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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
- Director of Construction
- Director of Maintenance
- Director of Planning
- Director of Preconstruction
- Director of Traffic Engineering
- Director of Environmental Services
- Director of Right of Way
- Director of Road Data Services
- (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 of an approved topic of 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. A representative from the FHWA also serves on each 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 Meeting

1.1 Purpose and Frequency

The purpose of the one-day meeting is to provide a forum 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 meeting 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 meetings can be modified as necessary.

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 Meeting. 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 meeting 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 meeting and designate the subject-area breakout session that the representatives will attend.

1.4 Format

The meeting begins with a plenary session for all participants. An overview of the research program is presented in the session and the purpose of the meeting discussed. Each meeting 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. 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 meeting 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 RDEC is 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.
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 the research liaison in the FHWA’s Division Office 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 (see Appendix 3). 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 4). The process for handling contract modifications is outlined in “Contract Process for Contract Modification to Federally Funded Research Projects” (see Appendix 5).

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 6). The research staff will distribute the report to SIC members, the FHWA, 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 (see Appendix 7). The final report should include, but not be limited to, the following information:
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 (see Appendix 7).

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 § 420.20 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

Research Proposal - Packet
RESEARCH PROPOSALS

Project Reporting Schedules and Invoices, Proposal Format, and Evaluation Guidelines
The following is intended to help researchers prepare a proposal that will be acceptable for review by the Steering and Implementation Committee (“Committee”) and the Research Unit for the South Carolina Department of Transportation (“SCDOT”). Proposals must comply with these requirements to be considered.

The research proposal shall be prepared in a manner that defines the research problem and objectives, provides a detailed work plan for achieving the objectives, and indicates how the research findings are expected to be used by the SCDOT. Proposals shall provide a straightforward description of the researcher’s ability to meet the stated objectives.

Ten double-sided, hard bound copies of the Proposal, and a PDF format of the same, shall be submitted to the Research Unit for review and distribution to the project Committee. Committees are typically composed of individuals from three representative groups: the SCDOT, Research Unit, and FHWA. Three to five SCDOT engineers or professionals with expertise in the study topic and whose areas of responsibility are impacted by the research, serve with the Committee Chairman, who provides project leadership and expertise in the study area. A representative from the FHWA and members of the Research Unit, which handles the day-to-day operations of the research program, serve on the Committee in an advisory capacity.

Once a proposal is selected, a meeting may be necessary with the Principal Investigator (“PI”) and Committee in order to fully define the project scope. It may be necessary to submit a revised proposal at the completion of this step. The Research Unit will then begin the project contracting process for the SCDOT and the PI’s academic institution or agency; the approved proposal is a part of this Agreement.

A kick-off meeting will be scheduled once a signed project contract is in place. Typical attendees for this meeting include, but are not limited to, the following: the PI, the PI’s investigative team, and the project Committee.

A. **Research Project Reporting Schedule and Invoices**

There four types of required reports and various optional reporting formats for project deliverables for all SCDOT research projects. These reports are detailed below.

1. **Quarterly Progress Reports** – A Quarterly Progress Report will be submitted electronically to the Office of Materials and Research on a calendar quarterly basis using the SCDOT’s form which will be provided at a later date. **(REQUIRED)**

2. **Interim Report(s)** – An Interim report may be required depending upon the length of the project and relative importance of the information obtained from the research. **(OPTIONAL)**

3. **Draft Final Report** – No less than 10 double-sided, bound copies of the draft Final Report, and a PDF format of the same, will be submitted to the SCDOT for a review time of 90 days before the project completion to allow the SCDOT and the FHWA to make necessary revisions to the report and final report printing. A technical editor may be used to prepare the Final Report. **(REQUIRED)**
4. **Final Report and Research Summary** – Ten double-sided, hardbound copies of the approved Final Report and 15 copies of a double-sided, one page Research Summary, or a quantity agreed upon by the PI and the Committee, will be delivered to the SCDOT prior to the scheduled competition date; PDF formats of both reports will be submitted at this time. *(REQUIRED)*

5. **Poster** - A poster (32” x 40”) highlighting the findings of the project will be delivered to the SCDOT prior to the scheduled competition date if requested by the Committee. *(OPTIONAL)*

6. **Other** – Other reporting formats may be necessary to share and promote the findings of the research (e.g., YouTube informational video, training video, and brochure). If this project requires an alternative reporting mechanism, then the Committee and PI will determine the format. The finished product will be reviewed and approved by the SCDOT communications department. *(OPTIONAL)*

Invoices for work completed will be submitted to the SCDOT in triplicate on a calendar quarterly basis. Invoices are paid based on an approved corresponding Quarterly Progress Report. All liaisons for the project will be handled through the Department’s Office of Materials and Research.

B. **Research Proposal Format**

The following is provided as a guideline for formatting a research proposal. Additionally, a template is provided in Appendix A.

1. **Identification**
   a. **Title** – Provide the exact title for the research project as it appears on the Problem Statement.
   b. **Research Organization** – Provide the name and address of the organization.
   c. **Principal Investigator** – Provide the name, title, mailing address, telephone number, and e-mail address of the PI.
   d. **Research Team** *(Evaluation Guideline #4)*
      i. Provide an organizational chart of key individuals who are deemed critical to the success of the research project
         a) Attach resumes in an Appendix
      ii. **Responsiveness and Availability** – Demonstrate responsiveness to the SCDOT and the availability and/or readiness of the proposed research team. Identify all key individuals currently committed to a lead role on other research and/or ongoing projects, a brief description of those projects, and how they may impact availability for this project.

2. **Subject Matter Expertise and Background of Experience** *(Evaluation Guideline #4)*
   a. Discuss the team’s understanding and familiarity with the subject problem area.
b. Provide specific experience of the proposed PI demonstrating capability and expertise in the subject problem area.

3. Problem Statement (Evaluation Guideline #1) – Clearly and concisely state the understanding of the problem and the research objectives.

4. Significance of Work (Evaluation Guideline #1)
   a. Provide a State-of-the-Art Review - Describe the most current research related to this subject (i.e., findings of Internet searches, TRIS database searches, and any other literature searches).
   b. Indicate why the proposed work is potentially significant as compared to other related research efforts.

5. Potential Benefits for SCDOT (Evaluation Guideline #3)
   a. Describe how the proposed work will create new knowledge and benefit the SCDOT.
   b. Include statements concerning the potential payoff from achievement of the project objectives.
   c. Where appropriate, measure benefits by articulating improved procedures, increased efficiency or effectiveness, operational and/or safety improvements, cost savings, etc.

6. Study Objectives (Evaluation Guideline #2)
   a. Indicate the specific research and technical objectives, and the scientific and practical aspects of the research methodology.
   b. Include such items as the approach to data collection, cooperative features, innovative concepts, and reliability of equipment proposed for use.

