



**RESEARCH DEVELOPMENT, TECHNOLOGY
TRANSFER, AND DATA MANAGEMENT
GUIDELINES FOR THE
WYOMING DEPARTMENT OF
TRANSPORTATION
RESEARCH CENTER**

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THE STATE OF WYOMING DEPARTMENT OF TRANSPORTATION
RESEARCH CENTER

The Research Development, Technology Transfer, and Data Management Guidelines for the Wyoming Department of Transportation Research Center (Guidelines) outline the research and development management process for reports and other research documents pursuant to Subpart B of the [Planning and Research Program Administration](#) codified federal rules, and the [Research, Development and Technology Transfer Programs](#); the duties and responsibilities of the Research Advisory Committee (RAC), the Research Manager, and the Wyoming Department of Transportation (WYDOT) Research Center (Research Center); the data management and metadata policies; and other conditions for the Research Center per federal and state rules, regulations and statutes. The Guidelines emphasize the research and development program interaction process; the research organizational structures for WYDOT and its federal partners; the program development process; the report writing process; the program evaluation and technology transfer process; and the data management process for digital materials and data. By following these Guidelines, WYDOT staff and stakeholders will be able to produce positive and meaningful results for research projects.

Authority for the administration of the Research Center and these Guidelines can be found in the following: a) [Fixing American's Surface Transportation Act \(FAST Act\)](#), which authorizes federal surface transportation programs through fiscal year 2020; b) [Moving Ahead for Progress in the 21st Century Act \(MAP-21\)](#), which allows for apportionment of Highway Trust funds for research and education, as well as other matters; c) [Chapter 5 of Title 23 of the United States Code, Research, Technology, and Education](#), which provides for activities leading to technology development and transfer by local departments of transportation and for input by stakeholders; d) [Section 450 of Title 23 of the Code of Federal Regulations, Planning Assistance and Standards, Statewide Transportation Planning](#), which guides statewide transportation planning and programming; and d) [Section 420 of Title 23 of the Code of Federal Regulations, Planning and Research Program Administration](#), which grants WYDOT the authority to administer State Planning and Research (SP&R) funds.

Funding for the research projects and the Research Center, and requirements for the administration of those funds, can be found in the [FAST Act](#), and the [Planning and Research Program Administration Federal Rules](#), which require that two percent of “the sums apportioned to a State for fiscal year 1998 and each fiscal year thereafter ... shall be available for expenditures by the State ...” for various surveys, investigations projects, planning, development, implementation, studies, research, technology transfer activities, and training. The [FAST Act](#) further requires “not less than 25 percent of [the 2 percent]... be expended by the State

for research, development, and technology transfer activities...” [23 U.S.C. 505(b)(1)] and that the federal share for SP&R shall be 80 percent. [23 U.S.C. 505(d)]

Other responsibilities for the Research Center are set out in the [Research, Technology, and Education Rules](#), which state:

Surface transportation research and technology development shall include all activities leading to technology development and transfer, as well as introduction of new and innovative ideas, practices, and approaches, through such mechanisms as field applications education and training, and technical support.
(23 U.S.C. 502(a)(2))

Further, in keeping with the federal digital data management plan guidelines and requirements, which include: the Office of Management and Budget (OMB) Memorandum, dated May 9, 2013, entitled [Open Data Policy – Management Information as an Asset – M-13-13](#); the Office of Science and Technology Policy (OSTP) Memorandum, dated February 22, 2013, entitled [Increasing Access to the Results of Federally Funded Scientific Research](#); the Deputy Secretary of Transportation memorandum, dated April 10, 2012, entitled [Implementation of Departmental Scientific Policy](#); the [Plan to Increase Public Access to the Results of Federally-Funded Scientific Research Results](#); and [Wyo. Stat. §9-21-101, Data Policies](#), the Research Center has incorporate a data management plan (DMP) section into the Guidelines that covers how data creation, collection, documentation, analysis, preservation, security, and dissemination will be managed by the Research Center. The DMP section sets out transparent, evolving, and extensive policies and management structures that will assist the Research Center and WYDOT in maintaining public digital research data that are generated from research projects funded with SP&R funds.

The DMP section is also set out to assist Principal Investigators, Project Champions, and the Research Center in implementing a plan to archive, store and maintain data once either the research project is finalized or the embargo period has expired. The DMP section will be an ever-changing, live document. With the assistance of the Research Advisory Committee (RAC), determinations will be made on the best practices and policies for a) archiving, sharing, and retention of data; b) securing intellectual property; c) sharing measures; and d) preservation and formatting practices. These discussions will ensure that data that are generated from the WYDOT research projects are open and available to the public.

In all, the Guidelines will provide the Research Manager, Principal Investigators, Project Champions, and the RAC with a better understanding of what is expected at all stages of the research project.

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REV. May 2018

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SECTION 1: ADMINISTRATION

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Chapter 2	Stakeholders
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Chapter 4	Annual Research and Development Work Program Cycle and Requirement
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CHAPTER 1: PURPOSE, MISSION STATEMENT, GOALS, AND GUIDELINE CONTEXT

1.1 Purpose

The purpose of the Guidelines is to provide a management process for the administration of the Research Center and to ensure all research reports conform to the [Communication Reference Guide \(updated April 12, 2012\)](#) (CRG), and the [U.S. Governmental Printing Office Style Manual \(GPO Manual\)](#). The Guidelines are drafted to increase the effectiveness of research reports received by the Wyoming Department of Transportation (WYDOT), to identify the various administrative responsibilities of the Research Center, and to provide procedural instructions for research projects. The programs, projects, and products generated by the Research Center using these Guidelines are for the benefit of WYDOT, its employees, the citizens of Wyoming, and other transportation agencies and users.

The Guidelines further set out the regulations regarding intellectual property, digital data, data management, data storage, data archiving, metadata requirements, data sharing policies, and open access. The Research Center uses these guidelines to ensure that data, which are considered a state asset, are managed properly through their life cycle, to improve data collection capabilities, and to make data available to the public, when possible.

When conducting research projects, Principal Investigators can perform either basic or applied research. Basic research involves “the study of phenomena whose specific application has not been identified...” [[23 C.F.R. 420.203](#)]; and applied research involves “the study of phenomena relating to a specific, known need in connection with the functional characteristics of a system...” [[23 C.F.R. 420.203](#)]

1.2 WYDOT Mission, Goals, and Balanced Score Card

To ensure that the Research Center performs in an effective and efficient manner, all research activities are aligned with the WYDOT Mission and Goals, and in conformity with the WYDOT Balanced Score Cards (BSC). The mission statement sets out that WYDOT shall provide a safe, high quality, and efficient transportation system. ([Strategic Plan 2012-2015](#), Page 5). WYDOT’s shared vision, mission, values, goals, overall strategic performance measures, and BSC methodology can be found in the [Strategic Plan](#).

1.3 Basic & Operating Policies for the Research Center

The Research Center’s policies and procedures are detailed in WYDOT’s Operating Policies manual at [Policy Number 4-1](#), and all subparts thereto.

1.4 WYDOT Research Center

The core mission of the Research Center is *to provide high quality research that aligns with the mission, values, and overall goals for WYDOT*. The Research Center uses WYDOT’s goals to

meet strategic performance measures, BSC measures, chosen program goals and objectives, and the needs of the State of Wyoming.

1.5 Data Management

The Wyoming Enterprise Technology Services (ETS) division assists in the core computing and communication needs of the State of Wyoming. Electronic records and transactions fall under the domain of ETS. Pursuant to Chapter 5, Sec. 3(a), *Electronic Transactions Electronic Records*¹, of the ETS current rules, agencies shall adopt procedures to protect the “reliability, authenticity, integrity, and usability of records.” Section 3(b) goes on to state that:

To accept, create, and store an electronic record, **a State agency must ensure the integrity of the information from the time it is first received and accepted, throughout the life cycle of the record.** The criteria for assessing integrity shall be whether the information has remained complete and unaltered... [emphasis added]

Section 4, *Retention of Electronic Records*², of Chapter 5 of the current ETS Rules states:

State agencies shall comply with all statutes and rules related to public records.

- a) For public records created and/or stored exclusively in electronic format, a State agency shall:
 - i. **Maintain records so they are accessible, accurate, authentic, reliable, legible, and readable throughout the life cycle.** [emphasis added]
 - ii. Prescribe a procedure for converting information transmitted electronically to paper for persons requiring paper copies.

ETS’ internal policies set out the following requirements for data.

[ETS 8100-P166](#) – Data Protection for Electronic Government Services

Agencies shall make available upon request, information about how data is protected, restricted, and used in e-Government transactions. A link or other access to the State of Wyoming Privacy Policy would satisfy this requirement. [emphasis added]

1.6 [Data Policies, Wyo. Stat. §9-21-101](#) (2016)

The newly enacted Wyoming statute states that:

Every agency shall adopt, enforce, and maintain a policy regarding the collection, access, security, and use of data. The policies should include:

¹[HTTPS://RULES.WYO.GOV](https://rules.wyo.gov); ADVANCED SEARCH REFERENCE NUMBER 077.0001.5.05112007

²*Id.*

- i. An inventory and description of all data required of, collected, or stored by an agency;
- ii. Authorization and authentication mechanisms for accessing the data;
- iii. Administrative, physical, and logical security safeguards, including employee training and data encryption;
- iv. Privacy and security compliance standards;
- v. Processes for identification of and response to data security incidents, including breach notification and mitigation procedures; and
- vi. In accordance with existing law, processes for the destruction and communication of data.

1.7 Wyoming Public Records Act

The Research Center's reports and data fall under the [Wyoming Public Records Act](#) (Wyo.Stat. §§16-4-201 through 205). The Wyoming Public Records Act defines what constitutes a public record and details the responsibility for protection and disposition of those records.

1.8 Overview of the Manual

The Guidelines are set out in four sections and incorporates ten Appendices.

Section 1 Administration

- | | |
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| Chapter 1 | Purpose, Mission Statement, Goals, and Guideline Context |
| Chapter 2 | Stakeholders |
| Chapter 3 | Research Center Library |
| Chapter 4 | Annual Research and Development Work Program Cycle and Requirement |
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- | | |
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Section 3 Proposals and Reports

- | | |
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| Chapter 8 | Research Project Development Flow Chart |
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Section 4: Data Management Plan and Meta Data

- | | |
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| Chapter 11 | Federal Requirements |
| Chapter 12 | Data Management Policies for the WYDOT Research Center |

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Appendix - Templates

- 1 Progress Report Template
- 2 Data Management Plan Template
- 3 Metadata Schema
- 4 Data Dictionary
- 5 Proposal Checklist Template for RAC Members
- 6 Research Project Feedback Form Template
- 7 WYDOT Research Project Evaluation Phase 1 Template
- 8 WYDOT Research Project Evaluation Phase 2 Template
- 9 Library Research Request Form Template
- 10 Section 508 Caption Template

Glossary of Terms

CHAPTER 2: STAKEHOLDERS

Pursuant to Chapter 5, [Research Technology, and Education of Title 23, United States Code](#):

Federal surface transportation research and development activities shall address the needs of stakeholders. Stakeholders include States, metropolitan planning organizations, local governments, tribal governments, the private sector, researchers, research sponsors, and other affected parties, including public interest groups. (5 U.S.C. 502(a)(5)).

The success of a research program is influenced by a research manager's ability to develop strong and lasting interactive relationships with all participants and stakeholders. In fact, the goals of WYDOT and the Research Center cannot be met without involvement and interaction with stakeholders, which include: WYDOT employees; university and college level staff and professors; other Wyoming state agencies; companies affiliated with transportation matters, such as vendors and contractors; private engineering firms; other State Departments of Transportation; local governments in Wyoming and other states; FHWA; AASHTO; and the general public.

The Research Center hosts Research Advisory Committee (RAC) meetings each quarter, and at other times as necessary, that are open to the public. This is a way for WYDOT and stakeholders to interact, to learn more about which projects have been finalized, to learn about the progress on projects, and to review new and upcoming projects. The RAC's October meeting is held at the University of Wyoming, College of Civil, and Architectural Engineering.

The Research Center is involved with, and in support of, the activities performed by the Wyoming Technology Transfer (T²) Center, located at the University of Wyoming. The Local Technical Assistance Program (LTAP), within the T² Center, transfers research findings and new technology to Wyoming agencies and individuals by providing information on new and developing technology, responding to direct requests, providing reference materials, and conducting T²/LTAP workshops. The T²/LTAP Center is sponsored by FHWA, WYDOT, and Wyoming cities/municipalities and counties. Fifty percent of the funding for the T²/LTAP Center comes from the FHWA Technical Transfer Program. WYDOT, Wyoming cities/municipalities and counties, and the University of Wyoming provide the necessary matching funds. [[Wyo. Stat. §21-7-115](#)] The T²/LTAP Center may also submit proposals for SP&R funded research.

CHAPTER 3: RESEARCH CENTER LIBRARY

A vast amount of research information is housed in the WYDOT Research Center Library (Research Library), and is available for loan to stakeholders and the public. This information is coded, catalogued, and entered into the Research Center's electronic database by title, author, abstract, etc. The Research Center Manager also has access to federal and state databases, which house research reports, synthesis, digests, and other research materials. The Research Library is housed in the Planning office on the WYDOT Complex. Further, stakeholders and WYDOT employees may search the web for transportation related publications.

3.1 In-House Library

Materials found in the in-house portion of the Research Library include federal and state publications, manuals, circulars, and other reference material. The Research Center staff can assist stakeholders in accessing any publication housed in the Research Library and on the web. The Research Manager will provide electronic and/or hard copies of publications, and/or conduct research upon request. ([See Library Research Request Form, Appendix 9](#)).

3.2 Electronic Library

3.2.1 Internet

For publications found on the web, there are many different databases available. Under the publication link on the Transportation Research Board website, cooperative research program series, TRB series, periodicals, annual reports, and other documents can be accessed. <http://www.trb.org/Publications/Publications.aspx>.

The resources link for the Federal Highway Administration web page has publications, laws, policies, and a link to the resource library. <http://www.fhwa.dot.gov/>.

The USDOT Research Hub allows access to FMCSA, FAA, MARAD, FHWA, FRA, FTA, PHMSA, OST, and NHTSA, plus numerous other research sites. <http://ntlsearch.bts.gov/researchhub/index.do>.

The National Transportation Library has developed the *Repository and Open Science Access Portal* ([ROSAP](#)) which is a digital library for transportation research. Publications in this database are submitted to increase the public's access to federally funded scientific research result.

3.2.2 WYDOT Library Database

An e-library, which contains abstracts from the research materials, can be accessed by WYDOT employees, in the WYDOT intranet at: <http://employees.dot.state.wy.us/ResearchLibrary/Home.jsp>.

CHAPTER 4: ANNUAL RESEARCH AND DEVELOPMENT WORK PROGRAM CYCLE AND REQUIREMENTS

In accordance with the requirements set forth in *Title 23 of the Code of Federal Regulations, Parts 420.207(a)(b)*, and *420.209(a)(b)*, the Research Center will prepare a Research and Development (R&D) Annual Research and Development Work Program report (Work Program) that will cover each research project conducted in a fiscal year. Information on the research projects remains in the Work Program until either the study's final report has been accepted, or the study has been terminated. The Work Program is based on WYDOT's fiscal year, which begins on October 1 and ends on September 30 of the following year. The Work Program is presented in four parts: a) the yearly budget summary; b) the FHWA Pooled Fund Projects Summary; c) the State Research Projects Summary, demonstration projects, federal aid experimental evaluation studies, and other special studies; and d) an inventory of all property/equipment purchased by the Contractors. The Work Program includes the following for each current research project:

- State study number.
- Study type.
- Study title.
- Budget estimate for the program year.
- Estimated cost for prior years of continuing studies.
- Principal Investigator's name.
- Project Champion's information.
- Period of study.
- Scope.
- Present status.
- Funding levels and share (Federal, state, and other sources) for Research Development and Technology (RD&T) activities for the program year.

A yearly budget summary included in the Work Program, shall contain the following:

- Revenue for the current year.
- Funds carried over from previous years.
- Current revenue expenditures for prior year projects, if any.
- TRB and NCHRP funding obligations, and any other program funds.
- T² Center funding for the University of Wyoming.
- Administrative costs.
- Total remaining Federal funding available for research studies.

Finally, a certification letter attesting that the State of Wyoming is in compliance with all requirements set forth in *Title 23 of the Code of Federal Regulation §420.209(c)*, and contemplates no changes that would alter that compliance must be incorporated in the Work Program.

