxDOT organization most knowledgeable of the functional area within the scope of the project.

For projects with IT deliverables that will require implementation or maintenance support after being delivered to TxDOT, the OPR director is consulted before the project starts. Approval for work on the IT development tasks is contingent on the OPR director agreeing to take ownership of, and provide long-term support for, the IT deliverables.

Research and Technology Implementation Office (RTI)

RTI manages TxDOT's research and implementation programs, including:

- ◆ coordinating the development of annual programs,
- ◆ developing and managing research and implementation program budgets,
- ◆ providing technical and contracting support to all research committees,
- ◆ tracking and supporting the implementation of research results,
- ◆ completing required state and federal reports,
- ◆ maintaining relevant policies and procedures, and
- ◆ reporting program status to the Research Oversight Committee.

The RTI Director:

- ◆ executes all research and implementation Project Agreements for TxDOT, based on project approvals discussed earlier in this chapter,
- ◆ approves the use of research contingency funds when the remaining balance is at least \$300,000, and
- ◆ approves modifications to active research and implementation projects not exceeding \$100,000, 25% of the total project budget, or increasing the scope of the project.

Technology Services Division (TSD)

Through TAP members and Project Advisors, TSD provides consultative services, and support, on a wide range of IT matters related to research and implementation projects.

Section 3 — University Personnel

Research Team

The research team on each project is made up of:

- ◆ a Research Supervisor, and
- ◆ other researchers, either professional researchers or students (generally graduate students), as needed.

The research team performs the work described in the Project Agreement, and coordinates and communicates with the Project Director, as needed, on all significant project matters.

Research Supervisor (RS)

The Research Supervisor is the person assigned by a Texas state-supported university (or the lead university on a joint project) to supervise a project. The RS is an employee of the university under contract with TxDOT to conduct, or lead, the project, and operates under the direction and authority of that university. Each project has only one Research Supervisor.

The RS has primary responsibility to TxDOT for the conduct and completion of the entire project, including all deliverables, and can only be changed through written modification of the Project Agreement. The RS:

- ◆ develops the project proposal or modification, as requested by RTI,
- ◆ supervises or oversees all research personnel working on the project to ensure the project is conducted according to the Project Agreement, including the Work Plan,
- ◆ provides project status and findings as requested by the PD or RTI,
- ◆ reports significant problems or outstanding successes to the PD and RTI as soon as practical,
- ◆ documents project work and results, and provides required deliverables in a timely manner, and
- ◆ may assist in the implementation and demonstration of project results.

Principal Investigator (PI)

Principal Investigator is a term used by many universities to designate the lead researcher at that university on a specific project. Participating universities in a joint project may each designate a researcher as PI or co-PI, as the university's professional standards dictate. TxDOT does not use the PI designation. Any member of the research team, other than the single Research Supervisor for the project, is referred to by TxDOT simply as a researcher.

University Liaison

Each Texas state-supported university wishing to participate in TxDOT's research program must name a central point of contact to handle program communication and administration. This contact is the individual designated as the University Liaison.

The University Liaison:

- ◆ coordinates all research and implementation program matters between the university and RTI, including for example:
 - RTI policies and procedures,
 - requests for proposals,
 - proposal submissions,
 - Project Agreements and associated correspondence,
 - requests for specific expenditure or other approvals, as outlined in RTI's *University Handbook*, and
 - deliverables.
- ◆ coordinates research and implementation program matters within their university.

Chapter 3 — Research Program Development

Contents:

[Section 1 — Annual Research Cycle](#)

[Section 2 — Mid-Year Projects](#)

Section 1 — Annual Research Cycle

The Annual Research Program

While projects may be initiated at any time during the year, most research projects are developed under the cycle described in this section. Multi-year projects are reviewed each year to determine whether they are progressing effectively and productively, and should continue as originally planned.

Development Cycle

The chart below presents an overview of the research program development cycle, with approximate dates for the major activities in the cycle. RTI announces specific dates and provides more specific instructions, for both TxDOT and university personnel, as activities occur throughout each fiscal year.

Overview of Research Program Development Cycle

Approximate Dates	Major Activities On Active Projects	Major Activities To Develop New Projects
August 1		Problem Statements are due to RTI.
August		RTI Engineers do an initial evaluation of Problem Statements, including identifying and evaluating on-going or recent related research.
September – October 7	Project Kick-off meetings are held.	TAP meetings are held to review, refine, and rate Problem Statements. During this period all significant technical issues, such as specific deliverables needed and TSD's review of selected Problem Statements are addressed, as much as possible.
October 20		RTI sends meeting materials to RMCs, including Problem Statements and the results of TAP evaluations.
Late October	RMCs review implementation approach for recently terminated projects.	RMCs meet to select Problem Statements to recommend to the ROC, including those to set aside for underutilized universities.
November – 1 st week		RTI sends meeting materials to ROC.
Mid November	ROC reviews program policies and status of the active program.	ROC selects Problem Statements for the next annual RFP.
Mid November		RTI distributes call for PMC members throughout TxDOT.

Overview of Research Program Development Cycle

Approximate Dates	Major Activities On Active Projects	Major Activities To Develop New Projects
Mid November – December 1		Problem Statements are finalized to include ROC input and other outstanding issues.
December 1		Final Problem Statements are due to RTI.
December		RFP package is developed by RTI.
January - 1 st week		RFP is sent to University Liaisons by RTI.
January 15		PMC nominations are due to RTI.
January 31		<ul style="list-style-type: none"> ◆ PD selections are finalized. ◆ PAs are selected, as practical.
February		Pre-proposal meetings are held.
February – March 15		PA selections are finalized.
March 1	Semi-Annual Progress Reports are due to RTI.	
March 25		University proposals are due to RTI.
April 1		All responsive proposals are sent to PMCs for technical evaluation.
April	Modifications are developed by universities, as requested by RTI.	Proposals are reviewed by Project Monitoring Committees (PMCs).
May 1	Modifications are due to RTI.	Proposals selections are due to RTI.
May 5		RTI sends meeting materials to RMCs, including proposal selection and review data.
Mid May	RMCs review implementation approach for terminating projects.	<ul style="list-style-type: none"> ◆ RMCs meet to review proposal selections and recommend new Project Agreements for the coming program year. ◆ RMCs meet to set research priorities for the program that will begin Sept 1, two years following.
Mid – Late May		RTI requests Problem Statements from TxDOT employees and university researchers, to address RMC research priorities.
Mid May – August 1		TxDOT employees and researchers develop Problem Statements.
Late May		RTI sends meeting materials to ROC.

Overview of Research Program Development Cycle

Approximate Dates	Major Activities On Active Projects	Major Activities To Develop New Projects
Early – Mid June	ROC reviews program policies and status of the active program.	<ul style="list-style-type: none"> ◆ ROC approves new Project Agreements for the coming program year. ◆ ROC may establish additional research priorities for the program that will begin Sept 1, two years following.
Mid June – Mid August		<ul style="list-style-type: none"> ◆ Project Agreements are finalized and executed by universities and RTI. ◆ RTI distributes executed agreements to University Liaisons and PMCs.
August 31	Semi-Annual Progress Reports are due to RTI.	
September 1		New fiscal year program begins.

Although most research problem statements are submitted based on the cycle described above, DDOs are welcome to submit needs at any time of the year, and in any format. See “Submit Research Needs” on RTI’s Crossroads (intranet) web site for instructions.

Needs submitted outside the annual development cycle are evaluated for criticality to TxDOT, and scheduled to start as available funding allows. Non-emergency projects are generally held for the next annual cycle.

