SECTION 3: PROPOSALS AND REPORTS

CHAPTER 8: RESEARCH PROJECT DEVELOPMENT FLOW CHART

The following pages set forth the basic proposal process. As stated previously, the Research Center remains open to research suggestions from stakeholders, both internal to WYDOT and external. The following flow chart will assist stakeholders understand the process from proposal to implementation.

Flow Chart

1. Problem Statement
2. Literature Search
3. Proposal
    1. Pre-proposal
    2. Formal Proposal
4. RAC Evaluation
5. Executive Staff and FHWA Approval
6. Funding
7. Research Agreement
8. Authorization to Proceed with Research
9. Research Conducted/Deliverables
10. Recommendations for Implementation and Implementation Reports
11. Reports
12. Data Management Plan
13. Overall Program Performance
14. Disposal of Property

8.1 Problem Statement

A problem statement is simply a brief description of an existing need. To begin the research process, problem statements are submitted to the Research Center at least two weeks before a proposal is submitted. Problem statements normally range from either a few sentences to a couple of paragraphs, and must describe the problem in enough detail that a literature search can be performed with a high degree of confidence. Problem statements should not be long, complex, or hard to understand. Items that should be included in the Problem Statement are:

- Aspects of the problem that are significant.
- How the problem adversely affects transportation facilities or services.
- What the Principle Investigator hopes to gain through this proposal.
- The most pertinent findings from any literature review conducted.

8.2 Literature Search

After receiving the problem statement, the Research Center conducts a comprehensive literature search and provides feedback to the stakeholders. The literature search assists WYDOT and stakeholders to determine whether the question posed is essential; whether there are other reasonable options available; what aspects of the question have been addressed in previous projects; and whether the question needs to be revised. Literature searches may also be conducted by the Principle Investigator prior to formulating the problem statement.

8.3 Proposal

Proposals, whether pre- or formal, must be brought to the RAC by the Principle Investigator, with backing by a Project Champion who has expertise in the proposed research area. No proposal will be accepted unless the Project Champion agrees to sponsor the project from proposal to the final report, and through implementation, if required by WYDOT.

Proposals should include all activities leading to the technological development sought, as well as introduce new and innovative ideas, practices, and approaches, when possible. Further, each proposal must relate to the WYDOT mission statement and goals which are applicable to the research project.(1) The steps Principle Investigators must follow when submitting a proposal can be found in Chapter 9.

8.3.1 Pre-Proposal

A pre-proposal is more than a problem statement and less than a formal proposal, but is still presented to the RAC for review. The intent of the process is to give the Principle Investigator a feeling of the RAC's opinion on the merits of investigating the problem further without consuming a large amount of time or effort. If a sufficient amount of interest is generated by the RAC, the Principle Investigator is asked to present a formal proposal. The Principle Investigator must submit a one to two page pre-proposal that briefly describes the problem that motivates the suggested research, and evaluates the topic's importance and urgency. The pre-proposal must provide enough information to allow the RAC to appreciate the significance of the problem, but does not require the elaborate details required of a formal proposal.

8.3.2 Formal Proposal

A proposal is a systematic controlled inquiry involving analytical and experimental activities that primarily seek to increase the understanding of underlying phenomena. Proposals can be for statewide, regional, national, or in-house projects. In order for a project to be eligible for federal aid, a proposal must be written in such a manner as to fully describe the research project process, schedule, and expenses. See Chapter 9 for full details on the submittal process for proposals.

8.4 RAC Evaluation and Funding Approval

Research proposals may be sent to the Research Manager anytime throughout the year. Projects requiring SP&R are reviewed by the RAC during its quarterly meetings, and at other times, if the RAC deems necessary. Prioritization can only be properly accomplished when all competing

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1 *http://www.dot.state.wy.us/wydot/site/wydot/lang/en/administration/strategic_performance/strategic_plans/mission_vision_values*

projects have been fully reviewed and scored by the RAC. Besides the criteria set out in Chapter 8 above, the RAC will weigh proposals using the Proposal Checklist for RAC Members that can be found in Appendix 5.

8.5 FHWA and Executive Staff Approval

Once a proposal has been reviewed by the RAC, and the RAC believes that there is sufficient merit to fund the project, the proposal is forwarded to FHWA and WYDOT Executive Staff for concurrent approval to proceed. Without approval by both FHWA and the Executive Staff, the proposal cannot proceed as an SP&R project. If the FHWA representative does not approve the proposal, but Executive Staff wants to proceed, non-Federal funding may be secured for the project

8.6 Funding

See Chapter 5 for information on funding and budgets.