CHAPTER 5: AVAILABLE FUNDS FOR RESEARCH PROJECTS

The following are categories and various types of funding available for research activities in line with mandatory federal requirements.

5.1 SP&R – Federal

Highway Trust Fund tax monies are made available to the Research Center under [Title 23 of the United States Code](#), and [the Planning and Research Program Administration](#) Federal Rules (Rules), with appropriate state matching funds, and are currently the main source of funding for the Research Center. The Rules allocate two percent of the total annual transportation disbursement to each state for State Planning and Research (SP&R) activities. The law further stipulates a minimum of 25 percent of the SP&R funds be reserved for state transportation research, development, and technology transfer efforts.

5.2 State Funds

Projects that are considered limited scope studies or local interest studies, or in case where there is a shortage of federal funds, are financed with state funds and not submitted to the RAC. These projects are undertaken independent of the RD&T program, and are not required to follow the strict guidelines that projects that receive SP&R funds follow. This does not mean that districts or other divisions in WYDOT cannot use this document as a guide. It is recommended, however, that each branch or district notify the State Programming Engineer of any state funded project for recordkeeping purposes. State funds can also be used as matching funds for any federally funded projects.

5.3 National Cooperative Highway Research Program (NCHRP)

The Research Center participates in the National Cooperative Highway Research Program and provides five and one-half percent of its SP&R funds yearly to NCHRP, which equates to approximately \$282,000. Studies performed with NCHRP funding do not require a state match, and are usually high cost projects that have national implications. Solicitation for NCHRP projects begin in July of each year with FHWA and NCHRP evaluating all proposals. NCHRP also uses evaluation panels to assess the problem statements submitted in some of the more popular subject areas. Full details on the NCHRP solicitation process can be found at: <http://www.trb.org/NCHRP/NCHRPOverview.aspx>.

To obtain a copy of *Information and Instructions for Preparing Proposals for the Transportation Research Boards' Cooperative Research Programs*, go to: <http://www.trb.org/NCHRP/CRPInfoProposers.aspx>.

Further, the *Procedural Manual for Contractors Conducting Research in the Transportation Research Board's Cooperative Research Program* can be found at: <http://www.trb.org/NCHRP/CRPInfoContractors.aspx>.

5.4 Pooled Fund Projects

The Transportation Pooled Fund (TPF) Program serves as a means for interested states, FHWA, and other organizations to collaborate when significant or widespread interest is shown in solving transportation related problems. Partners may use pool fund studies and other resources to solve problems through research, planning, and technology transfer activities. To qualify as a pooled fund study, more than one state transportation agency, federal agency, or other agency, such as a municipality of metropolitan planning organization, college/university, or a private company, must find the matter important enough to commit funds or other resources to conduct the research, planning, and technology transfer activity. Federal and state transportation agencies may initiate pooled fund studies. Local and regional transportation agencies, private industry, foundations, and colleges/universities may collaborate with any or all of the sponsoring agencies to conduct pooled fund projects. Pooled funds are calculated at a 80/20 split just like SP&R projects, unless the lead state requests a waiver for the state match requirement.

Generally, FHWA, TRB, NCHRP, or a state will act as the contracting agency for the pooled fund study. An advisory committee composed of representatives of each participating state or agency will be established to provide overall project direction and permit consideration of the cooperating states' views.

5.5 Collaborative Research and Development

Collaborative Research and Development is a cost sharing process that includes states and local governments, foreign governments, colleges and universities, corporations, institutions, partnerships, sole proprietorships, and trade associations. The federal share for these projects shall not exceed 50 percent. For the non-federal share, all costs directly incurred, including personnel, travel and hardware development costs, are included.

5.6 Apportionment

[Title 23 of the United States Code Section 104 et seq.](#) sets out the apportionment rules of all federal funding streams.

5.7 Future Strategic Highway Research Program Funds

All programs established with further Strategic Highway Research Program Funds are based on National Research Council Special Report 260, entitled [Strategic Highway Research: Saving Lives, Reducing Congestion, Improving Quality of Life](#), and the results that are identified in National Cooperative Research Program Project 20-58. The purpose of this program is to promote research results and products developed under the future strategic highway research program administered by TRB. Funding may come from SHRP 2 implementation or a percentage of a state's SP&R funds. Eligible activities are based on the report submitted to Congress by the TRB on the strategies and administrative structure to be used for implementation of F-SHRP results. The federal share for this funding is 80 percent.

CHAPTER 6: NATIONAL AND REGIONAL FHWA POOLED FUND PROGRAMS AND OTHER NATIONAL RESEARCH PROJECTS

6.1 POOLED FUNDS

Pooled Fund projects assist federal, state, and local agencies in combining research projects that may be beneficial nationally, regionally, or with various organizations within a state. The projects can also bring together governmental entities and academic institutions, foundations or private firms. See also Section 5.4 for more information on Pooled Funds.

6.1.1 National Pooled Fund Program

FHWA sponsors the National Pooled Fund Program, and when a new project becomes available, a letter describing the proposed pooled fund projects is distributed to each state research center. The Research Center solicits opinions and comments from technical staff within the agency regarding the relevancy of the pooled fund project. Notices of pooled fund studies shall be sent out to RAC members as they are received by the Research Manager or they can be reviewed on the Pooled Fund website. If the RAC determines that it would be in the best interest of WYDOT to participate in a pooled fund, the RAC shall determine the amount of financial support the project will receive and for what fiscal years. The FHWA Regional Research Engineer is responsible for executing the funding transfer documentation. As a subscriber, the state may have a representative on the project panel that meets to determine the scope of work for the project, to evaluate proposals, if the research is performed by contract, and to review the final report of the effort. The total amount of annual pooled fund financial support is a line item in the SP&R budget.

6.1.2 Regional Pooled Fund Program

FHWA sponsors a Regional Pooled Fund Program that is more of a bottom-up than top-down Program. A group of states may determine there is a problem of mutual interest to them and join together to investigate the matter. The state DOT that champions the idea performs the initial and ongoing administrative duties. Each regional pooled fund effort varies in its financial protocol, which is based on the requirements of the lead state.

Although federal-aid funding of pooled fund efforts is at the traditional 80 percent level, if the project is determined to be of national interest, the FHWA Associate Administrator for Research and Technology may determine that the project is a 100 percent federal-aid funded project. Most regional projects are funded at the 100 percent level. As with national efforts, reimbursable travel funding may be included in the study funds.

6.2 NCHRP

State DOTs are the sole source of funding for NCHRP. The process for funding and proposing projects at the NCHRP level follows the following process. In July of every year, AASHTO Standing Committee on Research (SCOR) solicits problems from a) AASHTO member transportation departments; b) the chairs of AASHTO committees and subcommittees; and c) the Federal Highway Administrator. Problem statements are accepted in September of each year. FHWA and NCHRP evaluate the problem statements. Evaluations are sent back to the Principal Investigators in November, and the Principal Investigator has until the end of December to decide whether he/she wishes to move forward or not. A report on the new problem statements is sent to the SCOR and the AASHTO RAC with a ballot for rating the statements according to priority. The ratings are returned to the SCOR secretary and are translated into priority rankings based on the average ratings of SCOR and AASHTO RAC. A summary of this report is sent to the SCOR for review prior to its meeting in Washington DC. SCOR makes the final determination on which completed or ongoing projects should receive additional funding for further work, and which new problem statements should be funded. Announcements for NCHRP projects are sent out in April.

SECTION 2: OPERATING POLICIES

Chapter 7 State Planning & Research (SP&R) Administration Process Research,
Development and Technology Interaction

CHAPTER 7: STATE PLANNING & RESEARCH (SP&R) ADMINISTRATION PROCESS RESEARCH, DEVELOPMENT AND TECHNOLOGY INTERACTION

The Research Center operates in accordance with the requirements found in the *FAST Act*, the Wyoming Statutes, Wyoming and Federal rules and regulations, and the Wyoming Department of Transportation Operating Policies. This Chapter outlines the requirements for managing the Research Center and the duties of the RAC, the Programming Engineer, and the Research Manager, as they pertain to the Research Center.

7.1 Wyoming Department of Transportation Research Center

The core mission of the Research Center is *to provide high quality research that aligns with the mission, values, and overall goals for WYDOT*. The Research Center uses WYDOT's overall goals to meet strategic performance measures; balanced scorecard measures; chosen program goals and objectives; and the needs of the State of Wyoming.

The administration of the Research Center is the responsibility of the Research Manager, under the direction of the State Programming Engineer, who is also the State Research and Development Engineer. The State Programming Engineer and the Research Manager monitor all SP&R research projects to ensure the projects are within the proposed budget and timeline, as set out in the research contracts. Changes in scope of work, key personnel, disengagement from a project for more than three months, transfers of funds in budget line items, and requests for additional funding, are tracked by the Project Champion and Research Manager, and brought to the attention of the Programming Engineer and/or the RAC, as necessary. Depending on the type of change, the RAC may be informed of a change during the quarterly meeting, if the change is informational in nature, or the RAC may be contacted about the change via e-mail, if immediate action by the RAC is required. If the Principal Investigator or contractor is found to be non-compliant with the terms of the contract, the State Programming Engineer and the Research Manager investigate the non-compliance, and if it is found that the Principal Investigator or contractor cannot or will not become compliant, the State Programming Engineer and the Research Manager will work with the Wyoming Attorney General's office to determine if the contract can or should be terminated, and whether a new Principal Investigator should be considered.

The State Programming Engineer and the Research Manager maintain contact with other programs within WYDOT, with outside institutions, and with federal partners to ensure the most up to date federal and state rules and regulations are followed, and to determine the best research projects to bring to the RAC. They also provide advice and general guidance during formal project studies, and serve as an important conduit for the transfer of research results to stakeholders.

The Research Center houses the Research Library. Publications are catalogued and placed in the internal Research Library database, and finalized research projects and proposals outlining current research projects are placed on the WYDOT website. The Research Manager assists WYDOT employees in obtaining research material. It should be noted that the Research Center

will not always be able to assist with fees for publications, but he/she may be able to find the publication at a lower price or in PDF format. The Research Manager also assists individuals in obtaining information from the Wyoming State Library and the University of Wyoming libraries.

7.2 Research Advisory Committee (RAC)

The RAC reviews, evaluates, and prioritizes all research development and technology transfer proposals and problem statements. The RAC convenes quarterly (January, April, July, and October), and at other times as deemed necessary. In order to meet or to vote on proposals, a majority quorum (fifty-one percent, or four members of the sitting RAC) must be present, either in person, via video conference, via e-mail, or via phone. A call for proposals will occur at least 45 days prior to a scheduled quarterly meeting, and is sent out to the RAC as whole and other interested parties. During the quarterly meetings, or at other times as determined by the Research Center, the RAC shall review and vote on proposals based on their merit; review the progress of current research projects to ensure they are timely and within budget; and review all innovative research projects for possible implementation.

Proposals shall be presented to the RAC as follows:

1. The Project Champion, or other interested party, shall inform the Research Manager of a possible research proposal and/or question.
2. The Research Manager shall place the proposal on the RAC agenda, if it meets the requirements set out in the Guidelines.
3. Interim proposals are proposals that are heard by the RAC at a time other than at the quarterly meeting. Interim proposals can include but are not limited to:
 - an emergency proposal that is sent down from Executive Staff.
 - a proposal that was heard at a RAC meeting but was tabled due to issues with the proposal.
 - a proposal that is brought to the attention of the RAC and is deemed time sensitive.
4. Electronic copies of the proposal shall be forwarded by the Research Manager to the RAC members, the executive staff, and to the FHWA representative prior to the RAC meeting.
5. The Project Champion and the Principal Investigator, and/or his/her designee, shall attend the RAC meeting, either in person or via video conference.
6. If an interim proposal is brought to the attention of the RAC, and the RAC and the Research Manager shall determine the type of presentation necessary. The presentation can include:
 - web based meeting.
 - in person presentation.
 - teleconference.
7. The Project Champion and the Principal Investigator, and/or his/her designee, shall have 15 minutes, or a longer time as designated by the RAC, to provide the RAC with an overview of the proposal.
8. The RAC shall have 15 minutes, or a longer time as designated by the RAC, to ask questions of the Project Champion, and the Principal Investigator, and/or his/her

designee.

9. Voting on the project will occur at the end of the RAC meeting for regular proposals, and via teleconference or e-mail for interim proposals. Only sitting RAC members are allowed to vote on proposals.
10. To determine the merits for all proposals, the RAC shall use the Proposal Checklist for RAC (See [Appendix 5](#)) to score the proposal. It should be noted that the template is an example only, and the checklist will be tailored to fit each proposal.

Further, to determine whether a project has sufficient merit to warrant further study, the RAC determines:

- Whether the proposed problem is adequately understood and defined.
- Whether the proposal is important and beneficial to the Wyoming stakeholders and WYDOT.
- Whether the proposal will have a positive long-term affect on WYDOT and the stakeholders, in other words, will the proposal provide a continuing, cooperative, and comprehensive impact that can be measured by WYDOT.
- Whether the proposal falls under at least one of the measures found in the BSC or meets at least one of the WYDOT goals.
- Whether the proposal sets out planned payoffs that the Project Champion intends to use from the outputs and the long term results.

The sitting RAC is composed of permanent, non-voting members, and rotating voting positions.

- Permanent positions include the Research and Development Engineer (State Programming Engineer); State Research Manager; and a FHWA representative.
 - The State Research Manager is a non-voting member of the RAC and acts as the chairperson of the RAC.
 - The Research and Development Engineer (State Programming Engineer) is a non-voting member of the RAC. This individual acts as the chairperson of the RAC in the absence of the Research Manager.
 - The FHWA representative is a non-voting member of the RAC. This individual is invited to attend the meetings by virtue of his/her office or position, and acts as a liaison between WYDOT and FHWA.
- Rotating positions include:
 - State Bridge Engineer
 - Geographic Information System/Intelligent Transportation System Program Manager
 - State Field Operations Engineer
 - State Highway Development Engineer
 - State Highway Safety Engineer
 - State Materials Engineer
 - State Planning Engineer
 - State Traffic Engineer
 - Chief Engineering Geologist
 - Lands Management Administrator

- District Engineers
- District Maintenance Engineers

Because the RAC membership is in addition to a member's normal workload, the Research Center rotates membership through senior staff position. Two district staff engineers and five program managers serve on the RAC each year. Membership on the RAC is by position and not by person. In the event a position is vacant, the new person hired for that position assumes the RAC duties for the remainder of that rotational period.

The rotation process for the RAC is as follows:

- District Engineers: District Engineers will rotate sequentially for one-year appointments according to district number, beginning with District 1.
- District Maintenance Engineers: District Maintenance Engineers will rotate sequentially for one-year appointments according to district number, beginning with District 2.
- Program Managers: The Committee's membership is broad-based and includes most program managers, who serve a two-year appointment.

7.3 Research and Development Engineer/State Programming Engineer:

The State Programming Engineer supervises the overall operations of the Research Center. This individual coordinates all WYDOT research activities with TRB and AASHTO-RAC, which includes decisions of participation, membership expenses, and correspondence.

The State Programming Engineer also has the following responsibilities concerning the Research Center:

- Manages WYDOT's participation in regional and national RD&T efforts, including TRB, NCHRP, and other cooperative projects with outside organizations.
- Makes decisions on membership expenses, correspondence, and meeting participation for the Research Center, only. All travel decisions must follow the WYDOT internal policies.
- Ensures completion of research projects and distribution of results to applicable divisions and branches, and other state DOT's.
- Sits on the AASHTO SCOR Standing Committee on Research.
- Meets with executive staff and/or program supervisors regarding the operation of the Research Center.
- Is the primary contact with all program supervisors regarding the operations of the Research Center.
- Approves invoices from contractors.
- Approves no-cost extensions.