Section 2 — Mid-Year Projects

Introduction

While a majority of the annual research program is developed by the schedule in the previous section, a method is in place to fund critical needs that arise during the year. A research contingency account is maintained by RTI on behalf of the Research Oversight Committee (ROC). This contingency account is used to fund new projects, or modifications to existing projects, which arise during the year and are considered critical. Examples of critical projects are those that directly impact significant safety issues or have the potential for immediate and major costs savings.

Contingency Account Funding Level

The initial level of funding for the contingency account is established when the ROC approves new Project Agreements for the coming year. Additional contingency funds may become available during the year from cancelled projects, or from projects that relinquish funds due to changes in project scope or schedule.

Procedures

Mid-year research needs should be submitted to RTI as they are identified, along with an explanation of the criticality of the project. Project approval and contingency funding approval authority is described in chapter 2.

All applicable TxDOT policies and procedures, including IT policies and procedures, apply to mid-year projects, just as to projects initiated during the annual cycle.

Chapter 4 — Implementation Program Development

Contents:

[Section 1 — Implementation Planning](#)

[Section 2 — Implementation Projects](#)

[Section 3 — Other Implementation Activities](#)

Section 1 — Implementation Planning

General

Successful implementation of the results of a research project depends on the actual results, management acceptance and support, and how effectively the research results or technology are packaged and communicated to the eventual end user.

How new technologies will be accepted by management and integrated into practice by the user are considered prior to initiating a project and are continually reviewed throughout a research project. The actual process of integrating research results into practice depends on:

- ◆ a valid strategy or implementation plan,
- ◆ effective communication of research results to the user community (this process is sometimes termed technology transfer), and
- ◆ a dedicated effort by individuals involved in the project.

Initial Planning for Implementation

Initial planning for implementation of research results begins with the development of the research Problem Statement by:

- ◆ identifying the problem to be addressed,
- ◆ identifying the stakeholders impacted by the problem,
- ◆ defining the objectives of the research,
- ◆ identifying the Office of Primary Responsibility (OPR) for implementing the expected results and products of the research project, and
- ◆ defining the products desired as outcomes of the research project, including the format for delivery of the products.

Implementation Plans

As projects are nearing completion, or deliver significant interim results, more focused planning takes place. Implementation plans are developed that outline the steps necessary to incorporate research products into TxDOT operations. Research products are delivered in various formats, including for example, stand-alone devices, handbooks, analytical tools, guidelines, specifications, or simply recommendations.

Implementation plans vary as widely as do research products. The plan for each product, or groups of similar products, is developed by the Project Director and reviewed conceptually by the RMC. In developing the plan, the Project Director considers, among other issues:

- ◆ what level of implementation is contemplated,
- ◆ what resources are needed,
- ◆ what timetable for implementation is most reasonable,
- ◆ what policy and procedure changes are needed, and who will develop these materials,
- ◆ who will the end users be,
- ◆ how is the product best disseminated throughout TxDOT operations,
- ◆ what changes to the product received, including format, are needed to facilitate adoption,
- ◆ what type of training is needed, if any, and who will coordinate with HRD-Training,
- ◆ who will develop training materials and conduct classes, if needed,
- ◆ how will future and refresher training be done, and
- ◆ is specific funding needed for initial implementation efforts.

Section 2 — Implementation Projects

Funding

An implementation project is typically triggered by the need for specific funding to help integrate a product, new method or process, or innovation into department operations. The Research and Technology Implementation Office (RTI) manages the department's implementation program, which exists primarily to fund these needs. Funding may be needed to cover such things as:

- ◆ the incremental cost for the first use of a product or innovation in construction or maintenance operations,
- ◆ the purchase of newly developed non-capital equipment for use in the field, or
- ◆ training of field personnel in the use of new equipment or methods.

Some implementation related costs are not eligible for funding under the implementation program, including:

- ◆ capital equipment purchases, and
- ◆ travel expenses for TxDOT personnel.

Most implementation projects stem from products delivered from TxDOT's research program. They become eligible for implementation funding when they are complete and ready for integration into department operations. Offices of Primary Responsibility (OPRs), Project Directors, RTI engineers, and RMC members all play a part in determining when a product is ready for implementation.

An implementation project may also be developed to aid in the implementation of a product or innovation from a non-TxDOT program or source. For these projects to be eligible for implementation funding, the TxDOT OPR must evaluate the product or innovation and determine that it is in fact ready to implement.

Initiating a Project

An Implementation Project Recommendation (IPR) is the vehicle for describing the need for funding for a particular implementation effort and requesting approval of an implementation project. The research Project Director under whose guidance the product was delivered and an RTI engineer work together to complete the IPR. If a separate implementation Project Director is selected, that person may also be involved in the development of the IPR.

The research Project Director (PD), working with the RTI engineer:

- ◆ ensures that the work proposed is implementation, not further research,

- ◆ obtains the OPR’s approval, and if the research PD does not work within the OPR, identifies a person from the OPR to serve as the implementation Project Director,
- ◆ develops an implementation work plan, outlining all activities which must take place to implement the product, including TxDOT and university involvement needed,
- ◆ identifies any items that need to be purchased under the implementation project,
- ◆ identifies any deliverables required from the implementation project, along with formats and target dates, and
- ◆ develops a funding estimate, for university and TxDOT activities needed.

The funding estimate for each IPR should include the cost of preparation and distribution of project deliverables, other than reports that serve primarily to document project work done. Examples of implementation project products that should be included in the IPR budget include workshop or training materials, handbooks or guidelines to be distributed throughout TxDOT, mass quantities of publications to be distributed to local entities or the public, and similar products.

If the IPR includes the development and delivery of information technology (IT) to TxDOT, a Project Advisor from TxDOT’s Technology Services Division helps:

- ◆ develop an appropriate technical implementation plan, depending on the level of implementation intended, and the potential impact on TxDOT operations,
- ◆ determine what IT project approval and reporting requirements are applicable, and
- ◆ prepare documentation needed to satisfy IT project approval and reporting requirements.

If an implementation project includes preparation and delivery of training, the PD works with the training section of the Human Resources Division to determine the best approach. This approach considers:

- ◆ who will develop the initial training,
- ◆ how the initial training will be delivered, and
- ◆ whether, and how, the training will be integrated into the department’s standard curriculum.

IPR Approval

IPRs are reviewed and approved at several levels during their development. These include the research Project Director, the implementation Project Director, and the DE/DD/OD of the Office of Primary Responsibility (OPR). IPRs are then presented to the Assistant Executive Director over that OPR for final approval.

Overview of Implementation Project Contracting

Implementation projects fall under two main contracting processes, depending primarily on whether or not a university will be involved in the project. The contracting process for university implementation projects echoes that of university research projects.

University Work

If university involvement is needed to implement a research product, the work is generally sole-sourced to the university that developed the product. In these cases, the Research Supervisor helps develop the funding estimate for university work.

If the product did not come from a research project, a competitive RFP is generally issued for university support for implementation activities. In these cases, the Project Director and RTI engineer work together to estimate university activities and funding needed.

University Project Agreements include only the work the university is responsible for.

TxDOT Activities

The OPR's responsibilities under an implementation project are documented in various ways, depending on the scope of the work. Contracts related to the OPR's or other TxDOT responsibilities are not typically executed by RTI. The implementation program generally funds purchases or contracts executed by a district or division. Such issues are explained in the IPR, including for example, specific construction or routine maintenance contracts that are proposed to receive funding through an implementation project.

RTI determines the best way to establish funding under implementation projects for TxDOT contracts and purchases. When purchases can be charged to RTI's implementation budget strategy, RTI provides a charge number to the district or division making the purchase. When funding must be established in a different budget strategy, RTI initiates a transfer of budget authority from the implementation strategy to the appropriate strategy funding the contract. A common example is when the implementation project is funding a change order on a construction contract.

