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INTRODUCTION

Program Manual Overview

This manual describes the management and functions of the Arizona Department of Transportation (ADOT) Research Center. It presents the following information:

- A description of Federal Highway Administration (FHWA) and ADOT program requirements.
- An overview of Research Center administrative procedures.
- Roles of ADOT Research Center staff.
- A description of the ADOT research program.
- Roles in Research Center functions of other ADOT entities, FHWA, other government agencies, and consultants.
- A description of the ADOT product evaluation program.

Research Center Overview

The Research Center manages ADOT’s research program and its product evaluation program.

The objective of studies conducted by the Research Center is to produce recommendations that can be applied to improve ADOT processes and products. Research studies address the full range of topics of interest to the department.

Studies are funded by the FHWA State Planning and Research program, Subpart B (SPR-B), managed by Research Center staff, and conducted by consultants from the private sector, public sector, and universities under contract with ADOT.

Federal Statutes and Regulations

The primary source of funding for ADOT’s research program is the Federal Highway Administration (FHWA) under provisions of the Fixing America’s Surface Transportation (FAST) Act. Federal regulations (23 CFR 420 et seq.) outline the requirements for State Planning and Research programs. The FHWA regulatory requirements for state research programs are described in 23 CFR 420.209.

FHWA Stewardship Document and Performance Measures

In 2015, FHWA and ADOT jointly signed an updated Stewardship Agreement authorizing ADOT to act on behalf of FHWA and enabling the state’s expenditure of federal funds, such as State Planning and Research. The Stewardship Agreement established performance indicators that are intended to increase accountability and promote continuous improvement.
**Title VI of the Civil Rights Act of 1964**

*Title VI* prohibits discrimination based on race, color, and national origin. 42 USC 2000d states that “No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.” The protections afforded under Title VI apply to anyone, regardless of whether the individual is lawfully present in the United States or a citizen of a State within the United States.

ADOT is subject to Title VI on all projects that expend a minimum of $1 of federal funds. As Research Center activities are funded by SPR-B, all studies are required to comply with Title VI. The ADOT Civil Rights Office (CRO) provides guidance on implementation of Title VI and monitors compliance. The Research Center reports relevant activities quarterly to the CRO. A sample Title VI quarterly report is provided in Appendix H.
ORGANIZATION

ADOT Research Center

The ADOT Research Center is part of the ADOT Multimodal Planning Division (MPD). Organization charts for ADOT and MPD are available on the ADOT intranet (ADOTNet). An organization chart for the Research Center is included in Appendix A.

Research Center staff are subject to ADOT, MPD, and Research Center policies. ADOT policies are available on ADOTNet. MPD policies are issued informally, usually through email. The responsibilities of Research Center personnel — in the research section and the product evaluation section — are described here.

Working title: Research Center Manager

Official position title: Administrative Services Administrator

Reports to: MPD Director

Manager Duties:

The Research Center manager is responsible for the delivery of all services and products of the research and the product evaluation sections.

- Supervises research project managers, product evaluation supervisor, and support staff
- Manages research studies, including the selection of consultants, review of deliverables, and associated tasks.
- Ensures Research Center compliance with FHWA and ADOT policies, and issues and maintains Research Center policies and practices
- Reviews and approves all problem statements, study scopes, and final reports
- Chairs the ADOT Research Advisory Committee
- Coordinates participation in the FHWA Pooled Fund Program
- Prepares and manages the Research Center budget
- Prepares and maintains the Research Center Program Manual
- Serves as ADOT’s representative to the Transportation Research Board (TRB), thus serving as TRB’s liaison to all Arizona transportation agencies
- Serves on the Arizona Council for Transportation Innovation
- Services on the AASHTO Research Advisory Committee
- Coordinates the development and submittal of problem statements to the TRB Cooperative Research Programs and coordinates the evaluation of research problem statements for potential funding by the National Cooperative Highway Research Program (NCHRP)
- Promotes the implementation of research products from the Research Center and the TRB Cooperative Research Programs.
Research Section Positions

Working title: Senior Research Project Manager

Official position title: Planning Program Manager 2 (three positions)

Reports to: Research Center Manager

Senior Research Project Manager Duties:

The Senior Research Project Manager actively manages transportation research studies that are performed by consulting firms, public agencies, and universities. Studies focus on producing recommendations that will be implemented at ADOT, and address engineering, planning, communication, social science, and other topics relevant to department stakeholders. The position ensures the delivery of high quality research by analyzing technical documents, reports, and other work products, and by working effectively with stakeholders.

- Develops research problem statements in response to customer needs.
- Assembles and chairs technical advisory committees for research studies.
- Manages the selection and hiring of research consultants.
- Manages research contracts and budgets.
- Provides technical expertise throughout the research process.
- Leads the technical review of study deliverables, including the final report.
- Documents study progress in the ResearchTrack database and shared drive files.
- As assigned by the Research Center manager, prepares the SPR-B Annual Work Program, coordinates scoring of the NCHRP ballot, coordinates Arizona’s participation in the TRB Minority Fellows program, and performs other tasks.

Working title: Technical Editor

Official position title: Public Information Officer 2

Reports to: Research Center Manager

Technical Editor Duties:

The technical editor manages many aspects of quality control for research products, which involve highly technical material on transportation topics. The editor analyzes the presentation, content, and format of research reports and advises consultants and project managers to ensure that final reports and other technical documents are clear, logical, consistent, and complete. The editor also serves as the project manager for editing performed by contract editors.
**Product Evaluation Section Positions**

**Working title:** Product Evaluation Program Supervisor

*Official position title:* Planning Program Manager 2

*Reports to:* Research Center Manager

**Product Evaluation Program Supervisor Duties:**

The program supervisor responds to the most complex administrative functions of the program, develops and improves processes, and maintains high quality working standards. The supervisor leads the staff to meet targeted measures on a monthly basis.

- Oversees the Product Evaluation Program
- Establishes program processes and procedures.
- Supervises product evaluation engineers and student interns
- Manages consultant contracts and approves invoices
- Manages the Approved Product List (APL)
- Communicates with internal customers, external stakeholders, and industry representatives
- Maintains the Product Evaluation Program website
- Serves on AASHTO’s National Transportation Product Evaluation Program (NTPEP)
- Attends ADOT Standards Committee meetings

**Working title:** Product Evaluation Engineer

*Official position title:* Transportation Engineer I (two positions)

*Reports to:* Product Evaluation Program Supervisor

**Product Evaluation Engineer Duties:**

The product evaluation engineer administers the evaluation process for possibly including products on the ADOT Approved Products List (APL). Evaluations are conducted by consultants and by the product evaluation engineer. The product evaluation engineer also assists in preparing for meetings of the two product evaluation committees.
Working title: Product Evaluation Intern

Official position title: Transportation Intern (number of positions varies)

Reports to: Product Evaluation Program Supervisor

Product Evaluation Intern Duties:

The product evaluation interns assist in processing new product applications, updating the Approved Products List (APL), and updating product evaluation databases.

ADOT Research Advisory Committee

The ADOT Research Advisory Committee (RAC) comprises staff from the Research Center, various ADOT divisions, and FHWA Arizona Division. Membership is intended to represent a wide range of fields and interests within the department. Membership in the RAC is voluntary. With the exception of the FHWA Arizona Division and the ADOT Director, there are no ex officio positions.

The RAC meets two to three times each year to consider ideas for new research studies. The RAC reviews problem statements that present an existing problem, objectives of the potential new study, anticipated benefits and beneficiaries of the proposed research, and an estimated budget and study duration. Approval of funding for new studies is determined by consensus; a voting process is conducted if consensus cannot be reached.
ADOT RESEARCH STUDIES

Research Study Development

Research studies begin with the identification of a need for information, a more efficient/effective process, or an improved product. While most ideas originate with ADOT staff, the Research Center encourages others in the Arizona transportation community to contact the Research Center manager to discuss ideas for new research.

The Research Center manager determines whether the idea meets basic criteria for an ADOT research study. The idea must be:

- Understood as applied research according to commonly accepted definitions. According to CFR 23 420.203, *Applied research* means the study of phenomena to gain knowledge or understanding necessary for determining the means by which a recognized need may be met; the primary purpose of this kind of research is to answer a question or solve a problem.

- Focused on developing recommendations that address an ADOT problem and that can potentially be implemented by ADOT

- Not restricted to the use of specific products or methods, unless the research is intended to evaluate such products or methods

- Devoid of a predetermined solution

The manager assigns each viable idea to a project manager (PM). (Separately, PMs may initiate meetings with internal and external stakeholders to generate ideas for research, and are encouraged to stay abreast of issues that can potentially be addressed through research). Taking the proposed research idea, the assigned PM identifies ADOT stakeholders relevant to the topic: most importantly a sponsor, the ADOT staff member with the authority to implement the recommendations of the potential study, and a champion, a stakeholder who supports the study and is committed to actively contributing expertise. The PM works closely with these key stakeholders to clearly define the existing need and to determine whether research can address that need. This process also determines if the sponsor is conceptually committed to the implementation of the eventual research recommendations.