7. Work Plan (Evaluation Guideline #2)
   a. Fully describe the approach intended and specify how the study will be structured to meet each study objective.
   b. The plan should identify major operational phases related to staff requirements, time schedules, and cost estimates.
      i. Work Time Schedule - Provide a progress chart (e.g., bar chart, time-line chart) illustrating the interrelationship and scheduling of the major phases of the study
      ii. The plan will incorporate Quarterly Progress Report submission deadlines, the review period required for the Draft Final Report, and the final Committee meeting to present project findings and plan/discuss Implementation.
   c. Detailed information should also be provided regarding sampling plans, tests to be used, number of test sections, statistical analysis methods, use/development of existing models, expected survey techniques, criteria used to determine acceptability, etc.

8. Facilities and Equipment (Evaluation Guideline #5)
   a. Fully describe the facilities that will be used for this project including storage of materials, if applicable.
   b. Fully describe the equipment that will be used for this project including potential purchases or development.
9. Implementation (Evaluation Guideline #6)
   a. Is it expected that the research findings will be readily usable? If not, describe anticipated further work or additional project phases that are necessary to develop or field test the findings.
   b. Indicate a clear plan for the transfer of purchased and/or developed equipment and/or tools, and necessary training for same.
   c. Where applicable, indicate a clear plan to address possible maintenance (i.e., update) for project equipment and/or tools.

10. Deliverables (Evaluation Guideline #3)
    a. List all SCDOT deliverables anticipated at the end of the project.
    b. Provide a realistic description of the manner in which the anticipated results will be reported, and/or how they will be used to improve transportation engineering or transportation evaluation processes (e.g., mathematical models, design techniques, field or laboratory test procedures, changes in highway specifications, impact methodologies, as a proposed specification, procedural manual or guide, and hardware for demonstration).
    c. Where applicable, provide a realistic description of any possible financial or institutional barriers to implementation of products from the research.

11. Budget Estimate
    a. Provide a summary tabulation showing the staffing plan, estimated man-hours, and total estimated cost by fiscal year and by each phase of the study.
    b. The estimate should include salaries, overhead, indirect costs, and where applicable, any travel expenses, equipment purchase and/or rental, expendable supplies and materials, report printing, and special services.
    c. If financing includes supplemental funding from other sources, a supplementary tabulation should show the total cost by source of funds.
    d. A separate line item may be added to cover the costs of a technical editor's services to prepare the Final Report.

C. Research Proposal Evaluation Guidelines:
1. Understanding of the Problem:
   a. Provide a clear and succinct statement and understanding of the problem and the research objectives.
   b. Present a review of the present state-of-the-art and a description of how the proposed work will create new knowledge and benefit the SCDOT

2. Research Approach:
   a. The evaluation of the research approach will consider consistency with the objectives and the scientific and practical aspects of the research methodology (e.g., the approach to data collection, cooperative features, innovative concepts, and reliability of equipment proposed for use).
b. Consideration will be given to the level of detail provided for the approach, and if it is sufficiently detailed in terms of work and budget allocations by tasks.

3. **Application of Results:**
   a. The evaluation will include a realistic appraisal of the prospects for successful accomplishment of project objectives.
   b. Consideration will be given to the statements indicating the manner in which the anticipated results will be reported and how they may possibly be used to improve transportation engineering or transportation evaluation practices (e.g., mathematical models, design techniques, field or laboratory test procedures, changes in highway specifications, or impact methodologies).
   c. Consideration will also be given to any possible financial or institutional barriers to implementation of products from the research.

4. **Qualifications of Principal Investigator(s):**
   a. Proposals are desired from individuals having demonstrated capability and expertise in the subject problem area.
   b. The evaluation will be based on the evidence contained in the proposal pertaining to both the experience and the indicated amount of effort by the PI(s).

5. **Facilities and Equipment:**
   a. The evaluation will be based on the evidence contained in the proposal.
   b. It is important to accurately describe whether facilities and equipment are available, or are proposed to be contracted, purchased, or built.
      i. Associated costs for same should be reflected in the proposal budget.

6. **Implementation / Technology Transfer Plan:**
   a. The evaluation will appraise the clarity and practicality for success in promoting the results of the research.
   b. Consideration will be given to the plan for the transfer of purchased and/or developed equipment and/or tools, and necessary training for same, for implementation.
   c. Where applicable, consideration will be given to the plan to address possible maintenance (i.e., update) for project tools.
APPENDIX A

RESEARCH PROPOSAL TEMPLATE
RESEARCH PROPOSAL

Prepared by:

[Example: Author #1
Author #2
Department of Civil Engineering
University Name]

[Example: Author #3
Department of Civil Engineering
University Name]

[Month, Day and Year of submission]

Project Duration: [Number of months to complete the project]
Project Cost: [Total amount spent out of Contract Award]

Sponsoring Agencies:

South Carolina Department of Transportation
Office of Materials and Research
1406 Shop Road
Columbia, SC 29201

Federal Highway Administration
South Carolina Division
Strom Thurmond Federal Building
1835 Assembly Street, Suite 1270
Columbia, SC 29201
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CHAPTER 1: IDENTIFICATION AND EXPERTISE

1.1 Research Organization

[Provide the name and address of the organization.]

1.1.1 Principal Investigator

[Provide the name, title, mailing address, telephone number, and email address of the principal investigator. Include current Curriculum Vitae in the Appendix.]

1.1.1.1 Principal Investigator’s Expertise

[Provide specific experience of the proposed Principal Investigator demonstrating capability and expertise in the subject problem area.]

1.1.2 Research Team

[Provide an organizational chart of key individuals who are deemed critical to the success of the research project.]

1.1.1.2 Research Team Expertise

[Discuss the team’s understanding and familiarity with the subject problem area. Include current Curriculum Vitaes in the Appendix.]

1.2 Responsiveness and Availability

[Demonstrate responsiveness to the SCDOT and the availability and/or readiness of the proposed research team. Identify all key individuals currently committed to a lead role on other research and/or on-going projects, a brief description of those projects, and how they may impact availability for this project.]
CHAPTER 2: SIGNIFICANCE OF WORK

2.1 Problem Statement

[Clearly and concisely state the understanding of the problem and the research objectives.]

2.2 State-of-the-Art Review

[Describe the most current research related to this subject (i.e., findings of Internet searches, TRIS database searches, and any other literature searches).]

2.3 Significance of Proposed Research

[Indicate why the proposed work is potentially significant as compared to other related research efforts.]
CHAPTER 3: POTENTIAL BENEFITS FOR SCDOT

[Describe how the proposed work will create new knowledge and benefit the SCDOT.]

[Include statements concerning the potential payoff from achievement of the project objectives.]

[Where appropriate, measure benefits by articulating improved procedures, increased efficiency or effectiveness, operational and/or safety improvements, cost savings, and other possible benefits.]
CHAPTER 4: STUDY OBJECTIVES, WORK PLAN, FACILITIES, AND EQUIPMENT

4.1 Study Objectives

[Indicate the specific research and technical objectives, and the scientific and practical aspects of the research methodology. Include such items as the approach to data collection, cooperative features, innovative concepts, and reliability of equipment proposed for use.]

4.2 Work Plan

[Fully describe the approach intended and specify how the study will be structured to meet each study objective. The plan should identify major operational phases related to staff requirements, time schedules, and cost estimates.]

