

SCDOT Research Manual



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1.0 PURPOSE AND CONTEXT OF MANUAL

1.1 Background

The United States' first national highway program included research as one of its principal missions. Highway research is the oldest continuous Federal highway activity, having begun with the establishment of the Office of Road Inquiry in the Department of Agriculture in 1893. With the creation of this office, whose primary mission was to investigate the best methods of road making and to assist in disseminating this information, a formal, organized research program began.

The first sustained fiscal support for highway research was authorized by the Federal Highway Act of 1921. The enactment of the Hayden-Cartwright Act of 1934 laid the foundation for the Federal-Aid State Highway Planning and Research (HP&R) Program. Under this act, up to one and a half percent of highway funds apportioned to a State could be used for "surveys, plans, and engineering investigations."

The Federal-Aid Highway Act of 1944 added the term "research" to the program which allowed States to use their one and a half percent allocation for a variety of research purposes. Funds not used for planning or research reverted to the construction program. The Federal-Aid Highway Act of 1962 required that the funds be used for planning and research purposes only, with the stipulation that they would lapse if not used within their availability period. The 1962 Act also gave States the option to use an additional half of a percent and up to one percent of their Federal-Aid primary and secondary system funds for planning and research activities.

The Federal-Aid Highway Amendments Act of 1963 incorporated "development" under planning and research, so this component could be an integral part of the overall R&D program and help stimulate States to take a more active role in the development phase.

The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 retitled Highway Planning and Research (HPR) to State Planning and Research (SPR) and increased the set-aside of funds apportioned to States for SPR activities from one and a half percent to two percent. ISTEA also required that "a minimum of [twenty five percent] 25% of State Planning and Research (SPR) funds shall be expended on research, development and technology transfer activities." Subsequent Acts have continued the minimum percentages of funding for research established by ISTEA.

1.2 Purpose

The primary purpose of this manual is to document the Department's research management process in accordance with federal requirements for use of SPR funds for Research, Development, and Technology Transfer (RD&T) activities. Also, the information in this manual should assist those not

directly associated with research to better understand the process and increase involvement in the program.

1.3 Authority

The authority for the Department to administer the SPR funds in the research program is contained in [23 C.F.R. § 420, Subpart B](#), “Research, Development, and Technology Transfer Program Management.” The authority for the Department to enter into agreements with institutes of higher education, consultants, or other government agencies to conduct research or related studies is found in [SC Code § 57-3-110 \(2012\)](#). The Department’s procedures for procurement and administration of federally funded research are outlined in Engineering Directive Memorandum (EDM) 55 (see [Appendix 1](#)).

2.0 MISSION AND GOALS OF THE RESEARCH UNIT

2.1 Mission

The Research Unit handles the day-to-day operations of the research program. The Unit assists with fulfillment of the Department's mission and goals by conducting applicable research, disseminating information, and promoting national research programs.

2.2 Goals

The goals of the Research Unit are:

- Perform and promote transportation-related research, technology transfer, and support activities;
- Utilize all SPR funds made available for research and explore additional sources of funding as necessary to carry out the mission of the Unit;
- Increase awareness of the research program among potential customers, both internal and external, to enhance interest and broaden the scope of the program;
- Maximize involvement of personnel from all areas of the Department in the research program process; and
- Promote national programs and initiatives that support and enhance transportation research.

3.0 CUSTOMER SUPPORT DEVELOPMENT

3.1 Purpose

It is essential to identify potential customers and secure their understanding and support in order to have a successful and meaningful research program. This can best be achieved by involving customers in the process of developing the research program, including them on project committees, or by involving them in discussions for studies related to their areas of interest.

3.2 Process

3.2.1 Research Partners

Research Partners are usually representatives of the Department, other state and local agencies, universities, transportation related associations (i.e., SC Asphalt Pavement Association, Asphalt Institute, American Concrete Pavement Association, and SC Mining Association), contractors, and the Federal Highway Administration (FHWA). The degree of involvement by research partners varies throughout the process as noted in this manual.

3.2.2 Forums for Inclusion

3.2.2.1 Requests for Research

Research topics are solicited from all research partners, and this process is discussed in section [5.1.2](#).

3.2.2.2 Committees

Research partners may be represented on specific committees as defined under Research Committees in section [4.2](#). The purpose of the different committees, agendas, and meeting schedules are included in that discussion.

3.2.2.3 Special Meetings

Members of the Research Unit will periodically meet with staff members of all major units in Headquarters and District Offices in order to identify partners and promote the intra-Departmental research program. These sessions will examine the scope of the research program and the needs of individual units that could possibly be addressed by research. The expertise and interest of individuals in the various units will be identified for possible involvement on research committees in other activities related to the program.

Special meetings will be held, as appropriate, to involve research partners who could be affected by pending or ongoing research. These meetings will allow input on specific research issues and their impact on partner operations, and foster support for implementation of findings and recommendations. Information gathered during the special meetings will be presented in various operation, committee, and periodically scheduled general meetings where research partners are in attendance (i.e., Hot Mix Asphalt Quality Improvement Committee, Joint Association of General Contractors/Engineers Conference, and SCDOT Engineers Conference).

4.0 RESEARCH ORGANIZATION

4.1 Research Unit

The Research Unit administers the Department's research program. The Unit's tasks include, but are not limited to, the following:

- Provide documentation, reports, and other information to meet federal and state requirements;
- Manage contracted research projects contained in the SPR Program;
- Conduct staff research and direct staff activities for studies conducted in-house through the SPR or In-House Investigation Programs;
- Manage the Department's New Products Program;
- Coordinate research activities involved with national research programs such as USDOT, FHWA, American Association of State Highway and Transportation Officials (AASHTO), Transportation Research Board (TRB), and National Cooperative Highway Research Program (NCHRP);
- Promote research implementation; and
- Conduct technology transfer activities including monitoring activities of the Transportation Technology Transfer Service (T³S) at Clemson University.