8.7 Research Agreement

The Attorney General's office provides contract templates that WYDOT must use when executing contracts. Contracts and Interagency Agreements have been drafted to meet all current WYDOT and federal legal standards. The proposal becomes Attachment A to the contract and is incorporated therein by reference. If there is a conflict between the language in the contract and the language in the proposal, the language in the contract controls.

8.8 Authorization to Proceed with Research

Once the contract or agreement has been fully executed, and the budget office has obligated funding, a letter authorizing work to begin is sent to the contractor and the Principle Investigator. No Principle Investigator may begin working on a project until they have received an "Authorization to Proceed" letter or e-mail from the Research Center.

8.9 Research Conduct/Deliverables

Contractors and/or Principle Investigators must keep WYDOT informed of all aspects of the research project. Principle Investigators must inform WYDOT and the Project Champion regarding changes in the scope of work; changes in key personnel; disengagement from the project for more than three months; transfer of funds; transferring or contracting out work; and the need for additional funding. Further WYDOT, through the Project Champion and the Research Center, shall monitor, and if necessary perform site inspections. Deliverables for each project are tailored to meet the needs of the Principle Investigator, contractor, and WYDOT, and any federal, state or other requirements specific to the research project.

8.10 Recommendations for Implementation and Implementation Reports

The implementation process is dependent on the exchange of information, which begins with clear, concise, and complete project reports. Though the Research Center does not normally fund implementation, it can assist in formulating working plans for implementation. This may include a proof of concept project, assistance in funding a part of implementation activities, etc. Parts of the implementation process may occur during the research process. Funding for the research project my include funding for partial implementation, if approved by the RAC. The Research Center is required to document benefits from implementation of research projects and track percentage of projects implemented, or document why a project was not implemented. At this time, recommendations to WYDOT on changes as set out in the research report can come from the Research Center, but actual implementation is the responsibility of WYDOT. Appendix 6, Research Project Feedback Form Template; Appendix 7, WYDOT Research Project Evaluation Phase 1; and Appendix 8, WYDOT Research Project Evaluation Phase 2 are used by the Research Center to better track and improve the implementation processes for research projects.

8.11 Reports

Principle Investigators are required to provide the Research Center with various types of reports during the contract period. Reports will outline the progress and success of each project. See Chapter 10 for details on all reports.

8.12 Data Management Plan

Data Management Plans (DMP), metadata tracking, and data cataloging are required for all research contracts. Principle Investigators are required to maintain, archive, and share the data and/or datasets that are generated from the research project. Following completion of the research report and within a reasonable amount of time, the Principle Investigators shall provide the data and datasets to WYDOT. For further information on Data Management Plans and Metadata Schema's, please see Section 4, and Addendums 2 and 3.

8.13 Overall Project Performance

The expenditure of SP&R funds for research and development purposes is carefully scrutinized. The use of these funds must add value to and must improve the efficiency of operations of WYDOT. The Research Center tracks the progress of all research studies to ensure that performance measures, outcomes, outputs, and cost benefit analysis measures are included in each project. Further, all projects financed using SP&R funds are required to submit progress reports. See Appendix 1.

8.14 Disposal of Property

Contractor shall maintain records and provide WYDOT with an inventory of all equipment purchased with the contract funds. When the equipment is no longer needed for the original project, the following steps shall be taken:

- Determine if any program(s) within WYDOT has a need for the equipment.
- If no WYDOT Program has a need for the equipment, determine if any state, federal, city, county, or municipality has a need for the equipment.
- If no state, federal, city, county, or municipality has a need or a use for the equipment, dispose of the equipment pursuant to pursuant to the *Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards,* 2 C.F.R. 200.313(e). This may include, but not be limited to, disposal with the State Property Warehouse.

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CHAPTER 9: RESEARCH PROBLEM STATEMENTS AND PROPOSALS

Drafting, submitting and presenting a proposal to the RAC is a multi-step process. Below are guidelines and steps that should be used when submitting a proposal.

9.1 Problem Statements

Two weeks prior to the submittal of a proposal, the Principle Investigator and/or Project Champion should submit a problem statement and a library research request form to the Research Center so a literature search can be conducted. This is a federal requirement to ensure that no research is duplicated causing federal funds to be unnecessarily wasted. The Research Manager shall review the problem statement prior to the literature review. Problem statements normally range from just a few sentences to a couple of paragraphs. Problem statements must describe the problem in enough detail to allow a thorough literature search. Problem statements should not be long, complex, or hard to understand and should lay out the following: a) aspects of the problem that is especially significant; b) how the problem adversely affects transportation facilities or services; and c) a summary of the most pertinent findings from the literature review.

