U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
Pavement Performance Division
Long-Term Pavement Performance

SPECIFIC PAVEMENT STUDIES EXPERIMENTAL DESIGN AND RESEARCH PLAN FOR EXPERIMENT SPS-9A SUPERPAVE™ ASPHALT BINDER STUDY

Federal Highway Administration
Turner-Fairbank Highway Research Center
6300 Georgetown Pike
McLean, Virginia 22101

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INTRODUCTION

This report contains the experimental design and research plan for the Specific Pavement Studies experiment SPS-9A. The SPS-9A is the first part of a multi-stage approach to the SPS-9 experiment, Field Validation of the SHRP (Strategic Highway Research Program) Asphalt Specifications and Mix Design. The SPS-9A is designed for immediate implementation to provide agencies with hands-on experience with methods and requirements developed under the SHRP program. The primary objectives of SPS-9A are to validate the SHRP binder specifications, to allow direct comparison of asphalt mixtures designed using Agency procedures and the newly developed SHRP procedures, and to provide initial data for use in refining the mixture performance models also developed as part of the SHRP research.

BACKGROUND

As part of the Strategic Highway Research Program conducted between 1987 and 1993, an extensive amount of research and development activities were conducted to improve performance of asphalt concrete pavements. These activities, conducted under the framework of the Asphalt Research Program, investigated chemical and physical properties of asphalt binder and involved the development of accelerated tests for asphalt-aggregate mixtures. One of the final products of the Asphalt Research Program is the process of designing asphalt concrete mixes tailored to the specific requirements of a project, based on established performance factors. This design process incorporating "Performance-Based Asphalt Specifications" and "Performance-Based Asphalt Aggregate Mixture Specifications" is referred to as SUPERPAVE™ (Superior Performance Pavement).

Initial performance-based specification limits and requirements were developed by the SHRP Asphalt Research Program from a data base of accelerated, standardized tests using established performance prediction models and validated by correlation with in-place field pavement data. Development of the national pavement data base is needed to expedite the analyses and further validate these products. This data base will permit centralized and efficient distribution of massive quantities of data to participating highway authorities, researchers, and other interested parties for refinement of the performance-based specifications. The SUPERPAVE™ process of designing asphalt concrete mixes tailored to the specific requirements of a project, based on these performance factors is detailed in SHRP Report SHRP-A-407 entitled, "The SUPERPAVE™ Mix Design Manual for New Construction and Overlays," dated June 1994. The key elements of the SUPERPAVE™ design process are listed below:

- Addresses Reduction and Control of
    - permanent deformation
    - fatigue cracking
    - low temperature cracking
- Develops Mixture Having Sufficient/Satisfactory

  * asphalt binder
  * voids
  * workability
  * performance characteristics

- Basis of Design

  * volumetric principles
  * evaluation of engineering properties of trial mixes using increasing levels of testing depending upon the reliability (traffic level) desired
  * 3 levels of design
    - Level 1 - low traffic (lower reliability)
    - Level 2 - medium traffic (better reliability)
    - Level 3 - high traffic (best reliability)
  * SUPERPAVE™ gyratory used for laboratory compaction

The SUPERPAVE™ mix design system is being validated using a three stage process. The first stage validation, conducted by SHRP, confirmed that variation of asphalt binder properties identified as probable, significant determinants of pavement performance causes reasonable, meaningful changes in the relevant performance characteristics of asphalt-aggregate mixtures. This was accomplished by using specifically designed accelerated laboratory tests and existing accelerated load facilities.

The second stage validation, also conducted under SHRP, established the degree of correlation between the asphalt binder properties shown to significantly affect performance-related characteristics of asphalt-aggregate mixtures and relevant field pavement performance parameters. This process provided data to set the specification limits for the relevant properties selected to control performance. This effort relied heavily on sampling and testing the Long Term Pavement Performance General Pavement Studies sections (GPS). The GPS experiments on flexible pavements provided an accelerated validation approach consistent with the objective of a rapid development of performance-based specifications. However, the use of GPS experiments only provided a limited precision due to the uncertainties in historical data and lack of experimental control over some key variables that influence pavement performance. The most critical unknown in GPS research is the traffic loading applied at each test section since construction. Other historical factors such as special events (heavy rainstorms/dramatic temperature changes), problems during the construction of the GPS sections, and the original properties of mixtures are not known. Although as many constraints as feasible were applied to selection of GPS test sections in the second stage validation process, some important factors, such as age of the test section and drainage features, were not systematically controlled. These first stages are documented in SHRP report SHRP-A-357, "Development and Validation of Performance Prediction Models and Specifications for Asphalt Binders and Paving Mixes."

