

Research Program Manual

August 15, 2010

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Arizona Department of Transportation

ADOT RESEARCH CENTER

RESEARCH PROGRAM MANUAL

Review Date: August 15, 2011

This document describes the standard operating procedures for the primary program activities of the ADOT Research Center. While exceptions may occur, these procedures will govern the majority of the Research Center's activities.

This document must be reviewed by the date shown on this page.

Approved:



Anne Ellis, Ph.D.
Director, ADOT Research Center

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ACRONYMS AND ABBREVIATIONS

| | |
|------------|--|
| AASHTO | American Association of State Highway and Transportation Officials |
| ADOT | Arizona Department of Transportation |
| APL | Approved Products List |
| ATRC | Arizona Transportation Research Center |
| CFR | Code of Federal Regulations |
| DOT | Department of Transportation |
| ERQ | Electronic Request for Quotes |
| FHWA | Federal Highway Administration |
| FY | Fiscal Year |
| ITD | Intermodal Transportation Division (ADOT) |
| JPA | Joint Project Agreement |
| LTAP | Local Technical Assistance Program |
| MatPEC | Materials Product Evaluation Committee |
| Melvyl | The University of California Library catalog |
| MPD | Multimodal Planning Division (ADOT) |
| NCHRP | National Cooperative Highway Research Program |
| NTQ | Not Practicable to Quote |
| NTIS | National Technical Information Service |
| NTPEP | National Transportation Product Evaluation Program |
| OCLC | Online Computer Library Center |
| PRIDE | Product Resource Investment Deployment and Evaluation |
| RAC | Research Advisory Committee (under AASHTO and SCOR) |
| RD&T | Research, Development & Technology Transfer |
| RiP | Research in Progress |
| RFP | Request for Proposal |
| RFQ | Request for Quotation |
| SAFETEA-LU | Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users |
| SCOR | Standing Committee on Research (under AASHTO) |
| SPR | State Planning and Research |
| TAC | Technical Advisory Committee |
| TCPEC | Traffic Control Product Evaluation Committee |
| TPF | Transportation Pooled Fund |
| TRACS | Transportation Accounting System |
| TRB | Transportation Research Board |
| TRIS | Transportation Research Information Services |
| TRQS | Transportation Research Quick Study |
| U.S.C. | United States Code |

1.0 INTRODUCTION

1.1 Procedures Manual Overview

This manual describes the management and functions of the research program as directed by the ADOT Research Center. It presents the following information:

- A description of Federal Highway Administration and ADOT program requirements.
- An overview of Research Center administrative procedures.
- A description of research program activities and how they function.
- A description of the ADOT Product Resource Investment Deployment and Evaluation (PRIDE) program.
- An overview of the ADOT library functions.
- Roles of ADOT staff in the research program.
- Roles of non-ADOT entities and individuals, including universities, other government agencies, and the private sector.

2.0 RESEARCH CENTER OVERVIEW

2.1 Research Center Mission and Vision

The ADOT Research Center adopted the following vision and mission statements in May 2010.

VISION

The ADOT Research Center sets the standard of excellence for transportation research, product evaluation and library services.

MISSION

To pursue, create and share knowledge in transportation.

2.2 Federal Statutes and Regulations

The primary source of funding for ADOT's research program is the Federal Highway Administration (FHWA) under provisions of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). Federal regulations (23 CFR 420 *et seq.*) outline the requirements for State Planning and Research (SPR) programs. Pursuant to 23 CFR 420.107(a) at least 25 percent of the SPR program funds must be used for Research, Development, and Technology Transfer (RD&T).

The FHWA regulatory requirements for state research programs are described in 23 CFR 420.209. These regulations state:

§ 420.209 What are the conditions for approval?

(a) As a condition for approval of FHWA planning and research funds for RD&T [research, development, and technology transfer] activities, a State DOT [Department of Transportation] must develop, establish, and implement a management process that identifies and results in implementation of RD&T activities expected to address high priority transportation issues. The management process must include:

- (1) An interactive process for identification and prioritization of RD&T activities for inclusion in an RD&T work program;
- (2) Use of all FHWA planning and research funds set aside for RD&T activities, either internally or for participation in transportation pooled fund studies or other cooperative RD&T programs, to the maximum extent possible;
- (3) Procedures for tracking program activities, schedules, accomplishments, and fiscal commitments;
- (4) Support and use of the TRIS database for program development, reporting of active RD&T activities, and input of the final report information;
- (5) Procedures to determine the effectiveness of the State DOT's management process in implementing the RD&T program, to determine the utilization of the State DOT's RD&T outputs, and to facilitate peer exchanges of its RD&T Program on a periodic basis;
- (6) Procedures for documenting RD&T activities through the preparation of final reports. As a minimum, the documentation must include the data collected, analyses performed, conclusions, and recommendations. The State DOT must actively implement appropriate research findings and should document benefits; and

(7) Participation in peer exchanges of its RD&T management process and of other State DOTs' programs on a periodic basis. To assist peer exchange teams in conducting an effective exchange, the State DOT must provide to them the information and documentation required to be collected and maintained under this subpart. Travel and other costs associated with the State DOT's peer exchange may be identified as a line item in the State DOT's work program and will be eligible for 100 percent Federal funding. The peer exchange team must prepare a written report of the exchange.

(b) Documentation that describes the State DOT's management process and the procedures for selecting and implementing RD&T activities must be developed by the State DOT and submitted to the FHWA Division office for approval. Significant changes in the management process also must be submitted by the State DOT to the FHWA for approval. The State DOT must make the documentation available, as necessary, to facilitate peer exchanges.

(c) The State DOT must include a certification that it is in full compliance with the requirements of this subpart in each RD&T work program. If the State DOT is unable to certify full compliance, the FHWA Division Administrator may grant conditional approval of the State DOT's work program. A conditional approval must cite those areas of the State DOT's management process that are deficient and require that the deficiencies be corrected within 6 months of conditional approval. The certification must consist of a statement signed by the Administrator, or an official designated by the Administrator, of the State DOT certifying as follows: "I (name of certifying official), (position title), of the State (Commonwealth) of _____, do hereby certify that the State (Commonwealth) is in compliance with all requirements of 23 U.S.C. 505 and its implementing regulations with respect to the research, development, and technology transfer program, and contemplate no changes in statutes, regulations, or administrative procedures which would affect such compliance."

(d) The FHWA Division Administrator shall periodically review the State DOT's management process to determine if the State is in compliance with the requirements of this subpart. If the Division Administrator determines that a State DOT is not complying with the requirements of this subpart, or is not performing in accordance with its RD&T management process, the FHWA Division Administrator shall issue a written notice of proposed determination of noncompliance to the State DOT. The notice will set forth the reasons for the proposed determination and inform the State DOT that it may reply in writing within 30 calendar days from the date of the notice. The State DOT's reply should address the deficiencies cited in the notice and provide documentation as necessary. If the State DOT and the Division Administrator cannot resolve the differences set forth in the determination of nonconformity, the State DOT may appeal to the Federal Highway Administrator whose action shall constitute the final decision of the FHWA. An adverse decision shall result in immediate withdrawal of approval of FHWA planning and research funds for the State DOT's RD&T activities until the State DOT is in full compliance.

2.3 FHWA Stewardship Document and Performance Measures

In March 2010, FHWA and ADOT jointly signed a new Stewardship Agreement authorizing ADOT to act on behalf of FHWA and enabling the expenditure of federal funds to carry out programs such as the State Planning & Research (SPR) program. While the agreement enabling ADOT's stewardship of federal funding is not new, the document is. With this authorization comes accountability. To increase accountability and lead to continuous improvement, Performance Measures have been drafted; they are being finalized as this is written. Many of ADOT's programs are enabled by FHWA; these are listed in the Stewardship document, which may be downloaded at <http://www.fhwa.dot.gov/azdiv/stewagmt.htm>. For the Research Center, the Performance Measures are:

1. Percentage of research results implemented in the work program
2. Number of research studies initiated and completed in the fiscal year
3. Distribution of research studies by discipline area (Traffic & Safety, Pavements, Maintenance, Environment, Structures, Planning & Administration, Construction & Materials).

2.4 Policies—ADOT, MPD and Research Center

Research Center staff is subject to ADOT, MPD and Research Center policies. ADOT policies are available on the ADOT intranet (ADOTNet). MPD policies are issued informally, usually through e-mail. The Research Center maintains a *Policies and Procedures* document that is available to staff on the ADOT computer network.

2.5 Research Programs

Major Projects

For projects with budgets greater than \$40,000 (per fiscal year), selection and ranking occurs annually. The selection and ranking are performed by the ADOT Research Council using a process that is described in detail in Section 4.2.

Projects may be approved with budgets using funds from one or more fiscal years. Those that are assigned funds from more than one year are typically large budget projects that take several years to complete. It is a means of spreading the cost so it does not have an adverse impact on a single year's budget. If a project is approved for multiple budget years it does not require approval in subsequent budget years. The funding in future budget years is allocated prior to selecting the new projects for that budget year.

For example, consider a project with a budget of \$600,000, where \$300,000 is allocated in the FY2010 budget and \$300,000 in the FY2011 budget. When FY2010 projects are developed, \$300,000 is removed from the available funding and assigned to the approved project prior to selecting new projects for FY2011.

Small Budget Projects

The Research Center small budget program is operated under the following guidelines:

- The annual budget for this program is \$200,000. The amount can be increased at the discretion of the research director.
- The initial budget for each project cannot exceed \$40,000, as approved by the Research Council on August 11, 2010.
- Projects may be proposed at any time during the year.
- Research ideas or problem statements approved by the Research Council will be funded until the small budget funds are fully appropriated. If the annual budget is not used, the funds will be transferred to other research projects or activities.

TRQS Projects

Transportation Research Quick Study (TRQS) projects have a budget of \$5,000 or less. The current annual budget for this program is \$20,000. The ceiling was increased during 2006 from \$2,500 to \$5,000. TRQS projects are authorized at the discretion of the research director. Research ideas or problem statements may be presented to the research director for TRQS funding by any ADOT employee (or "staff member"). The primary criteria are that the idea have a research element and offer a benefit to ADOT.

Pooled Fund Projects

Pooled fund projects will be funded on a case by case basis. The Research Council will be consulted by e-mail on all pooled fund requests of \$10,000 per year or greater, provided there is sufficient budget to support the project. Decisions on amounts under \$10,000 per year will be made by the research director unless he or she elects to elevate the decision to the Research Council. The decision will be based on a vote of the Research Council. (See *Section 4.2.*)

Pooled fund projects are not obligated when the research program is approved by FHWA. The annual program “budget” allocation for pooled funds is “0” as pooled fund amounts are transferred from the Project Transfer account (R0999) when obligated.

2.6 Research Advisory Committee (AASHTO)

The American Association of State Highway and Transportation Officials (AASHTO) established the Standing Committee on Research (SCOR) after its 1987 annual meeting. As a part of SCOR’s charter, AASHTO directed SCOR to create a Research Advisory Committee (RAC) with each Member Department entitled to representation. States are limited to three RAC members, with a total of one vote among them.

The ADOT director appoints the ADOT RAC members. The appointment is forwarded to the AASHTO President for concurrence. Only appointments signed by the ADOT director are considered official. When appointed, these are the only official members of RAC. RAC membership designations originate at the state level. The ADOT RAC member is usually the research director.