[Provide detailed information regarding sampling plans, tests to be used, number of test sections, statistical analysis methods, use/development of existing models, expected survey techniques, criteria used to determine acceptability, etc.]

4.2.1 Work Time Schedule

[Provide a progress chart (e.g., bar chart, time-line chart) illustrating the interrelationship and scheduling of the major phases of the study. Include mandatory and optional reporting deadlines and review periods.]

[The plan schedule will incorporate Quarterly Progress Report submission deadlines, the review period required for the Draft Final Report, and the final Committee meeting to present project findings and plan/discuss Implementation.]

4.3 Facilities and Equipment

4.3.1 Facilities

[Fully describe the facilities that will be used for this project including storage of materials, if applicable.]

4.3.2 Equipment
[Fully describe the equipment that will be used for this project including potential purchases or development.]
CHAPTER 5: IMPLEMENTATION AND DELIVERABLES

5.1 Implementation

[Is it expected that the research findings will be readily usable? If not, describe anticipated further work or additional project phases that are necessary to develop or field test the findings.]

[Indicate a clear plan for the transfer of purchased and/or developed equipment and/or tools, and necessary training for same.]

[Where applicable, indicate a clear plan to address possible maintenance (i.e., update) for project equipment and/or tools.]

5.2 Deliverables

[List all SCDOT deliverables anticipated at the end of the project.]

[Deliverables will include both required reports (i.e., Quarterly Progress Report, Draft Final Report, Final Report, and Research Summary) and optional reporting formats (e.g., poster, YouTube video, brochure, training course).]

[Provide a realistic description of the manner in which the anticipated results will be reported, and/or how they will be used to improve transportation engineering or transportation evaluation processes (e.g., mathematical models, design techniques, field or laboratory test procedures, changes in highway specifications, impact methodologies, as a proposed specification, procedural manual or guide, and hardware for demonstration).]

[Consider project implementation and promotion of the work in the deliverables.]

[Where applicable, provide a realistic description of any possible financial or institutional barriers to implementation of products from the research.]
CHAPTER 6: BUDGET ESTIMATE

[Provide a summary tabulation showing the staffing plan, estimated man-hours, and total estimated cost by fiscal year and by each phase of the study.]

[The estimate should include salaries, overhead, indirect costs, and where applicable, any travel expenses, equipment purchase and/or rental, expendable supplies and materials, report printing, and special services.]

[A separate line item may be added to cover the costs of a technical editor’s services to prepare the Final Report.]

[All travel is subject to the governmental rate and must be approved in advance. Acceptable reasons for travel are provided in the Agreement for the research project.]

[If financing includes supplemental funding from other sources, a supplementary tabulation should show the total cost by source of funds.]
REFERENCES

[Use a well-known bibliographic format such as the Chicago Manual of Style (author-date system) or the APA (American Psychological Association).

List complete references, including names of authors or editors; article title; chapter, book, journal, or report title; publisher or issuing agency; location of publisher; year of publication; volume and issue or report number; DOIs; and page numbers.

Attribute unpublished material, telephone conversations, and other personal communication in the reference section.

For web sources, include the complete URL and the date accessed.

When (Author, Date) citations are used in the text, alphabetize this list.

If numbered citations are used in the text, references should be listed in the order in which they are referred to in the text. List each reference only once in this numbered list. Use the same number to refer to that text multiple times. When numbered, references do not need to be alphabetical.]
APPENDIX A

[A’S TITLE HERE – NO PAGE NUMBER]

[Appendix A text or tables here. Page number A-1 and so on. If appendices are not needed, simply delete these sections.]
APPENDIX B

[B’S TITLE HERE – NO PAGE NUMBER]

[Appendix B text or tables here. Page number B-1 and so on.]
APPENDIX B

RESEARCH PROPOSAL – EVALUATION FORM
**PROJECT TITLE:**

**SUBMITTED BY:**

**UNIVERSITY / AGENCY:**

Please rate each proposal individually and provide your assessment of rating points for categories 1-6. Total the rating points in item 7.

<table>
<thead>
<tr>
<th>POINT</th>
<th>RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. UNDERSTANDING OF THE PROBLEM – 20 points</td>
<td></td>
</tr>
<tr>
<td>a) Clear and succinct conceptual understanding of the research problem and research objectives desired</td>
<td></td>
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<tr>
<td>b) Thorough review of the present state-of-the-art and a description of how the research will create new knowledge and describes how the research will benefit SCDOT</td>
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</table>

| 2. RESEARCH APPROACH - 25 points |
| a) Objectives and research approach proposed are consistent with the scientific and practical aspects of the research methodology, and are clear and easy to understand |
| b) Overall experimental methods and/or data analysis techniques are: |
| i. Adequately described, appropriate for the study, and are likely to produce the deliverables required |
| ii. Expected to collect sufficient data, perform sufficient tests, apply innovative concepts, employ reliable equipment, etc. |
| c) Overall approach is sufficiently detailed to accomplish study requirements: |
| i. Budget is reasonable for scope; personnel and travel necessary |
| ii. Work Plan is both reasonable and realistic |

| 3. APPLICATION OF THE RESULTS – 20 points |
| a) Realistic evaluation for successful accomplishment of project objectives |
| b) Describes how results will be reported and how research will be used to improve transportation engineering or transportation evaluation practices |
| c) Realistic evaluation for financial or institutional barriers to implementation of products from the research |

| 4. QUALIFICATIONS OF PERSONNEL – 20 points |
| a) Principal Investigator(s) has demonstrated capability and expertise in the subject problem area |
| b) Clearly identifies key individuals who are deemed critical to the success of the research project |
| c) Demonstrates responsiveness and availability by identifying: |
| i. all key individuals currently committed to a lead role on other projects |
| ii. how work in other ongoing projects may impact availability for this project |

| 5. FACILITIES and EQUIPMENT – 5 points |
| a) Available facilities and equipment listed is adequate to accomplish study requirements |
| b) Need for purchase or development of equipment listed and adequately documented |

| 6. IMPLEMENTATION / TECHNOLOGY TRANSFER PLAN – 10 points |
| a) Realistic evaluation for the success in promoting the results of research |
| b) Reflects a plan for the transfer of purchased and/or developed equipment and/or tools and necessary training for same |
| c) Reflects a plan for ongoing maintenance (i.e., updates) for tools, where applicable |

| 7. OVERALL POINT TOTAL |

| 8. IS PROPOSAL ACCEPTABLE |
| a) | NO | b) | YES |

| 9. COMMENTS: (List improvements needed or deficiencies in proposal.) |

* The Overall Point Total is solely used to provide a numerical rank of the proposals evaluated for a specific research project.
APPENDIX 4

Contact 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 5

Contact 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 6

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

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<thead>
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### Project Expense and Status Information

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<th>% of Contract Spent (to Date):</th>
<th>Contract Amount:</th>
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### 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.)

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<th>Percent of Task Completed</th>
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<th>Actual or Planned Start Date</th>
<th>Scheduled Completion Date</th>
<th>Actual or Planned Completion Date</th>
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### Progress and Accomplishments this Quarter

(includes meetings, work plan status, significant progress, equipment purchased, etc.)