7.4 State Research Manager (RAC Chairperson)

The State Research Manager is responsible for the administration and operation of the Research Center. General duties and responsibilities of the State Research Manager are as follows:

- Provides literature reviews for proposals, as needed.
- Monitors all SP&R funded research projects.
- Facilitates the exchange of research information with other agencies, researchers, state DOTs, and interested parties, and formulates strategies for technology transfer.
- Develops public and private research partnerships.
- Monitors national and international research for potential federally funded and sponsored projects.
- Prepares periodic status reports of research projects and conducts interim evaluations for the Research Center.
- Initiates requests for research proposals.
- Drafts research contracts and amendments for Attorney General's approval as to form.
- Reviews research proposals for accuracy, performance measures, and budget requirements.
- Reviews research invoices and forwards them on to the WYDOT budget office for payment.
- Monitors the yearly research-operating budget.
- Updates and publishes the yearly Work Program.
- Distributes all research documents and reports to the federal repositories, the Wyoming State Library, the RAC, and other stakeholders, as necessary.
- Maintains and archives project files from research studies.
- Monitors state and federal rules, regulations and statutes for changes, addendums and revisions in areas that affect the Research Center, research funding and research projects, including but not limited to general research, intellectual property, privacy, data management, metadata, archiving, guidelines, procurement, budgets, and evaluations.
- Writes and updates the Research Center mission statement and goals, performance measures, input and output measures, efficiency measures, and tracks all requirements and measures as set out in past evaluations for consistency.
- Maintains the publications housed in the Research Library and assures the publications are placed in the Research Center Library Database.
- Manages the Research Center web pages housed within the WYDOT website.
- Distributes transportation technology information to interested parties.
- Updates the Research in Progress (RiP) and Transportation Research Information system (TRIS) databases with Wyoming specific research information.
- Updates the Pool Fund sites for which Wyoming is the lead state.
- Catalogues all data and metadata that is generated by the research projects.
- Tracks all performance measures and evaluation recommendations for the Research Center.
- Writes and updates the Guidelines.

The Research Manager is the chairperson of the RAC. At times, and under such circumstances when the Research Manager is not available, the Research and Development Engineer shall act

as chairperson of the RAC. As chairperson, the Research Manager does not vote on any proposals or other issues that affect the RAC. The duties of the Research Manager during RAC meetings are as follows:

- Call, convene, and chair the RAC meetings.
- Arrange the agenda, time, and meeting room.
- Accept problem statements and/or proposals for consideration by the RAC.
- Serve as the RAC secretary in meetings.
- Draft and distribute RAC minutes.
- Monitor the presentations and the discussion section of the meeting.

7.5 Project Champion

The Project Champion is a WYDOT employee, who voluntarily or by assignment, assists the Principal Investigator in assuring the research project remains within budget, that the research project remains on track, answers technical and other questions the Principal Investigator may have, and addresses any changes in scope of work, key personnel, and disengagement from a project. The Project Champion further updates the Research Manager on any changes in the project, and is tasked with assisting with the implementation process for the research project.

The Project Champion must:

- Agree to act as the liaison between the Principal Investigator, and the Research Center.
- Keep the scope of the research within the project's intent.
- Answer technical questions when they arise.
- Monitor financial expenditures and progress reporting.
- Proofread the final report for technical accuracy.
- Assist in assuring that the outcome based performance measures set out for the project are being implemented.
- Assist in implementing the data management plan.
- Assist in implementation of the project findings, if necessary.
- Provide the RAC with an implementation report at the end of the project.

SECTION 3: PROPOSALS AND REPORTS

Chapter 8	Research Project Development Flow Chart
Chapter 9	Research Problem Statements and Proposals
Chapter 10	Research Report and Formatting

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. 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. Research Agreement
7. Funding
8. Authorization to Proceed with Research
9. Research Conducted/Deliverables
10. Recommendations for Implementation and Implementation Reports
11. Reports
12. Data Management Plan (due with final report)
13. Overall Program Performance
14. Disposal of Property
15. Data Management

8.1 Problem Statement

A problem statement is a brief description of an existing need and is submitted to the Research Center at least **two weeks** prior to a proposals submission. 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 Principal 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 Principal Investigator. The literature search assists WYDOT and Principal Investigator 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. The Principal Investigator also conducts literature searches prior to formulating the problem statement.

8.3 Proposal

Proposals, whether pre- or formal, must be brought to the RAC by the Principal 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 may be heard by the RAC at the quarterly RAC meeting or during an interim time, if warranted.

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 that are applicable to the research project. The steps Principal 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 Principal 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 Principal Investigator is asked to present a formal proposal. The Principal 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 SP&R funds, a proposal must be written in such a manner as to fully describe the research project process, schedule, and expenses.

8.4 RAC Evaluation and Funding Approval

Research proposals may be sent to the Research Manager anytime throughout the year. Projects requiring SP&R funds 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 projects have been fully reviewed and scored by the RAC. The RAC will weigh proposals using the Proposal Checklist for RAC Members that can be found in [Appendix 5](#), Proposal Checklist for RAC.

8.5 FHWA and Executive Staff Approval

Once a proposal has been reviewed by the RAC, and after the RAC determines 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 Research Agreement

The Attorney General's office provides [contract templates](#) that WYDOT must use when executing contracts. Contracts and Interagency Agreements are 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.

8.7 Funding

See Chapter 5 for information on funding and budgets.

8.8 Authorization to Proceed with Research

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

8.9 Research Conduct/Deliverables

Contractors and/or Principal Investigators must keep WYDOT informed of all aspects of the research project. Principal 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 Manager, shall monitor, and if necessary perform site inspections. Deliverables for each project are tailored to meet the

needs of the Principal 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 may 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 the 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

Principal 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. Principal 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 Principal Investigators shall provide the data and datasets to WYDOT. For further information on Data Management Plans and Metadata Schemas, see [Section 4](#), and [Appendix 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](#), Progress Report Template.

8.14 Property (Tangible and Intangible) and Equipment Purchased, and Disposal of the Property and Equipment

Contractor must provide the Research Center with the serial number, license number, or other descriptive information about the equipment/property purchased during the time of the project.

Contractor must carry equivalent insurance coverage for the property and/or equipment acquired during the time of the contract, unless and until such time that the title is transferred to WYDOT. (2 C.F.R. 200.310)

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.

WYDOT may loan, lease, or give research equipment that is excess to an educational institution or nonprofit organization for the conduct of technical and scientific education and research activities. Title of ownership shall transfer with a gift under this section.

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 proposals.

9.1 Problem Statements

Two weeks prior to the submittal of a proposal, the Principal 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. (See [Appendix 9](#), Library Research Request Form Template) 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 and 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 review performed by the Principal Investigator and/or 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 Principal Investigator narrow the problem statement; additionally, the literature search results and the Principal Investigator's subsequent investigation is an integral part of any future research proposal. After reviewing the articles, the Principal Investigator will decide whether he/she wants to proceed, since it may be found that the research articles answers all questions and no further research is necessary. If the Principal Investigator's review does not answer the question, the Principal Investigator can request a time slot on the RAC's meeting agenda. 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 Principal 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 period, 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.

NOTE: Unless there is a written agreement between the Contractor/Principal Investigator and WYDOT, all proposals shall be considered open access and shall be placed on the WYDOT, Research Center webpage.

http://www.dot.state.wy.us/home/planning_projects/research-center/current-research-projects.html

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. The formal proposal may be heard either at the next RAC meeting or at a time designated by the RAC.

9.3.2 Formal Proposal

The formal proposal (proposal) is a request for support and funding. The proposal should address, in detail, what the Principal 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 Principal Investigator's chances of selection. The Research Center will attempt to help the Principal Investigator address specific weaknesses in a proposal, if there are any, and the Research Center reserves the right to reject any proposal submitted that fails to follow these guidelines. Neither the Research Center nor WYDOT is responsible for any costs incurred by the Project Champion or the Principal Investigator, including proposal preparation, prior to the execution of a contract and funding approval by the WYDOT financial office. The Principal Investigator must submit an electronic copy of the proposal to the Research Center for distribution to the RAC.

NOTE: The following subsections are intended to help Project Champions and Principal Investigators prepare a formal proposal.

9.4 Title Page

The title page must contain the following information:

- **Project Title:** The title should be brief and should immediately convey to the reader what the proposed study will cover.
- **Name and Address of the WYDOT Project Champion:** Every research project must be sponsored by a WYDOT employee. The Project Champion, and/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, phone number, e-mail address, and physical address of the Principal Investigator(s).
- Date: Date the proposal is sent to the Research Center.

9.5 Problem Statement

The problem statement should set out all circumstances surrounding the current problem or issue that gives rise to the needs. If the problem statement is different than the one provided to the Research Center in the literature request, the Principal 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 policies, 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.
- Performance measure: 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 could include one or more of the following:

- 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 Principal Investigator should also address the following in their proposals, if applicable:

- 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 Principal Investigator plans to fulfill all deliverables for the research project. The statement of work area must include a work plan/scope and a work schedule.

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 should allow the reviewers an opportunity to judge the potential success and cost of the research.

All projects that include the building of 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 to this schedule 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 Principal 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 3 months, or a 25 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 SP&R 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.

	Budgeted Amount	Explanatory Note
Direct Cost		
Total Personnel Costs		
Principal 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

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.

NOTE on invoicing: FHWA requires that all projects funded with SP&R funds shall be invoiced no later than 120 days after a cost occurs. Principal Investigators/Contractors that do not provide an invoice to the Research Center at a minimum of every 4 months run the risk of their project being closed by FHWA. Pursuant to 2 C.F.R. 200.343 – 345, at the end of the term of the Contract/Agreement, Principal Investigators/Contracts must send a final invoice to the Research Center no later than 45 calendar days after the projects termination date. Invoices must include receipts for all equipment and supplies purchased, and all travel costs billed on the invoice.

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. See [Appendices 7, 8, and 9](#) for how the Research Center tracks implementation of projects.

9.13 Technology Transfer

Another goal of conducting research is to improve or enhance transportation practices. In order for research results to be useful, 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

A Data Management Plan (DMP) shall be attached to the proposal and must set out how the data and/or datasets from the project will be maintained, archived, and shared. The DMP should be revised during the course of the research project, if there are changes, and the DMP must contain information on maintaining data and/or datasets both during and when the project is completed. Changes to the DMP should be submitted to the Research Center 30 days prior to the change so that the Research Manager and the Principal Investigator can discuss the change prior to implementation. The final DMP must be provided to WYDOT within 90 days of the conclusion of the project. (See [Appendix 2](#), Data Management Plan). The Principal Investigator shall provide to WYDOT, within a reasonable time after the conclusion of this project, a copy of the non-confidential research data and/or datasets derived from the research project with the understanding that the data and/or datasets will be considered open access after a 12-month embargo period.

When drafting the DMP, the Principal Investigator and Project Champion shall jointly determine:

- Which data and/or datasets shall be linked to the final report.
- Where the data and/or datasets shall be archived.
- The retention period for archived data and/or datasets.
- What file format will be used to archive the data and/or datasets.
- How the data and/or datasets shall be labeled.
- How the data and/or datasets will be cataloged.
- What metadata shall be attached to the data and/or datasets.
- What written consents, licenses, or other tools will need to be attached to the data and/or datasets to insure privacy and intellectual property.
- The procedure for accessing the data and/or datasets at the end of the project.

CHAPTER 10: RESEARCH REPORTS AND FORMATTING

There are various reports that must be submitted after funding is approved. Below is a list of the reports, and the requirements for each report. This Chapter also lays out the information that must be included in each report. For 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 Internal Report Types

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

10.1.1 Progress Reports

Principal 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. [Appendix 1](#), Progress Report Template. Progress Reports will be submitted to WYDOT's Research Manager electronically. 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 Principal 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 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

RAC presentations are required for projects lasting more than one year and must cover the accomplishments for the research project during the preceding year. Principal 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, time permitting. 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. Interim reports shall be afforded the same protections as those found in the Final Report.

10.1.3 Final Report

At least **six weeks** prior to the termination of the contract, Principal Investigators shall submit an electronic version of the final report to the Research Center. **All reports must adhere to the standards for preparation and publication of scientific and technical reports as outlined in the Turner Fairbanks [Communications Reference Guide](#)** (updated February 24, 2017) (CRG), supplemented by the [U.S. Government Printing Office Style \(GPO\) Manual](#), or in a format approved by the Research Center. Formatting guidelines for the research reports can be found in Chapters 4 and 5 of the [CRG](#). All graphics, tables, figures, and photographs must be embedded within the body of the report in such a manner that will allow alternative text to be assigned to each. The technical page, Form DOT F 1700.7, for the final report shall include the Open Researcher and Contributor ID ([ORCID](#)) number for all authors named in the final report. Digital Object Identifiers (DOI) shall be assigned to the final report by the National Transportation Library (NTL). The Research Manager will insure final report printing, and final report distribution.

The final reports must be submitted to the Research Manager in electronic version. The electronic version must either be submitted on CD in PDF format and Word format, or electronically via e-mail, drop box or other document-sharing site.

The Research Center will coordinate the review of the draft report with the Project Champion and an outside proofreader. The Project Champion shall review the draft report for content and accuracy. The draft report will be reviewed by the outside proofreader for grammar and formatting only. Once both reviews are completed, and all changes have been implemented, the Research Center shall submit the final report for publication and distribute the report to the Wyoming State Library, the University of Wyoming library systems, the University of Wyoming Technology Transfer Center, the Transportation Research Board (TRB) TRID Database, the National Transportation Information Services (NTIS) database, the NTL, FHWA, Turner Fairbanks, Northwestern University, and the University of California Berkeley.

The final report will be considered open access. This means that readers are able to share and use the content from the report pursuant to any license requirements. Further, the final report must:

- Be freely available to the public.
- Be virus free.
- 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, [Appendix 3](#).
- Have attributes for all figures, graphs, tables, images and other artwork.
- Meet the requirements set out in Section 508 of the *Rehabilitation Act of 1973*, as amended.
- Be written in compliance with the [CRG](#).

10.2 Adapted Reports and Publications Derived from the Research

WYDOT encourages Principal Investigators/Contractors and/or graduate students associated with the project to author publications in journals using the research from the funded project. To ensure that there is no conflict between the requirements from the outside publisher and those set out by the Research Center, Principal Investigators/Contractor should adhere to the following:

1. All tables, figures, illustrations, equations, photographs, charts, etc., embedded in the body of the adapted report or other publication that are based on the data from the research project must include a source credit line that gives credit to the Principal Investigator/Contractor, State of Wyoming, WYDOT, and/or the originator.
2. All data, e-components, encoding, software, enhanced graphical, illustrative, video, and audio materials gathered for the research project are considered open access materials and must include an applicable Creative Commons or other similar license type agreement. Proper licenses must be executed to ensure that proper ownership is retained by the Principal Investigator/ Contractor, the State of Wyoming, and WYDOT.
3. Agreements with publishers for adapted reports must include a license agreement approved by WYDOT.
4. The Principal Investigator/Contractor must insure that the adapted report is substantially different from the WYDOT report.
5. The Principal Investigator/Contractor must obtain written permission and/or a waiver from WYDOT for any excerpts from copyrighted works, and for any licenses that may be associated with the adapted publications. This waiver shall only be for use and/or publishing rights, and not ownership. The Principal Investigator/Contractor shall also notify the publisher that WYDOT is a joint owner on all data and intellectual property.
6. The embargo period set out in the contract between the Principal Investigator/Contractor and WYDOT shall supersede and replace any embargo period set out by any publisher.
7. Data may be shared with outside publishers with minimal restrictions. Principal Investigator/Contractor shall name WYDOT as the funder for the project in the acknowledgement of the adaptive report.

10.3 Special Provisions for Final Reports

10.3.1 Copyrights and Patents

Principal Investigator/Contractor must keep in mind that all rights in works, including but not limited to databases, works of authorship, software (including web viewers), data, and inventions created or developed in the performance of the research project shall be jointly owned by WYDOT and Principal Investigator/Contractor. When preparing the final report, Principal Investigator/ Contractor must insure that the proper attribution is attached to all adaptations of

the final report. (Attribution is the giving of appropriate credit for the work and includes copyrights.) Principal Investigator/Contractor shall obtain all permissions and license agreements to use any copyrighted materials in the final report, shall include proper authorizations in the body of the final report for all copyrighted materials used, and shall provide to WYDOT information on its due diligence search for all orphan copyright material. Principal Investigator/Contractor shall also provide WYDOT with any permission necessary for use of patent or patented schematics used in the final report.

Principal Investigator/Contractor must consult with WYDOT regarding any patent rights that arise from, or are purchased with funds awarded under this Agreement. If the Principal Investigator uses copyrighted material, they must insure that they have the proper permissions from the right owners.

The State of Wyoming, WYDOT, and Principal Investigator/Contractor jointly own all documents, data compilations, reports, photographs, data and other work provided to or produced by Principal Investigator/Contractor in the performance of research project. Further, the State of Wyoming, WYDOT, and Principal Investigator/Contractor jointly own all data that may reside within the Principal Investigator/Contractor's hosting environment and/or equipment/media that relate to this project.