Regions

There are four regions within the RAC membership. ADOT is a member of RAC Region 4 (Western Region). The National RAC as well as each regional RAC has a chair and vice-chair.

Meetings

The National RAC meets twice each year. One meeting is held during the Transportation Research Board annual meeting each January, and may be held jointly with the AASHTO Standing Committee on Research (SCOR). During the summer the National RAC meets for 2-3 days. Meeting locations are rotated among the four RAC regions.

Each RAC region may have additional meetings or communications. RAC Region 4 currently holds a teleconference approximately 6 times per year.

Distribution Lists

Both the National RAC and RAC Region 4 maintain “listserv” distribution lists to contact RAC members and others involved in RAC activities. One of the primary uses of listserv distribution lists is for informal surveys or questionnaires. RAC members coordinate responses to these questions. The ADOT RAC member reviews each request for information and either responds directly or sends it to the appropriate ADOT group for a response.

NCHRP Coordination

The ADOT RAC member coordinates interaction with the National Cooperative Highway Research Program (NCHRP).

2.7 Peer Exchanges

Research peer exchanges are required by Federal Highway Administration (FHWA) regulation 23 CFR 420.209(a) which states in part:

- (a) As a condition for approval of FHWA planning and research funds for RD&T activities, a State DOT must develop, establish, and implement a management process that identifies and results in implementation of RD&T activities expected to address high priority transportation issues. The management process must include: . . .
- (7) Participation in peer exchanges of its RD&T management process and of other State DOTs' programs on a periodic basis.

FHWA clarified this requirement in a 2010 guideline memorandum that stated peer exchanges should be held once every five years.

FHWA regulation 23 CFR 420.203 defines peer exchange. The definition states:

Peer exchange means a periodic review of a State DOT's RD&T program, or portion thereof, by representatives of other State DOT's, for the purpose of exchange of information or best practices. The State DOT may also invite the participation of the FHWA, and other Federal, State, regional or local transportation agencies, the Transportation Research Board, academic institutions, foundations or private firms that support transportation research, development or technology transfer activities.

The ADOT Research Center held research peer exchanges in 1998, 2002 and 2005.

2.8 Transportation Research Board (TRB)

TRB Research Correlation Services

ADOT contributes to the general support of Transportation Research Board (TRB). The contribution acknowledges that a minimum level of service from TRB is available. The support is contributed from the Federal-Aid State Planning and Research (SPR) program allocation. The TRB general support is an established line item in the SPR Annual Work Program and is listed as "Research Correlation Services."

ADOT signed a 3-year subscription service agreement with TRB in March 2006. The agreement committed ADOT to payments to TRB of \$136,380 each year for the 2007-2009 triennium (fiscal years from July 1, 2006 to June 30, 2009), with payments made from research account R0111. Payments are made from the prior fiscal year's budget. The 2010-2012 triennium is currently being paid on a year-by-year basis due to uncertainties in state and federal financial resources, with the FY2011 payment remaining the same as in the past three years. The Research Center has committed the funding to participate for FY2011.

TRB State Representative

The TRB state representative is a research staff person, usually the research director, who serves as ADOT's primary contact with TRB. TRB is a division of the National Academies, which include the National Academy of Science, the National Academy of Engineering, the Institute of Medicine, and the National Research Council. The National Academies serve as independent advisors on scientific and technical questions of national importance.

The TRB state representative coordinates the dissemination of TRB information to ADOT, facilitates ADOT participation in TRB committees, and coordinates the annual visit to ADOT from TRB staff.

2.9 National Cooperative Highway Research Program (NCHRP)

The National Cooperative Highway Research Program (NCHRP) was created in 1962 to conduct research on acute nationwide problems affecting highway planning, design, construction, operation, and maintenance. It is administered by TRB and sponsored by the AASHTO member departments (i.e., individual state departments of transportation), in cooperation with FHWA.

NCHRP funds research projects with a national scope. Budgets for these projects are often larger than most state research projects.

The state departments of transportation are the sole sponsors of the NCHRP. Support is voluntary and funds are drawn from the states' Federal-Aid Highway apportionment of State Planning and Research (SPR) funds. The funds can be spent only for the administration of problems approved on ballot by at least two-thirds of the states. Each state's allocation is 5.5 percent of its SPR apportionment and is set forth in supplementary tables issued with each year's Federal-Aid Highway apportionments.

Each year (usually during July) the AASHTO Standing Committee on Research (SCOR) solicits problem statements from three authorized sources: (1) AASHTO member highway or transportation departments, (2) the chairs of AASHTO's committees and subcommittees, (3) the Federal Highway Administrator¹. The ADOT RAC member sends this request for new problem statements to interested individuals within ADOT, such as the Research Council, and assists those who wish to develop an NCHRP problem statement. The ADOT RAC member collects the problem statements and submits them to NCHRP.

Problem statements are due to NCHRP staff by September 15. FHWA and NCHRP then evaluate them. These evaluations are sent to the submitters in mid-November, who have until early December to comment on the evaluations or withdraw their problem statements.

While new problem statements are being developed, NCHRP panels and staff also work on recommendations for continuations of projects begun in earlier years. Late each December, a report on the continuation projects and new research candidates is distributed to the SCOR and the AASHTO Research Advisory Committee (RAC) with a ballot for rating the projects according to priority.

The ADOT RAC member coordinates ADOT's evaluation of the problem statements. The RAC member assigns problem statements to individuals within ADOT for evaluation. Evaluators are asked to score problem statements on a scale from 0 to 5. Those scoring a problem statement 0, 1 or 5 are encouraged to provide a comment on their score. The RAC member then compiles ADOT's recommendations and submits them to NCHRP after reviewing them with the State Engineer, who is a member of SCOR.

The average ratings of SCOR and RAC are returned to the SCOR Secretary (i.e., the Director of the Cooperative Research Programs) and used to evaluate the problem statements. A summary report is sent to the SCOR for review prior to its annual meeting in late March to determine final priorities and formulate a program. Based on the funding expected from Federal-Aid Highway apportionments for the given fiscal year, SCOR determines which completed or ongoing projects should receive additional funding for further work and which new problem statements should be programmed. An *Announcement of Research Projects* is prepared in April each year. This *Announcement* details the preliminary scopes of work that will be considered in requests for proposals. A list of these projects is also available at <http://www.trb.org/CRP/UpcomingProjects.asp>.

After acceptance by the National Academies (authority delegated to TRB's Executive Committee Subcommittee for the NCHRP) for administration by the Transportation Research Board, the problems

¹ National Cooperative Highway Research Program, available on the Web at <http://gulliver.trb.org/CRP/NCHRP/NCHRP.asp>

are assigned to panels of experts who provide guidance on the technical aspects of the research and translate the AASHTO problem statements into NCHRP research project statements with well-defined objectives. On the basis of these statements, TRB solicits proposals from private and public organizations that can demonstrate capability and experience in the problem area to be researched. These organizations include universities, nonprofit institutions, consulting firms, and individual consultants. Guidance for the preparation of proposals is included in the NCHRP brochure, *Information and Instructions for Preparing Proposals* (Updated October 2007).

The technical panels review the proposals, recommend contract awards, monitor research progress, provide technical guidance, and review reports for acceptability and for accomplishment of the agency's research plan. They also counsel TRB staff in matters of overall project administration. Selected agencies perform research under contract to the National Academies, guided by the *Procedural Manual for Agencies Conducting Research in the National Cooperative Highway Research Program*. Guidance for the preparation of final reports for submission to the NCHRP is found in the brochure *Instructions for Preparation of Cooperative Research Programs Reports*.

Research findings are published in the *NCHRP Report* series and the *NCHRP Synthesis of Highway Practice* series, or as an NCHRP Internet document. The reporting format is designed specifically to accommodate the transportation administrator and practicing engineer. In addition, to provide the earliest possible awareness and use of the research findings, *NCHRP Research Results Digests* and *NCHRP Legal Research Digests* are issued as warranted. All of these reports are available at the TRB Bookstore; many are also published on the Internet. Copies of all published reports are issued to the chief administrative officer of each highway and transportation department and widely within TRB circles.

2.10 Local Technical Assistance Program

The ADOT Local Technical Assistance Program (AZ LTAP) is administered by the Intermodal Transportation Division, Technical Training Group (ITD Tech). The AZ LTAP currently receives \$60,000 annually from the SPR research budget to assist its program; this funding is found on budget line R0117 of the Research Center Work Plan (SPR Part II). AZ LTAP services are provided within the framework of the broader ITD Tech mission.

The National LTAP program provides technical training for the local communities. One AZ LTAP goal is to provide local transportation agencies and public works officials with technical assistance. Technical assistance is often provided in areas such as road construction, maintenance, and administrative issues. This service is not intended to supplant or compete with traditional engineering or consulting services, but rather to augment them. In addition to training classes, AZ LTAP maintains library of video tapes on topics such as safety issues, preventative methods, and new technology.

AZ LTAP publishes a newsletter, *Arizona Milepost*, which is posted to its Web site: www.azltap.org.

3.0 ORGANIZATION

3.1 ADOT Research Center

The ADOT Research Center is part of the Arizona Department of Transportation (ADOT) Multimodal Planning Division (MPD). The responsibilities of Research Center personnel are described in this section.

Research Center Director — reports to the MPD Director

- Supervises project managers, librarian and support staff
- Ensures Research Center group compliance with FHWA and ADOT policies
- Chairs the Research Council
- Coordinates pooled fund project participation
- Prepares and manages the research budget
- Coordinates submittal of documents required by FHWA, including the Annual Program Book, quarterly reports, and project completion documentation.
- Coordinates final report reviews with the technical editor and checks all final reports for completeness
- Coordinates the development and submittal of problem statements to the TRB cooperative research programs, such as the National Cooperative Highway Research Program (NCHRP) and the Transit Cooperative Research Program (TCRP)
- Coordinates the evaluation of NCHRP research problem statements
- Issues and maintains research group policies

Research Project Manager

- Coordinates the development of new research problem statements, including identifying project Champions and Sponsors
- Assembles and chairs technical advisory committees for research projects
- Prepares procurement documents for research projects
- Coordinates the selection and hiring of researchers (principal investigators)
- Manages research contracts and budgets
- Provides technical expertise to the research process
- Leads the technical review of project deliverables, including the final report
- Provides *ad hoc* research assistance to ADOT
- Files project documents, processes budget transfers, prepares purchase orders and coordinates the preparation of Joint Project Agreements for certain intergovernmental or university contracts
- Manages research Project Track database and implementation tracking

PRIDE/APL Manager

- Coordinates the Approved Product List (APL) “PRIDE” program (see Product Resource Investment Deployment and Evaluation (PRIDE) Program)
- Chairs meetings of the Materials Product Evaluation Committee (MatPEC) and Traffic Control Product Evaluation Committee (TCPEC)
- Manages the product evaluation database and Approved Product List (APL)
- Coordinates product evaluation through third party contract evaluators (universities, consultants)
- Supervises student intern

Librarian

- Manages the Research Center library
- Orders publications
- Maintains the Research Center Web site
- Conducts literature searches for research project managers and other ADOT staff
- Does final review of all reports and manages their printing and distribution

Technical Editor

- Reviews all project reports and other Research Center written materials for style, grammar, clarity and conformance with Research Center guidelines
- Writes and edits contributions to newsletter and other Research Center documents including Program Manual, Implementation Report, and PRIDE Annual Report
- Checks reference citations for correctness and completeness

Support Staff

Administrative Assistant

- Assists research director with correspondence, calendar, scheduling
- Greets visitors
- Plans and arranges travel for Research Center staff
- Assists Librarian with sorting, shelving, shipping/receiving, etc.
- Assists with meetings, mail, time sheets, filing, and other administrative tasks

Student Worker/Engineering Intern

- Provides administrative support for the PRIDE program, including logging in PRIDE applications, sending applications to PRIDE evaluators, compiling evaluation reports, preparing letters to PRIDE applicants, and assisting with preparation for Product Evaluation Committee meetings

Organization charts for ADOT, MPD and the Research Center are included in *Appendix A*.