9.2 Literature Review

All proposals must have a literature search performed by both the Principle Investigator and the Research Center. This step may take time, especially if the Research Center has to order research articles from another library. Research articles are intended to help the Principle Investigator investigate and narrow the problem statement; additionally, the literature search results and the Principle Investigator's subsequent investigation is an integral part of any future research proposal. After reviewing the articles, the Principle Investigator will decide whether he/she wants to proceed (it may be found that the research articles answers all questions and no further research is necessary). If the Principle Investigator's review does not answer the question, at least three weeks prior to the RAC's scheduled meeting the Principle Investigator can request a time slot on the RAC's meeting agenda. In addition, the written request must be accompanied by a copy of the problem statement and any supporting material.

9.3 Proposals

The research proposal should be a well-prepared document that defines the research problem and objectives, provide a detailed work plan for achieving the objectives, and indicate how the research findings are expected to be used. Additionally, proposals should simply and economically provide a straightforward description of the Principle Investigator's ability to meet the requirements of the research.

Proposals for Pooled Fund projects must include the study number, lead agency information, funding request, estimated time frame, information on the study objectives and scope of work, the acceptance memorandum, service request forms, and any federal funding waiver documents. Pooled Fund studies should follow the requirements for proposals.

9.3.1 Pre-Proposal

The pre-proposal is a process by which the stakeholder presents their research question to the RAC in an abbreviated format. The pre-proposal must be in line with the WYDOT mission and goals, which are outlined in Chapter 1. The intent of the pre-proposal process is to predetermine whether the project has sufficient merit without consuming a large amount of time or effort. The pre-proposal is submitted in a one to two page report that briefly describes the matter that motivated the research suggestion, and assesses the topics importance and urgency. The report must provide enough information to allow the RAC to appreciate the significance of the matter, but does not require elaborate details. If the RAC feels that the pre-proposal has merit and warrants further study, it will request that a formal research proposal be prepared.

9.3.2 Formal Proposal

The formal proposal (proposal) is a request for support and funding. The proposal should address, in detail, what the Principle Investigator hopes to accomplish, how much the project will cost, and how long the project will take. The proposal must be in line with the WYDOT mission and goals, and the WYDOT Balanced Score Card, which are outlined in Chapter 1. Failure to follow the instructions set out in this Chapter could jeopardize the Principle Investigator's chances of selection. The Research Center will attempt to help the Principle Investigator address specific weaknesses in a proposal, if there are any, and the Research Center reserves the right to reject any proposal submitted which fails to follow these guidelines. Neither the Research Center nor WYDOT is responsible for any costs incurred by the Project Champion or the Principle Investigator, including proposal preparation, prior to the execution of a contract and funding approval by the WYDOT financial office. The Principle Investigator must submit an electronic copy of the proposal to the Research Center for distribution to the RAC.

*******The following subsections are intended to help Project Champions and Principle Investigators prepare a formal proposal that will be accepted with minimum change.***

9.4 Title Page

The title page must contain all of the following information:

- <u>Project Title</u>: The title should be brief and should immediately convey to the reader what the proposed study is about. A good title will help the reviewer better understand the proposal and will ensure that the RAC understands what the research project will focus on.
- <u>Name and Address of the WYDOT Project Champion</u>: Every research project must be sponsored by a WYDOT employee. The Project Champion, or his/her designee, acts as the research project's technical

contact responsible for overseeing most of the research services being provided. Research project administration and payment tracking will be the responsibility of the Research Center.

- Name and Address of Principal Investigator: Provide the complete name and address of the Principal Investigator(s).
- Date: Date the proposal is sent to the Research Center.
- Table of Contents, Figures, Tables, and Appendices: On a separate page, list the proposal's sections and page numbers, list all tables and figures, and list appendices.

9.5 Problem Statement

The problem statement should set out all circumstances surrounding the current problem or issue that gives rise to the concern. If the problem statement is different than the one provided to the Research Center, the Principle Investigator should set out what the differences are and why the two are different. The problem statement should emphasize how the problem or issue affects operations of WYDOT, stakeholders, and Wyoming highways. The problem statement should tie the problem or issue to the WYDOT mission and goals. It is important that as much detail as possible be included in the problem statement, and an explanation of the inadequacy of a technique, material, or specification can help define the extent of the problem better.

9.6 Background Statement

The background statement should provide the RAC more information and history on the problem or issue to be studied. An explanation of the literature search and an explanation of how the issue affects WYDOT's current polices, rules and/or regulations should also be included in the background section.

