



Providing solutions to highway building materials problems

FIRST YEAR WORK PLANS

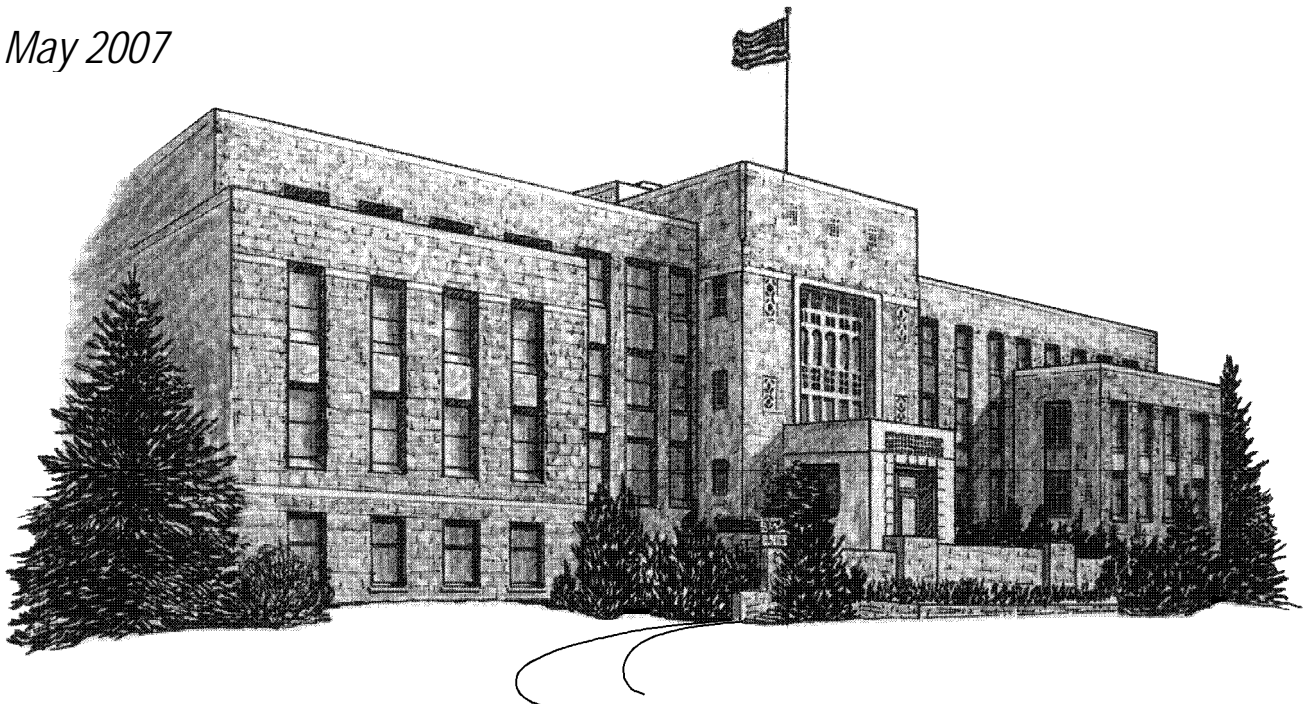
June 18 - December 25, 2007

ASPHALT RESEARCH CONSORTIUM

*PROGRAM AREA:
TECHNOLOGY TRANSFER*

*Prepared for
Federal Highway Administration
Contract No. DTFH61-07-H-00009*

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**RESEARCH PLAN FOR YEAR 1 OF FEDERAL HIGHWAY
ADMINISTRATION CONTRACT DTFH61-07-H-00009
“ASPHALT RESEARCH CONSORTIUM”**

FOREWORD

This document is the proposed Research Plan for Year 1 of the Federal Highway Administration (FHWA) Contract DTFH61-07-H-00009, the Asphalt Research Consortium. The Consortium is coordinated by Western Research Institute with partners Texas A&M University, the University of Wisconsin-Madison, the University of Nevada Reno, and Advanced Asphalt Technologies.

The Year 1 research plans are grouped into seven areas, Moisture Damage, Fatigue, Engineered Paving Materials, Vehicle-Pavement Interaction, Validation, Technology Development, and Technology Transfer. The format of the presentation of the work plans varies somewhat because of the different interactions of the work elements. The Moisture Damage and Fatigue areas contain work elements that are interrelated and thus will work together to advance the knowledge of mechanisms and models in these areas. In addition, there are some work elements that compliment one another by investigating a common principle using different methods. For example, in the Moisture Damage area, the principle of measuring surface energy of asphalts and aggregates is being pursued using the “macro” (or bulk) approach using the Wilhelmy plate and Universal Sorption Device for asphalts and aggregates, respectively. The surface energy of asphalts and aggregates is also being pursued using Atomic Force Microscopy at the nano scale. Using the two different methods provides a check on one another so that the true significance and importance of surface energy can be evaluated and related to performance properties. There are also examples of Modeling activities that compliment each other in a similar fashion. The Consortium members firmly believe that this approach make the research more robust.

