

National Research Council

# STRATEGIC HIGHWAY RESEARCH PROGRAM



SPECIFIC PAVEMENT STUDIES  
MATERIALS SAMPLING AND TESTING REQUIREMENTS  
FOR EXPERIMENT SPS-6  
REHABILITATION OF JOINTED PORTLAND  
CEMENT CONCRETE PAVEMENTS

STRATEGIC HIGHWAY RESEARCH PROGRAM  
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PREFACE

This report contains guidelines for the development and implementation of a material sampling and testing program for each test site included in the Specific Pavement Studies' experiment SPS-6, Rehabilitation of Jointed Portland Cement Concrete Pavements. These guidelines will help the SHRP regional office develop recommendations for a material sampling and testing plan tailored for the individual test site. The SHRP regional office and the participating highway agency must coordinate the activities associated with the development and implementation of the recommended field sampling and testing plan to ensure compliance with the plan objectives and thus achieve the study's goals.

This report should be used in conjunction with the SHRP Guide for Field Materials Sampling, Testing and Handling to perform the field material drilling and sampling work. Copies of these guidelines should be available during the on-site sampling and testing operations. All persons involved in the field sampling and testing operations for the SPS-6 experiment must be familiar with its content, particularly the types and numbers of samples to be obtained from the different test sections and pavement layers.

## TABLE OF CONTENTS

|   | <u>Page</u> |
|---|-------------|
| PREFACE . . . . .   | i           |
| TABLE OF CONTENTS . . . . .   | ii          |
| 1. INTRODUCTION . . . . .   | 1           |
| 1.1 Overview . . . . .  | 1           |
| 1.2 Minimum Requirements . . . . .                                      | 2           |
| 2. DEVELOPMENT OF SAMPLING AND TESTING PLANS . . . . .                  | 6           |
| 2.1 General . . . . .   | 6           |
| 2.2 Overall Sampling Location Layout Plan . . . . .                     | 13          |
| 2.3 Pre-Construction Sampling Plan . . . . .                            | 14          |
| 2.4 Post-Construction Sampling Plan . . . . .                           | 17          |
| 3. FIELD MATERIALS SAMPLING . . . . .                                   | 19          |
| 3.1 General . . . . .   | 19          |
| 3.2 Field Operations . . . . .  | 23          |
| 3.2.1 Coring of Pavement Surface and Bound (Treated) Layers . . . . .   | 24          |
| 3.2.1.1 Coring - Prior to Construction . . . . .                        | 24          |
| 3.2.1.2 Coring - After Construction . . . . .                           | 25          |
| 3.2.2 Augering of Subsurface Layers for Bulk Sampling . . . . .         | 25          |
| 3.2.3 Test Pit Excavation and Sampling . . . . .                        | 26          |
| 3.2.4 Uncompacted Mix Sampling Procedures . . . . .                     | 28          |
| 3.2.5 Collection of Samples, Marking, Packaging, and Shipping . . . . . | 28          |
| 3.2.6 Logs and Reports . . . . .  | 28          |
| 3.2.6.1 Core Holes . . . . .  | 29          |
| 3.2.6.2 Auger Holes . . . . .   | 29          |
| 3.2.6.3 Test Pits . . . . .   | 29          |
| 3.2.6.4 Shoulder Auger Probes . . . . .                                 | 30          |
| 3.2.7 Sample Code Number . . . . .                                      | 30          |
| 3.2.8 Labels and Tags . . . . .   | 33          |
| 3.2.9 Packaging . . . . .   | 33          |
| 3.2.10 Shipping . . . . .   | 34          |
| 3.2.11 Field Testing . . . . .  | 34          |
| 3.2.11.1 In-situ Density and Moisture Measurements . . . . .            | 34          |
| 3.2.11.2 Auger Probe . . . . .  | 34          |
| 3.2.12 Assembly of Data Sheets and Transmittal . . . . .                | 34          |

TABLE OF CONTENTS (Continued)

|  | <u>Page</u> |
|--|-------------|
| 4. LABORATORY MATERIALS TESTING . . . . .                    | 39          |
| APPENDIX A - EXAMPLE OF PRE-CONSTRUCTION SAMPLING PLAN       |             |
| APPENDIX B - EXAMPLE OF POST-CONSTRUCTION SAMPLING PLAN      |             |
| APPENDIX C - FIELD MATERIALS SAMPLING AND TESTING DATA FORMS |             |

## 1. INTRODUCTION

### 1.1 OVERVIEW

This report provides guidelines for the development and implementation of a material sampling and testing program for each of the test sites included in the Specific Pavement Studies' experiment SPS-6, Rehabilitation of Jointed Portland Cement Concrete Pavements. These guidelines will be used by the SHRP regional office to develop recommendations for a material sampling and testing plan tailored to the individual test site.

The SPS-6 experiment, Rehabilitation of Jointed Portland Cement Concrete Pavements, requires the construction of multiple test sections with similar details and materials at each of twenty four sites located in the four climatic regions. The experimental design and construction considerations for this experiment are described in the document, "Specific Pavement Studies: Experimental Design and Research Plan for Experiment SPS-6, Rehabilitation of Jointed Portland Cement Concrete Pavements," April 1989. Construction features and details for this experiment are described in the document, "Specific Pavement Studies: Construction Guidelines for Experiment SPS-6, Rehabilitation of Jointed Portland Cement Concrete Pavements," July 1990. In spite of attempts to control uniformity in construction, some variation between sites will exist. Therefore, it is important to develop and implement a sampling and testing plan that will provide the information necessary to evaluate such variations and their effect on performance.

To obtain materials characterization required for the SPS-6 experiment, the following steps are required:

1. Review of project site layout and soil profile logs.
2. Formulation of a field sampling plan. This plan should take into account site conditions and the laboratory material testing requirements. An adequate number of samples must be retrieved in the field to assure that all laboratory material characterization tests can be performed.

3. Development of a field sampling plan report. This report should specify sampling area locations, type and number of samples from each location, and a tracking table that specifies the tests to be performed on each sample.
4. Field sampling and testing of materials. In reporting the results of this work, adjustments made in the field to the sampling and testing plan must be recorded.
5. Testing of material samples in the laboratory.
6. Compilation and storage of data. This will include compilation of field sampling, field testing and laboratory material test data and entry of this data into the National Pavement Performance Database.

The SPS-6 experiment was developed to investigate the performance of selected rehabilitation techniques for jointed portland cement concrete (PCC) pavements. These include a combination of levels and types of pavement preparation with and without the application of asphalt concrete (AC) overlays. Preparation approaches included in this experiment are minimal surface preparation, full "Concrete Pavement Restoration" (CPR), and cracking/breaking and seating. Pavement preparation items such as grinding, undersealing, full-depth repair, partial depth repair, restoration of load transfer, resealing of transverse joints, and retrofitted subsurface drainage are evaluated. Also, AC overlays of different thickness are used on some test sections. Characterization of the material properties and the variations in these properties between and within the test sections is required to evaluate the cause of performance differences between test sections and provide a basis for improving current rehabilitation strategies and methods. Materials characterization should include those parameters used in current pavement design and mechanistic analysis models, and the engineering properties generally required to assess the characteristics and behavior of the materials.

## 1.2 MINIMUM REQUIREMENTS

The material sampling and test plan must be tailored to the specific features encountered on each project. Also, the participating highway agency may construct supplemental test sections at the site in addition to those required for the SPS-6 experiment. Therefore, the material sampling and testing plan will vary from one site to another. For illustration, an example of the

material sampling and testing requirements together with a conceptual site plan are presented in this report for a hypothetical "ideal" test site.

The site used for this illustration consists of the eight test sections required for the experiment. These sections include a control section and seven experimental sections, as shown in Figure 1. The rehabilitation treatments for these sections are as follows:

Section 1 - Routine maintenance, no overlay.

Section 2 - Minimum restoration, no overlay.

Section 3 - Minimum restoration, 4-inch thick AC overlay.

Section 4 - Minimum restoration, 4-inch thick AC overlay with saw and sealed joints.

Section 5 - Maximum restoration, no overlay.

Section 6 - Maximum restoration, 4-inch thick AC overlay.

Section 7 - Crack/break and seat, 4-inch thick AC overlay.

Section 8 - Crack/break and seat, 8-inch thick AC overlay.

The hypothetical "ideal" SPS-6 project illustrated in Figure 1 will be used to illustrate the minimum materials sampling and testing requirements. For this site, each of Test Sections 1, 3, 4, 6, 7, and 9 is 500-foot long. Sections 2 and 5 are 1000-foot long. Since the material sampling and testing methods are destructive, the sampling areas must be located outside the test sections. The material sampling areas are located adjacent to the ends of the test sections and are consecutively numbered as illustrated in Figure 1. Sampling prior to rehabilitation (locations 1 through 16) is intended to characterize the in-place properties of the existing pavement and subgrade. Sampling after overlay placement (locations 17 through 26) is intended to characterize the as-placed overlay material required for Test Sections 3, 4, 6, 7, and 8. "Pre-construction" and "post-construction" are used in this report to refer to before rehabilitation and after overlay placement, respectively.

The guidelines for formulating field materials sampling and laboratory testing plans for the SPS-6 experiment have been developed based on the experience gained from the materials testing program developed for the General Pavement Studies and the need for better characterization of the engineering properties of the materials within the test sites. The field material sampling

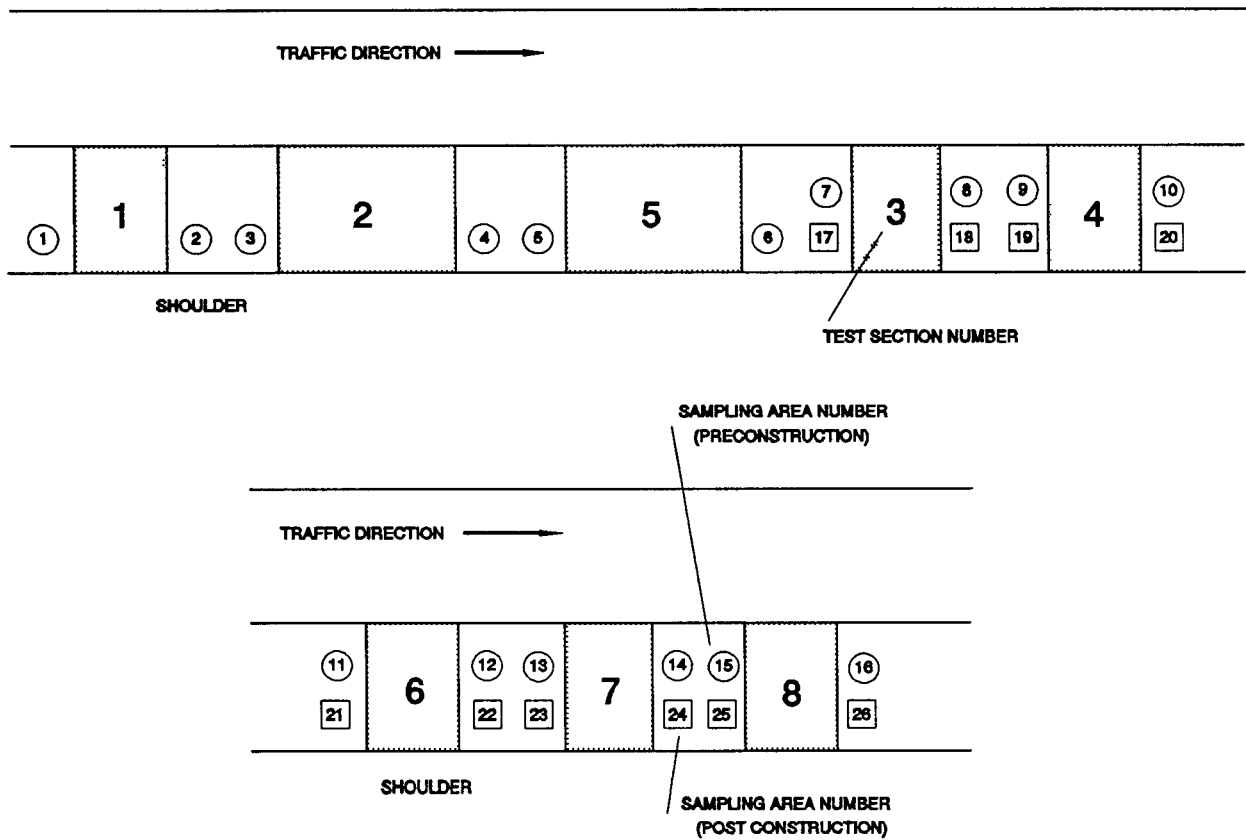


Figure 1. Example of Site Layout and Sampling Locations



plan should adequately address the laboratory testing needs. Therefore, a sufficient number of samples must be obtained from each test site to enable adequate characterization of the pavement materials by laboratory tests.

## 2. DEVELOPMENT OF SAMPLING AND TESTING PLANS

### 2.1 GENERAL

The details of the sampling plan for each SPS-6 site will differ depending on the variability and constraints of each specific project. The sampling plan must be tailored to account for the distance between test sections, project length, subgrade variability and other conditions unique to the site. The following guidelines are presented to help simplify the process of developing an appropriate field sampling plan for the experiment.

The pre-construction and post-construction sampling plans should be completed in a coordinated manner to ensure consistency. Participating highway agency input should be sought when appropriate during plan preparation. In addition, the following documents must be reviewed prior to plan preparation:

1. Project plan and profile sheets.
2. Soil profile sheets.
3. Laboratory material testing requirements described in this document.
4. Other documents or information related to this project. For example, review of field verification reports would help determining pavement structure cross-sections and subgrade variability along the site.

Criteria for selecting test section locations require that all test sections should have the same structural cross section and be constructed of the same materials under the same contract. To accommodate likely deviations from these and other established criteria, the test plan must be devised so that all known or suspected variations can be characterized. Generally, variability of the subgrade will be determined during the site selection process and should be a prime consideration in development of the final sampling and testing plan for the site. Plan and profile sheets are important to help determine the location of cut/fill sections and the possible variability in subgrade materials. The constraints imposed on location of test sections to avoid cut/fill transitions, bridges, culverts, substructures and side hill fills and the inclusion of supplemental test sections desired by the participating agency will likely increase the potential for variability of the subgrade soils along the site.

Bulk sampling should be performed at minimum of three locations per site. However, the actual number of sampling locations should be based on the total site length and known variations.

Table 1 lists the minimum number of material samples and sample types required for an SPS-6 site. A code is assigned to each sample to designate sample type (core, test pit, or auger), core size, and location number. For each sample type, material samples are obtained from the different pavement layers. The number of material samples listed in Table 1 are those required for each material layer.

Different types of samples of the pavement structure are required at each site, as follows:

- Four-inch outer diameter cores of the current pavement surface layer, i.e. the original PCC surface. These cores are designated on sampling plans as C-Type cores and are identified with small circles.
- Four-inch outer diameter cores of portland cement concrete, bound base layers and treated subbase layers. These cores are designated on sampling plans as C-Type sampling areas and are identified with small shaded circles.
- Six-inch outer diameter cores of portland cement concrete, bound base layers and treated subbase layers; augering of unstabilized base and subbase layers; thin-walled tube and/or splitspoon sampling of subgrade layers to 4 feet below the top of the untreated subgrade. These cores are designated on sampling plans as A-Type sampling areas and are identified with medium-sized unshaded circles.
- Twelve-inch outer diameter cores of portland cement concrete, bound base layers and treated subbase layers; augering of unstabilized base, subbase and subgrade to 12 inches below the top of the untreated subgrade for bulk sample retrieval. These cores are designated on sampling plans as BA-Type sampling areas and are identified with large-sized unshaded circles containing a diagonal line.

Table 1. Scope of Material Sampling and Field Testing

| Material and Sample Description   | Number of Material Samples | Sample Type Designation |
|---|----------------------------|-------------------------|
| <u>PRE-CONSTRUCTION</u>   |                            |                         |
| 1. PCC (original layer)   |                            |                         |
| Coring - 4" diameter cores  | 20                         | C1-C20                  |
| Coring - 6" diameter cores  | 3                          | A1-A3                   |
| Coring - 12" diameter cores   | 3                          | BA1-BA3                 |
| 2. Unbound Base/Subbase Layers (per layer)                                |                            |                         |
| Augering 6" diameter holes  | 3                          | A1-A3                   |
| Bulk sampling in 12" diam. holes  | 3                          | BA1-BA3                 |
| Bulk sampling in test pit   | 2                          | TP1-TP2                 |
| In-situ density and moisture content (nuclear gauge)                      | 2                          | TP1-TP2                 |
| Moisture content samples  | 7                          | TP1-TP2, BA1-BA3        |
| 3. Bound Base/Subbase Layers (per layer)                                  |                            |                         |
| Coring - 4" diameter cores  | 3                          | C5, C11, C19            |
| Coring - 6" diameter cores  | 3                          | A1-A3                   |
| Coring - 12" diameter cores   | 3                          | BA1-BA3                 |
| 4. Subgrade   |                            |                         |
| Splitspoon sampling   | 4*                         | A1-A2                   |
| Thin-walled tube sampling (* 2 tubes or 2 spoons or combination per hole) | 4*                         | A1-A2                   |
| Bulk sampling in 12" diam. holes  | 3                          | BA1-BA3                 |
| Bulk sampling in test pit   | 2                          | TP1-TP2                 |
| In-situ density and moisture content (nuclear gauge)                      | 2                          | TP1-TP2                 |
| Moisture content samples  | 7                          | TP1-TP2, BA1-BA3        |
| 5. Shoulder Auger Probes  | 3                          | S1-S3                   |
| <u>POST - CONSTRUCTION</u>  |                            |                         |
| 1. Asphaltic Concrete (overlay)   |                            |                         |
| Coring - 4" diameter cores  | 20                         | C21-C40                 |
| Bulk Samples from Plant   | 3                          | BV1-BV3                 |

- Six feet by four feet test pit to a depth of 12 inches below the top of the untreated subgrade for bulk sampling of unstabilized layers and subgrade materials and for nuclear density and moisture measurements on unstabilized pavement layers and subgrade material. These samples are designated on sampling plans as TP-Type sampling areas and are identified with an unshaded rectangle. Where possible, these locations should take advantage of full-depth patches that may be required outside of the test section.
- Six-inch outer diameter shoulder auger probes augered to a depth of 20 feet through the shoulder to determine the location of a rigid layer. These are designated on sampling plans as S-type sampling locations and are identified with a medium-sized unshaded circle with a bisecting "X". The purpose of the shoulder auger probe is to determine if bedrock or other significantly dense layers exist within 20 feet of the pavement surface. This determination is extremely important for the analysis of deflection measurements. However, shallow auger probes would not be warranted at locations where rock is known to exist at a very deep depth. Therefore, maps from the U.S. Geological Survey and the U.S. Department of Agriculture, county soil surveys, and other information from soil borings for nearby bridges or other structures should be used to assess the need for this auger probe.
- Bulk samples of the finished uncompacted AC mixtures used in the overlay. Asphalt concrete overlays used in this experiment will be composed of virgin materials with the corresponding sample designation "BV".

Bulk sampling requirements for the asphalt cement, aggregates and uncompacted mixes to be collected during construction are shown in Table 2. Part A of this table lists material required for the test site evaluation and SPS purposes. Part B lists the material to be shipped to the SHRP Reference Materials Library for testing as part of the SHRP Asphalt Research Program.

The laboratory material testing program corresponding to the sampling plan outlined in Table 1 is shown in Tables 3 and 4 for pre-construction and post-post-construction activities, respectively. These tables show the SHRP test

Table 2. Bulk Material Sampling During Construction.

A. Materials required for testing as part of SPS-6 experiment. \*

| Materials and Sample Description                       | Number of Material Samples |
|--|----------------------------|
| 1. Asphalt Concrete Mix<br>100 lb. bulk sample (total) | 3                          |

B. Materials to be shipped to the SHRP asphalt reference library. \*

| Material and Sample Description                           | Number of Material Samples |
|---|----------------------------|
| 1. Asphalt Cement<br>5 gallon containers                  | 11                         |
| 2. Aggregate<br>55 gallon drums                           | 1000 lbs                   |
| 3. Finished Asphaltic Concrete Mix<br>5 gallon containers | 200 lbs                    |

\* All materials shall be sampled at mix plant.

TABLE 3. PRE-CONSTRUCTION LABORATORY TESTING PLANS

| Material Type and Properties                      | SHRP Designation | SHRP Protocol | Tests per Layer | Material Source/ <sup>1</sup> Test Locations |
|---|------------------|---------------|-----------------|--|
| <b>I. PORTLAND CEMENT CONCRETE</b>                |                  |               |                 |  |
| Compressive Strength                              | PC01             | P61           | 10              | C1 C3 C5 C7 C9 C11 C13 C15 C17 C19           |
| Splitting Tensile Strength                        | PC02             | P62           | 10              | C2 C4 C6 C8 C10 C12 C14 C16 C18 C20          |
| PCC Coefficient of Thermal Expansion              | PC03             | P63           | 3               | A1 A2 A3                                     |
| Static Modulus of Elasticity                      | PC04             | P64           | 6               | C3 C5 C7 C11 C15 C17                         |
| PCC Unit Weight                                   | PC05             | P65           | 10              | C1 C3 C5 C7 C9 C11 C13 C15 C17 C19           |
| Core Examination / Thickness                      | PC06             | P66           | 23              | C1-C20 A1 A2 A3                              |
| <b>II. BOUND (TREATED) BASE AND SUBBASE</b>       |                  |               |                 |  |
| Type and Classification of Material and Treatment | TB01             | P31           | 3               | C5 C11 C19                                   |
| Pozzolanic/Cementitious: Compressive Strength     | TB02             | P32           | 3               | C5 C11 C19                                   |
| Asphalt treated: Dynamic Modulus (77F)            | TB03             | P33           | 3               | C5 C11 C19                                   |
| HMAC: Resilient Modulus                           | AC07             | P07           | 3               | C5 C11 C19                                   |
| <b>III. UNBOUND GRANULAR BASE AND SUBBASE</b>     |                  |               |                 |  |
| Particle Size Analysis                            | UG01             | P41           | 3               | TP1 [BA1-3] TP2                              |
| Sieve Analysis (Washed)                           | UG02             | P41           | 3               | TP1 [BA1-3] TP2                              |
| Atterberg Limits                                  | UG04             | P43           | 3               | TP1 [BA1-3] TP2                              |
| Moisture-Density Relations                        | UG05             | P44           | 3               | TP1 [BA1-3] TP2                              |
| Resilient Modulus                                 | UG07             | P46           | 3               | TP1 [BA1-3] TP2                              |
| Classification                                    | UG08             | P47           | 3               | TP1 [BA1-3] TP2                              |
| Permeability                                      | UG09             | P48           | 3               | TP1 [BA1-3] TP2                              |
| Natural Moisture Content                          | UG10             | P49           | 3               | TP1 [BA1-3] TP2                              |
| <b>IV. SUBGRADE</b>                               |                  |               |                 |  |
| Sieve Analysis                                    | SS01             | P51           | 3               | TP1 [BA1-3] TP2                              |
| Hydrometer to 0.001mm                             | SS02             | P42           | 3               | TP1 [BA1-3] TP2                              |
| Atterberg Limits                                  | SS03             | P43           | 3               | TP1 [BA1-3] TP2                              |
| Classification                                    | SS04             | P52           | 6               | TP1 [BA1-3] TP2 A1 A2 A3                     |
| Moisture-Density Relations                        | SS05             | P55           | 3               | TP1 [BA1-3] TP2                              |
| Resilient Modulus                                 | SS07             | P46           | 3               | A1 A2 A3                                     |
| Unit Weight                                       | SS08             | P56           | 6               | TP1 [BA1-3] TP2 A1 A2 A3                     |
| Natural Moisture Content                          | SS09             | P49           | 3               | TP1 [BA1-3] TP2                              |
| Depth to Rigid Layer                              |                  |               | 3               | S1 S2 S3                                     |

NOTE: 1 Samples within brackets are from the same sampling location.