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### Anticipated Work Next Quarter:

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### 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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APPENDIX 7

Final Report and Research Summary – Full Packet
Final Report and Research Summary

Formatting and Guidelines
# Table of Contents

I. DRAFT and FINAL REPORTS
   A. GUIDELINES
   B. ELEMENTS OF DRAFT FINAL REPORTS AND FINAL REPORTS
   C. REPORT PREPARATION

II. RESEARCH SUMMARY
   A. DESCRIPTION
   B. ELEMENTS OF RESEARCH SUMMARY
   C. RESEARCH SUMMARY FORMAT

III. REVIEW AND ACCEPTANCE PROCEDURES
   A. NON-TECHNICAL EDITORIAL REVIEW OF FINAL DELIVERABLES
   B. DELIVERABLE TIMELINE
   C. DISTRIBUTION OF FINAL REPORT AND RESEARCH SUMMARY
FINAL REPORT AND RESEARCH SUMMARY:
FORMATTING AND GUIDELINES

NCHRP 20-45, Scientific Approaches to Transportation Research

These report preparation guidelines have been prepared with reference to the NCHRP 20-45 report, Scientific Approaches for Transportation Research. Volume 1 of the report, Research Methodologies, provides useful information for planning, conducting, and reporting on research. Of particular value to these guidelines are “Chapter 5: Reports and Presentations” and “Appendix C: Writing and Format of Reports.” This resource is available at http://onlinepubs.trb.org/onlinepubs/nchrp/cd-22/start.htm.

Federal regulations require a final report for every research project (23 CFR 420.209.a.6). The report documents the methods used, data collected, analyses performed, conclusions, and recommendations.

I. DRAFT and FINAL REPORTS

A. GUIDELINES

The following guidelines are for use by Principal Investigators (PIs ) in the preparation of draft final reports and final reports of research projects sponsored by the SCDOT. Draft final reports and final reports shall be formatted according to these guidelines. A template for the final report is provided in Appendix A.

A well-written report is clear and concise. It communicates all important aspects of the research project to the reader in an effective and professional manner. The total written report, excluding Appendices, shall be no greater than 75 pages. Format guidelines have been prepared with reference to the NCHRP 20-45 report, Scientific Approaches for Transportation Research available at http://onlinepubs.trb.org/onlinepubs/nchrp/cd-22/start.htm. Additional information may be found in Volume One, Research Methodologies, for planning, conducting, and reporting on research; and in “Chapter 5: Reports and Presentations” and “Appendix C: Writing and Format of Reports” for report preparation.

While SCDOT does not have a format or style guide for the final report, the following requirements must be followed:

- The total written report, excluding Appendices, shall be no greater than 75 pages. Please remember this limit when providing explanations, data analysis, tables, figures, and charts. There is no page limit for the Appendix.
- A technical editor may be used to prepare the Final Report.
- Pages of a final report will be numbered. Pages prior to the Introduction shall be enumerated with lower case Roman numerals (i.e., i, ii, etc.). Beginning with the first page of the Introduction, Arabic numerals shall be used.
Text will be at least 12 point in size and in a common font (i.e., Times New Roman, Arial or an equivalent).

Acronyms and abbreviations will be spelled out and noted in parentheses upon their first use in a report.

Figures (including photographs) will be numbered and labeled.

Tables will be numbered and labeled.

Equations will be numbered.

The Research Program Manager will provide a Final Report Template with the Technical Report Documentation Page, and Research Summary template upon request, but no less than six (6) months before the end of the project. See Appendices A, B, and C.

B. ELEMENTS OF DRAFT FINAL REPORTS AND FINAL REPORTS

Elements of draft final reports and final reports shall be organized in the following order. Required and optional elements are noted.

1. Front Cover Page (required)
2. Technical Report Documentation Page (Form DOT F 1700.7) (required)
3. Disclaimer Page (required)
4. Acknowledgements (optional)
5. Metric Conversion Chart (optional, depending on the project)
6. Executive Summary (required)
7. Table of Contents (required)
8. List of Figures (required)
9. List of Tables (required)
10. List of Abbreviations/Acronyms (optional)
11. Body of Report (required)
12. References (required)
13. Appendices (optional)
14. Pagination (required)

1. Front Cover Page (required)

The cover page of the report must bear the following information:

- Title of the project exactly as it appears on the Agreement
- “Draft Final Report” or “Final Report,” as appropriate
- Author(s) name, department, and University/Agency name
- FHWA report number in correct format (e.g., FHWA-SC-xx-xx)
- Month and year of the draft final report submission or publication of the final report
- SCDOT and FHWA sponsoring agency contact information

Images on the cover may be used at the discretion of the PI.

The draft final report/final report must include the Technical Report Documentation page and is included in a fillable-format in the Final Report Template. The Technical Report Documentation Page must be completed as identified in the example below. The description of the problem, the objectives, the findings, the conclusions, and benefits to the SCDOT must be written concisely, not causing the form to exceed one page in length.

**Technical Report Documentation Page**

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<td>The title must be listed exactly as it appears on the SCDOT contract. Changes to the title during the course of the project must be approved in advance of Final Report submission.</td>
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<tr>
<td>South Carolina Department of Transportation</td>
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<th>13. Type of Report and Period Covered</th>
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<th>15. Supplementary Notes</th>
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<td>Provide additional information as appropriate (e.g., names of additional reviewers, etc.)</td>
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<tr>
<td>Provide a brief (250 words or less) factual summary of the most significant information contained in the report. An abstract shall state the purpose (a statement of goals), methods (experimental techniques or the means by which results were obtained), results (findings), and conclusions (implications of the findings and how they tie in with studies in related fields) of the research effort.</td>
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<td>This is a listing of terms that identify the major concepts of the research. Identify key words or short phrases, including those that may not appear in the report title or abstract, which libraries may use to catalog and index the report.</td>
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<th>22. Price</th>
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**Form DOT F 1700.7 (8-72)**

Reproduction of form and completed page is authorized.
3. Disclaimer Page (required)

The draft final report/final report must include a Disclaimer Page and use the following language:

The contents of this report reflect the views of the author who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the South Carolina Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

The State of South Carolina and the United States Government do not endorse products or manufacturers. Trade or manufacturer’s names appear herein solely because they are considered essential to the object of this report.

4. Acknowledgments (optional)

If the author includes an Acknowledgments section, it shall follow the Disclaimer page. On the Acknowledgments Page, the authors recognize the individuals in the Steering and Implementation Committee (“Committee”), SCDOT or other individuals which provided assistance or information, and the sponsoring organizations that funded the research project. The Acknowledgements page shall be no longer than 1/3 of a page, if possible.

5. Metric Conversion Table (optional, depending on the project)

The draft final report/final report must include a metric conversion table for those projects employing units of measurement and shall follow the Acknowledgements page. Please ensure that the information included in the table includes all the units of measurement used in the report. A full metric conversion table is available online from the Federal Highway Administration (FHWA) (https://www.fhwa.dot.gov/cfo/contractor_recip/contract_form_metricp.cfm).