The Research Unit is located at the Office of Materials and Research (OMR), which is part of the Construction Office in the Engineering Division. The Unit is supervised by the Research Engineer who reports to the Materials and Research Engineer.

4.2 Research Committees

Of all the activities that impact customer support, the work of research committees and their functions are probably most important. The research staff formally maintains contact with the operating units of the Department and other entities through committee involvement. Individuals not involved as committee members are included in a formal, interactive process which conscientiously solicits their participation and support. Appropriately structured, these committees are useful in developing and updating research plans, providing input for the periodic solicitation of potential research problems, setting priorities for projects selected for the work program, giving advice and general guidance during the process of the project, and serving as important conduits for the transfer of research results.

4.2.1 Research and Development Executive Committee

4.2.1.1 Function

The Research and Development Executive Committee (RDEC) guides and directs the Department's research program. This Committee has overall responsibility for the operation of the Research Unit, including fiscal accountability; reviewing and prioritizing research topics for development as research projects; monitoring progress of on-going studies and implementation of results from completed studies. The research staff serves as support for RDEC and makes regular progress reports and presentations at Committee meetings.

4.2.1.2 Membership

Membership is composed of high-level managers from all major units in Headquarters, a representative from OMR, two field representatives, and a representative from the FHWA. The makeup and organization of the Committee is shown below:

- Chairman, Deputy Secretary for Engineering
- Secretary, Materials and Research Engineer
- Deputy Secretary for Intermodal Planning
- Deputy Secretary for Finance & Administration
- Chief Engineer for Operations
- Chief Engineer for Project Delivery
- Chief Information Officer, Information Technology Services
- Director of Construction
- Director of Environmental Services
- Director of Intermodal and Freight Programs
- Director of Maintenance
- Director of Planning
- Director of Preconstruction
- Director of Right of Way
- Director of Road Data Services
- Director of Traffic Engineering
- (2) District Engineering Administrator
- FHWA Representative

4.2.1.3 Meeting Agenda

The Research Unit prepares the agenda for RDEC meetings. Agenda items are also solicited from Committee members in meeting announcements. While agenda topics will vary at meetings, the following subjects are typically included:

- Presentations by Principal Investigators on the status or findings of projects;
- Discussions concerning the implementation of findings;
- Discussions of results of ballots for research topics and/or final prioritization for development as research projects;
- Discussions and selection of pooled fund studies for participation;
- Updates on the status of SPR Subpart Part B funds; and
- Briefings on items of interest by the FHWA representative.

4.2.1.4 Meeting Frequency and Location

The Committee meets semiannually, summer and winter. A special meeting to prioritize research topics derived from the solicitation process described in section [5.1.2](#) may be held if timing does not coincide with a regular meeting. Meetings are usually held in the Department's Headquarters but if necessary, may be held at OMR.

4.2.2 Project Steering and Implementation Committee

4.2.2.1 Function

The overall responsibility of a Steering and Implementation Committee (SIC) is to provide guidance to the research project's Principal Investigator (PI) to ensure the needs of the Department are met. The SIC is usually formed when the development an approved topic of as a research study begins and will disband with the conclusion of the implementation phase of the project. General responsibilities of the SIC include, but are not limited, to the following:

- Reviewing the problem statement to ensure that it is stated correctly and is complete;
- Selecting the PI in accordance with section [5.2.1](#);
- Reviewing and approving the proposal prepared by the PI;
- Monitoring progress through project progress reports and meetings;
- Reviewing and approving the final report prior to printing;
- Determining the need for contract modifications on research projects; and
- Reviewing and approving proposals for additional work;

At the conclusion of the project, the SIC is responsible for the promotion and implementation of results.

4.2.2.2 Membership

Steering and Implementation Committees are usually composed of three to five Department engineers or professionals with expertise in the study topic and whose areas of responsibility are impacted by the research. An effort is made to include mid-level engineers and managers on SICs with expertise in the subject matter and who have sufficient time to devote to the task. FHWA's RDEC representative will advise SCDOT which projects, if any, will have FHWA serving on the SIC. As appropriate, individuals from the private sector may also be asked to participate as needed as a non-voting member.

With approval of the appropriate Director or Division Head, a chairperson is appointed for each SIC by the supervisor of the unit that proposed the study. A member of the Research Unit usually assists the chairperson in completing the membership of the SIC. In general, the chairperson acts as the Department's primary technical contact for the research project. Specific duties include but are not limited to:

- Arranging and scheduling SIC meetings, with assistance from the Research Unit;
- Preparing SIC meeting agendas on an as-needed basis;
- Finalizing the research problem statement;
- Leading the review and discussion of proposals with the SIC;
- Actively monitoring the PI's progress on the project;
- Assisting the PI, by coordinating with other units, to obtain data or information needed for the project;
- Making recommendations to the SIC on the need for and approval of time extensions and/or project modifications;
- Approving Quarterly Progress Reports and Invoices;
- Leading the discussion on the PI's research findings and the wording of same in the final report;
- Initiating and pursuing efforts on implementation of project findings; and
- Preparing an Implementation Statement.

4.2.2.3 Meeting Agenda

The agenda for SIC meetings vary depending upon the specific tasks to be accomplished. For example, the initial meetings usually involve finalizing the problem statement and items associated with selecting a PI. A meeting to discuss a proposal could include a presentation by the prospective PI on the concept of the study and tasks included in the proposal. An open discussion with the SIC and

prospective PI would also be included. Routine Committee meetings during the life of the study would include the following items as a minimum:

- A review of administrative details to include starting date, descriptions of any extensions, cost increases, current completion date, budget, and objectives;
- A presentation by the PI on project status;
- Discussion of problems encountered in the project, any concerns of the SIC, future direction of study, and changes in project scope; and
- Discussion of implementation of results already obtained or possible implementation activities for foreseeable findings.

