

**[PLEASE NOTE THE MDT RESEARCH PROJECTS PROGRAM
IS A CONTRACT PROGRAM, NOT A GRANT PROGRAM]**

Title

by

Name

Position

Affiliation

A proposal prepared for the

Montana Department of Transportation

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Date

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Note: Figure titles go below figures.

PROBLEM STATEMENT

Concisely express your understanding of the problem presented. If the proposal is in response to a Request for Proposal (RFP) or Research Problem Statement, do not repeat the wording of the RFP or Research Problem Statement; rather, demonstrate your insight into the problem.

BACKGROUND SUMMARY

Include background information on the research topic. Summarize the findings of a preliminary literature search and state the relationship of the proposed study to prior and current research. At a minimum include the following as part of the preliminary literature search:

1. TRB's Transportation Research International Documentation (TRID, <https://trid.trb.org/>) database, which includes results from the TRB Research in Progress (RIP) database (<https://rip.trb.org/>).
2. MDT's preliminary literature search or review: Ask MDT for their literature review/summary, if one was completed.

The summary should reveal your understanding of underlying principles and should clearly indicate your appreciation of the problem. The importance of this part of the proposal should not be underestimated. A comprehensive background summary ensures all aspects of the research topic have been adequately considered so new research can build upon prior work rather than duplicate it.

BENEFITS AND BUSINESS CASE

Identify potential benefits expected from the research. Describe how the research results can be used, and by whom, to improve transportation practice. Some possible benefits include:

- ★ Cost savings (both MDT and the affected public)
- ★ Economic development
- ★ Efficiency gains
- ★ Environmental gains
- ★ Improved infrastructure
- ★ Improved procedures and processes
- ★ Improved quality
- ★ Improved service
- ★ Improved system reliability
- ★ Increased life cycle
- ★ Increased safety
- ★ Reduced Congestion
- ★ Time savings
- ★ Other user benefits

The business case is the reason for initiating, need for the results, and description of the value and benefits of the project. The business case addresses such items as: will the problem continue unless research is done; what real world costs are associated with the problem; does future State activity depend upon this research; what savings in money or time might result from the research; what improvements could be made from the research (safety, efficiency, services); would the research be completed prior to a major implementation (timeliness); who will benefit from this research project; and what area within the Department will benefit from or be affected by this research.

OBJECTIVES

State the technical objectives of the study. Explain and justify any deviations from the objectives listed in the RFP or Research Problem Statement, if applicable.

Describe in very brief terms the expected product(s) of the research. The objective should be short, concise, and accurate. Don't put details in the objective related to how the study will be done unless some new or innovative research methodology is the key element of the research. The details will be in the research plan and reflected in the final product. If your objective is "to produce a new fuel-efficient vehicle," say so. Don't say that the objective is "to produce a new fuel-efficient vehicle, including the design, construction, testing, and installation of all necessary components including body, frame, power train, tires, wheels, seats, mirrors, and other appurtenances to be determined through a survey of user needs, performance measures, and financial constraints." If those things need to be done to accomplish the objective, put them in task statements.

RESEARCH PLAN

Describe how the objectives will be achieved through a complete and logical plan. Use the task descriptions given in the RFP or Research Problem Statement, if applicable, as a basis for developing the research plan. Specifically identify the tasks that will be performed. Explain and justify any deviations from the tasks listed in the RFP or Research Problem Statement, if applicable. Begin with Task 0: Project Management.

To the extent possible, identify major operational activities and relate these activities to staffing requirements, time schedules, and cost estimates. Describe how the activities will be carried out. Research methodology shall be described in the greatest level of detail that the Principal Investigator's understanding of the problem permits and to permit evaluation of the probability of success in achieving the objectives.

The plan should also describe the technical basis of the research. Describe the following and other such items, as appropriate:

- ★ Principles of theories to be used
- ★ Significant variables to be tested
- ★ Analytical and statistical procedures
- ★ Experimental and testing procedures
- ★ Evaluation criteria
- ★ Inspection and survey methods
- ★ Controls to be used
- ★ IT components (software, hardware, data management and/or technology devices, including maintenance; a special process may need to be followed)
- ★ Material, procedure, or device development

Ongoing communication between the research team and MDT staff and project QA/QC are critical to the success of the project. The proposal must include a description of the steps the research team will take to ensure QA/QC and regular communication occurs with MDT's Research Programs staff and the Technical Panel throughout the project.