If all of these conditions are met, the PM develops a research problem statement that clearly defines the existing issues or challenges faced by ADOT, the objectives that would be met by the proposed research, anticipated benefits and beneficiaries, and an estimated budget and study duration. A problem statement does not prescribe research methodology or include a scope or work. A problem statement template is included as Appendix B.
**Research Study Selection and Funding**

Problem statements are presented by the assigned PM at a Research Advisory Committee (RAC) meeting. Committee members discuss each statement thoroughly with the objective of reaching informed consensus on whether the proposed research should be recommended for funding. Following each RAC meeting, the Research Center manager assigns a tentative SPR number to each new study, notifies MPD Finance and the research liaison at the FHWA Arizona Division of the studies approved by the RAC, and requests an amendment to the currently approved *Annual Work Program*. Upon ADOT receiving this approval, the SPR number (a unique identification number) is permanently assigned.

**Pooled Fund Studies**

The [Transportation Pooled Fund (TPF)](https://www.nhtsa.gov/tpf) program is administered by FHWA, the Transportation Research Board (TRB), and the American Association of State Highway and Transportation Officials (AASHTO). Under the program, research studies that address transportation issues of significant and widespread interest are jointly funded by multiple federal, state, regional, and/or local transportation agencies, along with possible combinations of academic institutions, foundations, and private firms.

SPR-B funds are eligible as contributions to pooled fund studies. ADOT staff initiate requests for contributions by contacting the Research Center manager. The manager works with the initiating employee to identify a sponsor, an ADOT manager/director who supports participation in the pooled fund and has the authority to determine that the pooled fund would benefit the relevant technical area.

The sponsor, or their representative, presents the request to the RAC at a regularly scheduled meeting. The RAC considers the request and, as with problem statements, discusses the request thoroughly with the objective of reaching informed consensus regarding a recommendation for funding.

Following the RAC’s approval of the contribution of funding to a pooled fund study, the Research Center manager notifies MPD Finance and the FHWA Arizona Division office and requests an amendment to the currently approved *Annual Work Program*. Upon the granting of this approval, the Research Center manager enters the commitment on the pooled fund website. MPD Finance coordinates with the FHWA Arizona Division to ensure the transfer of SPR-B funds from the Research Center budget to the designated pooled fund.

When the RAC and FHWA approve a contribution of SPR-B funds to a pooled fund study, a representative from ADOT is selected to participate on the study’s advisory panel. The representative periodically informs the Research Center and the RAC of the study’s progress. (This entire process varies when Arizona is the lead state of a pooled fund study.)
Study Management

Research Project Managers

All Research Center studies are managed by a project manager (PM) on staff (see Research Project Development, Research Problem Statements).

Sponsors and Champions

All Research Center studies must have a sponsor and a champion (see Research Project Development, Research Problem Statements). The sponsor is an ADOT staff member with the authority to implement the recommendations of a specific research study, and the champion is a key stakeholder who supports the study and is committed to actively contributing technical expertise throughout the study process.

Technical Advisory Committees

The Technical Advisory Committee (TAC) assists the Research Center PM in the review and approval of the research process and deliverables. All studies must have a TAC. The PM identifies appropriate TAC members from among ADOT staff in consultation with the sponsor and champion, who also serve on the TAC. FHWA is invited to assign a representative to each study TAC. All recommended TAC member lists are submitted to the Research Center manager for review and approval before the start of a study.

The TAC’s functions are summarized below:

- Review and evaluate consultant responses to task assignments; review and refine the study work plan (these tasks are performed by a subset of the TAC, typically the sponsor and/or champion and others)
- Provide data and other information, such as information on contacts and resources, to the consultant
- Regularly attend and participate actively in TAC meetings
- Critically review and comment on interim and final deliverables in a prompt manner, with a focus on the review of technical content for which the members have subject matter expertise
- Inform colleagues and managers in their ADOT work groups about the study
- Support and offer input on potential implementation of study results
- If the sponsor, lead the implementation of research recommendations

Procurement of Consultants and Approval of the Work Plan

The ADOT Multimodal Planning Division (MPD) has established a contract for on-call consultant services to conduct research studies, as well as for technical editing and for product evaluation. The on-call list includes researchers from universities and private consulting companies.

Research contracts are awarded to qualified experts through a competitive process in accordance with requirements set by ADOT Procurement and MPD Contracts:
• The PM prepares a scope of work with input from the sponsor and other key stakeholders.
  o To comply with requirements of Title VI of the Civil Rights Act of 1964, the PM conducts a four-factor analysis of limited English proficiency (LEP) to determine if the scope must call for LEP services (e.g., translation of a survey into Spanish).
• The PM initiates a task assignment by entering the scope, evaluation criteria, and other required information into the online SharePoint system operated by MPD Contracts.
• MPD Contracts prepares and releases the task assignment, similar in content to a Request for Proposals, to the on-call consultants in relevant disciplines.
• The PM identifies the selection panel, which comprises the PM, the sponsor and/or champion (supervisors and their directly reporting staff cannot serve on a selection panel concurrently), and another member of the TAC. MPD Contracts requires that selection panels have an odd number of members and may not include any combination of supervisor and directly reporting staff.
• The selection panel uses a scoring instrument developed by Research Center staff, an example of which is included as Appendix C, to evaluate responses to task assignments and tentatively select the consultant team determined to be most qualified.
• The PM notifies MPD Contracts, which sends a notice of selection to all consultants who received the initial task assignment. The notice is tentative. The consultant is not given a notice to proceed (NTP) until after the successful negotiation and approval of a refined work plan (scope, schedule, and budget).
• The PM schedules a “scoping meeting” with the sponsor, other key stakeholder(s), and the prospective consultant team to negotiate the details of the work plan, and to identify deficiencies and how to correct them. The details include the following:
  o The scope is divided into tasks that, for most studies, include a literature review, methodology, data collection, data analysis, conclusions, recommendations, and implementation plan. Whenever possible, the completion of each task/subtask should result in a deliverable product; major tasks are documented in a technical memorandum.
  o The study budget is coordinated with the tasks within the scope, i.e., a specific fee is associated with each task and subtask and their associated deliverables. The work plan must be structured so that an invoice is submitted and payment occurs during each calendar quarter.
• The tentatively selected consultant submits a refined work plan that includes negotiated details and corrects deficiencies.
• The selection panel reviews the refined work plan, resulting in one of three options.
  o If the panel approves the work plan, the PM submits it to MPD Contracts. If MPD Contracts agrees that the work plan is complete, it coordinates with MPD Finance to issue a purchase order to the consultant, which generates a notice to proceed (NTP).
  o If the panel does not approve the refined work plan due to minor deficiencies, the PM works with the consultant to resolve them and, upon approval of the further refined work plan, submits it to MPD Contracts.
  o If the panel does not approve the refined work plan due to significant deficiencies, the PM notifies MPD Contracts that no award will be made. The PM proceeds with one of three options after consulting with the Research Center manager:
The consultant is procured through a Request for Proposals that does not restrict responses to on-call consultants.

Another attempt to procure a consultant from the on-call list is made using the task assignment process.

The sponsor decides to cancel the study.

For research studies that are performed by another state agency or a local agency, MPD Contracts establishes an intergovernmental agreement (IGA) as a contractual agreement.

If the task assignment process fails to result in the selection of a qualified consultant, or if the study’s topic is outside the expertise of consultants on the on-call contract, a consultant may be procured through a Request for Proposals issued by ADOT Procurement.

**Monitoring Research Progress**

The PM monitors the progress of each study under their direction. This process includes holding TAC meetings to assess study progress and maintaining regular communication with the consultant, the sponsor, and the TAC.

A key component of monitoring research progress is the critical analysis of study deliverables. The PM, with TAC input, is responsible for closely reviewing all deliverables; analyzing the technical content for completeness, accuracy, logic, and organization; and, when necessary, providing consultants with clear direction regarding improvements to meet Research Center expectations.

Study monitoring also includes tracking study expenditures against the approved budget. The PM ensures and documents that expenditures correlate with the approval of completed deliverables. PMs review and either approve or reject all invoices associated with their studies. An invoice can be paid only upon the approval of the PM. Payments must be connected to research work products (deliverables) specified in the contract.