4.2.2.4 Meeting Frequency and Location

Frequent meetings are encouraged between the chairman, key members of the SIC, and the PI during the life of a project. The frequency of meetings will be established at the beginning of a project and will typically occur monthly or quarterly. The PI will present a research status to the full SIC at intervals necessitated by the work (i.e., bi-annually and/or annually). At a minimum, short-term projects, where the project duration is less than two years, should meet no less than once per quarter and long-term projects, where the project duration is greater than two years, should meet no less than twice per year. After completion of the project, meetings will be held as needed to promote project implementation of findings.

Meetings are usually held at OMR or Headquarters but may be scheduled at the work site, if possible, for projects involving laboratory or fieldwork.

5.0 PROGRAM DEVELOPMENT

5.1 Problem Solicitation and Research Project Approval Process

5.1.1 Purpose

The process for soliciting Research Topics for the RDEC's consideration for funding as studies in the SPR Research Program is described in section [5.1.2](#). The primary goal of the solicitation process is to identify a wide array of potentially beneficial research needs that support the mission, strategic plan, and directives of SCDOT are used in the development of the work program.

5.1.2 Solicitation Process

5.1.2.1 Research Topic Solicitation Forum

1.1 Purpose and Frequency

The purpose of the one-day forum is to discuss proposed projects related to subject areas in the Department that can be addressed by research, and to increase awareness and understanding of the Department's research program among all its customers. The one-day forum serves as the primary topic solicitation and is held every two or two and one half years. However if circumstances warrant, the interval between solicitation forums can be modified as necessary. SCDOT coordinates with FHWA to determine the forum's date and agenda.

1.2 Determination of Projects for Discussion

This process begins by notification from a member of the research staff sending a Suggested Topic Form to all major units in the Department, in-state institutes of higher education, industry, trade organizations, and the FHWA. The deadline for topic submission is provided in that communication. The research unit will review all topics received by the submission deadline and group the same by subject matter. The grouped topics will be sent for review to appropriate Engineering Directors, or to Deputy Secretaries for topics related to administration or freight. The Department is not obligated to pursue research project development for all topics that are submitted in this process. The Engineering Directors/Deputy Secretaries will review the topics, and determine those that they consider to be of greater priority for the Department and are worthy of discussion at the Research Topic Solicitation Forum. The Engineering Directors/Deputy Secretaries will then put the selected topics into list form and send the same to the research unit.

1.3 Participants

The forum typically includes participants from all areas of the Department, in-state institutes of higher education, industry, trade organizations, FHWA, and all individuals whose topics were selected for discussion. Prior to the meeting, personnel from the Research Unit will confer with the upper management for each division of SCDOT to identify Department representatives who will participate in the forum and designate the subject-area breakout session that the representatives will attend. FHWA's RDEC representative determines the level of FHWA participation at the solicitation forum.

1.4 Format

The forum begins with a plenary session for all participants. An overview of the research program is presented in the session and the purpose of the forum discussed. Each participant then attends one (or more) of several pre-assigned breakout sessions. Breakout sessions are organized so that each contains different, yet related, topics by subject area of potential research interest for the Department. The breakout sessions can vary from meeting to meeting, but generally include subject areas such as:

- Construction / Materials
- Maintenance / Bridge Maintenance
- Traffic / Safety
- Preconstruction / Environmental
- Intermodal Planning / Business Operations

One moderator (and one record keeper, if needed) from OMR is assigned to each breakout session. Moderators have some discretion in how to conduct their breakout session as some will be larger than others, and the topics within each session can vary. The general format for each breakout session is to discuss each of the submitted topics in the subject area during the morning session to ensure that all participants understand the scope and intent of each proposed topic. Only Department and FHWA personnel participate in the afternoon session in which one or more voting techniques are used to identify and prioritize the topics having greater priority for the Department. FHWA attendees serve in an advisory position during this process, but do not vote. Similar topics may be combined at this point. Before completing the breakout session, a champion from the Department is identified for each of the higher priority topics. It is the champion's responsibility to develop a problem statement for the topic (see [Appendix 2](#)).

The forum concludes with another plenary session of all participants during which the moderator of each breakout session shares information on their group's activities and presents the selected higher priority topics from their session. In closing, a timeline is provided to all participants and

includes the date problem statements are due to the Research Unit and dates of milestones in the RDEC's balloting and approval process.

5.1.2.2 Problem Statements

The champion can obtain assistance in preparing a problem statement from anyone, either inside or outside the Department, as deemed appropriate. Assistance in preparation of a higher priority topic problem statement by personnel associated with an in-state institute of higher education, industry, trade organization, or consultant interested in performing the research in no way obligates the Department to award the project to that entity.

A problem statement form is sent to all topic champions by a member of the research staff. A copy of the form, along with directions for completing the form, may be found in [Appendix 2](#). Completed problem statements are due approximately three to four weeks after the Research Topic Solicitation Meeting.

The research staff will designate a numbering scheme for each topic subject area and will assign a unique identification number to each completed problem statement within the subject areas. After reviewing each problem statement, the research staff will determine if clarification or additional information is needed and will work directly with the project champion.

The research staff will conduct a basic literature search for each problem statement topic. The problem statements and literature search results for each subject area are then forwarded to the appropriate Director/Division Head for their review. The Director/Division Head will then determine the ranked order the problem statements from greatest to least based on the perceived need for the same to the Department.