TABLE 4. POST-CONSTRUCTION LABORATORY TESTING PLANS

| Material Type and Properties               | SHRP Designation | SHRP Protocol | Tests per Layer | Material Source/ <sup>1</sup> Test Locations      |
|--|------------------|---------------|-----------------|---|
| <b>A. ASPHALT CONCRETE:</b>                |                  |               |                 |   |
| Core Examination/Thickness                 | AC01             | P01           | 20              | ALL CORES   |
| Bulk Specific Gravity                      | AC02             | P02           | 20              | ALL CORES   |
| Maximum Specific Gravity                   | AC03             | P03           | 3               | BV1 BV2 BV3                                       |
| Asphalt Content (Extraction)               | AC04             | P04           | 3               | BV1 BV2 BV3                                       |
| Moisture Susceptibility                    | AC05             | P05           | 3               | BV1 BV2 BV3                                       |
| Creep Compliance                           | AC06             | P06           | 3               | C25 C34 C36                                       |
| Resilient Modulus                          | AC07             | P07           | 3               | [C21, C22, C23], [C31, C32, C33], [C38, C39, C40] |
| Tensile Strength                           | AC07             | P07           | 3               | C24 C30 C37                                       |
| <b>B. EXTRACTED AGGREGATE:</b>             |                  |               |                 |   |
| Bulk Specific Gravity:                     |                  |               |                 |   |
| Coarse Aggregate                           | AG01             | P11           | 3               | FROM UNCOMPACTED MIX                              |
| Fine Aggregate                             | AG02             | P12           | 3               | FROM UNCOMPACTED MIX                              |
| Type and Classification:                   |                  |               |                 |   |
| Coarse Aggregate                           | AG03             | P13           | 3               | FROM UNCOMPACTED MIX                              |
| Fine Aggregate                             | AG03             | P13           | 3               | FROM UNCOMPACTED MIX                              |
| Gradation of Aggregate                     | AG04             | P14           | 3               | FROM UNCOMPACTED MIX                              |
| Roundness Index of Coarse Aggregate        | AG06             | P14B          | 3               | FROM UNCOMPACTED MIX                              |
| NAA Test for Fine Aggregate Particle Shape | AG05             | P14A          | 3               | FROM UNCOMPACTED MIX                              |
| <b>C. ASPHALT CEMENT (FROM MIX):</b>       |                  |               |                 |   |
| Abson Recovery                             | AE01             | P21           | 3               | FROM UNCOMPACTED MIX                              |
| Penetration at 50F, 77F, 90F               | AE02             | P22           | 3               | FROM UNCOMPACTED MIX                              |
| Specific Gravity (60F)                     | AE03             | P23           | 3               | FROM UNCOMPACTED MIX                              |
| Viscosity at 77F                           | AE04             | P24           | 3               | FROM UNCOMPACTED MIX                              |
| Viscosity at 140F, 275F                    | AE05             | P25           | 3               | FROM UNCOMPACTED MIX                              |

NOTE: 1 Samples within brackets are from the same sampling location.



designation, SHRP material testing protocol, the number of tests for each layer of material and the material source/sample type designation which corresponds to the codes shown in Tables 1 and 2. This site-specific field material sampling and laboratory testing plan for each SPS-6 site should include the following elements:

- Overall sampling location layout plan (based on Figure 1).
- Detailed pre-construction sampling layout.
- Detailed post-construction sampling layout.
- Pre-construction laboratory testing plan.
- Post-construction laboratory testing plan.

Other items which may be included with the sampling and testing plan are soil profile logs, plan and profile sheets and other information specific to the project which are pertinent to the field sampling and laboratory testing plans. The recommended plan should be compiled and submitted for review and approval by SHRP prior to implementation.

The following sections provide details for each element of the SPS-6 site-specific field material sampling and laboratory testing plan.

## 2.2 OVERALL SAMPLING LOCATION LAYOUT PLAN

The overall sampling layout plan is used to identify the location of sampling areas relative to the test sections for sampling activities before rehabilitation and after overlay construction. The approximate transition lengths between test sections should be indicated on the plan. Figure 1 illustrates an example of an overall sampling plan.

Since the material sampling and testing methods are destructive, the sampling areas should be located outside the test sections. However, the sampling areas should be located relatively close to the test section ends so that samples obtained represent the materials and conditions encountered within the section, but they should not be located too close to the section ends to contribute to the development of distress in the test sections. As a guideline, sampling areas should be located at least 25 feet from the start or end of a section. The construction guidelines for this experiment require that Test

Sections 1, 3, 4, 6, 7, and 8 be 600 feet long and Test Sections 2 and 5 be 1,100 feet long. This will provide a 50 feet long portions at each end of the test section for sampling operations.

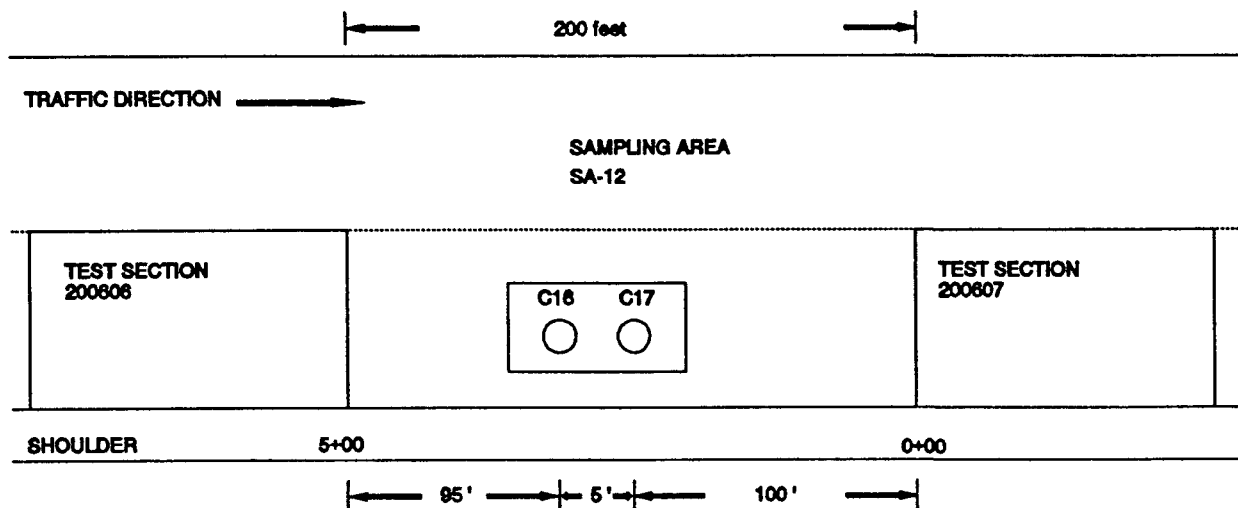
The sampling areas are designated with a code SA followed by a two digit number. The numbers are assigned consecutively starting with pre-construction sampling areas and the first area encountered on the test site in the direction of traffic. Post-construction sampling areas should be numbered consecutively following the highest number assigned to the last pre-construction sampling area and also starting with the first area encountered on the site in the direction of traffic as illustrated in Figure 1.

Location of the sampling areas are specified relative to the end of the nearest adjacent test section. A test section relative station number should be used to reference the location as illustrated in Figure 2. Further explanation is provided in Appendix C.

### 2.3 PRE-CONSTRUCTION SAMPLING PLAN

When laying out the detailed pre-construction sampling plan, the following principles should be applied:

- In tailoring sampling plans to site specific conditions, the tests to be performed on each sample must be considered since materials testing and characterization is the primary objective of the sampling plan.
- At least one, preferably two, C-Type 4-inch diameter cores of the PCC should be placed before and after each pavement test section to quantify the PCC layer thickness. If only one core is to be taken, it should be located three feet from the pavement edge. If two cores are taken, they should be located 2 feet and 3 1/2 feet from the pavement edge.
- The generic field sampling plan described in this report includes one BA-Type core location (3 cores at that location) and two test pits for sampling of unbound materials. Test pits are preferred over BA-Type sampling areas since they allow measurements of the in-place moisture



|                          | Alternative 1<br>Location referenced to<br>test section 200606 | Alternative 2<br>Location referenced to<br>test section 200607 |
|--------------------------|--|--|
| <b>CORE C16 LOCATION</b> |  |  |
| STATE CODE               | 20   | 20   |
| SPS PROJECT CODE         | 06   | 06   |
| TEST SECTION NO          | 06   | 07   |
| STATION                  | 5+95   | -1-05  |
| OFFSET                   | 03   | 03   |
| <b>CORE C17 LOCATION</b> |  |  |
| STATE CODE               | 20   | 20   |
| SPS PROJECT CODE         | 06   | 06   |
| TEST SECTION NO          | 06   | 07   |
| STATION                  | 6+00   | -1-00  |
| OFFSET                   | 03   | 03   |

In this example of the location referencing system, designated sampling area SA-12 is situated between sections 200606 and 200607. In SA-12, two 4" C-type cores are specified, C16 and C17, to be 5 feet apart and three feet from the edge of the lane. The location of these two cores can be specified relative to either test section 200606 (alternative 1) or test section 200607 (alternative 2). In alternative 1, the station number of core C16 is 5+95 since it is 95 feet past the end of section 200607. Core C17 is at station 6+00. In alternative 2, the station number of core C16 is -1+05 and C17 is -1+00 since they occur in advance of test section 200607. Thus, when specifying the sampling locations on the field data form, the station number written on the form must correspond to the test section indicated on the form.

Figure 2. Illustration of Location Referencing System

content and density of all unbound materials using nuclear methods. If test pits are not possible, three BA-Type boreholes should be used for bulk sampling.

- Test pit and BA-Type sampling should be performed at a minimum of three locations on the test site. Ideally, these sampling areas should be placed between the first and second test sections in the middle of the site, and between the last two test sections.
- BA-Type boreholes or test pits should not be placed directly before or directly after the entire SPS test site. These bulk sampling areas should always be located between two test sections unless extenuating circumstances prevail.
- In general, bulk sampling areas should always consist of a combination of one test pit (or three BA-Type boreholes), one A-Type borehole and one C-Type corehole. In situations where a change in subgrade condition requires additional bulk sampling, the C-Type core may be omitted.
- Sampling locations, particularly A-Type, should not be located in cut and fill transition areas. A-Type sampling areas must always be located completely in either a cut or fill.
- Sampling areas should not be located in areas which are considered non-representative of the test section, such as patched areas or areas exhibiting isolated distress occurrences.
- Bulk sampling areas (areas which include test pits or BA-Type sampling areas) should preferably be located adjacent to a test section that will receive an AC overlay. However, where possible test pits may be located near full depth joint repair sites.
- For a test section that is placed more than one mile away from another test section or group of test sections, sampling should include at least two C-Type cores (PCC only) located at one end and a bulk

sampling area (test pit or BA-Type samples, one A-Type and one C-Type cores) located at the other end.

- If a group of test sections is located more than a mile from another localized group of test sections, each group should be treated separately and a complete set of tests performed for each group.
- Sampling for supplemental test sections, such as those representing the agency's rehabilitation practice, should be incorporated in the sampling and testing plan following the overall criteria established for the SPS experiment.

Generally, the sampling plan should reflect the variation of the materials at a specific site. If there is a high degree of variability at the site, the number of bulk sampling and A-Type sampling locations should be increased. Similarly, if the subgrade soil is relatively consistent, less bulk and A-Type samples would be required.

Detailed sampling plan layouts should be prepared for use in the field following the format shown in Appendix A. The location and type of each sample should be illustrated relative to the beginning and end of each test section.

#### 2.4 POST-CONSTRUCTION SAMPLING PLAN

The purpose of the post-construction sampling is to characterize the as-placed properties of the asphalt concrete overlay materials. This includes determination of thickness, resilient modulus, specific gravity, creep compliance and tensile strength. Tests on the extracted aggregates and asphalt cements will be performed on the uncompacted bulk samples obtained from the mix plant. The required number of resilient modulus, creep compliance and thickness tests will control the number of post-construction cores. All post construction cores must be four inch outer diameter cores.

- Resilient modulus. Three resilient modulus tests should be performed on cores from the AC overlay. Three cores obtained from the same approximate area (adjacent to each other) are required for each resilient modulus test. Thus, a total of 9 cores would be tested.

- Creep compliance. One creep compliance test should be performed. Three cores obtained from different locations on the test site are required for this test.
- Thickness. Two cores taken from locations adjacent to both ends of each test section are needed to quantify the as-placed thickness. These cores should be taken along the same transverse line at 2 feet and 3 1/2 feet from the pavement edge.

Since no overlay will be placed on Sections 1, 2, and 5, no post-construction sampling is required adjacent to these sections. Testing on any supplemental sections may be done at the direction of the participating agency. The rationale for testing of the SHRP sections may form the basis for the testing plan for these supplemental sections.

Care must be taken to insure that the post-construction sampling areas are located in portions of the pavement that were constructed with the same materials, layer thicknesses, and rehabilitation treatment preparation as on the adjacent test sections and thus are representative of the test section. Areas with varying layer thicknesses or material types should be avoided.

An example of post-construction sampling plan for a hypothetical "ideal" SPS-6 test site is shown in Appendix B.

### 3. FIELD MATERIALS SAMPLING

#### 3.1 GENERAL

This section describes procedures for field material sampling, field testing and handling of cores and other material samples in the field and during transfer to the laboratory for testing. These procedures should be followed as closely as possible to minimize the variability of material properties attributable to differences in sampling and handling techniques.

Throughout this document, the various types of base and subbase layers of pavements are referred to by such terms as "bound", "treated", "untreated", etc. The terms "bound", "treated", and "stabilized" are used interchangeably and refer to base and subbase layers containing a cementing/binding agent such as asphalt or portland cement. The terms "unbound", "untreated", and "unstabilized" are used interchangeably and refer to granular base and subbase layers containing no additional materials. Subgrade soils are classified as either fine-grained or coarse-grained soils and refer to the materials beneath a base or subbase layer.

The field material sampling and field testing activities will provide pavement material samples for laboratory testing and will yield in situ density and moisture test data and visual pavement layer information for the test sections. This information will be reported using the forms provided in Appendix C for eventual inclusion in the National Pavement Performance Data Base.

Field sampling and field testing will be performed in three phases: pre-construction, during construction and post-construction. The pre-construction sampling phase is intended to fully characterize the existing pavement structure and thus provide a baseline to compare the different rehabilitation techniques. The during-construction sampling phase will provide samples to help verify the mix design and characterize the asphalt concrete overlay materials. The post-construction sampling and testing phase will help determine material properties of the as-built sections. This information will be used in evaluating the effectiveness and long-term performance of the different rehabilitation

techniques. Requirements and details of field material sampling activities for each of these three phases are presented in the following sections of the report.

Sampling of the existing pavement structure will include the following types of samples:

- Four-inch outer diameter cores of portland cement concrete.
- Four-inch outer diameter cores of PCC, bound base layers and treated subbase layers.
- Six-inch outer diameter cores of PCC, bound base layers and treated subbase layers; augering of unstabilized base and subbase layers; thin-walled tube and/or splitspoon sampling of subgrade layers to four feet below the top of the untreated subgrade.
- Twelve-inch diameter cores of PCC, bound base layers and treated subbase layers; augering of unstabilized base, subbase and subgrade to twelve inches below the top of the untreated subgrade for bulk sample retrieval.
- Six-foot by four-foot test pits to twelve inches below the top of the untreated subgrade soil, nuclear density and moisture measurements on stabilized pavement layers and subgrade material; bulk sampling of unstabilized layers and the subgrade.
- Six-inch shoulder auger probes.

The Field Set Number "1" has been assigned to designate all sampling operations performed prior to rehabilitation and/or overlay construction. Therefore, the number "1" shall be used when completing the material sampling and field testing forms for sampling prior to construction activities.

During overlay placement on the Test Sections 3, 4, 6, 7, and 8, asphaltic concrete materials used in the overlay will be sampled and collected. All sampling and collection of materials during overlay construction will occur at the mix plant to avoid interruptions to construction activities. These samples



will be obtained for research purposes only and will not be a part of any contractual quality control programs by the participating highway agency. The following materials will be collected:

- 55 gallons of asphalt cement used in the asphalt concrete mix. This material should be collected in eleven 5-gallon pails provided by SHRP from the asphalt concrete mix plant after the asphalt has been heated for mixing.
- 1000 lbs of the finished aggregate product (combined coarse and fine aggregate) to be used in the asphalt concrete mix. This material shall be sampled in conformance with applicable portions of AASHTO Designation T2. This material should be collected in two 55-gallon drums to be furnished by SHRP. For drum plants, the aggregate should be obtained from the charging (inclined) conveyor using the bypass chute, if possible. Otherwise, the sample should be taken from the belt on the charging conveyor. For batch plants, the aggregates can be sampled from the inclined conveyor at the dryer.
- 200 lbs of the finished asphalt concrete mix used in the construction of the test sections. These materials shall be sampled at the plant in conformance with applicable sections of AASHTO T168. SHRP will provide 5-gallon containers for shipment and storage of the finished asphalt concrete.

The containers furnished by SHRP for these materials are of a special manufacture to accommodate long-term storage. It is necessary that scheduling information be furnished to the A-001 contractor as soon as possible along with a shipping address and name and telephone number of the person designated to receive the shipment of these containers.

A diagram of the pavement cross section which clearly identifies all of the layers in the pavement structure should be forwarded to the offices of the SHRP A-001 contractor several weeks before the start of construction. Detailed project plan sheets are not necessary. A simple drawing indicating the required information and dimensions is all that is required. The SHRP A-001 contractor will then determine which layers of the pavement structure should be sampled.

The requested information and materials should be forwarded to the following address:

SHRP-Asphalt Research Program  
The University of Texas at Austin  
8701 North Mopac Blvd., Suite 450  
Austin, Texas 78759  
Attn: James S. Moulthrop  
Tel: (512) 471-8585  
Fax: (512) 471-0909

A copy of Field Operations Information Form 1 (Appendix C) should be completed and included with the shipment to the SHRP A-001 contractor and another copy of the form should be mailed separately. This will allow a trace of the shipment if it does not arrive in a timely manner. Containers should be shipped by suitable means as agreed upon by the SHRP Regional Engineer and the participating agency. SHRP will bear the cost of shipping all materials collected for the SHRP asphalt research effort.

In addition to the 200 lbs of the finished asphaltic concrete mix required for the SHRP Asphalt Research Program another 100 lbs of the mix shall be obtained in the same manner at the plant for SPS research purposes. These materials shall be stored in a suitable container and shipped to the laboratory designated by the participating highway agency for testing. The laboratory tests to be conducted on these uncompacted samples are listed in Table 3.

Table 2 summarizes the field material sampling required during the construction of each SPS-6 test site.

Characterization of the AC overlay (post-construction sampling) materials is essential for evaluating the performance of the rehabilitated structure. The in-place material sampling of the AC overlay consists of retrieving four-inch outer diameter cores of the overlay as indicated in Table 1. These sample areas will be illustrated on the sampling plans with a small circle. No other type of sampling will be required after overlay placement.

The Field Set Number "2" has been assigned to designate sampling operations performed during and after overlay placement. Therefore, the number "2" shall

be used when completing the material sampling and field testing forms for those sampling activities performed during and after construction.

### 3.2 FIELD OPERATIONS

This section outlines procedures for field sampling, field testing and handling of material retrieved from the SPS-6 test site. Field operations for each site will include the following activities:

1. SHRP regional office should coordinate with the participating highway agency the field activities involved in the drilling and sampling operations. With concurrence of the participating highway agency, the SHRP Regional Engineer shall designate a representative to assist the participating highway agency and contractors in ensuring that the field operations are performed in accordance with the approved field sampling and testing plan.
2. After arriving at the site and establishing traffic control, the responsible personnel shall lay out the initial sample locations and perform the sampling and testing operations in the following sequence:
  - a) sawing and removal of PCC pavement at the test pit location(s).
  - b) coring and boring of BA-Type boreholes.
  - c) bulk sampling and moisture/density testing in the test pit(s) as layers are removed.
  - d) boring and augering of C-Type core holes and A-Type auger holes.
  - e) shelby tube undisturbed sampling of subgrade material. If unable to obtain Shelby tube samples, the SHRP Representative may direct the use of splitspoon sampling to obtain subgrade material samples.
  - f) auger probes in the shoulder.
  - g) patching, cleanup and removal of traffic control.