The research areas of Engineered Paving Materials, Vehicle-Pavement Interaction, and Validation generally contain work elements that are more “stand-alone” in nature but this doesn’t mean that these work elements will operate independently because in most cases, at least two Consortium partners are teaming to conduct the work. These work elements will also provide useful information to the other research activities in the Consortium.

Finally, the areas of Technology Development and Technology Transfer are the areas where the research deliverables will get transmitted to the user community. The Technology Development area will take promising research developments and refine them into useful tools for engineers and technologists involved in the design, construction, and maintenance of flexible pavement systems. The Technology Transfer area will also transfer Consortium research findings to the asphalt community using the Consortium website, presentations, publications, and workshops.

The Asphalt Research Consortium members strongly believe that the proposed research is responsive to the needs of asphalt engineers and technologists, state DOT’s, and supports the FHWA Strategic Goals and the Asphalt Pavement Road Map.

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PROGRAM AREA: TECHNOLOGY TRANSFER

Technology transfer is a very critical step in the overall process of research-technology development-implementation. The ultimate goal of research is to develop sound techniques that can be implemented by the industry to design and build more durable and long-lasting pavements. If the research can not be transferred to the industry in the form of implementable material selection, design, analysis, and construction techniques, then its overall value will be highly questionable. The technology transfer task is a crucial part of every research and development program that is aimed at improving the state of the practice of the asphalt pavements/materials engineering community. This has been highly recognized by the FHWA through its technology transfer centers throughout the country as part of the national Local Technology Assistance Program (LTAP).

The overall objective of the technology transfer effort is to transfer the technology from the various research activities into practical applications for the asphalt pavement community, including both public agencies and private industry. The research findings will be communicated to the highway community using presentations at conferences, publication of results in a variety of journals, presentations at Expert Task Group (ETG) meetings, development and frequent updates of a website, development of training materials, and conducting of workshops. The technology transfer effort will attempt to close the loop between research and practice by translating research findings into standard test methods (some of which may be useful as specification tests), training materials, and training workshops and courses.

The Consortium will work on two areas of technology transfer: 1) Outreach and Databases and 2) Training. The Outreach and Databases effort will start in the first of the Consortium while the training effort will start in the second year of the Consortium.

Category TT1: Outreach and Databases

BACKGROUND

The two critical aspects of outreach are: communication and accessibility. There is a great need to keep the stakeholders informed of the various Consortium activities. The stakeholders should also be able to have unobstructed and easy access to the various components of the research and development. They should be able to view and follow the progress of the various activities of the Consortium on their own time schedule. The stakeholders should also be kept informed of all the locations, dates, and deadlines for any training activities.

Accessibility is defined as the ability of the stakeholders to access valuable materials and research data that may help their programs. There may be some intermediate findings that the industry will use to improve a certain aspect of their operations. Accessibility to such information will be provided through electronic databases that incorporate the technical information on the various materials that are being researched by the Consortium.

HYPOTHESIS

All activities of the Consortium should be communicated and accessible to the stakeholders in a timely manner.

OBJECTIVES

The objectives of this effort are to provide venues for the transfer of the various activities of the Consortium to the asphalt pavement community in a highly effective and organized manner.

EXPERIMENTAL DESIGN

The following tasks will be completed in order to achieve the objectives of this research effort. The following Consortium members will participate in this effort:

- University of Nevada, Reno (UNR)

Work element TT1a: Development and maintenance of consortium website (Duration: Year 1 through Year 5)

A Consortium Website will be developed using Micromedia Dreamweaver. The Website will announce workshops and training courses, provide links to partners research activities, federal and asphalt paving related association websites. The consortium website will have a comment submission page. The Website will be developed within the first six-month of the contract and will be routinely updated to stay current with the various activities. It is anticipated that the University of Nevada will develop and maintain the consortium website.

Work element TT1b: Communications (Duration: Year 1 through Year 5)

The Consortium will produce and distribute flyers and newsletters on the progress of the various research activities. Brochures of the scheduled workshops and training courses will be produced and distributed to the industry. Newsletters will be produced three times annually which will highlight the activities of the Consortium with technical write-ups on the various research activities. It is planned that the University of Nevada will produce the communication materials and the other Consortium partners will contribute with information pertinent to their activities.

Work element TT1c: Prepare presentations and publications

Work element TT1d: Development of materials database (Duration: Year 2 through Year 5)

A materials database will be developed and designed to store information related to the sources and properties of the materials that are being used in the various research activities of the consortium. The overall structure of the database will be defined based on the type of the data collected and the information that needs to be stored. The consortium website developed in Task 1.0 will serve as a mean to access the database. A dynamic database-driven web application will

be developed allowing data users to present information retrieved from the database on the web pages. Additionally, authorized personnel of the Consortium partners will have a secured access to populate the database with information pertinent to their activities. The subsequent steps will be followed to design the materials database system.