Although GPS sections provide valuable and timely information, controlled Specific Pavement Studies (SPS) of newly constructed and reconstructed or rehabilitated (resurfaced) pavement sections are needed in the third stage to provide an accurate estimate of the relative influence of key pavement elements that affect pavement performance for purposes of specification validation. The SPS-9 "Field Validation of the SUPERPAVE™ Asphalt Specifications and Mix Design" experiment provides an opportunity for the third stage validation. The importance of this experiment is highlighted by its ability to evaluate the interaction of traffic, structural parameters and climatic factors on pavement performance in a controlled manner.

SPS-9 OVERALL EXPERIMENT OBJECTIVES

The objectives of SPS-9 are as follows:

- To further validate the performance-based asphalt and asphalt-aggregate mixture specifications through controlled field experiments;
- To provide a direct comparison, in terms of measured performance between existing highway agencies' asphalt specifications, asphalt-aggregate mixture specifications, mixture design procedures and SHRP's performance-based specifications and mix design and analysis system;
- To provide performance data collected over a long term from controlled field experiments and to provide for modification of specifications at the local, regional or national level.
- To provide training and assistance to Agency personnel in binder characterization procedures, the mix design process and establish the practicality of implementing the SUPERPAVE™ system.
- To provide data for SUPERPAVE™ models refinement and modifications.

Field validation of the SPS-9 experiment is being carried out under the Long Term Pavement Performance (LTPP) Program's Specific Pavement Studies. The LTPP program is being managed by the LTPP Division, Office of Research of the Federal Highway Administration (FHWA). The SUPERPAVE™ validation efforts are being supported by FHWA's Office of Applied Technology through the pooled fund purchase of new testing equipment, training programs, and technical assistance for highway agency personnel.

In order to immediately start the process of field validation with equipment presently available to agencies and provide exposure to procedures and concepts of SUPERPAVE™, the validation will be carried out in two steps as follows:

SPS-9A	-	SUPERPAVE™ Asphalt Binder Study
SPS-9B	-	SUPERPAVE™ Level II and III System Study

SPS-9A allows Highway Agencies and Contractors to have hands-on experience to utilize and implement the SHRP asphalt technology as soon as possible. As discussed later, SPS-9A will also allow comparison of current Agency practices with the proposed SUPERPAVE™ mix design process.

The experimental design for SPS-9B will be a more extensive validation and optimization of SUPERPAVE™. It will validate pavement structural factors and design reliability and address issues related to optimizing the total flexible pavement design process.

SPS-9A OBJECTIVES

SPS-9A will focus on two main issues; performance of SUPERPAVE™ mixtures relative to local agency mixtures and the verification of the SHRP asphalt binder selection process. Specifically:

1.) Comparison of the SUPERPAVE™ and local agency mix performance in a controlled experiment

2.) Validation of the SHRP asphalt binder selection procedure for local conditions by direct comparison of performance between different binder grades in a controlled experiment

Global analysis will be limited to comparisons of the performance of binder materials meeting Agency requirements, binders meeting SHRP specifications, and binders that are known to deviate from the SHRP specified requirements for a given site. Validation of SHRP binder specifications is achieved by evaluating the performance at different SHRP asphalt grades at a site and monitoring volumetric and binder stiffness changes over time. The factorial developed ensures that a full range of materials and environmental conditions will be evaluated. Performance data and laboratory test data from the SPS-9A projects will be supplied to the SUPERPAVE™ contractor for validation effort of the SUPERPAVE™ models.

SPS-9A EXPERIMENT DESIGN

The SPS-9A experimental design consists of a moisture/temperature factorial to be filled by test sites constructed by the participating agencies. The environmental conditions in this factorial for the SPS-9A experiment are defined by the SHRP Asphalt Research Program in specific rainfall amounts and pavement temperatures as opposed to the global environmental conditions used in the other LTPP experiments.

