

**THEME 2**  
**PROBLEM STATEMENTS**

## **Theme 2 – Institutional and Organizational Issues**

The theme 2 problem statements presented in this section of the report relate to workforce development, communication, contracting, and organizational structure. The recommendations in this area are intended to address issues that include the impact of pavement management on funding and how to determine, promote, and effectively communicate the use and the benefits of pavement management.

# RESEARCH PROBLEM STATEMENT

## I. PROBLEM TITLE

*Communicating Pavement Management Information and Benefits*

## II. RESEARCH PROBLEM STATEMENT

An important part of establishing credibility in a pavement management system is presenting recommendations in a way that resonates with the audience. Historically, pavement managers have not been effective in "telling their story" in a way that influences the decisions of executives, the public, and other external stakeholders.

**Tasks:** The research will include the following tasks:

1. Identify current practices incorporating pavement management with strategic planning.
2. Develop criteria for determining best practices regarding incorporating pavement management analyses into business and strategic processes.
3. Identify best practices and case studies suitable to illustrate how to successfully tie network- and project-level decisions/goals.
4. Develop guidelines documenting recommendations for using pavement management analysis results to provide meaningful planning decisions.

### **Final Product:**

The products of the study include templates, sample PowerPoint presentations, webcasts of successful approaches, and/or guidelines for using these strategies.

## III. RESEARCH OBJECTIVE

Investigate how highway agencies have successfully gained buy-in from decision makers that have led to increased use of pavement management information, investigate strategies for effectively communicating pavement management information (including the benefits of preservation), provide guidance for pavement managers responsible for making these types of presentations, and explore current methods of communication (e.g., Twitter, Facebook, and Wikipedia).

## IV. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

**Estimated Budget:** \$250,000

**Estimated Project Duration:** 12 months

# RESEARCH PROBLEM STATEMENT

## I. PROBLEM TITLE

*Improving the Skills of Pavement Managers*

## II. RESEARCH PROBLEM STATEMENT

An effective pavement manager must have both technical and social skills to be most successful; skill levels affect the final output, which in turn affects credibility and buy-in. Some of the technical skills are taught in college or through on-the-job training, such as management skills (people skills) and understanding organizational behavior. However, some aspects of a pavement manager's job are not covered in a traditional civil engineering curriculum. Agencies have three options for addressing this shortcoming; they can contract for the services needed, provide the training needed, and/or allow untrained staff to perform the activities. Furthermore, although pavement management documentation is prolific, it has not been organized in a way that is effective in training or improving pavement management operations.

**Tasks:** The research will include the following tasks:

1. Develop an online clearinghouse for pavement management resources, including plan documentation, case studies, open-source software, training materials, and others.
2. Define appropriate levels of training and/or aptitude for personnel working with pavement management systems.
3. Identify inexpensive, yet effective, training alternatives when funding for professional development is limited.
4. Develop guidelines for getting the most out of contracted pavement management systems.

### **Final Product:**

The research will result in training guides to help agencies in the evaluation of fiscal and organizational impacts associated with workforce development, an online clearinghouse of useful resources, and information on career paths in pavement management.

## III. RESEARCH OBJECTIVE

There are three specific objectives for the research. First, the research will develop an online clearinghouse for pavement management resources. The second objective is to define basic levels of aptitude concerning pavement management systems. The final research objective is to develop guidelines that transportation agencies can use to ensure an outsourced pavement management system meets an agency's needs.

## IV. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

**Estimated Budget:** \$250,000

**Estimated Project Duration:** 12 months

# RESEARCH PROBLEM STATEMENT

## I. PROBLEM TITLE

*Annual Approval of State Planning and Research (SP&R) Program Funding*

## II. RESEARCH PROBLEM STATEMENT

The annual approval of SP&R funding does not currently match the timing of data collection and processing for most state highway agencies. When SP&R funds are available for use, they expire at the end of the year making it difficult for the SHA to expend the approved funds. This study will identify the SP&R funding restrictions, identify solutions that will meet FHWA and SHA requirements, determine recommended solutions, and suggest policy changes.