Management of University and TxDOT Performance

The implementation Project Director directs both university and TxDOT work on an implementation project.

Section 3 — Other Implementation Activities

Technology Transfer

Technology Transfer is the term used for effective communication of research results to the user community, and is an integral part of implementation activities. The Research and Technology Implementation Office (RTI) assists in technology transfer functions in many ways. Some examples include:

- ◆ monitoring the quality of deliverables,
- ◆ creating articles about research or implementation projects for publication both inside and outside of TxDOT,
- ◆ maintaining and enhancing the RTI web sites,
- ◆ assisting with the creation of formal presentations of research results,
- ◆ overseeing the maintenance of TxDOT's transportation library, managed by the Center for Transportation Research at The University of Texas at Austin,
- ◆ serving as the clearing house for research related information from federal agencies and other state departments of transportation,
- ◆ maintaining information about TxDOT research activities on TRB's Research in Progress (RIP) web site, and
- ◆ funding technology transfer activities, such as video production, editing, printing of documents and other materials, and distribution of deliverables.

Chapter 5 — Contracting

Contents:

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[Section 2 — CRIA Provisions](#)

[Section 3 — Project Proposals](#)

[Section 4 — Project Agreements](#)

[Section 5 — Modifications](#)

[Section 6 — Subcontracts](#)

Section 1 — Introduction

Authority for Contracting

The Education Code, sections 67.24 and 85.29, Research and Experimentation for the Texas Department of Transportation, (first effective 9/1/71, last amended by the 75th legislature), allows TxDOT to contract with The University of Texas at Austin and the Texas A&M University System to conduct research relating to transportation.

The Education Code, Chapter 150, Transportation Research, (added by the 75th legislature, effective 5/28/97), allows TxDOT to contract with any Texas public senior college or university to conduct research relating to transportation.

Types of Contracts and Programs

Cooperative Research and Implementation Agreement (CRIA) — A CRIA contains a set of standard provisions either required by state or federal law, or agreed to during negotiations between TxDOT and universities. Each university wishing to perform a TxDOT research and implementation project must first execute a CRIA with TxDOT.

The standard provisions in each university's CRIA are incorporated by reference into each Project Agreement executed under that CRIA. These standard provisions are listed in the next section of this chapter.

Project Agreements (PAs) — Each research or implementation project conducted by a university is represented by a Project Agreement executed between the Research and Technology Implementation Office (RTI) and a Texas state-supported university. Each Project Agreement includes, among other things:

- ◆ an itemized project budget, by fiscal year, for each institution involved,
- ◆ the termination date of the project,
- ◆ a detailed work plan,
- ◆ a deliverables table,
- ◆ a schedule of activities, and
- ◆ whether the project is part of an annual program, or an independent project.

Annual Programs — Article 9A of the CRIA provides for both an Annual Program of Research and an Annual Program of Implementation between each university and TxDOT. This Article sets an upper limit on the annual funding for each of these programs. Each university within a university system has its own programs, within the limits set in this article.

Each annual program is composed of one or more projects with similar sources of funding. Combining these projects under a single program gives the university some flexibility for sharing funds between projects. This flexibility precludes the need for a university to obtain RTI's approval for minor budget changes on individual projects.

The sum of the contracted budget amounts for all the projects in a university's annual program sets that program's total funding. Although billings may exceed the contracted budget amounts on individual projects, as described in Article 9A, total billings for all projects in a university's annual program may not exceed that program's total funding.

Independent Projects — Article 9B of the CRIA provides for research and implementation projects which are independent of an annual program. These projects are funded from sources different from the funding sources for an annual program, or from multiple funding sources. Consequently, these projects cannot share funding with other projects and must be contracted independently.

Contract Communications Management

RTI develops a Communications Management Plan for each research and implementation project. Each plan lists the stakeholders, the procurement milestones, and the expected formal communications relevant to each project.

Each plan also specifies the point(s) of contact during certain phases of the solicitation and performance periods of each project. Key roles outlined in each plan include:

- ◆ RMC Contract Specialist – the single point of contact for:
 - receiving all external communications during the solicitation (RFP) period, responsible for recording and retaining all external communications during this period and for providing complete and consistent information to all researchers who expressed an interest in submitting a proposal on the project,
 - ordinary business communications while the project is on-going, and
 - formal contract notices while the project is on-going,
- ◆ Project Director – after contract award, manages the day-to-day project activities, communicating with researchers and RTI, as needed, and
- ◆ RMC Research Engineer – supports the Project Director, including communicating with researchers, the Project Director, and other TxDOT staff, as needed.

Section 2 — CRIA Provisions

Overview of Cooperative Research and Implementation Agreement (CRIA) Provisions

Each CRIA contains standard provisions under which research and implementation programs between TxDOT and a specific university are conducted. These provisions are listed below and presented in detail in RTI's *University Handbook*.

Executed agreements may differ slightly from the language in the handbook. Legal counsel at some institutions may require minor wording differences. Agreements executed with university systems, rather than individual institutions, contain wording to reflect that scope. All CRIAs executed by TxDOT contain the same provisions in all material respects.

Cooperative Research and Implementation Agreement Provisions

Article 1 – Nature of the Agreements	Describes Annual Programs and Project Agreements
Article 2 – Contract Period	Establishes the term of the agreement
Article 3 – Notices and Communication to TxDOT	Specifies which office represents TxDOT and provides an address for all notices
Article 4 – Definitions	Defines terms used in the agreement
Article 5 – University Coordination	Requires each university to coordinate programs with its institution
Article 6 – Subcontracts	Provides provisions for subcontracting
Article 7 – Project Approval	Describes the actions that must be taken before a project is considered fully approved
Article 8 – Amendments	Provides provisions for amending the CRIA and Project Agreements
Article 9 – Budget	Establishes budgeting rules and overall amounts for Annual Programs and Independent Projects
Article 10 – Facilities, Equipment and Procurement	Provides requirements for equipment use and procurement, and use of university facilities
Article 11 – Salary and Travel Charges	Establishes rules for such charges
Article 12 – Indirect Cost Charges	Provides provisions for charging indirect costs
Article 13 – Billing and Payment	Establishes billing frequency and allowable costs
Article 14 – Records and Audits	Provides record-retention requirements, and Federal and state audit compliance requirements
Article 15 – Reports and Other Deliverables	Establishes compliance standards for project deliverables
Article 16 – Ownership of Data	Provides for ownership of information developed under projects
Article 17 – Copyrights	Gives rules for copywriting information developed under projects

Cooperative Research and Implementation Agreement Provisions

Article 18 – Patents	Establishes rules for patenting inventions developed under projects
Article 19 – Compliance with Laws	Requires university to comply with all Federal and state laws and regulations
Article 20 – Federal Funds Reports	Establishes rules for university reporting of Federal funds
Article 21 – Roadway Safety	Requires university to comply with the TxDOT safety rules
Article 22 – Equal Employment Opportunity	Requires university compliance with federal EEO requirements
Article 23 – Affirmative Action	Requires university compliance with federal and state affirmative action requirements
Article 24 – Civil Rights	Requires university compliance with federal civil rights statutes
Article 25 – Debarment Certification	Prohibits the university from making any award to debarred individuals or institutions
Article 26 – Gratuity Provisions	Disallows university gifts to TxDOT employees
Article 27 – Lobbying Certification	Requires university compliance with federal lobbying statutes
Article 28 – Buy Texas	Requires the university to give preference to Texas products when project is state funded
Article 29 – Termination of Program or Project	Establishes procedures for termination of all or part of this agreement
Article 30 – Remedies	Sets forth terms for breach of agreement
Article 31 – Severability	Provides that the invalidity or illegality of any provision of this agreement will not affect the other provisions
Article 32 – Prior Agreement Superseded	Provides that previous cooperative agreements relating to this program are superseded
Article 33 – Signatory Warranty	Warrants that the signatories of this agreement have authority to sign
Article 34 – Incorporation	Incorporates various attachments into the agreement

Non-Discrimination

It is TxDOT’s policy that no person shall on the grounds of race, color, national origin, sex, age, or disability be excluded from participation in or be denied the benefits of or otherwise be subjected to discrimination under any of our programs, including the research program. This policy is reflected in all executed CRIAs, most predominantly in Article 24.

