

# Evaluation of the WYDOT Research Center (2021)

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## **1. Introduction**

A systematic, well-designed, and implementable research program is one of the effective techniques to overcome the complex issues facing State Departments of Transportation (DOTs). These issues are generally addressed locally or regionally through the cooperation between DOTs and their state universities. Recognizing this need, it is essential for any research program to be subjected to a comprehensive evaluation every once in a while to ensure that the program is meeting its objectives. Some federally funded programs are required to do such evaluations based on pre-established performance measures. As a result, the Wyoming Technology Transfer (WYT2) Center, in collaboration with the Wyoming Department of Transportation (WYDOT), conducted a few WYDOT Research Center evaluations in the past two decades (Saha et al., 2019; Terfehr & Ksaibati, 2012; Schneider et al., 2008). Having such evaluations in place will ensure that the WYDOT Research Program is fulfilling its mission and it is relevant to the day-to-day operation of WYDOT.

Given the leverage of research dollars, enhancements in research effectiveness will yield a high return on investment. As a result, evaluations of research programs ensure that transportation agencies receive the highest return on their investments by providing insights into various research projects, analyzing data across all projects, and conducting detailed case studies for a select group of projects. The evaluation of projects will provide valuable lessons learned and recommendations for managing research studies in the future.

With this understanding, the WYDOT Research Program management contracted the WYT2 Center to analyze the research program, and provide strategic and operational recommendations and implementation assistance to increase program effectiveness. Previous WYDOT Research Center's evaluations established performance measures that have been enhanced and monitored over the years. These performance measures will be enhanced further and then utilized in the current proposed evaluation process.

This proposal presents several tasks for metrics that can be used to assess and communicate the research value at the WYDOT Research Center. The framework of this proposal should be able to draw out broader social, economic, and policy impacts. Hence, a formative approach focusing on identifying potential opportunities to enhance and demonstrate the effectiveness of the WYDOT Research Center will be developed.

## **2. Background**

This background section will briefly cover the previous phases to evaluate the WYDOT Research Center and Research Program as well as the requirement for federal agencies to set and use performance measures for management and budgeting.

The Wyoming Department of Transportation's Research Center receives approximately one million dollars in annual funding. A research program within an engineering organization, such as WYDOT, can be a valuable tool in contributing to meeting corporate goals. In transportation, effective investment in research creates knowledge and innovations that result in more cost-effective management of assets, improvements in safety and mobility, cost savings, and other public benefits. With this understanding, the WYDOT's Research Center management contracted (WYT2) Center to analyze the Research Program and provide strategic and operational recommendations and implementation assistance to increase program effectiveness. All previous evaluation phases concluded found that the WYDOT Research Program was an effective and valuable asset for WYDOT and the transportation community (Redd et al., 2008; Terfehr & Ksaibati, 2012; Saha et al., 2018; Greer & Ksaibati, 2019). In these previous phases, a methodology was developed for the evaluation of the WYDOT Research Center. The initial phases developed a process for monitoring the WYDOT Research Center based on specific performance measures. In addition, the performance measures for the research projects from 2010 to 2016 were reviewed and compared with a previous study completed in 2012. Feedback surveys and performance evaluation surveys were completed by Principle Investigators and WYDOT Project Champions. A methodology for conducting benefit-cost analysis (BCA) was also developed in the latest phase.

By law, the performance of federally funded research programs are expected to be evaluated regularly or on an ad hoc basis to measure how well a research program is being run. The Government Performance and Results Act (GPRA) has therefore necessitated federal agencies (Department of Transportation, Department of Agriculture, Department of Energy, etc.) to set master plans and use performance metrics to effectively manage and allocate budgets within the agencies. As a result, federal programs should have greater efficiency, effectiveness, and accountability (National Academy of Sciences, 1999). When evaluating a research program, three key areas need to be addressed. These areas are: process management, program quality, and program value. Generally, the use of performance measures and program evaluations can help research centers to easily meet their expectations and identify the most effective ways to assess the performance and research results at the federal agencies. According to the National Cooperative Highway Research Program (NCHRP) Synthesis 300, less than half of the States' DOT Research Programs have formal performance measurements in place for their research programs (Sabol, 2001).