The following language shall be placed in the disclaimer section of all final reports.

No copyrighted material, except that which falls under the "fair use" clause, may be incorporated into a report without permission from the copyright owner, if the copyright owner requires such. Prior use of the material in a WYDOT or governmental publication does not necessarily constitute permission to use it in a later publication.

- Courtesy — Acknowledgment or credit will be given by footnote, bibliographic reference, or a statement in the text for use of material contributed or assistance provided, even when a copyright notice is not applicable.
- Caveat for Unpublished Work — Some material may be protected under common law or equity even though no copyright notice is displayed on the material. Credit will be given and permission will be obtained as appropriate.
- Proprietary Information — To avoid restrictions on the availability of reports, proprietary information will not be included in reports, unless it is critical to the understanding of a report and prior approval is received from WYDOT. Reports containing such proprietary information will contain a statement on the Technical Report Documentation Page restricting availability of the report.

***10.3.2 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](#). This Act states that all electronic products produced by government agencies must be accessible to persons with disabilities, including those persons with vision, hearing, cognitive,

and mobility impairments. For further information regarding Section 508, see the Web-based Intranet and Internet Information and Applications on the United States Access Board ([Access Board](#)).

According to the Access Board, text equivalent means:

...adding words to represent the purpose of a nontext element. This provision requires that when an image indicates a navigational action such as “move to the next screen” or “go back to the top of the page,” the image must be accompanied by actual text that states the purpose of the image. This provision also requires that when an image is used to represent page content, the image must have a text description accompanying it that explains the meaning of the image.

The text information associated with a nontext element should communicate the same information as its associated element. For example, when an image indicates an action, the action must be described in the text. The types of nontext elements requiring actual text descriptions are limited to those elements that provide information required for comprehension of content or those used to facilitate navigation.

A non-text element is an image, graphic, audio clip, or other feature that conveys meaning through a picture or sound.

Further, structural tags must be used for headings, tables, figures, equations, and footnotes. This allows individuals with disabilities to navigate the report. Using structural tags also allows the author of the report to build and generate the table of contents, table of figures, etc. To ensure structural tags are working properly:

- Use Microsoft Word® bullet and numbering format to embed structural tags when creating a list.
- Create the hierarchal system for headings using Microsoft Word® style elements found on the “home” tab. Do not manually type headings into the report.
- Underline text only for hyperlinks to WebPages. Do not underline for emphasis added.
- URLs must be complete web addresses. Do not use “click here” or “read more” and hyperlinks must be associated with all URLs.
- All images, art, diagrams, logos, photographs, screenshots, graphs, tables, equations, figures must be associated with alternative text.
 - To insert “alternative text” in the report, review the support document from [Microsoft®](#).
 - Equations should be inserted into the report as an image.
 - For descriptive text for complex images, graphs, tables, etc., if there is no complete description in a paragraph immediately above or below, insert a complex description in the alternative text box.
 - Charts and graphs must have a title, legend, and axis labels where applicable.

An electronic Section 508 captions file, in addition to the final publication file, is required when submitting a report **only if** alternative text links have not been embedded into the final report. This file must contain a list of all descriptions of nontext elements, including but not limited to every photo, chart, graph, pie chart, flow chart, diagram, and equation. Examples of 508 figure captions can be found at:

- <https://www.fhwa.dot.gov/publications/research/safety/04091/alttext.cfm>
- [Appendix 10](#)
- Pages 19-20 of the [CRG](#).

10.4 Front Cover for Internal Reports

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. Do not include a FHWA logo on any reports without permission from the Research Center.
- **WYDOT Logo**: A copy of the WYDOT Logo can be obtained from the Research Center. See Page 48 above for instructions on linking “alternative text” to the logo.
- **Report Number**: The report number is the WYDOT 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. See Page 48 above for instructions on linking “alternative text” to the photo.
- **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 Principal 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.
- **Principal Investigator**: The name, address, phone number and e-mail address of the contractor and/or the Principal Investigator. See Page 48 above for instructions on linking “alternative text” to the e-mail address.
- **Report Date**: The publication month and year.



Figure 1: Example of Front Cover

10.5 Front Matter for Internal Final Report

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

10.5.1 Forward: Information regarding the forward section can be found on page 32 of the [CRG](#).

10.5.2 Disclaimer Notice: A disclaimer notice, which matches that found on page 33, and Appendix B, page 79, of the [CRG](#), must appear on the inside of the front cover of all reports with the following changes:

Notice

This document is disseminated under the sponsorship of the Wyoming Department of Transportation (WYDOT) in the interest of information exchange. WYDOT assumes no liability for the use of the information contained in this document.

WYDOT does not endorse products or manufacturers. Trademarks or manufacturers' names appear in this report only because they are considered essential to the objective of the document.

Quality Assurance Statement

WYDOT provides high-quality information to serve Government, industry, and the public in a manner that promotes public understanding. Standards and policies are used to ensure and maximize the quality, objectivity, utility, and integrity of its information. WYDOT periodically reviews quality issues and adjusts its programs and processes to ensure continuous quality improvement.

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 that may be obtained through the Research Center.

The following language must also be included on the disclaimer page.

The report is covered under a Creative Commons, CC-BY-SA license. When drafting an adaptive report or when using information from this report, ensure you adhere to the following:

Attribution — You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

ShareAlike — If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original.

No additional restrictions — You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation. No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material.

10.5.3 Quality Assurance Statement: A quality assurance statement, which matches that found on page 33 of the [CRG](#), must appear **verbatim** on the inside of the front cover of all reports. See also, Appendix B, Page 79 of the [CRG](#).

10.5.4 Technical Report: The Standard Technical Report Title Page [Form DOT F1700.7] lists key study information in a tabular format used by FHWA and other agencies. It should be a single page numbered "i". A sample of the standard technical title page can be found at Appendix C, page 81, [CRG](#). All Principal Investigators/authors shall insure that their ORCID number is inserted in the Technical Report next to their name. Digital Object Identifiers shall be placed in the technical report in the supplemental information box.

In Box 18 of the Technical Report Documentation Page, insert the following language:

This document is available through the National Transportation Library and the Wyoming State Library. Copyright ©YEAR. All rights reserved, State of Wyoming, Wyoming Department of Transportation, and CONTRACTOR/AUTHOR'S NAME.

In Box 15 of the Technical Report Documentation Page, insert all Creative Common Licensing links and other attributions, where necessary. Contact the Research manager or go to <https://creativecommons.org/licenses/> for further information on Creative Common Licenses.

10.5.5 Metric Conversion Chart: Metric measurements are now optional, but a conversion chart must be placed in the report. 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 research grants may contain dual units with metric units being listed first and English units in parentheses next to the metric unit. The metric conversion chart should be numbered page "ii," in the final report. 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 D, page 83, [CRG](#).

10.5.6 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" in the final report. See detailed instruction on pages 35-36 of [CRG](#), and a sample of the table of contents can be found in Appendix E, page 85 of the [CRG](#).

10.5.7 List of Figures: The list of figures show figure numbers, captions, and page numbers. The list of figures should begin on a separate page following the table of contents. See pages 37-43 of the [CRG](#). A sample of the list of figures can be found in Appendix F, page 87, [CRG](#).

10.5.8 List of Tables, Equations, and Formulas: 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. See pages 44 of the [CRG](#). A sample of the List of Tables can be found in Appendix G, page 89, [CRG](#). Information on the list of equations and formulas can be found on pages 45-46 of the [CRG](#).

10.6 Report Body

The intellectual content of the report should be set out in a logically organized manner. In separate chapters, the report body should contain the following elements: Executive Summary, Problem Description, Objectives, Task Description, Findings and Conclusions, and Implementation Recommendations. Keep in mind that each chapter should begin on an odd-numbered (right-hand) page to aid location.

10.6.1 Executive Summary/Introduction: The executive summary/introduction (summary) should encapsulate the study's purpose, general approach, 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 body of the report.

10.6.2 Problem Description: The problem description should be set out in a separate chapter. This chapter should describe the problem that motivated the work and any literature review performed. 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.

10.6.3 Objectives: One or multiple chapters should be dedicated to the project's objectives. 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 in this chapter(s) and should include the output measures, outcome measures, goals, and performance measures.

10.6.4 Task Description: One or multiple chapters 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 Principal Investigator as to how to write the report. The discussion must be sufficiently complete and clearly written to allow the study's sponsor and the public 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.

10.6.5 Findings and Conclusion: One or multiple chapters 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.

10.6.6 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.

10.7 Back Matter (Reference Material) for Internal Final

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 [CRG](#) for more detail.

10.7.1 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 Principal 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 and should contain proper attributions.

10.7.1.1 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).

10.7.1.2 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.

10.7.2 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 but not required.

10.7.3 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 DOI, when available. See pages 34-35 and Appendix P, page 125 of the [CRG](#) for further information. Apply hyperlinks to reference material, when possible.

10.7.4 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.

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

10.7.6 Photos of Nonpublic Figures: All photos of individuals must be taken and published with the permission of the individual via a signed Model Release Form, and a redacted form should be provided to the Research Center with the final report. See Appendixes M and N of the [CRG](#), Pages 115 and 117.

10.7.7 Graphics: Information on graphics can be found on page 20 of the [CRG](#).

10.7.8 Miscellaneous material that pertains to the report

Copyright: Information on Copyrights can be found on pages 20 through 24 of the [CRG](#). Specific information on copyrighting for figures can be found at Pages 22 and 24 of the [CRG](#). Appendix O, Pages 119-124.

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.

10.8 Original and Adapted Information/Documents

The Principal Investigator and/or the Contractor shall return all original and adapted information/documents, original state owned data, and any adapted work to WYDOT in a useable format, and as set out in the contract between WYDOT and the contractor.

10.9 Embargo Periods

Principal Investigator and/or the Contractor shall be allowed to implement a 12-month embargo period for data produced in the research project. Unless there is written approval from WYDOT, reports shall not be embargoed and shall be published immediately.

SECTION 4: DATA MANAGEMENT PLAN AND METADATA SCHEMA

Chapter 11 Federal and State Requirements

Chapter 12 Data Management Policies for the WYDOT Research Center

CHAPTER 11: FEDERAL AND STATE REQUIREMENTS FOR DATA

Since the turn of the century, the Federal government and the State of Wyoming began implementing rules and regulations regarding digital data, data storage, data archiving, and open data sharing plans. This Chapter outlines the Federal and state requirements for data management and digital data.

11.1 American COMPETES Reauthorization Act of 2010

The [*American COMPETES Reauthorization Act of 2010*](#) (ACRA; Public Law 111-358), was signed into law in 2011, and required the director of Office of Science and Technology Policy (OSTP) to establish a working group under the National Science and Technology Council (NSTC) direction to coordinate Federal science agency research and policies related to the dissemination of long term stewardship of the results of unclassified research, including digital data.

11.2 Office of Science and Technology Policy Memorandum, dated February 22, 2013

In February of 2013, OSTP released a memorandum entitled [*Increasing Access to the Results of Federally Funded Scientific Research*](#) (OSTP 2013 Memorandum), which directed the heads of executive departments to develop a plan to support increased public access to the published results of research funded by Federal funding. The OSTP 2013 Memorandum provided guidance on federally funded scientific research, including peer-reviewed publications and digital data. The OSTP 2013 Memorandum further sets out that “Federal agencies investing in research and development must have clear and coordinated policies for increasing such access” and a plan should be developed to “support increased public access to the results of research funded by the Federal Government.”

This plan directs all agencies to implement:

- A strategy for leveraging existing archives, where appropriate.
- A strategy for improving the public’s ability to locate and access digital data.
- An approach for optimizing search, archival, and dissemination features, while ensuring long-term stewardship of the results.
- A plan for notifying awardees and other federally funded scientific researchers of their obligations.
- An agency strategy for measuring and enforcing compliance with its plan.

11.3 Executive Order 13642 dated May 9, 2013

The May, 2013, Executive Order 13642, entitled, [*Making Open and Machine Readable the New Default for Government Information*](#) (EO 13642 Memorandum), states that government

information shall be “managed as an **asset** throughout its life cycle to promote interoperability and openness... and to ensure that data are released to the public in ways that make the data easy to find, accessible and usable.” [emphasis added] In the EO 13642 Memorandum, the Office of Management and Budget (OMB) was directed to issue an Open Data Policy to advance the management of Government information. Agencies, including the USDOT, were directed to implement the requirements of the OMB Open Data Policy.

11.4 Office of Management and Budget Memorandum dated, May 9, 2013

In May of 2013, the OMB issued a memorandum entitled [*Open Data Policy for Managing Information as an Asset*](#) (M-13-13). This memorandum required executive departments and agencies (Agencies) to “collect and create information in a way that supports downstream information processing and dissemination activities”, which included using “machine-readable and open formats, data standards, and common core and extensible metadata for all new information creation and collection efforts.” Agencies, including the USDOT, were required to ensure the use of “open licenses and review of information for privacy, confidentiality, security, or other restrictions to release.” M-13-13 is in line with the *Paperwork Reduction Act*, the *Privacy Act of 1974*, the *Federal Information Security Management Act of 2002 (FISMA)*, the *Confidential Information Protection and Statistical Efficiency Act of 2002 (CIPSEA)*, the *Freedom of Information Act*, and the existing OMB and the OSTP guidance policies. M-13-13 applies to all new information collection, creation, and system development efforts as well as major modernization projects that update or re-design existing information systems beginning in the early stages of the planning process, and management should continue throughout the projects life cycle.

11.5 USDOT Plan to Increase Public Access to the Results of Federally-Funded Scientific Research Results Version 1.1, dated December 16, 2015

The USDOT *Plan to Increase Public Access to the Results of Federally-Funded Scientific Research Results Version 1.1, dated December 16, 2015* (USDOT Public Access Plan), was issued in response to the OSTP 2013 Memorandum. The USDOT Public Access Plan requires:

- Authors to submit to the NTL digital repository all publications that meet the scope criteria as set out on Page 2 of the USDOT Public Access Plan.
- Publications to be freely available to the public no later than 12 months following publication.
- Public access to final research data, subject to restrictions that pertain to privacy, confidentiality, and homeland security.
- All DOT funded research proposals to include a supplementary document labeled “Data Management Plan” (DMP), and include long-term digital data set preservations and storage location information.
- Repositories to enable and allow public access and sharing.
- Full access to the DOT’s scientific publications and digital data requirements for tracking of the research and data.
- Data to be entered into the NTL repository that serves as the permanent archive of technical reports. The NTL will provide a searchable database of data management plans.

- The USDOT Research Hub to serve as the linking mechanism for scientific publications and their underlying research data.
- All research project descriptions to be submitted to the Transportation Research Board Research-in-Progress database and ensure that the projects are updated.

The plan applies to all DOT employees and awardees from non-DOT organizations that publish scientific material or compile digital data sets resulting from research and development programs conducted under a DOT grant, contract, or other agreement.

11.6 FHWA - Data Capture and Management: Needs and Gaps in the Operation and Coordination of USDOT Data Capture and Management Programs

In 2010, the FHWA Office of Operations, Office of Transportation Management (HOTM) commissioned a white paper entitled, *Data Capture and Management: Needs and Gaps in the Operation and Coordination of U.S. DOT Data Capture and Management Programs* (HOTM White Paper). The HOTM White Paper focused on infrastructure, travel, and climate, and looked at data capture and management activities across various U.S. DOT program areas, and identified gaps and potential opportunities for filling the gaps and managing program activities. The HOTM White Paper recommended that HOTM should develop a data business plan (DBP) to address the gaps and to improve coordination among real time data capture programs within U.S. DOTs.

In 2011, HOTM commissioned a DBP study to address gaps; to serve as a prototype for other U.S. DOT offices; and to provide leadership by offering or suggesting best data collection practices. In 2012, the FHWA Data Governance Council signed a charter that provided strategic review and oversight of all FHWA data collections efforts. The council signaled the need for improved data management within FHWA and its programs and allowed stakeholders to benefit from data programs.

11.7 USDOT - U.S. DOT Roadway Transportation Data Business Plan (Phase 1)

In 2013, [*U.S. DOT Roadway Transportation Data Business Plan \(Phase 1\)*](#) (U.S. DOT DBP), was written and focused on roadway travel mobility data, but also reviewed the above-mentioned papers and their recommendations and conclusions. The U.S. DOT DBP sets out practices and recommendations for the U.S. DOT based on experiences of other national and state agencies data management plans. The recommendations set out in U.S. DOT DBP followed best practices outlined in [*NCHRP 666, Volume II: Guide for Target-Setting and Data Management*](#), Chapter 2: Guide for Data Management.