5.1.3 Research Project Approval Process

5.1.3.1 Balloting

The research staff prepares a ballot form where the higher priority problem statements are listed in the Director/Division Head ranked order by subject area. The ballot employs a rating scheme of 0 to 5, with 0 indicating "no need" and 5 indicating "great need." The ballot, copies of the problem statements, and information obtained from the literature search are then sent to RDEC members. The FHWA RDEC representative may advise, but does not vote. The voting members of RDEC are then asked to use the provided ballot to rank the problem statements with respect to the following:

- Represents a current problem within the Department that needs researching;

- Has a high probability of success with implementable results that are beneficial to the Department;
- Has anticipated results with a projected high rate of return for the Department; and
- Represents completed or ongoing research on the specific problem, as identified by the literature search, where results could be readily implemented by the Department.

Voting RDEC members will return the completed ballots to the Research Unit within a specified time frame. The balloting period usually is between two to three weeks, and will be determined based on the number of problem statements on the ballot. The Research staff will prepare an average of the ratings for each problem statement and prepare a summary sheet that will be distributed for review to RDEC members prior to the final prioritization meeting.

1.1 Final Prioritization Meeting

An RDEC meeting is held to discuss the ballot results and to develop a final list of higher priority projects. When possible, the balloting process will be scheduled so that the final prioritization meeting can be held at a regularly scheduled RDEC meeting. The summary sheet for the ballot process, as described above, is distributed with the agenda to all RDEC members for their review prior to this meeting.

A financial report detailing projected expenditures and funds available for the research program through the succeeding two federal fiscal years is presented at the final prioritization meeting. Open discussions will be held during this meeting, and any project champion wishing to address the Committee to promote a particular project can be placed on the agenda. Projects can be moved up or down in priority and/or removed from consideration at the discretion of the Committee at this meeting.

A final list of higher priority projects is developed. Typically, ten to fifteen projects are approved for funding. The number of projects approved can vary depending on the availability of funds, perceived need, and estimated project funding levels. The final list of projects is voted on by the Committee and forwarded to the Deputy Secretary for Engineering or his designee for approval. The final list of projects is also included in the SPR Subpart Part B Work Program report, which is submitted to the FHWA.

1.2 Scheduling of Approved Projects

Projects are developed over a two-year period within reasonable conformity to the prioritized order established by the RDEC, unless circumstances warrant a change in priority of a project. Projects are developed as funds are available and budget limits permit.

5.1.3.2 Process for Handling Projects Arising from Critical Needs

2.1 Project Criteria

A critical needs project is one where an urgent (e.g., time-sensitive) need arises from any area of the Department which requires additional research and was not considered during the project solicitation meeting. National or regional pooled-fund studies, which are administered by other state DOTs, are also included in the critical needs category. Requests for participation in pooled-fund studies can be received at various times and often require a limited time for response. An avenue is available for urgent projects where they may be addressed prior to the next-scheduled research topic solicitation meeting.

2.2 Procedures for Critical Needs Projects

2.2.1 Preparation of Project Description

Critical needs projects which arise between research topic solicitation meetings are referred to the Research Unit. A champion from the area requesting the research will prepare a problem statement in accordance with [Section 5.1.2.2](#). The completed problem statement, and other pertinent information demonstrating the need to RDEC, will be sent to the Research Unit. The problem statement will be reviewed by the research staff and if deemed necessary, forwarded to FHWA's RDEC representative to ensure that the project is eligible for funding through the SPR Research Program. The research staff will also conduct a brief literature search for the proposed project.

2.2.2 Balloting Critical Needs Projects

When possible, the critical needs problem statement, related information, and a voting ballot will be sent to all members of the RDEC. Ballots may not be sent to the RDEC if the project arises near the time of a regularly scheduled meeting. In that instance, the proposed project will be discussed and a vote will be taken at the meeting. Projects recommended for funding are forwarded to the Secretary of Transportation or his designee for approval.

2.2.3 Scheduling Critical Needs Projects

Critical needs projects that are recommended by the Committee and approved by the Deputy Secretary for Engineering or his designee will usually begin development fairly quickly. If approved-yet-undeveloped projects remain on a prioritized list from a past solicitation, the RDEC can establish the priority order for the critical needs project. Initiation of the critical needs project is also dependent on availability of funds and adequate budget levels.

5.2 Project Development Process

The Research Unit is responsible for developing and administering projects approved by the Deputy Secretary for Engineering or his designee. These projects can be conducted by in-house researchers or through a contract with an outside Principal Investigator (PI). The decision on how to select a PI is made by the SIC and will be determined by the manpower and testing requirements of the proposed project, and by the availability of Department in-house expertise in the subject area.

5.2.1 Types of Research Projects

5.2.1.1 In-House Research Projects

SPR in-house projects can be conducted by any duly authorized Department employee. Usually, OMR staff will serve as the PI and the SIC approves the selection of the PI for in-house projects. In-house projects are usually small-scale studies that require minimal laboratory or field testing and may be conducted by OMR staff in addition to their normal duties and responsibilities. In-house projects have the same reporting and other requirements as projects contracted with an outside PI.

5.2.1.2 Contract Research with In-State Institutes of Higher Education

Several options are available to the Department for contracting SPR projects. The first option usually explored is to contract with an in-state institute of higher education based on their availability of expertise in a wide range of subject matters and experience in performing research. This arrangement is beneficial to both parties as an in-state institute's overhead rate often allows performance of work at a lesser cost to the Department, and students of the institute benefit from the research experience.