Over the past decades, DOTs funded a wide variety of research programs to make the nation's transportation system safer and more competent. In the federal fiscal year of 2019, DOT had a research budget of more than \$1 billion (GAO, 2020). Given the expectations of highway research and the level of resources dedicated to it, it is important to know that DOTs are conducting high-quality research that is relevant and useful. In 2020, U.S. Government Accountability Office (GAO) issued a report on actions to improve DOT's internal collaboration and reliability of the information on research activities. These actions made recommendations to DOT, aimed at

improving the process for updating guidance to align its efforts with all leading practices. However, the number of resources, tools, and methodologies to effectively manage the research centers at the DOTs are still limited.

Traditionally, some transportation research programs in the United States were allocated funding based on earmarks. Earmarks are provisions in the legislation that allocates money for certain programs. In more recent transportation legislation, earmarks are being cut and programs like transportation research are now competing for funding. In the future, transportation legislation could decrease or drop earmarking completely. DOT research programs could also face similar funding cutbacks if the trends in transportation legislation remain. DOT research programs that can perform evaluations on the funded projects will probably improve the outputs of their programs as opportunities for improvement can be identified.

The state of New York established, through Operational Goal 94-8, the following list of areas that can be evaluated by performance measurements:

- Resources utilization.
- Evaluation of completed work.
- Rate completed work against standards.
- Compare similar projects for efficiency and effectiveness.
- Determine project outputs and performance.

From the list above, managers can then evaluate their programs by ensuring goals are being met, defend present resources, justify additional resources, measure efficiency, and improve performance (USDOT, 1997). The literature review in this proposed study will identify the knowledge gaps in what is known for the state DOT research programs about the tools, resources, and guidance available to effectively manage research programs. For example, there are few published reports on the evaluation of research programs across state DOTs, how research programs assess the quality of the funded research, and how agencies allocate these funds to different streams of research.

Finally, research centers at state DOTs need to develop a better understanding of what are the basic building blocks “ingredients” to make their research programs more effective and how these ingredients often come together in a research program to deliver quality and value. As a result, evaluating research programs regularly could help DOTs assess their programs and identify the missing ingredients in developing their recipes for success.

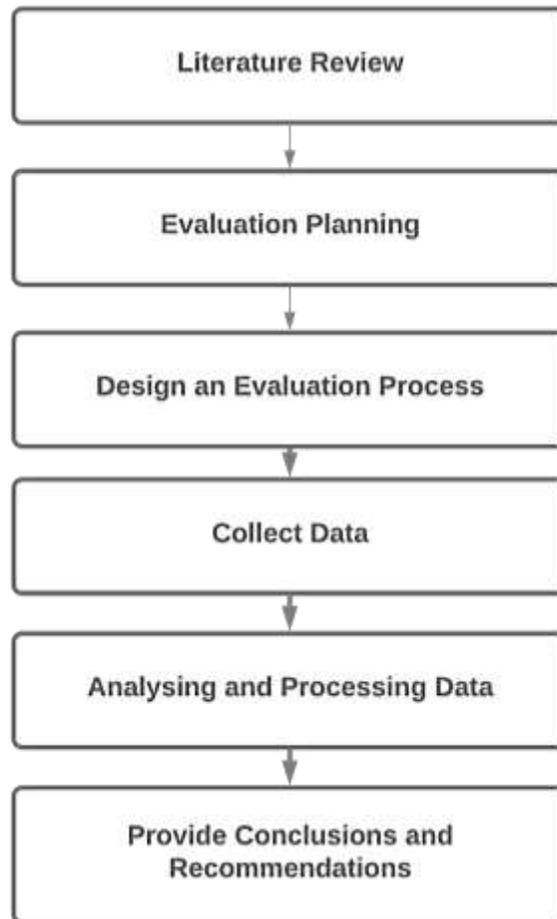
### **3. Objectives**

The main objectives of this study are to:

1. Evaluate the performance of the WYDOT Research Center based on the research studies that were conducted since 2017.
2. Investigate the development of new metrics (performance measures) that can be used to assess and communicate the research value at the WYDOT Research Center along with the performance measures currently used by the WYDOT Research Center.
3. Identify the current strength and potential opportunities to further enhance the efficiency and effectiveness of the WYDOT Research Center.
4. Make recommendations about the effectiveness of the WYDOT Research Program.