11.8 National Transportation Library DOT Public Access Guidelines

The National Transportation Library's (NTL) repository, ROSAP (repository and open science access portal) allows for full text research, reports, and datasets, and serves as the portal for

transportation data, and provides library services. The NTL sets out that DMPs should conform to the [USDOT Public Access Plan](#) and that each plan shall include a narrative describing:

- The final research data to be produced in the course of the project.
- The standards to be used for data and metadata format and content.
- Policies for access and sharing the final research data.
- Policies and provisions for re-use, re-distribution, and the production of adapted reports.
- Plans for archiving the final research data and other research products, and for preservation of access to them.

11.9 AASHTO

American Association of State Highway and Transportation Officials (AASHTO) is working on data management plans for research data, and the subcommittee of data is working on the core data principles proposed for use by state DOTs regarding data management. The [core data principles](#) as set out by AASHTO are:

- Valuable: Data is an asset.
- Available: Data is open, accessible, transparent, and shared.
- Reliable: Data quality and extent is fit for a variety of applications.
- Authorized: Data is secure and compliant with regulations.
- Clear: There is a common vocabulary and data definition.
- Efficient: Data is not duplicated.
- Accountable: Decisions maximize the benefit of data.

CHAPTER 12: DATA MANAGEMENT PLAN POLICIES FOR THE WYDOT RESEARCH CENTER

Data is considered an asset and is valuable to Principal Investigators, WYDOT, stakeholders, and the public. As such, Principal Investigators, Project Champions, and WYDOT become accountable for the quality of the data generated and they must ensure the data is accompanied with enough metadata to assist the public in accessing the data. Managing the data in a formal manner ensures that duplication of the data does not occur and that the research dollars are spent wisely.

This Chapter outlines the policies and procedures the Principal Investigator and/or the Contractor, and Project Champion will follow when establishing their Data Management Plan (DMP). In developing the DMP and the policies, the Research Center balanced insuring the data was open to the public, the needs of the Principal Investigators and WYDOT, and insuring confidentiality and privacy. The Research Center is implementing the following policies and guidelines to be used for all research projects funded by the Research Center.

12.1 Steps for data management

All research projects shall follow the below timeline.

12.1.1 Prior to beginning a research project

A kickoff meeting shall be set up prior to or just as the contract is initiated. The kickoff meeting shall include reviewing the proposed DMP, necessary metadata to ensure all required data is archived, and all parties understand how the data will be managed. Any changes to the DMP must be approved by the Research Center. The kickoff meeting will also ensure that the Principal Investigator(s) understands the deliverables set out in the contract. At this time, the parties will determine whether there needs to be disclosures or legal protection for the report and the data (PHI, PII, and/or sensitive data), and whether data needs to be scrubbed and/or deidentified. At this meeting, all rights to the data and/or datasets shall be determined. See [Appendix 2, Template for Data Management Plan](#).

12.1.2 During the research project

During the research project, the Principal Investigator shall ensure that the data is maintained and backed up in a secure manner, and it shall be the Principal Investigator's responsibility to determine storage requirements. The Principal Investigator shall update the Metadata Schema ([Appendix 3](#)) during the life of the research project, as needed. The Principal Investigator shall also apply for an ORCID number. Prior to providing the final report or publishing any publication based on the contracted research, the Principal Investigator shall discuss with the Research Center the need of a DOI for the report and/or data, and what DOIs have already been attached to adapted reports.

12.1.3 After the final report is written

The Principal Investigator and/or Contractor, Project Champion, and WYDOT shall:

- Set the embargo period for the data.
- Appraise the data inventory.
- Organize the data and content files.
- Process the data.
- Ensure the Metadata Schema is complete.
- Determine who will manage the data once the project is complete.
- Determine what the retention period will be.
- Determine who will budget for the retention of data.
- Set out how to name the files and datasets.
- Determine whether there are any outliers.
- Determine how to cite the data and/or datasets.
- Determine what the data parameters and/or units of measure will be.

If the data is sensitive, privileged, or confidential, the Principal Investigator and the Research Center shall determine who can access the data, who can reuse the data, and how to ensure confidentiality. It should be kept in mind that data formats may be different during the submission, distribution, and preservation phases.

12.2 What Data Are Archived

The Principal Investigator and/or Contractor, Project Champion, and WYDOT shall jointly determine:

- What data and/or datasets shall be linked to the final report.
- Where the data and/or datasets shall be archived.
- The retention period for archived data and/or datasets.
- What file format will be used to archive the data and/or datasets.
- How the data and/or datasets shall be labeled.
- How the data and/or datasets will be cataloged.
- What metadata shall be attached to the data and/or datasets.
- What written consents, licenses, or other tools will need to be attached to the data and/or datasets to insure privacy and intellectual property.
- The procedure for accessing the data and/or datasets at the end of the project.

The Principal Investigator and/or Contractor shall provide WYDOT, within a reasonable time after the conclusion of the research project, a copy of the non-confidential research data and/or datasets derived from this project with the understanding that the data and/or datasets will be made available to the public.

The Principal Investigator and/or Contractor shall complete an electronic version of the Data

Management Plan (DMP) that is found in the WYDOT *Research Development, and Technology Transfer and Data Archiving Guidelines*, no later than 90 days after the signing of the Contract. Any changes to the DMP shall be submitted to the WYDOT Research Manager and the Project Champions within 30 days of the change.

Except as specified in the Contract between WYDOT and the Principal Investigator, the State of Wyoming, WYDOT, and the Principal Investigator and/or Contractor shall jointly own all documents, data compilations, reports, photographs, data and other work provided to or produced by the Principal Investigator and/or Contractor. Further, the State of Wyoming, WYDOT, and The Principal Investigator and/or Contractor shall jointly own all data that may reside within the Principal Investigator and/or Contractor's hosting environment and/or equipment/media that relates to the research project.

For purposes of these Guidelines, the Research Center will use the following primary definition for data:

The recorded factual material commonly accepted in the scientific community as necessary to validate research findings.³

When determining what data should be archived, and what data should be linked to the final report, the Research Center, Project Champion, and the Principal Investigator and/or Contractor shall review the data available, and determine what data and datasets to archive and link.

Determining factors of what data to archive include:

- Will there be a demand for the data.
- How difficult will the data be to replicate.
- Are there barriers to future use.
- Is the data stored or archived somewhere that cannot guarantee long-term storage.
- Is the data the only copy.

The following forms of data/datasets should be reviewed when determining what data should be archived:

- Primary data used in the production of the report: Raw, verified data that has been obtained directly from a source. It can be captured through experimental, surveys, interviews, focus groups, or other direct interactions with individuals in the field. Does not include analysis data.
- Unpublished datasets: Materials and methods; clear description of the variables presented; supported by unpublished reports; and any other relevant material.
- Secondary Data: Pre-existing data not gathered or collected by the authors. Usually collected by another organizations or source.
- Metadata: Set of data that describes and gives information about the dataset – cataloging information.
- Dataset description document: Describes all variables in the dataset and the

³ <http://guides.libraries.psu.edu/dmptoolkit/describing-data>

- measurement units used.
- Codebook: A list of variable names, variable labels, and label values. Should specify the data position of each variable, describe the contents of each variable, and identify the range of possible codes and the meanings of the codes.
 - Questionnaires: An unused copy of the questionnaire.
 - Handbooks, guides, and manuals derived from research.

When determining what counts as data and what should be archived, it will depend on the Principal Investigator's knowledge of the data, and what he/she believes is valuable.

NOTE: It should be noted that data gathered and/or archived, will be determined on a case-by-case basis for each research project.

12.3 What Data Are Not Included

Data that does not need to be archived or saved includes preliminary analyses of a project, drafts, and plans for future research, peer reviews, interoffice communications, e-mails, letter, or other forms of correspondence when looking at what data to archive. The Principal Investigator and/or Contractor, and the Project Champion will have the opportunity to discuss what data and/or other digital material should be excluded prior to finalizing the project.

12.4 Data Management Plan Template for Research Projects

Principal Investigators are required to complete a DMP prior to beginning a research project, and update the DMP throughout the life of the project. See [Appendix 2](#), Data Management Plan.

12.5 Metadata Format and Content Template

All datasets, data, and reports may need a Metadata Schema. Determination of what data will need a complete Metadata Schema will be determined on a case-by-case basis. Full details on the Metadata Schema can be found in the MARC21 Concise at <http://www.loc.gov/marc/marcdocz.html>, and the requirement from the National Transportation Library (NTL) can be found at <http://ntl.bts.gov/publicaccess/index.html>. The Research Center Metadata Schema can be found in [Appendix 3](#), Metadata Schema.

12.6 Data Sharing Agreements

The Research Center and the Principal Investigator and/or Contractor will execute a data sharing agreement, if one is required, or for intellectual property reasons. The data sharing agreement may include clauses on cleaning of the data; data sharing requirements; forms for sharing; formats of data; software requirement; and metadata requirements. Templates for data sharing during the time of the research project, and after completion of the project are available at the Research Center.

12.7 Locating and Accessing Digital Data Materials, Data, and Databases

For research projects that were completed prior to October 1, 2014, the Research Center shall link digital materials, data, and/or databases, if possible. If the data has not been turned over to the Research Center, and the Principal Investigator and/or Project Champion still has access to the data/datasets, the Research Center may ask for a copy for its files.

For research projects completed after October 1, 2014, the Research Manager shall work with the Principal Investigator and the Project Champion to ensure the Research Center receives an inventory of digital material, data, and/or datasets that are relevant to the research project. All digital material, data, and datasets will be copyrighted, if necessary. From the inventory, the Project Champion, Principal Investigator, and the Research Center will determine what data will be linked to the report.

12.8 Ensure the Public Can Read, Access, Download and Analyze Digital Data

Pursuant to the *Freedom of Information Act*, the *Wyoming Public Records Act*, and the numerous State of Wyoming digital data management rules and regulations, the Research Center is required to ensure that the public can read, access, download, and analyze digital data. The goal of the Research Center is thus to work with the Principal Investigator, stakeholders, the Project Champion, and the RAC to determine the best ways to accomplish this goal.

The Research Center shall archive data in a repository chosen by the Research Center, and link the data to the report that is stored in electronic form in the Wyoming State Library or through the NTL site. This will ensure the report and data are available to the public immediately. The Research Center does not wish to duplication storage efforts, and if data will be stored by the Principal Investigator or the Project Champion for the duration of its life cycle, the Research Center proposes to leave the data in those databases until such time as it is determine that the data should be either deleted or archived in a predetermined repository. The storage facility will be publicly accessible and will allow for linkage between the report and the data/dataset. See also the requirements for Sec 508 Compliance.

12.9 Data Formats and Dissemination

Before data is archived, the Principal Investigator, Project Champion, and Research Center shall determine what the best format for archiving the data is. It must be kept in mind that formatting may change from collection to archiving, and as such, the Principal Investigator should be prepared to adjust the formatting where necessary. A plan for formatting and archiving should be set up either prior to or during the research process.

12.10 Storage, Archiving and Backup

All data gathered from research projects should be considered “open.” This means that the data

and/or datasets should be available to the public, unless there is a compelling reason not to release the information. Archiving will begin in the early stages of the research process and shall continue during the course of the project. When storing data, a backup must always be kept, security for the data must be incorporated during the project phase, and data must be organized in such a manner that it is easily accessible.

Archiving of the data could be a time specific endeavor or could be long term. Data must remain available for a minimum of three years after a project is complete, and it may be necessary to retain the data indefinitely. To ensure the availability of data, each set of data and report must have persistent identifiers or DOI. Data must also be formatted in such a manner that it can be stored and retrieved easily.

If the Principal Investigator and/or the Project Champion will be archiving and/or storing data, the DMP shall describe physical and cyber resources, and facilities that will be used for the effective preservation and storage of research data. In collaborative proposals or proposals involving sub-awards, the lead Principal Investigator is responsible for assuring data storage and access for data gathered by the subrecipient.

If there is sensitive and/or confidential data gathered, the Principal Investigator is tasked with ensure that the storage, backup, and security systems meet all Health Insurance Portable and Accountability Act (HIPAA) and Health Information Technology for Economic and Clinical Health Act (HITECH) requirements. When archiving sensitive and/or confidential data, please provide the following:

- A brief description of the data.
- Whether the data was original or was gathered from an existing database.
- Security and privacy information.
- Intellectual property rights for any data that comes from an existing database.
- How the data were managed during the project, with information about versions.
- What outliers are present in the data.

12.11 Intellectual Property Rights

The Research Center wants to ensure that we are able to collect data while at the same time protecting intellectual property rights of agencies and the private sector. The Research Manager, in conjunction with the Attorney General's office, will set out guidelines on who owns the intellectual property rights and proprietary interests for data, datasets, and other documents. The major questions to be kept in mind are:

- Who owns or has a valid license to the intellectual property?
- What steps should be taken to protect the intellectual property?
- When sharing data, how will the intellectual property rights be protected?

Issues such as disclaimers, open licenses, and copyrights will be reviewed to ensure all data, datasets, etc. contain the proper coverage. All contracts for research projects will have specific

language on respective rights and the obligations of all parties regarding the use, reproduction, and disclosure of the data, and will set out what data will be delivered to the Research Center. The type, quantity, or quality of the data to be delivered will be set out in the DMP.

Data, which is first produced in the performance of the contract, must be copyrighted at the first instance. The copyright will list the contractor, the State of Wyoming and WYDOT as right owners, with all rights reserved. WYDOT retains an “unlimited, and irrevocable license to reproduce, publish, or otherwise use and to authorize others to use, for federal and state purposes: a) the copyright in any work developed during the contract period; and b) any rights of copyright to which the Principal Investigator and/or contractor purchases ownership using funds awarded”. (Wyoming Contract Template)

The Programming Engineer and the Research Manger, or his/her designee, shall be responsible for handling intellectual property issues within the Research Center.

The Research Center, and the Principal Investigator will determine what intellectual property will be released to the public, if there is an issue with confidentiality, trade secrets, etc. The Research Center and Principal Investigator shall monitor and audit any agreements (e.g. Cooperative Research and Development Agreement (CRADA)) as well as any licensing compliance issues to identify intellectual property assets that are produced, used, or purchased because of the project. This shall include a review of any licenses and agreements with third parties to ensure that sufficient agreements are in place.

The Research Center will set up an intellectual property catalog for all research reports. This will provide a comprehensive assessment of all forms of intellectual property owned by WYDOT. This should include expiration dates, maintenance fee due dates, license agreements with licensees, conception data, and potential intellectual property.

The Research Center will work with the Attorney General’s office to determine if the intellectual property needs to be registered. The Attorney General’s office will have the final say on registration of any intellectual property.

The Principal Investigator and the Research Center will make all determinations on whether the intellectual property should be excluded from use by others, if there is a need to control future use, licensing agreements, and how to keep the intellectual property in the public domain. As a note, if the report or data is release to the public domain without claiming intellectual property rights, the Principal Investigator and WYDOT could forfeit their rights.

Management decisions on any source codes will be made by the Wyoming ETS Department, the Principal Investigator, and the Research Center.

12.12 Disclaimer

When necessary, a disclaimer form will be provided to the RAC with the proposal and updated forms will be attached to the progress reports. Disclaimer forms will provide an overview and description of any inventions, concepts, works, or ideas proposed in the research project or set out in the research report with sufficient information to decide appropriately whether to pursue

intellectual property protection. The disclaimer form shall include:

- A description of the technology, invention, or creative work.
- What does it do. Key features and benefits.
- Are there any national security concerns.
- What is the funding source.
- The technology, invention, or creative work to be protected by Intellectual Property.

Principal Investigator, Project Champion, the Research Manager will determine which data and/or datasets will require disclaimers. Disclaimers may be required for confidentiality issues, intellectual property rights, or other issues. Examples of Disclaimers can be obtained from the Research Center.

12.13 Selection and Retention Periods

Data from research projects can be large and cumbersome. The Research Center and Principal Investigator shall collaborate to determine what data should be retained and what data should be linked to the research report. All data collected during the research process shall be retained until the Principal Investigator, Project Champion, and the Research Manager have an opportunity to discuss the data available and what will be needed for the final report. See Sections 12.2 and 12.3 for guidelines on what data should and should not be archived. Any data which is archived, should be machine-readable and in an open format. The Principal Investigator shall provide the Research Center with a data inventory, and if the data is not housed by the Research Center, the location and the custodian of the data should be provided to the Research Center. Further, the formatting of the data will be determined by the Principal Investigator, WYDOT, and/or the chosen data repository.