**Tasks:** The research will include the following tasks:

1. Identify source(s) and reason(s) for SP&R funding restrictions.
2. Identify possible resolutions for getting the most out of SP&R funds.
3. Recommend policy revisions and such to implement solutions.

### **Final Product:**

The final product of the research is a set of recommendations for revising policy to better utilize SP&R funds in the timeframe allowed.

## III. RESEARCH OBJECTIVE

The primary objective of this research is to reconcile the timeframe of agency practices with the availability of SP&R funds.

## IV. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

**Estimated Budget:** \$100,000

**Estimated Project Duration:** 12 months

# RESEARCH PROBLEM STATEMENT

## I. PROBLEM TITLE

*Framework for Minimizing the Delivery of Treatment Application*

## II. RESEARCH PROBLEM STATEMENT

Often, pavement preservation/rehabilitation projects are delayed due to plan preparation, advertising, and letting. This lag time between project selection and construction may render the selected treatment ineffective due to the continued advancement or acceleration of pavement distress. There is a need to develop a process for reducing the timing between project selection and treatment application to ensure proper treatment application, maximize performance life, and reduce overall life-cycle cost.

**Tasks:** The research will include the following tasks:

1. Survey SHAs regarding planning and programming procedures.
2. Identify or develop procedures for reducing the time between treatment selection and application.
3. Conduct case studies to verify recommendations using data provided by SHAs.
4. Develop best practices for timely planning and programming of preservation and rehabilitation treatments.

### **Final Product:**

The research will result in the development of best practices for the timely planning and programming of pavement preservation/rehabilitation applications.

## III. RESEARCH OBJECTIVE

The primary objective of this research is to develop a best practices guide for improving the efficiency and timeliness of planning and programming operations regarding implementing pavement management recommendations, particularly with respect to pavement preservation/rehabilitation treatment applications.

## IV. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

**Estimated Budget:** \$250,000

**Estimated Project Duration:** 12 months

# RESEARCH PROBLEM STATEMENT

## I. PROBLEM TITLE

*Addressing Trade-Offs, Metric Issues, and Purchasing Controls/Policies*

## II. RESEARCH PROBLEM STATEMENT

Political and organizational issues and organizational inertia can frequently impede the incorporation of improved and beneficial analysis and technological advancements into the pavement management process. In order to overcome this challenge, key issues related to the trade-offs, metric terms/issues, policies, and purchasing controls need to be determined, quantified, and presented so that more educated decisions can be made.

**Tasks:** The research will include the following tasks:

1. Survey practitioners regarding implementation of pavement management activities with respect to political and/or organizational encumbrances.
2. Identify common critical issues impacting implementation, especially with respect to acquiring new technology or analysis procedures and deployment of such.
3. Identify common critical issues regarding defining performance metrics and measures to meet the needs of practitioners and decision-makers.
4. Prepare a synthesis of findings.

### **Final Product:**

The final product of the research is a synthesis of common issues encountered in pavement management with respect to political and/or organizational impacts on policy, performance measures, implementation of new practices and activities, and so on.

## III. RESEARCH OBJECTIVE

The primary objective of this research is to understand the common critical issues surrounding political and/or organizational change on pavement management policy.

## IV. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

**Estimated Budget:** \$30,000

**Estimated Project Duration:** 9 months

# RESEARCH PROBLEM STATEMENT

## I. PROBLEM TITLE

*Impact of Pavement Management Investment Levels on Benefits*

## II. RESEARCH PROBLEM STATEMENT

As agency budgets tighten, pavement management data collection activities (which typically represent the largest part of the budget for pavement management activities) are at risk of budget cuts. However, since the relationship between expenditures for data collection and analysis tools and pavement management outputs is not well understood, the financial impact and/or risk of budget cuts cannot be communicated. For example, if an agency cuts the data collection budget by 50 percent, an agency could respond by extending the frequency with which data are collected or be reducing the amount of data collected in each cycle. The consequences associated with each of these options are not well understood and there is no known basis for deciding how to address this challenge.