Research Center group policies are stored in a common computer folder, accessible to research staff.

3.2 Executive Group

The Executive Group provides overall management direction to ADOT. When possible, the Research Center director will provide updates to the Executive Group on research program activities.

The current Executive Group members are:

Kevin Biesty, Director, Government Relations
John Bogert, Chief of Operations
Matthew Burdick, Director, Communication and Community Partnerships
John Carlson, Special Projects
Terry Conner, Director Enforcement and Compliance Division
John Fink, Director, Finance and Accounting
Nancy Gomez, Personnel and Training Manager
John Halikowski, Director, ADOT
John McGee, Exec. Director for Planning and Policy
John Nichols, Director Administrative Services Group
Floyd Roehrich, Jr., State Engineer
Stacey Stanton, Director, Motor Vehicle Division
Jennifer Toth, Director, Multimodal Planning Division
Melissa Wynn, Budget & Strategic Planning

3.3 Research Council

The Research Council evaluates and ranks problem statements for new research, including pooled fund projects, thereby selecting new research projects. The Council monitors project activity and implementation and provides guidance on the research program. The Council reviews technical advisory committee membership for research projects. The *Research Council Procedures* guide is contained in *Appendix B*.

Membership in the Research Council is voluntary. With the exception of the FHWA Arizona Division, there are no automatic or organizational positions on the Council.

The current Research Council members are:

Julio Alvarado, Construction Group
Matt Burdick, Director, Communications and Community Partnerships
John Carlson, Special Projects
Jim Delton, State Materials Engineer
Anne Ellis, Director, Arizona Transportation Research Center – Chair
Dallas Hammit, Deputy State Engineer for Operations
Lonnie Hendrix, State Maintenance Engineer
Reed Henry, Roadway Engineering Group
Mark Hodges, Director of Data Management and Analysis
Kelly LaRosa, Federal Highway Administration
Mike Manthey, State Traffic Engineer
Sam Maroufkhani, Deputy State Engineer
Jean Nehme, Bridge Group
Scott Nodes, Transportation Technology Group
Mike Normand, Director, Community Grants and Services
Floyd Roehrich, Jr., State Engineer
Tim Tait, Director, Community Relations
Suzan Tasvibi-Tanha, Information Technology Group
Wendy Terlizzi, Office of Environmental Services Water Quality Manager
Mary Viparina, Assistant State Engineer
Todd Williams, Environmental Services Director

3.4 Research Emphasis Areas

Each research project is assigned to one of seven emphasis areas:

- Environment
- Intelligent Transportation Systems
- Maintenance
- Materials and Construction
- Planning and Administration
- Structures
- Traffic and Safety

4.0 PROGRAM DEVELOPMENT

4.1 Budget

The primary source of funding for the ADOT research program is the Federal Highway Administration (FHWA). Under federal guidelines (23 CFR 420.107) at least 25 percent of the SPR program funds must be used for research. Most of the SPR funds must be matched at a level of 20 percent with state funds (23 CFR 420.119). Some expenditures, such as the TRB correlation, the NCHRP contribution, and most pooled fund studies, do not require a state match and can be funded with 100 percent SPR funds. Recent federal funding for the research program has ranged from approximately \$2.5 to \$3 million per year.

The first step in developing a new fiscal year budget is to request a budget estimate from FHWA. The fiscal year (FY) 2011 main budget items are shown in Table 1.

Table 1
Main Research Budget Categories

| ID No. | Item | FY2011 Budget Amount |
|--------------|--------------------------------------|----------------------|
| SPR-100 | Administrative Accounts | \$2,380,000 |
| | SPR-110: Library | -- |
| | SPR-111: TRB Correlation Program | -- |
| | SPR-112: Administration of Research | -- |
| | SPR-113: Staff Salaries | -- |
| | SPR-114: Technical Writing/Editing | -- |
| | SPR-116: APL (PRIDE) Program | -- |
| | SPR-117: LTAP | -- |
| | SPR-118: TRQS Program | -- |
| | SPR-125: NCHRP contribution | -- |
| | SPR-127: Small Budget Projects | -- |
| SPR-600-700 | Research Projects | \$800,000 |
| SPR-900 | Adjustment Accounts | \$460,000 |
| | SPR-994: MPD Portfolio Adjustment | -- |
| | SPR-995: Director's Special Projects | -- |
| | SPR-996: Project Additions | -- |
| | SPR-997: Participation Projects | -- |
| | SPR-998: Budget Closeout Funds | -- |
| | SPR-999: Project Transfer | -- |
| TOTAL | | \$3,640,000 |

The TRB correlation is determined by TRB. The NCHRP contribution is 5.5 percent of the total SPR apportionment. The LTAP contribution is \$60,000 per year. The current set-aside for small budget projects is \$200,000. Other budget amounts can be adjusted from year to year.

Total funds in the Research Center budget are presented in the Annual Program Book. See *Section 4.4*.

Match Funding

All projects – with the exception of NCHRP (National Cooperative Highway Research Program) contribution, the TRB (Transportation Research Board) Research Correlation, and most pooled fund contributions – require a 20% state funding match to receive FHWA funds. This is accomplished by assigning state employee salaries and other state costs to the match. State universities and other state agencies are required to contribute the 20% match for a project.

Non-federal employee participation in projects can also be counted toward the match requirement.

Budget Tracking

At the beginning of each fiscal year, funds are obligated from the proposed FHWA budget to support the annual ADOT research program. MPD sets up advanced ADOT construction funds to finance the program until FHWA funding becomes available (usually in 3-4 months). When the FHWA funding becomes available, payments from the advanced construction funds are paid back.

After a project is approved by the Research Council and FHWA, the Research Center director submits a request to the Multimodal Planning Division (MPD) Administrative Group to set up a budget tracking number for the project. The research program tracking numbers for fiscal year 2010 are federal project number 177 and Project Number suffix 22P. The project numbers advance by two digits each year: the federal project number for FY2011 will be 179 with Project Number suffix 23P.

Unobligated funds include pooled fund contributions and NCHRP payments. These funds are not tracked in the accounting system until they are obligated.

Pooled Fund Budget

Pooled fund contributions normally do not require a state match. The funding is listed in the ADVANTAGE system. However, the Multimodal Planning Division (MPD) does not include this information in its monthly budget reports to the Research Center because the funds are not obligated until they are designated by the Research Center. A separate tracking system is required, outside the MPD spreadsheets, to track pooled fund contributions. The tracking steps include:

- Date funds are committed (on Pooled Fund Web page)
- Date letter requesting obligation is sent to MPD
- Date confirmation of authorization is received from the Federal Highway Administration (FHWA) — form AZPR2X

The letter requesting that funds be obligated is sent to MPD in draft form for the MPD director's signature. The letter identifies applicable projects and funding sources. The funding source is unobligated funds until the amount identified in the original budget presented in the Annual Program Book (*Section 4.4*) is fully allocated. Additional pooled fund obligations will come from transfers of obligated funds from other accounts, such as the project transfer account. A sample draft pooled fund obligation letter is shown in *Appendix C*.

NCHRP Budget

ADOT's contributions to the NCHRP do not require a state match. The funding is listed in the ADVANTAGE system. However, the Multimodal Planning Division (MPD) does not include this information in its monthly budget reports to the Research Center because the funds are not obligated until they are designated by the Research Center. A separate tracking system is required, outside ADVANTAGE, to track NCHRP contributions.

The NCHRP annual contribution is made by sending a request to the MPD Administrative Section. The amount of the payment due (as specified by NCHRP) is sent to MPD with instructions to process the payment.

4.2 Research Project Development

Ideas for research may be submitted to the Research Center at any time. There is a link on the Center's web site which can be used to submit a research problem statement or idea. Problem statements may also be submitted to the research director or project managers at any time. In addition to these processes, research project managers conduct formal problem statement and idea solicitation activities for each emphasis area. These formal activities include meetings with key groups or individuals within ADOT and research emphasis area workshops.

Research Problem Statements

Research problem statements must include all key information. The research problem statement outline, with these information items shown, is included in *Appendix D*.

Each proposed research statement is evaluated by a research project manager. Some problem statements could be developed in more than one emphasis area. For example, a study of wildlife road crossings could be included in the Environment emphasis area or the Traffic and Safety emphasis area. However, projects are presented to the Research Council under only one emphasis area. Project managers work with the individual or group submitting the problem statement to refine it and ensure that all the elements of the problem statement are included in the document.

Proposed Implementation

Successful implementation of research results begins by considering potential implementation at the development stage. Implementation is considered throughout the research project cycle, with the technical advisory committee (TAC) monitoring this effort. Final reports include a discussion of proposed implementation. At the completion of a research project, the project manager responsible for the project monitors implementation associated with the project for as long as implementation associated with the study continues. (See also *Research Implementation*.)

Champions and Sponsors

All Research Center projects must have a Champion and a Sponsor. The Champion and Sponsor can be the same person.

CHAMPION

The Champion is a person who supports the project and assists and supports the research activity. The Champion must be identified in the research problem statement.

SPONSOR

A Sponsor is a person with the authority to make a decision on the project research recommendations and carry the implementation forward if appropriate. The Sponsor has the authority to approve TAC members (subject to Research Council oversight) and the work plan (subject to Research Center oversight). All Sponsors must be ADOT employees unless an exception is approved by the Research Council. The Sponsor must be identified in the research problem statement.

Technical Advisory Committee (TAC)

The TAC is responsible for the review and approval of the study process and all documents produced by a research study. The proposed TAC must be identified when a research problem statement is developed to help ensure that the scope of the proposed study has been carefully considered. Refer to *Section 4.6* for more information on the development of TACs.

Research Emphasis Area Workshops

Each emphasis area project manager may submit three research problem statements to the Research Council for evaluation and potential approval. If the project manager receives more than three problem statements that qualify for consideration, an evaluation process will be necessary to reduce the number. This evaluation is performed by emphasis area stakeholder through e-mail or a workshop. In rare cases more than three problem statements may be advanced in a single emphasis area, at the discretion of the research director.

The following guidelines describe the requirements for research emphasis area project screening workshops.

1. Each project manager determines the number of votes authorized for each emphasis area under his or her direction.
2. Each vote is allocated to a specific entity, such as an ADOT group, FHWA, local jurisdiction, state agency, or university.
3. The research director reviews the proposed voting structure.

VOTING OPTIONS AT THE WORKSHOP

The project manager will determine the voting option for each workshop. This information should be provided prior to the workshop.