When appropriate, a different sequence of activities may be used to improve the efficiency of the operations. However, special consideration must be given to the test pit location(s) because of their complexity and the substantial time and effort they require. Core or auger locations that are considered

unacceptable should be replaced with alternate locations and marked on the as-sampled layout plan.

3. SHRP field representative shall record and report problems encountered during field operations to the SHRP Regional Engineer and obtain recommendations for resolution.
4. Test samples shall be prepared for shipping together with completed logs and other records.

### 3.2.1 Coring of Pavement Surface and Bound (Treated) Layers

This activity will involve coring of PCC pavement surface and other treated base and subbase layers of pavements at the locations shown on the field material sampling plan. Exploration logs must be prepared using Sampling Data Sheets 1 and 2 in Appendix C. This coring will occur at two times: prior to construction (4-inch, 6-inch, and 12-inch diameter cores) and after construction (4-inch diameter cores). The coring operations shall be carried out in accordance with AASHTO T24, "Obtaining and Testing Drilled Cores and Sawed Beams of Concrete", using the equipment and methods specified in the SHRP-LTPP Guide for Field Materials Sampling, Handling and Testing.

It is essential for laboratory material testing that cores be oriented in the direction of traffic. Therefore, all cores of pavement surfaces shall be marked on the top with an arrow to show the direction of traffic. This marking should be made prior to removal of the cores from the pavement using a waterproof marking material and in a manner that will ensure visibility after coring operations. Plugs shall not be inserted in cores to be used for laboratory testing. Suction cups and wire pulls have been successfully used for core extraction.

3.2.1.1 Coring - Prior to Construction - Core locations shall be as shown on the sampling plan figures developed for the specific test site. It is especially important that the 4-inch and 6-inch diameter cores be taken perpendicular to the pavement surface, i.e. at a 90 degree angle to the surface, to ensure the recovery of straight, intact, smooth-surfaced specimens suitable for laboratory testing. Details on tolerances and quality control of the coring operations are

included in Section 4 of the SHRP-LTPP Guide for Field Materials Sampling, Handling and Testing. All cores shall be dried before packaging.

Special care must be taken during the coring operations of treated materials. The bit type, rate of penetration and cooling medium shall be varied as necessary to minimize tearing and breakage. If 4-inch diameter cores suitable for testing cannot be recovered from the designated C-Type sampling locations due to the nature or condition of the material, chunks or pieces of the treated materials from these layers shall be obtained from the test pit area or the respective BA-Type sampling locations. These chunk and piece samples shall then be coded, packaged, and shipped as bulk material.

Portland Cement Concrete cores that are extracted with an adhering treated layer shall not be split at the layer interface in the field. These samples should be wrapped and shipped as a single core to the testing laboratory.

3.2.1.2 Coring - After Construction - Core locations shall be as shown on the after construction field sampling plan figures developed for the test site. Only 4-inch diameter and C-Type cores are required of the overlay. All coring specifications outlined previously shall be followed. If it is not possible to obtain cores of the overlay only, cores shall be taken to the full depth of the pavement, packaged and shipped to the laboratory intact for sawing at the overlay interface.

### 3.2.2 Augering of Subsurface Layers for Bulk Sampling

This activity is required only before rehabilitation or overlay placement and involves pavement coring, augering and sampling of untreated base/subbase and augering and sampling of subgrade layers of pavements at BA-Type locations to obtain bulk samples. These operations shall be carried out in accordance with AASHTO T203, "Soil Investigation and Sampling by Auger Borings" and AASHTO M146, "Terms Relating to Subgrade, Soil-Aggregate and Fill Materials".

The pavement surface layer and any treated materials shall be cored with a 12 inch diameter bit at the BA-Type bulk sampling augering locations. All 12-inch diameter cores of PCC shall be removed and discarded unless intact cores of these materials were not recovered at the C-Type locations. All untreated

base and subbase layers shall be augered separately to obtain uncontaminated samples of each layer. The material raised by the auger from the layer immediately below the cored pavement surface or bound layers should be discarded due to possible contamination by water or fines from the coring operations. As augering of the unbound layer proceeds, the operator must observe the presence of material from the next lower layer. If materials from the two layers are mixed together, the sample shall be discarded. The uncontaminated material from each layer shall be separately retained as large bulk samples.

Bulk sample quantities required for packaging and shipment are shown in Table 5. A small bag or jar sample shall be obtained from each layer of each BA-Type borehole for laboratory moisture testing.

At the undisturbed sample locations (A1, A2), the pavement surface layer and any treated materials shall be cored with a 6-inch diameter bit and all cores removed. Undisturbed samples of the natural subgrade or fill material directly beneath base and/or subbase layers at A-Type locations shall be obtained to a depth of 4 feet below the top of the subgrade or fill using Shelby (thinwall) tube sampling. If Shelby tube samples cannot be obtained, splitspoon samples may be obtained if approved by the SHRP representative. Shelby (thinwall) tube sampling shall be performed in accordance with AASHTO T207. Splitspoon sampling shall be performed following the procedures in section 3.4.5 of the SHRP-LTPP Guide for Field Materials Sampling, Handling and Testing. If rock, boulders or other forms of dense material are encountered within four feet of the top of natural subgrade or fill, another attempt for sampling the subgrade shall be made at a different location with a longitudinal offset of 5 to 10 feet. If refusal occurs at the second location at a shallow depth, splitspoon sampling shall be terminated.

### 3.2.3 Test Pit Excavation and Sampling

Test pits shall be excavated and sampled in accordance with Section 3.5 of the SHRP-LTPP Guide for Field Materials Sampling, Handling and Testing. Requirements for bulk sample quantities are listed in Table 5.

Table 5. Weight Requirements for Bulk Samples of Unbound Base, Subbase and Subgrade Layers

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| <u>Layer</u>    | <u>Bulk Samples<br/>from three 12" Auger<br/>Holes (BA1, BA2, and BA3)</u>                               | <u>Bulk Samples<br/>from Test Pit</u>  |
|-----------------|--|--|
| Unbound Base    | Maximum 200 lbs. (100 lbs. Minimum)  | 200 lbs.   |
| Unbound Subbase | Maximum 200 lbs. (100 lbs. Minimum)  | 200 lbs.   |
| Subgrade        | <ul style="list-style-type: none"> <li>• Coarse Grain 200 lbs.</li> <li>• Fine Grain 150 lbs.</li> </ul> | <ul style="list-style-type: none"> <li>200 lbs.</li> <li>150 lbs.</li> </ul> |

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#### 3.2.4 Uncompacted Mix Sampling Procedures

The sampling of the uncompacted AC mix shall be performed at the mix plant to avoid interruptions to the construction activities. These samples shall be obtained in accordance with AASHTO T168 and shipped to the laboratory in containers provided by SHRP. In addition to the materials samples obtained for the SHRP Asphalt Research Program purposes, at least one hundred pounds of the AC mix shall be sampled and sent to the laboratory designated by the participating highway agency. Where sampling at the mix plant is not feasible, the AC material sample should be obtained from the hauling vehicle at the test site. If concerns about the uniformity of the AC mix arise during the construction, at least two samples of one hundred pound each shall be obtained.

#### 3.2.5 Collection of Samples, Marking, Packaging, and Shipping

All samples retrieved during the sampling and testing process shall be carefully marked, packaged and shipped to the laboratory designated by the participating highway agency (unless the highway agency authorizes other arrangements). The samples shall be packaged and preserved in accordance with ASTM D4220 (Group B), "Preparing and Transporting Soil Samples". Extreme care must be taken in packaging and shipping of test samples to avoid damage of the samples.

#### 3.2.6 Logs and Reports

Accurate and detailed record keeping is essential for the materials sampling and testing program. During the field sampling operations, two types of forms must be completed. These are the Field Operations Information Forms and the Sampling Data Sheets. Field Operations Information Forms are used to record general information about the pavement test sections and the materials samples. Sampling Data Sheets are used to record the actual information for each sampling area or sampling location. A person should be designated to record data at each site on the appropriate data sheets, insure the accuracy and integrity of the collected data and forward the data sheets to the appropriate personnel. This person shall have a thorough understanding of the content of the data sheets and the procedures for completing the sheets. If these forms are completed by a person other than the SHRP representative, then the data sheets must be



approved by the SHRP representative prior to forwarding the sheets to the appropriate personnel.

3.2.6.1 Core Holes - A separate log shall be completed for each core hole. The depth of penetration of each coring operation and the average length of the recovered core shall be recorded to the nearest 0.1 inch. Data sheets for these logs are included in Appendix C. Sampling Data Sheet 1 shall be used to record cores obtained from A- and BA-Type sampling areas. Sampling Data Sheet 2 shall be used to record pavement cores from C-Type sampling areas. These logs shall show the general type of material in accordance with terminology described in Appendix C of the SHRP-LTPP Guide for Field Materials Sampling, Handling and Testing. Remarks shall include the type of cooling medium, difficulties encountered in coring, defects observed in the core such as cracks, voids and disintegration, and other pertinent observations.

3.2.6.2 Auger Holes - The data for each A-Type augering hole shall be recorded on Sampling Data Sheet 4. The data should include the thicknesses and descriptions of the unbound layers, depth of shelly tube or splitspoon samples and other related data. Data to be recorded on this form should include the following:

1. Material type and description for each layer of untreated materials and soils in accordance with Table C.2. of the SHRP-LTPP Guide for Field Materials Sampling, Testing and Handling.
2. Thickness of each layer as measured in the hole to the nearest 0.1 inch.
3. Presence and levels of any water encountered.
4. Sample numbers.

The data for each BA-Type bore hole shall be recorded on Sampling Data Sheet 5 in a similar manner to that described for A-Type cores.

3.2.6.3 Test Pits - Test pits shall be logged as excavation progresses and reported on Sampling Data Sheets 6 and 7. The record shall include the description of each layer in accordance with the layer designations provided on the preliminary data sheets, thickness of each layer to the nearest 0.1 inch, sample numbers and number of bags per sample, test numbers, any water seepage,

sloughing, voids and other pertinent items. The layer thicknesses shall be measured at least at two points on each exposed face for a total of eight measurements. Additional measurements shall be made if thickness measurements vary by more than 0.3 inch for surface and treated layers or 1.0 inch for untreated layers. Measurements shall also be made of the shoulder surface and base/subbase layers. All measurements shall be recorded on the logs and a transverse profile (cross section) of the pavement shall be included.

Good quality color print photographs of the test pit profile shall be taken at and keyed to the locations described on the Sampling Data Sheet 6 test pit log. The photographs shall be taken with the sun behind the photographer (if possible to avoid shadows) to provide a total view of the test pit and close-up views of the pavement profiles. If voids or discontinuities exist in the pavement structure, multiple close-up pictures should be taken. The photographs should be sent to the SHRP regional office for processing and filing for archival purposes.

3.2.6.4 Shoulder Auger Probes - Data for shoulder auger probes shall be reported using Sampling Data Sheet 9.

Table 6 lists the forms that should be included in the field data packet for each sampling phase (i.e., pre-construction, during construction and post-construction).

### 3.2.7 Sample Code Number

Each sample (core, block, bulk, moisture, Shelby tube, splitspoon, chunks) shall be assigned a four digit number that must be recorded on appropriate data forms. The sample code number will have two letters on the left side and two numbers on the right side.

The first letter on the left identifies the sample type in one of the following categories:

Table 6. Forms to be Completed During Each Phase of Field Material Sampling, Handling and Testing.

Pre-construction - (Field Set Number 1)

Field Operations Information Form 1

Field Operations Information Form 2

Sampling Data Sheet 1

Sampling Data Sheet 2

Sampling Data Sheet 4

Sampling Data Sheet 5

Sampling Data Sheet 6

Sampling Data Sheet 7

Sampling Data Sheet 8

Sampling Data Sheet 9

During Construction - (Field Set Number 2)

Field Operations Information Form 1

Field Operations Information Form 2

Sampling Data Sheet 10

Post-construction - (Field Set Number 2)

Field Operations Information Form 1

Field Operations Information Form 2

Sampling Data Sheet 2

- C - core sample
- B - bulk sample
- K - block sample
- M - moisture sample
- T - Shelby tube sample
- J - splitspoon sample
- P - broken pieces or chunks

The second letter from the left identifies the type of material in the sample in one of the following categories:

- A - asphalt concrete
- P - portland cement concrete
- T - treated, bound, or stabilized base/subbase
- G - untreated, unbound granular base/subbase
- S - subgrade soil or fill material

The numbers to the right will designate the sample number. The numbers shall be assigned consecutively for each sample type. For example, samples taken from C-Type core locations shall be designated C1, C2, C3, etc. Samples taken from A-Type locations shall be designated A1, A2, A3, etc. and samples taken from BA-Type locations shall be designated BA1, BA2, etc. If a bulk sample of one layer is contained in more than one bag, then the number of bags and the same bulk sample number should be recorded on each bag.

The following are examples of valid combinations of letters and numbers making up sample code numbers:

- CA24 Asphaltic concrete cores.
- CT24 Treated base or subbase cores.
- BV01 Bulk sample of asphalt concrete.
- KT02 A treated base/subbase block sample from the test pit (if retrieved).
- PT02 Pieces of treated base or subbase (up to two bags from the test pit area or from 12 inch BA-Type bore holes). These types of samples must be taken if good cores could not be obtained from the treated layer.

- BG01 Bulk samples from granular base or subbase material (from BA-Type bore holes and from the test pit). For example, assign BG01 (for base) and BG02 (for subbase) for samples of granular layers from auger hole BA1; BG03 and BG04 for BA2 samples; and BG05 and BG06 for samples from auger hole BA3.
- BS01 Bulk samples of subgrade material from different BA-Type bore holes and for samples from the test pit.
- MG01 Granular base/subbase samples for moisture content (from BA1, BA2, BA3, A1 and A2 Type auger holes and from the test pit).
- MS01 Subgrade samples for moisture content (from BA-type and A-type auger holes and from the test pit).
- TS04 Shelby tube samples from subgrade (two Shelby tubes from each A-type location).
- JS01 Jar samples of subgrade from splitspoon sampler (two splitspoons from each A-Type location).

### 3.2.8 Labels and Tags

Requirements regarding labels and tags shall be as specified in Section 3.6.5.(d) of the SHRP-LTPP Guide for Field Material Sampling, Handling and Testing. However, as a minimum, the following information shall be included on tags and labels:

STATE CODE

SPS PROTECT CODE

TEST SECTION NO.

CORE/SAMPLE LOCATION (as marked on sample layout plans)

SAMPLE NUMBER (four digit code)

DATE (mm-dd-yy, sampling date)

FIELD SET (one digit number which will be "1" for the first round of sampling [pre-construction] and "2" during the second round of sampling [during and after construction])

### 3.2.9 Packaging

Packaging shall be as specified in Section 3.6.5(e) of the SHRP-LTPP Guide for Field Materials Sampling, Handling and Testing. In addition, Field

Operations Information Sheets 1 and 2 shall be sent with each shipment of materials samples.

### 3.2.10 Shipping

All samples should be shipped within 5 days to the laboratory designated by the participating highway agency. Each box shall be labeled, as described in Section 3.2.8, to include the State Code, SPS Project Code, type(s) of samples, box number (for each series of boxes for the specific project to each delivery point). The boxes should be labeled "Handle with Care" or similar wording. Samples shall be protected against freezing and overheating.

### 3.2.11 Field Testing

Field testing includes in-situ density and moisture measurements and auger probes for determination of bed rock location if it exists within 20 feet of pavement surface.

3.2.11.1 In-situ Density and Moisture Measurements - The in-situ nuclear density testing shall be carried out in accordance with Section 3.7 of the SHRP-LTPP Guide for Field Materials Sampling, Handling and Testing. Sampling Data Sheet 8 shall be used to record the results of the nuclear density/moisture tests.

3.2.11.2 Auger Probe - Auger probes shall be carried out in accordance with Section 3.8 of the SHRP-LTPP Guide for Field Materials Sampling, Handling and Testing at the locations designated on the sampling plans prepared for the test site.

### 3.2.12 Assembly of Data Sheets and Transmittal

The following is a description of the format that should be used for the assembly of the data sheets from each SPS-6 test site. The forms will appear in the final assembled data packet in the order illustrated in Figures 3, 4 and 5 for pre-construction, during construction and post-construction activities, respectively. The title page will be the first (top) sheet of the data packet and it will include the following:

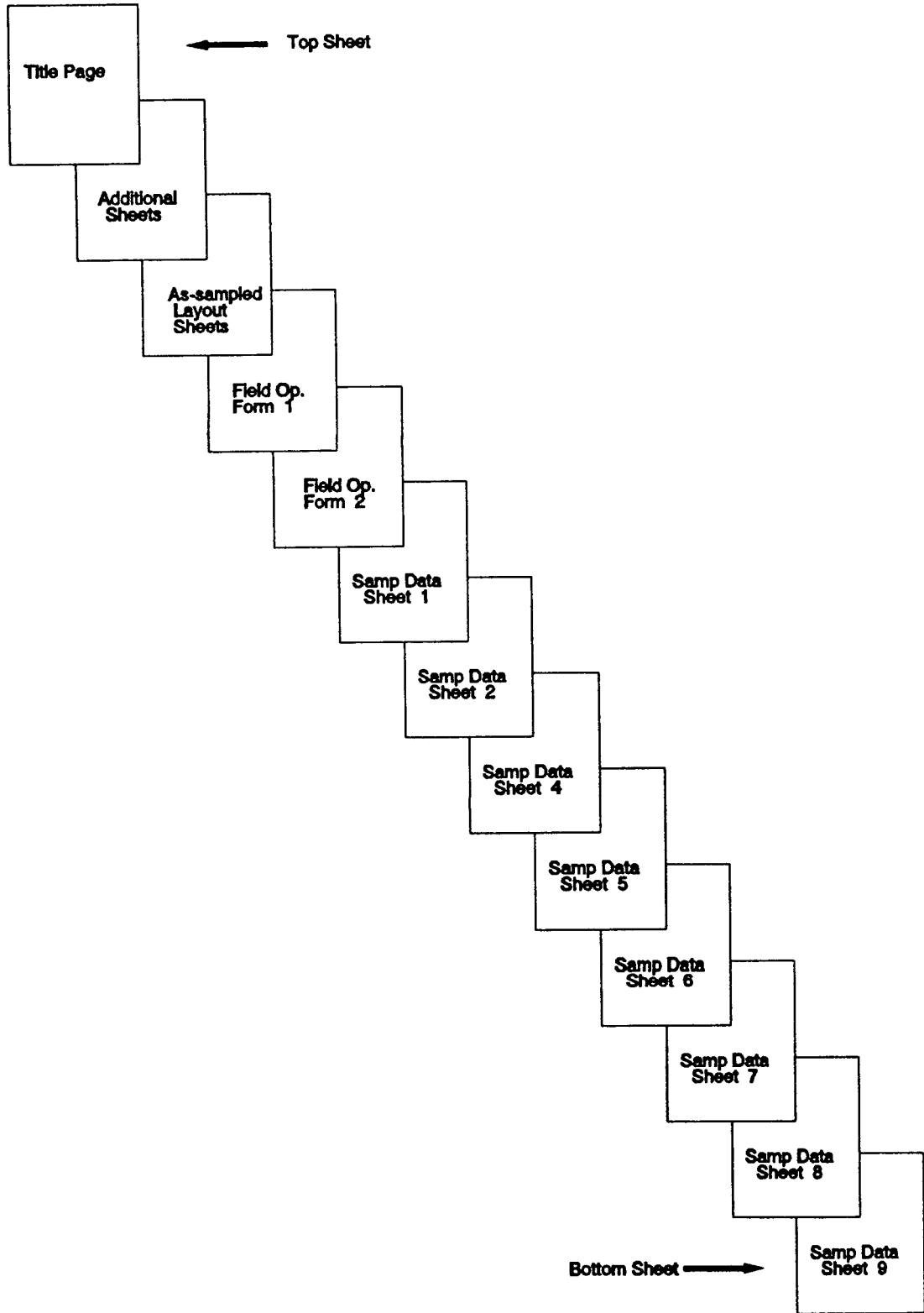


Figure 3. Assembly of "Pre-Construction" Sampling and Testing Forms

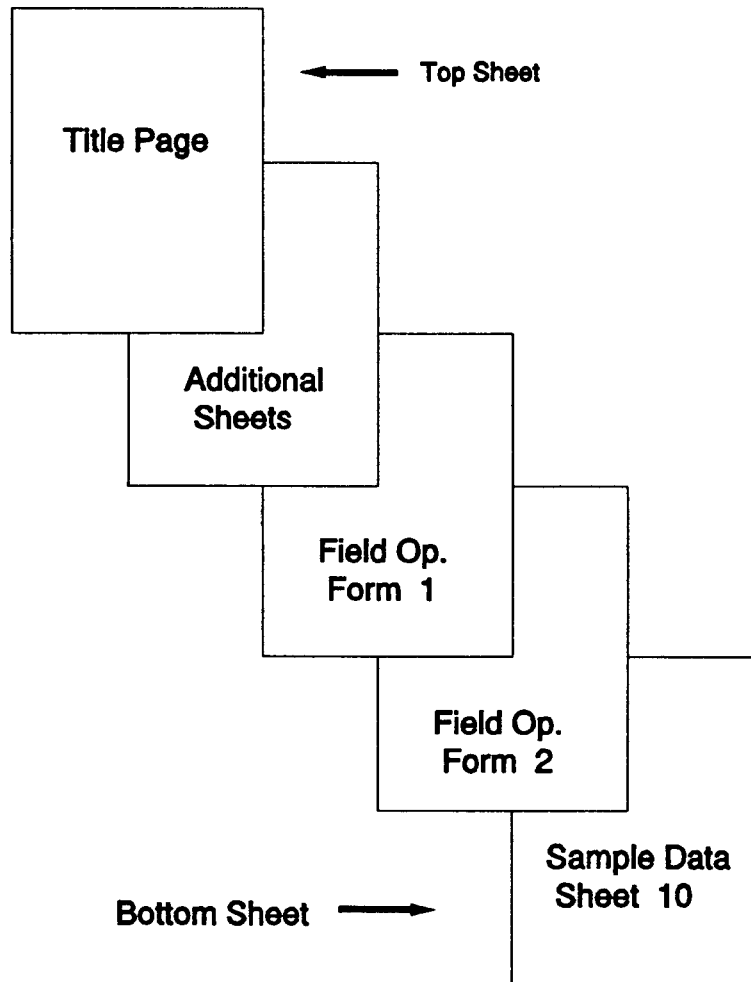


Figure 4. Assembly of "During Construction" Sampling and Testing Forms



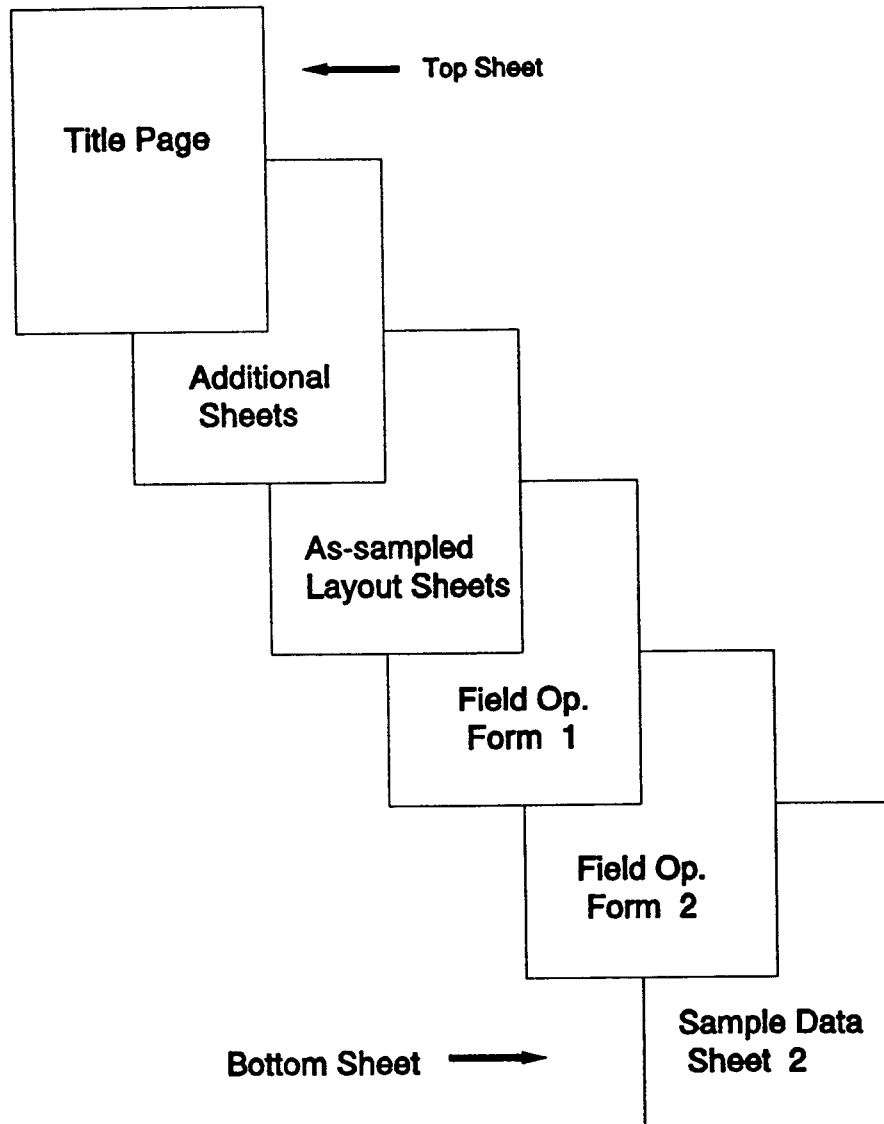


Figure 5. Assembly of "Post-Construction" Sampling and Testing Forms

- 1 - SHRP Region
- 2 - State
- 3 - State Code
- 4 - SPS Project Code
- 5 - Experiment Name
- 6 - Highway Number
- 7 - Date(s) of Field Material Sampling and Field Testing
- 8 - Submitting Contractor/Agency
- 9 - Total Sheets, Including the Title Page.

To determine the number of sheets (item 9 above) all of the pages in the packet should be counted. The pages should then be numbered consecutively, starting with the title page. For example, if there are 100 pages in the packet, the title page would be "page 1 of 100" followed by "page 2 of 100" and so forth until the last page would read "page 100 of 100". This will insure that any lost sheets can be quickly identified and found.

After the packet has been assembled and numbered, the original and appropriate number of duplicates should be made. The original and one copy should be forwarded to the SHRP regional office. Also, copies should be forwarded to the participating highway agency and those laboratories designated by the agency to perform the laboratory tests on the samples.

4. LABORATORY MATERIALS TESTING

Table 7 lists the laboratory test procedures which will be used to characterize the materials obtained from each SPS-6 site. When implementing the sampling plan for an SPS-6 site, it is imperative that a sufficient amount of samples be retrieved for each material type to ensure completion of all tests. Therefore, a laboratory testing plan, similar to that shown in Tables 3 and 4, shall always be developed in conjunction with the field material drilling and sampling plan. The plan shall list the tests to be performed and the samples to be used for each test. The laboratory testing plan summarized in Tables 3 and 4 is an example of a plan that addresses the minimum laboratory tests required to characterize the materials at a test site.

Table 7. Laboratory Material Testing Procedures.

| MATERIAL TEST                                     | SHRP TEST DESIGNATION | SHRP PROTOCOL |
|---|-----------------------|---------------|
| PORTLAND CEMENT CONCRETE                          |                       |               |
| Compressive Strength                              | PC01                  | P61           |
| Splitting Tensile Strength                        | PC02                  | P62           |
| Coefficient of Thermal Expansion                  | PC03                  | P63           |
| Static Modulus of Elasticity                      | PC04                  | P64           |
| PCC Unit Weight                                   | PC05                  | P65           |
| Core Examination/Thickness                        | PC06                  | P66           |
| ASPHALTIC CONCRETE                                |                       |               |
| Core Examination/Thickness                        | AC01                  | P01           |
| Bulk Specific Gravity                             | AC02                  | P02           |
| Maximum Specific Gravity                          | AC03                  | P03           |
| Asphalt Content (Extraction)                      | AC04                  | P04           |
| Moisture Susceptibility                           | AC05                  | P05           |
| Creep Compliance                                  | AC06                  | P06           |
| Resilient Modulus                                 | AC07                  | P07           |
| Tensile Strength                                  | AC07                  | P07           |
| EXTRACTED AGGREGATE                               |                       |               |
| Specific Gravity Coarse Aggregate                 | AG01                  | P11           |
| Specific Gravity Fine Aggregate                   | AG02                  | P12           |
| Type and Classification:                          |                       |               |
| Coarse Aggregate                                  | AG03                  | P13           |
| Fine Aggregate                                    | AG03                  | P13           |
| Gradation of Aggregate                            | AG04                  | P14           |
| NAA Test for Fine                                 |                       |               |
| Aggregate Particle Shape                          | AG05                  | P14A          |
| Coarse Aggregate Shape Test                       | AG06                  | P14B          |
| ASPHALT CEMENT                                    |                       |               |
| Abson Recovery                                    | AE01                  | P21           |
| Penetration at 77 and 115° F                      | AE02                  | P22           |
| Specific Gravity (60F)                            | AE03                  | P23           |
| Viscosity at 77F                                  | AE04                  | P24           |
| Viscosity at 140F, 275F                           | AE05                  | P25           |
| BOUND (TREATED) BASE AND SUBBASE                  |                       |               |
| Type and Classification of Material and Treatment | TB01                  | P31           |
| Pozzolanic/Cementitious:                          |                       |               |
| Compressive Strength                              | TB02                  | P32           |
| Asphalt treated:                                  |                       |               |
| Dynamic Modulus (77F)                             | TB03                  | P33           |
| HMAC:   |                       |               |
| Resilient Modulus                                 | AC07                  | P07           |
| UNBOUND GRANULAR BASE AND SUBBASE                 |                       |               |
| Particle Size Analysis                            | UG01                  | P41           |
| Sieve Analysis (washed)                           | UG02                  | P41           |
| Atterberg Limits                                  | UG04                  | P43           |
| Moisture-Density Relations                        | UG05                  | P44           |
| Resilient Modulus                                 | UG07                  | P46           |
| Classification                                    | UG08                  | P47           |
| Permeability                                      | UG09                  | P48           |
| Natural Moisture Content                          | UG10                  | P49           |
| SUBGRADE  |                       |               |
| Sieve Analysis                                    | SS01                  | P51           |
| Hydrometer to 0.001mm                             | SS02                  | P42           |
| Atterberg Limits                                  | SS03                  | P43           |
| Classification                                    | SS04                  | P52           |
| Moisture-Density Relations                        | SS05                  | P55           |
| Resilient Modulus                                 | SS07                  | P46           |
| Unit Weight                                       | SS08                  | P56           |
| Natural Moisture Content                          | SS09                  | P49           |

APPENDIX A - EXAMPLE OF PRE-CONSTRUCTION SAMPLING PLAN

This appendix contains an example of a pre-construction field sampling layout plan for an SPS-6 test site which provides the minimum requirements for materials characterization considered essential for the experiment. This plan should be adjusted with consideration to the condition and details of the specific test site.

A schematic layout of a test site illustrating the location of the test sections and sampling areas is shown in Figure A.1. An example of a pre-construction sampling plan for an "ideal" test site is illustrated in Figures A.2 through A.9 for test sections 1 through 8, respectively.