Subtask TT1d-1: Identify the overall features of the web application

Under this task, UNR will identify and list the aspects of the web application. The list of the identified features will be sent to the Consortium partners for inputs and modifications. It is anticipated at this point that the web application will include the following features:

- Allow any user to request and retrieve information from the Consortium materials database through an electronic format.
- Allow authorized users to add, delete, and edit materials information through an electronic format.
- Allow authorized users to create a new category of materials.

Subtask TT1d-2: Identify materials properties to include in the materials database system

This task will identify the specific materials information that needs to be included in the materials database system. UNR will contact the Consortium partners and collect the anticipated type of materials properties to be reported.

Subtask TT1d-3: Define the structure of the database

After identifying the features of the web application, the type of information requested by users will be the basic step for defining the structure of the database. This task will define how the database should be structured to best answer users' needs. All data will be stored in a simple row/column format in tables (rows referred as records and columns referred to as fields). The first step consists of choosing the tables in the database. A relational database format will most probably be used. A relational database is a database containing separate tables, with the tables sharing data. Each table will describe a collection of related entities. The next step will be choosing, in each table, the columns describing the properties of each entity in the table and the *primary key* column(s). Each row of data will be uniquely identified by the values in a *primary key* column or a combination of columns allowing users to zero in on the exact row requested when searching the database. After defining the basic columns and *primary keys* in the tables, relationships between the various tables will be defined. Once the relationships are defined, Structured Query Language (SQL) statements to combine data from two tables will be written in Micromedia Dreamweaver. SQL is the standard language for controlling and interacting with relational databases. SQL allows retrieving, adding, and deleting data to and from a database.

Subtask TT1d-4: Create the database

The final design step is to create the database using a database system like Microsoft Access, SQL Server, or Oracle9i. A quality control (QC) system for data checks during acquisition and prior to database loading will be developed. QC checks on the information consist of validity of

the provided information. Range checks on the validity and reasonableness of values entered in a field will be conducted. Additionally, relational checks between data stored in other fields will be conducted.

Work element TT1e: Development of research database (Duration: Year 2 through Year 5)

A research database is important to keep Consortium partners and the asphalt pavement community current with the on-going and completed researches. The research database will cover the Consortium's recent, ongoing, and planned research studies. The Consortium website developed in Task 1.0 will serve as a medium to access the research database. It is anticipated that the University of Nevada will develop and maintain the Research Database and the other Consortium partners will populate the databases through a secured access with information pertinent to their activities. A dynamic database-driven web application will be developed allowing data users to present information retrieved from the research database on the web pages. The subsequent steps will be followed to design the materials database system.

Subtask TT1e-1: Identify the information to include in the research database system

This task will identify the information in the research database that needs to be included. It is anticipated at this point the research database will include the following information for each research task: problem statement, budget, timeline of activities, results update in form of reports, white papers or any other type of documents, contacts information, and relationship to other studies.

UNR will send the Consortium partners a list of the anticipated information that needs to be included in the research database for inputs and modifications.

Subtask TT1e-2: Define the structure of the database

After defining the type of information that needs to go into the research database the structure of the database will be defined. All data will be stored in a simple row/column format in tables (rows referred as records and columns referred to as fields). The first step consists of choosing the tables in the database. A relational database format will most probably be used. A relational database is a database containing separate tables, with the tables sharing data. Each table will describe a collection of related entities. The next step will be choosing, in each table, the columns describing the properties of each entity in the table and the *primary key* column(s). Each row of data will be uniquely identified by the values in a *primary key* column or a combination of columns allowing users to zero in on the exact row requested when searching the database. After defining the basic columns and *primary keys* in the tables, relationships between the various tables will be defined. Once the relationships are defined, Structured Query Language (SQL) statements to combine data from two tables will be written in Dreamweaver. SQL is the standard language for controlling and interacting with relational databases. SQL allows retrieving, adding, and deleting data to and from a database.

Subtask TT1e-3: Create the database

The final design step is to create the database using a database system like Microsoft Access, SQL Server, or Oracle9i.

YEAR 1 PROJECT DIRECTION

It is anticipated that Tasks 1 and 2 will start in Year 1.

SCHEDULE

Task	Time Frame				
	Year 1	Year 2	Year 3	Year 4	Year 5
1	x	x	x	x	x
2	x	x	x	x	x
3		x	x	x	x
4		x	x	x	x

RELATIONSHIP TO FHWA FOCUS AREA

This research effort fits under the FHWA Focus Area of Technical Capabilities Building.

BUDGET

The anticipated budget is listed in the Table below.

	Year 1	Year 2	Year 3	Year 4	Year 5
UNR	50,000	150,000	150,000	150,000	150,000