Add acceptance/decision points where actions for Technical Panel review, approval, acceptance, or rejection are required.

The plan should include a kick-off meeting as the first activity of the project after contracting. The project kick-off meeting serves to ensure everyone involved in the research project is informed of the contractual obligations, scope of work, data requirements and source, deliverables, project milestones, timetable, and other project elements. This meeting will also

provide an opportunity to clarify technical issues or concerns with the project. If necessary, an amplified work plan will result from the kick-off meeting. This amplified work plan is due two weeks following this meeting.

It is absolutely critical to include the data (time range, fields, etc.) needed for the project, the source of the data, and how the data will be obtained from the source. For example, if the data is only in hard copy format, will the researchers go to the source and enter the data into a spreadsheet or database, or will the source provide this data entry? Be very specific.

If a literature review is a component of the research, typically, it is one of the first tasks, with this task report being one of the first deliverables. However, the literature review should continue throughout the research and the updated information should be updated for the final report.

If possible, the research plan should include the development of qualitative and quantitative performance measures, such as process improvements, and a cost/benefit analysis for the research and potential implementation. A performance measures report is a required deliverable.

Also, as appropriate, the research plan should include the development of a technology transfer/communication/marketing plan(s) and training. Consider such factors as the target audience, end users, communication methods, events, responsible person/area, required approvals, and efforts needed for full implementation. Timing for communications should also be considered.

In addition, the plan should include a final presentation. An overview of the project will be provided with detailed discussions on the findings and recommendations. This presentation will possess strong technical components and in-depth discussions focusing primarily on the research and implementation.

The plan should also include an implementation meeting to be facilitated by the project's Principal Investigator and will include the project Technical Panel and others as appropriate. The purpose of the meeting is to review the Principal Investigator's implementation recommendations to determine which will be implemented as is, with changes, and which will not be implemented. The discussion will include other items, not mentioned in the project final report, to be implemented, as well as a determination of any unmet research needs. The Principal Investigator will document this discussion in the form of an implementation report, with the following sections: introduction and purpose, implementation summary, and implementation recommendations (includes Principal Investigator's recommendations and MDT response). It may be possible to combine the implementation meeting with the final project presentation.

Other meetings may be deemed necessary by MDT or the research team and should be included in the proposal.

All meetings should be included in the proposal. The Principal Investigator is responsible for preparing meeting materials and submitting these materials to the MDT Research Project Manager at least two weeks in advance of the meeting. Likewise, the Principal Investigator is responsible for submitting meeting notes for Technical Panel review no later than two weeks following the meeting.

Any instrument (survey, interview questions, etc.) and the specific contact list will need to be reviewed and approved in advance by the project Technical Panel.

If test methods are to be developed as a part of this project and proposed as national standards, the order of submittal shall be first to American Association of State Highway and Transportation Officials (AASHTO), in cooperation with MDT. If the test method or specification is not adopted through the AASHTO process, the research team will be free to submit to the American Society for Testing and Materials (ASTM) or other national standard organizations. See https://transportation.org/materials/wp-content/uploads/sites/36/2023/01/How_to_AASHTO_Materials_Standards.pdf for document on How to Turn Materials Related Research into a Formal AASHTO Materials Standard Specification.

INTELLECTUAL PROPERTY

Describe any potential intellectual property issues.

MDT AND TECHNICAL PANEL INVOLVEMENT

Describe any assistance that may be required from MDT and your research project Technical Panel, include the timeframe(s) in which this assistance is required. Include such items as:

- ★ Traffic control
- ★ Construction
- ★ Highway maintenance
- ★ Drilling and sampling
- ★ Access to transportation facilities, including such items as: MDT headquarters, MDT district offices, field locations
- ★ Space at MDT headquarters or district offices, including such items as: office space, network access, computer equipment
- ★ Detailed Information/Data request from MDT staff
- ★ Access to written information or databases
- ★ Interviews
- ★ Review of deliverables

OTHER COLLABORATORS, PARTNERS, AND STAKEHOLDERS

Identify individuals and/or organizations that need to be brought into the fold to create buy-in and acceptance of the results; review results; and/or participate in communications, decisions, and/or deployment. Specify the relationship and roles.