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<td>Footlambert6s (fl)</td>
<td>3.426</td>
<td>Candela/m2(ed/m2)</td>
</tr>
</tbody>
</table>

### Force and Pressure or Stress

<table>
<thead>
<tr>
<th>Poundforce (lbf)</th>
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<th>Newtons (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poundforce per square inch (psi)</td>
<td>6.89</td>
<td>Kilopascals (kPa)</td>
</tr>
</tbody>
</table>

#### 6. Executive Summary (required)

The draft final report/final report must include an Executive Summary. This element shall follow the Acknowledgments page (or Metric Conversion Table, where appropriate) and immediately precede the Table of Contents. The Executive Summary shall provide a concise synopsis of the research issue, the main findings or results, conclusions, the significance of the research, recommendations, and the projected or actual benefits of implementing the research. The text from the Executive Summary may be used in the stand-alone Research Summary document.

Readers often turn first to the executive summary for an overview of the project. Because of its importance, you may be asked to rewrite or rework the executive summary to better reflect the research project findings, conclusions, and recommendations. Remember that many of the intended readers of this document will be unfamiliar with specifics of this project and should be provided with adequate descriptions and explanations (where appropriate).

The Summary shall conclude with a list of the Steering and Implementation Committee members who participated for a part or the entirety of the project. The project Chairman shall be clearly distinguished.

#### 7. Table of Contents (required)

The draft final report/final report must include a Table of Contents following the Executive Summary. The Table of Contents shall identify all report elements and corresponding page numbers including front matter (beginning with the Disclaimer page), list of figures, list of tables, list of abbreviations/acronyms (where appropriate), chapter titles, references, and appendices. The Table of Contents itself shall not be listed in the Table of Contents. Titles for each chapter shall read exactly as in the report body. Tables of content shall reflect the hierarchy of chapters and sections.
8. List of Figures (required)

A List of Figures shall follow the Table of Contents and begin on a new page. The List of Figures shall include the titles of the figures exactly as they appear in the report. Figures in the Executive Summary and Appendices must also be numbered and listed.

9. List of Tables (required)

A List of Tables shall follow the List of Figures and begin on a new page. The List of Tables shall include the titles of the tables exactly as they appear in the report. Tables in the Executive Summary and appendices must also be numbered and listed.

10. List of Acronyms, Abbreviations, and Symbols (optional)

A List of Acronyms, Abbreviations, and Symbols shall follow the List of Tables where appropriate. For example, provide a list when there are more than five references to organizations using an acronym, the report includes a shorthand naming system for research activities or findings, or for other similar items. All of the acronyms, abbreviations, and symbols that were used in the report shall be provided with their proper name or description.

11. Body of Report (required)

The body of the report shall open with an Introduction (Chapter 1), which will provide a detailed description of the problem, identify the objectives for addressing the problem, and introduce the research approach (i.e., tasks). An overall, coherent project goal shall be provided that correlates to the identified problem. The remainder of the report will be defined by and in relation to the problem, objectives, and approach presented in the Introduction.

Segment the main body of the report into chapters numbered sequentially beginning with Arabic numeral 1. Subheadings shall be distinguished by numbered subsets and/or through font changes and/or indentations. Begin each chapter on a new page. The author(s) may find the following suggestions helpful for organizing the body of a report. They are based on National Cooperative Highway Research Program (NCHRP) 20-45, Scientific Approaches for Transportation Research, Volume 1.

Figures placed within the body of the report shall be identified with a number and a descriptive caption placed under the figure, centered. Tables placed within the body of the report shall be identified with a number and a descriptive caption placed above the table, centered. Figures and tables shall appear proximate to the text describing them. All figures and tables must have a reference in the text. Figures and tables shall illustrate or exemplify a point or otherwise provide assistance in presenting the subject material. Figures and tables shall use two identifying numbers: the first is the chapter number, and the second is the consecutive order of the figure or table within the chapter (e.g., Figure 1-1, Figure 1-2, Table 1-1, Table 1-2).
Chapter 1: Introduction
- Description of Problem
- Background / Hypothesis
- Objectives

Chapter 2: Literature Review
- Review of previous research
- Summary of state-of-the-art
- Experimental design

Chapter 3: Methodology
- Equipment
- Procedures

Chapter 4: Findings
- Summary of data
- Method of analysis
- Presentation of Results

Chapter 5: Discussion
- Validity of hypothesis
- Factors affecting the results
- Implications
- List of Deliverables from Proposal, indicating if item was achieved or modified during the project

Chapter 6: Conclusion, Recommendations, and Implementation
- Conclusions from the study
- Recommendations based on the Findings and Conclusions that are specific for SCDOT and SC conditions
- A plan for Implementation that reflects in-depth planning and discussions with the SIC that identifies key steps and resources necessary

12. References (required)

Authors must follow the methodology of a standard style manual (e.g., Chicago Manual of Style, APA) to document and present in-text citations, endnotes or footnotes, and referenced works.

13. Appendices (optional)

Appendices are not included in the 75 page limit for the written report, and may be included to provide additional material to complement information presented (e.g., glossary, details of equipment or procedures, and multiple data analysis charts). Appendices shall follow the References section. Appendices shall have their own cover page and numbering system (e.g., A-1, A-2). The Appendix cover page is not numbered, and consists of the appendix numeric number and title.

14. Pagination (required)

With the exception of the cover page, all pages shall bear a visible page number. Pages prior to the Introduction shall be enumerated with lower case Roman numerals (e.g., “ii,” “iii”). Numbering for the remainder of the report shall use Arabic numerals, beginning with “1” on the first page of “Chapter 1 – Introduction.” The cover page is considered page “i”; however, numbering is suppressed on the cover page. Center page numbers at the bottom of each page.
C. REPORT PREPARATION

1. Report Format

The following are general guidelines for formatting the final report/final report.

- Draft Final Reports are not rough drafts. The report should be clear, concise, well-written, high-quality, publication-ready, and written with the target audience in mind.

- A technical editor may be used to prepare the Final Report.

- If there are multiple contributors for the report, verify that there is one writing style. Be consistent in style, use of bullets, and punctuation.

- The report should be no greater than **75 written pages**, including figures, charts, and tables (“graphics”). Appendices are not included in the report page limit.

- Clearly mark the initial submission “Draft.” Remove “Draft” from the Final Submission.

- List all members of the Steering and Implementation Committee who participated for a part or the entirety of the project

- Verify correct use of SCDOT reference; it must appear as “South Carolina Department of Transportation (SCDOT)” in first reference, then as “SCDOT” in subsequent references.

- Define abbreviations and acronyms on their first occurrence in the abstract, executive summary, and main body of the report. A List of Acronyms, Abbreviations, and Symbols is helpful when these are heavily.

- Table of contents, list of figures, and list of tables should begin on a separate page. Begin each chapter on a new page.

- Include the Technical Report Documentation Page (**Form DOT F 1700.7 (8-72)**) and a separate Research Summary.

- Number pages prior to Chapter 1 with lower case Roman numerals, use Arabic numerals on the first page of Chapter 1, and center page numbers at the bottom of the page.