9.7 Objectives

The objectives section defines what the Principal Investigator hopes to accomplish at the completion of the project, and sets out the goals that provide the optimum technique, material, or specification from a financial, operational, environmental, or social viewpoint. The objective section must include the following:

- Output measures: The direct or indirect link between the proposal and the WYDOT goals and/or TRB strategic plans.
- Outcome measures: The end result of the project. Outcome measures should explain how an action will improve efficiency, safety, or another measure while at the same time lower costs, accident rates or another measure.
- Goals: What will be accomplished by the proposed project.

- <u>Performance measure</u>: How to manage and/or improve a service or process, by what unit of measure, and by when. The performance measure should provide effectiveness, efficiency, quality, and/or timeliness of the project.

9.8 Benefits

To the extent possible, qualitative benefits from the proposed project should be stated. These might include:

- Estimated cost savings or cost avoidance.
- Estimated reduction in crashes and fatalities (*for those studies involving cost savings or avoidance and reductions in crashes and fatalities, a cost-benefit analysis is highly recommended*).
- How operational methods will be improved.
- How safety and mobility will be improved.
- What percentage of increased public user support will be realized.
- What specifications will be revised.
- What public relations should improve, and if so, how.
- The expected reduction in energy consumed, and how practices will be improved or simplified.
- Whether WYDOT's policies will be impacted, and if so, how.

9.9 Applicable Question

Project Champion and Principle Investigator should also address the following in their proposals:

- Are there any potential barriers to implementation (e.g. material, technology, vendors, legal/regulatory, public perception).   For each potential barrier, identify strategies to mitigating these potential barriers.
- What is the expected time frame for implementation.
- Does the project involve action on Federal lands or other conditions that will require National Environmental Policy Act (NEPA) documentation (e.g. Categorical Exclusion or Environmental Assessment), and/or forest service or other permits.
- What are the major uncontrollable factors and/or unknowns in the project such as weather, wildlife, material properties, traffic, etc.   For each uncontrollable factor, address whether there could be additional costs or delays.
- Should the project be segmented into phases with go-no/go decision points based on known unknowns (e.g. technology, partnerships, regulatory).

- If the project involves evolution of one or more technologies, is a technology road map provided showing how these technologies fit together.
- Will a Buy American Waiver be necessary.
- Will any data produced by this project be considered confidential or sensitive.
- Will the data and/or report from the final project be copyrighted, patented, or trademarked.

9.10 Statement of Work

The statement of work section should set out how the Principle Investigator plans to fulfill all deliverables for the research project. The statement of work area must include the following:

9.10.1 Work Plan/Scope

The work plan/scope area should demonstrate an understanding of the techniques and methods to be used to resolve the problem, and should contain all components necessary for the successful completion of the research. The work plan/scope section should set out the tasks to be performed and whether future phases will be necessary to reach the ultimate goal. The work plan will allow the reviewers an opportunity to more accurately judge the potential success and cost of the research.

All projects that will be used to build databases, software, or other computer type projects must include information on designs, computer programs needed or to be used, and storage capabilities.

9.10.2 Work Schedule

The work schedule and work plan are interrelated, and the work schedule should set out a calendar that reflects the times to accomplish each plan component. Milestones, decision points, and deadlines must be included in the work schedule. A bar chart or other graphical representation can be used to accomplish this item. Requests for extensions of time must be received no later than 60 days prior to the contract end date.

Any changes in the duration of the contract, in the work plan/scope, work schedule, or cost of the project must be in writing and may need approval by the RAC. The RAC has authorized the Research Center to grant all no cost funding requests. If a proposal is approved, the Principle Investigator should provide the Project Champion and Research Manager with changes to the work plan/scope 30 days prior to the change, if possible. Changes that must be set out in writing include:

- Scope of work or objectives of the project.
- Changes in key persons.
- Disengagement from the project for more than three (3) months, or a Twenty-five percent reduction in time devoted to the project.

- The inclusion of costs that require prior approval.
- The transfer of funds between line items.
- The subawarding, transferring or contracting out of work.
- Changes in the approved cost sharing or matching.
- The need for additional Federal funds.

9.11 Budget

The budget for the project should be laid out in a format similar to that found in Figure 2. The budget is nothing more than cost estimation, which should be the best guess on what costs will be. Each component of the work plan represents estimates of salary, equipment, travel, and other costs. The work schedule and the cost estimate are interrelated. Again, the best cost estimates correspond to the work plan components describing the costs of each task in terms of salary, equipment, travel, etc. The cost estimate must include all monies requested for work that will be performed, whether that work will be billed against the grant funds or not. Additionally, the Research Center and the RAC require the costs be broken into fiscal year totals. All funding sources must be reflected in the budget.

******NOTE on request for additional funding.**
Requests for additional funding must be received from the contractor and Project Champion as soon as the need is known but no later than 60 days prior to the end of the contract term.