PRODUCTS

List the products that will be delivered during the research project. All products required for implementation must be included as project deliverables. Deliverables might include:

- ★ Reports
 - Progress Reports
 - Task Reports
 - Final Report
 - Project Summary Report (text and graphics only; see [example](#))
 - Implementation Report (text and graphics only; see [example](#))
 - Performance Measures Report (includes both qualitative and quantitative performance measures, as appropriate; see [example](#))
- ★ Data Management Plan
- ★ Technology Transfer/Communication Plan
- ★ IT Components
- ★ Manuals
- ★ Photographs
- ★ Video or other audio/visual materials
- ★ Training Materials
- ★ Guidebooks
- ★ Specifications
- ★ Detail Drawings
- ★ Poster
- ★ Project Webinar
- ★ TRNews Research Pays Off article

Unless otherwise directed in the RFP or contract, if applicable, always include the following items as products:

- ★ Progress Reports (monthly (required for private consultants), quarterly, or some other regular schedule that fits the project schedule, primarily speak to budget and schedule; quarterly progress reports are due by the end of the month following the reporting period; monthly or bimonthly are due by the 15th of the month following the reporting period)
- ★ Task Reports (more oriented toward technical progress and accomplishments; these reports must be written with sufficient detail such that they could be a chapter in the final report; due by the end of the month following completion of the task)

- ★ Final Report, including recommendations, an implementation plan and performance measures, as applicable
- ★ Data Management Plan
- ★ Project Summary Report
- ★ Implementation Meeting and Report
- ★ Performance Measures Report
- ★ Poster
- ★ Final Presentation
- ★ Project Webinar

All marketing/information deliverables, which will be used as official MDT publications (i.e., flyer, brochure, manual, poster) and distributed to the public, must be prepared in conformance with MDT External Communications Policy, available upon request; Public Disclosure of Costs (MCA § 18-7-306); and Power to Contract for Printing- - Exception (MCA § 18-7-101).

Reports must be clear, concise, and submitted in MS Word and Adobe PDF format and follow MDT's [Report Writing Requirements](#). This document is updated periodically; it is up to the researcher(s) to ensure the latest version is used.

Products are expected to be of exceptional quality. Draft deliverables are the research team's vision of the complete and final deliverables. All draft deliverables must be spell checked and reviewed by a person. All proposals must address deliverable quality and how quality will be guaranteed (i.e., use of editing staff and/or peer reviewer).

RISKS

Identify risks to budget, resources, schedule, and scope. Identify potential mitigation measures, forewarning indicators, and contingencies. Determine impact and probability. Rate risks as high, medium, and low. Develop a plan to mitigate risks.

IMPLEMENTATION

MDT research projects are intended to produce results that will be applied. Describe how the research results may be able to be applied by MDT. To the extent possible, include the following:

- ★ Describe the form in which the findings may be reported, such as a mathematical model, a laboratory test procedure, or a design technique. Describe these results in terms of the user (e.g., practicing engineer, administrator).
- ★ Identify who would logically be responsible for applying the research results, such as AASHTO, Federal Highway Administration (FHWA), MDT, or a particular office within MDT.
- ★ Identify specific standards or practices that might be affected by the research findings, such as AASHTO or MDT specifications, MDT policies and procedures, legislation, or fiscal requirements.
- ★ Submit an implementation plan tied to performance measures. If an IT component is part of the implementation submit a work plan for update and maintenance.
- ★ Describe activities necessary for successful implementation.
- ★ Describe the criteria for judging the progress and consequences of implementation.
- ★ Provide an estimate of the costs of implementation.
- ★ Identify the long-term implementation activities and costs.
- ★ Identify barriers of implementation and how these barriers might be reduced or eliminated.
- ★ If the findings of a study are not suitable for immediate application in practice, the proposal should specify additional steps needed before application can occur (e.g., additional research, field testing, changes in policy, etc.).

It is understood the research may produce unanticipated findings, making changes in the implementation plan necessary. This is acceptable. The proposal selection, however, will be greatly influenced by the practicality and direction of the implementation plan presented in the proposal.

These items should be included in more detail in the implementation section of the final report and the implementation report.

SCHEDULE

Provide a graphical presentation illustrating the scheduling of the major research tasks on a monthly or quarterly basis, as appropriate (See Table 1 as an example). This chart should include all meetings and deliverables, and the specific date of each meeting and deliverable submittal.