**Tasks:** The research will include the following tasks:

1. Survey practitioners for information regarding funding levels for pavement management data collection, number of network miles, and budget for preservation, rehabilitation, and reconstruction.
2. Analyze survey results to determine if any trends exist between funding for pavement management and funding for pavement preservation/rehabilitation/reconstruction.
3. Conduct risk analyses for cost effectiveness of perceived trends.
4. Develop guidelines allowing practitioners to illustrate how funding levels impact pavement management and its practices.

### **Final Product:**

The final product of the research is a set of guidelines for determining how funding impacts pavement management practices, illustrating the risks or benefits associated with changes in levels of funds allocated to pavement management/preservation activities.

## III. RESEARCH OBJECTIVE

There are three specific objectives for the research. First, the research will determine the relationship between agency funding and pavement management practices. The second objective is to define the risk or benefit associated with whether adequate funding is provided to conduct pavement management/preservation work. The final research objective is to develop guidelines that will illustrate for practitioners how pavement management is affected by funding and the impact such effects can have.

## IV. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

**Estimated Budget:** \$350,000

**Estimated Project Duration:** 24 months



# RESEARCH PROBLEM STATEMENT

## I. PROBLEM TITLE

*Methods to Promote Pavement Management as a Management Tool*

## II. RESEARCH PROBLEM STATEMENT

Pavement management is an important tool to help agencies keep a long-term perspective when managing assets. It can be used to show impacts of different strategies, estimate needs, set and monitor performance targets, and evaluate changes in design, materials, or construction. But its value to agencies is not always well understood, especially among executives and elected officials with short-term positions. Therefore, what is needed is a public relations campaign that raises the profile of pavement management and communicates the wide-ranging benefits it provides an agency.

**Tasks:** The research will include the following tasks:

1. Identify various internal and external audiences—considering both marketing and engineering perspectives—affected by pavement management.
2. Survey practitioners regarding how pavement management is promoted internally and externally.
3. Identify effective ways of promoting pavement management to garner internal, public, and official buy-in and support.
4. Develop a marketing/public relations campaign(s) to raise the profile of pavement management activities and their associated benefits to the public, officials, and the practicing agency.

### **Final Product:**

The research will result in marketing materials that can be used to demonstrate the benefits of pavement management to all stakeholders.

## III. RESEARCH OBJECTIVE

There are two specific objectives for the research. First, the research will identify effective ways of promoting pavement management practices internally and externally to an agency. The second objective is developing a marketing/public relations campaign to encourage pavement management activities by an agency.

## IV. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

**Estimated Budget:** \$100,000

**Estimated Project Duration:** 12 months

# RESEARCH PROBLEM STATEMENT

## I. PROBLEM TITLE

*Recommended Methodology to Calculate Pavement Asset Value and Communicate to Stakeholders*

## II. RESEARCH PROBLEM STATEMENT

Asset management systems have traditionally been required to answer the following fundamental questions: What assets do we have? Where are they? What condition are they in? A fourth, but equally fundamental, question now also exists: What is the value of our assets both today and expected over the life cycle? This fourth question has become particularly relevant with the advent of Government Accounting Standards Board Statement 34 (GASB 34), which is a past based approach, as compared to current and future based approaches. GASB 34 uses historical data to calculate asset value, and if this is not available, current replacement costs are “deflated” using a construction price index to estimate historic cost. Current based methods include replacement cost, written down replacement cost and net salvage value. Future based methods require performance models and include productivity realized value, salvage value, and market value. Application to real networks has been limited but indicates substantial differences in calculated asset value, depending on method, age of the asset, predicted performance, and various other factors. Agencies who track and report asset value over time do not have consistent, understandable, and widely accepted methodology.

**Tasks:** The research will include the following tasks:

1. Carry out a review of existing literature, national and international, on asset valuation methodology for civil infrastructure and particularly how it has been applied to pavements at the strategic, network and project levels.
2. Identify the positive features and the shortcomings of these methodologies.
3. Review the (full accrual accounting) requirements of GASB 34, and the various ways in which GASB 34 can be reported.
4. Prepare recommendations for a consistent, understandable and acceptable methodology for pavement asset valuation which can be used for reporting under GASB 34, but can also have wider application or use by stakeholders if possible.

### **Final Product:**

The final product of this study is a methodology for assessing pavement value for reporting to GASB 34.