Whenever possible, project proposals will be solicited from multiple in-state institutes of higher education, and the SIC will employ a qualification-based evaluation to select the PI. The selection criteria will measure the qualification and expertise of the researcher, understanding of the problem, proposed research approach, application of the results, implementation plan, and other criteria unique to the specific project. If expertise in the subject matter for an approved research project resides at only one in-state institute of higher education, the SIC will request a proposal and pursue developing the project with that institute. The research staff will make a conscientious effort in the course of meetings, seminars, and other encounters to identify institute of higher education faculty members with special and/or unique experience or expertise in areas of interest to the Department. The contracting process, including cost negotiations and development of the final proposal, for in-state institutes of higher education is in accordance with section [5.2.2](#).

5.2.1.3 Contract Research with State or Federal Agencies

The SIC may request a proposal and pursue developing an SPR project with a state or federal agency, such as United States Geological Survey (USGS), due to the agency's particular expertise, availability of specialized equipment, and other resources. The contracting process, including cost negotiations and development of the final proposal, for state or federal agencies is in accordance with section [5.2.2](#).

5.2.1.4 Advertised Research Projects

If a SIC determines that the scope of the research may require specialized expertise or equipment that is not available in-house, at an in-state institute of higher education, or at a state or federal agency, the SIC can request that the SPR project be advertised. OMR staff will determine if the procurement should follow the exempt or non-exempt process as identified in Departmental Directive 13 (see [Appendix 1](#)). If exempt, procurement for the research project will follow the qualifications based process outlined in Departmental Directive 41. If non-exempt, procedures outlined in Departmental Directive 13 will be used for the procurement.

5.2.1.5 In-House Investigation Studies

State-funded, non-SPR, studies are conducted under the In-House Investigation Program at the OMR. The program is guided by the In-House Investigation Committee and is composed of OMR staff engineers. The Materials and Research Engineer serves as chairperson of this Committee and the Research Engineer is secretary. Meetings are held biannually, usually in the spring and fall. Progress reports on active investigations are presented by assigned staff researchers and potential new projects are discussed at these meetings.

Studies conducted under the program are small in scale, require minimal laboratory or field testing, and may be conducted by OMR staff in addition to their normal duties and responsibilities. These studies are often related to the evaluation and performance of a newly submitted product. At times, these projects can expand significantly in scope, transition into an SPR project, and thus require all applicable approvals.

5.2.2 Contracting Process for SPR projects

Engineering Directive Memorandum (EDM) 55 provides overall guidance for procurement and administration of federally funded research (see [Appendix 1](#)). The process for contracting SPR projects is outlined in detail in "Contract Process for Federally Funded Research Agreements" (see [Appendix 3](#)). The process for handling contract modifications is outlined in "Contract Process for Contract Modification to Federally Funded Research Projects" (see [Appendix 4](#)).

The research staff initiates an SPR project by requesting approval through Project Programming System (P2S). The Programs Controls Division reviews and processes the P2S request and enters necessary information into the FHWA's Fiscal Management Information System (FMIS) for the FHWA Division Office's approval and obligation of project funds.

5.3 Work Program Requirements

5.3.1 Purpose

The SPR Subpart Part B Work Program describes all the proposed research activities with estimated costs. The work program covers two federal fiscal years, is prepared by research staff, and is updated yearly. The SPR Subpart Part B Work Program is submitted to the FHWA Division Office before the first day of each federal fiscal year (October 1 – September 30) for approval and project authorization. Following Division Office approval, the SPR2 Work Program is published and distributed by the Research Unit.

5.3.2 Process

5.3.2.1 FHWA Work Program Requirements

The requirements for administration of a State Planning and Research Program are contained in [23 CFR Part 420](#). Research, Development, and Technology Transfer (RD&T) program requirements are defined in [23 CFR § 420.207](#). They are as follows:

- a) The State DOT's RD&T work program must, as a minimum, consist of a description of RD&T activities to be accomplished during the program period, estimated costs for each eligible activity, and a description of any cooperative activities including the State DOT's participation in any transportation pooled fund studies and the NCHRP. The State DOT's work program should include a list of the major items with a cost estimate for each item. The work program should also include any study funded under a previous work program until a final report has been completed for the study.
- b) The State DOT's RD&T work program must include financial summaries showing the funding levels and share (Federal, State and other sources) for RD&T activities for the program year. State DOT's are encouraged to include any activity funded 100 percent (100%) with State or other funds for information purposes.
- c) Approval and authorization procedures in [§ 420.115](#) are applicable to the State DOT's RD&T work program.

5.3.2.2 FHWA Conditions for Approval

The conditions for approval of FHWA planning and research funds for RD&T activities are found in [23 CFR § 420.209](#).

6.0 PROGRAM REPORTING

6.1 Project Level Reporting

The exchange of information, via clear, concise and complete project reports, is essential to the implementation of research findings. It is important that these reports detail the progress and accomplishments of research projects.

Proper reporting of the individual components, represented by the projects, enhances evaluation of the entire program.

6.1.1 Reports

6.1.1.1 Quarterly Reports

The PI will prepare and submit a Quarterly Progress Report to the Research Unit on a calendar quarterly basis using the Department's form (see [Appendix 5](#)). The research staff will distribute the report to SIC members, FHWA's RDEC representative, and other appropriate areas of the Department. The SIC Chairperson must receive and approve a Quarterly Progress Report in order to authorize payment of the invoice for the corresponding quarter.

6.1.1.2 Interim Reports

Interim reports may be required on projects of duration of two to three years or greater, or on projects expected to produce significant accomplishments during the course of the research. The report details work to the interim point in time, significant accomplishments, implementation of results and expected results, impediments to the project, and plans to overcome impediments.