The MDT Research Review Committee (RRC) approves project funding. This committee meets at most once a month. Check with MDT Research staff to ensure your start date is in sync with funding approval by the RRC or indicate time by months or quarters, as appropriate, rather than dates (i.e., month 1, month 2 or quarter 1, quarter 2, etc.).

Always allow one month for the initial MDT review of the first draft deliverables. All second draft deliverables must be submitted to MDT within two weeks after receipt of MDT comments. All future revisions must be submitted to MDT within one week of receipt of comments. Assume at least two review and revision cycles (three drafts) for all deliverables. Specific deliverable due dates should consider the following:

- ★ The first draft of the project summary and performance measures reports, as well as the project poster, should be scheduled to be due at least six weeks after the delivery of the first draft of the final report. This allows MDT to provide comments to researcher(s) and for those comments to be incorporated into these deliverables, reducing rework.
- ★ The final presentation and implementation meeting should be scheduled no earlier than two months following the first delivery of the project summary and performance measures reports. Again, this allows time for MDT to review these two reports and provide feedback to the researcher(s) before this meeting occurs. This meeting can occur as late as two months following MDT acceptance of all final deliverables and their posting on the project website.
- ★ The project webinar can be combined with the final presentation.
- ★ The first draft of the implementation report is due two weeks following the implementation meeting.

Time is of the essence. The time schedule must be realistic; do not anticipate any time extensions, barring unforeseen situations. This is your schedule and you must follow it. Contract end dates may go beyond your schedule; don't assume you have extra time to complete deliverables, as you do not.

Table 1: Project Time Schedule

Activities	Dates	2020												2021									
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10
Kick-off Meeting	3/1/20			■	◆			◆			◆			◆			◆						
1 – Literature Review			↑	■	■	■																	
Task 1 Report	6/15/20					■																	
Decision Point Meeting	6/30/20					◆																	
2 – Inspection Data Review and Processing						■	■	■	■														
Task 2 Report	9/15/20							■															
Decision Point Meeting	9/30/20							◆															
3 – Statistical Analysis								■	■	■	■												
Task 3 Report	12/15/20											■											
Decision Point Meeting	12/31/20											◆											
4 – Deterioration Curve Development												■	■	■									
Task 4 Report	3/15/21																■						
Decision Point Meeting	3/31/21																◆						
5 – Implementation Report	5/31/21																■	■					
6 – Final Reporting																							
6a – Draft Final Report	7/30/21																■	■	■				
6b – Project Summary Repo	7/30/21																		■				
6c – Final Report	10/15/21																				■		
6d – Final Presentation	10/31/21																					■	

- ◆ Quarterly Progress Reports
- ↑ Deliverable Due Dates

BUDGET

Show the detailed and **fully** itemized project cost by state fiscal year (SFY) and task. The state fiscal year runs from July 1 to June 30. Show all cost sharing, including in-kind. Payment is on a cost reimbursement basis, not to exceed the cost indicated in the proposal.

Include a table of key personnel with hourly pay rates and benefits itemized.

List and itemize all travel.

Meetings (except kick-off meeting) and all deliverables (except progress reports) must be itemized. If these meetings do not occur or the deliverables are deemed unnecessary, the budgeted amount will be deducted from the total contract amount.

Include a table fully itemized by task.

No budget amendments should be anticipated.

Example budget tables are shown in Tables 2-5.

Table 2: Detailed Project Budget

Labor Expenses											
Person	Role	Kick-off	Task 1	Task 2	Task 3	Total	Hourly Wage	Total Wages	Hourly Benefit	Total	Total Cost
X							\$	\$	\$	\$	\$
Y							\$	\$	\$	\$	\$
Z							\$	\$	\$	\$	\$
W							\$	\$	\$	\$	\$
V							\$	\$	\$	\$	\$
Total:							\$	\$	\$	\$	\$
Indirect Cost @ X%:											\$
Fixed Fee @ X%:											\$
Total Labor Cost:											\$
Direct Expenses											
Subcontractor: A											\$
Subcontractor: B											\$
In State Travel											\$
Out of State Travel											\$
Expendable Supplies											\$
Total Project Cost:											\$

Table 3: Travel Budget

Travel				
Assumption		Number	Unit Cost	Total
Airfare	2 trips for 2 persons + 1 trip for 1 person			\$
Hotel	2 trips for 2 persons + 1 trip for 1 person - 2 nights			\$
Rental Car	3 trips - 2 days per trip			\$
Meals	2 trips for 2 persons + 1 trip for 1 person - 2 days			\$
Total:				\$

Note: Travel must be in accordance with FHWA 48 CFR 31. In lieu of receipts, the per diem can be charged. However, the entire per diem must be paid to the traveler. Alcohol is not an allowable charge.