	Budgeted Amount	Explanatory Note
Direct Cost		
Total Personnel Costs		
Principle Investigator		
Other Personnel		
Fringe Benefits		
Research Travel		
Report Generation		
Equipment		
Other		
Technical Transfer		
Conferences/Report Presentation		
Miscellaneous Travel		
Indirect Costs		
Project Administration		
Overhead		
TOTAL		

FIGURE 2: Example of the Research Project Budget Analysis

9.12 Implementation

The primary purpose and objective of the research project is to improve the operational responsiveness of WYDOT. Because the implementation process is lengthy and involved, assurances of a high probability of actual operational improvements assists in advancing a proposal. A broad and descriptive outline of the implementation process should be included in the body of the proposal. The proposal should also state who will logically be responsible for applying the research results, and specific standards or practices that might be affected by the research findings.

9.13 Technology Transfer

Another goal of conducting research is to improve or enhance transportation practices. In order for research results to be used, transfer of knowledge from the researcher must be made to new or potential user. This transfer can be seen as a process encompassing the dissemination of the research results and knowledge regarding any new processes, methods, and products that increases the technical quality. Like the implementation process, a broad but descriptive technology transfer outline should be written.

9.14 Data Management Plan

The proposal must set out how the data and/or datasets from the project will be maintained, archived, and shared. The Data Management Plan (DMP) must contain information on maintaining data and/or datasets both during and after the project is completed. A DMP must be attached to the proposal. (See Appendix 2). The Principle Investigator should keep in mind the following when drafting its DMP: a) what types of data the proposed research will generate; b) which data will have value to other research users; c) what data could be shared; and d) what data formats and quality standards will be applied to enable the data to be shared effectively. Further, a timeline should be considered which will allow the researcher and WYDOT reasonable, but not unlimited, time periods for exclusive use of the data. Changes to the DMP should be submitted to the Research Center 30 days prior to the change so that the Research Manager and the Contractor can discuss the change prior to implementation. All changes must be mutually agreed upon.

CHAPTER 10: RESEARCH REPORTS AND FORMATTING

There are various reports that must be submitted after funding is approved. Below is a list of the types of reports, and the requirements for each type of report. This Chapter also lays out the information that must be included in each final research report. Questions on any of the steps or for assistance in writing any of the reports please contact the Research Center at 307-777-4182.

10.1 Report Types

Below is a list of the types of reports and the overall requirements for each type.

10.1.1 Progress Reports

Principle Investigators submit progress reports to the RAC every three months until completion of the project. The information provided in the progress reports should allow a reviewer to determine whether the project is progressing satisfactorily or whether project revisions may be necessary. Progress reports will be due on or before the final calendar day in January, April, July, and September. To ease the effort of writing progress reports, a form has been developed and all areas of the form must be completed. See Appendix 1, Progress Report Template. In general, progress reports should be simple and brief, usually three or four pages, but the length of progress reports depends on the amount of activity that occurred during the reporting period, the nature of the topic, and the amount of interaction between the Principle Investigator and the Project Champion. Each task should be identified and discussed within the context of what was completed before the reporting period, what was accomplished during the reporting period, and what yet remains to be done. Problems that were encountered should also be explained, as should their solutions. Any changes in time or cost for the fiscal year, whether an increase or decrease, must be noted, and an explanation for the change must be provided. When there has been no progress during the quarter, progress report must explain why.

10.1.2 Interim Reports

Principle Investigators shall submit interim reports and make RAC presentations each year that the project is open. Interim presentations are normally heard during the October RAC meeting. The Interim Report and the RAC presentation should cover the accomplishments for the project to date. Interim reports rarely exceed 20 pages in length and must cover much the same material found in the progress reports. The interim report shall advise the Research Center and the RAC of preliminary findings and recommendations that will influence the direction of the remainder of the project, or report findings that can be adopted prior to project completion. The front section and body of an interim report should be prepared in the same manner as a final report. The purpose of the interim report should be clearly stated and should focus on the work performed to date, and should include sufficient background to establish context within the entire project. The interim report should explain how the findings were developed, how they relate to the study's original objectives, and how they will affect the remainder of the project.

10.1.3 Final Report

At least two months prior to the termination of the contract, Principle Investigators shall submit a draft final report to the Research Center. The Research Center will coordinate the review of the draft final report by the Project Champion and an outside proofreader. The report length will depend on the topics complexity and breadth, but usually a length of 20 to 100 pages is appropriate. In general, the organization of a final report should reflect the organization of the study's project statement and proposal. The draft report will be reviewed by the outside proofreader for grammar and formatting only. The Project Champion shall review the report for content and accuracy. Once both reviews are completed, and all changes have been implemented, the final report will be submitted for publication. Completion of the final report is required before final payment will be made. All reports must adhere to the standards for the preparation and publication of scientific and technical reports as outlined in the *Communications Reference Guide* (updated April 12, 2012) (Reference Guide). http://www.fhwa.dot.gov/publications/research/general/03074/index.cfm. All graphics (tables, figures, and photographs) must be embedded either within the text or at the end of the final report.