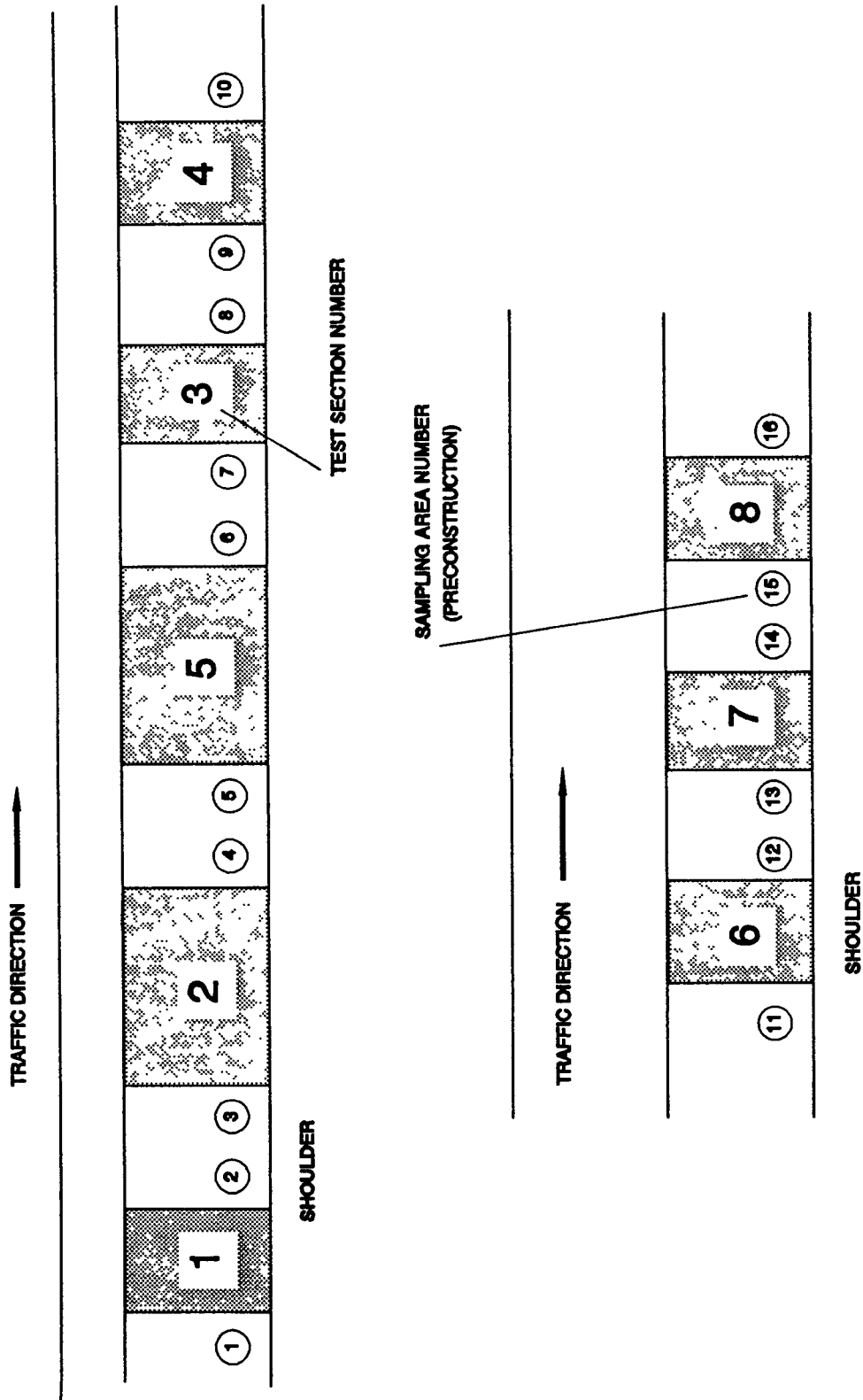


Figure A.1 Example of "Pre-Construction" Sampling Area Plan

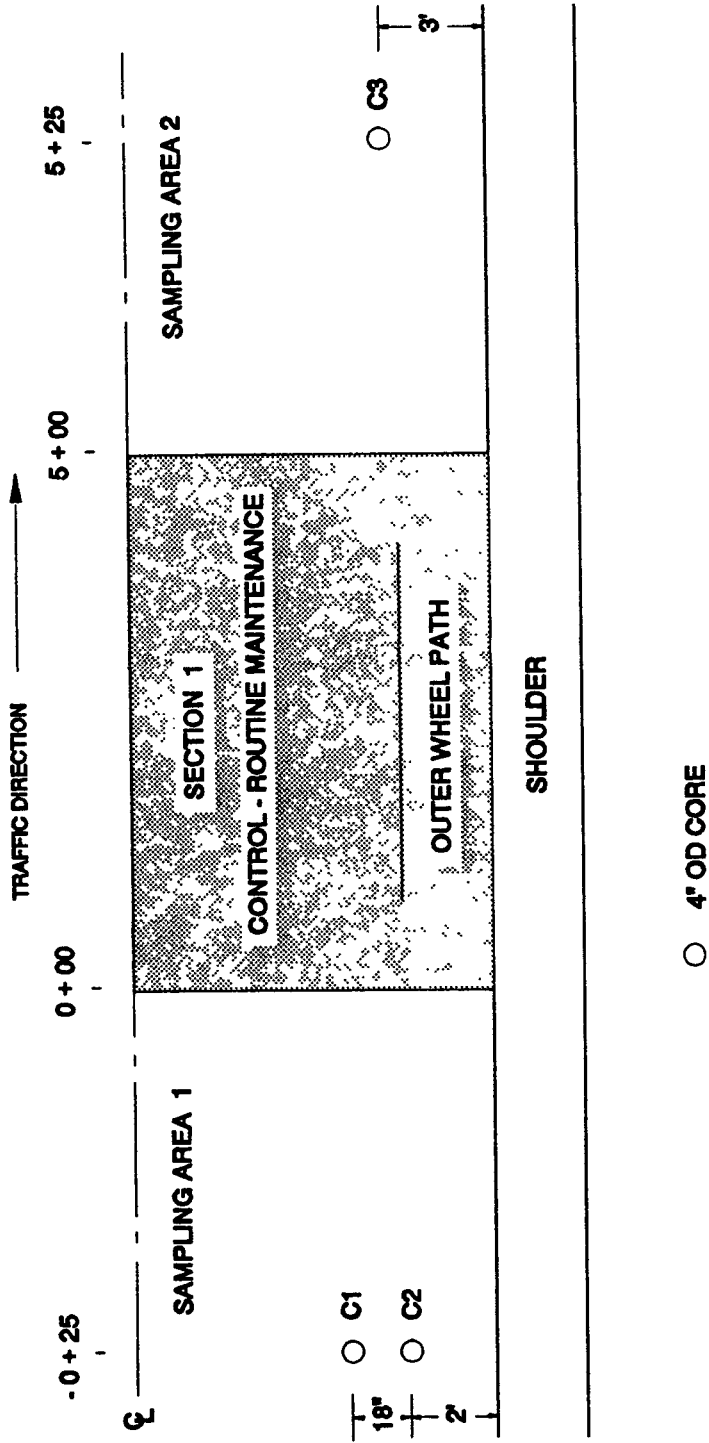


Figure A.2 Example of "Pre-Construction" Sampling Plan for Test Section 1

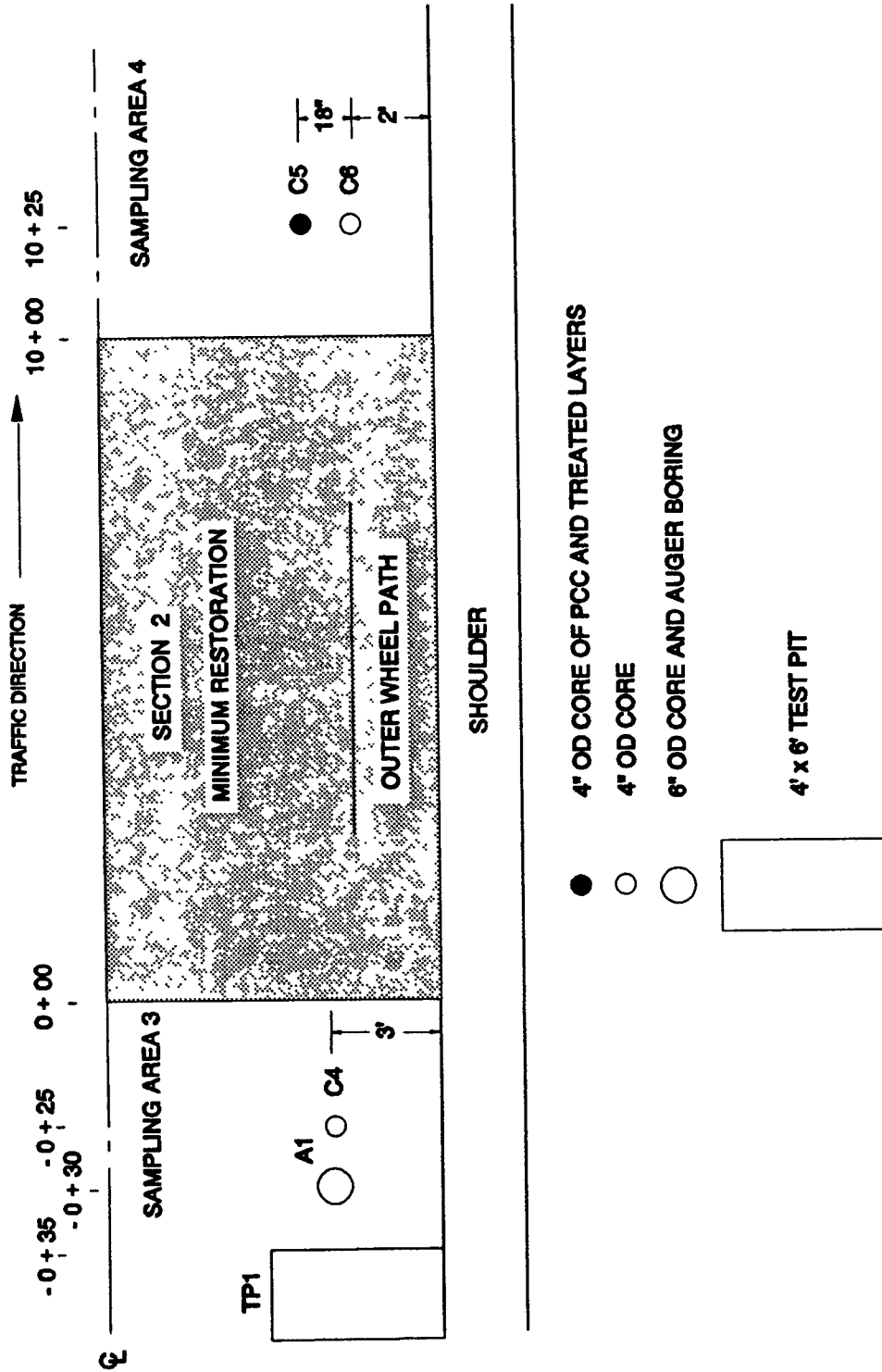


Figure A.3 Example of "Pre-Construction" Sampling Plan for Test Section 2



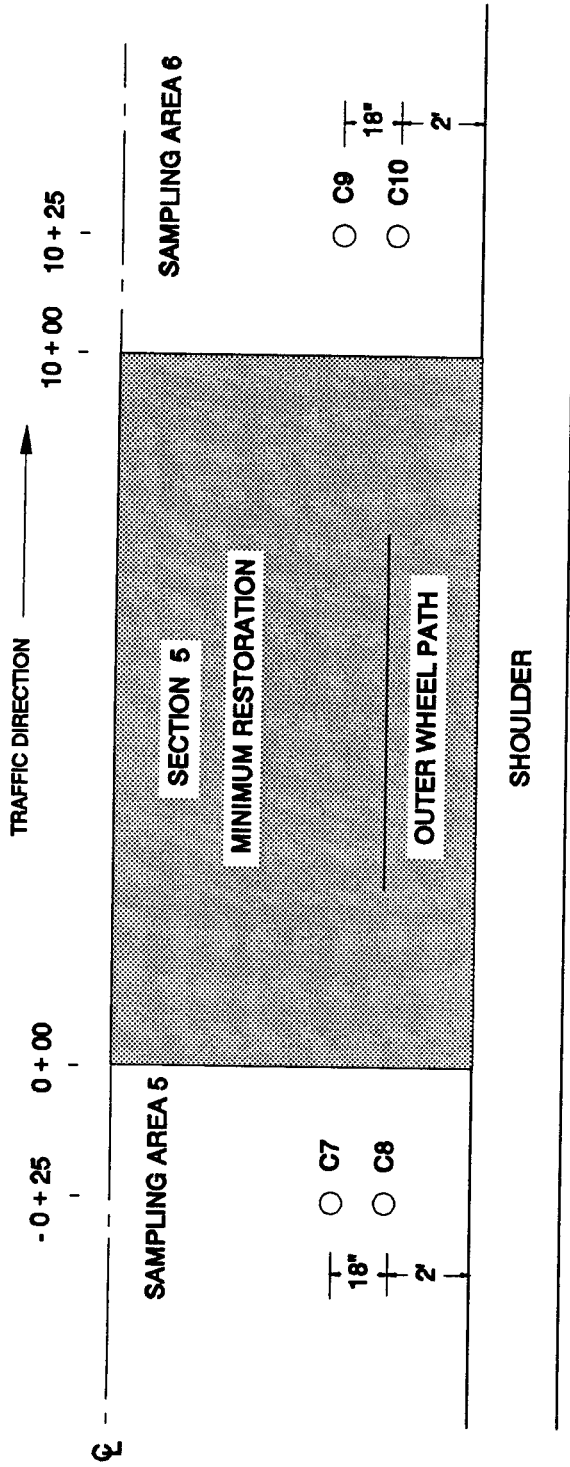
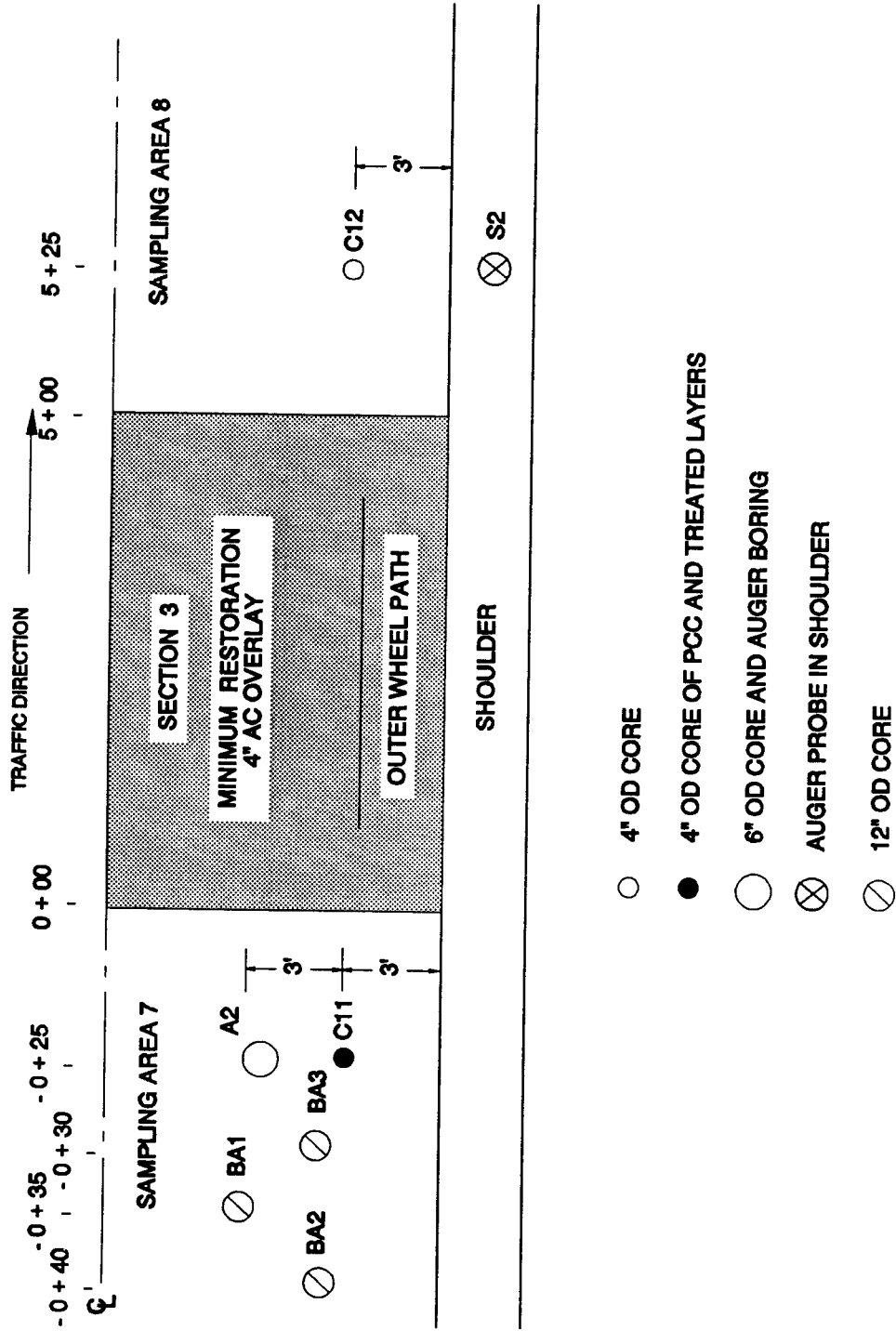
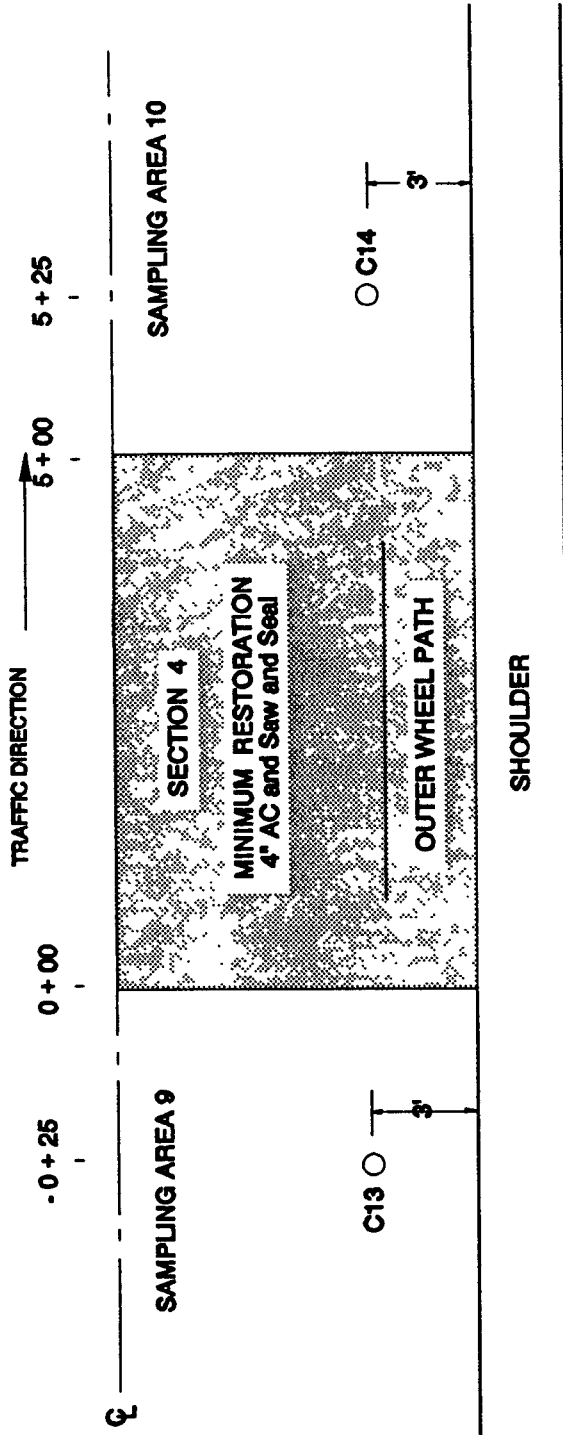


Figure A.4 Example of 'Pre-Construction' Sampling Plan for Test Section 5



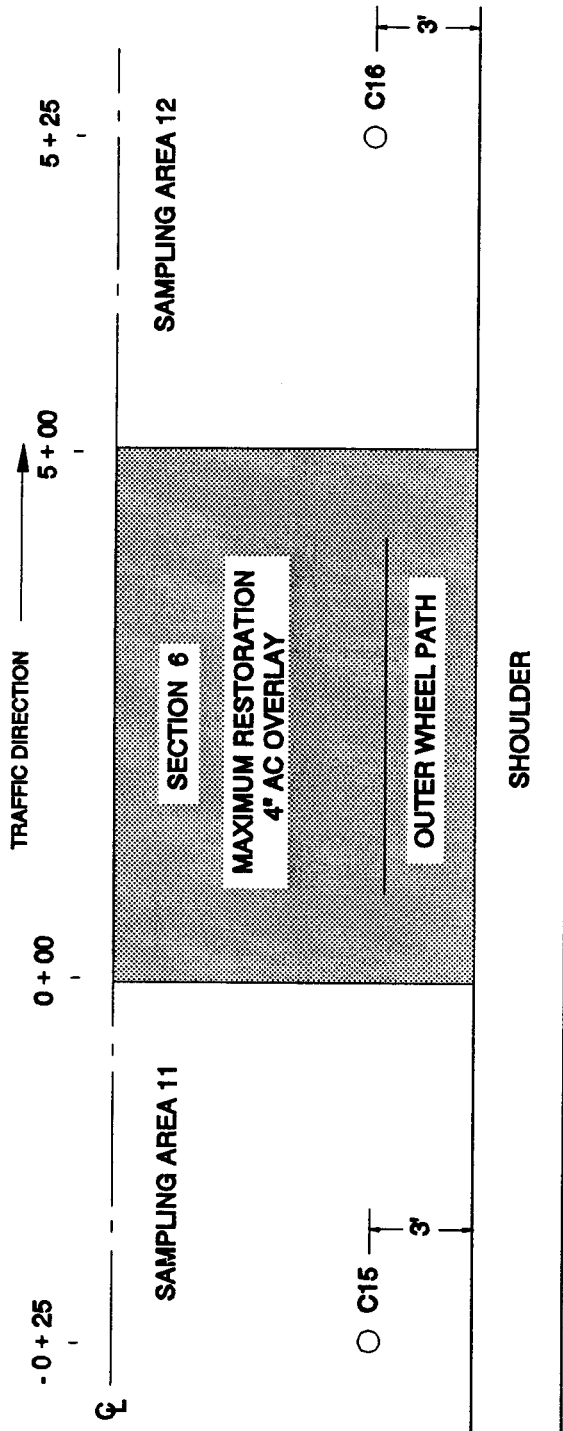
- 4" OD CORE
- 4" OD CORE OF PCC AND TREATED LAYERS
- 6" OD CORE AND AUGER BORING
- ⊗ AUGER PROBE IN SHOULDER
- ⊘ 12" OD CORE

Figure A.5 Example of "Pre-Construction" Sampling Plan for Test Section 3



○ 4" OD CORE

Figure A.6 Example of "Pre-Construction" Sampling Plan for Test Section 4



○ 4" OD CORE

Figure A.7 Example of "Pre-Construction" Sampling Plan for test Section 6

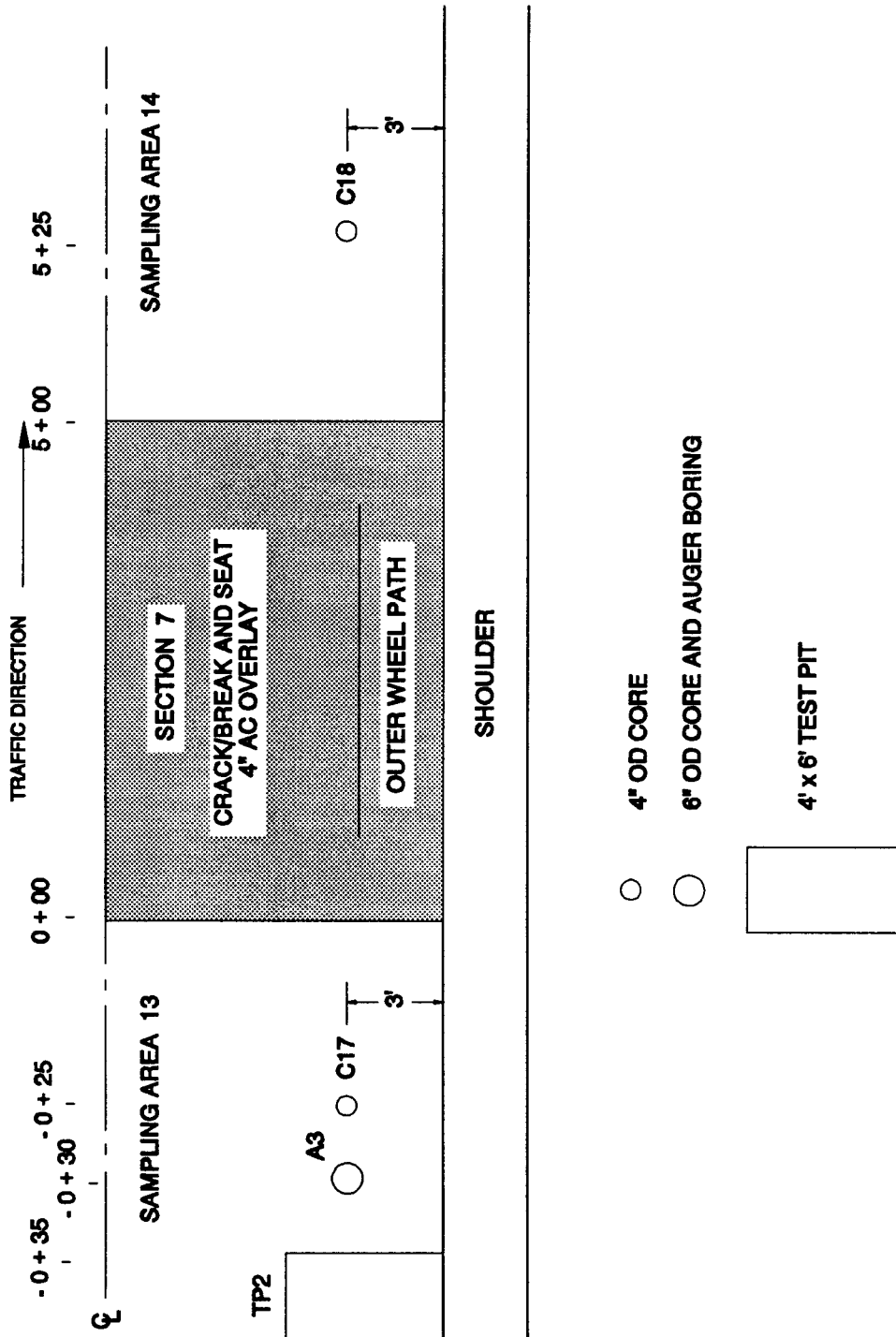
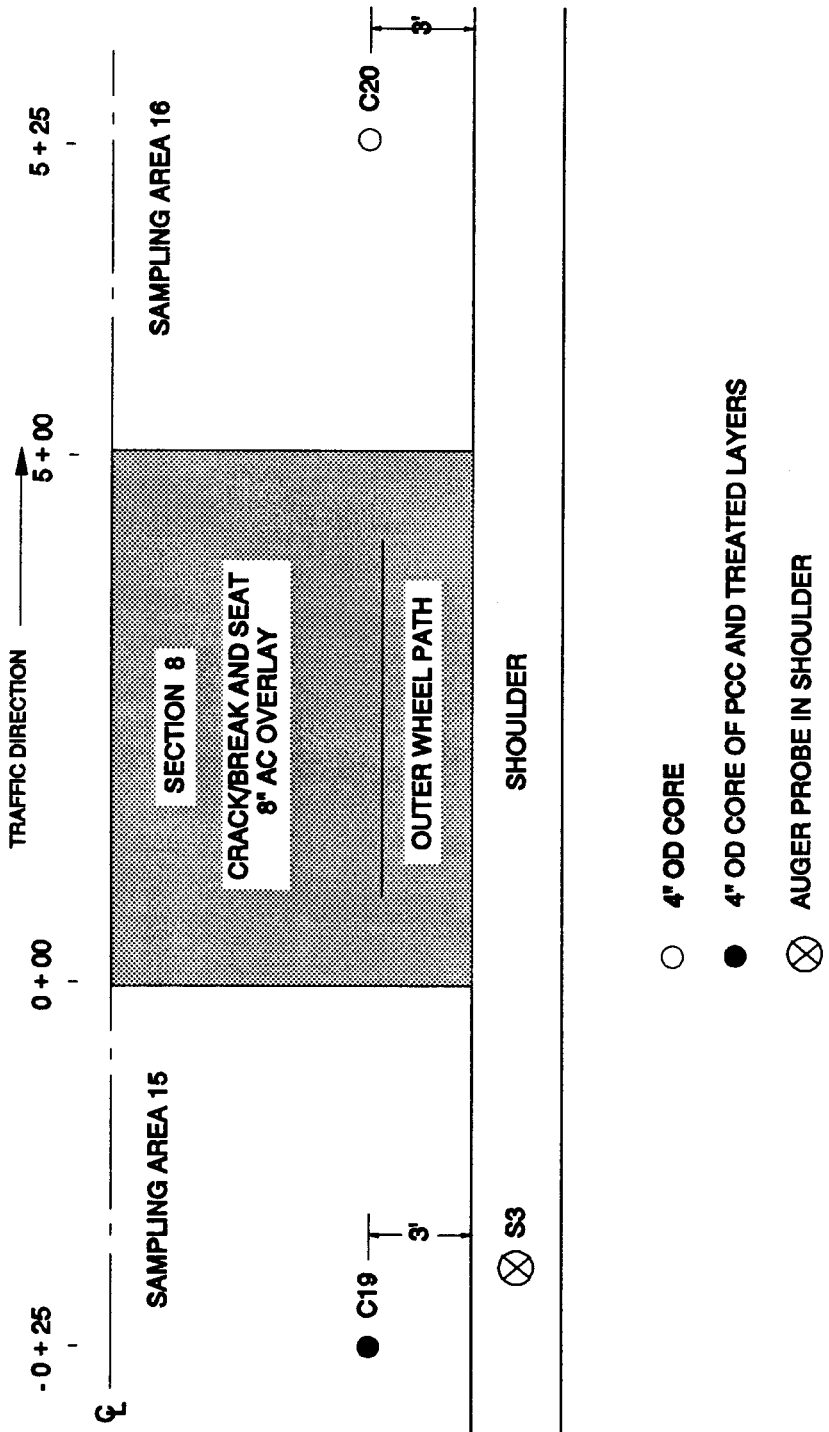


Figure A.8 Example of "Pre-Construction" Sampling Plan for Test Section 7



- 4" OD CORE
- 4" OD CORE OF PCC AND TREATED LAYERS
- ⊗ AUGER PROBE IN SHOULDER

Figure A.9 Example of "Pre-Construction" Sampling Plan for Test Section 8

APPENDIX B - EXAMPLE OF POST-CONSTRUCTION SAMPLING PLAN

This appendix contains an example of a post-construction field sampling layout plan for an SPS-6 test site which provides the minimum requirements for materials characterization considered essential for the experiment. This plan should be adjusted with consideration to the condition and details of the specific test site.

A schematic layout of a test site illustrating the location of the test sections and sampling areas is shown in Figure B.1. An example of a post-construction sampling plan for an "ideal" test site is illustrated in Figures B.2 through B.6 for Test Sections 3, 4, 6, 7, and 8 which require an overlay as part of rehabilitation. Test Sections 1, 2, and 5 require no overlay as part of rehabilitation and, therefore, require no post-construction sampling.