**Report Preparation**

A final report is required for all completed research. *Specifications for Preparing Research Reports* documents the format and editorial standards required for research reports. The *Specifications* are posted online and referenced in all research contract documents. The project manager and technical editor ensure that the consultant is familiar with the *Specifications* at the outset of the study.

**Deliverable Review Process**

*Interim Deliverables*

- The consultant submits an interim deliverable, typically a technical memorandum, to the PM for review and approval.
- The PM distributes the deliverable to the TAC for critical analysis to ensure the document is technically accurate, thoroughly documents the study task, and is clear.
• The PM concurrently distributes the deliverable to the technical editor, who
  o Reviews content and organization; provides the PM with comments/guidance to convey to the author.
• The PM compiles their own comments with those from the editor and the TAC and directs the consultant to revise the document accordingly.
• The PM approves deliverable following satisfactory revision; multiple review cycles may be needed prior to approval.

Draft final report

• The consultant submits draft final report to the project manager for review and approval.
• The PM distributes the report to the TAC for critical analysis to ensure the document is accurate, thorough, and clear, while adhering to Research Center requirements for final reports.
• The PM concurrently distributes the report to the technical editor, who
  o Checks for the presence and quality of specific required elements (abstract, reference list, recommendations, etc.)
  o Reviews for clarity, completeness, and organization; provides the PM with comments/guidance to convey to the author.
  o Potentially identifies content issues, which the PM will consider and ask the consultant to correct.
• The PM compiles his/her own comments with those from the editor and the TAC and directs the consultant to revise the document.
• The PM approves the deliverable following satisfactory revision; multiple recycles may be needed prior to approval.
• FHWA review: Following revision and approval of the draft final report, the PM sends a print copy and a digital copy, along with a transmittal letter, to the research liaison at the FHWA Arizona Division office, who either reviews it personally or forwards it to the appropriate FHWA subject matter expert for review.
  o FHWA must respond within 30 days of receipt of the report.
  o If FHWA requires revision of the report, the PM directs the consultant to revise.
  o If the requested revisions are significant, the PM submits the revised report to FHWA, and requests approval within one week.

Final report and publication

Approved draft final reports are edited by, in most cases, an external editor selected from the research on-call contract. (On rare occasions, the Research Center’s technical editor will edit the report in-house.) While FHWA’s approval is pending, the Research Center’s technical editor initiates the editing process.

• The technical editor determines who will edit the draft report based on report content and editor availability.
• The technical editor initiates a technical editing task assignment with MPD Contracts to assign final editing to a contract editor. (The task assignment process takes time, running concurrently with the wait for FHWA approval.)
• The contract editor, upon receiving the notice to proceed and FHWA’s approval of the draft report, revises (edits) the draft report and documents unresolved issues that cannot be addressed independently.
• The contract editor returns the edited draft report and documentation of issues to the technical editor.
• The technical editor collaborates with the PM and the consultant to revise the report. The PM ensures that the consultant answers all questions on content and makes necessary revisions within approximately two weeks.
• Following the PM’s approval of all revisions and edits to the report, the technical editor sends the report Word file to ADOT Creative Services to format in the InDesign template for final research reports.
• Creative Services returns the formatted report to the technical editor.
• The technical editor verifies key quality points, makes necessary final adjustments, and converts to PDF format to publish online. To publish, the technical editor sends a PDF of the final report to the ADOT Web Team for posting on www.azdot.gov/research.

Report Distribution

The PM notifies the TAC that the report has been published and sends a link to the online report.

For distribution to the FHWA Arizona Division Administrator and research liaison, the PM prepares a transmittal letter for the Research Center manager’s signature; the technical editor sends the letter with two print copies of the report. A sample transmittal letter is included in Appendix D.

The technical editor arranges for report printing and binding with the print shop at the Arizona Department of Education, and distributes to external repositories either print copies or electronic links to the online report. A list of all report recipients is provided in Appendix E. The list of electronic recipients is in accordance with the directive to AASHTO from a 2015 FHWA letter (https://www.fhwa.dot.gov/publications/research/general/revision_to_spr_report_distribution.pdf). The technical editor keeps two print copies for the Research Center archives.

The technical editor periodically announces the publication of research reports to subscribers to ADOT’s GovDelivery service.

Study Documentation

The Research Center maintains a Microsoft Access database called ResearchTrack to document essential information on all active research studies and most completed studies. Information on studies dating to 1998 was incorporated from an earlier version of the database called ProjectTrack. The database is designed to accommodate information that includes:

• A brief overview of study background and objectives
• Budget and expenditures
• Consultant contact information
• The study sponsor, champion, and technical advisory committee members
The status of the research, editing, publication, and implementation processes

The PMs are responsible for updating study information in the database.

All study-related final documents, e.g., problem statement, work plan, meeting notes, deliverables, are stored in the Research Center shared (G) drive. Financial records for research studies are maintained by MPD Finance.

**Research Implementation**

One measure of the success of a research program is the extent to which the recommendations developed by its studies are used in practice. Thus, implementation is an important consideration from the development of the initial research problem statement through completion of the study.

Task assignments and requests for proposals for all research studies require the prospective consultants to address the proposed implementation of the anticipated research results. Each research final report includes a plan for implementation.

At six-month intervals during the 18 months following the conclusion of a research study, the PMs contact study sponsors to inquire on the implementation of recommendations, and to identify reasons for why implementation is successful or not. The PMs document their inquiries in the ResearchTrack database.
FHWA State Planning and Research Annual Work Program

Requirements

23 CFR 420 requires that recipients of federal SPR-B funds prepare an Annual Work Program that documents how funds were used in the prior fiscal year and that presents how anticipated funds will be used in the coming fiscal year.

To allow the Research Center to promptly respond to the needs of research customers, FHWA allows the Research Center to develop its program of studies throughout the year. The Annual Work Program submitted by the Research Center each spring includes all active studies, as well as all studies approved by the RAC and FHWA during the prior fiscal year, whether or not they are under contract with a consultant.

However, when submitted to FHWA at the onset of each fiscal year, the Annual Work Program does not include all research studies that will be initiated that year. As the RAC recommends new studies within the fiscal year (see Research Advisory Committee), the Research Center manager sends a request by email to the FHWA research liaison requesting approval of an amendment to add the new studies to the Annual Work Program. Through email response, FHWA notifies the manager of approval or rejection. An example of an Annual Work Program page summarizing a research study is included as Appendix F.

The Annual Work Program also documents contributions of SPR-B funds to FHWA pooled fund studies.

Schedule

The approximate dates for development of the State Planning and Research Annual Work Program are shown in Table 1.
Table 1: FHWA State Planning and Research *Annual Work Program* Approval Cycle

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<thead>
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<th>APPROXIMATE DATES</th>
<th>ACTIVITY</th>
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<td>Year-round</td>
<td>Research Center accepts viable ideas for new studies, and project managers prepare problem statements.</td>
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<td></td>
<td>Research Advisory Committee meets two or three times annually to discuss problem statements and consider approval for funding. Amendments to the <em>Annual Work Program (SPR-B)</em> are made for problem statements approved by FHWA for funding.</td>
</tr>
<tr>
<td>February - March</td>
<td>Research Center prepares the draft updated <em>Annual Work Program (SPR-B)</em>.</td>
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<tr>
<td>March - April</td>
<td>The draft <em>Annual Work Program (SPR-B)</em> is submitted to MPD for inclusion in <em>State Planning and Research Annual Work Program</em>, which addresses Subparts A (planning) and B.</td>
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<tr>
<td></td>
<td>MPD prepares a letter to FHWA authorizing program funds.</td>
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<tr>
<td></td>
<td>The MPD director presents the draft <em>State Planning and Research Annual Work Program</em> to FHWA.</td>
</tr>
<tr>
<td>June</td>
<td>MPD Finance submits to FHWA the draft <em>State Planning and Research Annual Work Program</em>, the study authorization request, and a letter signed by the MPD director requesting funds and approval.</td>
</tr>
<tr>
<td>July</td>
<td>FHWA approves the <em>State Planning and Research Annual Work Program</em> and authorizes funds.</td>
</tr>
</tbody>
</table>

Funding Documentation and Modifications

New studies in the *Annual Work Program* and those included through amendment throughout the year may be initiated after FHWA’s approval and authorization of the program funds.

At each of its meetings, the RAC typically recommends the funding of new studies, as described in problem statements, for SPR-B funding. Following each meeting, the Research Center manager assigns a tentative SPR study number to each newly recommended study and contacts the FHWA Arizona Division research liaison and MPD Finance to request approval to amend the *Annual Work Program* to include
the new studies. Upon FHWA’s approval and confirmation from MPD Finance that an official “study number” has been established for the new study, the PMs may initiate the research process.