Table 1 depicts the experiment design for the SPS-9A experiment that incorporates the SHRP asphalt environmental factors. Temperatures are duplicates of the latest SHRP PG specification but limited to more commonly found conditions in the United States, as indicated by the unshaded cells. As shown in Table 1, 32 temperature-moisture combinations result in a total of 32 project sites.

Each test site for SPS-9A shall include three test sections, one using the Agency's current mixture design, one using the SUPERPAVE™, and the other using a SUPERPAVE™ mixture with a SHRP binder grade either higher or lower than required by SUPERPAVE™. Other promising mixtures, such as SMA or rubber asphalt, may be included as supplemental test sections. This will afford the agencies an opportunity for a direct comparison of the magnitude of improved long-term performance provided by the mixture designs and specifications criteria.

Table 1. Study Design - SPS-9A

Moisture		Wet > 635 mm/year of precipitation				Dry < 635 mm/year precipitation			
Average 7 Day Maximum Pavement Design Temperature		<52C	<58C	<64C	<70C	<52C	<58C	<64C	<70C
Minimum Pavement Design Temperature	> -46C								
	> -40C								
	> -34C								
	> -28C								
	> -22C								
	> -16C								
	> -10C								

NOTES:

Traffic rate should exceed 50,000 ESAL/year in study lane.
Total traffic for design (design life) is Agency choice.
The Average 7-day maximum pavement design temperature is the average of the highest daily pavement temperatures for the seven hottest consecutive days.
The minimum pavement design temperature is the coldest pavement temperature of the year.

Thus, at least three test sections will be required at each SPS-9A site but additional supplemental test sections are encouraged.

SITE-RELATED FACTORS

The test site measurements are to include traffic, moisture, air and pavement temperatures and the primary distress factors of fatigue, permanent deformation and low-temperature cracking. Not all of the primary distress factors will be measured in each environmental regime or zone. For example, low-temperature cracking will not necessarily be measured in the southeastern part of the United States.

Traffic Factors

Traffic, while a major factor, is not controlled as a multi-level design factor in the experiment. Instead, traffic will be addressed as part of the test site selection process. An eligible test site candidate must have a minimum estimated design traffic loading of 50,000 ESAL/year (Equivalent Single Axle Loads) on the outside lane. Traffic will vary from site to site and will, therefore, be a co-variable in the study. The actual site specific traffic loading will be determined based on existing monitoring efforts.

Environmental Factors

The environmental factors for SPS-9A are defined by moisture and pavement temperatures. Sites are categorized into two regions based on their moisture levels: wet (635-mm or more annual precipitation) and dry (less than 635-mm annual precipitation).

Pavement temperatures are defined as the 7-day maximum pavement design temperature and the minimum pavement design temperature. The pavement temperatures are specifically linked to the SHRP binder performance-based specifications. The 7-day maximum pavement design temperature is the average 7-day maximum pavement design temperature calculated from the highest daily pavement temperatures for the seven hottest consecutive days. The minimum pavement design temperature is the coldest air temperature of the year. Tables of weather statistics for 5,313 weather stations in the U.S. and 1,515 stations in Canada are contained in the report SHRP-A-648 A, "Weather Database for the SUPERPAVE Mix Design System." However, the tables in that report contained significant errors for the Canadian data and therefore the tables should not be relied upon. Correct information is contained in the computer program SHRPBIND, available from FHWA LTPP Division. Using this program, the weather station closest to the project site is used for determining the environmental regime within which the project falls.

Site specific environmental data are necessary. Moisture and other environmental conditions will be determined using existing local weather station data, corrected to the location of the project. Pavements will be instrumented to obtain pavement temperature and air temperature.

Pavement Structural Factors

Test pavements may be built either as new construction or as a part of rehabilitated existing rigid or flexible pavement using asphalt overlays. Pavement structural factors (subgrade, subbase, base, binder and surface) are not controlled as a multi-level design factor in the SPS-9A experiment. The type and thickness of the pavement sections will be designed using each state's pavement design procedure (AASHTO, etc.), including proper consideration for drainage. The subgrade may be either fine or coarse-grained material. The base may be either a granular or stabilized type. It should be noted that SUPERPAVE™ cannot predict thermal and fatigue cracking for overlays at this time, and its performance predictions are limited to rutting for overlays. Therefore, the preference is for new pavement or rehabilitated pavements with significant asphalt concrete thickness (100-mm or more).