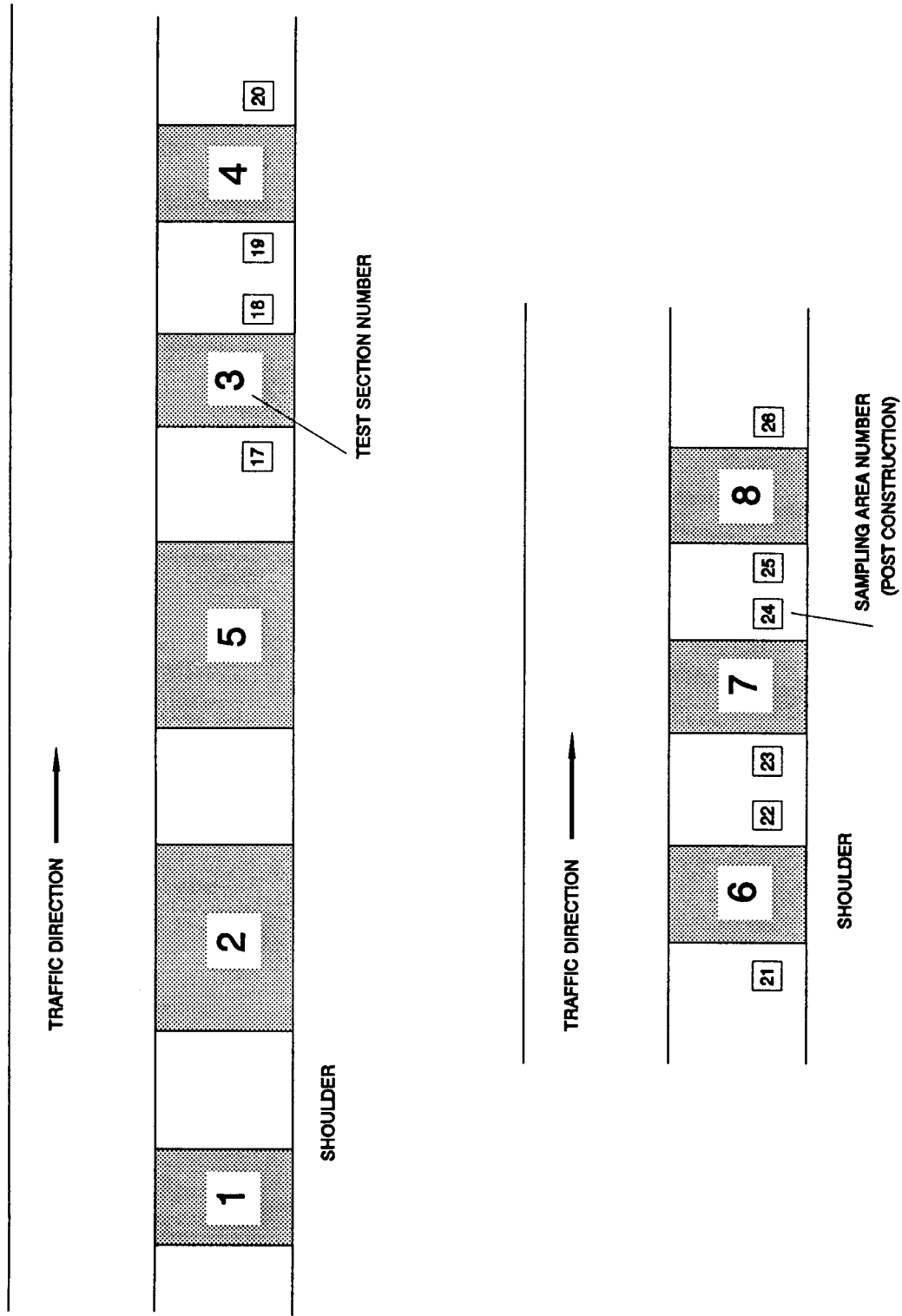


Figure B.1 Example of "Post-Construction" Sampling Area Plan



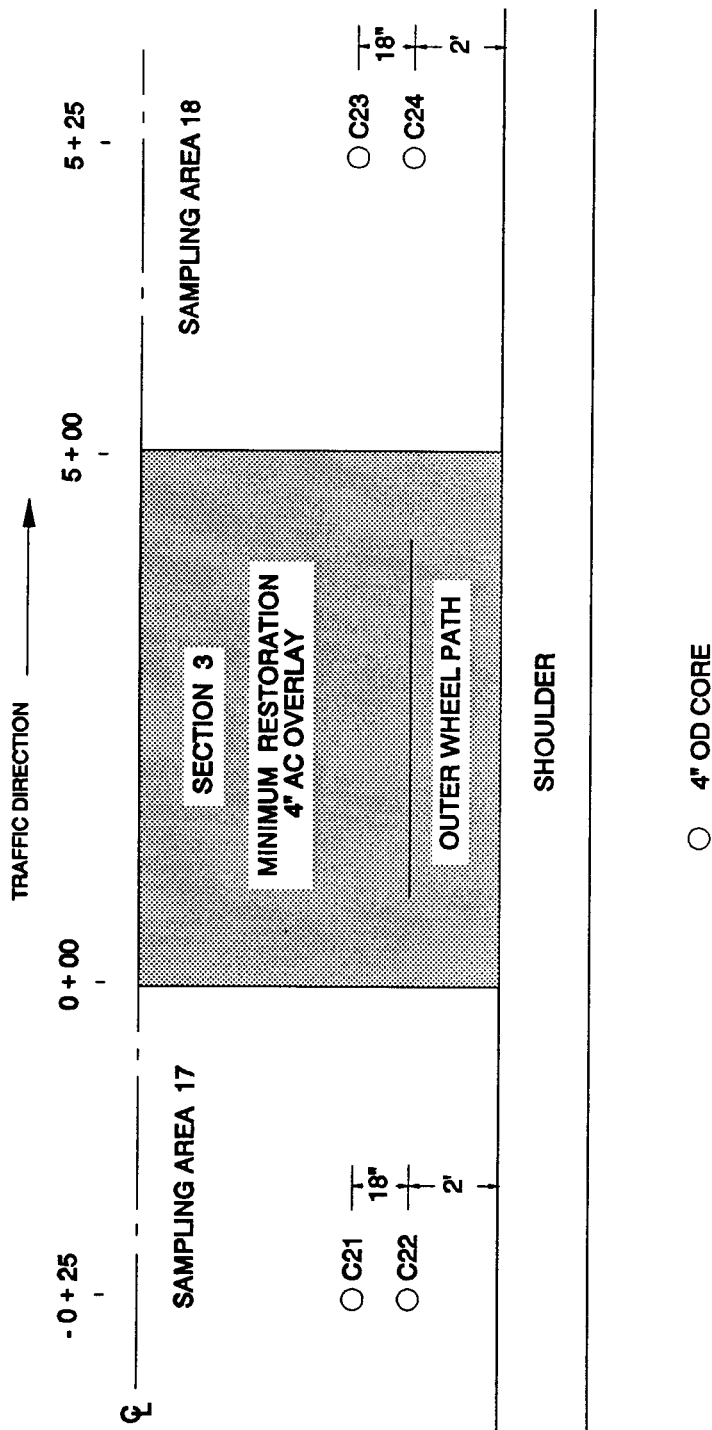


Figure B.2 Example of "Post-Construction" Sampling Plan for Test Section 3

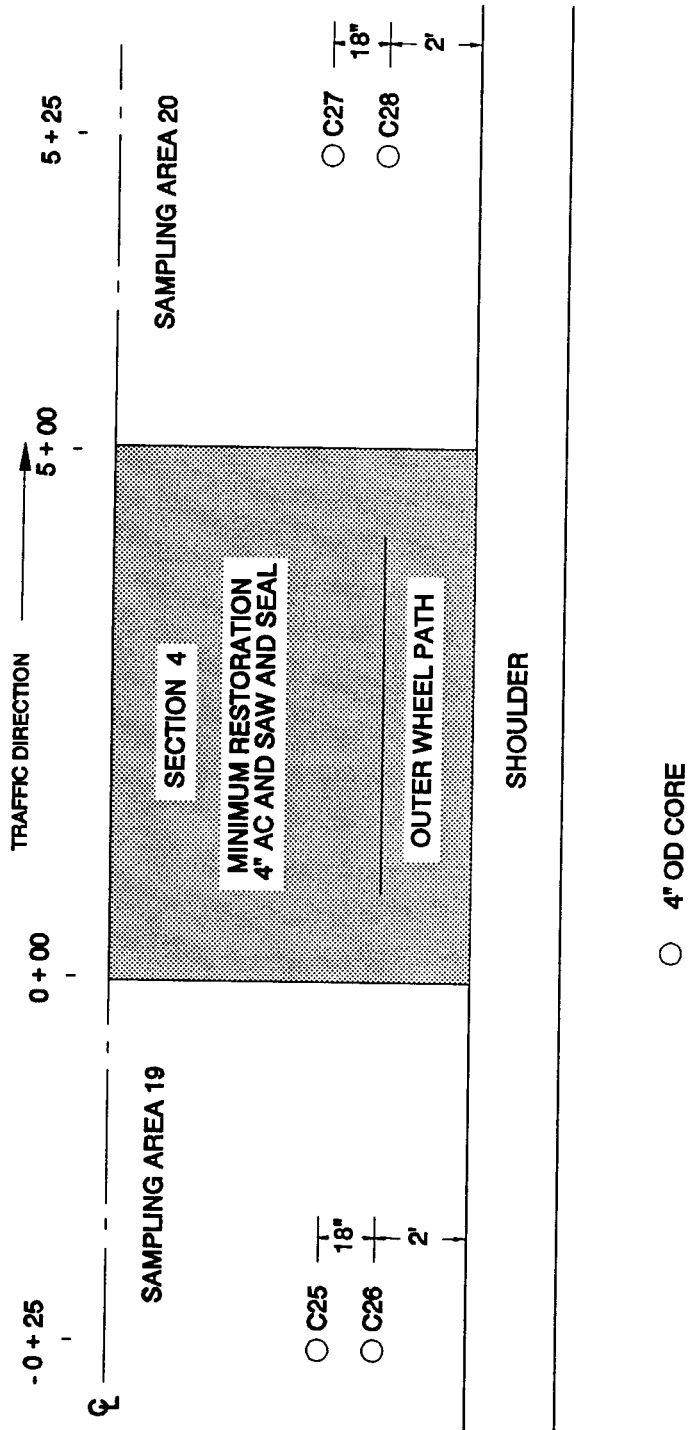


Figure B.3 Example of "Post-Construction" Sampling Plan for Test Section 4

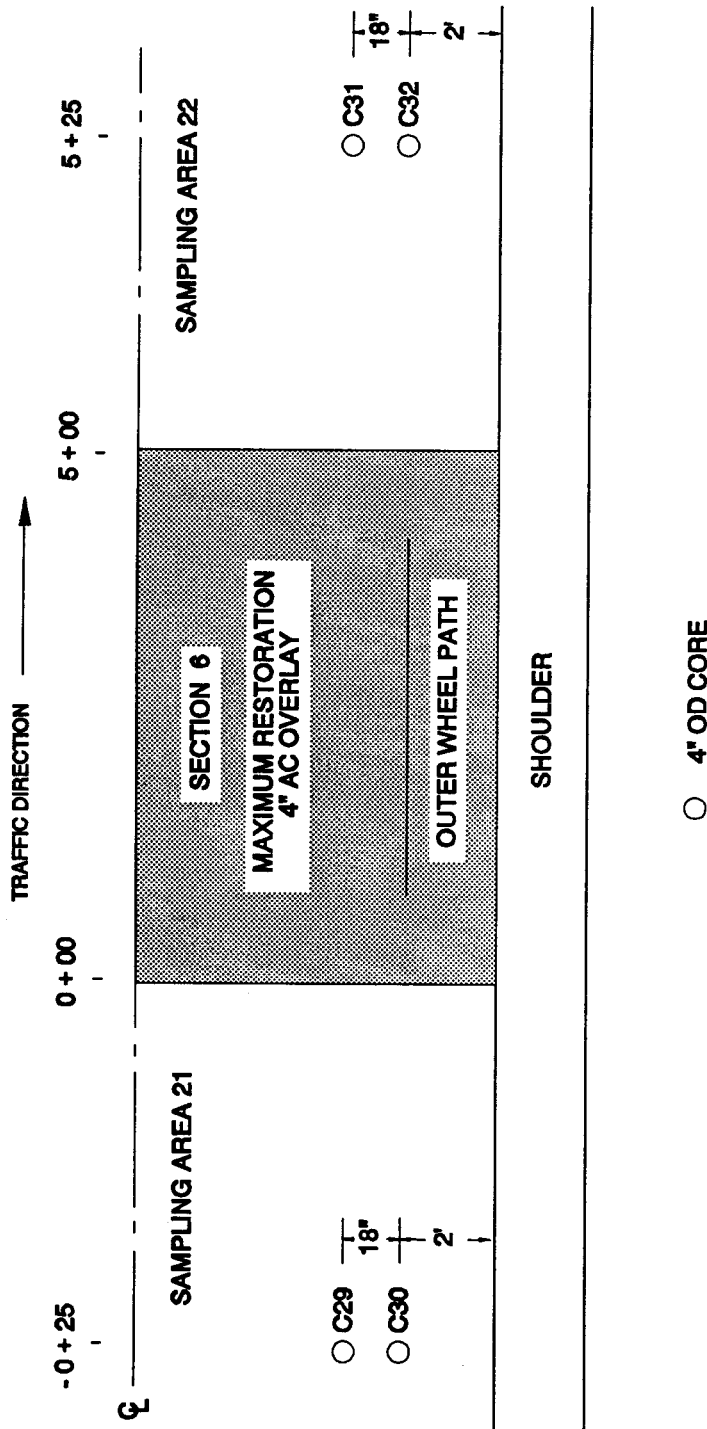


Figure B.4 Example of "Post-Construction" Sampling Plan for Test Section 6

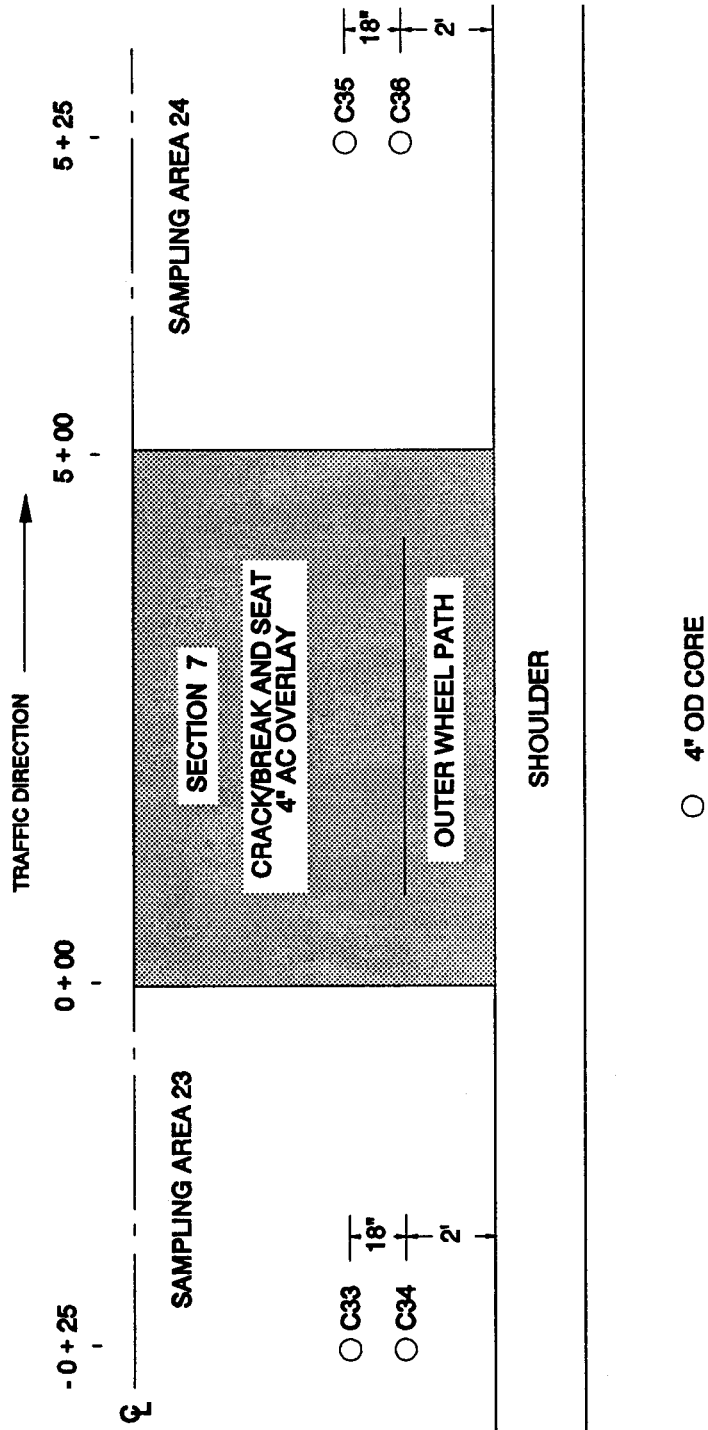
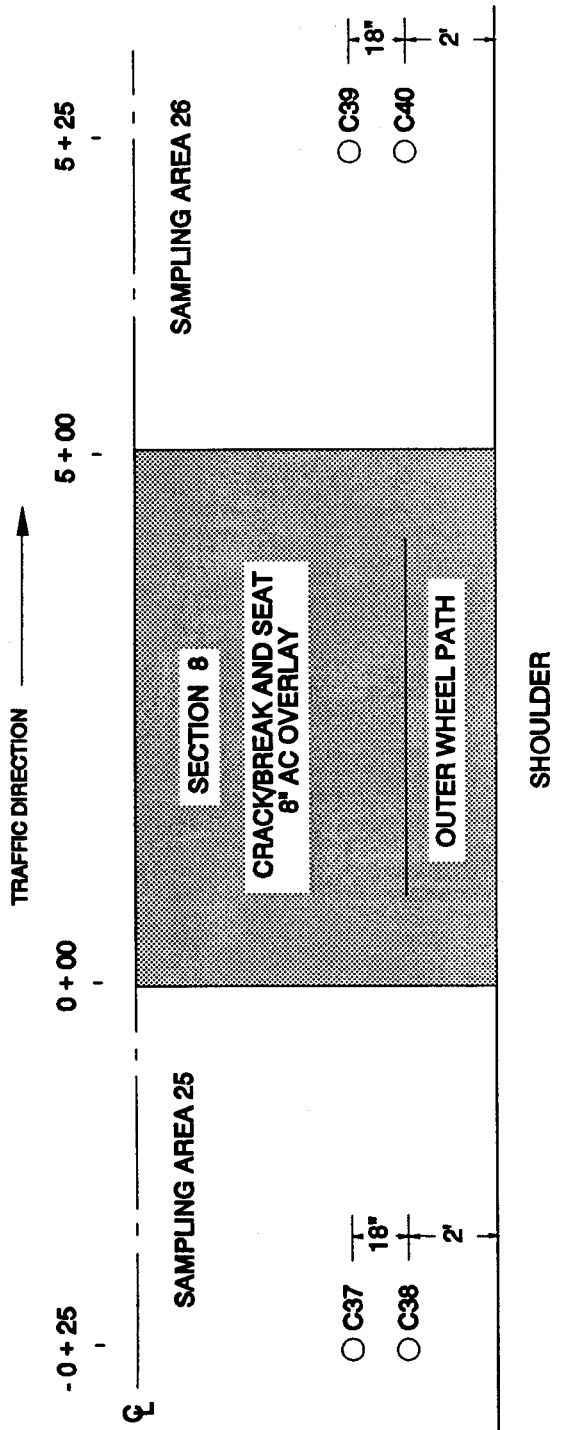


Figure B.5 Example of "Post-Construction" Sampling Plan for Test Section 7



○ 4" OD CORE

Figure B.6 Example of "Post-Construction" Sampling Plan for Tets section 8

## APPENDIX C - FIELD MATERIALS SAMPLING AND TESTING DATA FORMS

In general, the field materials sampling and testing for the SPS-6 test sites should be performed following the guidelines described in Operational Guide No. SHRP-LTPP-OG-006, "SHRP-LTPP Guide for Field Materials Sampling, Testing, and Handling," May 1990. However, field data forms have been revised and data sheets have been included to report bulk asphalt concrete materials sampled during construction. These changes and/or additions have been made to accommodate specific needs of the SPS-6 experiment.

## REVISED FIELD DATA FORMS

Due to differences between the sampling requirements for GPS and SPS projects, the field materials sampling and testing data forms used in the GPS program were modified. The primary changes common to each form relate to test section number, sample location referencing system, and sampling area number. These forms are included at the end of this appendix.

Test Section Number. The six digit test section identification numbers on the data forms have been subdivided into three, two digit fields representing the state code, SPS project code, and test section number. The structure of this number is described under SPS Test Section Numbering Scheme later in this document.

Sample Location Reference System. All material sampling and field testing data forms which reference the location of a sample or test use a station, offset and sampling area number. The sampling area number is a two digit number used to reference all of the samples taken from one area of the project. The sampling numbers are developed as part of the materials sampling plan for the test site, and should run in sequential order in the direction of traffic.

The station to be specified on these data forms is referenced from either the beginning or end of the test section adjacent to the sampling area. For expediency in the field, the station number designated on the form is relative to the test section number designated on the data form. Thus, if the sampling area occurs after the referenced test section, the station number should be greater than 5+00 (or 10+00 for sections 2 and 5). If the sampling area occurs in front of the

designated test section, the station number should be negative. The offset distance is measured from the interface of the outside edge of the test section lane and the outside shoulder to the core location (measured from the outside edge of the pavement slab).

Figure 2 illustrates the location referencing system to be used for SPS material samples. In this example, designated sampling area SA-12 is situated between sections 200606 and 200607. In SA-12, two 4-inch diameter C-Type cores are specified, C-16 and C-17, to be 5 feet apart and three feet from the edge of the lane. The location of these two cores can be specified relative to either test section 200606 (alternative 1) or test section 200607 (alternative 2). In alternative 1, the station number of core C-16 is 5+95 since it is 95 feet past the end of section 200606 and core C-17 is at station 6+00. In alternative 2, the station numbers of cores C-16 and C-17 are -1-05 and -1-00, respectively since they occur in advance of test section 200607. Thus when specifying the sampling locations on the field data form, the station number must correspond to the test section indicated on the form.

#### LTPP-SPS MATERIAL SAMPLING AND FIELD TESTING DATA SHEETS

##### Common Data Elements

Most of the LTPP-SPS Material Sampling and Field Testing data sheets use the same top block of information related to the test section and project.

SHEET NUMBER. Since multiple data sheets will be required for the samples and tests from the multiple sampling areas on the project, room is provided on all data forms to sequentially order the data sheets. The first field is the sequential number of the data sheet and the second field is the total number of data sheets submitted.

SHRP REGION. Indicate the SHRP-LTPP region in which the state or province is located: North Atlantic, North Central, Southern, or Western.

STATE. Indicate the name of the state, District of Columbia, Puerto Rico, or the Canadian Province in which the project is located.

STATE CODE. Enter the two-digit numeric code corresponding to the state or province as shown in Table C.1 of the SHRP-LTPP Guide for Field Materials Sampling, Testing and Handling.

SPS PROJECT CODE. The two digit SPS project code. The first digit (from the left) of this code should either be a 0 (zero) for the first project constructed in a state, or a letter (assigned in alphabetical order) for additional projects of the same SPS experiment constructed in the same state or province. The second digit corresponds to the SPS experiment number, i.e. 6 for SPS-6 experiment.

TEST SECTION NO. The two digit number assigned to the test section. If a GPS project is co-located on the SPS project and GPS data sheets are used for the material sampling and field testing, the four digit SHRP SECTION ID should be divided into two-two digit fields and the first two digits (from the left) should be entered as the SPS PROJECT CODE and the last two digits entered as the TEST SECTION NO. Enter the test section number marked on the project in the field.

SPS EXPERIMENT NO. The SPS experiment number for the project. This should be "SPS-6" for projects in the SPS-6 experiment, "Rehabilitation of Jointed Portland Cement Concrete Pavements".

ROUTE/HIGHWAY. Record the signed designation for the route or highway the project is located upon.

Lane. Drilling and sampling shall always occur on the outside lane for the SPS program. Record a "1" for sampling occurring on the outside lane and a "2" for sampling on the inside lane.

Direction. Record the direction of travel at the project site. Use the following abbreviations:

E for eastbound traffic direction  
W for westbound traffic direction  
N for northbound traffic direction  
S for southbound traffic direction



SAMPLE/TEST LOCATION. Check "Before Section" if the sampling location is before the beginning of the test section indicated under TEST SECTION NUMBER on the form (station 0-). Check "After Section" if the sampling location is after the end of the test section indicated on the form (station 5+ or station 10+).