1. Allow only those present to vote.
2. Allow mail-in ballots.

ALTERNATIVE WORKSHOP STRATEGY

In place of conducting a formal workshop, a project manager can work with selected groups to develop research problem statements. The following steps might be included.

1. Develop a formal working group for an emphasis area. This group can include all interested ADOT groups, FHWA, local jurisdictions, state agencies and universities.
2. The working group, rather than the workshop participants, votes on project problem statements.

4.3 Research Project Selection Processes

Major Projects

Problem statements in each research emphasis area are developed through open workshops or coordination with internal ADOT departments. For open workshops customized, weighted voting schemes are used in each emphasis area to rank the problem statements. (See *Section 4.2.*) The research director reviews the top-ranked statements from each emphasis area. If approved by the research director, these problem statements move forward to the Research Council.

At the Research Council's option, a preliminary e-mail vote may be conducted to reduce the number of problem statements. A maximum of five problem statements are put forth by the Research Center in

each of the seven research emphasis areas. The Research Council typically chooses to reduce this number by e-mail to a maximum of three problem statements per emphasis area for final consideration. However, the number of problem statements brought forward is determined by the Research Council.

The final group of problem statements is presented and discussed at a Research Council meeting. The Research Council then scores each problem statement.

Scoring of problem statements for both the e-mail evaluation and meeting evaluation is:

- 3 = high value to Arizona
- 2 = medium value to Arizona
- 1 = low value to Arizona
- 0 = no value to Arizona

Research Council member scores are added together for each project to yield the project's total score. The total score is the basis for ranking the problem statements.

The statements are then ranked based on the Research Council scores. Projects are selected for funding in order of scoring rank until the available funds are allocated.

Projects may be approved with budgets proposed in more than one fiscal year. This typically only occurs for large budget projects that take several years to complete. It is a means of spreading the cost so it does not have an adverse impact on a single year's budget. If a project is approved for multiple budget years it does not require approval in subsequent budget years. The funding in future budget years is allocated prior to selecting the new projects for that budget year.

For example, consider a project with a budget of \$600,000, where \$300,000 is allocated in the FY2010 budget and \$300,000 in the FY2011 budget. When FY2011 projects are developed, \$300,000 is removed from the available funding and assigned to the approved project prior to selecting new projects for FY2011.

Small Budget Projects

The Research Center small budget program is operated under the following guidelines:

- The annual budget for this program is \$200,000. The amount may be increased at the discretion of the research director.
- The initial budget for each project cannot exceed \$40,000, as approved by the Research Council at the Aug 11, 2010 meeting.
- Projects may be proposed at any time during the year.
- After screening by Research Center staff, proposed small budget projects are presented to the Research Council for evaluation and vote (either by e-mail or at a meeting). Three options will be given to Research Council members if an e-mail ballot is used:
 - (1) Approve or disapprove as is.
 - (2) Approve or disapprove with comments.
 - (3) Request discussion at a meeting before a decision is made.

If a quorum of the Research Council votes, the issue will be decided by a majority of those voting. If there is not a quorum or not a majority vote and there is interest by at least one Research Council member, follow up discussion will be held, either through e-mail or at a Research Council meeting.

- Small budget problem statements approved by the Research Council will be funded until the small budget funds are appropriated. If the annual budget is not used, the funds will be transferred to other research projects or activities.

TRQS Projects

Transportation Research Quick Study (TRQS) projects have a budget of \$5,000 or less. The current annual budget for this program is \$20,000. TRQS projects are authorized at the discretion of the research director. Ideas for TRQS projects may be presented to the research director for TRQS funding by anyone in ADOT. The primary criteria are that the topic have a research element and offer a benefit to ADOT.

Pooled Fund Projects

The current annual budget for pooled fund projects is \$50,000. The Research Council will be consulted by e-mail on all pooled fund requests of \$10,000 per year or greater. Decisions on amounts under \$10,000 per year will be made by the Research Center unless the research director elects to elevate the decision to the Research Council. The decision will then be based on a vote of the Research Council.

Voting for pooled fund evaluation will be based on the following scale:

- 3 = high value to Arizona
- 2 = medium value to Arizona
- 1 = low value to Arizona
- 0 = no value to Arizona

Pooled fund problem statements receiving an average score of 1.5 or above will be funded in order of their rank by scoring until the pooled fund budget is exhausted. A quorum of Research Council members must vote to have a valid decision.

4.4 FHWA Program (Annual Work Plan) and Document Review

All expenditures of FHWA funds are subject to review and approval by FHWA. Each year the Research Center prepares a research program, or Annual Work Plan. The work plan describes proposed and existing research projects, activities and proposed budgets. The work plan for the upcoming fiscal year is submitted to FHWA during June, prior to the start of each state fiscal year, as Part 2 of the MPD State Planning and Research (SPR) budget request and work plan.

Funding sources are included in this plan, including proposed FHWA funding amounts. Projects programmed with funds other than FHWA State Planning and Research funds are included in the work plan for information. The non-SPR funds are clearly documented and not included in the total SPR annual budget. Funds for new projects cannot be expended until FHWA approves the program. Changes from the program presented in the work plan require FHWA approval.

Small budget projects require individual FHWA review. The small budget program is presented as a lump sum item in the Annual Work Plan. As individual projects are developed for the small budget program, they each require FHWA review and approval before they can be programmed. Similarly, an account is set up for pooled funds. When funds are obligated to a pooled fund the money is transferred out of the research pooled fund account to FHWA.

Proposed changes to the program, such as changes in work scope, increases in budget or project cancellation, are reviewed with FHWA prior to final action on the proposed change. Under Federal regulation (49 CFR 18.30(c) (1)), any transfer that exceeds 10 percent of the current total approved budget requires FHWA prior approval. This can be accomplished through the use of e-mail communications.

FHWA Program Approval and Research Problem Statement Cycle

The approximate dates for development of the annual FHWA research program are shown in Table 2.

Table 2
FHWA Program Approval Cycle

| APPROXIMATE DATES | ACTIVITY |
|--------------------------|---|
| 9/1 – 12/15 | Research problem statements solicited, submitted and prepared |
| 1/1 – 2/15 | Research project managers select top 5 problem statements in each of 7 research emphasis areas using workshops or meetings with key ADOT groups and stakeholders |
| 2/15 – 3/1 | Research director reviews all problem statements; final modifications to problem statements completed |
| 3/1 – 3/15 | Research Council completes initial screen of initial problem statements, reducing list to a maximum of 3 in each emphasis area |
| 3/15 – 3/31 | Research Council completes evaluation of final problem statements resulting in a ranking of the list of final problem statements |
| 4/30 | Draft research work plan submitted to MPD Administrative Group for inclusion in State Planning and Research work plan |
| 5/15 | FHWA submits comments on draft work plan to MPD Administrative Group; Research Center copied |
| 5/31 | Research Center submits final work plan to MPD Administrative Group. MPD Administrative Group to prepare letter to FHWA authorizing program funds |
| 6/15 | MPD Administrative Group submits project authorization request (AZPR2X Form), letter signed by MPD director requesting funds and approval of work plan, and final work plan to FHWA |
| 7/1 | FHWA approves work plan and authorizes funds |

4.5 Project Funding Setup and Modifications

Budget Approval and Setup

New projects in the program plan are initiated after FHWA approves the federal elements of the plan and authorizes the program funds. This begins with a request to the Multimodal Planning Division (MPD) Administrative Group to set up an account for the project. At the beginning of each federal fiscal year, funds are obligated from the proposed FHWA budget.

MPD sets up a Project Number for each project. The Project Number reflects the federal fiscal year budget that the project is funded from. For example, Project Number R0647 20P would refer to research project SPR-647 in budget year 20 or fiscal year 2008.

The status of each project budget is tracked in the ADOT ADVANTAGE accounting system. The system shows the original budget, the amount spent and the balance. Encumbered funds (funds set aside for a purchase order or other contractual agreement) are shown as funds already spent.

Budget Modifications

Project budget changes resulting from significant program or project modifications require FHWA approval. After approval is received, the requested change or fund transfer is sent to the MPD Administrative Group for action.

If a project amendment increases a project budget the funds for this increase are transferred from the appropriate account (usually the project transfer account) into the project account. If a project is completed with a significant amount of money remaining in the project account, these funds are transferred to the project transfer account.

Funds cannot be transferred between fiscal years. Therefore, if additional funding were approved for a project the transfer would be from the project transfer account in the same fiscal year as the project. In some cases it is necessary to set up a project account in another fiscal year in order to increase funding for a project. For example, if a project is approved in year 1 and additional funding is approved and available in year 2, then a new project number must be set up in year 2 for that project.

4.6 Project Management

Champions and Sponsors

All Research Center projects must have a Champion and a Sponsor (see *Section 4.2, Research Project Development, Champions and Sponsors*). Projects will not be approved, funded or advanced without a dedicated Sponsor and Champion.

Development of Technical Advisory Committees

Unless exempted by the research director, all projects must have a technical advisory committee (TAC). The project manager for a project develops a potential TAC for the project in consultation with the project Champion and Sponsor. The project manager is typically a member of the TAC. FHWA is invited to have a representative on all TACs. All recommended TACs are submitted to the research director for review. The research director informs the Research Council of all new TACs, allowing Research Council members an opportunity to suggest changes to any TAC.

Procurement Requirements

The project manager and TAC determine the appropriate procurement mechanism and contract for the project. On-call contracts and Joint Project Agreements (JPAs) are processed by the MPD administrative group. A Request for Proposal (RFP) or Request for Quotation (RFQ), which is usually in the form of an Electronic Request for Quote (ERQ), is processed by the ADOT Procurement Group.

Selection panels must be created for RFPs or ERQs. The panel can be a single person for an ERQ, usually the project manager. State procurement rules govern these processes. The research project manager must always be a member of the procurement selection panel unless the research director approves an exception.

Selecting Research Project Teams and Investigators

Research projects are conducted by highly qualified experts through a competitive process. Examples include, but are not limited to, university professors or students, consulting companies, private individuals, a staff member from another government agency, or an ADOT staff person (including research staff). The project manager and TAC for a project determine evaluation criteria for the review of consultant proposals select the team determined to be most qualified. Each consultant team must identify a principal investigator who will lead the study effort and serve as the primary contact for the team.

Development of the Project Scope of Work

The project manager, principal investigator and TAC develop the project Scope of Work (SOW). Typically, the principal investigator will prepare a draft Scope of Work. The project manager then works with the principal investigator to refine it before presenting it to the TAC for review. The Scope of Work becomes a key component of the contract document when contracts are required. For in-house principal investigators, the project manager must clearly document the Scope of Work in writing.

Monitoring Research Progress

The project manager carefully monitors the progress of each research project under his or her direction. This includes holding one or more progress meetings, regular telephone and written communications with the principal investigator, the TAC and other key individuals relevant to the study.

Project monitoring also includes tracking project expenditures against the approved budget. The project manager must ensure and document that expenditures correlate with progress. Project managers review all invoices associated with their projects. Before an invoice can be paid it requires the approval of the project manager responsible for the corresponding project as well as that of the research director. *Payments must be connected to research work products or “deliverables” specified in the contract.*

Report Preparation

A final report is required for all completed research. *Guidelines for Preparing ATRC Research Reports (Section 6.3)* describes the format and editorial standards required for research reports. These guidelines are referenced in all research contract documents. The project manager ensures that the principal investigator is familiar with these guidelines at the outset of the study. Each report is reviewed in accordance with the procedures outlined in the *Final Report Review Procedure* section.