Section 3 — Project Proposals

Overview

Universities submit proposals to the Research and Technology Implementation Office (RTI) in response to a Request for Proposal (RFP). RTI does not accept unsolicited proposals.

RTI develops and distributes RFPs for both research and implementation projects. RFPs for research projects are based on approved Problem Statements and are distributed for competitive response. Implementation project RFPs are based on approved Implementation Project Recommendations (IPRs), and may be either competitive or non-competitive.

A proposal is basically an unsigned Project Agreement. Proposals are submitted in the format of Project Agreements to facilitate the process of going from a successful proposal to an executed agreement. The selected proposal on a project may need only signatures to become an executed Project Agreement. However, some successful proposals need some degree of revision before they are executed as Project Agreements.

Eligible Proposers – All Projects

Proposals are accepted only from Texas state-supported universities. Proposals that include partnerships with other entities will be considered only when the appropriate expertise is not available at a Texas state-supported university.

Proposals are not accepted that include any research team member with “seriously late” deliverables. Researchers not eligible to propose at the time of the annual research RFP remain ineligible for that entire program year, under both the research and implementation programs. They also may not be added to any active project. To manage this issue, RTI:

- ◆ tracks the status of deliverables due from universities, from initial submission to final publication or delivery,
- ◆ coordinates periodic reviews of the data with university staff to assure accuracy, and
- ◆ sends a list of researchers deemed ineligible under this policy to universities, before the proposal submission deadline for each annual RFP. The Research Supervisor of each project is held accountable for all late deliverables on the project.

Lateness is measured by the time a deliverable action has been due past the deadline established in the Project Agreement, for initial submissions, or a formal notice from RTI, during later stages of deliverable review, revision, and final production. For each program year, “seriously late” is defined as deliverable actions due on or prior to October 31, of the calendar year prior to distribution of the annual RFP, that are not submitted to RTI, in good faith, by the end of February, the next

calendar year. For example, for the 2010 program year, “seriously late” would be defined as those deliverables with actions due on or prior to October 31, 2008 that are not submitted to RTI, in good faith, by the end of February 2009.

Eligible Proposers – “Underutilized” RFP

Some projects are set aside in each annual research program for an RFP to Texas state-supported universities classified as underutilized by TxDOT’s research program. RTI maintains data on university awards, and re-evaluates for each program year which universities meet this classification.

For this purpose, underutilized is defined as “active universities averaging less than 1% of total program awards for the previous 5 years.” Universities graduate from this category when they have exceeded that award level for 3 consecutive years.

As long as they are not otherwise considered ineligible, underutilized universities may propose, as the lead agency or a partner, on all competitively awarded projects. For projects in the “underutilized” RFP, proposals are accepted only with an underutilized university as the lead agency, and at least 50% of the project work, as represented by each university’s proportion of the total project budget, to be performed by an underutilized university(s).

Required Documents

The documents listed below are required in every proposal. If a proposal omits required information, and is deemed non-responsive, it will not be accepted for technical evaluation.

- ◆ Cover Page (**if omitted, proposal will be deemed non-responsive**),
- ◆ Exhibit A, Itemized Budget,
- ◆ Exhibit B, Project Description,
 - Project Abstract,
 - Implementation (optional section),
 - Work Plan (**if omitted, proposal will be deemed non-responsive**),
 - Identification of Information Technology (IT) Deliverables to TxDOT,
 - Assistance or Involvement by TxDOT,
 - Deliverables Table (**if omitted, proposal will be deemed non-responsive**),
 - Schedule of Research Activities (**if omitted, proposal will be deemed non-responsive**),
- ◆ Background and Significance of Work, and
- ◆ Research Staff and Facilities (**if omitted, proposal will be deemed non-responsive**).

If additional information is required for a specific project, that additional requirement will be stated in the Project Statement or Implementation Project Recommendation distributed in the RFP.

Each required document is discussed in general below, and in detail, along with the related forms, in RTI's *University Handbook*.

Cover Page

The Cover Page is the foundation of each Project Agreement and is the signatory document in each final agreement. In summary, the Cover Page:

- ◆ identifies the project, including its classification as either research or implementation, annual program or independent project,
- ◆ identifies the parties to the agreement and sets out their basic obligations,
- ◆ incorporates CRIA provisions and attached exhibits into the agreement,
- ◆ establishes the term and budget for the project, and
- ◆ specifies how the notice of a university's right to work each year will be sent by RTI.

Exhibit A, Itemized Budget

Each Exhibit A details a single year's budget for an agency, for that specific project. A separate Exhibit A is included for each performing agency on the project, for each year of the project. Each Itemized Budget should include the best estimates available for individual item costs. The total project costs on the Itemized Budget represent the contract amount between TxDOT and the performing agency. If there is a discrepancy between the line items and the total shown on Exhibit A, the total, as shown, is used during initial evaluation of the proposal.

During the project, a university may move funding from one cost item to another, or add cost items, within the Itemized Budget for the particular fiscal year, without modifying the Project Agreement, as long as total annual costs do not change.

However, adding certain cost items to a project budget, such as equipment purchases, subcontracts, and out-of-state travel, may require TxDOT approval prior to the expenditure of funds, as described in RTI's *University Handbook*. Such approval may be documented in any written form, including, at the university's option, on an updated Itemized Budget.

Exhibit B, Project Description

Project Abstract — summarizes the project need, objectives, and tasks. It should clearly and succinctly describe the project to everyone involved in evaluating the proposal, and is used in various project reporting databases.

Implementation — optional section that presents the researcher's assessment of potential areas for application of the research findings, such as changes in specifications, standards, or department policies.

Work Plan — fully describes the approach the researchers intend to use and specifies how the project will be structured and performed, showing how and in what sequence specific tasks will be accomplished. The Work Plan guides project work and is a valuable resource to all those connected with the project.

Identification of Information Technology (IT) Deliverables to TxDOT — describes all IT deliverables (software and hardware) that will be delivered to TxDOT during the project, or after it terminates. This information is required to meet state reporting requirements and to allow TxDOT to effectively plan for the implementation of IT deliverables.

Assistance or Involvement by TxDOT — describes any need for TxDOT assistance expected on the project, other than that normally provided by the Project Monitoring Committee. TxDOT assistance may include items such as core drilling, traffic control, testing, materials and supplies, minor IT services, providing data files, or maps. It does not include supplying significant items of equipment which must be purchased for the project. The cost of TxDOT assistance described here is not included in the university's budget. RTI makes provisions to cover these costs.

Deliverables Table — lists all deliverables anticipated or required from the project. Minimum deliverables required by TxDOT are shown on the Project Statement. Researchers may propose additional deliverables that they feel would enhance the value of the project.

Schedule of Research Activities — shows the tasks proposed to accomplish the project, along with an estimated schedule for completion, and the estimated percentage of the total project budget that each task represents.

Background and Significance of Work

This section is limited to no more than 10 pages. It:

- ◆ describes findings from a literature search and discusses related existing technology,
- ◆ demonstrates the researcher's understanding of the underlying principles involved, and
- ◆ outlines the researcher's approach to the problem.