The Research Center provides electronic copies of all research reports to the Wyoming State Library, the University of Wyoming library systems, the University of Wyoming Technology Transfer Center, the TRID Database, National Transportation Information Services (NTIS), National Transportation Library (NTL), FHWA, Turner Fairbanks, Northwestern University, and University of California Berkeley. As such, all final reports must:

- Be freely available to the public.
- Be virus free.
- Assure that all links within the document are working properly.
- Be written in a clear, concise style, suitable for web format.
- Be proofread and edited in advance of submission.
- Be imprinted with meta tags. See the Metadata Schema, Addendum 3.
- Have attributes for all images and other artwork.

10.2 SECTION 508 OF THE *REHABILITATION ACT of 1973*, as amended (29 U.S.C. 794d)

Since the final report will be accessible on various state and Federal websites in electronic formats, all reports must be written in compliance with Section 508 of the *Rehabilitation Act of 1973*[2]. All reports must be in plain language that will aid WYDOT in converting the report to meet Section 8 requirements, if necessary. Further all tables, figures, equations should be written with enough detail to describe what is in each insert.

[2] *https://www.section508.gov/Section-508-Of-The-Rehabilitation-Act*

When inserting photos and other objects use high contrast, when possible. Other tips that may help can be found on page 8 of the Reference Guide.

Further, information on the Section 508 please see:

- Electronic documents, reports, brochures that are the main final product of FHWA (http://www.access-board.gov/sec508/guide/1194.22.htm – Web-based Intranet and Internet Information and Applications (1194.22).
- CDs and any electronic files. (http://www.access-board.gov/sec508/guide/1194.22.htm – Web-based Intranet and Internet Information and Applications (1194.22).
- PowerPoint Presentations, if they are distributed through CD, Web, etc, and if they contain graphic elements that need a test based alternative. (http://www.access-board.gov/sec508/guide/1194.22.htm – Web-based Intranet and Internet Information and Applications (1194.22).
- Converting documents to 508 compliant PDFs. http://www.adobe.com/content/dam/Adobe/en/accessibility/products/acrobat/pdfs/A9-accessible-pdf-from-word.pdf.

10.3 FRONT COVER

A sample of a front cover can be found in Figure 1 below. Parts of the front cover include:

- Sponsoring Agency(ies): The names and logos of sponsoring agencies are shown in the upper left corner of the front cover.
- FHWA Logo: Copies of the logo can be found in Appendix M, page 97, of the Reference Guide:
  http://www.fhwa.dot.gov/publications/research/general/03074/index.cfm
- WYDOT Logo: A copy of the WYDOT Logo can be obtained from the Research Center.
- Report Number: The report number is the FHWA assigned number followed by the letter designation "F" and is assigned by the Research Center. If the report consists of more than one volume, all volumes will have the same number.
- Illustration or Photograph: A relevant photograph or illustration may be used to communicate the subject of the study.
- Study Title: The report title is usually the study name used throughout the duration of the study. If the title in the report is different from that used in the proposal, the Principle Investigator should alert the Research Manager to such changes.
- Report Type: The phrase "Final Report" identifies the report as a final report. If the report is a draft, the phrase "DRAFT Final Report" must be used.
- Principle Investigator: The name and address of the contractor and/or the Principle Investigator. Names of individual investigators are listed in the Technical Report.
- Report Date: The publication month and year.