Implementation Tracking

After a project is completed, the Research Center monitors the implementation of recommendations from the research. This activity continues as long as new implementation occurs. See *Section 7* for additional information on implementation.

4.7 Research Project Contracts

If the principal investigator is not an ADOT employee, one of several contract mechanisms is used. The options include the following processes.

On-call Contractors

ADOT maintains several lists of companies and individuals with which it has on-call contracts. If the project manager, in conjunction with the TAC, deems it appropriate, several options are available to engage an on-call contractor. The preferred method is to solicit proposals from several companies on the

on-call list and select a company based on these proposals. Another is to request a proposal from a single contractor and negotiate the tasks with that entity. Since these contractors are already under contract to ADOT, the process to employ an on-call contractor is usually the most efficient method.

Joint Project Agreement

A joint project agreement (JPA) can be used to contract with other Arizona government entities, including state or local government agencies and universities. The project manager, in conjunction with the TAC, decides if a JPA is appropriate for a project. JPAs for the research program are coordinated by the Multimodal Planning Division administrative group.

Request for Quotation (RFQ)

For projects of less than \$50,000 a request for quotation (RFQ) can be used to select a principal investigator. This is an informal bid process and can usually be accomplished using the Electronic Request for Quote (ERQ) system. The project manager works with the TAC to decide on the selection process.

Request for Proposal

A request for proposal (RFP) can be used to solicit proposals on the work scope when the On-call contract cannot provide a suitable contractor. This must be coordinated with and approved by the ADOT Procurement Group; justification must be provided by filing a SPO-150 form. An RFP is required for new contracts of \$50,000 or greater that do not use a Joint Project Agreement (JPA), Intergovernmental Agreement (IGA), or the On-call contract. A selection panel for the RFP must be chosen. The panel is usually the same group as the TAC, although this is not a requirement. The research project manager works with the TAC to determine the selection panel. The project manager must be a member of the Procurement selection panel unless exempted by the research director.

4.8 Purchase Orders, Invoices, and Payments

Contract work is paid through purchase orders. The MPD Administrative Group creates a purchase order on request from the Research Center. Invoices for all research projects must be sent or forwarded to the Research Center. The project manager or other staff person responsible for a contract must review each invoice for that contract and ensure that documentation to support the completion of work is attached. After approval by the Research Center, the invoice and supporting documentation is forwarded to the MPD administrative group for processing and payment through the ADOT accounting group.

4.9 Project Cancellation Procedure

Occasionally, there is a need to cancel a project, such as when a project is no longer needed or viable, or the principal investigator cannot complete the project. The steps required for project cancellation are described in this section.

The process begins with the project manager reviewing the project status with the project Sponsor, Champion and TAC. If all agree that the project should be cancelled, the project manager submits this recommendation to the research director. The recommendation includes the rationale for canceling the project. If the research director concurs with this decision, a letter is sent to FHWA recommending project cancellation. If FHWA concurs, the project is cancelled and any remaining funds in the project budget are transferred to another account (usually the project transfer account).

When preparing the rationale for project cancellation, the project manager investigates any contract issues that may be involved in the project cancellation. Resolution of the contract issues is part of the rationale presented to the research director.

4.10 Project Log Database

The Research Center maintains a Microsoft Access database for research projects. The database includes essential information about all active projects and most completed projects dating back to 1998. Information contained in the database includes:

- A discussion of the project background and objectives
- Total budget and the amount spent
- The principal investigator
- The project Champion, Sponsor and Technical Advisory Committee
- The status of the research
- Report publication status
- A discussion of project implementation
- Additional items used for the FHWA quarterly report

Research project managers are responsible for keeping information on their projects up to date in the database. The database uses nine tabs to organize the information: *Admin 1; Admin 2; Contract Info; Research; Publish – RiP; Implementation; Implementation Benefits; Implementation Issues* and *FHWA Rpt Items*. Examples of the current entry fields for the database are shown below and on the following pages.

| ATRC PROJECT LOG | | | |
|--|--|---|---|
| Admin 1 | Admin 2 | Contract Info | Research |
| Publish - RiP | Implementation | Implement Benefits | Implement Issues |
| FHWA Rpt Items | | | |
| Sequence No. Enter only the number part of the Project ID 604 | Project ID (SPR/AZ No.) SPR-604 | ADVANTAGE Nos. R0604 18P | ATRC Project Manager Dave Elack |
| Project Name Real-Time Adaptive Ramp Metering: Phase 2– Implementation and Enhancement | | | Emphasis Area ITS |
| BUDGET INFO | | Project Description and Background | |
| TRACS No. - Proj - FY TRACS 18 - 069 - 2006 | ADOT's Freeway Management System is designed to apply "smart" ramp metering, taking into account the impacts on mainline freeway traffic flow. However, real-time traffic-adaptive ramp metering has never been implemented. *New FMS controller upgrades, and the existing communication infrastructure, would allow the full utilization of new ramp metering control strategies, such as the U of A's traffic-adaptive MILOS program, on extended freeway corridors. Such "smart" corridors will make ramp-metered traffic flow smoother and improve the operation of interchanges and connecting corridors in the region. *The preceding SPR 595 project (Phase 1) used corridor simulation modeling to validate the traffic-adaptive concept. This new Phase 2 project will perform early-implementation field tests, and identify system refinements with the upgraded FMS on the I-10 corridor. | | |
| TRACS No. - Proj - FY | | | |
| TRACS No. - Proj - FY | | | |
| Additional Budget Years | | | |

| ATRC PROJECT LOG | | | | | | | | |
|---|---|---------------|----------|--|----------------|--------------------|------------------|----------------|
| Admin 1 | Admin 2 | Contract Info | Research | Publish - RIP | Implementation | Implement Benefits | Implement Issues | FHWA Rpt Items |
| Project No. | Project Name | | | | | | | |
| SPR-604 | Real-Time Adaptive Ramp Metering: Phase 2– Implementation and Enhancement | | | | | | | |
| Other Participants (ADOT and External Groups) | | | | Principal Investigators | | | | |
| Transportation Technology Group Transportation Technology Group Traffic Engineering Group Maricopa Association of Governments (MAG) | | | | Name | | | | |
| Champion | | | | Organization | | | | |
| Scott Nodes | | | | University of Arizona | | | | |
| Sponsor | | | | Address | | | | |
| Scott Nodes | | | | ATLAS Center / SIE Dept PO Box 210072, Tucson AZ 85721-0072 | | | | |
| TAC Names and Organizations | | | | Telephones | | | | |
| TAC based on SPR 595: Scott Nodes-Transportation Technology Group – (Champion) Tim Wolfe, Joe McGuirk, Chuck McClatchey -Phoenix Maint Dist; Ryan Gish, Lydia Warnick, Glen Jonas - Technology Group Tom Parlante, -Traffic Engineering Group Sarath Joshua, Maricopa Association of Governments (MAG) Jim Decker, Christine Warren - Traffic Engineering Tempe; Faisal Saleem MCDOT | | | | 520-621-2990 | | | | |
| | | | | E-mail | | | | |
| | | | | pitu@sie.arizona.edu | | | | |

| ATRC PROJECT LOG | | | | | | | | |
|--|---|---|-------------------------|-------------------------------------|----------------|--------------------|------------------|--|
| Admin 1 | Admin 2 | Contract Info | Research | Publish - RIP | Implementation | Implement Benefits | Implement Issues | FHWA Rpt Items |
| Project No. | Project Name | | | | | | | |
| SPR-604 | Real-Time Adaptive Ramp Metering: Phase 2– Implementation and Enhancement | | | | | | | |
| Initial ATRC Funds | Additional ATRC Funds | Notes on ATRC Added (change order) Funds | | | | | | |
| \$200,000.00 | \$0.00 | | | | | | | |
| Other Funds (Total) | Other Fund Sources | | | | | | | |
| \$0.00 | Matches: \$50,000 combined from U of A team & others -after internal renegotiation delays | | | | | | | |
| Funds Transferred Out | Comment - Fund Transfers (Project cancellation, closeout, etc.) | | | | | | | |
| \$0.00 | | | | | | | | |
| Total Project Funds | Amount Spent | Calculated Balance | Budget Info Date | | | | | |
| \$200,000.00 | \$33,024.49 | \$166,975.51 | 12/20/2007 | | | | | |
| CONTRACT - RFP/FOD/JPA Processing Dates | | | | | | | | |
| ENTER APPLICABLE DATES | | | | | | | | |
| Docs Submitted | Contract Complete | To ATRC Mgr | ATRC Mgr OK | Contract Complete or N/A | | | | Contract Notes |
| 07/13/2006 | 01/19/2007 | 07/07/2006 | 10/18/2006 | <input checked="" type="checkbox"/> | | | | The JPA 07-001T package was filed on Jan 19th. |

| ATRC PROJECT LOG | | | | | | | | |
|--|---------|------------------------------|---------------------------------------|----------------------------|------------------------------|------------------------------|------------------|----------------|
| Admin 1 | Admin 2 | Contract Info | Research | Publish - RiP | Implementation | Implement Benefits | Implement Issues | FHWA Rpt Items |
| Status and Summary of Research Originally to be initiated in late 2006, on substantial completion and acceptance of SPR 595, which delayed the JPA completion until January. It was filed on Jan 19th, *which enabled the project kickoff meeting to take place on 2-28-07. This Project 604 will perform implementation field tests, and identify possible system refinements with the upgraded FMS on the I-10 corridor. *Work is in progress, and the project TAC met again on December 10th - next meeting is Feb 27th. *John Semmens has assumed project management for ATRC. | | | Percent Complete (Opt.) 20% | | Project ID SPR-604 | | | |
| Groups Involved MAG, Cities of Tempe and Phoenix, MCDOT, ADOT | | | | | | | | |
| REPORT ACTION DATES | | | | | | | | |
| Draft Report Received | | TAC Approval Complete | | Approved by FHWA | | Ed. Comments Received | | |
| | | | | | | | | |
| Report Sent to TAC | | Report Sent to FHWA | | Report to Tech. Ed. | | Report to Librarian | | |
| | | | | | | | | |

| ATRC PROJECT LOG | | | | | | | | |
|-----------------------------------|---------|---|----------|------------------------------|----------------|--|------------------|--------------------|
| Admin 1 | Admin 2 | Contract Info | Research | Publish - RiP | Implementation | Implement Benefits | Implement Issues | FHWA Rpt Items |
| Project No. SPR-604 | | Project Name <i>Real-Time Adaptive Ramp Metering: Phase 2- Implementation and Enhancement</i> | | | | | | |
| PUBLISHING TASK DATES | | | | RiP | | Report Published <input type="checkbox"/> | | Report Date |
| Report to Printer | | | | Date Entered into RiP | | 01/24/2005 | | |
| Rpt Received from Printer | | | | Date Removed from RiP | | | | |
| Report Distributed | | | | | | | | |
| Research Notes Distributed | | | | | | | | |
| Report Published on Web | | | | | | | | |