This information is only used during the evaluation of proposals, and does not become part of the Project Agreement.

Research Staff and Facilities

This information is required to be attached to each proposal. It is used only during the evaluation of proposals, and does not become part of the Project Agreement.

Required Format for Submission

Current Forms — Proposals should be submitted on current RTI forms. These forms are distributed to university liaisons as they are updated, and with each annual RFP.

Media — All proposals are required to be submitted in PDF format, 1 file per proposal. The PDF file may be submitted via email if the file is small enough to pass through TxDOT's email gateway (limited to 15 megabytes). It may also be submitted on a CD. At the university's option, a single hard copy of the proposal may be sent to RTI, in addition to the PDF file. The PDF copy of each proposal is distributed for review by each Project Monitoring Committee.

Meeting the Deadline

Timeframe — The date and time that proposals are due is set by RTI and is displayed prominently in the RFP instructions. The deadline is also included on each Project Statement. Proposals are not accepted after the published deadline.

Responsibility for Timely Delivery of Proposals — The responsibility for ensuring the timely arrival of each proposal at RTI rests with the university. Failure of email or fax equipment, the post office, or courier service will not be reasons for acceptance of a proposal after the date and time established. No exceptions will be made.

RTI provides confirmation, via email reply, for proposals received by email, within 1 day of receipt of the proposal. TxDOT's email system does not provide for an automated receipt, nor does it reply to messages sent to non-existent email accounts.

Delivery Methods and Locations — The acceptable methods and addresses for delivery of proposals are included in the RFP instructions distributed by RTI. Proposals must be received before the deadline at one of these addresses to be accepted.

Important Notes About Electronic Submission — FAX submissions attempted close to the deadline may fail due to a busy signal at RTI, and will not be accepted unless successfully received in RTI before the deadline. Email submissions will be accepted **if** RTI can obtain documented evidence that a proposal was sent to the **correct** email address and was received by TxDOT's Internet mail server before the deadline.

Section 4 — Project Agreements

Overview

A Project Agreement is basically an executed project proposal, without the Background and Significance of Work and Research Staff and Facilities sections. Unless the project is modified, the initial Project Agreement represents the project throughout its life.

After proposals are received for a project, there are several things that must happen before a Project Agreement is executed and the project is activated. They include:

- ◆ all responsive proposals are forwarded for technical evaluation and a final selection is made and approved,
- ◆ final funding for the selected proposal is approved, and
- ◆ revisions to the Project Agreement requested by TxDOT are completed.

The Cover Page, on RTI's current form, and Exhibits A and B, including all required elements discussed in the previous section of this chapter, must be included in the final Project Agreement before it is executed by TxDOT.

Proposal Selection

On most projects only one proposal from those received is selected. More than one proposal may be selected on projects that are of high priority to TxDOT for which different proposers offer very different and innovative approaches. The ROC may determine that more than one solution proposed is viable and valuable to TxDOT.

Funding Approval

For projects intended to start on the first day of the next fiscal year, the ROC makes final decisions at their spring meeting, based on a financial analysis prepared by RTI.

Funding for mid-year projects is approved, from contingency funds, as needed and available. In these cases funding is approved before proposals are requested, and the Project Statement will typically identify the maximum funding available in the current fiscal year.

Revisions to the Project Agreement

An agreement may be revised, from the language in the proposal, up to the point when it is executed by TxDOT. With each revision, a new date should be shown on the cover page, and revisions

should be clearly marked. If revisions are not clearly marked for review, they may be held to be invalid, even if the Project Agreement is executed.

All revision highlighting and strikethroughs should be incorporated into the agreement before execution.

Project Approval and Activation

Article 7 of the CRIA contains provisions for project approval. Project approval and activation is explained further below.

Annual Funding — Each project is approved and activated for each fiscal year separately. Even on projects that carry a termination date several years in the future, approval for the current fiscal year does not guarantee that future years of the project will be funded and approved. Funding for future years of a project is considered as each of those years is approaching.

Activation Letter — A project is considered approved and activated for the fiscal year once RTI issues an Activation Letter to the performing agency. Each Activation Letter states the beginning date of the project for that agency for the fiscal year. Work before that date will not be reimbursed by TxDOT.

Beginning Date of the Project — The project's beginning date is the earliest activation date among all performing agencies. Therefore, on joint projects, an individual performing agency's activation date may differ from the project's beginning date.

Conditional or Partial Project Activation — A project may be activated before all portions of the work have been fully approved. In such cases, the Activation Letter states which portions of the work are not yet approved. A subsequent Activation Letter is issued when and if those portions of the work are approved. Work on unapproved portions of a project will not be reimbursed by TxDOT.

Contract Documents — Along with the initial Activation Letter, RTI sends a fully executed copy of the Project Agreement.

For projects being modified, RTI sends an Activation Letter, a fully executed copy of the Modification, and any documents referenced on the Modification.

For projects continuing into a second or subsequent year, without the terms of the agreement being modified, the budget for that year is activated by RTI and the only document distributed for that fiscal year is the Activation Letter.

Section 5 — Modifications

Overview

Article 8 of the CRIA contains provisions for amending executed Project Agreements. These amendments are commonly termed “Modifications”. Modifications to a Project Agreement can only be executed while that agreement is active, and must be executed before work authorized by the Modification is performed.

All changes to the terms of a Project Agreement are documented on a Modification form and executed by all parties to the original agreement. Examples of common Modifications are listed below under “When a Modification is Required” and discussed in detail in RTI’s *University Handbook*.

Documents and communications that clarify, rather than change terms of the agreement, are not considered Modifications. Neither are communications that provide current status information, or an update to estimates in a Project Agreement, but do not fundamentally change the terms of the agreement. All such communications should be in writing, and may require concurrence from the Project Director, but need not be submitted on a Modification form. Some examples are listed below under “When a Modification is **NOT** Required.”

Requests for Modification

The need for a Modification may become apparent in several different ways. Two primary places are in progress reports or project meetings.

However the need becomes known, RTI evaluates the information, coordinates within TxDOT to obtain whatever approval is required, confirms that funding is available, if needed, and then requests that the university submit a Modification. Unsolicited Modifications are not accepted from universities.

When a Modification is Required – Examples

A Modification, executed by all parties to the agreement, is required to:

- ◆ change the total project budget,
- ◆ change an agency’s annual budget or indirect cost rate,
- ◆ change the Research Supervisor,
- ◆ change the work plan, including changes in technical objectives, project scope, or tasks,
- ◆ extend the project’s termination date,
- ◆ add or remove any item from the Deliverables Table, or

- ◆ change the due date for any item on the Deliverables Table.

When a Modification is Not Required – Examples

A Modification is **not** required to:

- ◆ change a researcher who is not the Research Supervisor (requires PD concurrence, coordinated through RTI),
- ◆ update the status or clarify an entry on the Deliverables Table (updated Deliverables Table may be submitted to RTI, RTI will evaluate the need for PD concurrence),
- ◆ update the Schedule of Research Activities without adding or deleting tasks or changing the duration of the project (updated Schedule of Research Activities may be submitted to RTI, RTI will evaluate the need for PD concurrence), or
- ◆ update Exhibit A to move funding between line items.

Modification Form

A standard Modification form, requiring signature by all parties to the original agreement, is used for all Modifications. Most items on the form parallel items on the Cover Page of a Project Agreement, and are self-explanatory.

Language on the Modification signature page must either specify the new contract terms, or must list and incorporate by reference all documents attached to the Modification. The previous terms in the Project Agreement will remain in effect for any portion of the Project Agreement not listed on the Modification signature page as being changed.