Asphalt-Aggregate Mixture Design Factors

The SHRP binder specification will be strictly adhered to for one test section, i.e. the performance grade will be selected for that site based on temperature data having a 98 % reliability. The other SUPERPAVE™ test section will use a SHRP binder to investigate the sensitivity of performance grade selection for that site by choosing a grade that will theoretically result in earlier occurrence of pavement distress (either thermal cracking or rutting), if the assumptions in the SUPERPAVE™ system are correct. This alternate SHRP binder selection will be based on the following:

1. The participating agency shall choose the distress type that the binder will be selected to minimize or prevent. If the agency desires to examine both distresses, then an additional test section will be constructed and included as a SPS-9A core test section.

2. If the agency selects:

   <u>Thermal Cracking</u> - Low temperature grade component is increased by two grade levels and the high grade remains the same. (e.g. PG 58-34 may be required for the site so the alternate binder would be a PG 58-22 to examine thermal cracking)

   <u>Rutting</u> - High temperature grade component decreases by one grade and low temperature grade remains the same. (e.g. PG 64-28 may be required for the site so the alternate binder would be PG 58-28 to examine rutting)

The agency asphalt mix components will be selected based on those materials meeting the agency's existing specification criteria. Only asphalt, modified asphalt, and aggregates meeting the <u>SHRP specification and mixture design criteria</u> presented in SHRP-A-379 "SUPERPAVE™ Mix Design System Manual of Specifications, Test Methods, and Practices," as adopted and revised by AASHTO, will be used for the SHRP mixtures. The same aggregate gradation and asphalt content must be used for the SUPERPAVE™ and SUPERPAVE™ alternate binder mixtures. Asphalt, modified asphalt, and/or aggregates not meeting the SHRP specification and mixture design criteria, or considered borderline, may be used in the agency sections or supplemental test sections, but should not be used in the SHRP mixtures. Asphalt, modified asphalt or aggregates meeting the SHRP specification and mixture design criteria may be required to be shipped from other sources and used for the SHRP mixtures.

The mixture design is a controlled multi-level factor in this experiment. Part of each test site will include an asphalt-aggregate mixture designed by the state's current procedure (Marshall, Hveem, experience, etc.). The other two test sections will contain mixtures designed using the SUPERPAVE™ system. SPS-9A investigates the SHRP binder specification by evaluating different performance grades at a site and monitoring volumetric and stiffness changes over time.

The limited availability of SHRP mix equipment makes it necessary to concentrate on Level I mix designs for the majority of SPS-9A test sites. Some basic relationships (density and asphalt binder stiffness changes) are examined for all test sections. Most projects (approximately 24) would use the Level I (volumetric) mix design. As the advanced SUPERPAVE™ testing equipment and procedures become available, limited Level II and Level III designs will be considered. A subset of 8 test sites is planned to be designed using SUPERPAVE™ Level III requirements.

Sampling and Testing

A program of site materials characterization will be performed for each SPS-9A project; on the existing pavements when the project is part of rehabilitation or periodically during construction of new pavement. This will include field sampling and laboratory testing of recovered pavement materials to determine the engineering properties of these materials. Characterization will provide a base line of information for further assessment of performance differences between test sections. Further, more specific characterization, will be performed on the new asphalt materials used in these projects, the SUPERPAVE™ and Agency mixtures used in overlay or new construction activities.

Sampling and laboratory testing of asphalt materials on the test sections will consist of uncompacted samples of mix obtained at construction as well as cores taken at prescribed time intervals. Specific laboratory tests will be performed depending on the type of mix sampled; SUPERPAVE™, Agency, or SUPERPAVE™ with alternate binder. Laboratory specimens of the Level I design mix with the specified SHRP asphalt binder will be tested using Level III procedures and performance predictions. Post-construction sampling and testing will be conducted on all test sections and will include performing volumetric testing (void determination) and limited binder testing (dynamic shear rheometer and bending beam rheometer) for all projects at set time intervals. The proposed sampling and testing interval, designed to record early changes in properties, would be t=0, 6, 12, 18, 24, and 48 months after construction. Performance prediction testing (Level III) will be performed on cores taken from the SUPERPAVE™ test section at t=0, 12, 24, and 48 months after construction. Table 2 summarizes the performance and volumetric testing requirements for SPS-9A projects. The availability of testing equipment and final procedures may impact the timely performing of the Level III testing but cores should be taken at the prescribed intervals and stored for eventual testing.