6.1.1.3 Final Reports

The PI will ensure that SIC members of a project are made aware of research findings prior the submission of a draft or final report. If requested, the PI will make a final presentation of research to the SIC at the conclusion of the project.

Federal regulations require a final report for every SPR project to document RD&T activities (see [23 CFR § 420.209\(a\)6](#)). The Department follows final report guidelines as set out in Volume 1, Chapter 5, of the [NCHRP 20-45](#) report, *Scientific Approaches for Transportation Research*. The final report should include, but not be limited to, the following information:

- Title Page
- Technical Report Documentation Page (Form DOT F 1700.7)
- Disclaimer
- Acknowledgements
- Executive Summary
- Table of Contents, List of Tables, and List of Figures
- Work Plan, including the experimental research plan, data collection, description of sites and activities, and an analysis of the data
- Findings
- Conclusions that are specific for the Department and SC conditions
- Recommendations that are based on the findings and conclusions
- Implementation Plan that reflects in-depth planning and discussions with the SIC, and identifies key steps and resources necessary to introduce results into practice
- Footnotes and References
- Appendices

6.1.1.4 Research Summary

The Research Summary is a stand-alone report that is limited to two pages, and highlights the research performed, results, and value to the Department. The intended readers of this document are the Department’s Commissioners, Secretary, Directors, and the general public. The readers will be unfamiliar with specifics of the project and should be provided adequate descriptions and explanations, where appropriate.

6.2 Program Level Reporting

The expenditure of public funds is subject to close scrutiny. After carefully selecting problem statements and developing the work program, the research effort must clearly follow defined procedures to ensure positive results. From an individual project basis, the results are very meaningful. Collectively, the results are important to the overall research program.

6.2.1 Reports

6.2.1.1 Annual Report

The Annual Report documents the work accomplished during the federal fiscal year on individual SPR projects and a summary of the Research Unit’s accomplishments. This report provides a general overview of the program, a breakdown of program and project funding, information pertaining to accomplishments in areas of emphasis identified, brief descriptions of studies started, and summaries

of studies completed. The Annual Report is submitted to the FHWA Division Office for approval after the end of the federal fiscal year. Following Division Office approval, the Annual Report is published and distributed by the Research Unit.

6.3 Funding Adherence

6.3.1 Program Level

Federal funds that are made available for the SPR Program as provided in [23 CFR § 420.107\(a\)](#) requires that, “a State DOT must expend no less than 25 percent (25%) of its annual SPR funds on RD&T activities.” The funds are set aside in an appropriation code for use on approved line items in the work program. Funds utilized and unused balances are closely monitored by research staff and compared with figures contained in the Federal Management Information System (FMIS).

Other means of funding research projects are available for research purposes, such as federal funds from other appropriations, pooled fund arrangements, and private funds. If other funding sources are used, the research staff will use detailed accounting procedures to ensure financial accountability.

6.3.2 Project Level

Budgets are established for each line item in the work program. All line items in the program are authorized and funds obligated by PR2 as SPR program funds are made available. Sufficient funds must be available under the research objective code in the Department’s budget to allow expenditures on research projects, regardless of the amount of available SPR funds.

Project expenditures are tracked by the research staff for each line item. A database is maintained that summarizes budgeted amounts, invoice amounts and dates paid, and account balances for each project.

7.0 RESEARCH PEER EXCHANGE

7.1 Purpose

The use of peer exchanges was established to provide state DOT RD&T programs the opportunity to examine, evaluate, and improve their own research programs through a collaborative team of peers, experts, and others involved in the process. The requirement for peer exchange is included in [23 CFR §420.209\(a\)\(7\)](#).

7.2 Process

The state DOT hosting a peer exchange will select a team of participants knowledgeable about state research programs to exchange information and best practices relating to their overall research program and management process or to examine more focused areas needing improvement as identified by the host state. A traditional peer exchange is held in the host state and lasts for two to three days. The team of participants, usually four to five people, can include members from other state research programs, FHWA staff, universities, or other relevant participants; at least one or two of the team members should have participated on previous peer exchange teams. The host state will determine the format for the exchange and appoint a team leader. Multistate and virtual peer exchanges are also allowed in accordance with [FHWA-HRT-10-48](#), "Guide for Peer Exchanges," dated June 2010.

7.3 Reports

The host state is responsible for preparing a written report of the exchange. Copies of the report are provided to participants and the FHWA Division Office, as a minimum.

7.4 Funding

Per FHWA requirements, the host state is responsible for travel costs incurred by peer exchange team members. SPR funds are utilized to reimburse these expenses.

8.0 TECHNOLOGY TRANSFER

8.1 Purpose

The main goal of a state's research program is to implement successful research results or incorporate them into standard practice. Technology Transfer is defined in [23 CFR § 420.203](#) as "those activities that lead to the adoption of a new technique or product by users and involves dissemination, demonstration, training, and other activities that lead to eventual innovation." The Research Unit strives to keep internal partners, external partners, and the general public informed of completed research projects.

8.2 Process

Technology transfer is a team effort requiring active participation by many parties, both inside and outside the Department, including FHWA, TRB, NCHRP, AASHTO, professional and trade organizations, universities, vendors, and many more. The Research Unit is very active in the technology transfer process in the following ways:

- the results of the research projects are advanced for implementation;
- Results of research projects are widely disseminated within the Department, the FHWA, TRB, National Transportation Library (NTL), National Technical Information Service (NTIS), and to industry, as applicable;
- During and after the completion of projects, the research staff schedules meetings, presentations, training programs, and seminars, as appropriate, to present details and findings of the research;
- Results of research performed by other states or agencies are distributed to appropriate units within the Department;
- The research staff administers and monitors the Transportation Technology Transfer Service at Clemson University, part of the Local Technical Assistance Program (LTAP);
- The research unit maintains a research web page that includes copies of research summaries and final reports of completed research projects, and highlights items of interest related to the Department's research program; and
- Information is provided to Research in Progress (RIP) and the Transportation Research International Documentation (TRID) databases as appropriate.