Modifications to work tasks or deliverables must list all work tasks or deliverables affected on the Modification signature page. If the signature page does not list a specific work task or deliverable for which an attachment is included, the previous terms in the Project Agreement will remain in effect.

Modifications to budget amounts must list all project budgets being affected on the Modification signature page, including annual and total project budget amounts. If a change to the total project budget is not specifically stated on the signature page, the previous total project budget will remain in effect.

RTI's *University Handbook* discusses Modifications in more detail. It also provides example language for many common situations.

Section 6 — Subcontracts

Definition of a Subcontract for a University

Any contract or procurement of engineering or other professional services arranged between a university contracting with TxDOT and an entity not a part of that university is considered a subcontract. This definition is not intended to cover routine service purchases such as copier or automotive repair, printing, use of storage facilities, or similar services that administratively support research work.

The basic provisions dealing with subcontracts are contained in Article 6 – Subcontracts, of the CRIA. This article provides that the university must have written concurrence from RTI for any subcontract with a Texas state university, and for subcontracts in excess of \$4,000 with other entities.

Other articles of the CRIA that deal with issues that may relate to subcontracts include:

- ◆ Article 12 – Indirect Cost Charges
- ◆ Article 14 – Records and Audits
- ◆ Article 18 – Patents
- ◆ Article 24 – Civil Rights
- ◆ Article 25 – Debarment Certification
- ◆ Article 27 – Lobbying Certification
- ◆ Article 29 – Termination of Program or Project

Submitting Subcontracts for Review and Concurrence

Purpose of Review — RTI reviews university contracts with entities outside of the university to ensure the subcontracts are necessary and justified. This review is necessary because the Cooperative Research Program supports projects to be conducted chiefly by Texas state-supported universities.

The review is not intended to determine the adequacy of the contract provisions. TxDOT is not a party to the contract and RTI's concurrence does not reflect approval of the contract provisions.

Evidence of RTI Concurrence — RTI's concurrence in a subcontract may be evidenced either by execution of a Project Agreement that adequately discloses the subcontract, or by a written statement from RTI identifying the subcontract and explicitly concurring in it.

See RTI's *University Handbook* for more details on what constitutes adequate disclosure of a sub-contract in a Project Agreement and RTI's written statement of concurrence for other subcontracts.

Chapter 6 — Project Performance

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Section 1 — Progress Reports and Papers

Introduction

Project Agreements outline the work to be done, provide an estimated time frame for the completion of each task, establish a termination date for the project, and establish a maximum annual budget for each university. Universities are reimbursed for allowable expenses, as work is completed, up to the limit established in the Project Agreement, not paid a fixed fee for the total project.

TxDOT uses several tools to monitor the progress of work on each project. These tools help TxDOT know that the project is progressing productively, and help provide the information needed to determine whether university invoices are reasonable and payable. Some of these tools include:

- ◆ Semi-Annual Progress Reports,
- ◆ Monthly or Quarterly Progress Reports, or as requested by the Project Director,
- ◆ Project Meetings,
- ◆ Technical Memorandums, and
- ◆ Papers.

Semi-Annual Progress Reports

Semi-Annual Progress Reports are required for all research and implementation projects active during the reporting period. The Research Supervisor (RS) on each project is responsible for the report. For joint projects, the report prepared by the RS covers activities at all universities involved in the project.

These progress reports are required by program policy, and are not included on the Deliverables Table in each Project Agreement. They are used to help manage each project, and are not intended for publication.

Semi-Annual Progress Reports are due according to the cycle described in chapter 3 of this manual and instructions from RTI. Current submission procedures, including what information is required, are outlined in each request sent to the universities, by RTI, approximately one month before each report is due.

Monthly or Quarterly Progress Reports

Monthly, quarterly, or other periodic progress reports may be required for certain projects. The Project Director (PD) typically determines the need for such reports, and the format desired.

Reports may be required because a project is in a critical period, there appear to be problems with the direction of the project, or for other reasons.

These progress reports are used to help manage the project. They are not included on the Deliverables Table in the Project Agreement. Nor are they intended for publication.

The submission of monthly or quarterly progress reports, to either the PD or RTI, does not negate the requirement for Semi-Annual Progress Reports for all active projects.

Project Meetings

There are typically several project meetings held during each project. These include:

- ◆ kick-off meeting — held soon after the project is activated, to ensure that researchers understand TxDOT's expectations from the project, and that TxDOT understands the level of participation the researchers need from TxDOT,
- ◆ progress meetings — held periodically throughout the project, as determined necessary by the Project Director or RTI, and
- ◆ wrap-up meeting — held within the last few months of the project to discuss and resolve all remaining issues on the project.

Technical Memorandums (Tech Memos)

Most Project Agreements include provisions requiring the Research Supervisor (RS) to submit a tech memo to the Project Director and RTI at the end of each task that is not otherwise structured to specifically produce a project deliverable. Tech memos serve to both document project work as it progresses and to provide current research results to TxDOT.

Tech memos may be submitted in the format the RS feels is most appropriate to document and demonstrate the results of the work completed. While tech memos must at a minimum be understandable, RTI does not require that they be professionally edited before submission, and they are not intended for publication.

Papers

Papers developed by researchers for professional journals or conferences may also be an effective mechanism to demonstrate project work and results. They may not however be submitted to journals or conference proceedings without the appropriate approval from TxDOT, as the sponsor of the project.

Papers (including articles and bulletins) that contain significant technical findings from a TxDOT project, which have not been approved by TxDOT, shall not be presented publicly, or published,

without prior approval from TxDOT. Public presentation includes posting on non-secure Internet sites. Public presentation does not include a presentation made to TxDOT personnel or at TxDOT-sponsored meetings. See RTI's *University Handbook* for instructions on how to submit a paper for TxDOT approval.

Papers containing subject matter and technical findings substantially similar to those in a deliverable that TxDOT has already approved do not require TxDOT review before presentation.

Section 2 — Deliverables

Contracted Deliverables

Each Project Agreement includes a Deliverables Table that lists all the formal deliverables that a university is obligated to deliver under that project. RTI tracks these deliverables from initial receipt, through review by TxDOT, and final completion by the university. The Research Supervisor of each project is held accountable for contracted deliverables not initially delivered or completed in a timely manner.

Purpose of Deliverables

Deliverables on research and implementation projects serve to:

- ◆ document work performed and the processes and techniques used,
- ◆ document and support the results achieved and associated recommendations,
- ◆ facilitate the implementation of project results within TxDOT, and
- ◆ share project results, as practical, with the research community.

Types of Deliverables

Deliverables on research and implementation projects are divided into two categories:

- ◆ products, and
- ◆ reports.

Products

Products are intended primarily for implementation within TxDOT operations. They are the useable outcome of most research and implementation projects, and vary widely in their form and content. Products are distributed within TxDOT, as needed, to facilitate their integration into operations. Where practical, they are also published and available to others.

Some products are delivered as stand-alone devices or publications. Others are delivered within reports. Whether a product is to be delivered stand-alone or not is specified on the Deliverables Table. The decision on which route is best is made at the beginning of the project and may depend on the amount of information the product represents, the intended audience, anticipated distribution, or other factors. Examples of products include:

- ◆ specifications,

- ◆ design procedures,
- ◆ recommendations,
- ◆ manuals, guidelines, field guides, and brochures,
- ◆ workshop and training materials,
- ◆ devices, and
- ◆ information technology, including software or hardware.

TxDOT standards for the development and delivery of various types of products can be found in RTI's *University Handbook*.

Reports

Reports are intended to document all significant project work and the results achieved. They are the vehicle through which the validity of research processes can be judged, and research work can be shared throughout the research community. They also enable future research to build on past efforts and findings. As such, reports are distributed widely.