Retention periods for data shall be on a case-by-case basis. The minimal retention period is three years after conclusion of the award or three years after public release, whichever is later. Exceptions requiring longer retention periods may happen when data supports patents, when questions arise from inquiries or investigations with respect to research, or when a post-graduate student is involved. Research data that supports patents shall be retained for the entire term of the patent. The Federal Government, State of Wyoming, and ETS all require that data, records, and other items be made available to the public pursuant to *Section 508 of the Rehabilitation Act of 1973*.

When determining data retention, data quality should be a major factor. The data should accurately represent the research project; have consistently defined data elements; be within acceptable ranges defined by the project; be provided to WYDOT in a timely manner; and be easily accessible, understandable and usable. The Principal Investigator will be required to provide clean data and data logs for any outliers.

Retention policies for all data, datasets, and other documents are approved by the WYDOT Records Department and the Attorney General's office, with recommendations from the

Principal Investigator and the Research Center. At a minimum, all data, datasets, and documents generated from the project must be retained for three years. All other time limits shall be jointly determined by the Research Center and Principal Investigator.

If any data is deemed confidential or sensitive, it shall be retained in a secure storage center which adheres to the guidelines set out in [HITECH Act](#) and/or [HIPAA](#), and shall only be retained as long as necessary. All sensitive and confidential data shall be disposed of in a manner that complies with either HIPAA or HITECH.

12.14 Embargo Periods

The Principal Investigator shall be allowed to maintain the data without releasing it to the public for a stated period not to exceed 1 year. This is known as an embargo period. On a case-by-case basis, the Research Center and Principal Investigator will entertain requests from outside sources for the release of data within the embargo period. Clear and convincing evidence of the need for the data must be presented to the Research Center in order to request copies of the data during the embargo period.

Unless there are extenuating circumstances, the report and all associated documents will be released to the public at a suitable time.

There is no embargo period for reports and reports shall be published immediately.

12.15 Ethics and Privacy

Principal Investigator, Project Champion, and the Research Center must ensure ethical requirements, and data privacy rules and regulations are followed when working on research projects. All information gathering rules regarding data, datasets, software, etc must be followed. Though data gathered for these research projects should be transparent, this does not mean the rules for confidentiality and privacy should be ignored. If the project gathers data that is considered personal health information (PHI), personally identifiable information (PII), or sensitive material, precautions must be in place prior to beginning the project, and HIPAA and HITECH guidelines must be followed. Further, all legal permissions must be obtained and property storage must be acquired. Informed consent forms must be retained for the life of the data. Internal Review Boards may be necessary for any project where protected health information (PHI), personally identifiable information (PII) or sensitive materials are involved.

All individuals who will have access to any confidential and/or sensitive information must receive training on privacy, security, safeguards, encryption, breach notifications and mitigation procedures. Safeguards must be in place to ensure unauthorized user do not have access to the data, and authorized users must use secure passwords to access confidential and sensitive data. The Principal Investigator must set out policies on how to identify the identity of all users.

12.16 Budgets For Data Retention

Data storage shall be determined on a case-by-case basis. Data may be stored by the Principal Investigator, Project Champion, the Research Center, or an approved outside repository. The length of time for retention, the need for the data on a daily basis, and the type of data will dictate where the data is retained, and as such, the cost of storing the data. The entity which stores the data shall be responsible to keep the data operational and available, and for the cost of storage.

12.17 Digital Object Identifier (DOI), and Open Access, and Contributor ID (ORCID)

Prior to publishing any paper or report using data or conclusions drawn from a research project, the Principal Investigator(s) must work with the Research Center to ensure that there is no duplication or conflicts with digital object identifiers. Adaptive copies of reports from funded research projects must be provided to the Research Center with the reports DOI.

Principal Investigator and authors named on any report or paper must register for an ORCID number at <http://orcid.org/> prior to publishing any work that is derived from a research project. This number helps distinguish researchers who have similar names and allows Principal Investigator to attach their work to other works. The ORCID registry is available free.

12.18 Data Citation Index

Principal Investigators are required to provide the Research Center with a data citation index (Index). The Index should include all data gathered and datasets built during the life of the project. This will enable the Principal Investigator, Program Champion(s) and the Research Manager to access the data and/or datasets. It will also enable the Research Center to better archive the data. The Index should include an attribution for the data object to the persons and/or institutes creating the data, and a standard form of citation for each piece of data.

12.19 Annual review of data management plan template

During the October RAC meeting, the Research Center will provide the RAC with an updated data management plan to be reviewed. Changes and comments to the plan will be discussed during the January RAC meeting each year.

12.20 Annual Review of Project Specific Data Management Plans, Data Clean Up, Scrubbing

The Principal Investigator and Project Champion shall meet yearly to discuss changes in the original and any revised DMPs. If there are any changes to the DMP, the Principal Investigator shall provide the Research Center with a copy of the revisions. The Principal Investigator shall

be responsible for detecting, removing, and/or correcting dirty data (i.e. data that is incorrect, out of data, redundant, incomplete, or formatted incorrectly). Data cleansing allows for consistency in the data and can include data auditing, workflow specification, workflow execution, and post-processing and control.

12.21 Licensing

Terms and conditions for software, codes, and data are essential to ensure ownership and rights. All research projects, which are funded specifically for building or the maintenance of software, codes and some other types of database, must have a license attached to the report before the software is made publically available. All licenses must:

- Have full attribution for the Principal Investigator, WYDOT.
- Must be open source.
- Must be considered copyleft.
- Must be for non-commercial purposes.
- Must be approved by WYDOT prior to finalizing.

The best form of license to use is a General Public License (GNU). When attaching the license, a copy must be attached to the research report as an appendix. For all electronic copies of the data and/or software, there must be a rights statement that appears prior to the stakeholder obtaining the data and/or software. Rights statements are very short and usually state that the database and/or software is made available under the license number “X”, which text can be found at (specific location).

APPENDICES

- 1 Progress Report Template
- 2 Data Management Plan Template
- 3 Metadata Schema for Research Projects
- 4 Data Dictionary
- 5 Proposal Checklist Template for RAC Members
- 6 Research Project Feedback Form Template
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- 9 Library Research Request Form Template
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- 11 Creative Commons License (CC-BY-SA)

Appendix 1 Progress Report Template

Project Title:			WYDOT Project Number:		Period: From: To:
Research Agency: Wyoming Department of Transportation 5300 Bishop Blvd., Cheyenne, WY 82009-3340 WYDOT Research Center 307.777.4182			Organizations and or collaborators who have been involved with this project.		Report Type <input type="checkbox"/> Quarterly <input type="checkbox"/> Interim
Principal Investigator and all other individuals who have worked on the project (include ORCID number for each):			Percent Overall Work Complete		<input type="checkbox"/> Ahead of Schedule <input type="checkbox"/> On Schedule <input type="checkbox"/> Behind Schedule
Start Date	Comp. Date	Contract Days	Days Elapsed	Percent Time Used	Prepared By:
Funds Authorized		Funds Expended			
Total Project:	Current FY:	Total Project:	Current FY:	Quarterly:	

Activities and Accomplishments: The information provided in this section allows WYDOT to assess whether satisfactory progress has been made during the reporting period. Please be as detailed as possible, but try to keep your report to three to four pages in length, if possible.

1. What are the major goals and objectives of the project?
List major goals, milestones, target dates for important activities or phases of the project. Show actual completion dates or the percentage of completion. If goals have been revised from the last reporting period, list the revised goals and objectives.

2. Describe what was accomplished under these goals.
 - a) Major activities.
 - b) Specific objectives.
 - c) Significant results (both positive and negative).
 - d) Key outcomes and other achievements.
 - e) Goals not met.

3. What opportunities for training and professional development has the project provided?
If the research is not intended to provide training and professional development, state "Nothing to Report". Otherwise, describe opportunities for training and professional development, training activities, and professional development.

4. How have the results been disseminated to communities of interest?
Describe what results have been disseminated and in what manner, including publications, conference papers, and presentation.

5. What do you plan to do during the next reporting period to accomplish the goals and objectives?
Describe briefly what you plan to do during the next reporting period to accomplish the goals and objectives.

6. List any products resulting from the project during the reporting period. Include in this list:
 - a) Publications, conference papers, and presentations.
 - b) Website(s) or other internet sites (List the URL).
 - c) Technologies or techniques.
 - d) Inventions, patent applications, and/or licenses.
 - e) Other products, such as data or databases, physical collections, audio or video products, software or NetWare, models, educational aids or curricula, instruments or equipment.

7. Impact:
 - a) How will this project impact WYDOT?
 - b) How will this project impact other agencies?

8. Changes to Scope of Work. Provide the following changes, if applicable:
 - a) Scope of work or objectives of the project.
 - b) Changes in key persons.
 - c) Disengagement from the project for more than three (3) months, or a twenty five (25) percent reduction in time devoted to the project.
 - d) The inclusion of costs that require prior approval.
 - e) The transfer of funds between line items in the budget.
 - f) The subawarding, transferring or contracting of work.
 - g) Changes in the approved cost sharing or match.

Signed :

Date:

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Appendix 2 Data Management Plan

Name of Contractor	
Name of project	
Project Duration	Start date : End:
DMP Version	
Date Amended, if any	
Name of all authors, and ORCID number for each author	
WYDOT Project Number	
Name of all peer reviewed publications which have been generated using data from this project	
Any Digital Object Identifier (DOI), including any CROSSREF number, which has been assigned to any peer reviewed publication or data generated by this project	
URLs for all peer reviewed publications which have been generated using data from this project	
RiP RH Display ID Number	
Dataset URL, if available	

What constitutes data will be determined by the Principal Investigator, Project Champion, and the Research Manager. In general, your plan should address final research data. This includes recorded factual material commonly accepted in the scientific community as necessary to validate research findings. Final research data do not include laboratory notebooks, partial datasets, preliminary analyses, drafts of scientific papers, plans for future research, peer review reports, communications with colleagues, or physical objects, such as gels or laboratory specimens. See Chapter 12, subsections 12.2 and 12.3 for full details on what data to retain. As part of your research, you may also generate unique data, which are data that cannot be readily replicated. Your DMP should also address unique data that may arise from your research.

WYDOT expects the timely release and sharing of data to be no later than the acceptance for publication of the main findings from the final dataset, unless the Principal Investigator will be embargoing the data. In such a case, the data cannot be embargoed for a period longer than 12 months. See Chapter 12, subsection 12.13 and 12.14 for information on retention and embargos.

1. Introduction

The purpose of this research project is to:

2. Definitions

- a. Code or scripts include code used in the collection, manipulation, processing, analysis or visualization of data, but may also include software developed for other purposes.
- b. Copyright is a set of legal rights extended to copyright owners that govern such activities as reproducing, distributing, adapting, or exhibiting original works fixed in tangible forms.
- c. Data means the recorded factual material commonly accepted in the scientific community as necessary to validate research findings, but not any of the following: preliminary analyses, drafts of scientific papers, plans for future research, peer reviews, communications with colleagues. Recorded material excludes physical objects (e.g. laboratory samples). Research data also does not include trade secrets, commercial information, materials necessary to be held confidential; and personnel and medical information and similar information the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.
- d. Data Archive is a site where machine-readable materials are stored, preserved or possibly redistributed to individuals interested in the materials.
- e. Data Management Plan is a document that specifies your plans for managing your data and files for a research project.
- f. Dataset means collection of data.
- g. Metadata refers to structured data about data that helps define administrative, technical, or structural characteristics of the digital content.

3. Data Types and Storage

The types of data and/or datasets generated and/or used in this project include ...

Provide a description of the data that you will be gathering in the course of your project. You should address the nature, scope, and scale of the data that will be collected. Describe the characteristics of the data, their relationship to other data, and provide sufficient detail so that reviewers will understand any disclosure risks that may apply. Discuss value of the data over the long-term. Please provide the name of all repositories where the data will be housed during the lifetime of the project.

Checklist

- What type of data will be produced?
- How will data be collected? In what formats?
- How will the data collection be documented?
- Will it be reproducible? What would happen if it got lost or became unusable later?
- How much data will it be, and at what growth rate? How often will it change?
- Are there tools or software needed to create/process/visualize the data?
- Will you use pre-existing data? From where?
- Storage and backup strategy?

4. Data Organization, Documentation and Metadata

The plan for organizing, documenting, and using descriptive metadata to assure quality control and reproducibility of these data include ...

Your DMP should describe the anticipated formats that your data and related files will use. To the maximum extent practicable, and in accordance with generally accepted practices in your field, your DMP should address how you will use platform-independent and non-proprietary formats to ensure maximum utility of the data in the future. If you are unable to use platform-independent and non-proprietary formats, you should specify the standards and formats that will be used and the rationale for using those standards and formats.

NOTE: Attach the Metadata Schema, URL for data generated, and all peer reviewed publications from this project.

Checklist

- What standards will be used for documentation and metadata?
- Is there good project and data documentation format/standard?
- What directory and file naming convention will be used?
- What project and data identifiers will be assigned?
- Is there a community standard for metadata sharing/integration?

5. Data and/or Database Access and Intellectual Property

What access and ownership concerns are there...

Protecting research participants and guarding against the disclosure of identities and/or confidential business information is an essential norm in scientific research. Your DMP should address these issues and outline the efforts you will take to provide informed consent statements to participants, the steps you will take to protect privacy and confidentiality prior to archiving your data, and any additional concerns. If necessary, describe any division of responsibilities for stewarding and protecting the data among Principal Investigators.

If you will not be able to deidentify the data in a manner that protects privacy and confidentiality while maintaining the utility of the dataset, you should describe the necessary restrictions on access and use. In general, in matters of human subject research, your DMP should describe how your informed consent forms will permit sharing with the research community and whether additional steps, such as an Institutional Review Board (IRB), may be used to protect privacy and confidentiality.

Checklist

- What steps will be taken to protect privacy, security, confidentiality, intellectual property or other rights?
- Does your data have any access concerns? Describe the process someone would take to access your data.
- Who controls it (e.g., PI, student, lab, University, funder) ?
- Any special privacy or security requirements (e.g., personal data, high-security data) ?
- Any embargo periods to uphold?

6. Data Sharing and Reuse

The data will be released for sharing in the following way ...

Describe who will hold the intellectual property rights for the data created by your project. Describe whether you will transfer those rights to a data archive, if appropriate. Identify whether any copyrights apply to the data, as might be the case when using copyrighted instruments. If

you will be enforcing terms of use or a requirement for data citation through a license, indicate as much in your DMP. Describe any other legal requirements that might need to be addressed.

Checklist

- If you allow others to reuse your data, how will the data be discovered and, shared?
- Any sharing requirements (e.g., funder data sharing policy) ?
- Audience for reuse? Who will use it now? Who will use it later?
- When will I publish it and where?
- Tools/software needed to work with data?

7. Data Preservation and Archiving

The data will be preserved and archived in the following ways ...

Describe how you intend to archive your data and why you have chosen that particular option. You may select from a variety of options including, but not limited to:

- Use of an institutional repository.
- Use of an archive or other community-accepted data storage facility.
- Self-dissemination.

You must describe the dataset that is being archived with a minimum amount of metadata that ensures its discoverability. Whatever archive option you choose, that archive must support the capture and provision of the National Transportation Library metadata requirements. In addition, the archive you choose must support the creation and maintenance of persistent identifiers and must provide for maintenance of those identifiers throughout the preservation lifecycle of the data. Your plan should address how your archiving and preservation choices meet these requirements.

Checklist

- How will the data be archived for preservation and long-term access?
- How long should it be retained (e.g., 3-5 years, 10-20 years, permanently) ?
- What file formats? Are they long-lived?
- Are there data archives that my data is appropriate for (subject-based? Or institutional)?
- Who will maintain my data for the long-term?