Table 2. Summary of SPS-9A Testing

Project Type	Test Section	Time After Construction, months					
		0	6	12	18	24	48
Main Study	Agency	V	V	V	V	V	V
	SHRP Binder	S*	V	V	V	V	V
	Alternate SHRP Binder	V	V	V	V	V	V
SUPERPAVE Level III Sites	Agency	S		S		S	S
	SHRP Binder	S*		S		S	S
	Alternate SHRP Binder	S		S		S	S

Testing Types: V = volumetric and binder stiffness tests

S = SUPERPAVE Level III performance tests

S* SUPERPAVE Level III testing at t=0 months will be performed on 3 sets of specimens; design mixture in the laboratory, plant mixture compacted in the laboratory, plant mixture compacted in the field (cores).

TEST SECTION CONFIGURATION AND CONSTRUCTION CONSIDERATIONS

The SPS-9A test pavements may be built either as part of a new, reconstructed roadway, overlay, or as a parallel test road. If built as part of a reconstructed or resurfaced roadway, the reconstruction should include all lanes. In all cases, the cross section must be uniform. Pavement widening projects are suitable only if all the test sections at a test site are part of the widening project and all lanes are reconstructed to achieve a uniform pavement cross section at all test sections. Construction of the test sections in a lane which is added to an existing pavement are not suitable for this experiment because of the difficulty of discerning the relationship of distresses developed in the existing lanes and those developed in the widened test sections.

Figure 1 illustrates conceptual test site layout for the SPS-9A experiment. The experimental design or treatment requires a minimum test section length of 300 m that includes a monitoring length of 150-m. This will enable the drilling and sampling operations to be performed outside of the 150-m monitoring length. Sufficient plant production should be provided to ensure acceptable uniformity and consistency in asphalt concrete mixture delivered and placed. This requires a minimum of one asphalt tanker load (approximately 450 tonnes of mix). Test sites that use 10,000 tonnes of mix or more using the SHRP Binder grades will receive priority in coordinating the availability of FHWA SHRP Asphalt trailer and NCHRP 9-7 quality control assistance. Transition sections are required between test sections. The length of these transitions depends on site conditions, such as locations of cut and fills, drainage structures, utilities, etc., but a minimum transition length of 30-m should be provided between test sections. Ideally, all test sections should be placed on shallow fill sections. While test sections may be built on cut or fill, no test sections should be built on a cut/fill transition or on side hill fills.

Test sections for this experiment may be constructed on separate projects or as extensions to other SPS test sites. Provisions can be easily made to accommodate the test sections for this experiment on projects intended for the experiments on structural factors for flexible pavements (SPS-1), on rehabilitation of asphalt pavements (SPS-5), and on restoration of jointed portland cement concrete pavements (SPS-6). However, thickness of the asphalt surface for all SPS-9 test sections at each site must be uniform but may differ from that required for the other experiment test sections and be not less than 65-mm. The entire thickness of the asphalt surface of those sections incorporating the agency mixture design and the SUPERPAVE™ mixture design shall be constructed with the respective mixture.

Replication of projects is not incorporated in the experiment design. However, duplicate test sections within project sites are desirable.

Shoulders

For newly constructed sites, shoulders should have the full pavement structure across their width, i.e. the structural layers in the shoulder should match those of the outside lane. Shoulder width should be at least 1.2-m.