- Appendices should have their own cover page and numbering system (e.g., A-1, A-2). The appendix cover page is not numbered, and should include the appendix number and title.

- Use one-inch margins on all sides.

- Flush left justify the report as full justification can create irregular spacing.

- Use single line spacing for the body of the report, double space between paragraphs, and triple space between chapter sections.
• Use a consistent type face and font size for body text. Text will be at least 12 point in size and in a common font (Times Roman, Arial, or an equivalent is recommended).

• Use series commas (i.e., Oxford comma)

• Use consistent capitalization, hyphens, headings, titles, and bullets.

• Use spell check and other advanced editing options, ensure subject-verb agreement, and do not capitalize or italicize for emphasis.

• Write numbers if they are nine or less; use numerals if they are 10 or more or if they are associated with a scientific unit.

• Make sure all graphics are clear, present, and labeled. Do not use object links to other files.

• Be sure that all graphics are relevant to the report, and include text descriptions.

• Tables that continue for more than one page must have a continuation title and headings.

• Make sure all copyright permissions are secured.

• Do not include blank pages in the report.

• Avoid widows and orphans (i.e., single lines of a paragraph at the bottom or top of a page).

• Ten bound copies and a PDF of the Draft Final Report is due 90 days before the project end date.

• E-mail reports to the Research Unit at SwygertTL@scdot.org and HeapsMW@scdot.org.


The draft final report and final report are contracted deliverables that address the objectives defined in the Scope of Services. PIs shall submit no less than 10 bound copies of the draft final report to the SCDOT Research Unit for a non-technical editorial review pursuant to contract requirements and no less than 90 days (3 months) before the authorized final project deliverable date. Prior to submission, the PI shall edit the draft final report for technical accuracy, correct grammar, clarity, organization, and format. A technical editor may be used to prepare the Final Report.

Draft final reports are not rough drafts. The SCDOT Research Unit expects PIs to provide draft final reports that are well-written, high-quality, and publication ready. If the draft final report is riddled with incorrect grammar or incoherent statements, exhibits a general lack of
readability, or is missing required sections, the SCDOT Research Unit will return it to the PI for correction and resubmission.

The non-technical editing review of the draft final report is limited to format, grammar, and clarity. Editorial reviews will consist of a full format review and a non-exhaustive review for readability. Reviews will document deficiencies in an itemized list noting page number, editorial problem, and suggested solution. Editorial reviews will not be considered a comprehensive list of possible editorial errors as the onus of the quality and accuracy of the writing is the remains with the PI.

The Research Unit will provide editorial review comments to both the PI and Committee. As PIs are responsible for the overall quality of reports, it is necessary that they incorporate editorial review comments as appropriate. The Research Unit will not re-review the final report; the PI shall ensure that the final report has been revised to reflect the identified revisions prior to submitting the final report to the Research Unit for distribution and posting to the SCDOT website.

II. RESEARCH SUMMARY

A. DESCRIPTION

The Research Summary is a stand-alone report that is limited to two pages, and highlights the research performed, results, and value to SCDOT. The intended readers of this document are the SCDOT 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).

B. ELEMENTS OF RESEARCH SUMMARY

As the Research Summary is limited to two pages, word choice and formatting are extremely important. The format for the Summary is detailed below:

- Project Information (first column, first page)
  - SCDOT No – SPR project number
  - FHWA Number – Include the FHWA number that was assigned to this project and provided to you. The format is as follows: Report No. FHWA-SC-XX-XX.
  - Report Date – Include the Month and Year of publication
  - Principal Investigator - Please include the following information: Lead PI’s name, title, email address, phone number, department, and Agency or University.
  - Steering and Implementation Committee – Provide a list of all of the committee members with distinction given to the project Chairman and FHWA representative.
  - SCDOT Research Unit and Report Information – The following information will be inserted into the draft by the Research Unit
• “Please contact us for additional information: Research Unit, (803) 737-1969 | HeapsMW@scdot.org, SCDOT Research Website: http://www.scdot.scltap.org”
• “This final report is available online at: http://www.scdot.scltap.org/projects/completed”

• Project Title and Synopsis (text box, second and third columns, first page)
  o Project Title – List the title of the project in all capital letters in a font point size that is larger than the text font. Please remove the text box line from the title box.
  o Synopsis – Please explain in 100 words or less the context of the problem, a simple description of the research and how the results are being used in layman’s terms. Remember that the intended readers of this document are the SCDOT Commissioners, Secretary, Directors, and the general public. The readers will be unfamiliar with specifics of this project and should provide adequate descriptions and explanations (where appropriate). Please remove the text box line from the title box.

• Problem - Please describe using 100 words or less the logical overview of how the problem came about in layman terms.

• Research - In 150-200 words, please provide a broad understanding of the method of research and at least two key findings resulting from it in layman’s terms.

• Results - Using 275-300 words, please explain in plain language the results of the research study as it relates to SCDOT. Highlight the important findings of the research. Highlight recommendations (where appropriate).

• Value & Benefit - Using 75-100 words, please explain the value of this research as it relates to SCDOT. Be sure to emphasize the potential benefits to SCDOT if findings are implemented (where appropriate).

• Principal Investigator’s Acknowledgement – The Lead PI will provide an acknowledgement of all contributing researchers and authors for the project in a text box appearing at the bottom of third column on the second page of the Research Summary.

C. RESEARCH SUMMARY FORMAT

The following are general guidelines for formatting the Research Summary.

• The Research Summary is limited to two pages and uses either a two or three-column document template. This Template is available in Appendix B.
• The report text will be at least 10 point in size and in a common font (i.e., Times New Roman, Arial, or an equivalent) for paragraph text.
• Double-space between paragraphs and single-space within each paragraph.
• Include 1-2 colorful graphics that are relevant to the text.
If overly-technical jargon or complicated mathematical equations must be used, please use them sparingly.

- Provide adequate descriptions and explanations, where appropriate.
- The final document shall be submitted in both print and electronic (PDF) formats, with 15 copies printed front/back on cardstock paper.
- Upon request, the Research Program Manager is available to help with formatting this Summary.

III. REVIEW AND ACCEPTANCE PROCEDURES

A. NON-TECHNICAL EDITORIAL REVIEW OF FINAL DELIVERABLES

The SCDOT Research Unit leads the non-technical editorial review of final deliverables. Enough time needs to be built into the review process for meaningful revision. The Research Unit will provide editorial review comments to both the PI and Committee.

As PIs are responsible for the overall quality of reports, it is necessary that they incorporate editorial review comments as appropriate. The Research Unit will not re-review the final report; the PI shall ensure that the final report has been revised to reflect the identified revisions prior to submitting the final report to the Research Unit for distribution and posting to the SCDOT website.

Once the Report and project deliverables are approved by the Research Unit, the same will be shared with the Committee who will perform a technical review of the Final Report and project deliverables.