**Budget Modifications**

Modifications to research study budgets are rare, and they are considered only for changes to the research scope determined necessary by the sponsor and the PM. MPD Finance requests FHWA approval for budget changes, and processes the approved change by transferring funds from the appropriate account into the study budget.

**Purchase Orders, Invoices, and Payments**

Contract work is paid through purchase orders. When a consultant is selected for a specific study, the PM notifies MPD Contracts, which processes the purchase of consultant services through the state procurement system, which generates a purchase order that serves as the notice to proceed. MPD Contracts issues an email to the consultant documenting the notice to proceed.

Following the completion of a research task and the PM’s approval of its associated deliverable, the consultant submits invoices to MPD Finance at MPDInvoice@azdot.gov. MPD Finance logs the receipt of each invoice and forwards it to the appropriate PM. The PM approves it through DocuSign after ensuring that the work for which ADOT is being invoiced has been completed to the department’s satisfaction.

**Study Cancellation Procedure**

A study may be canceled at any stage. Funds may or may not have been expended at the time of cancellation. Reasons for cancellation generally fall into two categories:

- The study is fulfilling its intended objectives, but the study sponsor believes that changing circumstances will not enable the implementation of anticipated recommendations (i.e., the study is no longer relevant).
- The study is not fulfilling its intended objectives and problems cannot be resolved.

The cancellation process is as follows:

- The PM or a key stakeholder identifies an issue that may warrant cancellation.
- The PM reviews the study status with the sponsor, the primary customer for the research, with potential input from other key stakeholders.
- If the sponsor believes that the study should be canceled, the PM submits the written rationale and recommendation to the Research Center manager.
- Following the approval of the action and documentation by the Research Center manager, the PM sends a letter to FHWA recommending study cancellation and briefly stating the reason.
- If FHWA concurs, the study is canceled, and the Research Center is notified by letter (which is kept on file).
- MPD Finance transfers any remaining funds in the study budget to the general research account.
National Research Programs and Activities

Peer Exchanges

Research peer exchanges are required 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 [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: . . .

. . . (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 as:

. . . 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.


AASHTO

The American Association of State Highway Transportation Officials (AASHTO) is a nonprofit, nonpartisan association representing transportation departments in the 50 states, the District of Columbia, and Puerto Rico. It represents multiple transportation modes: air, highways, public transportation, rail, and water. Its primary goal is to foster the development, operation, and maintenance of a coordinated national transportation system.

AASHTO works to educate the public and key decision makers about the role that transportation plays in a sound economy. It serves as a liaison between state departments of transportation and the federal government. AASHTO sets technical standards for all phases of highway system development — design, construction of highways and bridges, materials, and many other technical areas.

State DOTs contribute to the annual support of AASHTO. The ADOT Research Center contributes SPR-B annually for Arizona’s share of support.
AASHTO Research Advisory Committee

AASHTO established the Standing Committee on Research (SCOR), the predecessor to the current Standing Committee on Research and Innovation (SCORI), after its 1987 annual meeting. AASHTO directed SCOR to create a Research Advisory Committee (RAC) with each member DOT entitled to representation. The ADOT director appoints the Research Center manager as the department’s representative on the AASHTO RAC. The appointment is forwarded to the AASHTO President for concurrence. Only appointments signed by the ADOT director are considered official.

The RAC is divided into four regions; ADOT is a member of RAC Region 4 (Western Region). The National RAC, as well as each regional RAC, has a chair and a vice-chair.

The AASHTO RAC meets twice each year. One meeting is held during the Transportation Research Board Annual Meeting each January, and is typically held jointly with the Transportation Research Board/State Representatives’ annual meeting. During the summer the National RAC meets for three days in a location rotated among the four RAC regions.

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

Transportation Research Board

The Transportation Research Board (TRB) is a program unit of the National Academies of Sciences, Engineering, and Medicine, which provide independent, objective analysis and advice to the nation and conduct other activities to solve complex problems and inform public policy decisions.

The mission of TRB is to promote innovation and progress in transportation through research, with an emphasis on the implementation of research results. ADOT, among other AASHTO member departments (state DOTs), contributes SPR-B funding annually to the financial support of TRB. The transfer of funds is conducted by MPD Finance and is documented by the Research Center in the Annual Work Program.

The Research Center manager serves as Arizona’s TRB state representative, a role defined by TRB as follows:

The principal continuing link between the state highway or transportation department (DOT) and the Transportation Research Board (TRB) is the TRB representative from the department. The representative is appointed by TRB upon the recommendation of the DOT Chief Executive Officer. It is through this link that the state is kept informed of TRB activities and/or research in progress elsewhere. Equally, it is this link by which TRB is kept informed of issues and problems facing the state DOT and of the state’s research activities.

As the TRB state representative, the Research Center manager disseminates TRB information to ADOT, encourages ADOT participation on TRB committees and research project panels, and coordinates the annual visit to ADOT from TRB staff, among other activities.
**Cooperative Research Programs**

The [Cooperative Research Programs](#) Division of TRB administers a number of major research programs sponsored by state DOTs and other organizations. The ADOT Research Center informs ADOT staff of opportunities to contribute ideas for future studies and to serve on project panels that provide input to the studies. Research Center staff members are available to assist in the development and submission of research problem statements for these programs.

**National Cooperative Highway Research Program**

The National Cooperative Highway Research Program (NCHRP) conducts research on problems affecting highway planning, design, construction, operation, and maintenance at a national level. NCHRP is supported through annual contributions of SPR-B funds by AASHTO member departments.

Each fiscal year, NCHRP solicits FHWA, AASHTO committees, and state departments of transportation (DOTs) for ideas for new research. NCHRP sends the ADOT Research Center manager, as the state’s TRB representative and member of the AASHTO Research Advisory Committee, information on the annual solicitation. The Manager distributes the information to members of the ADOT RAC, and requests that they forward the solicitation to their staff.

Each state DOT plays a role in selecting the ideas that to be funded as research studies. ADOT participates as follows:

- NCHRP sends the annual ballot of submitted ideas (in the form of research problem statements) to the Research Center manager.
- The Research Center manager assigns a PM to manage the scoring of each proposed idea.
- The PM distributes the ballot to members of the ADOT RAC, who are assigned to score problem statements in their areas of expertise.
- The PM collects and organizes the scores and submits them to NCHRP.

Each state’s scores are considered by the AASHTO Standing Committee on Research and Innovation, which makes the final decision on research study funding.

**Other Cooperative Research Programs**

The ADOT Research Center welcomes ideas from ADOT employees for research to be conducted under other programs administered by TRB. They are:

- Transit Cooperative Research Program (TCRP)
- Airport Cooperative Research Program (ARCP)
- Behavioral Traffic Safety Cooperative Research Program (BTSCRP)
- National Cooperative Freight Research Program
- Hazardous Materials Cooperative Research Program (HMCRP)
- National Cooperative Rail Research Program (NCRRP)
FHWA’s Local Technical Assistance Program (LTAP) is designed to provide information and training to local governments and agencies responsible for roads and bridges in the United States. The mission of LTAP is to foster a safe, efficient, and environmentally sound surface transportation system by improving skills and increasing knowledge of the transportation workforce and decision makers.

LTAP is composed of a network of centers, with one in every state. Arizona’s Local Technical Assistance Program (AZ LTAP) is administered by ADOT’s Infrastructure Delivery and Operations (IDO) Division. AZ LTAP provides local transportation agencies and public works officials with training and technical assistance related to road construction and maintenance, as well as on administrative topics.

The Research Center contributes $68,750 in SPR-B annually to AZ LTAP.
ADOT PRODUCT EVALUATION PROGRAM

Function

The ADOT Product Evaluation program, which is operated by the Research Center and funded by SPR-B, coordinates the review and acceptance of highway construction products for possible use by ADOT, and maintains the Approved Products List (APL). The APL is a list of categorized products that have been determined to meet ADOT’s Standard and Stored Specifications, and have been approved for potential use on roadway construction projects. The APL is a resource for ADOT construction field personnel, local public agencies, and private industry.

The Product Evaluation program maintains guidelines that document its processes in detail.

Product Evaluation Process

Manufacturers and distributors submit applications for products to be considered for inclusion on the APL. ADOT contracts with consultants to evaluate a majority of product applications submitted, with the remainder evaluated by ADOT subject matter experts and the product evaluation staff. Evaluators advise whether the products meet ADOT’s specifications, and recommend those that do for inclusion on the APL.