| ATRC PROJECT LOG | | | | | | | | |
|--|---|---------------|----------|---------------|----------------|--|------------------|----------------|
| Admin 1 | Admin 2 | Contract Info | Research | Publish - RIP | Implementation | Implement Benefits | Implement Issues | FHWA Rpt Items |
| Project No. | Project Name | | | | | | | |
| SPR-604 | Real-Time Adaptive Ramp Metering: Phase 2– Implementation and Enhanceme | | | | | | | |
| IMPLEMENTATION | | | | | | Dates of Contact with Interested Entities | | |
| Status of Implementation | | | | | | Request for Decision | | |
| Research in progress - target is completion in August/September 2008. *John Semmens has assumed project management for ATRC. | | | | | | | | |
| Entities Contacted by ATRC | | | | | | Response Received | | |
| Entities Contacted | | | | | | | | |
| | | | | | | Follow Up (one year) | | |
| | | | | | | | | |
| | | | | | | LAST REVIEW DATE: | | |
| | | | | | | 02/05/2008 | | |
| <input type="checkbox"/> No Further Implementation Planned | | | | | | | | |

| ATRC PROJECT LOG | | | | | | | | |
|------------------------------------|---------|---------------|----------|------------------------------------|----------------|--------------------|-------------------|----------------|
| Admin 1 | Admin 2 | Contract Info | Research | Publish - RIP | Implementation | Implement Benefits | Implement Issues | FHWA Rpt Items |
| | | | | | | | Project ID | |
| | | | | | | | SPR-604 | |
| Cost Savings | | | | Safety Benefits | | | | |
| TBD but expected to be substantial | | | | TBD but expected to be substantial | | | | |
| Process Improvements | | | | Other Benefits | | | | |
| TBD but expected to be substantial | | | | TBD but expected to be substantial | | | | |

| ATRC PROJECT LOG | | | | | | | | |
|--|---------|---------------|-----------------------------|---------------|----------------|--------------------|-------------------|----------------|
| Admin 1 | Admin 2 | Contract Info | Research | Publish - RiP | Implementation | Implement Benefits | Implement Issues | FHWA Rpt Items |
| IMPLEMENTATION ISSUES | | | | | | | Project ID | SPR-604 |
| Cost Impediments | | | Resource Impediments | | | | | |
| TBD | | | TBD | | | | | |
| Political Impediments | | | Other Impediments | | | | | |
| TBD | | | TBD | | | | | |
| Recommended Follow-up Actions | | | | | | | | |
| Encourage the sponsor groups within ADOT to agree on a pilot or demonstration implementation, and to conduct in-house monitoring and evaluation. | | | | | | | | |

| ATRC PROJECT LOG | | | | | | | | |
|---|--|---------------------|----------|---------------|--|--------------------|------------------|----------------|
| Admin 1 | Admin 2 | Contract Info | Research | Publish - RiP | Implementation | Implement Benefits | Implement Issues | FHWA Rpt Items |
| Project No. | Project Name | | | | | | | |
| SPR-604 | Real-Time Adaptive Ramp Metering: Phase 2- Implementation and Enhancement | | | | | | | |
| Expected Completion | Status | FHWA Contact | | | Emphasis Area Code | | | |
| 8-31-08 | IP (05 %) | Hansen | | | ITS | | | |
| ENTER: (Date) Ongoing Pending N/A | ENTER: Proposal IP (% complete), denotes In Progress Draft Complete Cancelled N/A | | | | <input checked="" type="checkbox"/> FHWA Report Item | | | |

4.11 Research Support Activities

In addition to research projects, the Research Center supports ADOT with *ad hoc* research efforts. These efforts range from literature searches to brief surveys of other states or organizations. These are not funded as separate programs but are performed by research staff as part of their duties.

4.12 Pooled Fund Studies

The Transportation Pooled Fund (TPF) Program allows federal, state, and local agencies and other organizations to combine resources to support transportation research studies. When significant or widespread interest is shown in solving a transportation-related problem, the research, planning, and technology transfer activities to do so may be jointly funded by several federal, state, regional, and local transportation agencies, academic institutions, foundations, or private firms as a pooled fund study.

To qualify as a pooled fund study, more than one state transportation agency, federal agency, other agency (such as a municipality or metropolitan planning organization), college, university or private company must commit funds or other resources to conduct the research, planning, and technology transfer. If a subject has been studied previously, the new study should provide information that will complement or advance previous investigations of the subject matter. A federal, state, regional, or local transportation agency may initiate pooled fund studies. Private companies, foundations, colleges and universities may partner with any or all of the sponsoring agencies to conduct pooled fund projects.

See *Section 4.3* for a discussion of how ADOT participation in pooled fund projects is considered.

ADOT Sponsored Pooled Fund Studies

ADOT-sponsored pooled fund studies are initiated by means of the following steps:

1. Prepare a research problem statement. The problem statement should meet the same standards as all other ADOT research problem statements, including the identification of a Champion and Sponsor for the project.
2. The problem statement must follow the same Research Council approval process as other research problem statements.
3. After approval by the ADOT Research Council, the Research Center submits the problem statement and request for funding through the Arizona FHWA Division office. If it approves the request, the division office will submit the request to FHWA headquarters, along with its endorsement of the problem statement. Upon submitting the statement and request to establish the study, a solicitation may be posted on the Transportation Pooled Fund (TPF) web site. A solicitation may remain posted on the TPF web site for up to 1 year.
4. For studies led by ADOT, submission of a commitment to ADOT is an acknowledgement by a study partner that it will formally obligate funding to the pooled fund study. Commitments are made online at the TPF website. Each federal, state, regional, or local agency uses the obligation forms that are generally used to obligate funds for research, planning, or technology innovation studies that use federal funding sources. This process is the official obligation of funds on behalf of the study partners and the means by which these funds are made available for use for the pooled fund study. ADOT's federal funds for pooled fund studies are obligated through the Arizona FHWA Division offices in the Fiscal Management Information System (FMIS). The Arizona FHWA office can confirm ADOT contributions to pooled funds.

5. To request reimbursement for funding, Form PR-20 "Voucher for Work Performed Under Provisions of the Federal Aid and Federal Highway Acts, as Amended" should be submitted to the Arizona FHWA Division office. The Division Office then submits the voucher to FHWA's Turner-Fairbank Highway Research Center, to verify satisfactory program progress. Finally, the voucher is forwarded to FHWA Headquarters Finance Division for payment so proper distribution of study expenditures may be made among study partners.

5.0 PRODUCT EVALUATION – APPROVED PRODUCT LIST (APL or “PRIDE”) PROGRAM

5.1 APL “PRIDE” Program Background

ADOT’s Product Evaluation Program started as the Product Resource Investment Deployment and Evaluation (“PRIDE”) program in May 1985 when ADOT established the Policy for Field Test Requested by Outside Parties to address the increasing demands of technology and the limited resources of the agency. This policy gave the Research Center the responsibility for managing and documenting proposals for test sections submitted by vendors. A Product Evaluation Advisory Committee was established to evaluate the proposals and to recommend products or technologies to be considered for field evaluation.

The current “PRIDE” policy, SUP-9.01 PRODUCT RESOURCE INVESTMENT DEPLOYMENT AND EVALUATION (PRIDE) PROGRAM, became effective on July 18, 2002 and was revised and reissued on January 27, 2006. It provides for two Product Evaluation Committees (PECs): Materials (MatPEC) and Traffic Control (TCPEC). These committees are responsible for establishing the operational policy for the new products evaluation and approval process under the “PRIDE” program. While each PEC has primary areas of responsibility, product evaluations often overlap these areas, requiring decisions from both committees on a product’s acceptability. The PECs have the authority to approve or disapprove new products. Approved products are placed on the Approved Products List (APL). The committees have the authority to remove previously approved products from the APL that are later found to be unacceptable.

5.2 APL “PRIDE” Program Description

The Research Center directs the Product Approval “PRIDE” Program, which is funded as part of the SPR Program. This program coordinates the review and acceptance of new products for possible use by ADOT and maintains the Approved Products List (APL).

Outside contractors are used on an as-needed basis to support the Product Approval “PRIDE” program. They may provide administrative support as well as perform evaluations of products submitted to the APL “PRIDE” program for review.

APL “PRIDE” Program Annual Report

The *PRIDE Program Annual Report*, published annually, summarizes the main activities of the Product Approval “PRIDE” program for the previous calendar year. It also lists the MatPEC and TCPEC memberships and summarizes their actions.

6.0 ADOT RESEARCH LIBRARY, REPORTS AND DOCUMENTATION

6.1 Library

The Research Center houses and operates the main ADOT library, which is maintained by a full time librarian. The library is open to ADOT employees, transportation faculty in Arizona universities, and Arizona local and county transportation staff.

The library catalog is available on the Internet. The library collection currently includes over 33,000 entries, including nearly 80 journal and magazine subscriptions.

Mission

The library's mission is to provide information to all ADOT employees, transportation related information services to the faculty and staff of the universities and colleges in Arizona, and to the local Arizona transportation departments (city or county). Limited services are provided to the public.

Acquisition Policy

The library welcomes recommendations for new books and periodicals; however, the librarian has primary responsibility for the selection and acquisition of library materials.

1. BOOKS AND REPORTS

The library attempts to acquire all publications of the Arizona Department of Transportation. The librarian uses the following criteria to decide acquisition of other items:

- ADOT's need for the information.
- Positive reviews and evaluations in accepted reviewing media and/or citation in specialized bibliographies or indexes.
- The reputation of the publisher.
- The author's reputation.
- Availability at other area libraries (if the price is over \$200.00).
- Membership in a series (i.e., annual proceedings, standards) that the library has.
- Whether the book is a new edition with revised information or a reprint.

2. MAGAZINES AND SERIALS

The librarian uses the following criteria to decide magazine and serial purchases:

- Likely usage by ADOT employees.
- Inclusion in indexing or abstracting by services available in the Library.
- Frequency of citation in the literature.
- Availability at other area libraries.
- Price and price increases.
- Volume of requests for material from the serial via interlibrary loan.

Multiple copies of serials will not be purchased.

3. GIFTS

The library reserves the right to accept or discard any donated materials as it sees fit. It will not photocopy materials unless there is copyright clearance.

4. DISCARDS

The library considers discarding books when their information becomes obsolete, they are replaced by later editions, space restrictions require a smaller collection, the items are not used or they are damaged beyond repair.

Catalog

Library holdings are classified using the Library of Congress and the Superintendent of Documents classification schemes. Their bibliographic information is entered into the library database using DB/TextWorks software. This database can be accessed through the Research Center network and the Internet.

Circulation

ADOT employees, faculty of Arizona public colleges and universities, and transportation officials of Arizona cities and counties may borrow circulating items from the library. Graduate students at Arizona public universities may request borrowing privileges via a letter on department letterhead signed by a faculty member.

All materials circulate except periodicals, reference items, computer software and manuals, indexes, Research Center vault reports, and the original, camera-ready copies of ADOT research reports. Study guides for engineer-in-training and professional engineer tests circulate only to ADOT employees.

The checkout is documented by filling out a circulation card in the desired document. The librarian records the information and tracks the loan. The standard loan period is one month. The borrower may renew an item two times, providing no one else has asked for it.

The borrower is responsible for returning items borrowed. The borrower may choose to have items sent to him and to return items via interagency mail or the U.S. Postal Service, however, the borrower is liable for the book if it is lost. The library will suspend or limit borrowing privileges of clients who do not return library materials. Borrowers who have kept items for more than six months will have their borrowing privileges suspended until the items are returned. They must replace or pay for lost, destroyed or damaged items. The library replaces books kept for more than one year and charges the replacement cost to the borrower. Borrowers who leave or change their current employment or student status must return all borrowed items to the library.