Feedback is very important in the process. Research staff talks to its customers at various meetings and other occasions to determine the usefulness of the information being provided and what other information could be useful.

APPENDIX 1

Engineering Directive Memorandum (EDM) 55

South Carolina Department of Transportation
Engineering Directive Memorandum

Number: 55

Primary Department: Construction

Referrals: 23 Code of Federal Regulations, Part 420
23 United States Code
43 United States Code
48 Code of Federal Regulations, Federal Acquisition Regulation (FAR)
49 Code of Federal Regulations, Parts 18 and 19
Office of Management and Budget (OMB) Circular A-21
Office of Management and Budget (OMB) Circular A-133
Title 57, Code of Laws of South Carolina
Chapter 63, South Carolina Code of Regulations
Departmental Directive 13
Departmental Directive 41
SCDOT Research Manual

Subject: Procurement and Administration of Federally Funded Research

State Planning and Research (SPR) funds received by state DOTs are administered by the Federal Highway Administration (FHWA). A portion of these funds are set aside for use in research, development, and technology transfer (RD&T) activities in the SPR Part II Program. Federal guidelines for use of these funds, as outlined in 23 CFR 420.209, require state DOTs to establish a management process for identification and prioritization of RD&T activities to address transportation issues in their organizations.

In accordance with requirements for use of SPR funds for RD&T activities, SCDOT has developed a research management process that is documented in the SCDOT Research Manual. This process and manual were approved by SCDOT's Research and Development Executive Committee and the FHWA. Research topics will be solicited and projects selected for funding as outlined in the approved management process. The Deputy Secretary for Engineering will approve the prioritized list of selected projects. The list of approved projects will be submitted to the Commission at the next succeeding meeting for information and included in the SPR Part II Work Program submitted to the FHWA.

Research projects will be developed in the approved prioritized order. A Steering and Implementation Committee, composed of SCDOT personnel with expertise in the subject area as well as a representative from the FHWA, will be formed for each research project. This committee will select the principal investigator in accordance with the approved management process as defined in the SCDOT Research Manual. Whenever possible, proposals for a project will be solicited from multiple in-state institutes of higher education for consideration. Qualification based selection will be used for selecting principal investigators. Selection will

utilize criteria that measure expertise of the researcher, understanding of the problem, proposed research approach, implementation plan, and other criteria unique to the specific project. If expertise in the subject matter for an approved research project resides at only one in-state institute of higher education, the committee will request a proposal and pursue developing the project with that institute. If a Steering and Implementation Committee determines that a state or federal agency, such as the United States Geological Survey (USGS), is best suited to conduct a research project due to their particular expertise, availability of specialized equipment required for a study, etc., the committee will request a proposal and pursue developing the project with that government agency.

Negotiations will be conducted after the principal investigator is selected and the approach to performing the research is agreed upon and finalized by the Steering and Implementation Committee and the principal investigator. Negotiation procedures are documented in the SCDOT Research Manual.

Once the proposal is finalized, Office of Materials and Research staff will prepare a Commission Agenda Transmittal Form requesting approval of the agreement for the research project and forward through appropriate channels for submission to the Commission. Once approved by the Commission, contracts will be executed by the Chief Engineer for Operations.

If a Steering and Implementation Committee determines that the scope of the research may require specialized expertise or equipment not normally available at institutes of higher education, the committee can request that the research project be advertised. Office of Materials and Research staff will determine if the procurement should follow the exempt or non-exempt process as identified in Departmental Directive 13. If exempt, procurement for the research project will follow the qualifications based process outlined in Departmental Directive 41. If non-exempt, procedures outlined in Departmental Directive 13 will be used for the procurement.

Administration of executed SPR research contracts will be handled at the Office of Materials and Research in accordance with the approved management process as outlined in the SCDOT Research Manual and in compliance with all state and federal requirements.

Approved by: John V. Walsh
John V. Walsh, Deputy Secretary for Engineering

Effective Date: September 7, 2012

APPENDIX 2

Research Topic Submission Form

Research Topic Submission Form

I. Topic Title: _____

II. Research Problem Statement: _____

III. Research Objectives and Deliverables: _____

IV. Specific Results and Payoff Potential: _____

V. Implementation: _____

VI. Champion:

Name: _____ Title: _____

Phone: _____ Email: _____

Agency/Affiliation: _____

APPENDIX 3

Contract Process for Federally Funded Research Agreements

CONTRACT PROCESS FOR FEDERALLY FUNDED RESEARCH AGREEMENTS

[As detailed in EDM 55 (Revised 9/7/12) and the Research Manual (Revised 8/12/19)]

1. Identification of Research Topics and Approval of Projects
 - A. Research topics are identified in accordance with section 5.1.2 “Solicitation Process” in the Research Manual
 - B. Topics are approved for development as research projects by the Research and Development Executive Committee (RDEC) as outlined in section 5.1.3 “Research Project Approval Process”
 - C. The list of approved projects is submitted to the Commission for information and is included in the SPR Part II Work program submitted to the FHWA

2. Project Steering and Implementation Committee
 - A. A Steering and Implementation Committee (SIC) is formed for each project as outlined in section 4.2.2, “Project Steering and Implementation Committee,” in the Research Manual
 - B. The SIC will finalize the problem statement and select the principal investigator (PI)
 - C. The SIC will provide guidance to the research project’s PI during the course of the project to ensure the needs of the Department are met
 - D. The SIC is responsible for implementation of findings