FIELD SET NO. The field set number is a sequentially assigned number to indicate the different time periods in which sampling and field testing were conducted on the project. These time periods usually refer to different stages in the pavement life, such as prior to overlay construction, after overlay construction, end of test, etc. A field set number can apply to more than one day since sampling of SPS test sections usually requires more than one day. As a general rule, the same field set number should be applied to all material samples and field tests conducted in a continuous 30 day period, unless a construction event occurs between the two sampling sessions. Enter 1 for the first time that material sampling and field testing are conducted on the project. For SPS-6 projects, the first sampling should occur prior to rehabilitation construction. Enter 2, 3, etc. for the second, third and subsequent sampling and field testing on this project.

#### SAMPLING DATA SHEET 1. LOG OF PAVEMENT CORE AT BOREHOLE LOCATIONS

This form is similar to Form S01 used for GPS test sections. This data sheet is used to log pavement cores taken at the borehole locations (either A-Type 6 inch cores or BA-Type 12 inch cores). Use the core sample coding system given in the sampling plan developed for the project to designate the core number reported on the data forms. Depth should be measured from the pavement surface to the bottom of the core of each layer and recorded to the nearest tenth of an inch.

OPERATOR. Record the coring equipment operator's name.

EQUIPMENT USED. Indicate the generic type of the coring equipment used.

CORING DATE. Record the month, date, and year the core was taken.

SAMPLING AREA NO. The sampling area number is a two digit number used to reference all of the samples taken from one area of the project. It has the form SA-##. This number is developed as part of the materials sampling plan for the project.

LOCATION; STATION. This is the station number of the core, relative to the test section specified under TEST SECTION NO. on the form. This number should be greater than 5+00 (or 10+00 for Sections 2 and 5) for sampling locations that occur after the test section specified, and less than 0+00 for sampling locations which occur before the test section specified. (See discussion under Sample Location Reference System)

LOCATION; OFFSET. This is the distance from the interface of the pavement lane and the outside shoulder to the center of the core location (measured from the outside edge of the pavement slab). This distance should be indicated to the nearest tenth of a foot.

CORE HOLE NO. Enter the core hole sample code number following the sample coding system specified in the material sampling plan developed for the project. Core hole numbers designated with either an A- or a BA- should be used with this sheet.

CORE BARREL SIZE. Record the rated inside diameter of the core barrel to the nearest tenth of an inch.

COOLING MEDIUM. Record the material used for cooling during the coring operation.

DEPTH. Under the depth column, draw horizontal lines to designate the approximate depths of changes in the bound materials. Also write the depths in this column to the nearest tenth of an inch. All depths should be referenced from the pavement surface. The total depth cored should be indicated in this column even if a useable sample was not recovered.

CORE RECOVERED. Record the thickness of the recovered core. This should be the thickness of the testable (intact) portion of the core. This thickness

may be less than the depth recorded in the depth column due to breakage of the material. On pavement sections with bound base layers, the thicknesses of the base layers in the core should be indicated separate of the HMAC surface layers. The approximate average thickness of the core, or portion of the core, to the nearest tenth of an inch should be recorded.

CORE SAMPLE NO. Record the core sample number for the recovered core. Separate sample numbers should be assigned to surface and bound base layers from the same core, even if the bound base adheres to the surface layer.

MATERIAL DESCRIPTION. Enter the appropriate material description based on the generic material type. These material descriptions are contained in Table C.2, Appendix C, of the SHRP-LTPP Guide For Field Materials Sampling, Testing and Handling.

MATERIAL CODE. Enter the appropriate material code number from Table C.2 of the SHRP-LTPP Guide for Field Materials Sampling, Testing and Handling corresponding to described type of material.

#### **SAMPLING DATA SHEET 2. PAVEMENT CORE LOG AT C-TYPE CORE LOCATIONS**

This is similar to Form S01A used for GPS test sections. It is used to log 4-inch and 6-inch diameter pavement cores extracted from C-Type core locations.

Each sheet can be used to record cores taken from six different core hole locations from one sampling area. Separate sheets should be used for cores from each sampling area. Space is provided in each column to record cores for up to 4 layers from one core hole. The pavement surface layer core should be recorded first, followed by other layers in the column. The first column from the left should always start with the lowest numbered core hole in the sampling area.

OPERATOR. Record the coring equipment operator's name.

EQUIPMENT USED. Indicate the generic type of the coring equipment used.

CORING DATE. Record the month, date, and year the core was taken.

SAMPLING AREA NO. The sampling area number is a two digit number used to reference all of the samples taken from one area of the project. It has the form SA-##. This number is developed as part of the materials sampling plan for the project.

CORE BARREL SIZE. Record the rated inside diameter of the core barrel to the nearest tenth of an inch.

COOLING MEDIUM. Record the material used for cooling during the coring operation.

CORE HOLE NO. Enter the core hole sample code number following the sample coding system as specified in the materials sampling plan developed for the project.

LOCATION: STATION. This is the station number of the core, relative to the test section specified under TEST SECTION NO. on the form. This number should be greater than 5+00 (or 10+00 for Sections 2 and 5) for sampling locations that occur after the test section specified, and less than 0+00 for sampling locations which occur before the test section specified. (See discussion under Sample Location Reference System in this document.)

LOCATION: OFFSET. This is the distance from the interface of the pavement lane and the outside shoulder to the core location (generally measured from the outside edge of the pavement slab). This distance should be indicated to the nearest tenth of a foot.

CORE RECOVERED. Circle the appropriate response to indicate if an intact and suitable core was recovered from the indicated core hole.

REPLACEMENT CORE HOLE NO. Record the sample number of the core that will replace a core which was deemed unacceptable during field sampling operations. This entry should only be used when a "No" was recorded in the "Core Recovered" data entry space of this form.

CORE SAMPLE NO. Record the core sample number for the recovered core. Separate sample numbers should be assigned to surface and bound base layers from the same core hole, even if the bound base adheres to the surface layer.

DEPTH. Depth should be measured from the pavement surface to the bottom of the material interface in the core and expressed to the nearest tenth of an inch.

MATERIAL DESCRIPTION. Enter the appropriate material description based on the generic material type. These material descriptions are contained in Table C.2, Appendix C, of the SHRP-LTPP Guide for Field Material Sampling, Handling and Testing.

MATERIAL CODE. Enter the appropriate material code number from Table C.2 of the SHRP-LTPP Guide for Field Materials Sampling, Handling and Testing corresponding to the described type of material.

**SAMPLING DATA SHEET 3. \*\*\* NOT USED IN SPS-6 EXPERIMENT \*\*\***

**SAMPLING DATA SHEET 4. A-TYPE BORE HOLE LOG**

This form is similar to Form S02A used for GPS test sections. It is designed to record logs of A-Type bore holes and any other similar type sampling areas. The following data is recorded on this form.

OPERATOR. Record the boring equipment operator's name.

EQUIPMENT USED. Indicate the generic type of the drilling equipment used.

BORING DATE. Record the month, date, and year the operation was performed.

SAMPLING AREA NO. The sampling area number is a two digit number used to reference all of the samples taken from one area of the project. It has the form SA-##. This number is developed as part of the materials sampling plan for the project.

LOCATION; STATION. This is the station number of the bore, relative to the test section specified under TEST SECTION NO. on the form. This number should be greater than 5+00 (or 10+00 for Sections 2 and 5) for sampling locations that occur after the test section specified, and less than 0+00 for sampling locations which occur before the test section specified. (See discussion under Sample Location Reference System in this document.)

LOCATION; OFFSET. This is the distance from the interface of the pavement lane and the outside shoulder to the center of the bore location (generally measured from the outside edge of the pavement slab). This distance should be indicated to the nearest tenth of a foot.

BORE HOLE NO. Enter the core hole sample code number following the sample coding system specified in the material sampling plan developed for the project.

BORE HOLE SIZE. Record the borehole size (diameter) in inches to the nearest inch.

STRATA CHANGE. Record the depth of strata changes to the nearest tenth of an inch. The depth of strata changes should always be measured from the top of the pavement surface. Draw a horizontal line across the form which indicates the depth of each strata change.

Also, record the depth of sampling for each sample taken. For example, if a thin-walled tube sample was obtained at a depth from 18 inches to 36 inches, a line should be drawn at the 18 inch mark and the 36 inch mark along with the appropriate sample code number, material description, etc. See example data sheets in the SHRP-LTPP Guide for Field Materials Sampling, Testing and Handling for further clarification.

SAMPLE NUMBER. Record the sample number for splitspoon or thin-walled tube samples obtained from the subgrade.

# BLOWS. The next four columns (*# Blows, Refusal?, DLR (Driving Length to refusal, IOP (Inches of Penetration))*) shall be used only if a splitspoon sample recovery was attempted. Standard practice for recording the blow count for

splitspoon samples requires the following format: A - B - C, where:

- A - number of blows for first 6 inches of penetration by the splitspoon sampler. This is considered a seating drive.
- B - number of blows for second 6 inches of penetration by the splitspoon sampler.
- C - number of blows for third 6 inches of penetration by the splitspoon sampler.

Record the blow count from the first 6 inches of seating penetration by the splitspoon sampler in the left most column under number of blows. ("A" from above example of blow count record). Record the blow count from the second 6 inches of penetration by the splitspoon sampler in the middle column under number of blows ("B" from above example of blow count record). Record the blow count from the third 6 inches of penetration by the splitspoon sampler in the right most column under number of blows. ("C" from above example of blow count record).

Refusal of the splitspoon sampler is defined as having advanced less than one inch with 100 blows (or no observed advance of the sampler during the application of 10 blows) or the test is aborted at the discretion of the SHRP Representative to avoid damage to the splitspoon sampler.

If the splitspoon sampler is "refused" in the first 6 inches indicate the blow count to refusal in the left most column, place a "Y" in the *Refusal?* column and indicate in the *DLR* (Driving Length to Refusal) column, the distance, measured to the nearest tenth of an inch, from the top of the pavement surface to refusal. Also, record the penetration depth of the splitspoon sampler in the *IOP* column (distance penetrated in "A").

If the splitspoon is refused during the second 6 inches of penetration, indicate the blow count to refusal in the middle column, place a "Y" in the *Refusal?* column and indicate in the *DLR* column the distance, measured to the nearest tenth of an inch, from the top of the pavement surface to refusal. Also, record the penetration depth of the splitspoon sampler in the *IOP* column

(distance penetrated in "A" + "B").

If the total blow count ("A" + "B") reaches 100 before penetrating deeper than 12 inches, the splitspoon sampling procedure should be stopped and the blow count for the second 6 inch increment should be recorded in the middle column and the total depth of penetration recorded under the *IOP* column (the depth of penetration shall be measured from the beginning of penetration of the splitspoon sampler.)

In the case of refusal during the third 6 inch increment, the same instructions outlined previously for the left and middle columns will be followed. The penetration depth of the splitspoon sampler will be recorded in the *IOP* column (distance penetrated in "B" + "C").

If the second and third 6 inch increment blow count ("B" + "C" only) reaches 100 before prior to penetrating 18 inches, the splitspoon sampling procedure should be stopped and the blow count for the third 6 inch increment recorded in under number of blows. The total depth of penetration ("B" + "C" only) should be recorded under the *IOP* column (measured from the beginning of penetration of the splitspoon sampler minus the 6 inch seating drive).

REF?. Record a "Y" if splitspoon sampler is refused (see explanation under # *Blows* above). Record a "N" if the full 18 inch sample is recovered and the splitspoon is not refused. This column is only used if a splitspoon sampler is utilized.

Refusal is defined as occurring when the splitspoon sampler advances less than one inch in 100 blows (or no observed advance of the sampler during the application of 10 blows) or when the test is aborted at the discretion of the SHRP Representative to avoid damage to the splitspoon sampler.

DLR. Driving Length to Refusal - Record the penetration of the splitspoon sampler to refusal to the nearest tenth of an inch. This value is measured from the top of the pavement surface. This column is only used if a splitspoon sampler is utilized and refused. In the case of refusal, an entry is made in the *DLR* and *IOP* columns.



IOP. Inches of Penetration - Record the distance of penetration of the splitspoon sampler after 100 blows is reached in the first 6 inches ("A"), the first and second 6 inches of penetration ("A" and "B") or the second and third 6 inches of penetration ("B" and "C") (See explanation under # Blows above). This column is only used if a splitspoon sampler is utilized.

MATERIAL DESCRIPTION. Enter the appropriate material description for each strata based on the generic material type. These material descriptions are contained in Table C.2, Appendix C, of the SHRP-LTPP Guide for Field Material Sampling, Testing and Handling.

MATERIAL CODE. Enter the appropriate material code number for each strata from Table C.2 of the SHRP-LTPP Guide for Field Material Sampling, Testing and Handling corresponding to the described type of material.

#### SAMPLING DATA SHEET 5. BA-TYPE BORE HOLE LOG

This form is similar to S02B used for GPS test sections. It is designed to record logs of BA-Type bore holes and any other similar type sampling areas. The following information is recorded on this form:

OPERATOR. Record the boring equipment operator's name.

EQUIPMENT USED. Indicate the generic type of the drilling equipment used.

BORING DATE. Record the month, date, and year the operation was performed.

SAMPLING AREA NO. The sampling area number is a two digit number used to reference all of the samples taken from one area of the project. It has the form SA-##. This number is developed as part of the materials sampling plan for the project.

LOCATION: STATION. This is the station number of the bore, relative to the test section specified under TEST SECTION NO. on the form. This number should be greater than 5+00 (or 10+00 for Sections 2 and 5) for sampling locations that occur after the test section specified, and less than 0+00 for sampling locations

which occur before the test section specified. (See discussion under Sample Location Reference System in this document.)

LOCATION; OFFSET. This is the distance from the edge of the pavement lane and the outside shoulder to the center of the bore location (generally measured from the outside edge of the pavement slab). This distance should be indicated to the nearest tenth of a foot.

BORE HOLE NO. Enter the bore hole sample code number following the sample coding system specified in the material sampling plan developed for the project.

BORE HOLE SIZE. Record the bore hole size (diameter) in inches to the nearest inch.

STRATA CHANGE. Record the depth of strata changes to the nearest tenth of an inch. The depth of strata changes should always be measured from the top of the pavement surface. Draw a horizontal line across the form which indicates the depth of each strata change.

SAMPLE NUMBER. Record the sample number for the bulk samples obtained from unbound layers.

MOISTURE SAMPLE NUMBER. Record sample numbers for samples taken from unbound base, subbase and subgrade for moisture content testing.

MATERIAL DESCRIPTION. Enter the appropriate material description for each strata based on the generic material type. These material descriptions are contained in Table C.2, Appendix C, of the SHRP-LTPP Guide for Field Materials Sampling, Handling and Testing.

MATERIAL CODE. Enter the appropriate material code number for each strata from Table C.2 of the SHRP-LTPP Guide for Field Material Sampling, Handling and Testing corresponding to the described type of material.

**SAMPLING DATA SHEET 6. TEST PIT LOG**

This form is similar to Form S03 used for GPS test sections. It is designed to record data from the field sampling and field testing from test pits. The following data is recorded on this form:

TECHNICIAN. Record the name of the technician who retrieved the samples and recorded the information on the data form.

EQUIPMENT USED. Indicate the generic type of the equipment used to cut and excavate the test pit.

EXPLORATION DATE. Record the month, date, and year the operation was performed.

SAMPLING AREA NO. The sampling area number is a two digit number used to reference all of the samples taken from one area of the project. It has the form SA-##. This number is developed as part of the materials sampling plan for the project.

LOCATION: STATION. This is the station number of the test pit, relative to the test section specified under TEST SECTION NO. on the form. This number should be greater than 5+00 (or 10+00 for Sections 2 and 5) for sampling locations that occur after the test section specified, and less than 0+00 for sampling locations which occur before the test section specified. (See discussion under Sample Location Reference System in this document.)

LOCATION: OFFSET. This is the distance from the edge of the pavement lane and the outside shoulder to the outside edge of the test pit (generally measured from the outside edge of the pavement slab). This distance should be indicated to the nearest tenth of a foot.

TEST PIT NUMBER. Enter the test pit code number shown in the sample coding system specified in the material sampling plan developed for the project.

TEST PIT SIZE. Record the length and width of test pit to the nearest half foot.

STRATA CHANGE. Record the depth of strata changes to the nearest tenth of an inch. The depth of strata changes should always be measured from the top of the pavement surface. Draw a line across the form to indicate strata changes.

MOISTURE SAMPLE NUMBER. Record sample numbers for samples taken from unbound base, subbase and subgrade for moisture content testing.

BULK SAMPLE NUMBER. Record the sample number for bulk samples taken from the unbound pavement layers and the subgrade.

MATERIAL DESCRIPTION. Enter the appropriate material description for each strata based on the generic material type. These material descriptions are contained in Table C.2, Appendix C, of the SHRP-LTPP Guide for Field Material Sampling, Handling and Testing.

MATERIAL CODE. Enter the appropriate material code number for each strata from Table C.2 of the SHRP-LTPP Guide for Field Materials Sampling, Handling and Testing corresponding to the described type of material.

#### **SAMPLING DATA SHEET 7. TEST PIT SKETCH**

The sheet is similar to Form S03A used for GPS test sections. It is designed to provide the field sampling personnel with an appropriate form to record any sketches of the excavation of the test pit that may be appropriate. This sketch should at least include: (a) dimensions of the test pit; (b) depth of each layer in the test pit; (c) material type of each layer and (d) the direction of traffic. The other information requested on this form is the same as that provided on Sampling Data Sheet 6, Test Pit Log. An example of completed field data packet is contained in Appendix E of the SHRP-LTPP Guide for Field Materials Sampling, Handling and Testing.

**SAMPLING DATA SHEET 8. IN SITU DENSITY AND MOISTURE TESTS**

This sheet is similar to Form S04 used for GPS test sections. It is designed to record data from the in situ density and moisture tests performed on all unbound layers in the test pits with a nuclear moisture and density gauge. The following data is recorded on this form.

OPERATOR. Record nuclear density gauge operator's name.

NUCLEAR DENSITY GAUGE I.D.. Record the identification number of the nuclear density gauge.

TEST DATE. Record the month, date, and year the test was performed.

SAMPLING AREA NO. The sampling area number is a two digit number used to reference all of the samples taken from one area of the project. It has the form SA-##. This number is developed as part of the materials sampling plan for the project.

LOCATION: STATION. This is the station number of the test pit, relative to the test section specified under TEST SECTION NO. on the form. This number should be greater than 5+00 (or 10+00 for Sections 2 and 5) for sampling locations that occur after the test section specified, and less than 0+00 for sampling locations which occur before the test section specified. (See discussion under Sample Location Reference System in this document.)

LOCATION: OFFSET. This is the distance from the edge of the pavement lane and the outside shoulder to the location the test was performed (generally measured from the edge of the pavement slab). This distance should be indicated to the nearest tenth of a foot.

TEST PIT NUMBER. Enter the test pit code number shown in the sample coding system specified in the material sampling plan developed for the project.

DATE OF LAST MAJOR CALIBRATION. Record the date of the last major calibration of the nuclear density gauge. All dates should be recorded as mm-

dd-yy. A major calibration is defined as that calibration/verification performed as directed in Section 4 of the SHRP-LTPP Guide for Field Materials Sampling, Handling and Testing. Daily calibrations performed in the field do not constitute a major calibration.

DEPTH FROM SURFACE TO THE TOP OF THE LAYER. This information is obtained from Sampling Data Sheet 5 for each unbound granular layer. Record to the nearest tenth of an inch and measure from the top of the pavement surface for each test performed.

LAYER DESCRIPTION. Write in the generic description of the type of layer tested, such as BASE, SUBBASE, or SUBGRADE.

MATERIAL TYPE. Report a "G" if the material is unbound (granular); report a "T" if the material is other than unbound (treated). In practice, all entries should be a "G" since nuclear density testing is not required on bound materials.

IN SITU DENSITY. For each unbound layer, record four nuclear density gauge results. These measurements should be taken at the top of each unbound layer using the direct transmission test method. Record to one decimal place in pounds per cubic foot (pcf).

AVERAGE. Calculate and record the average in situ density for each unbound layer. Record to one decimal place.

METHOD (A,B,or C). Record the test method used to perform the in situ density test as per AASHTO T238, "A" - Backscatter, "B" - Direct Transmission, or "C" - Air Gap. The direct transmission method ("B") should always be used.

ROD DEPTH. Record the depth of the nuclear density gauge probe to the nearest tenth of an inch.

IN SITU MOISTURE CONTENT. For each unbound layer, record four in situ moisture content test results. These tests should be conducted at the top of each layer. Record as a percentage moisture content to one decimal place. The backscatter method should always be used for this measurement.

AVERAGE. Calculate and record the average of the four in situ moisture content test results for each unbound layer. Record to one decimal place.

**SAMPLING DATA SHEET 9. SHOULDER PROBE LOG**

This data sheet is similar to Form S05 used for the GPS test sections. It is used to record the results of the shoulder auger probe to determine the depth to a rigid layer.

OPERATOR. Record the auger equipment operator's name.

EQUIPMENT USED. Indicate the generic type of the auguring equipment used.

AUGERING DATE. Record the month, date, and year the operation was performed.

SAMPLING AREA NO. The sampling area number is a two digit number used to reference all of the samples taken from one area of the project. It has the form SA-##. This number is developed as part of the materials sampling plan for the project.

LOCATION; STATION. This is the station number of the bore, relative to the test section specified under TEST SECTION NO. on the form. This number should be greater than 5+00 (or 10+00 for Sections 2 and 5) for sampling locations that occur after the test section specified, and less than 0+00 for sampling locations which occur before the test section specified. (See discussion under Sample Location Reference System in this document.)

LOCATION; OFFSET. This is the distance from the edge of the pavement lane and the outside shoulder to the center of the auger location (generally measured from the outside edge of the pavement slab). For shoulder probes, this distance will be measured toward the outside edge of the shoulder. This distance should be indicated to the nearest tenth of a foot.

AUGER PROBE NUMBER. Record the auger probe number; an S1 for the first auger and increasing consecutive numbers for subsequent auger probes in the direction of traffic.

TOP OF ROCK BASED ON. Enter "Auger Refusal" if auger is refused. If the top of rock is based on some other observation, describe the source, e.g. historical records.