The Product Evaluation program established and works closely with two ADOT committees, the Materials Product Evaluation Committee (MatPEC) and the Traffic Control Product Evaluation Committee (TCPEC), each of which meet quarterly to review the evaluation reports for products that are recommended for approval. The MatPEC is chaired by the Assistant State Engineer, Materials Group, while the TCPEC is chaired by the Assistant State Engineer, Traffic Group. Members are drawn from the staff of the Materials and Traffic Groups. A quorum of at least five ADOT members is required to approve a product for inclusion on the APL. If an approved product is found unacceptable for ADOT use, committees are responsible for approving the product’s removal from the APL.

When a product is accepted onto the APL, staff notify applicants by email with the decision, an approval date, and the date the product requires renewal of the approval (usually five years from notification date). When products are denied inclusion, applicants receive a disapproval notice with the reason for denial. An applicant may apply for reconsideration within 60 days of the date of notification.

Examples of a product application and a completed evaluation, and a listing of MatPEC and TCPEC members, are included in Appendix G.
National Transportation Product Evaluation Program

The AASHTO National Transportation Product Evaluation Program (NTPEP) is a partnership between public agencies and private sector manufacturers. Its primary service is single-source testing of products manufactured to AASHTO standards and commonly used by state DOTs. The ADOT Product Evaluation program supervisor, along with other key ADOT staff, are members of NTPEP and its various technical committees.
Appendix A: ADOT Research Center Organizational Chart
Appendix B: Research Problem Statement Template
Title of Suggested Study

Date:

Project Sponsor: [name], [title], [work unit] an ADOT employee with authority to implement research

Project Champion: [name], [title], [work unit] an ADOT employee (or other public sector staff) who supports the study and assists the PM

Research Center Budget: $

Other Budget: [if applies] Funding Source: [if applies]

Estimated Project Duration: xx months

Problem Description:

Provide background and summarize key issues to be addressed by the research. Quantify (in terms of cost, time, etc.) the baseline condition that would be improved by the implementation of anticipated research recommendations.

Research Objectives:

Clearly state what the research will accomplish and/or what type of information it will provide.

Affected Groups and Anticipated Impacts:

Summarize the entities at ADOT that would benefit from the research and/or that must be involved in the research process. Discuss the potential impacts of this research to ADOT — to enhance safety, to save costs, to expend resources, etc. — as well as to other agencies that might be potentially affected.

Expected Implementation:

Describe how the research recommendations will be applied at ADOT and, potentially, other agencies. Describe the anticipated improvements that will result from the research. If possible, compare the anticipated results with the baseline condition quantified in the Problem Description.
Appendix C: Consultant Selection Evaluation Form
**PROJECT TEAM EXPERIENCE AND COMMITMENT**

<table>
<thead>
<tr>
<th>Key questions to ask:</th>
<th>Points (0-40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>o <strong>PM</strong> has expertise in managing research, including the development of a research scope, the documentation of results, and the ability to meet the project scope, schedule, and budget. – 10</td>
<td></td>
</tr>
<tr>
<td>Has the PM managed other research studies, developed research methodologies, and written research reports on any topics? How does he/she convey that the scope, schedule, and budget will be met?</td>
<td></td>
</tr>
<tr>
<td>o <strong>PM</strong> has expertise in subject matter relevant to this study -- 5</td>
<td></td>
</tr>
<tr>
<td>Is the PM an expert on the topic of this study, even if the expertise is not research-related?</td>
<td></td>
</tr>
<tr>
<td>o <strong>PM</strong> has expertise in research methods relevant to this study – 5</td>
<td></td>
</tr>
<tr>
<td>Is the PM an expert in the research methods needed for this study?</td>
<td></td>
</tr>
<tr>
<td>o <strong>Key personnel</strong> have expertise in the conduct of research, including the development of objectives and methodology and documentation of results – 10</td>
<td></td>
</tr>
<tr>
<td>Does the team have expertise in developing research methodologies, conducting research, and writing research reports on any topics?</td>
<td></td>
</tr>
<tr>
<td>o <strong>Key personnel</strong> have expertise in subject matter relevant to this study; a technical writer is identified – 5</td>
<td></td>
</tr>
<tr>
<td>Does the team have expertise on the topic of this study, even if the expertise is not research-related?</td>
<td></td>
</tr>
<tr>
<td>o <strong>Key personnel</strong> have expertise in research methods relevant to this study – 5</td>
<td></td>
</tr>
<tr>
<td>Does the team have expertise in the research methods needed for this study?</td>
<td></td>
</tr>
<tr>
<td>TOTAL POINTS</td>
<td></td>
</tr>
<tr>
<td>WORK PLAN</td>
<td>COMMENTS</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>o Presents a sound and defensible research methodology – 20</td>
<td>Are the research tasks scientifically sound, attainable, clearly understandable, and free of bias?</td>
</tr>
<tr>
<td>o Conveys a firm understanding of the objectives, products, and issues unique to this study – 10</td>
<td>Does the work plan give us confidence that the research team understands the purpose of the study and what we need? Repeating text from the TA is inadequate.</td>
</tr>
<tr>
<td>o Structures the research by task, deliverables, and schedule as directed in the task assignment - 10</td>
<td>Is the research clearly broken down by task, deliverable, and due date? Is it easy to understand what will be done, what will be delivered, and when?</td>
</tr>
<tr>
<td>o Contains innovative options that will increase the value of the study - 5</td>
<td>Does the work plan add anything that is beyond our vision and is useful?</td>
</tr>
<tr>
<td>TOTAL POINTS</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FAIR AND REASONABLE PRICE</th>
<th>COMMENTS</th>
<th>Points (0-15):</th>
</tr>
</thead>
<tbody>
<tr>
<td>The cost is commensurate to the tasks required by the task assignment and presented in the work plan - 15</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>TOTAL POINTS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TOTAL POINTS for ALL CATEGORIES _____________

For research project manager only:

| Does the proposal include sub-consultants not included on the original on-call contract? | Yes ☐ No ☐ |
Appendix D: Research Center Letters to FHWA
Sample Research Report Transmittal Letter to FHWA

[on Multimodal Planning Division letterhead]

June 19, 2018

Karla S. Petty
Division Administrator
Federal Highway Administration
4000 North Central Avenue, Suite 1500
Phoenix, Arizona 85012

Subject: SPR-577, Arizona Quiet Pavement Pilot Program: Comprehensive Report

Dear Ms. Petty:

Enclosed are two copies of the subject final report. The report is also available on the internet at http://azdot.gov/planning/research-center/research/research-reports. Submittal of this report fulfills our obligation for this research study. Please let us know if you need additional copies.

Sincerely,

Dianne Kresich
Research Center Manager
Arizona Department of Transportation
206 South 17th Avenue, MD 3108
Phoenix, AZ 85007

Enclosures
(2) SPR-577, Arizona Quiet Pavement Pilot Program: Comprehensive Report (final report)
July 3, 2018

Karla S. Petty
Division Administrator
Federal Highway Administration
4000 North Central Avenue, Suite 1500
Phoenix, Arizona 85012

Attn: Romare Truely

Dear Ms. Petty:

The ADOT Research Center has cancelled SPR-746, *Evolving Arizona’s Project Delivery Methods*, at the request of the project’s sponsor. The unused funds in the project budget will be returned to the general research budget.

Sincerely,

Dianne Kresich
Research Center Manager
Appendix E: Research Report Distribution List
PRINT COPY RECIPIENTS

State Documents (2 copies)  Transportation Center Library (1 copy)
Arizona Library, Archives & Public Records  Northwestern University Library
1919 W. Jefferson St.  1970 Campus Drive
Phoenix, AZ  85007  Evanston, IL  60208-2300

Ms. Karla Petty (2 copies)
Division Administrator
Federal Highway Administration
4000 N. Central Ave., Suite 1500
Phoenix, AZ  85012

ELECTRONIC RECIPIENTS

<table>
<thead>
<tr>
<th>Federal Highway Administration (FHWA) Research Library</th>
<th>Turner-Fairbank Highway Research Center 6300 Georgetown Pike McLean, VA 22101-2296 <a href="mailto:fhwalibrary@dot.gov">fhwalibrary@dot.gov</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>FHWA, Office of Corporate Research, Technology, and Innovation Management, HRTM-10</td>
<td>Turner-Fairbank Highway Research Center, Room T-305 6300 Georgetown Pike McLean, VA 22101-2296 <a href="mailto:john.moulden@dot.gov">john.moulden@dot.gov</a></td>
</tr>
<tr>
<td>National Transportation Library (NTL)</td>
<td>NTL Headquarters, W12-300 1200 New Jersey Avenue SE Washington DC 20590 <a href="mailto:NTLDigitalSubmissions@dot.gov">NTLDigitalSubmissions@dot.gov</a></td>
</tr>
<tr>
<td>National Technical Information Services (NTIS)</td>
<td>U.S. Department of Commerce 5301 Shawnee Rd Alexandria, VA 22312 <a href="mailto:input@ntis.gov">input@ntis.gov</a></td>
</tr>
<tr>
<td>Transportation Research Board (TRB)</td>
<td>Transportation Research Board Library (TRID) 500 Fifth Street, NW Washington, DC 20001 <a href="http://trid.trb.org/submit.aspx">http://trid.trb.org/submit.aspx</a></td>
</tr>
<tr>
<td>Northwestern University Transportation Library</td>
<td>1935 Sheridan Road Evanston, IL 60208 <a href="mailto:r-sarmiento@northwestern.edu">r-sarmiento@northwestern.edu</a></td>
</tr>
</tbody>
</table>
Appendix F: State Planning and Research Annual Work Program
Sample Project Page
**SPR-729, Effectiveness of Wildlife Crossing Guards and Right-of-Way Escape Mechanisms**