Clientele

The ADOT Research Library is open to the public, though some services are restricted.

Collection Description

ADOT's library has over 33,000 books, magazines, videos and CDs. The collection focuses on transportation planning and engineering. Most of the collection is reports published by federal and state transportation agencies. It also has professional society and commercial publications.

History

The ADOT Library was established in July 1989. In 1990 the Research Center transferred from the Highways Division to the Transportation Planning Division. In 1995 it was transferred to the Intermodal Transportation Division. In 1997 it was transferred to the Director's Support Division. In 1999 it was transferred to the Transportation Planning Division, now named the Multimodal Planning Division, where it remains today.

Interlibrary Loan

The library borrows material from other libraries for ADOT staff through its interlibrary loan service. The library absorbs the charges for this service. Clients requesting an interlibrary loan must provide complete and accurate bibliographic information about the items they want to borrow.

Literature Searches

On request, the library will compile bibliographies on work-related issues for ADOT staff. The library uses various bibliographic databases—some free, some that charge a fee—to find citations relevant to the research question. These databases include the Transportation Research Information Services (TRIS), the National Technical Information Service (NTIS), and the University of California Library catalog (Melvyl), all of which are free, and the Online Computer Library Center (OCLC), which is fee-based.

Ordering Books for Staff

The library can order printed material for research staff or staff can order it directly. ADOT staff must order material directly. The exception is for free materials, which the Library will order for any ADOT staff. The library will assist ADOT staff in purchasing printed material by providing publisher addresses and phone numbers; order forms (when available); and price information.

Other ADOT Collections

The library supervises the entry of other ADOT section libraries into its database. This includes training on the use of the DB/TextWorks software and procedures to catalog the material. This assistance does not exceed four hours a week for a section. The section must have a purchased copy of the DB/TextWorks software and an on-site person designated as a library liaison to maintain the database. This on-site maintenance includes cataloging and entering new material; updating items when they are checked out and returned; deleting items when they are lost or not returned.

Outreach

The librarian provides tours of the library, staff presentations on library services (usually given to groups in their work areas), and instruction in the use of such tools as the library databases, indexes, and specific reference books.

Reference Services

Although the library responds to transportation-related reference questions from anyone, questions from ADOT staff receive the highest priority. ADOT staff may ask for information on any job-related topic. The library works with the requestor to determine the best way to deliver the answer: telephone calls, in-person visits to the library, fax, email, interagency mail or U.S. Postal Service.

6.2 Quarterly Reports to FHWA

A quarterly progress report is submitted to FHWA for the following periods:

- January 1 – March 31 (report dated April 1)
- April 1 – June 30 (report dated July 1)
- July 1 – September 30 (report dated October 1)
- October 1 – December 31 (report dated January 1)

The report includes a one-line summary of all active research projects, including budget information. The MPD administrative group provides the budget information.

6.3 Research Document Guidelines

The Research Center maintains guidelines governing the format and printing of its research reports. An archive of previous editions of the guidelines is maintained on the Research Center shared computer “G” drive at: G:\TPD\ATRC\Team References\Rpt Guidelines Archive.

The guidelines are dated and maintained on the “G” drive so that contract requirements can be matched with the appropriate edition. For example, a contract signed on 12/1/2009 would be subject to the report guidelines in effect then. Modifications or updates to the guidelines prepared after the contract date do not affect the original contract.

A template for the four-page Research Note that accompanies research reports is also on the “G” drive.

6.4 Final Report Review Procedure

All research contracts require the principal investigator to provide a draft report on the completed project and to respond to comments on the report. After a final report is reviewed and accepted by the Technical Advisory Committee (TAC) for the respective research project, the project manager sends the report to FHWA for its review. After the project manager addresses all comments from and resolves all concerns raised by the TAC and FHWA and receives FHWA approval, the document is ready for review by the technical editor.

The draft report is given to the research director, who sends an electronic copy to the technical editor. The technical editor’s comments on the document are returned to the project manager, who then works with the principal investigator for the study to address questions or comments from the technical editor.

After the project manager is sure that all questions and edits from the TAC, FHWA, and the technical editor have been addressed, one copy of the report is printed by the research project manager for review by the research director. After comments from the research director have been addressed, the report is ready for printing. Report printing is coordinated by the librarian, working with the project manager.

Report distribution is directed by the research librarian. Final reports and Research Notes are posted on the Research Center’s Web site by the librarian.

6.5 Project Completion and Documentation

After a report has completed the review and printing process, a project completion letter is sent to FHWA with two copies of the report unless otherwise specified by FHWA. If a project is not completed or is cancelled, a letter explaining the action is composed by the research director, with assistance from the

project manager and sent to FHWA.. Any remaining funds in such terminated projects are transferred to a project transfer account or other appropriate research account.

The files for the completed project are turned over to the MPD Administrative Group for filing. Files should comply with the ADOT records retention policy (MGT-9.09, *Records Retention and Disposition Schedule*).

6.6 Research Center Newsletter

The Research Center publishes a newsletter periodically. The newsletter is distributed electronically to ADOT, the AASHTO Research Advisory Committee list-serv distribution list, and other interested individuals.

6.7 Research Center Web Page

The current Research Center Web page address is: <http://www.azdot.gov/TPD/ATRC>

The Web page includes the following:

- Background information.
- A list of research emphasis areas and descriptions of active projects.
- The form for submitting a research problem statement.
- List of Research Center staff.
- PRIDE program reference material and the application form.
- Publications that can be downloaded, including final reports, research notes, TRQS reports, newsletters, implementation reports, PRIDE annual reports, and other Research Center documents.
- The ADOT Research Library catalog.

The research librarian has the primary responsibility for maintaining the Research Center Web page in coordination with the ADOT Information Technology Group.

6.8 TRIS and RiP Databases

The Transportation Research Board maintains two transportation research databases. The Transportation Research Information Services (TRIS) database is the world's largest and most comprehensive bibliographic resource on transportation information. It covers all modes and disciplines of transportation.

TRB also maintains the Research in Progress (RiP) online database. The system allows users in state Departments of Transportation to add, modify and delete information on their current research projects. Most of the RiP records are projects funded by federal and state Departments of Transportation. University transportation research is also included.

The research librarian submits reports to TRB for inclusion in TRIS. The librarian also enters information on ADOT research projects into the RiP database. The RiP information is gathered from the research project managers and completed research reports.

6.9 Annual Reports

In addition to the Annual Program Book submitted to FHWA (see *Section 4.4*), the Research Center publishes two annual reports. The annual *Research Implementation Report* and the *PRIDE Program Annual Report* are both published annually. These reports cover activities that occurred during the previous calendar year. See *Section 7.1* for a discussion of the annual *Research Implementation Report* and *Section 5.1* for a description of the annual *PRIDE Program Annual Report*.

7.0 IMPLEMENTATION AND PROGRAM EVALUATION

7.1 Research Implementation

One measure of the success of a research program is the extent to which results from the research are used. With this in mind, implementation is an important consideration from the initial research problem statement development through completion of the research project.

All project problem statement must discuss the proposed implementation of the research. Implementation is considered throughout the project. The final report must address proposed implementation. The project TAC considers the proposed implementation when it reviews the final report.

Each quarter project managers are required to check on all projects in their emphasis area that are being actively implemented and update the status of implementation for those projects. This information is entered into the Project Log database.

7.2 Implementation Tracking Form

The Research Center uses a form to monitor implementation related to research projects. The form is a tool to assist the project manager in describing the status of implementation related to a research study. All research project managers use the same form for implementation tracking. A copy of the form is included in *Appendix E*.

There are several strategies available for use of the form, including:

1. The project manager sends the form to key users with instructions for completing the form.
2. The project manager gathers pertinent information and completes the form.
3. A combination of the first two strategies, where the project manager works with the key users to complete the form.

Research Implementation Report

An annual report on research implementation is published by the Research Center for each calendar year from information compiled by project managers and entered into the Project Log database. The report reviews implementation that occurred during the previous calendar year on any ADOT research projects. Information may involve recently completed projects or projects completed in prior years that still have active implementation. The report is published in March for the previous calendar year.