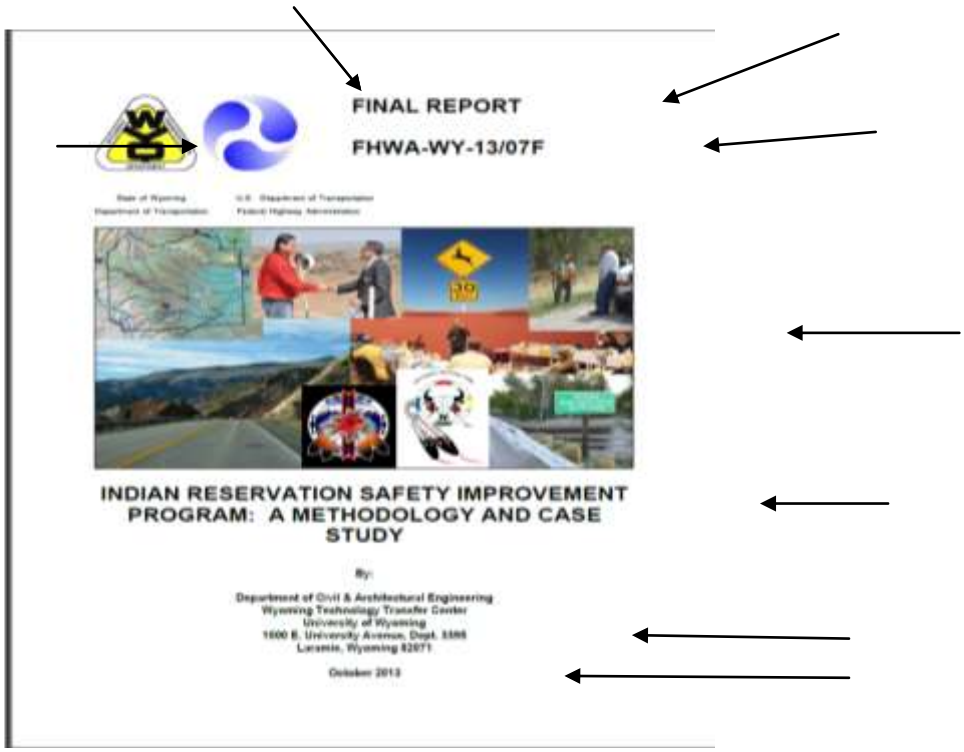

Figure 1: Example of Title Page

10.4 FRONT MATTER

The front matter section helps identify the report and describes its content and format. Front matter consists of the following elements:

10.3.1 Technical Report*:* The Standard Technical Report Title Page lists key study information in a tabular format used by FHWA and other agencies. It should be a single page numbered "i". [Form DOT F1700.7]. A sample of the standard technical title page can be found at Appendix B, page 78, Reference Guide.

10.3.2 Forward: Information regarding the forward section can be found at page 25 of the Reference Guide.

10.3.3 Disclaimer Notice*:* A disclaimer notice, which matches that found on page 26 of the Reference Guide, must appear verbatim on the inside of the front cover of all reports. Further, if the report contains either confidential information or if any information in the report is subject to copyright, patent, or trademark requirements, the report must contain additional disclaimers, which may be obtained through the Research Center.

10.3.4 Quality Assurance Statement: A quality assurance statement, which matches that found on page 26 of the Reference Guide, must appear verbatim on the inside of the front cover of all reports.

10.3.5 Metric Conversion Chart*:* According to the *U.S. Code of Federal Regulations (23 C.F.R. 420.121(p))*, federal research reports must provide units of measurement using the SI (metric) system. The American Society for Testing and Materials publication, *Standard Practice for Use of the SI International System of Units: The Modernized Metric System* (ASTM E380-89a or later) should be used. Reports prepared under FHWA planning and research grants may contain dual units with metric units being listed first and English units in parentheses next to the metric unit. For further guidance on metric units, see the U.S. Government Printing Office Style Manual (GPO Manual) which can be found at: http://www.gpo.gov/fdsys/pkg/GPO-STYLEMANUAL-2008/content-detail.html. The metric conversion chart should be numbered page "ii,". An electronic version of the chart is available from the Research Center and a sample of the metric conversion chart can be found in Appendix E, pages 79-80, Reference Guide.

10.3.6 Table of Contents*:* The table of contents lists the chapters, sections, and subsections of the report with page references. The table of contents should begin on page "iii". See detailed instruction on page 28 of Reference Guide, and a sample of the table of contents can be found in Appendix F, page 81 of the Reference Guide. Additional information on the table of contents can be found on page 28, of the Reference Guide and in the GPO Manual.

10.3.7 List of Figures*:* The list of figures shows figure numbers, captions, and page numbers. The list of figures should begin on a separate page following the table of contents. A sample of the list of figures can be found in Appendix G, page 82, Reference Guide.

10.3.8 List of Tables*:* The list of tables shows table numbers, captions, and page numbers. The list of tables should begin on a separate page following the list of figures, unless the lists of figures and list of tables both fit completely on one page. A sample of the List of Tables can be found in Appendix H, page 83, Reference Guide.

10.4 REPORT BODY

The intellectual content of the report resides in logically organized sections of the report body. The report body consists of the following elements: Executive Summary, Problem Description, Objectives, Task Description, Findings and Conclusions, and Implementation Recommendations. Each section should be titled and should begin on an odd-numbered (right-hand) page to aid location. When drafting a report, utilize the Reference Guide and U.S. Government Printing Office Style (GPO) Manual. See page 29 of Reference Guide for more detail. All documents submitted to NTL must adhere to the GPO guidelines.