<table>
<thead>
<tr>
<th>Consultant:</th>
<th>Jeff Gagnon, Arizona Game and Fish Department</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FY Authorization</strong></td>
<td><strong>2015</strong></td>
</tr>
<tr>
<td>Original Contract Amt</td>
<td>$235,000</td>
</tr>
<tr>
<td>Current Contract Amt</td>
<td>$293,750</td>
</tr>
<tr>
<td>Expenditures to Date</td>
<td>$132,016</td>
</tr>
<tr>
<td>Available Amount</td>
<td>$161,734</td>
</tr>
<tr>
<td>Percent Complete</td>
<td>40%</td>
</tr>
<tr>
<td><strong>Contract Date (NTP)</strong></td>
<td>1/20/2015</td>
</tr>
<tr>
<td><strong>Original Completion Date</strong></td>
<td>6/30/2019</td>
</tr>
<tr>
<td><strong>Adjusted Completion Date</strong></td>
<td>6/20/2020</td>
</tr>
<tr>
<td>Current Project Manager</td>
<td>Bernadette Phelan</td>
</tr>
<tr>
<td>Project Sponsor</td>
<td>Paul O’Brien</td>
</tr>
</tbody>
</table>

**PROBLEM STATEMENT**

Collisions with large ungulates (deer, elk, and bighorn sheep) pose a safety concern on Arizona highways. To reduce such collisions, ADOT installs fencing that limits access to the right-of-way (ROW). Wildlife crossing guards (WCGs) let vehicles cross the ROW while limiting wildlife entry. Arizona uses double-deep cattle guards and sometimes electrified mats, neither of which has been confirmed as more effective than other types.

If large ungulates do gain access to the ROW, they need an exit. The fencing has escape mechanisms to allow wildlife to leave: one-way gates, slope jumps, and jump-outs. Jump-outs cost less, but little is known about appropriate designs for different species. Now that several types of jump-outs have been installed throughout Arizona in areas with elk, deer, and bighorn sheep, more research can determine effective heights and designs for the different species.

**RESEARCH OBJECTIVES**

The five-year study will evaluate the effectiveness of various WCGs in deterring ungulates from ROW access and of various types of escape mechanisms in allowing different ungulate species to exit the ROW while preventing entry by others. Study results will identify the ideal WCGs and escape mechanisms to be installed at appropriate locations where ungulate-vehicle collisions are a problem.
Appendix G: Product Evaluation Program
APPLICATION FOR PRODUCT EVALUATION

Note: Applications must be submitted electronically to: apl@azdot.gov

I, being an authorized (Name of Company Representative)
agent of, request that

(Company Name)

the Arizona Department of Transportation (ADOT) performs a product evaluation of

(Name of Product)
Identify the ADOT Approved Products List (APL) subcategory or subcategories that this product would be listed under. A copy of the APL may be viewed or downloaded from the Product Evaluation Program web site at: http://www.azdot.gov/apl.

APL Categories applicable to the PRODUCT (list specific sub-categories):
I have read and understood the ADOT Product Evaluation Instructions. The subject product (hereinafter PRODUCT) is submitted for evaluation under the Product Evaluation Program under existing APL subcategories.
Submit all the necessary information as described in the Application Instructions.

(Signature of Company Representative)  (DATE)

Has the PRODUCT previously been submitted to the Product Evaluation Program for evaluation?
Yes No

Please provide the previous Product Evaluation Program application identification number(s) and product name(s).

Is the PRODUCT a component of a system that has been previously evaluated under the Product Evaluation Program?

Explain and provide the previous Product Evaluation Program application identification number(s) and product name(s).

Is the PRODUCT a replacement for a product the Applicant manufactures that is presently on the APL?
Yes No

Please provide the previous Product Evaluation Program application identification number(s), product name(s), and the APL Subcategory.

Does the product have a Globally Harmonized System (GHS) Safety Data Sheet (SDS)?
Yes No

If yes, please send an SDS by email to apl@azdot.gov.

Does the product have supporting National Transportation Product Evaluation Program (NTPEP) data?
Yes No

Please comment.

Is the PRODUCT approved on other state DOT APLs or Qualified Products List (QPLs)?

Please list the state DOTs.

APPLICATION Page 2 5/8/2017

Arizona Department of Transportation
Product Evaluation Program

MANUFACTURER:
ADDRESS:
WEBSITE: CONTACT:
PHONE: E-MAIL:

DISTRIBUTOR:
ADDRESS:

WEBSITE: CONTACT:
PHONE: E-MAIL:

PRODUCT:
Trade Name: Description:
Primary Use:
Secondary Use:
Guarantee:
LIST APPLICABLE SPECIFICATIONS AND TEST PROCEDURES:

ADOT: ASTM: AASHTO: OTHER:

PRODUCT is proposed for the following specific uses:

GENERAL:

Attach available literature pertaining to the product, including, but not limited to, instructions and limitations for use, laboratory analyses, handling precautions, health hazards, an up to date Safety Data Sheet, specifications, installation and maintenance manuals or pamphlets, independent 3rd party test results, and cost. Information regarding product composition, formulation, or design may also be requested. If this is the case, written proprietary information should be underlined or, in the case of drawings or plans, labeled, so that information may be redacted if there is a public information request. The application itself and non-proprietary supporting literature will not be redacted from a public information request; nor will proprietary information that is not underlined or labeled. In the future, if a public information request is received, the vendor/manufacturer may be contacted for clarification regarding proprietary information.

The Arizona Department of Transportation reserves the right to refuse to test any material that cannot be safely tested with the laboratory equipment available to ADOT. If unused product portions would be considered hazardous waste (as defined by 40 CFR 261 et seq.) then the Applicant must accept the financial responsibility for proper return or disposal of this material.

By submitting this application, the applicant and/or their representative grant ADOT permission to reproduce, in full or in part, any information supplied by the Applicant for the purposes of this evaluation. This permission also will apply to material with copyrights held by applicant.

PLEASE DO NOT SEND ANY PRODUCT SAMPLES UNLESS REQUESTED BY ADOT.

NO applications will be accepted by postal mail or hard copy. All applications must be submitted electronically to: apl@azdot.gov.

APPLICATION Page 4 5/8/2017
Supporting Documents

Please indicate the supporting documents that you wish to include. Check all that apply.
*Videos or other supporting documents that are over 8MB cannot be emailed*

- Safety Data Sheet
- Product Information/ Specifications Sheet
- Test Data
- Design Sheets
- Laboratory Report
- Certificate of Analysis
- Certificate of Compliance
- Other

Submit completed Application and the appropriate attachments to:

apl@azdot.gov (include product name in subject line)

You will receive an email response within two weeks.

Got questions, please contact:

ADOT Product Evaluation Engineer
Tel: 602.712.6430 or 602.712.8205
Email: apl@azdot.gov

APPLICATION Page 5 5/8/2017
January 29, 2018

Director, ADOT Research Center
Attn: Product Evaluation Program Manager
206 S. 17th Avenue, Mail Drop 310B
Phoenix, AZ, 85007

Subject: Product Evaluation

| Product ID: | 17118 |
| Manufacturer: | Parimal Parekh (Civil & Environmental Consultants, Inc.) |
| Product Name: | T1300 |
| APL Category | I – Soil Reinforcement and Geosynthetics; |
| Applicable Specification | ADOT Spec: 1014-3, 1014-4.01(A), 1014-4.02(A), 1014-03(A) |
| Manufacturer’s Representative | Parimal Parekh (Civil & Environmental Consultants, Inc.) |
| Phone: | +91 79 4006 4529 |
| E-mail: | pparekh@terramgeo.com |

Dear Product Evaluation Program Manager,

We have completed the product evaluation for the above mentioned product based on the set of ADOT specifications. The product has been evaluated based on several categories including general information, contact information, tests reports submitted, physical, mechanical, and durability characteristics. The application notes have also been thoroughly checked.