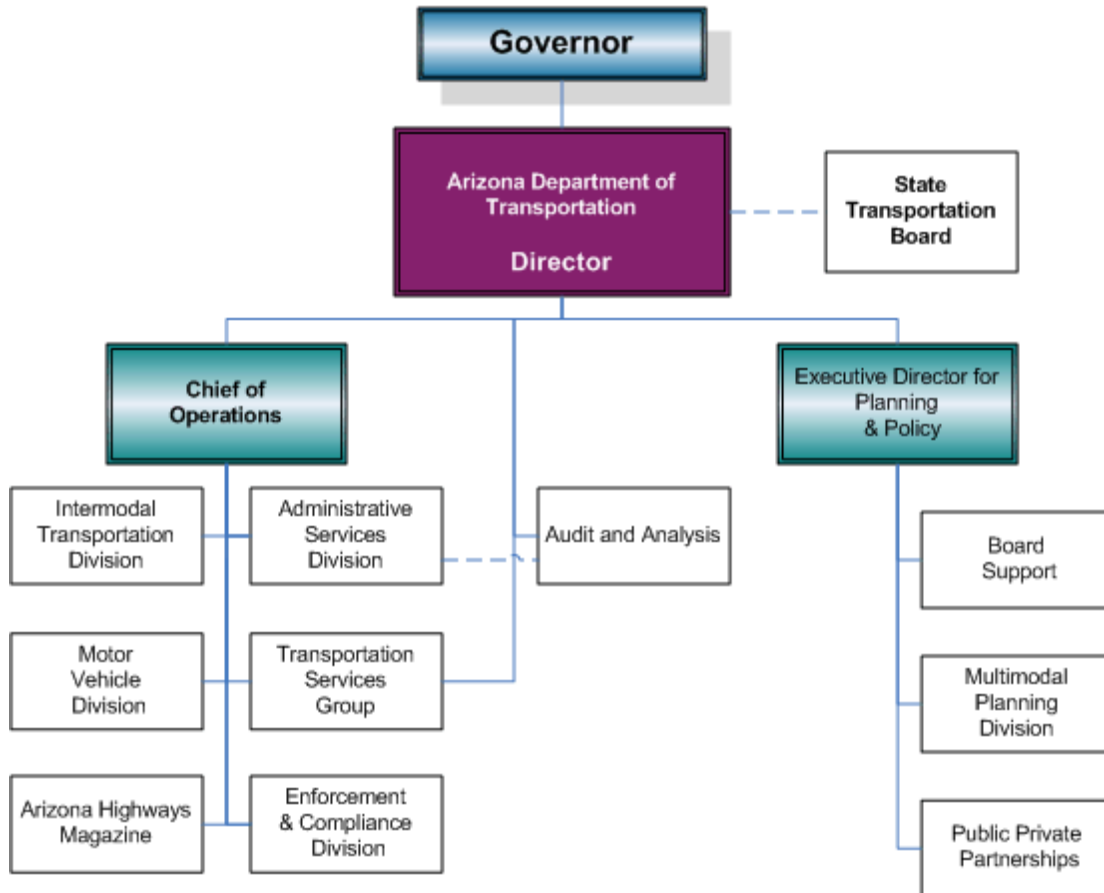
APPENDIX A

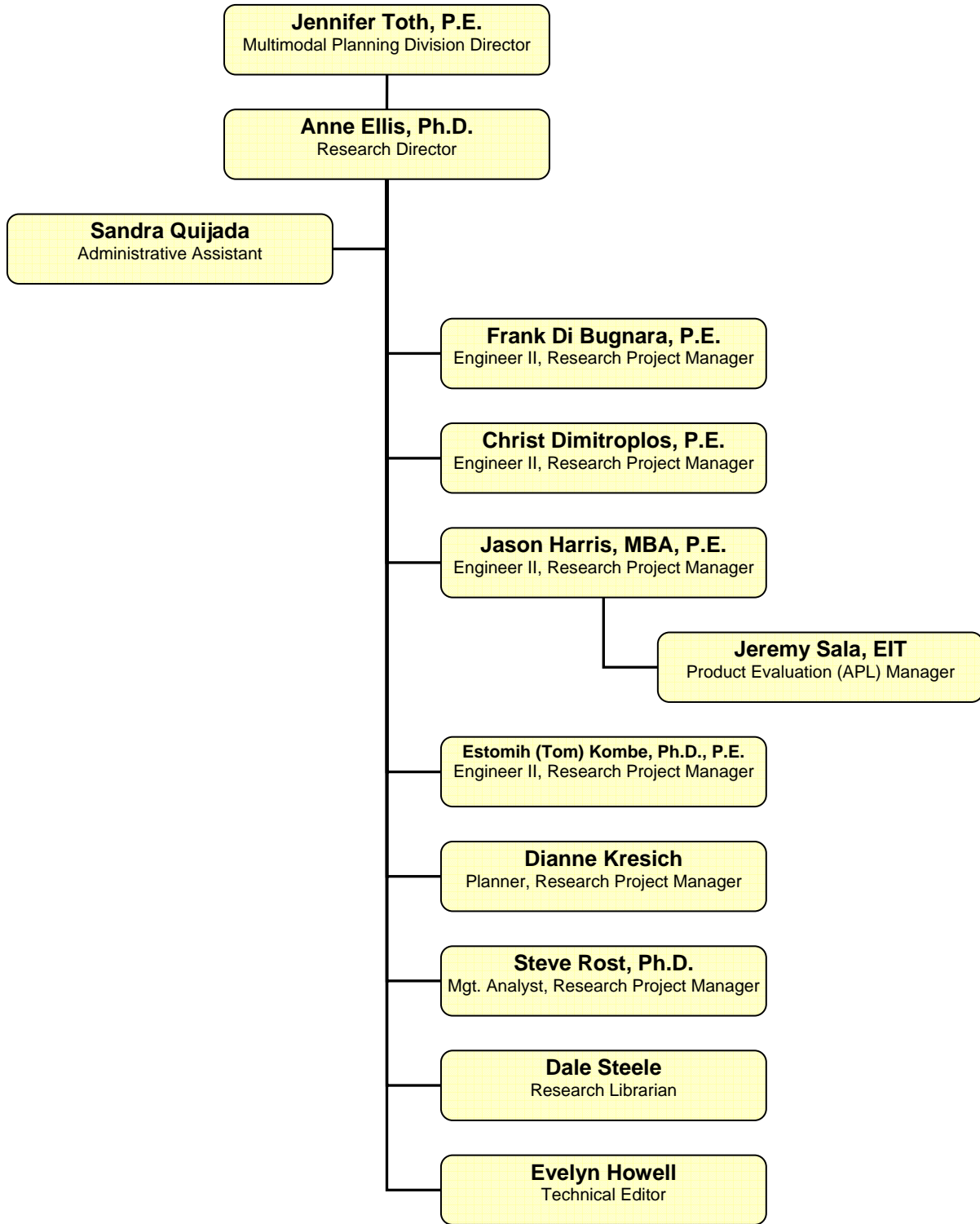
ORGANIZATION CHARTS – ADOT and Research Center



Arizona Department of Transportation Organization Chart

July 26, 2010





APPENDIX B

RESEARCH COUNCIL PROCEDURES

RESEARCH COUNCIL PROCEDURES

Introduction

This document outlines the standard practices and procedures of the Arizona Department of Transportation (ADOT) Research Council. The Research Council supports the ADOT research program which is directed by the ADOT Research Center.

Research Council Membership

The Research Council evaluates and rates problem statements for new research, including pooled fund projects, thereby selecting new research projects. The Council monitors project activity and implementation and provides guidance to the Research Center on the research program. The Council reviews technical advisory committee membership for research projects.

Membership in the Research Council is voluntary. With the exception of FHWA, there are no automatic or organizational positions on the Council. FHWA always has the opportunity to serve on the Council. Members are appointed by the research director.

Voting Procedures

The general procedure for Research Council voting, either by e-mail or at a meeting, is that a quorum is required for a valid vote. A majority of those voting will decide the outcome of the vote. If there is not a majority supporting a position (due to abstentions or requests for further discussion), the issue is not decided.

Major Project Selection

The Research Council evaluates major research problem statements presented by the Research Center on an annual basis. This process typically employs an initial screen by e-mail to select the top candidate problem statements in each of the seven research emphasis areas. The final candidate problem statements are reviewed at a meeting during March of each year.² The Research Council completes its evaluation of the final problem statements at this meeting. The results of the individual Research Council member evaluations are totaled to create a ranking for all the final problem statements. The problem statements are funded, beginning with the highest rated problem statement, followed by the next highest rated problem statements, until all of the available funding is allocated.

Small Budget Project Selection

The small budget research program is available for projects with budgets or \$40,000 or less, as approved by the Research Council at its August 11, 2010 meeting. The program's annual budget is \$200,000. Problem statements for small budget projects may be submitted any time.

Unless the research director or a Research Council member requests that a problem statement under consideration requires discussion at a Research Council meeting, problem statements are sent to the Research Council for evaluation via e-mail. The Research Council is given three options on the e-mail ballot:

² Formerly June of each year; changed to March as of FY2011 when the fiscal year cycle was aligned with that of the state, July 1 to June 30.

1. Approve or disapprove as is.
2. Approve or disapprove with comments.
3. Request discussion at a meeting before a decision is made.

Voting proceeds as described in the section on *Voting*.

If a quorum of the Research Council votes and there is not a majority of votes in favor of the problem statement and one or more Research Members suggests further discussion, then further dialogue will be pursued, either at a Council meeting or through e-mail.

Pooled Fund Selection Process

The Research Council is consulted by e-mail on all pooled fund problem statements of \$10,000 or greater. Decisions on amounts under \$10,000 will be made by the research director unless he or she elects to elevate the decision to the Research Council.

The decision is based on a 0-3 evaluation of each problem statement. Those problem statements receiving an average score of 1.5 or above will be funded. A majority of Research Council members must vote to have a valid decision.

Evaluation score definitions:

3 = high value to Arizona

2 = medium value to Arizona

1 = low value to Arizona

0 = no value to Arizona

TAC Review

The research director submits the names of all project technical advisory committee (TAC) members to the Research Council for review. Research Council members review these lists and consult with the respective research project manager or the research director if the members have questions or comments.

Project Sponsor Requirements

All research project Sponsors must be ADOT employees unless an exception is approved by the Research Council. If an exception is considered, the research director will submit the recommendation to the Research Council for a vote.

APPENDIX C

POOLED FUND OBLIGATION LETTER SAMPLE

DRAFT OBLIGATION LETTER

DATE

Mr. Robert E. Hollis
Division Administrator
Federal Highway Administration
4000 North Central Avenue, Suite 1500
Phoenix, Arizona 85012

Attention: Ms. Kelly LaRosa, P.E., AICP

Through: Ms. Mary Hewitt, Arizona Department of Transportation

Re: Pooled Fund Project Funding Obligations

The table below lists Pooled Fund projects that the Arizona Department of Transportation, through the ADOT Research Center, wishes to support through the State Planning and Research program. Please initiate the appropriate actions using Form PR-1240 to obligate funds as shown in the table.

| Project No. | Project Title | Amount | Fiscal Year | Program |
|--------------------|-------------------------|---------------|--------------------|----------------|
| TPF-X(XXX) | <i>Title of Project</i> | \$XX,XXX | FYXXXX | SPR-PL-1(XX) |
| TPF-X(XXX) | <i>Title of Project</i> | \$XX,XXX | FYXXXX | SPR-PL-1(XX) |
| TPF-X(XXX) | <i>Title of Project</i> | \$XX,XXX | FYXXXX | SPR-PL-1(XX) |
| | | | | |
| | Total Obligation | 0 | | |

APPENDIX D

RESEARCH PROBLEM STATEMENT FORM

Project ID: XXX-1

Project Title: **Title of the Proposed Research Project**

Problem Description:

Provide background on the problem and summarize key issues related to the problem.

Literature Search Summary:

Summarize the literature search performed related to the problem.

Research Objectives:

Clearly state the objectives of the proposed research, i.e., what the research will accomplish or what type of information it will provide.

Affected Groups:

List the affected ADOT groups as well as external entities.

Anticipated Benefits:

Discuss the potential benefits of this research, e.g., improved safety, cost savings, more efficient processes, help in decision-making, etc.

Expected Implementation:

Describe how the research results will be implemented or deployed.

Project Champion (required): Person promoting project

Project Sponsor (required): Person with authority to move a project forward

Proposed Technical Advisory Committee:

List the proposed project TAC members.

Research Center Budget: \$ _____

Other Budget: \$ _____ (identify source)

Estimated Completion Date: ___ months/years after initiation

| Strategic Plan Correlation (FY11) | X |
|--|----------|
| Technology | |
| Congestion Management | |
| Customer Service | |
| Highway Safety | |
| Environmental Stewardship | |

[THIS COMPLETED FORM SHALL NOT EXCEED ONE PAGE. SUPPLEMENTAL INFORMATION MAY BE ATTACHED TO THIS FORM.]

APPENDIX E

IMPLEMENTATION TRACKING FORM

ADOT Research Center

SPR-XXX or AZ-XXX: Title of Report Implementation Plan

Date: xx/xx/xxxx

Project Manager: NAME

Tel: PHONE NO.

Email: EMAIL ADDRESS

Implementation Actions

1. Briefly describe each recommendation
2. Indicate whether each recommendation is being or will be implemented
3. Discuss the actions taken in regard to the recommendation or the reason why the recommended action is not being taken
4. Indicate the current status of the recommendation.

| 1 | 2 | 3 | 4 |
|---|--------|-----------|--------|
| Recommendation | Yes/No | Rationale | Status |
| * ENTER TEXT IN THESE ROWS * ADD OR DELETE ROWS AS NEEDED | | | |
| | | | |
| | | | |
| | | | |
| | | | |

BENEFITS

Briefly describe the benefits anticipated or observed (for all of the following categories that apply) from implementing any of the recommendations. Whenever possible include quantified data (for example, dollars, time or lives saved).

| Category | Benefits of Implementation |
|----------|----------------------------|
| COST | |
| PROCESS | |
| SAFETY | |
| OTHER | |

IMPEDIMENTS

If impediments exist that prevent implementation action, briefly discuss them in the appropriate category.

| Category | Impediments to Implementation |
|----------|-------------------------------|
| COST | |
| RESOURCE | |
| OTHER | |