B. DELIVERABLE TIMELINE

The Final Report and Research Summary deliverable expectations according to the following 90-day (3 month) review process are detailed below:

Step 1  **Draft report:** The PI submits no less than 10 bound copies of the draft final report to the Research Unit. The report must meet high standards of writing and presentation. The Research Unit provides a non-technical editorial review of the report and deliverables. In the event that a low-quality, non-publication ready report is submitted, the report will be returned to the PI for immediate revisions and resubmission to the Research Unit.

   Due date: At least **90 days** (3 months) before the authorized final project deliverable date.

Step 2  **Steering and Implementation Committee review:** The draft final report is distributed to the Committee for review. The Research Unit requests comments from the Committee, compiles the comments, and communicates the necessary
revisions to the PI. The Committee makes comments based on the following standards:

• Completeness: The report contains all the necessary content.

• Technical merit: The research is well-documented and the findings are scientifically founded.

Due date: Within **30 working days** (1 month) of receipt of the draft final.

**Step 3**  
**Final Presentation of Research:** The PI meets with the Committee and Research Unit to present final work on the project. Possible revisions to the draft final report may be discussed in this meeting.

Due Date: At least **30 days** (1 month) before the authorized final project deliverable date.

**Step 4**  
**Resubmittal and Research Summary:** As needed, the PI modifies the draft final report and resubmits the report to the Research Unit. The Research Summary is also submitted to the Research Unit at this time.

Due date: Within **15 working days** (2 weeks) of receiving the Committee’s comments from the Research Unit.

**Step 5**  
**Formatting Review and Final Revisions:** The Committee reviews the technical merit revisions and the Research Unit reviews formatting consistency. The Research Unit will work with the PI until all revisions are made and the final report and research summary are initially accepted.

Due date: The two week period before the final deliverable date indicated in the contract or authorization.

**Step 6**  
**Delivery:** Following the report’s initial acceptance, the PI submits the final report in hard copy and digital format according to the following specifications:

- **Final Report:** Ten double-sided, hardbound copies and an electronic (PDF) format are submitted. Additional copies may be requested prior to printing.

- **Research Summary:** Fifteen double-sided, cardstock copies and an electronic (PDF) format are submitted. Additional copies may be requested prior to printing.

- If the entire report file is larger than 5 megabytes (MB), the files must be uploaded to the SCDOT SharePoint Document Repository. The PI will contact the Research Unit for a link for SharePoint submission.

- The PI delivers the final report and research summary to the SCDOT Research Unit at:
Due date: Deliverable date indicated in the contract or authorization work plan.

Step 7  **Final Acceptance:** The Research Unit is responsible for accepting the final project deliverables.

Due date: The later of the following:

- After final deliverables have been received and approved as indicated in Step 6.
- After the final invoice has been received and approved.

C. DISTRIBUTION OF FINAL REPORT AND RESEARCH SUMMARY

Upon receipt, the Research Unit will distribute the Final Report and one-page Research Summary to the Committee, Research and Development Executive Committee (RDEC), USDOT, National Technical Information Service (NTIS), FHWA, and Transportation Research Information Services (TRIS). Additionally, the documents will be uploaded and available online in the following locations: the SCDOT Office of Materials and Research website ([http://www.scdot.scltap.org/projects/completed/](http://www.scdot.scltap.org/projects/completed/)), and TRID ([https://trid.trb.org/](https://trid.trb.org/)).
APPENDIX A

DRAFT AND FINAL REPORT TEMPLATE
[Report Title — Exactly as it appears on the Agreement. Add or delete blank lines to keep all this info on one page]

**FINAL REPORT**

*Prepared by:*

[Example: Author #1
Author #2
Department of Civil Engineering
University Name]

[Example: Author #3
Department of Civil Engineering
University Name]

**FHWA-SC-XX-XX**

*[Publication Month and Year]*

*Sponsoring Agencies:*

**South Carolina Department of Transportation**

*Office of Materials and Research*

1406 Shop Road
Columbia, SC 29201

**Federal Highway Administration**

*South Carolina Division*

Strom Thurmond Federal Building
1835 Assembly Street, Suite 1270
Columbia, SC 29201
1. Report No  
   FHWA-SC-xx-xx

2. Government Accession No.

3. Recipient’s Catalog No.

4. Title and Subtitle

5. Report Date

6. Performing Organization Code

7. Author/s


9. Performing Organization Name and Address
   South Carolina Department of Transportation  
   Office of Materials and Research  
   1406 Shop Road  
   Columbia, SC 29201

10. Work Unit No. (TRAIS)  

11. Contract or Grant No.  
    SPR No. xxx

12. Sponsoring Organization Name and Address
    South Carolina Department of Transportation  
    Office of Materials and Research  
    1406 Shop Road  
    Columbia, SC 29201

13. Type of Report and Period Covered
    Final Report


15. Supplementary Notes

16. Abstract

17. Key Words
    Unclassified

18. Distribution Statement
    No restrictions. This document is available to the public through the  
    National Technical Information Service, Springfield, VA 22161.

19. Security Classification (of this report)
    Unclassified

20. Security Classification (of this page)
    Unclassified

21. No. Of Pages

22. Price
DISCLAIMER

The contents of this report reflect the views of the author who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the South Carolina Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

The State of South Carolina and the United States Government do not endorse products or manufacturers. Trade or manufacturer’s names appear herein solely because they are considered essential to the object of this report.
ACKNOWLEDGMENTS

[Keep Acknowledgments to 1/3 of a page, if possible.

It is customary to list the individuals in the Steering and Implementation Committee, SCDOT or other individuals which provided assistance or information, and the sponsoring organizations that funded the research project.]
EXECUTIVE SUMMARY

[The executive summary should:

- Present a concise synopsis of the research issue, the main findings or results, conclusions, the significance of the research, recommendations, and the projected or actual benefits of implementing the research;
- Be limited to 2 pages (or fewer); and
- May be used as content for the stand-alone, two page Research Summary report.
- Should conclude with a list of the Steering and Implementation Committee members who participated for a part or the entirety of the project. The project Chairman should be clearly distinguished.

Readers often turn first to the executive summary for an overview of the project. Because of its importance, you may be asked to rewrite or rework the executive summary to better reflect the research project findings and conclusions.]
TABLE OF CONTENTS

Chapter 1: Introduction .............................................................................................................1
  Type chapter title (level 2) ....................................................................................................2
  Type chapter title (level 3) ....................................................................................................3
  Type chapter title (level 4) ....................................................................................................3
Type chapter title (level 1) ......................................................................................................4
  Type chapter title (level 2) ....................................................................................................5
  Type chapter title (level 3) ....................................................................................................6
  Type chapter title (level 4) ....................................................................................................6
LIST OF FIGURES

Figure 1.1  Sample photo. ........................................................................................................ 2

Figure 1.2  Sample chart. .......................................................................................................... 2
LIST OF TABLES

Table 1.1  Sample table........................................................................................................................................... 2
CHAPTER 1: INTRODUCTION

[The total written report, excluding Appendices, should be no greater than 75 pages. Please remember this limit when providing explanations, data analysis, tables, figures, and charts. There is no page limit for the Appendix.

A technical editor may be used to prepare the Final Report.

Use single line spacing for the body of the report, double space between paragraphs, and triple space between chapter sections.