They have submitted their product for ADOT APL categories I-1, I-5, I-6 and I-7. Based on the data provided to us, the subject product only meets the specifications for ADOT APL categories I-5 and I-6. Hence this product is recommended to the Product Evaluation Committee for approval, only for the mentioned categories.

Sincerely yours,

Barzin Mobasher, Ph.D., P.E.
School of Sustainable Engineering and the Built Environment
Arizona State University
The following is general information regarding the product

<table>
<thead>
<tr>
<th>Product ID</th>
<th>17118</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Name</td>
<td>T1300</td>
</tr>
<tr>
<td>Product Description</td>
<td>The product is a heat-bonded, non-woven geotextile manufactured from polypropylene fibers. This geotextile is manufactured using a randomly oriented web to provide isotropic properties. T1300 provides excellent uniformity with high permeability and low pore size for soil filtration. Roll size: 150 meters long x 4.5 meters wide.</td>
</tr>
<tr>
<td>Manufacturer information, including name, address, and phone number.</td>
<td>Contact person: Parimal Parekh (Civil &amp; Environmental Consultants, Inc.) Terram Geosynthetics Pvt. Ltd. A-704, Safal Pegasus, Anandnagar Road Ahmedabad - 380 015. Gujarat, India* <a href="http://www.terram.com">www.terram.com</a> Phone: +91 79 4006 4529 E-mail: <a href="mailto:pparekh@terramgeo.com">pparekh@terramgeo.com</a></td>
</tr>
<tr>
<td>MSDS</td>
<td>Provided.</td>
</tr>
<tr>
<td>Testing Lab name, location, and Certification status</td>
<td>Not Provided.</td>
</tr>
<tr>
<td>National Transportation Product Evaluation Program (NTPEP) Data</td>
<td>Yes</td>
</tr>
<tr>
<td>Additional Application Information</td>
<td>No</td>
</tr>
<tr>
<td>Primary Use</td>
<td>Separation geotextile, subsurface drainage geotextile, permanent erosion control geotextile</td>
</tr>
</tbody>
</table>

*Information of the local distributor are on file.*
### Nonwoven in category I-1 (ADOT 1014-5)

<table>
<thead>
<tr>
<th>Test</th>
<th>Requirements</th>
<th>Results</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grab tensile strength, ASTM D4632, Min</td>
<td>200 lbs</td>
<td>168</td>
<td>N.A.</td>
</tr>
<tr>
<td>Grab elongation at break, ASTM D4632, Range</td>
<td>15% - 115%</td>
<td>50%</td>
<td>OK</td>
</tr>
<tr>
<td>Puncture strength, ASTM D4833, Min</td>
<td>75 lbs</td>
<td>398 lbs (ASTM D6241)</td>
<td>OK</td>
</tr>
<tr>
<td>Burst strength, ASTM D3786, Min</td>
<td>320 psi</td>
<td>250 psi</td>
<td>N.A.</td>
</tr>
<tr>
<td>Trapezoidal tear strength, ASTM D4533, Min</td>
<td>50 lbs</td>
<td>63 lbs</td>
<td>OK</td>
</tr>
<tr>
<td>Permittivity, AZ 730, Min</td>
<td>0.50 s⁻¹</td>
<td>1.1 s⁻¹ (ASTM D4491)</td>
<td>OK</td>
</tr>
<tr>
<td>Apparent opening size, ASTM D4751, US standard sieves, Range</td>
<td>30 – 140 (0.11 – 0.60 mm)</td>
<td>0.192 mm</td>
<td>OK</td>
</tr>
<tr>
<td>UV stability, ASTM D4355, Min</td>
<td>70%</td>
<td>≥ 70 %</td>
<td>OK</td>
</tr>
</tbody>
</table>
## I-5. Low Survivability, Woven Separation Fabric

<table>
<thead>
<tr>
<th>Test</th>
<th>Requirements</th>
<th>Results</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grab Tensile Strength, lbs., (ASTM D 4632), Min</td>
<td>140</td>
<td>168</td>
<td>OK</td>
</tr>
<tr>
<td>Grab Elongation at Break, %, (ASTM D 4632)</td>
<td>Min: 13</td>
<td>50%</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Max: 115</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puncture Strength, lbs., (ASTM D 4833), Min</td>
<td>50</td>
<td>398 lbs</td>
<td>OK</td>
</tr>
<tr>
<td>Burst Strength, psi, (ASTM D 3786), Min</td>
<td>210</td>
<td>250</td>
<td>OK</td>
</tr>
<tr>
<td>Trapezoidal Tear, lbs., (ASTM D 4533), Min</td>
<td>40</td>
<td>63 lbs</td>
<td>OK</td>
</tr>
<tr>
<td>Permittivity, s⁻¹, (ARIZ 730), Min</td>
<td>0.07</td>
<td>1.1 s⁻¹</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>(ASTM D4491)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AOS, U.S. Standard sieve size, (ASTM D 4751)</td>
<td>30-140</td>
<td>0.192 mm</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>(0.11 – 0.60 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultraviolet Stability, %, (ASTM D 4355), Min</td>
<td>70</td>
<td>≥ 70 %</td>
<td>OK</td>
</tr>
</tbody>
</table>
### I-6. Moderate Survivability, Woven Separation Fabric

<table>
<thead>
<tr>
<th>Test</th>
<th>Requirements</th>
<th>Results</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grab Tensile Strength, lbs.,</td>
<td>140</td>
<td>168</td>
<td>OK</td>
</tr>
<tr>
<td>(ASTM D 4632), Min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grab Elongation at Break, %,</td>
<td>Min: 13</td>
<td>50%</td>
<td>OK</td>
</tr>
<tr>
<td>(ASTM D 4632)</td>
<td>Max: 115</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Puncture Strength, lbs.,</td>
<td>50</td>
<td>398 lbs</td>
<td>OK</td>
</tr>
<tr>
<td>(ASTM D 4833), Min</td>
<td></td>
<td>(ASTM D6241)</td>
<td></td>
</tr>
<tr>
<td>Burst Strength, psi,</td>
<td>210</td>
<td>250</td>
<td>OK</td>
</tr>
<tr>
<td>(ASTM D 3786)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trapezoidal Tear, lbs.,</td>
<td>40</td>
<td>63 lbs</td>
<td>OK</td>
</tr>
<tr>
<td>(ASTM D 4533), Min</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permittivity, s(^{-1}),</td>
<td>0.07</td>
<td>1.1 s(^{-1})</td>
<td>OK</td>
</tr>
<tr>
<td>(ARIZ 730), Min</td>
<td></td>
<td>(ASTM D4491)</td>
<td></td>
</tr>
<tr>
<td>AOS, U.S. Standard sieve size,</td>
<td>30-140</td>
<td>0.192 mm</td>
<td>OK</td>
</tr>
<tr>
<td>(ASTM D 4751)</td>
<td>(0.11 – 0.60 mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultraviolet Stability, %,</td>
<td>70</td>
<td>≥ 70 %</td>
<td>OK</td>
</tr>
<tr>
<td>(ASTM D 4355)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Nonwoven in category I-7 (ADOT 1014-4.03)

<table>
<thead>
<tr>
<th>Test</th>
<th>Requirements</th>
<th>Results</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grab tensile strength, ASTM D4632, Min</td>
<td>200 lbs</td>
<td>168</td>
<td>N.A.</td>
</tr>
<tr>
<td>Grab elongation at break, ASTM D4632, Range</td>
<td>45% - 115%</td>
<td>50%</td>
<td>OK</td>
</tr>
<tr>
<td>Puncture strength, ASTM D4833, Min</td>
<td>75 lbs</td>
<td>398 lbs</td>
<td>OK</td>
</tr>
<tr>
<td>Puncture strength, ASTM D4833, Min</td>
<td>75 lbs</td>
<td>398 lbs</td>
<td>OK</td>
</tr>
<tr>
<td>Burst strength, ASTM D3786, Min</td>
<td>320 psi</td>
<td>250</td>
<td>N.A.</td>
</tr>
<tr>
<td>Trapezoidal tear strength, ASTM D4533, Min</td>
<td>50 lbs</td>
<td>63 lbs</td>
<td>OK</td>
</tr>
<tr>
<td>Permittivity, AZ 730, Min</td>
<td>0.07 s⁻¹</td>
<td>1.1 s⁻¹</td>
<td>OK</td>
</tr>
<tr>
<td>Apparent opening size, ASTM D4751, US standard sieves, Range</td>
<td>30 - 140</td>
<td>0.192 mm</td>
<td>OK</td>
</tr>
<tr>
<td>UV stability, ASTM D4355, Min</td>
<td>70%</td>
<td>≥ 70 %</td>
<td>OK</td>
</tr>
</tbody>
</table>
## NTPEP Database