Both a summary report and a full technical report(s) are typically required on research projects. Often only a short technical report is required on implementation projects.

More details on the different type of reports, and standards for their development and delivery to TxDOT, can be found in RTI's *University Handbook*.

Deliverable Due Dates

Deliverables are due to RTI as specified on each Deliverables Table. All deliverables submitted to RTI to comply with these due dates should have been reviewed and edited, as applicable to the specific type of deliverable, before submission. Deliverables submitted for TxDOT review should demonstrate good quality professional work.

The due date specified on the Deliverables Tables for many project reports is within 60 days after the termination of the Project Agreement. This 60 days allows time for professional editing and reproduction at the university after the technical research work is completed on the project. This professional editing and reproduction is funded through support projects established specifically for these purposes.

TxDOT may ask that a rough draft of any report be submitted when the project terminates, whether or not that expectation is specified on the Deliverables Table. In those cases, rough drafts are not expected to have been edited at the university.

Section 3 — Allowable University Costs

Introduction

There are several authoritative documents that provide the basis for determining eligible costs chargeable by universities, and other research agencies, to TxDOT research and implementation projects. These include:

- ◆ Title 49, Part 18, “Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments”, of the Code of Federal Regulations,
- ◆ Title 23, Section 420.113, “What costs are eligible?”, of the Code of Federal Regulations,
- ◆ Office of Management and Budget (OMB) Circular A-21, “Cost Principles for Educational Institutions”,
- ◆ OMB Circular A-87, “Cost Principles for State, Local, and Indian Tribal Governments”,
- ◆ OMB Circular A-102, “Grants and Cooperative Agreements with State and Local Governments”, and
- ◆ “Uniform Grant Management Standards”, Governor’s Office of Budget and Planning.

While each of these documents sets out related principles, 23 CFR 420.113 is the most directly relevant to what costs FHWA will participate in. TxDOT’s requirements, based on principles in several of the documents listed above, are summarized below.

Eligible Costs

The following conditions must be met for costs to be eligible for reimbursement.

- ◆ Costs are necessary and reasonable for proper and efficient accomplishment of project objectives, and within the scope of the Project Agreement.
- ◆ Costs meet all applicable principles for allowable costs in federal regulations.
- ◆ Costs are payable under Texas state requirements and rules, including the determination of the correct state budget year.
- ◆ Costs were incurred after TxDOT activation of the project, and prior to termination.
- ◆ Costs are verifiable from TxDOT or university (or subcontractor’s) records.
- ◆ Costs are within approved project budget limits.

The first condition stated above is the over-riding principle that TxDOT applies to all costs billed by the university on a project. The costs must be necessary and reasonable on **that** project, or they will not be reimbursed by TxDOT.

In no case should a university apply costs to a project that they do not directly relate to. In no case should remaining project funds be spent to buy items, such as equipment, that will not be used on **that** project. The application of the principles expressed above are applied case by case, based on the facts of the specific situation.

Specific Cost Items

RTI's *University Handbook* discusses CRIA provisions, application federal and state requirements, and specific approvals needed, if applicable, for the following cost issues and items in more detail:

- ◆ Cost Control,
- ◆ Equipment,
- ◆ Supplies,
- ◆ Facilities,
- ◆ Indirect (Overhead) Charges,
- ◆ Salary and Travel,
- ◆ Foreign Travel,
- ◆ Proposal Preparation, and
- ◆ Technical Assistance Panel (TAP) Participation.

Section 4 — Billings

Introduction

TxDOT reimburses universities and other agencies performing work on research and implementation projects for actual costs, allowing a modest charge for indirect costs that meet federal guidelines. Performing agencies may submit summary billings for reimbursement. Each summary billing must be supported by individual project invoices.

Project invoices are submitted against a specific fiscal year's project budget. Invoices cannot be accepted for estimated costs, costs not yet incurred, costs incurred outside the term of the Project Agreement, costs incurred in a different fiscal year than the one being charged, or costs incurred while a project is suspended.

Billing / Invoice Deadlines

Interim Billings — There is no specific deadline for interim billings, except that all interim billings for a fiscal year must be received before the final billing for that fiscal year.

Final Billings — A final billing is required for each fiscal year a project is active. Final billings are due by December 31 of the following fiscal year, or within 120 days of project termination, whichever comes first. If the December 31 or 120-day deadline can not be met, the performing agency must so notify the Research and Technology Implementation Office (RTI) one month before the deadline.

All final billings should be clearly marked "FINAL" by the performing agency. However, if no notice of expected late billing on a project is received by December 31, RTI will consider the last billing received by December 31 as the final billing, even if it is not so marked.

Billings received not in compliance with the deadlines above may not be paid by TxDOT.

Format and Documentation

The performing agency must provide RTI with an acceptable invoice before any reimbursement of costs is processed. An acceptable invoice describes all charges to be reimbursed and includes adequate supporting documentation.

Specific requirements for billing and invoice formats and supporting documentation are contained in RTI's *University Handbook*.

Records Retention

RTI maintains copies of billings, invoices, and supporting documentation for the required TxDOT retention period. The PD maintains copies of project invoices as long as they are useful to the PD. The university maintains records as required in Article 14 of the CRIA.

Section 5 — Audits and Recordkeeping

Responsibilities

Both the state and federal government may audit project expenditures. Audit and recordkeeping responsibilities of the universities are outlined in Article 14 of each CRIA.

RTI maintains project files for four years after project termination.

Audit Scheduling

Periodic audits of the research and implementation programs may be conducted by federal agencies, the Texas State Auditor, and the TxDOT Audit Office. These entities may also conduct audits of specific research or implementation projects. Such audits are coordinated through RTI.

Audits may be requested on a particular project by the Project Director, the Research Management Committee, the Research Oversight Committee, or by RTI. Such audit requests, with justification for the audit, are sent to RTI for coordination with the TxDOT Audit Office.

Chapter 7 — TxDOT, FHWA, and Local Costs

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Section 1 — Program Management

Costs Charged to RTI by TxDOT Employees

The Research and Technology Implementation Office (RTI) maintains a charge number for use by TxDOT employees who are involved in management of TxDOT's research and implementation programs. This charge number is available for both time and travel charges related to program management.

Approval

Approval for the use of RTI's charge number is inherent in membership by a TxDOT employee on any of the following committees:

- ◆ Research Oversight Committee (ROC),
- ◆ Research Management Committees (RMCs), or
- ◆ Technical Assistance Panels (TAPs).

Annual Charge Number

RTI establishes a new charge number each fiscal year to cover the approved costs described above. This charge number is provided directly to individuals participating in committee activities. TxDOT participants may also obtain this charge number by contacting RTI directly.

FHWA Participants

FHWA participants should contact their respective FHWA administrative offices for information on charging time and travel costs associated with TxDOT's research and implementation programs. RTI does not typically cover these costs.

City, County, or other Local Participants

A few members from local governmental or like entities serve on TAPs in support of TxDOT's research program. RTI does not typically cover time or travel costs for these members.

Section 2 — Project Participation

Costs Charged to RTI

Research Program — The Research and Technology Implementation Office (RTI) maintains a charge number for use by TxDOT employees who are involved in managing individual research projects. This charge number is available for both time and travel charges related to research project management and is not project specific. Non-TxDOT employees serving on Project Monitoring Committees are not typically reimbursed for time or travel costs.

RTI also establishes project specific charge numbers. These charge numbers are used by TxDOT employees providing assistance on university projects.

Implementation Program — Time or travel charges related to specific implementation projects are charged to RTI only if the scope of the specific implementation project includes those costs. Implementation project budgets do not typically include travel costs. These costs are typically charged to an employee's regular overhead account.