### **4. Research Tasks**

The goal of this proposed study is twofold: to present and justify the need for the evaluation of the WYDOT research center and research program (2021) study and to present the practical ways in which the proposed study should be conducted. Therefore, this section will briefly cover the tasks projected for this study. Figure 1 illustrates the general design elements and procedures for conducting the proposed study that is governed by federal standards.



**Figure 1. General Elements of Design And Procedures for the Proposed Study.**

The following research tasks will be performed to address the objectives of this study:

1. Review recent research evaluation frameworks used nationally, along with the tools/methods these frameworks included. A summary of the review will be extremely helpful in planning the evaluation.
2. Work closely with the WYDOT Research Center staff to identify all past projects initiated or completed, since 2017, and then evaluate the WYDOT Research Center performance based on the predetermined performance measures.
3. Identify the need for additional performance measures to assess and communicate the value of the WYDOT Research Center. Such potential new measures will be identified base on the results from the literature review and the availability of historical data.
4. Secure performance measure information from the WYDOT Research Center on all the selected projects completed since 2017.

5. Quantify the benefit associated with implementing selected WYDOT research projects. This task will be performed based on the results from the survey conducted on completed projects.
6. Perform detailed analysis on the proposals submitted to the WYDOT from 2017 to 2021. Such analysis will result in identifying the quantities and qualities of proposals. In addition, it will identify the equity in resource allocations among various WYDOT programs.
7. Compare the performance measures values from this evaluation to previous evaluations and make specific conclusions on the trends of performance measures over time.
8. Enhance the process (Checklist) that WYDOT RAC Members uses to make funding decisions by evaluating the effectiveness of the current checklist to ensure that it fulfills the emerging needs of WYDOT. The RAC members will be consulted to ensure that the checklist meets their immediate and future needs.
9. Develop a formal process (toolkits or templates) for WYDOT to monitor the implementation of research findings.
10. Summarize conclusions and provide recommendations about the effectiveness of the WYDOT Research Center.
11. Prepare a final report to combine all findings and recommendations of this study.
12. Present the findings of the study to WYDOT.

## **5. Study Outcomes**

This study will provide specific conclusions and recommendations about the value of the WYDOT Research Center. The following specific outcomes are expected at the conclusion of the study:

1. A final report with all the findings of the case studies will be provided. The report will clearly identify the strength and opportunities of the WYDOT Research Center.
2. A comprehensive comparison of past performance measures to current ones will be presented. Such comparison will help in identifying performance trend over time.

3. The conclusions and recommendations will be presented to the WYDOT Research center to facilitate the full implementation the recommendation of this study.

## 6. Timeline and Staffing

The tasks of this study require the contributions of one postdoctoral research fellow, one faculty member, and one graduate student.. This study is expected to commence after the Notice to Proceed is sent to the contractor, and be completed in 20 months.

## 7. Budget

The overall project budget is estimated as \$68,228. Table 1 shows the budget’s breakdown. The budget includes all costs associated with conducting all the tasks described in section 4.

**Table 1. Budget Breakdown.**

<b>Categories</b>	<b>WYDOT</b>
Faculty Salaries	\$9,900
Post Doc	\$10,900
Faculty/Post doc Fringe Benefits (36.6%)	\$7,613
Student Salaries	\$18,500
Student Fringe Benefits (2.4%)	\$444
<b>Total Personnel Salaries</b>	<b>\$39,300</b>
<b>Total Fringe Benefits</b>	<b>\$8,057</b>
<b>TOTAL Salaries &amp; Fringe Benefits</b>	<b>\$47,357</b>
Travel	\$1,500
Equipment/software	\$0
Supplies	\$2,000
Contractual	
Construction	
Other Direct Costs (Specify)*	\$6,000
<b>TOTAL Direct Costs</b>	<b>\$56,857</b>
F&A (Indirect) Costs	\$11,371
<b>TOTAL COSTS</b>	<b>\$68,228</b>

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