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>oz/yd²</td>
<td>MD Strength (lbs)</td>
<td>MD Strain (%)</td>
<td>XD Strength (lbs)</td>
<td>MD</td>
<td>XD</td>
<td>MD</td>
<td>XD</td>
<td>MD</td>
<td>XD</td>
<td>1/sec.</td>
</tr>
<tr>
<td>Mean</td>
<td>4.73</td>
<td>224</td>
<td>64</td>
<td>237</td>
<td>61</td>
<td>111</td>
<td>121</td>
<td>458</td>
<td>1.61</td>
<td>0.13</td>
<td>87</td>
</tr>
<tr>
<td>COV(%)</td>
<td>7.9</td>
<td>11.9</td>
<td>13.8</td>
<td>10.6</td>
<td>15.2</td>
<td>18.2</td>
<td>13.1</td>
<td>15.4</td>
<td>12.4</td>
<td>16.8</td>
<td>12.7</td>
</tr>
<tr>
<td>Manufacturer’s Claimed MARV</td>
<td>4.570</td>
<td>169</td>
<td>50</td>
<td>169</td>
<td>50</td>
<td>63</td>
<td>63</td>
<td>398</td>
<td>1.1</td>
<td>0.192</td>
<td>50</td>
</tr>
</tbody>
</table>
List of Committee Members (MatPEC and TCPEC)

ADOT Materials Product Evaluation Committee (2018)

Ammon Heier (FHWA)
Chris Cooper
Craig Wilson
Guy Skirpan
Jessica Banner
Jesús Sandoval-Gil
J.J. Liu
Julie Kliewer
Lee McCleary

Marwan Aouad
Michael Rigby
Murari Pradhan
Nye McCarty
Paul Burch
Rehnuma Rahman
Scott Weinland


Andrew (Andy) Roth
Bashir Hassan
Chris Cooper
Guy Skirpan
Jesús Sandoval-Gil
Jeffrey King (FHWA)
Karim Rashid

Lee McCleary
Marwan Aouad
Maysa Hanna
Raymundo Baca
Scott Beck
Scott Orrahood
William Faber
Appendix H: Sample Title VI Quarterly Report
TITLE VI
QUARTERLY REPORT

Please submit to the ADOT Civil Rights Office via email: civilrightsoffice@azdot.gov.
If additional space is needed for any question(s) please send attachment(s) along with the Quarterly Report. Please complete all sections of the report.

In compliance with ADOT’s Title VI Nondiscrimination Implementation plan a quarterly report is required to be submitted by the designated Title VI liaison for each program area. The Title VI liaison for each program area is required to ensure that ADOT’s respective areas, programs, and subrecipients comply with Title VI regulations and assurances, collect and analyze demographic data of participants/beneficiaries of programs, and meet the objectives of the Title VI Plan. Data collected through the Title VI Liaison Program representatives will be used to create ADOT’s Annual Goals and Accomplishment report to meet federal and state reporting requirements.

I. Division/Program Area Information

Division/Program Area: MPD Research Center

Title VI Liaison: Dianne Kresich Official Title: Research Center Manager

Date Submitted: 01/24/2018

Mailing Address:
206 S. 17th Avenue
MD 310B
Phoenix, AZ 85007

Phone: (602) 712-3134
Fax: 

Email: dkresich@azdot.gov

II. Policy Updates

1. Were any manuals, policies or procedures updated this quarter?
   
   Yes ☐ No ☒

If so, please briefly describe which Title VI requirements were considered in the update(s):

________________________________________________________________________
________________________________________________________________________
III. Description of the Service Area Demographics

1. How many projects were conducted this quarter? 25 projects are programmed or active

Please upload any additional tables or charts here:

<table>
<thead>
<tr>
<th>Awarded Project Information</th>
<th>Highest Limited English Proficient (LEP) language in project area</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROJECT TITLE</td>
<td>TRACS No.</td>
</tr>
<tr>
<td>Evaluation of ADOT Messaging in Public Involvement</td>
<td></td>
</tr>
</tbody>
</table>

2. What method(s) does your office use to collect demographic and LEP data?

A detailed work plan and research method are developed for each study. For studies that require the collection of demographic and LEP data, study consultants use reliable sources of information and document their findings in deliverables. When surveys are conducted to collect data, demographic information is typically requested from the survey respondent.

IV. Dissemination of Title VI Information

1. In accordance with USDOT Order 1050.2A did all request for proposals/solicitations for bids and consultant agreements/ construction contracts include Title VI related language (Appendix A &E)?

   Yes ☒   No ☐

If not, please briefly explain why:
2. Were any public meetings conducted this quarter? (Public meetings include any ADOT hosted events for the public or external customer(s).)

   Yes ☒    No ☐

   If so, please briefly explain the projects and how they were advertised:

   [Blank space]

3. Did all of your public advertisements contain ADA and Title VI Nondiscrimination language?

   Yes ☐    No ☐    Did not have any public advertisements ☒

4. Were Title VI summary reports provided to the Civil Rights Office for all public meetings?

   Yes ☐    No ☐    Did not have any public meetings ☒

5. Are current copies of the ADOT ADA and Title VI Nondiscrimination notice available and accessible to your division/office and any off site location?

   Yes ☒    No ☐

   If so, please briefly explain where they are located (including project sites):

   [Blank space]

   The notices are posted inside the Research Center next to the door. At public meetings, notices are displayed at meeting room entrances.

6. Do you have Title VI material available in languages other than English?

   Yes ☒    No ☐

   If so, please briefly explain who they were disseminated to and how:

   [Blank space]

   The Title VI material provided by ADOT, which includes a translation into Spanish, is displayed at public meetings conducted during the research process. No public meetings were conducted during the past quarter.
7. Is information about Title VI disseminated to your consultants?

Yes ☒  No ☐  We do not have consultants ☐

If yes, please explain how:

☐ In person training
☐ Web based training
☒ Other

We refer consultants to information sources. Task assignments include information, as well.

V. Affected Populations

1. Were any Title VI Populations affected this quarter?

Yes ☐  No ☒

If so, please briefly describe what groups were affected and what efforts were made to minimize and mitigate adverse effects.

VI. Limited English Proficiency (LEP) Requirements:

1. Was there a four factor analysis conducted for each project listed in Section III? Please list the project name, TRACS number, and if the analysis was approved by the Civil Rights Office (CRO). If more space is needed please attach the additional page(s).

<table>
<thead>
<tr>
<th>PROJECT TITLE</th>
<th>TRACS No.</th>
<th>Reviewed by CRO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation of ADOT Messaging in Public Involvement</td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

2. What steps are taken to ensure “meaningful” access to LEP individuals?

We conduct four-factor analyses to determine appropriate language services. If such services are needed, this would be noted in the project scope and accommodated in the budget. The selected consultant would typically provide these services.
3. Please explain the LEP services that were provided this quarter:

None this quarter.

4. How many LEP services were requested this quarter? 

5. Cost of LEP services provided this quarter? 

VII. Complaint Information

1. List any complaints of discrimination filed with your division/program area for the reporting period to include: Date of complaint, name of person who filed the complaint, and nature of the complaint (brief statement).

<table>
<thead>
<tr>
<th>Date:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name:</th>
<th>Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nature:</th>
<th>Nature:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b. No complaints filed against this division/office for this reporting period ✗

VIII. Training

1. Has the Title VI Liaison received Title VI training within the last two years?

   Yes ✗ No ☐

If so, please briefly describe who conducted the training and when it was conducted:

FHWA training, November 2016.
Quarterly liaison meetings.
Training to Research Center staff, March 2018.
2. Has the program area received Title VI training within the last two years?
   Yes ☒ No ☐

If so, please briefly describe who conducted the training and when it was conducted:

The Research Center manager received FHWA training in November 2016. CRO providing training to Research Center staff in March 2018.

3. Does the program area have a Title VI training request?
   Yes ☐ No ☒

If so, please briefly describe the need:

IX. Major Accomplishments

Please list and provide a summary of activities and accomplishments within your division/program area relative to any or all of the following (please send attachment if more space is needed):

1. Promoting and providing diversity in the decision-making process; addressing/mitigating any possible adverse impacts on minority communities.

   When relevant, the Research Center considers potential adverse impacts on minority communities when conducting research studies.

2. List any efforts your program area has made to your processes towards compliance with Title VI.

   The Research Center manager informs staff on Title VI requirements and tries to ensure compliance.

If you need to attach any additional documents, please upload here:

Submit