Approval

Research Project Management — Approval for the use of RTI's charge number, within the limitations described above, is inherent in membership by a TxDOT employee on a Project Monitoring Committee.

TxDOT Assistance on University Projects — University researchers sometimes need assistance from TxDOT to be able to perform work in the field. Traffic control is a common example of this type of assistance. After the researcher contacts TxDOT field personnel to coordinate the anticipated field work, the University Liaison submits a request to RTI describing the work, the estimated cost, and whether the work is expected to be performed by state forces or a contractor. After confirming that funds are available, RTI issues a Research Fund Authorization (RFA) and sets up a project specific charge number.

Individuals not serving in one of the approved capacities mentioned above are not eligible to use an RTI charge number.

Annual Charge Number

Research Program — RTI establishes a new charge number each fiscal year to cover the approved committee costs described above. This charge number is provided directly to individuals participating in project committee activities. TxDOT participants may also obtain this charge number by contacting RTI directly.

RTI establishes charge numbers for RFAs as needed, and provides those charge numbers to the TxDOT personnel who will be coordinating the work.

Implementation Program — If the scope of an implementation project includes time or travel costs for TxDOT employees that will be charged to RTI, RTI establishes a specific charge number for that implementation project and provides it to the Office of Primary Responsibility (OPR) for the project. The OPR is then responsible for distributing the charge number consistently with the approved scope of the project.

Chapter 8 — Other Research Programs

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Section 1 — Transportation Research Board (TRB)

Overview

The Transportation Research Board (TRB) is a unit of the National Research Council, a private, nonprofit institution that is the principal operating agency of the National Academy of Sciences and the National Academy of Engineering. The Board's mission is to promote innovation and progress in transportation by stimulating and conducting research, facilitating the dissemination of information, and encouraging the implementation of research results.

TRB fulfills this mission through the work of its standing technical committees and task forces, addressing all modes and aspects of transportation, publication and dissemination of reports and peer-reviewed technical papers, administration of contract research programs, conduct of special studies on transportation policy issues at the request of Congress and government agencies, operation of an on-line database of research information, and the hosting of an annual meeting that typically attracts 8,000 transportation professionals from the United States and abroad.

One of the major contract research programs administered by TRB is the National Cooperative Highway Research Program (NCHRP), which is discussed further in the next section of this chapter.

Other contract research programs administered by TRB include:

- ◆ **Transit Cooperative Research Program (TCRP)** – established in 1992 by the three cooperating organizations: Federal Transit Administration; the National Academies, acting through TRB; and the Transit Development Corporation, Inc., a nonprofit educational and research organization. The TCRP undertakes research and other technical activities in response to the needs of transit service providers. The scope of TCRP includes a variety of transit research fields including planning, service configuration, equipment, facilities, operations, human resources, maintenance, policy, and administrative practices.
- ◆ **Airport Cooperative Research Program (ACRP)** – authorized in 2003 as part of the Vision 100-Century of Aviation Reauthorization Act. In October 2005, the Federal Aviation Administration executed a contract with the National Academies, acting through TRB, to serve as manager of the ACRP. Program oversight and governance are provided by representatives of airport operating agencies. The ACRP carries out applied research on problems that are shared by airport operating agencies, undertaking research and other technical activities in a variety of airport subject areas including design, construction, maintenance, operations, safety, security, policy, planning, human resources, and administration.
- ◆ **National Cooperative Freight Research Program (NCFRP)** – authorized in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), with funding first established for 2006. NCFRP is sponsored by the US Department of

Transportation's (US DOT) Research and Innovative Technology Administration and managed by the National Academies, acting through TRB. Program governance is provided by an oversight committee including a representative cross section of freight stakeholders. NCFRP's scope includes applied research on problems facing the freight industry and covering a broad range of issues related to the objective of improving the efficiency, reliability, safety, and security of the nation's freight transportation system.

- ◆ **Hazardous Materials Cooperative Research Program (HMCRP)** – a cooperative research program focused on hazardous materials transportation authorized in SAFETEA-LU, with funding first established for 2006. HMCRP is sponsored by US DOT's Pipeline and Hazardous Materials Safety Administration, and managed by the National Academies, acting through TRB. HMCRP is intended to complement other US DOT research programs as a stakeholder-driven, problem-solving program, researching real-world, day-to-day operational issues with near- to mid-term time frames. The scope of HMCRP includes applied research to improve the information used in managing risk associated with the transportation of hazardous materials, and to advance current knowledge and practice relating to hazardous materials transportation.

To learn more about TRB activities, programs, and publications, visit www.trb.org.

RTI Responsibilities

The Research and Technology Implementation Office (RTI) has several responsibilities related to TxDOT's involvement with TRB. These responsibilities include:

- ◆ coordinating the execution of TxDOT's contract with TRB, which provides funding to help TRB operate, and provides TRB materials to TxDOT,
- ◆ ensuring that TRB publications are maintained in TxDOT's research library, and
- ◆ maintaining information about active TxDOT research projects in the TRB Research in Progress (RIP) database.

Section 2 — NCHRP

Overview

The National Cooperative Highway Research Program (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. The state departments of transportation are the sole sponsors of the NCHRP. Support is voluntary and funds are drawn from each state's Federal-Aid Highway apportionment of State Planning and Research (SPR) funds, in an amount equal to 5½ % of the total SPR apportionment.

For a complete description of NCHRP program development, and listings of NCHRP projects and publications, visit TRB's web site at www.trb.org and navigate to Cooperative Research Programs. Or visit the NCHRP site directly at www.trb.org/NCHRP.

NCHRP Panel Membership

A panel of individuals representing state departments of transportation, the Federal Highway Administration, universities, and private trade associations is selected to manage each NCHRP project. The panel prepares the scope of work, reviews proposals, selects the organization to do the research, monitors progress on the project, and reviews final reports.

Many TxDOT professionals serve on NCHRP panels. RTI coordinates the nomination process for panel members between NCHRP and TxDOT.

Section 3 — Pooled Fund Program

Overview

The Federal Highway Administration (FHWA) sponsors the Transportation Pooled Fund Program as a means for interested states, FHWA, and other organizations to partner to solve common transportation related problems. To qualify as a pooled fund study, more than one state transportation agency, federal agency, local agency such as a municipality or metropolitan planning organization, college or university, or a private company must find the subject important enough to commit funds or other resources to the project.

State and federal transportation agencies may initiate pooled fund studies. Local and regional transportation agencies, private industry, foundations, and colleges and universities may partner with any or all of the sponsoring agencies to conduct pooled fund projects.

RTI Responsibilities

The Research and Technology Implementation Office (RTI) serves as TxDOT's coordinator for the Transportation Pooled Fund Program. In that role, RTI is responsible for:

- ◆ receiving solicitations for pooled fund projects, whether the solicitation is received from FHWA, a lead state on a project, or a DDO,
- ◆ reviewing each solicitation to determine how the proposed project relates to ongoing research activities and TxDOT priorities,
- ◆ coordinating with the appropriate TxDOT division to determine whether they wish to join the project,
- ◆ notifying other states of TxDOT's interest,
- ◆ managing the total annual pooled fund allocation approved by TxDOT's Research Oversight Committee,
- ◆ managing the commitment of TxDOT's SPR funds to pooled fund projects, and
- ◆ managing pooled fund project information for TxDOT on the pooled fund web site at www.pooledfund.org.

Pooled Fund Project Funding

Pooled fund projects are funded from TxDOT's apportionment of SPR funds. As such, they compete for funding with other TxDOT research activities. This competition is either immediate or long-term, depending on whether or not Texas is the lead state on the project. Therefore, all pooled

fund solicitations are evaluated to ensure that the benefits TxDOT expects to receive from the project are balanced with the funding committed.