NOTE:

Researchers evaluating data repositories as the option(s) for storing and preserving their data should examine evidence demonstrating that the repository:

- a. Promotes an explicit mission of digital data archiving.
- b. Ensures compliance with legal regulations, and maintains all applicable licenses covering data access and use, including, if applicable, mechanisms to protect privacy rights and maintain the confidentiality of respondents.
- c. Has a documented plan for long-term preservation of its holdings.
- d. Applies documented processes and procedures in managing data storage.
- e. Performs archiving according to explicit workflows across the data life cycle.
- f. Enables the users to discover and use the data, and refer to them in a persistent way through proper citation.
- g. Enables reuse of data, ensuring appropriate formats and application of metadata.
- h. Ensures the integrity and authenticity of the data.
- i. Is adequately funded and staffed, and has a system of governance in place to support its mission.
- j. Possesses a technical infrastructure that explicitly supports the tasks and functions described in internationally accepted archival standards like Open Archival Information System (OAIS).

NOTE: This DMP is created as a derivative from the DMP belonging to the University of Minnesota and can be found at <https://www.lib.umn.edu/datamanagement/DMP>

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Appendix 3 Metadata Schema

Title⁴	Human-readable name of the asset. Should be in plain English and include sufficient detail to facilitate search and discovery. A name given to the publication or data element. All substitute or alternative titles must have a different Metadata Transmittal Schema.
Creator/contact point	An entity/person(s) primarily responsible for making the content of the resource. Contact person's name, ORCID number, and email for the asset.
Publication Date(s)	The date associated with the final report/dataset.
Description/Abstract	Human-readable description (e.g., an abstract) with sufficient detail to enable a user to quickly understand whether the asset is of interest. May include abstract, table of contents, reference to a graphical representation of content or a free text account of the content.
Subject and Keywords	The topic of the content of the resource. Tags (or keywords) help users discover your dataset; please include terms that would be used by technical and non-technical users.
Identifier⁵ and/or source	A unique identifier for the dataset/publication. Examples: URI, URL, DOI, ISNB, ISSN.
Collection and Related Documents	If there is a secondary dataset, cite source. The collection of which the dataset is a subset should be listed. Include all identifiers and/or sources.
Edition	Most recent date on which the dataset was changed, updated or modified.
Related Documents	Related documents such as technical information about a dataset, developer documentation, etc.
Coverage	Spatial location, temporal period, jurisdiction.
Language	The language of the dataset/publication.
Publisher/Distributor	FHWA and Wyoming Department of Transportation List all other publishing companies that this publication has been sent to.

⁴ To include alternate title; conference title; and journal title, if they are different.

⁵ To include record numbers; report numbers; NTIS number; TRIS Accession Number; OCLC Number; ISBN; ISSN; contract number; and DOI if available .

Funding agency	FHWA and Wyoming Department of Transportation
Access Restrictions	The degree to which this dataset could be made publicly available, <i>regardless of whether it has been made available</i> . Choices: public (Data asset is or could be made publicly available to all without restrictions), restricted public (Data asset is available under certain use restrictions), or non-public (Data asset is not available to members of the public).
Intellectual Property and Other Rights	This may include information regarding access or restrictions based on privacy, security, or other policies. This should also serve as an explanation for the selected “accessLevel” including instructions for how to access a restricted file, if applicable, or explanation for why a “non-public” or “restricted public” data asset is not “public,” if applicable.
License	The license or non-license (i.e. Public Domain) status with which the dataset or API has been published.
Code and software needs	List all code specific information. Is there specific software needed to run the database or data.
Format	The machine-readable file format. May include media type or dimensions. Used to determine the software, hardware or other equipment needed to display or operate the resources.
Choice of Repository	If you have a preference, list the repository where you will archive your data/datasets.

NOTE: Each separate report, dataset, collection, existing collection, and software developed must have its own table. All fields in this Schema must be completed at the time of the final report.

NOTE: This Metadata Schema is created as a derivative from the Common Core required fields that can be found at <https://project-open-data.cio.gov/schema/>.

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Appendix 4 Data Dictionary

Archive

A site where machine-readable materials are stored, preserved, and possibly redistributed to individuals interested in using the materials.⁶

Balance Score Card (BSC)

Strategic planning and management system to align activities to the vision and strategy of the organization, improve communications, and monitor organization performance against strategic goals. The Research Center is linking research to WYDOT's Balanced Score Card.

Catalog

Collection of data and/or datasets.

Completion date

The termination date of the contract.

Copyright

A statutory right that grants creators (authors) certain exclusive rights in their creations for a legally established duration of time.⁷

Copyleft

A general method for making a program (or other work) free, and requiring all modified and extended versions of the program to be free as well.⁸

Creator

Person who creates or generates the data or dataset.

Data

The recorded factual material commonly accepted in the scientific community as necessary to validate research findings.

Data Archiving

The systematic retention and re-use of transportation data that is typically collected to fulfill real-time transportation operation and management needs. Data archiving is also referred to as data warehousing or operations data archiving. Transportation operations and their respective sensors and detectors, and other data collection processes, are a potentially rich and detailed source of data about transportation system performance and characteristics. (**Note: Insert the phrase “and other data collection processes” to address private-sector data collection.**)⁹

⁶ <https://www.lib.umn.edu/dp/glossary>

⁷ <https://www.lib.umn.edu/dp/glossary>

⁸ <http://www.gnu.org/copyleft/copyleft.en.html>

⁹ <http://onlinepubs.trb.org/onlinepubs/circulars/ec166.pdf>

Data Management

The development, execution, and oversight of architectures, policies, practices, and procedures to manage the information lifecycle needs of an enterprise in an effective manner as it pertains to data collection, storage, security, data inventory, analysis, quality control, reporting and visualization.¹⁰

Data Owner

A Data Owner is the authority, individual, or organization having legal rights to specified data. The legal rights of a Data Owner include their personal information, copyright and intellectual property rights, as well as the rights to exploit and/or destroy the data. The rights of the Data Owner apply even when the owned data is collected by a third party and/or combined with data owned by others.¹¹

Data Set

A collection of data presented in tabular or non-tabular form.¹²

Digital Object

An object composed of a set of bit sequences.¹³

Digital Object Identifier

A digital object identifier (DOI) is a unique alphanumeric string assigned by a registration agency (the International DOI Foundation) to identify content and provide a persistent link to its location on the Internet. The publisher assigns a DOI when an article is published and made available electronically. All DOI numbers begin with a *10* and contain a prefix and a suffix separated by a slash. The prefix is a unique number of four or more digits assigned to organizations; the suffix is assigned by the publisher and was designed to be flexible with publisher identification standards.¹⁴

Digital Preservation

All the activities undertaken to ensure that the digital content is maintained in usable formats and can be made available in meaningful ways for current and future uses over time.

Intellectual property rights (IPR)

Conceptual property that has commercial value, including copyrighted or trademarked property such as literary or artistic works or information such as patents, business methods, or industrial processes.¹⁵

¹⁰ NCHRP 666, *Volume II: Guide for Target-Setting and Data Management*, Chapter 2: Guide for Data Management, p. II-31

¹¹ WYO ETS

¹² M-13-13

¹³ <https://www.lib.umn.edu/dp/glossary>

¹⁴ <http://www.apastyle.org/learn/faqs/what-is-doi.aspx>

¹⁵ WYO ETS

Metadata

Data about other data. Preservation metadata Implementation Strategies (PREMIS) data dictionary is a metadata dictionary developed for preservation.¹⁶ Describes characteristics or attributes of data. Metadata provides relevant information about the data.

Metadata: Preservation

The contextual information necessary to carry out, document, and evaluate the processes that support the long-term retention and accessibility of digital content. Preservation metadata documents the technical processes associated with preservation (*Migration/Refreshing*), specifies rights management information, establishes the authenticity of digital content, and records the chain of custody and provenance for a digital object.¹⁷

Metadata: Rights Management

Administrative metadata that indicates the copyrights, user restrictions, and license agreements that might constrain the end-use of digital content (including metadata files).¹⁸

Metadata: Structural

Information that provides information on how the digital object is organized or how compound objects are put together or related. This may include the page or chapter order of a book, its table of contents or indexes. Structural metadata is often used by software programs.¹⁹

Non-disclosure Agreement (NDA)

A legal contract that outlines confidential materials or knowledge that the parties wish to share with one another for certain purposes, but restrict from other use without proper authorization. It is a contract through which the parties agree not to disclose information covered by the agreement.²⁰

ORCID

ORCID provides a persistent digital identifier that distinguishes you from every other researcher and, through integration in key research workflows such as manuscript and grant submission, supports automated linkages between you and your professional activities ensuring that your work is recognized.²¹

Open Data

Publically available data structured in a way that enable the data to be fully discoverable and usable by end users.²²

Open Source

Open source refers to software in which the source code is available to the general public for use and/or modification from its original design. Open source code is typically created as a

¹⁶ <http://www.loc.gov/standards/premis/>

¹⁷ <https://www.lib.umn.edu/dp/glossary>

¹⁸ <https://www.lib.umn.edu/dp/glossary>

¹⁹ <https://www.lib.umn.edu/dp/glossary>

²⁰ WYO ETS

²¹ <http://orcid.org/>

²² M-13-13

collaborative effort in which programmers improve upon the code and share the changes within the community.²³

Retention Schedule

A list classifying public records by type and detailing the life cycle of these records, including the length of time records must be retained by the agency, and their eventual disposition.²⁴

Rights Owner

An individual, group, or organization that holds intellectual property rights to specific digital resource(s). See also: *Copyright*.²⁵

Start Date

The date that the contract went into effect.

Wyoming Public Records Act

Sections 16-4-201 through 205 of Wyoming statutes that define what constitutes a public record and details the responsibility for protection and disposition of those records.²⁶

²³ <https://www.lib.umn.edu/dp/glossary>

²⁴ WYO ETS

²⁵ <https://www.lib.umn.edu/dp/glossary>

²⁶ WYO ETS

Appendix 5 Proposal Checklist for RAC

The proposal checklist will be completed by each sitting RAC member after review of the proposals and after hearing the presentation by the principal investigator. The below checklist is an example only. Checklist will be tailored to each proposal.

Proposal Checklist for RAC Members

Proposal Name: _____

Amount Requested: _____

Number of Years Proposed: _____

Approval: Yes No

Proposal type:

Full: _____

Partial: _____

Literature Review: _____

Pooled Fund: _____

Extension Time/Funds: _____

NCHRP: _____

Proposal Score: _____

Proposal Ranking: _____

RAC Member: _____

PART I.

1. Is the proposed problem adequately defined and outlined?

Yes No

2. Is the proposal important and beneficial to the Wyoming stakeholders and WYDOT?

Yes No

3. Will the proposal have a positive long-term affect on WYDOT and the stakeholders, in other words, will the proposal provide a continuing, cooperative and comprehensive impact?

Yes No

4. Can all significant barriers to implementation be overcome?

Yes No

5. Is there a clearly defined and sufficient budget for the proposal?

Yes No

If your answer to all questions above is no, do not continue forward.

PART II.

Criteria/ Output	Details	Points	Score Range Definitions			Total Points and Comments
	Details – What are the expected outcome measures, goals and performance measures for this project.		1-6	6 to 12	12 to 20	
Cost Benefit/Savings (cost savings or cost avoidance)	Does this project have a significant cost or performance savings or avoidance?	20	Minimal productivity / savings/ improvement	Division wide productivity / savings/ improvement	Statewide productivity/ savings/ improvement	
Safety	Will this project enhance, benefit, or improve safety (which could include avoiding hurt, injury, or loss; risk; and manners in which to keep the public safe).	20	Increase safety in one area	Increase safety in multiple areas	Increase safety across WYDOT and the State	
New engineering knowledge or methodology implemented	Will this project provide new engineering knowledge or implement a new methodology?	20	Does not propose new engineering knowledge or methodologies	Moderately changes existing knowledge or methodologies	Changes existing knowledge or methodologies	
State of Good Repair	Ensure WYDOT Proactively Maintains Critical Transportation Infrastructure in a State of Good Repair.	20	Does not provide for maintenance of critical transportation infrastructure.	Moderately provides for maintenance of critical transportation infrastructure.	Significantly assists WYDOT in the maintenance of critical transportation infrastructure.	
Positive Impact on Environment/Environmental	To what extent does this project have a positive impact on the environment?	20	Does not impact	Improves some relations	Totally improves relations	

Sustainability						
TOTALS						

PART III. Implementation

1. Could the results from this project be implemented immediately?
2. Whose responsibility would it be to implement this project?

PART IV. Contractor/Principal Investigator Audit Information

1. Is the contractor financially stable: Yes No
2. Quality of management systems: Yes No
3. History of performance:

4. Are there any findings from any audits: Yes No

5. Is the applicant able to effectively implement statutory, or regulatory requirements: Yes No


6. Other requirements:

Appendix 6 Research Project Feedback Form Template

This form should be finalized within 3 months after the final report is published.

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RESEARCH FEEDBACK FORM

Principle Investigator:	
Contracting Agent:	
Project Title:	
Project Champion:	

PROPOSAL PROCESS	Rate your satisfaction with the proposal process:	<input type="checkbox"/> Very Satisfied <input type="checkbox"/> Satisfied <input type="checkbox"/> Dissatisfied
	What did you like about the proposal process?	
	What did you dislike about the proposal process?	
RESEARCH PROGRAM STAFF	Rate your satisfaction with the Research Program Staff:	<input type="checkbox"/> Very Satisfied <input type="checkbox"/> Satisfied <input type="checkbox"/> Dissatisfied
	As a researcher, what suggestions can you provide to improve the management and administration of the program?	
PROJECT SPONSOR To be answered by Principle Investigator only	Rate your satisfaction with the Project Sponsor:	<input type="checkbox"/> Very Satisfied <input type="checkbox"/> Satisfied <input type="checkbox"/> Dissatisfied
	What suggestions can you provide to improve the interaction with the program sponsor?	
CONTINUOUS IMPROVEMENT	Please provide other suggestions to improve the Research Program.	
LESSONS LEARNED	Briefly, what are the most important and transferrable lessons learned from this project:	
RESEARCH RESULTS	In this area insert the major tasks from the project, and whether the tasks were completed or if any fell short. Please also, provide an explanation as to why the task was not completed. Remember that negative results or incomplete tasks may be a success for your project.	

NOTE: This Research Feedback Form is created as a derivative from the Research Feedback Form that can be found in the research report entitled *Evaluation of WYDOT's Research Center and Research Program*, P. 125,

https://ntl.bts.gov/lib/51000/51900/51955/EVAULATION_OF_WYDOTS_RESEARCH.PD

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Appendix 7 WYDOT Research Project Evaluation Template Phase 1



PROGRAM PERFORMANCE EVALUATION PHASE I

Project Name:

Project ID Number:

Start Date:

Completion Date:

Principal Investigator:

WYDOT Sponsor:

*This form is to be completed nine months after the research report is published.
Select one corresponding box for each question.*

1) Were all of the proposed objectives of the research project fulfilled?

- All objectives were fulfilled
- Some objectives were fulfilled
- No objectives were fulfilled

2) Expected future level of implementation within WYDOT.

- Full Implementation
- Partial Implementation
- No Implementation
- Results do not recommend implementation

3) External technology transfer.

- Any national, Regional, or Local presentations, publications, etc.
- No external technology transfer

4) Internal technology transfer.

- Presentation created and used by the Research Center or relevant departments within WYDOT

No internal technology transfer

5) **Was a research report created?**

A professional and concise research report was created, meeting WYDOT's expectations

No research report was created or an inadequate research report was submitted

6) **Was the research project completed within its proposed timeline?**

The project was completed within its proposed timeline or within approved extension

The project was completed within one month of its proposed timeline

The project was completed after one month of its proposed timeline

The project was not completed

7) **Was the research project completed within its proposed budget?**

The project was completed within its proposed budget or within an approved funding increase

The project was not completed within its budget

NOTE: This Research Feedback Form is created as a derivative from the Project Evaluation Form that can be found in the research report entitled *Evaluation Department of Transportation's Research Program: A Methodology and Case Study*, P. 104, http://ntl.bts.gov/lib/51000/51800/51882/FHWA_1202F_RS_03211_Evaluating_DOT_REsearch_Programs.pdf

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Appendix 8 WYDOT Research Project Evaluation Template Phase 2



PROGRAM PERFORMANCE EVALUATION

PHASE 2

Project Name:

Project ID Number:

Start Date: Completion Date:

Principal Investigator:

WYDOT Sponsor:

*This form is to be completed at a minimum 2 years after a research project has been completed.
Select one corresponding box for each question or fill in application question.*

1) Have the results of this research project contributed to WYDOT's Mission and/or Goals?

- Yes
 No

2) If yes, briefly describe which aspects of WYDOT's Mission and/or goal have been advanced or affected by the results of the research project:

3) Have the results of this research project been implemented within WYDOT?