The introduction should include a description of the problem and its significance to the SCDOT’s work, background, statement of hypothesis, and objectives.]

1.1 [Insert Level 2 Title Here]

[Do not indent paragraphs, but double space between each paragraph.

Paragraph text…]

1.1.1 [Insert Level 3 Title Here]

[Paragraph text…]

1.1.1.1 [Insert Level 4 Title Here]

[Paragraph text…]
Figure 1.1 Sample photo.

Figure 1.2 Sample chart.

Table 1.1 Sample table

<table>
<thead>
<tr>
<th>Cell 1</th>
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</tr>
</thead>
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<tr>
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<tr>
<td></td>
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</tr>
</tbody>
</table>
CHAPTER 2: LITERATURE REVIEW

[This chapter should include a review of previous research and provide a summary of state-of-the-art or state-of-the practice as appropriate.]
CHAPTER 3: METHODOLOGY

[This chapter should include the project experimental design, equipment used, procedures, etc.]
CHAPTER 4: FINDINGS

[This chapter should include a summary of the data, the method(s) of analysis, and present results.]
CHAPTER 5: DISCUSSION

[This chapter should validate the hypothesis, discuss the factors affecting the results, and implications for the SCDOT.

This chapter will conclude with a list of the project deliverables from the Proposal, and indicate that the items were achieved or modified during the project.]
CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

[This chapter should provide the conclusions, recommendations from the study, and plans for implementation.]

6.1 Conclusions

[Be sure that the conclusions are clearly articulated.]

6.2 Recommendations

[The recommendations should be specific (and measurable, where possible) for SCDOT and South Carolina conditions. When applicable, also include recommendations for further research and an Implementation Plan.]

6.3 Implementation Plan

[The recommended Implementation Plan should reflect in-depth planning and discussions with the Steering and Implementation Committee and contain sufficient information to:

a) provide direction on steps needed to implement the project deliverables;

b) provide recommendation on staffing needs and resources; and

c) list individuals and organizational roles and responsibilities recommended for implementation.

Where applicable, provide a realistic description of any possible financial or institutional barriers to implementation of the research.]
REFERENCES

[Use a well-known bibliographic format such as the Chicago Manual of Style (author-date system) or the APA (American Psychological Association).

List complete references, including names of authors or editors; article title; chapter, book, journal, or report title; publisher or issuing agency; location of publisher; year of publication; volume and issue or report number; DOIs; and page numbers.

Attribute unpublished material, telephone conversations, and other personal communication in the reference section.

For web sources, include the complete URL and the date accessed.

When (Author, Date) citations are used in the text, alphabetize this list.

If numbered citations are used in the text, references should be listed in the order in which they are referred to in the text. List each reference only once in this numbered list. Use the same number to refer to that text multiple times. When numbered, references do not need to be alphabetical.]
APPENDIX A

[A’S TITLE HERE – NO PAGE NUMBER]

[Appendix A text or tables here. Page number A-1 and so on. If appendices are not needed, simply delete these sections.]
APPENDIX B

[B’S TITLE HERE – NO PAGE NUMBER]

[Appendix B text or tables here. Page number B-1 and so on.]
APPENDIX B

RESEARCH SUMMARY TEMPLATE
**Problem**

Please describe using 100 words or less the logical overview of how the problem came about in layman terms.

Text, text, text......
Text, text, text......
Text, text, text......
Text, text, text......
Text, text, text......
Text, text, text......
Text, text, text......
Text, text, text......

**Research**

In 150-200 words, please provide a broad understanding of the method of research and at least two key findings resulting from it in layman’s terms.

Text, text, text......
Text, text, text......
Text, text, text......
Text, text, text......
Text, text, text......
Text, text, text......
Text, text, text......
Text, text, text......
The Principal Investigator would like to thank the following for their contributions: co-PIs, students, etc.

**Results**

Using 275-300 words, please explain in plain language the results of the research study as it relates to SCDOT. Highlight the important findings of the research. Highlight recommendations (where appropriate).

**Value & Benefit**

Using 75-100 words, please explain the value of this research as it relates to SCDOT. Be sure to emphasize the potential benefits to SCDOT if findings are implemented (where appropriate).

**FORMATTING TIPS:**

- The Project Summary is limited to two (2) pages. The final document should be submitted in both print and electronic (PDF) formats, with 15 copies printed front/back on cardstock paper.
- Text will be at least 10 point in size and in a common font (Times New Roman, Arial, or an equivalent) for paragraph text.
- Use full justification for all text appearing after the Title.
- Include 1-2 colorful graphics that are relevant to the text.
- Use center justification for Graphics and Identifying Titles.
- Double-space between paragraphs and single-space within each paragraph.
APPENDIX C

CHECKLIST: FINAL REPORT AND RESEARCH SUMMARY
CHECKLIST: Final Report & Research Summary

Please use this list as checklist as a guideline to ensure that the basic elements of the report are included and are accurate before submitting a draft to the Research Engineer.

☐ Ten bound copies and a PDF of the Draft Final Report is due 90 days before the project end date.
☐ Draft Final Reports are not rough drafts. The report should be clear, concise, well-written, high-quality, publication-ready, and written with the target audience in mind. A technical editor’s services may be used.
☐ If there are multiple contributors for the report, verify that there is one writing style. Be consistent in style, use of bullets, and punctuation.
☐ The report should be no greater than 75 written pages, including figures, charts, and tables (“graphics”). Appendices are not included in the report page limit.
☐ Clearly mark the initial submission “Draft.” Remove “Draft” from the Final Submission.
☐ List all members of the Steering and Implementation Committee who participated for a part or the entirety of the project.
☐ Verify correct use of SCDOT reference; it must appear as “South Carolina Department of Transportation (SCDOT)” in first reference, then as “SCDOT” in subsequent references.
☐ All abbreviations/acronyms must be spelled out on the first reference.
☐ Table of contents, list of figures, and list of tables should begin on a separate page.
☐ Include the Technical Report Documentation Page (Form DOT F 1700.7 (8-72)) and a separate Research Summary.
☐ Number pages prior to Chapter 1 with lower case Roman numerals, use Arabic numerals on the first page of Chapter 1, and center page numbers at the bottom of the page.
☐ Appendices should have their own cover page and numbering system (e.g., A-1, A-2). The appendix cover page is not numbered, and should include the appendix number and title.
☐ From the Proposal, provide a list of the project deliverables and indicate that the items were achieved or modified during the project.
☐ Be sure that the conclusions are clearly presented and recommendations are specific (and measurable, where possible) for SCDOT and South Carolina conditions.
☐ Use series commas (i.e., Oxford comma)
☐ Use spell check and other advanced editing options.
☐ Generally, write numbers if they are nine or less and use numerals if they are 10 or more.
☐ Make sure all graphics are clear, present, and labeled. Do not use object links to other files.
☐ Be sure that all graphics are relevant to the report, and include text descriptions.
☐ Make sure all copyright permissions are secured.
☐ E-mail reports to the Research Unit at SwygertTL@scdot.org and HeapsMW@scdot.org.