## III. RESEARCH OBJECTIVE

The objective of this study will be to develop an asset valuation methodology for civil infrastructure, particularly on how it applies to pavements at the strategic, network, and project level.

## IV. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

**Estimated Budget:** \$100,000

**Estimated Project Duration:** 12 months

# RESEARCH PROBLEM STATEMENT

## I. PROBLEM TITLE

*Suggested Topics for Pavement Management into the Civil Engineering Curriculum*

## II. RESEARCH PROBLEM STATEMENT

There is not sufficient emphasis on pavement management in civil engineering curricula. As a result, there is a steep learning curve for new practitioners. Therefore, there is a need to raise the awareness of pavement management concepts in the existing college curricula.

**Tasks:** The research will include the following tasks:

1. Survey and create a synthesis of current college curricula regarding transportation engineering and management.
2. Survey practitioners' needs in regards to new employee knowledge and skills.
3. Develop teaching/learning resources to increase the level of awareness among instructors and students.

### **Final Product:**

The final product of the research is a set of instructors' resources for incorporating pavement management principles and concepts into college curricula.

## III. RESEARCH OBJECTIVE

There are two specific objectives for the research. First, the research will determine what level of education regarding pavement management practices and principles would be beneficial to new employees. The second objective is developing resources instructors can use to incorporate pavement management-related education into their syllabi.

## IV. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

**Estimated Budget:** \$100,000

**Estimated Project Duration:** 12 months

# RESEARCH PROBLEM STATEMENT

## I. PROBLEM TITLE

*Constant Funding for Pavement Management*

## II. RESEARCH PROBLEM STATEMENT

Inconsistent levels of funding make it difficult for pavement management staff to keep pavement conditions at a consistent level and predict future needs (e.g., pavement preservation, rehabilitation, and reconstruction) of the system. Additionally, it is difficult to maintain a consistent level of work for designers and contractors.

**Tasks:** The research will include the following tasks:

1. Survey SHAs regarding approaches used for fund allocation.
2. Summarize the advantages/disadvantages of each approach.
3. Quantify the impacts of suboptimal allocations.
4. Identify the monetary needs for a consistent pavement management work program to allow agencies to optimize pavement treatments and funding.
5. Develop best practices guidelines and recommendations.

### **Final Product:**

The research will result in the development of guidelines for recommending allocation of funds according to objective pavement management data.

## III. RESEARCH OBJECTIVE

The primary objective of this study is to develop a synthesis of practice for allocating funds for pavement preservation and pavement rehabilitation.

## IV. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

**Estimated Budget:** \$100,000

**Estimated Project Duration:** 12 months

# RESEARCH PROBLEM STATEMENT

## I. PROBLEM TITLE

*Identify Information Technology (IT) Needs to Effectively Manage a Pavement Management System*

## II. RESEARCH PROBLEM STATEMENT

As agencies seek to achieve efficiencies in information technology practices, users of advancing technologies are experiencing challenges for accessing, manipulating, and using technology associated with internal IT departments. Often, technology advancements to address pavement management needs are impeded due to potential limitations in network capabilities, IT personnel understanding of the issues, or pavement managers' lack of knowledge on IT limitations, procedures, and roles.

**Tasks:** The research will include the following tasks:

1. Survey practitioners regarding the role IT departments play in acquiring, implementing, and deploying new pavement management information technology.
2. Identify common goals, needs, and gaps between pavement managers and IT managers.
3. Develop synthesis for coordinating IT needs and addressing common obstacles to satisfy both pavement management needs and IT management.

### **Final Product:**

The final product of the research is a synthesis that identifies common critical issues encountered when acquiring, implementing, and deploying new pavement management information technology, and how to work with IT management to more effectively communicate needs.

## III. RESEARCH OBJECTIVE

The primary objective of this research is to identify and address common issues encountered between IT management and pavement management as it pertains to effectively meeting the goals and objectives of pavement management policy and practice.

## IV. ESTIMATE OF PROBLEM FUNDING AND RESEARCH PERIOD

**Estimated Budget:** \$30,000

**Estimated Project Duration:** 9 months