- Full Implementation
 Partial Implementation
 No Implementation

4) What is the cost/benefit associated with this project?

- Benefits associated with results of project exceeds costs of project

Benefits associated with results of project do not exceed costs of project

5) **Have the results of the project had any impacts on nations, regional or local organizations or agencies?**

Yes

No

6) **If yes, briefly identify the organization or agency that was impacted, and what affect the research project had on them:**

7) **Has additional research been pursued or conducted as a result of this project within WYDOT?**

Yes, additional research has been approved

No, additional research has not been approved.

8) **If yes, identify the project.**

NOTE: This Research Feedback Form is created as a derivative from the Project Evaluation Form, which can be found in the research report entitled *Evaluation Department of Transportation's Research Program: A Methodology and Case Study*, P. 106, [http://ntl.bts.gov/lib/51000/51800/51882/FHWA_1202F_RS_03211_Evaluating_DOT REsearch Programs.pdf](http://ntl.bts.gov/lib/51000/51800/51882/FHWA_1202F_RS_03211_Evaluating_DOT_REsearch_Programs.pdf)

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Appendix 9 Library Research Request Form Template

Name and Contact information:
Problem Statement: Aspects of the problem that are significant. How the problem adversely affects transportation facilities or services. The most pertinent findings from any literature review already conducted.
Keywords:
Time frame:

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Appendix 10 Format for 508 Captions for Nontext Elements Template

- Figure 1. Graphic. Name of graphic. [Insert 508 caption for graph.]
- Figure 2. Photo. Name of photo. [Insert 508 caption for photo.]
- Figure 3. Formula. Name of formula. [Insert 508 caption for formula.]
- Figure 4. Chart. Name of chart. [Insert 508 caption for chart.]
- Figure 5. Equation. Name of equation. [Insert 508 caption for equation.]

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GLOSSARY OF TERMS

ADMINISTRATIVE TERMS, DEFINITIONS AND ORGANIZATIONS ASSOCIATED WITH THE RESEARCH CENTER AND RESEARCH LIBRARY

Airport Cooperative Research Program (ACRP)

ACRP is an industry-driven, applied research program that develops near-term, practical solutions to problems faced by airport operators. ACRP is managed by the Transportation Research Board (TRB) and sponsored by the Federal Aviation Administration (FAA).

<http://www.trb.org/ACRP/ACRP.aspx>

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO works to educate the public and key decision makers about the critical role that transportation plays in securing a good quality of life and sound economy for our nation. Representing all 50 states, the District of Columbia, and Puerto Rico, AASHTO serves as a liaison between state departments of transportation and the Federal government. AASHTO is an international leader in setting technical standards for all phases of highway system development. Standards are issued for design, construction of highways and bridges, materials, and many other technical areas. One of the important standing committees that directly influences national research objectives is the AASHTO Standing Committee on Research.

<http://www.transportation.org/Pages/default.aspx>

Annual Research and Development Work Program Report

The Work Program is a detailed yearly budget for the Research Center, which is mandated by the *Planning and Research Program Administration Federal Rules (23 C.F.R., Part 420.111(a))*, and which includes a description of proposed work programs and costs, and must summarize all funding as follows: a) federal share by type; b) matching rate by type; c) state and/or local matching share; and d) other state or local funds. See also *23 C.F.R. Part 420.111(b)(1)*.

Applied Research

The study of phenomena relating to gained knowledge or understanding necessary for determining the means by which a recognized need may be met; the primary purpose of this kind of research is to answer or solve a problem. *23 C.F.R. Part 420.203*.

Asset Management

A strategic and systematic process of operating, maintaining and improving physical assets, with a focus on both engineering and economic analysis based upon quality information, to identify structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that will achieve and sustain a desired state of good repair over the life cycle of assets at a minimum practicable cost. *MAP-21, Pub. Law 112-141 – July 6, 2012 – 126 STAT. 419, Sec. §1103*.

Basic Research

The study of phenomena and of observable facts, without specific applications towards processes or products in mind; the primary purpose of this kind of research is to increase knowledge.

MAP-21, Pub. Law 112-141 – July 6, 2012 – 126 STAT. 419, Sec. §1103.

Consultation Services

Consultants refer to engineering firms, architectural firms, surveying firms, educational institutions, and other firms or individuals engaged in providing consulting or other professional services. The term architectural and engineering services in this context means professional services or an architectural or engineering nature performed by contract that are associated with research, planning, development, design, construction, alteration, or repair of real property. WYDOT Engineering Services is responsible for administering all consultant services and agreements except those for research contracts sponsored by the RAC.

Demonstration Project

A formal research project that is conceived to apply specific research results to an actual highway construction project, maintenance operation, or operating procedure. This type of project is intended to demonstrate the value and applicability of specific research results. This type of project may include experimental evaluation projects, applied demonstrations, implementation projects, and operational tests. As with all research projects using state planning and research (SP&R) funding, demonstration projects also require the designation of a WYDOT Representative to supervise the project.

Exploratory Advanced Research

Research that falls under this category is usually long term, higher risk research with potentially dramatic breakthroughs for improving the durability, efficiency, environmental impact, productivity, and safety aspects of highway and inter-modal transportation systems. *23 U.S.C. §502(e)*.

Federal Highway Administration (FHWA)

The Federal Highway Administration (FHWA) is an agency within the U.S. Department of Transportation that supports state and local governments in the design, construction, and maintenance of the nation's highway system (Federal Aid Highway Program) and various federally and tribal owned lands (Federal Lands Highway Program). Through financial and technical assistance to state and local governments, FHWA is responsible for ensuring that America's roads and highways continue to be among the safest and most technologically sound in the world. FHWA is headquartered in Washington, D.C., with field offices across the United States, including the Wyoming field office in Cheyenne, Wyoming. <http://www.fhwa.dot.gov/>.

The FHWA performs its mission through two main programs: 1) The Federal-Aid Highway Program, which provides Federal financial assistance to the States to construct and improve the national highway system, urban and rural roads, and bridges; and 2) the Federal Lands Highway program, which provides access to and within national forests, national parks, Indian reservations and other public lands. To support these program areas, FHWA conducts and manages a comprehensive research, development, and technology program.

Final Report

A report documenting a completed RD&T study or activity.²⁷ See Chapter 9 for full details on the final report.

Fiscal Year (WYDOT)

A twelve-month period beginning on October 1 each year and ending on September 30 of the following year.

Hazardous Materials Cooperative Research Program (HMCRP)

HMCRP conducts research intended to advance current knowledge and practice relating to hazardous materials transportation.

In-House Research Project

A formal type of study undertaken by a WYDOT program, generally without the contracted aid of an outside investigator.

Local Technical Assistance Program (LTAP)

A national network of technology transfer centers that provides training, technical information, workshops, problem solving assistance, newsletters, video libraries, etc. to local city and county agencies in an effort to improve safety and efficiency.²⁸ LTAP and Tribal Technical Assistance Program (TTAP) are composed of a network of 58 Centers – one in every state, Puerto Rico and the regional centers serving tribal governments. The LTAP/TTAP Centers enable local counties, parishes, townships, cities and towns to improve their roads and bridges by supplying them with a variety of training programs, an information clearinghouse, new and existing technology updates, personalized technical assistance and newsletters. <http://www.ltap.org/>

National Cooperative Freight Research Program (NCFRP)

National Cooperative Freight Research Program (NCFRP) is sponsored by the US Department of Transportation's Research and Innovative Technology Administration (RITA) and managed by the National Academies, acting through its Transportation Research Board (TRB). NCFRP carries out applied research on problems facing the freight industry that are not being adequately addressed by existing research programs. <http://www.trb.org/NCFRP/NCFRP.aspx>

National Cooperative Highway Research Program (NCHRP)

This research program is sponsored by the state departments of transportation and the Federal Highway Administration. NCHRP is administered through the National Academy of Sciences' Transportation Research Board (TRB). Funds are provided to support this program through an annual agreement allocation devised by the AASHTO and FHWA. The annual agreement currently requires that each state department of transportation contribute five and one-half percent of its total Federal SP&R appointment. The AASHTO Board of Directors has the prerogative to set or adjust this apportionment rate. <http://www.trb.org/NCHRP/NCHRP.aspx>

²⁷ 23 C.F.R., Part 420.203.

²⁸ 23 C.F.R. §504(b).

National Research Advisory Committee (National RAC)

The RAC to the AASHTO Standing Committee on Research supports the activities of SCOR and is committed to a proactive committee promoting quality and excellence in research and in the application of research findings to improve state transportation systems. Each AASHTO Member Department is represented on RAC.

<http://research.transportation.org/Pages/AboutSCORandRAC.aspx>

Peer Exchange

A review conducted periodically (generally every three years) with the assistance of other state research managers as an aid to help maintain conformance with Federal requirements regarding the management of the SP&R research program. The purpose of the peer exchange is to review processes currently in place, share WYDOT's successes, and to exchange information on how these processes could be improved. *23 C.F.R. Part 420.203.*

Performance Based Research

All surface transportation research and development projects shall include a component of performance measurement and evaluation and shall be outcome-based. *23 U.S.C. §502(a)(7).*

Pooled Fund

Cooperative funding of a research project by two or more state and/or federal highway agencies, and possibly other entities. A study is given pooled fund designation by FHWA.

<http://www.pooledfund.org/>. See Chapter 8 for full details on Pooled Funds.

Pre-Proposal

The intent of the pre-proposal is to give the presenter a feeling of the RAC's opinion on the merits of investigating the problem through a research project, without consuming a large amount of time or effort. See Chapter 9 for full details on pre-proposals.

Principal Investigator (PI)

The lead researcher who is responsible for the technical direction of the work. Because the PI is expected to have the primary responsibility, he/she is expected to be available and actively involved in the research efforts for the full contract period. Principal investigators are approved by the Research Advisory Committee (RAC).

Project Authorization

Authorization to proceed letter which, when forwarded to the Principal Investigator by the State Research Manager, authorizes the research project to begin. This letter can only be sent after proper legal instruments have been signed by WYDOT's legal staff, WYDOT's Executive Staff, the contractor, and funding approval is received from FHWA and WYDOT's budget office.

Project Budget.

That portion of a research proposal that depicts the total funds required for work accomplishment over an entire study's duration. The budget is divided into line items that depict both direct costs and indirect costs, and is subdivided by fiscal years. For information on budgets see *2 C.F.R. 200 et seq.*

Direct Costs

Elements of a budget which include salaries, wages, fringe benefits, supplies, materials, travel, expendable equipment, non-expendable equipment, equipment rental, laboratory use fees, and data processing expenditures.

Indirect Costs

Elements of a budget which cover clerical, accounting, bookkeeping, procurement, and other administrative services for which no charge is identified or allowable elsewhere in the direct costs. Indirect Costs are also referred to as overhead. Indirect costs also cover university administrative costs for research projects sponsored by WYDOT.

See Chapter 7 for full details on Budgets.

Project Champion

A WYDOT employee who voluntarily or by assignment assists the Principal Investigator in assuring the research project remains within budget, that the research project remains on track, answers technical and other questions the Principal Investigator may have, and addresses any changes in scope of work, key personnel, and disengagement from a project for more than three months. The Project Champion further updates the Research Manager to any changes. The Project Champion also is tasked with assisting with the implementation process for the research project.

Proposal

A proposal is a systematic controlled inquiry involving analytical and experimental activities that primarily seek to increase the understanding of underlying phenomena. Both WYDOT employees and concerned stakeholders can submit proposals for review by the RAC. Proposals may be for statewide, regional or national projects. Requests for procurement are not used when preparing proposals and pre-proposals, and the format for submitting proposals is listed below in Chapter 9.

Research

A systematic controlled inquiry involving analytical and experimental activities that primarily seek to increase the understanding of underlying phenomena. Research can be basic or applied. *23 C.F.R .Part 420.203.*

Research Advisory Committee (RAC)

The RAC reviews, evaluates, and prioritizes all proposals and problem statements for WYDOT Research Center projects for which SP&R funding is required. *WYDOT Policy Number 4-1(II).* See Chapter 5 for details on the RAC duties.

Research, Development, and Technology Transfer (RD&TT)

This term encompasses all activities necessary to the generation, investigation, communication, and application of new or innovative transportation technologies. *23 U.S.C. §502(b).*

Research in Progress (RiP)

TRB online database of active transportation research projects. <http://rip.trb.org/>

Strategic Highway Research Program 2 (SHRP II)

SHRP II's mission is to deliver efficient, practical solutions to plan, renew and operate the nation's highway network through the collaborative efforts of the FHWA, AASHTO, and TRB.

Stakeholder

Stakeholders can include states, metropolitan planning organizations, local governments, the private sector, researchers, research sponsors, and other affected parties, including public interest groups. <http://rip.trb.org/>. For the purpose of this document, the term stakeholder also includes WYDOT personnel.

Standing Committee on Research (SCOR)

AASHTO relies on SCOR to represent the Associations' interests in all research activities for all transportation modes. The Committee makes reports and recommendations on the National Cooperative Highway Research Program (NCHRP) and other activities to the AASHTO Board of Directors. <http://research.transportation.org/Pages/default.aspx>

State Research Project

A research project using 80 percent federal SP&R funding and a 20 percent state match. 23 *U.S.C. §505(c)*. State research projects generally do not involve participation by other states.

State Research and Development Engineer (also the State Programming Engineer)

The person responsible for the overall management of the Research Center. See Chapter 5 for details on State Research and Development Engineers.

State Research Manager

The person directly responsible for the workings of the WYDOT Research Center. See Chapter 5 for details on State Research Manager.

Technology Transfer

Activities that lead to the adoption of a new technique or product by users and involve dissemination, demonstration, training, and other activities that leads to eventual implementation. 23 *C.F.R. Part 420.203*.

Transit Cooperative Research Program (TCRP)

A national transit research program authorized in July 1992 and administered under the cooperative agreement by the National Academy of Sciences' Transportation Research Board, the Federal Transit Administration, and the Transit Development Corporation Incorporated. The Federal Transit Administration funds this program. <http://www.trb.org/TCRP/Public/TCRP.aspx>

Transportation Research Board (TRB)

A unit of the National Research Council (NRC). The NRC is a private, nonprofit institution that is the principal operating agency of the National Academy of Sciences and the National Academy of Engineering. TRB's mission is to promote innovation and progress in transportation by stimulating and conducting research, facilitating the dissemination of information, and encouraging the implementation of research results.

<http://www.trb.org/Main/Home.aspx>

Transportation Research Information Service (TRIS)

A database containing numerous records of published transportation research. TRIS Online is a collaborative effort between the Transportation Research Board, National Research Council, National Academies, the Bureau of Transportation Statistics, and U.S. Department of Transportation, and provides a public-domain, web-based version of the bibliographic database as a component of the National Transportation Library, and enhances transportation research , safety, and operations by sharing knowledge and information. <http://www.trponline.org/>

University Transportation Centers (UTC)

Under the management of the U.S. Department of Transportation (USDOT), selected universities are chosen as international centers of transportation excellence and mandated to advance U.S. technology and expertise in the many disciplines comprising transportation through the mechanisms of education, research, and technology transfer. <http://www.rita.dot.gov/utc/home>

WYDOT Executive Staff

Individuals authorized to oversee the workings of WYDOT. The Executive Staff is comprised of the Director, Chief Engineer, Aeronautics Administrator, Engineering and Planning Engineer, Highway Patrol Administrator, Support Services Administrator, and Technical Services Engineer.

http://www.dot.state.wy.us/wydot/administration/executive_staff/exec_staff_profile

WYDOT Research Center (Research Center)

A program within the programming unit charged with administering research projects using SP&R funds. The Research Center manages over one million dollars in research projects annually; is set up to assist in research studies for WYDOT projects; and is federally mandated.⁽²⁹⁾ The Research Center tracks the progress of all research studies, progress reports, yearly reports and final reports to ensure that performance measures, outcomes, outputs, and cost benefit analysis measures are met when funding research studies. The Research Center also houses the Research Library and monitors the available electronic libraries (E-Library).

²⁹ 23 U.S.C. §501, *Research, Technology, and Education*; 23 U.S.C. §101 et. seq., *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)*; 23 C.F.R. Part 450.100, *Planning Assistance and Standards*; 23 C.F.R. Part 420, *Planning and Research Program Administration*; and Pub. L. 112-141, July 6-2012, 126 Stat. 405, *Moving Ahead for Progress in the 21st Century Act (MAP-21)*