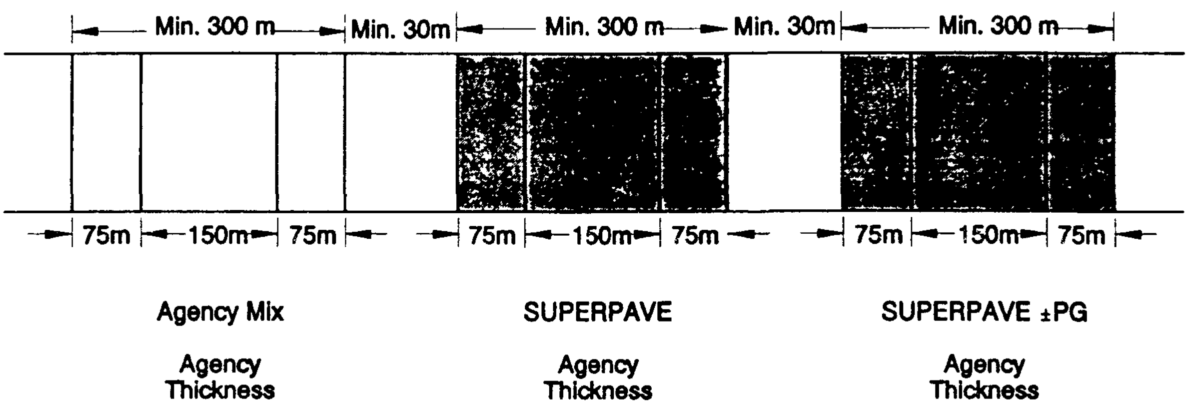

Figure 1 - Test Site Layout for SPS-9A

Figure 1 - Test Site Layout for SPS-9A

Crown

Crowned and non-crowned (constant cross-slope) pavement cross sections may be constructed.

BENEFITS TO PARTICIPATING HIGHWAY AGENCIES

The SPS-9 experiment, while being coordinated through the FHWA LTPP Division, is conducted for and by state and provincial highway agencies. Therefore, the details of the experiment have been selected to address the needs of the highway community. However, the experimental rigor necessary to achieve the desired results from this research requires that participating agencies agree to the same experimental factors and to construct the required test sections in a consistent manner. The statistical aspects of this experiment make the full cooperation of participating highway agencies crucial to its success. In addition, specific issues of local concern as well as innovative techniques can also be incorporated through the impetus and opportunities provided by this national study.

While all highway agencies will benefit from the information, knowledge and products that result from this research, participating agencies will accrue additional direct benefits. Since a portion of this research will be conducted in an agency's jurisdiction on test sections constructed using materials and techniques employed by that agency and exposed to local climate and traffic loadings, participating agencies will be able to make direct use of the results. Test sections within an agency's jurisdiction allow that agency an opportunity to directly compare their mixture design and specifications to the performance-based specifications and mixture design developed by the SHRP Asphalt Research Program. In addition, the agencies will perform mix designs with the assistance of the FHWA.

The SPS-9 experiment has been "separated" into two sub-experiments denoted as SPS-9A and SPS-9B experiments. This has been done in recognition of the significant pay off expected with early implementation of SUPERPAVE™ mix design process by State Agencies. As discussed, the SPS-9A experiment will allow State Agencies and Contractors to have hands-on experience to utilize and implement SHRP asphalt technology as soon as possible. SPS-9A experiment provides a forum for the FHWA sponsored "showcasing" of SHRP asphalt products. Participation in the SPS-9A experiment will allow quick comparison of current Agency practices with the proposed SUPERPAVE™ mix design process. During SPS-9A implementation, the SUPERPAVE™ process is expected to be further refined as feedback from the project sites is received, reviewed, evaluated, and changed as needed. The SUPERPAVE™ mix design methods and laboratory test procedures are expected to be further validated during this phase of the experiment.

The final validation and optimization of SUPERPAVE™ will be undertaken as part of the SPS-9B experiment. SPS-9B experiment involves investigating the structural factors and design reliability (level of SUPERPAVE™ mix design) and addresses issues related to optimizing the total flexible pavement design process.

The overall SPS-9 experiments will provide the local engineer the opportunity to weigh the practical effects of alternatives that can be applied to performance-based specification evaluation. For example, higher initial cost of employing select materials can be assessed against the savings in maintenance and rehabilitation costs over the life cycle of the pavement. The role of optimizing the mix design can be assessed against layer thickness requirement.

In addition to these direct benefits, participating agencies will also receive ancillary benefits as a result of direct involvement in the experimental process including valuable insights and exchange of ideas through interaction with the FHWA team, researchers and highway personnel from other agencies. Interim data analysis and results will be provided to the agencies during the tenure of the SPS-9 experiment.