3. Contracting Research with In-State Institutes of Higher Education
 - A. Whenever possible and with assistance from Research Unit staff, the SIC will send the problem statement to multiple in-state institutes of higher education to determine interest
 - B. The SIC will meet with all interested faculty from the institutes to discuss the problem statement in detail, answer questions pertaining to the scope and intent of the study, and request proposals be submitted to the Office of Materials and Research (OMR) approximately 30 days after the meeting, depending on the complexity of the study
 - C. The SIC will review the proposals received from the institutes and select a PI by using a qualification-based evaluation process
 - D. If expertise in the subject matter resides at only one in-state institute of higher education, the SIC will request a proposal and pursue developing the project with that institute
 - E. The will SIC meet with the selected PI to finalize the proposal by adding, modifying, or removing tasks as appropriate, establishing final deliverables, and negotiating time and costs
 - F. Once the proposal is finalized, the Research Unit staff will request an agreement from Legal Services and, once the same is approved, send a copy to the institute for signatures
 - G. When the institute returns the signed agreement, the Research Unit staff will send it to Legal Services for review and for execution by the Deputy Secretary for Finance and Administration; a copy of the completed agreement will be sent to OMR
 - H. Research Unit staff contacts the PI and the Chairperson of the project’s SIC to determine a suitable start date and, based on the start date and duration of the project, a completion date for the project; this may differ from the date entered in the agreement by the Contract Assurance Office
 - I. Research Unit staff will send a copy of the executed agreement to the institute and communicate the start date and completion date for the project

4. Contracting Research with other State or Federal Agencies
 - A. If the SIC determines that a state or federal agency, such as the United States Geological Survey (USGS), is best suited to conduct a research project due to the agency’s particular

expertise, availability of specialized equipment, and other resources, the SIC will request a proposal and pursue developing the project with that government agency

- B. The SIC will meet with the PI to finalize the proposal by adding, modifying, or removing tasks as appropriate, establishing final deliverables, and negotiating time and costs
 - C. Once the proposal is finalized, the Research Unit staff will request an agreement from Legal Services and, once the same is approved, send a copy to the agency for signatures
 - D. When the agency returns the signed agreement, the Research Unit staff will send it to Legal Services for review and for execution by the Deputy Secretary for Finance and Administration; a copy of the completed agreement will be sent to OMR
 - E. Research Unit staff contacts the PI and the Chairperson of the project's SIC to determine a suitable start date and, based on the start date and duration of the project, a completion date for the project; this may differ from the date entered in the agreement by the Contract Assurance Office
 - F. Research Unit staff will send a copy of the executed agreement to the institute and communicate the start date and completion date for the project
5. Advertised Research Projects
- A. If the SIC determines that the scope of the research may require specialized expertise or equipment not available at in-state institutes of higher education, or at a state or federal agency, the SIC can request that the project be advertised
 - B. Research Unit staff will proceed with advertisement in accordance with section 5.2.1.4, "Advertised Research Projects," in the Research Manual

APPENDIX 4

Contract Process for Contract Modification to Federally Funded
Research Projects

CONTRACT PROCESS FOR CONTRACT MODIFICATION TO FEDERALLY FUNDED RESEARCH PROJECTS

1. Contract Modifications for Federally Funded Research project
 - A. The need for a contract modification on a research project is determined by the Steering and Implementation Committee (SIC)
 - B. The SIC will meet with the Principal Investigator (PI) to discuss the additional work and will request a modified proposal
 - C. The SIC will review the proposal and request any additions or modifications to the tasks, deliverables, time, and a revised budget for associated costs for the additional work as appropriate
 - D. Once the revised proposal is finalized, the Research Unit staff will send it to the Research Development and Executive Committee (RDEC) for review and approval
 - E. Once approved by RDEC, The Research Unit staff will request a contract modification from Legal Services and, once the same is approved, send a copy to the PI's organization for signatures
 - F. When the PI's organization returns the signed contract modification, the Research Unit staff will send the contract modification to Legal Services for execution by the Deputy Secretary for Finance and Administration; a copy of the completed contract modification will be sent to OMR
 - G. Research Unit staff will send a copy of the completed contract modification by letter to the PI's organization that includes the project's new completion date and additional cost for the project

APPENDIX 5

Quarterly Progress Report Form



Instructions: Principal Investigators should complete a quarterly progress report for each calendar quarter, or part thereof, during which the project is active. The report is due the last day of the month following the report period. All fields must be completed. Submit form, via email, to Terry Swygert (SwygertTL@scdot.org).

Report Date	Report period:	Project ID:
		SPR

Project Information

SPR Number	Project Title

Steering Committee Chairman	E-mail

Contract Start Date:	Contract End Date:	Project Schedule Status: (Ahead, On Time, Behind)

Principal Investigator

Principal Investigator	Phone Number

Affiliation	E-mail

Project Expense and Status Information

Amount Spent this	Total Spent (to Date):	% of Contract Spent (to Date):	Contract

Project Schedule Status (list all project tasks with percentage complete; original, revised estimated, and actual begin and completion dates; resources, any outstanding issues including schedule, resources, etc.)

Task No.	Abbreviated Task Title – Issues with Task Schedule	Percent of Task Completed	Scheduled Start Date	Actual or Planned Start Date	Scheduled Completion Date	Actual or Planned Completion Date

Progress and Accomplishments this Quarter (includes meetings, work plan status, significant progress, equipment purchased, etc.)

--

Anticipated Work Next Quarter:

--

Risks and Circumstances Affecting Project Budget, Scope, and/or Time (describe any challenges encountered or anticipated that might affect the competition of the project within the time, scope, and fiscal constraints set forth in the agreement, along with recommended solutions to those problems):

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