Table 4: Task, Meeting, and Deliverable Budget

Task, Meeting, and Deliverable Cost Breakout			
Item	Labor	Travel	Total
Task 1	\$	\$	\$
Task 2	\$	\$	\$
Meeting 1: Interim Meeting	\$	\$	\$
Task 3	\$	\$	\$
Deliverable: Spreadsheet	\$	\$	\$
Deliverable: Training	\$	\$	\$
Deliverable: Project Summary Report	\$	\$	\$
Deliverable: Implementation Report	\$	\$	\$
Deliverable: Performance Measures Report	\$	\$	\$
Deliverable: Final Presentation	\$	\$	\$
Total:	\$	\$	\$

Table 5: State Fiscal Year (SFY) (7/1 – 6/30) Breakdown

Item	State Fiscal Year (SFY)			Total Cost
	2020	2021	2022	
Salaries	\$	\$	\$	\$
Benefits	\$	\$	\$	\$
In State Travel	\$	\$	\$	\$
Out of State Travel	\$	\$	\$	\$
Expendable Supplies	\$	\$	\$	\$
Total Direct Costs	\$	\$	\$	\$
Indirect Cost – X%	\$	\$	\$	\$
<i>Total Project Cost:</i>	\$	\$	\$	\$

STAFFING

Include pertinent background information for each member of the research team, including subconsultants, significantly participating in the project. Describe how academic, professional, and research experiences relate to the project and their role in the project. Include a summary of past accomplishments in the same or closely related problem areas. Justify each research team members' participation.

Provide a table showing the number of person-hours devoted to each task by research team members, as illustrated in Table 6. List the names of principal investigators and other key professionals who will be involved. Support personnel may be identified by classification.

Table 6: Project Staffing

Name of Principal, Professional, Employee, or Support Classification	Role in Study	Task						Percent of Total Project Hours (total hrs./person /total project hrs.)	Percent of Time vs. Annual Basis (total hours/ person/ 2080 hr.)
		1	2	3	4	5	Total		
Professor A	Principal Investigator	60	60	60	60	60	300	20	14
Professor B	Co-Principal Investigator	15	25	20	20	0	80	5	4
Graduate Student 1	Field Testing	500	120	300	70	0	990	67	48
Graduate Student 2	Analysis	10	15	5	15	5	50	3	2
Editor	Report Preparation, Editing, and Review	5	10	5	10	20	50	3	2
TOTAL		585	230	390	175	85	1470	N/A	N/A

List current commitments of each project team member to other work in sufficient detail to permit assessment of the research team's ability to meet the proposal's commitments. List percentages of time committed to all projects, including the one described in this proposal, clearly showing the time is available for the project described in this proposal. Include a statement that the level of effort proposed for principal and professional members of the research team will not be changed without written consent of MDT.

FACILITIES

Describe the facilities available to accomplish the research. Indicate equipment necessary for completion of the research and specify any restrictions on its use.

Principal Investigators are expected to be fully capable of completing the proposed research prior to contracting. This includes having any necessary equipment on hand or acquiring the use of such equipment, such as through a lease agreement, and the expertise to obtain valid results. If additional equipment is proposed, identify and explain the need for it in the budget estimate and be prepared to develop a request for approval; all equipment purchases require approval by the FHWA as per 2 CFR 200.

National or state laboratory and technician certifications for activities relevant to the research project should be provided in the proposal. If the research requires laboratory and/or technician certification the proposer does not have at the time of submittal, the proposal will communicate the efforts to be made to obtain certification or committee approval to conduct testing with the proposed technicians and laboratories. Nonexpendable supplies and equipment purchased with MDT funds are MDT property and will be delivered to MDT when the project is complete.

REFERENCES