10.4.1 Executive Summary/Introduction*:* The first chapter of the report should be a summary designed to inform the reader of the study's purpose, general approach, and significant findings, conclusions, and recommendations. The summary should concisely express the most important information about the project, without depending on references to other material in the final report. For consistency, conclusions and recommendations offered within the executive summary should match exactly those presented later in the final report. Because managers are likely to refer to the executive summary more often than to the full report, recommendations should be supported within the executive summary.

10.4.2 Problem Description*:* The second chapter should describe the problem that motivated the work. The researcher should supplement the description presented in the project's proposal with his/her own insights. Often the discussion offered in the researcher's proposal or work plan, when updated to reflect insights gained during the investigation, comprises a good description of the problem.

10.4.3 Objectives*:* After the problem is stated, the study's defined objectives should be stated and explained. The chapter(s) should lay out the relationship of the research objectives to the problem stated in the proposal. If the researcher has added objectives, they should also be stated and explained. The degree to which the objectives were accomplished should be summarized and this section should include the output measures, outcome measures, goals, and performance measures.

10.4.4 Task Description*:* These chapter(s) should state the project's defined tasks and explain how they were accomplished. Usually, a task-by-task discussion is easiest to follow but it is up to the Principle Investigator as to how to write the report. The discussion must be sufficiently complete and clear to allow the study's sponsor to determine whether the project's tasks were accomplished fully, partially, or not at all, and to appreciate the technical significance of the work. Experimental plans should be clearly explained. Deviations from the defined tasks, either planned or to overcome problems, should be justified, explained and evaluated. The discussion should also explain the tasks' relationship to the study's objectives.

10.4.5 Findings and Conclusion: This chapter(s) should explain what was learned from the study and assess the reliability of the findings. Results of surveys, tests, analyses, and other experimental techniques should be stated along with explanations of their significance. Any limitations to the validity or applicability of the observations or analyses should be clearly stated.

10.4.6 Implementation and Other Recommendations*:* The researcher should state, explain, and justify any recommendations for implementation of the research. This can include specific changes in current processes; policy changes; training recommendations; procedural changes; and future research. To ensure that recommendations are correctly identified and properly stated, they should be numbered. The recommendation itself should consist of one to three concise sentences clearly stating what should be done, by whom and, if applicable, when. Recommendations should be sufficiently clear and complete to permit their understanding when quoted later outside of the context of the final report. After each recommendation is stated, it should be more fully explained and suitably supported by reference to the findings and conclusions provided earlier in the report. Any limitations on the recommendation's applicability should be plainly stated.

10.5 BACK MATTER (REFERENCE MATERIAL)

Back matter may consist of the following elements: Appendices, Glossary, Bibliography, References, Index, Data Management plan, and Back Cover. Not all elements are required. See page 24 of the Reference Guide for more detail.

10.5.1 Appendices*:* Appendices should be reserved for material that is either lengthy or related to the research by reference. Appendices may contain voluminous tables or graphs, samples of survey or analysis forms, standards or other pertinent documents referenced in the report body. The Principle Investigators should refrain from including marginally related material in appendices, and should instead limit their use to pertinent information. Data spreadsheets or tables may be placed as an appendices in the report. All data spreadsheets and/or tables should be listed on the DMP.

10.5.1.1 Internal Appendices: If appendices are short enough to include in the same volume as the final report, they should appear after the report body in alphabetical order, and should be titled according to their content. appendix title and letter, should be listed in the report's table of contents, with the pagination continued consecutively from the report (do not use A-1, etc).

10.5.1.2 External Appendices*:* When appendices are too long to include in the final report, they should appear as supplemental, sequentially numbered volumes of the final report.

10.5.2 Glossary: The Glossary is an alphabetized list of uncommon or specialized words used in the text, and their definitions. Inclusion of a glossary is strongly encouraged.

10.5.3 Bibliography and References*:* Every report that makes use of other sources either by direct quotation or by reference must list those sources. All data that generates from an outside source shall be listed in this section. Each listed source must be accurate and complete enough for the reader to find in a library. References to unpublished sources must clearly indicate where the material may be found. References, or some other equivalent title, are used for a list that contains only those items that are actually referenced in the text. Bibliographies must include digital object identifiers (DOI), when available.

10.5.4 Index: An Index is an alphabetized list of key words representing information to be found in the text, and page number(s) where it may be found. An index is optional unless the document is unusually long or complex.

10.5.5 Back Cover*:* A back cover must be provided with both sides being blank.

******NOTE regarding inventory. The contractor shall provide an inventory of all supplies and equipment purchased for this project as a separate document at the same time as the final report.**