SUPPLEMENTAL SECTIONS

Sponsoring agencies have the opportunity to expand the experiment to address some of their own interests and concerns as well as incorporate innovative technology through the construction of Supplemental Sections. For example, rubber asphalt or stone matrix asphalt (SMA) pavements as well as other materials, such as modified asphalt, may be constructed in supplemental test sections as part of this experiment and their performance directly compared to that of the basic experimental test sections. In addition, performance of pavements using asphalts that have the same SHRP grade but are produced by different methods may be investigated. Supplemental sections provide participating agencies the opportunity to conduct intensive pavement field research relatively economically by taking advantage of the research infrastructure and monitoring data provided by performance of the SPS-9 study.

The construction of supplemental test sections is strongly encouraged. FHWA is prepared to assist interested agencies in the experimental design, data collection, and performance monitoring of such supplemental experiments. Further, if a group of participating agencies desire to join together in such activity, FHWA is also prepared to work with these states and/or provinces to coordinate a multi-state/provincial supplemental experiment.

PARTICIPATING HIGHWAY AGENCY RESPONSIBILITIES

Participating highway agencies play the key role in the development, construction and conduct of the Specific Pavement Studies, including the following activities:

- Participation in experiment and implementation plans.
- Nomination of test sites.
- Preparation of plans and specifications.
- Selection of construction contractors.
- Development of the state and SHRP mixture designs, with assistance from FHWA.
- Materials testing to characterize in-place materials.
- Construction of test sections.
- Construction control, inspection, management.
- Installation and operation of traffic monitoring equipment and submission of traffic and load data.

- Collecting and reporting of weather data and pavement environmental data (pavement temperature and moisture data).
- Installation and operation of in-pavement instrumentation and reporting of data on a limited number of test sections.
- Provision of traffic control for all test site data collection.
- Material sampling and testing.
- Collecting and reporting of as-built construction data.
- Conducting and reporting of periodic skid resistance.
- Conducting and reporting of maintenance activities.

FHWA RESPONSIBILITIES

The primary role of FHWA is to provide coordination and technical assistance to participating highway agencies to help insure uniformity and consistency in construction and data collection to achieve the desired study results. Some of the activities the FHWA team will be responsible for include:

LTPP Division

- Development of experimental design.
- Coordination among participating agencies.
- Final acceptance of nominated test sites.
- Development of uniform data collection guidelines and forms.
- Coordination of materials sampling and testing.
- Monitoring of pavement performance.
- Development and operation of comprehensive database and data entry.
- Control of data quality.
- Data analysis and reporting.
- Further refinement of SUPERPAVE™ models.

Office of Technology Applications

- Assistance in development of SHRP mixture designs.
- Review of material mix designs.
- Mixture verification and quality control assistance.
- Agency training.
- Pooled fund purchase of testing equipment.

IMPLEMENTATION AND SCHEDULE

The SPS-9 research plan and experimental design is ready for implementation. However, its development is an evolutionary process and refinements may be required as experience is gained from early projects. This refinement will be incorporated as part of the SPS-9B experiment. The initial step in the implementation of SPS-9A is the identification and submission by highway agencies of candidate projects for possible inclusion in the SPS-9A study. A total of 32 test sites (at least 3 test sections at each) will be required to complete the SPS-9A experiment as planned. The test sites will be selected by proceeding in an orderly manner, considering projects scheduled for construction nominated by the states to fill the experiment design cells. This process may take 3 to 4 years and extend into 1997. An agency wishing to participate in the SPS-9 must first construct a SPS-9A project in order to develop the needed expertise and experience in using the SUPERPAVE™ system. SPS-9B projects are not expected to be constructed until 1996.

SPS-9A projects are expected to be monitored for a period of 48 months (or until failure, if earlier) at which time the future monitoring status of the projects will be determined in coordination with the FHWA LTPP Division. SPS-9B projects are expected to be monitored until failure or until end of the LTPP program, whichever occurs first.

To assist the highway agencies in identifying candidate projects for SPS-9A, guidelines for nominating and evaluating candidate projects for this experiment have been developed and are detailed in a separate publication entitled "Specific Pavement Studies Guidelines for Nomination and Evaluation of Candidate Projects for Experiment SPS-9A - SUPERPAVE™ Asphalt Binder Study", August 1994, revised September 1995. This report includes nomination forms, identify project selection criteria, and outline highway agency participation requirements.