DEPTH FROM SURFACE. Record the depths of strata changes to the nearest tenth of a foot.

MATERIAL DESCRIPTION. Enter the appropriate material description for each strata based on the generic material type. These material descriptions are contained in Table C.2, Appendix C, of the SHRP-LTPP Guide for Field Materials Sampling, Handling and Testing.

MATERIAL CODE. Enter the appropriate material code number for each strata from Table C.2 of the SHRP-LTPP Guide for Field Material Sampling, Handling and Testing corresponding to described type of material.

REFUSAL WITHIN 20 FEET (Y/N). Record a "y" for yes or a "n" for no as appropriate to indicate if whether or not a rigid layer was encountered within 20 feet from the pavement surface.

DEPTH TO REFUSAL. Record the depth to refusal to the nearest tenth of a foot if the auger refused.

#### **SAMPLING DATA SHEET 10. SAMPLING UNCOMPACTED BITUMINOUS PAVING MIXTURES**

This data sheet is used to record information concerning sampling of uncompact bituminous paving mixtures (asphalt concrete) for LTPP material testing purposes. Sampling shall be performed according to AASHTO T-168, except that a 100 lb sample size should be used.

Due to the difficulty of determining the test sections corresponding to the plant-sampled material, in most cases a 00 should be entered as the test



section number. However, if the test section on which the sampled material is used is known, this number should be indicated on the form.

PERSON PERFORMING SAMPLING. Record the name, title and affiliation of the person performing the sampling.

PLANT NAME. Record the common name or operator of the mix plant facility which produced the sampled material.

PLANT LOCATION. Record the location of the mix plant, including street address, town, and state.

PLANT TYPE. Indicate the general type of mix plant used to produce the mix. If a plant other than a batch or drum plant was used, indicate other and provide a description of the plant on the next line.

DESCRIPTION OF MIX PLANT. Provide a brief description of the type of mix plant noting any special features of traditional types of batch or drum plants, or a description of other mix plant types.

MANUFACTURER OF MIX PLANT. Enter the name of the mix plant manufacturer.

MODEL NUMBER. Enter the model number or model designation of the mix plant.

BATCH SIZE. Record the size of the batch the sample from which the sample was obtained.

SAMPLING LOCATION. Enter the code number shown on the data form corresponding to the location from which the sample was taken. If the sample was taken from the roadway prior to compaction, indicate the station and offset of the sample and the respective test section number.

MIX TYPE. Enter the code number corresponding to the generic type of material (all virgin material, or containing recycled material). For SHRP test sections, only virgin material shall be used.

LAYER TYPE. Enter the code number, as shown on the form, which corresponds to the type of layer in which the material is used.

SAMPLE TYPE DESIGNATOR. Enter the sample type designation for the sample. This is a 4 digit code which identifies the generic type of material, virgin or recycled, and a sequential number for each sample of each material type obtained. SHRP test sections in the SPS-6 experiment, only virgin mix shall be used. However, the supplemental sections constructed by the participating highway agency may incorporate recycled materials. For materials incorporating all virgin materials, the sample type designation shall begin with the letters BV (Bulk Virgin). For materials incorporating recycled materials, the designator shall begin with BR (Bulk Recycled). These letter designations are followed with a two digit number sequentially assigned to each sample, for each type of material.

SAMPLE NUMBER. This is a 4 digit code starting with the letters BA (Bulk Asphalt Concrete) and followed with a sequentially assigned two digit number, which uniquely designates each bulk asphalt concrete sample.

APPROXIMATE SAMPLE SIZE. Enter the approximate weight of the sample obtained to the nearest pound.

DATE SAMPLED. Enter the date the material sample was obtained.

LOCATION SAMPLE SHIPPED TO. Record the location the sample was shipped to from the field. In many cases this should be the laboratory which will perform the testing.

DATE SHIPPED. Enter the date the material was shipped to the location indicated on the form.

GENERAL REMARKS. Provide any general remarks concerning the representativeness of the obtained sample, comments concerning the quality or uniformity of the mix, or any other pertinent miscellaneous comments.

## FIELD OPERATION INFORMATION FORM 1. LABORATORY SHIPMENT SAMPLES INVENTORY

This form is intended to provide a record of field activity and no information from this form will be included in the data base. This form is similar to Form S06 used for GPS test sections, and provides the necessary information on where each sample was shipped for testing. Also, it provides a detailed inventory of material samples shipped to each materials testing laboratory. At least one form should be completed for each sampling area on the project. The inventory should be made in the following sequence of sample location numbers, starting from the pavement surface layer in each case.

1. Samples from C-Type locations, starting from cores of pavement surface layers.
2. Samples from A-Type bore holes and any additional similar bore holes.
3. Samples from BA-Type bore holes and any additional similar bore holes.
4. Samples from test pits.

Sample location numbers, sample numbers and sampling area numbers should be obtained from the appropriate Sampling Data Sheets. "Sample size" should be used to record the number of bags of bulk samples or the number of jar samples bearing a single sample number in each case. The bulk sample from one layer can be placed in more than one bag, if necessary. However, the sample number should be the same on all of these bags with an indication of the number of bags on the labels and in the column of the "Sample size." For core samples, record only diameter of the core in the "Sample size" column in inches.

Enter core, bulk, moisture, tube or splitspoon in the "Sample type" column as appropriate. Enter AC, PCC, Base, Subbase or Subgrade in the "Sample material" column as appropriate. The "Sample condition" should indicate a brief description as to the overall quality of the sample - cores: good, poor, fractured; bulk samples: satisfactory, wet, insufficient quantity, contaminated.

Since more than one laboratory may be used to test samples in the SPS program, room is provided on this form to indicate up to three laboratories to receive samples from each sampling area. Enter the laboratory number, as noted

at the bottom of the form, to which each sample is sent in the LAB column.

Typically, samples will include:

- All PCC cores from C-Type, A-Type, and BA-Type locations.
- All treated base/subbase cores (including ATB, CTB and econocrete) of 4-inch diameter from C-Type locations.
- Bulk samples and jar samples of granular (untreated) layers and subgrade from BA-type locations and test pits.
- Thin-walled tube samples and splitspoon samples from the subgrade.

**FIELD OPERATION INFORMATION FORM 2. SUMMARY OF MATERIAL SAMPLES SENT TO EACH LABORATORY**

This form provides a summary of the information provided on Field Operations Information Form 1 by testing laboratory. It is similar to Form S06A used for GPS test sections. A separate form should be completed for each set of samples sent to each separate laboratory.

This form requires the samples to be listed according to the layer number of their respective sources. The layer number is assigned from the bottom (subgrade) to the pavement surface. Enter the layer number in the left hand column, starting with layer number 1 for the subgrade and increasing each layer number with the next layer. The last layer number should be assigned to the pavement surface layer. A description of the pavement layer material and sample type is provided in the next column on the right, followed by the total number of samples and sample type.

**OTHER GPS DATA FORMS**

\*Other Field Materials Sampling and Testing data forms used for GPS test sections but not referenced in this document should not be completed for the SPS activity. These forms include S07, S08, S09, S10, S11, S12, S13, S14A, S14B, S15A, S15B, S16A, and S16B.

LTPP-SPS MATERIAL SAMPLING AND FIELD TESTING  
 PAVEMENT CORE LOG AT BOREHOLE LOCATIONS  
 SAMPLING DATA SHEET 1

SHEET NUMBER \_\_\_\_\_ OF \_\_\_\_\_

SHRP REGION \_\_\_\_\_ STATE \_\_\_\_\_ STATE CODE \_\_\_\_\_  
 SPS EXPERIMENT NO \_\_\_\_\_ SPS PROJECT CODE \_\_\_\_\_  
 ROUTE/HIGHWAY \_\_\_\_\_ Lane \_\_\_\_\_ Direction \_\_\_\_\_ TEST SECTION NO. \_\_\_\_\_  
 SAMPLE/TEST LOCATION:  Before Section  After Section FIELD SET NO. \_\_\_\_\_

OPERATOR \_\_\_\_\_ EQUIPMENT USED \_\_\_\_\_ CORING DATE \_\_\_\_ - \_\_\_\_ - \_\_\_\_  
 SAMPLING AREA NO. SA- \_\_\_\_\_ LOCATION: STATION \_\_\_\_\_ OFFSET \_\_\_\_\_ feet from °/s  
 CORE HOLE NUMBER \_\_\_\_\_ CORE BARREL SIZE \_\_\_\_\_ (in. Inside Diam.) Cooling Medium \_\_\_\_\_

| Scale<br>(Inches) | Depth<br>(Inches) | Core<br>Recov.<br>(Inches) | Core<br>Sample No. | Material<br>Description | Material<br>Code |
|-------------------|-------------------|----------------------------|--------------------|-------------------------|------------------|
| 0                 |                   |                            |                    |                         |                  |
|                   |                   |                            |                    |                         |                  |
|                   |                   |                            |                    |                         |                  |
| 5                 |                   |                            |                    |                         |                  |
|                   |                   |                            |                    |                         |                  |
|                   |                   |                            |                    |                         |                  |
| 10                |                   |                            |                    |                         |                  |
|                   |                   |                            |                    |                         |                  |
|                   |                   |                            |                    |                         |                  |
| 15                |                   |                            |                    |                         |                  |
|                   |                   |                            |                    |                         |                  |
|                   |                   |                            |                    |                         |                  |
| 20                |                   |                            |                    |                         |                  |
|                   |                   |                            |                    |                         |                  |
|                   |                   |                            |                    |                         |                  |
| 25                |                   |                            |                    |                         |                  |

Note: "Depth" should be measured from the top of the pavement surface to the bottom of the cores of each layer and recorded to the nearest tenth of an inch.

GENERAL REMARKS: \_\_\_\_\_

CERTIFIED

VERIFIED AND APPROVED

DATE

\_\_\_\_\_  
 Field Crew Chief  
 Affiliation: \_\_\_\_\_

\_\_\_\_\_  
 SHRP Representative  
 Affiliation: \_\_\_\_\_

\_\_\_\_ - \_\_\_\_ - 19 \_\_\_\_  
 Month - Day - Year

LTPP-SPS MATERIAL SAMPLING AND FIELD TESTING  
 PAVEMENT CORE LOG AT G-TYPE CORE LOCATIONS  
 SAMPLING DATA SHEET 2

SHEET NUMBER \_\_\_\_\_ OF \_\_\_\_\_

SHRP REGION \_\_\_\_\_ STATE \_\_\_\_\_ STATE CODE \_\_\_\_\_  
 SPS EXPERIMENT NO \_\_\_\_\_ SPS PROJECT CODE \_\_\_\_\_  
 ROUTE/HIGHWAY \_\_\_\_\_ Lane \_\_\_\_\_ Direction \_\_\_\_\_ TEST SECTION NO. \_\_\_\_\_  
 SAMPLE/TEST LOCATION:  Before Section  After Section FIELD SET NO. \_\_\_\_\_  
 OPERATOR \_\_\_\_\_ EQUIPMENT USED \_\_\_\_\_ CORING DATE \_\_\_\_-\_\_\_\_-\_\_\_\_  
 SAMPLING AREA NO SA- \_\_\_\_\_ CORE BARREL: Tip Type \_\_\_\_\_ Cooling Medium \_\_\_\_\_

Note: Record information for all cores extracted from each core hole in one column in the table below. Use a separate sheet for each sampling area. "Depth" should be measured from the pavement surface to the bottom of the core and recorded to the nearest tenth of an inch.

| CORE HOLE NUMBER          |        |        |        |        |        |        |
|---------------------------|--------|--------|--------|--------|--------|--------|
| LOCATION: (a) STATION     |        |        |        |        |        |        |
| (b) OFFSET (Feet, O/S)    |        |        |        |        |        |        |
| Core Recovered?           | YES/NO | YES/NO | YES/NO | YES/NO | YES/NO | YES/NO |
| Replacement Core Hole No. |        |        |        |        |        |        |
| Core Size (inch Diam.)    | 4/6    | 4/6    | 4/6    | 4/6    | 4/6    | 4/6    |
| Core Sample No.           |        |        |        |        |        |        |
| Depth (Inches)            |        |        |        |        |        |        |
| Material Description      |        |        |        |        |        |        |
| Material Code             |        |        |        |        |        |        |
| Core Size (inch Diam.)    | 4/6    | 4/6    | 4/6    | 4/6    | 4/6    | 4/6    |
| Core Sample No.           |        |        |        |        |        |        |
| Depth (Inches)            |        |        |        |        |        |        |
| Material Description      |        |        |        |        |        |        |
| Material Code             |        |        |        |        |        |        |
| Core Size (inch Diam.)    | 4/6    | 4/6    | 4/6    | 4/6    | 4/6    | 4/6    |
| Core Sample No.           |        |        |        |        |        |        |
| Depth (Inches)            |        |        |        |        |        |        |
| Material Description      |        |        |        |        |        |        |
| Material Code             |        |        |        |        |        |        |
| Core Size (inch Diam.)    | 4/6    | 4/6    | 4/6    | 4/6    | 4/6    | 4/6    |
| Core Sample No.           |        |        |        |        |        |        |
| Depth (Inches)            |        |        |        |        |        |        |
| Material Description      |        |        |        |        |        |        |
| Material Code             |        |        |        |        |        |        |
| Remarks                   |        |        |        |        |        |        |

GENERAL REMARKS: \_\_\_\_\_

CERTIFIED \_\_\_\_\_ VERIFIED AND APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 Field Crew Chief \_\_\_\_\_ SHRP Representative \_\_\_\_\_  
 Affiliation: \_\_\_\_\_ Affiliation: \_\_\_\_\_  
 \_\_\_\_\_ - \_\_\_\_ - 19 \_\_\_\_  
 Month- Day- Year

LTPP-SPS MATERIAL SAMPLING AND FIELD TESTING  
 A-TYPE BORE HOLE LOG  
 SAMPLING DATA SHEET 4

SHEET NUMBER \_\_\_\_\_ OF \_\_\_\_\_

SHRP REGION \_\_\_\_\_ STATE \_\_\_\_\_  
 SPS EXPERIMENT NO \_\_\_\_\_  
 ROUTE/HIGHWAY \_\_\_\_\_ Lane \_\_\_\_\_ Direction \_\_\_\_\_  
 SAMPLE/TEST LOCATION:  Before Section  After Section

STATE CODE \_\_\_\_\_  
 SPS PROJECT CODE \_\_\_\_\_  
 TEST SECTION NO. \_\_\_\_\_  
 FIELD SET NO. \_\_\_\_\_

OPERATOR \_\_\_\_\_ EQUIPMENT USED \_\_\_\_\_ BORING DATE \_\_\_\_-\_\_\_\_-\_\_\_\_  
 SAMPLING AREA NO: SA- \_\_\_\_\_ LOCATION: STATION \_\_\_\_\_ OFFSET \_\_\_\_\_ feet from °/s  
 BORE HOLE NUMBER: \_\_\_\_\_ BORE HOLE SIZE: \_\_\_\_\_ (inch Diam.)

| Scale<br>(Inches) | Strata<br>Change<br>(Inches) | Sample<br>Number<br>(1) | #Blows(2) |    |    | Ref?<br>Y/N<br>(3) | DLR<br>(Inches)<br>(4) | IOP<br>(5) | Material<br>Description | Material<br>Code |
|-------------------|------------------------------|-------------------------|-----------|----|----|--------------------|------------------------|------------|-------------------------|------------------|
|                   |                              |                         | 6"        | 6" | 6" |                    |                        |            |                         |                  |
| 10.0              |                              |                         |           |    |    |                    |                        |            |                         |                  |
| 20.0              |                              |                         |           |    |    |                    |                        |            |                         |                  |
| 30.0              |                              |                         |           |    |    |                    |                        |            |                         |                  |
| 40.0              |                              |                         |           |    |    |                    |                        |            |                         |                  |
| 50.0              |                              |                         |           |    |    |                    |                        |            |                         |                  |
| 60.0              |                              |                         |           |    |    |                    |                        |            |                         |                  |
| 70.0              |                              |                         |           |    |    |                    |                        |            |                         |                  |
| 80.0              |                              |                         |           |    |    |                    |                        |            |                         |                  |
| 90.0              |                              |                         |           |    |    |                    |                        |            |                         |                  |
| 100.0             |                              |                         |           |    |    |                    |                        |            |                         |                  |

- Record sample numbers for splitspoon/thin-walled tube samples taken from the subgrade.
- For splitspoon samples, record the number of blows for the first, second and third 6 inches of penetration.
- Refused* - If the splitspoon is refused, place a Y in the *REFUSAL* column and complete *Driving Length To Refusal* column. Refusal is defined as less than 1 inch of penetration with 100 blows.
- Driving Length To Refusal* - Record penetration to refusal of splitspoon from the top of the pavement surface.
- Inches Of Penetration* - Record from start of splitspoon sampling procedure if 100 blows is reached before one foot of penetration. If penetration exceeds 12 inches before 100 blows is reached, enter middle 6 inches plus depth of penetration into the last 6 inches when 100 blows was reached (not including seating drive); record to nearest tenth of an inch.

GENERAL REMARKS: \_\_\_\_\_  
 CERTIFIED \_\_\_\_\_ VERIFIED AND APPROVED \_\_\_\_\_ DATE \_\_\_\_\_-\_\_\_\_-\_\_\_\_  
 \_\_\_\_\_ -19\_\_\_\_  
 Field Crew Chief \_\_\_\_\_ SHRP Representative \_\_\_\_\_ Month- Day- Year  
 Affiliation: \_\_\_\_\_ Affiliation: \_\_\_\_\_

LTPP-SPS MATERIAL SAMPLING AND FIELD TESTING  
 BA-TYPE BORE HOLE LOG  
 SAMPLING DATA SHEET 5

SHEET NUMBER \_\_\_\_\_ OF \_\_\_\_\_

HRP REGION \_\_\_\_\_ STATE \_\_\_\_\_  
 SPS EXPERIMENT NO \_\_\_\_\_  
 ROUTE/HIGHWAY \_\_\_\_\_ Lane \_\_\_\_\_ Direction \_\_\_\_\_  
 SAMPLE/TEST LOCATION:  Before Section  After Section

STATE CODE \_\_\_\_\_  
 SPS PROJECT CODE \_\_\_\_\_  
 TEST SECTION NO. \_\_\_\_\_  
 FIELD SET NO. \_\_\_\_\_

OPERATOR \_\_\_\_\_ EQUIPMENT USED \_\_\_\_\_ BORING DATE \_\_\_\_-\_\_\_\_-\_\_\_\_  
 SAMPLING AREA NO: SA- \_\_\_\_\_ LOCATION: STATION \_\_\_\_\_ OFFSET \_\_\_\_\_ feet from °/s  
 BORE HOLE NUMBER: \_\_\_\_\_ BORE HOLE SIZE: \_\_\_\_\_ (inch Diam.)

| Scale<br>(Inches) | Strata<br>Change<br>(Inches) | Sample<br>Number<br>(1) | Moisture<br>Sample<br>Number (2) | Material<br>Description | Material<br>Code |
|-------------------|------------------------------|-------------------------|----------------------------------|-------------------------|------------------|
| 10.0              |                              |                         |                                  |                         |                  |
| 20.0              |                              |                         |                                  |                         |                  |
| 30.0              |                              |                         |                                  |                         |                  |
| 40.0              |                              |                         |                                  |                         |                  |
| 50.0              |                              |                         |                                  |                         |                  |
| 60.0              |                              |                         |                                  |                         |                  |
| 70.0              |                              |                         |                                  |                         |                  |
| 80.0              |                              |                         |                                  |                         |                  |
| 90.0              |                              |                         |                                  |                         |                  |
| 100.0             |                              |                         |                                  |                         |                  |

- Record sample numbers for bulk samples taken from unbound layers and the subgrade.
- Record sample numbers for samples taken from unbound base, subbase and subgrade for moisture content testing.

GENERAL REMARKS: \_\_\_\_\_

CERTIFIED \_\_\_\_\_  
 Field Crew Chief  
 Affiliation: \_\_\_\_\_

VERIFIED AND APPROVED \_\_\_\_\_  
 SHRP Representative  
 Affiliation: \_\_\_\_\_

DATE  
 \_\_\_\_-\_\_\_\_-19\_\_\_\_  
 Month- Day- Year



LTPP-SPS MATERIAL SAMPLING AND FIELD TESTING  
 TEST PIT LOG  
 SAMPLING DATA SHEET 6

SHEET NUMBER \_\_\_\_\_ OF \_\_\_\_\_

SHRP REGION \_\_\_\_\_ STATE \_\_\_\_\_  
 SPS EXPERIMENT NO \_\_\_\_\_  
 ROUTE/HIGHWAY \_\_\_\_\_ Lane \_\_\_\_\_ Direction \_\_\_\_\_  
 SAMPLE/TEST LOCATION:  Before Section  After Section

STATE CODE \_\_\_\_\_  
 SPS PROJECT CODE \_\_\_\_\_  
 TEST SECTION NO. \_\_\_\_\_  
 FIELD SET NO. \_\_\_\_\_

TECHNICIAN \_\_\_\_\_ EQUIPMENT \_\_\_\_\_ EXPLORATION DATE \_\_\_\_-\_\_\_\_-\_\_\_\_  
 SAMPLING AREA NO: SA- \_\_\_\_\_ LOCATION: STATION \_\_\_\_\_ OFFSET \_\_\_\_\_ feet from °/s  
 TEST PIT NUMBER \_\_\_\_\_ PIT SIZE: (a) Length \_\_\_\_\_ feet (b) Width \_\_\_\_\_ feet

| Scale<br>(Inches) | Strata<br>Change<br>(Inches) | Moisture<br>Sample No. | Bulk<br>Sample No. | Material Description | Material<br>Code |
|-------------------|------------------------------|------------------------|--------------------|----------------------|------------------|
| 4                 |                              |                        |                    |                      |                  |
| 8                 |                              |                        |                    |                      |                  |
| 12                |                              |                        |                    |                      |                  |
| 16                |                              |                        |                    |                      |                  |
| 20                |                              |                        |                    |                      |                  |
| 24                |                              |                        |                    |                      |                  |
| 28                |                              |                        |                    |                      |                  |
| 32                |                              |                        |                    |                      |                  |
| 36                |                              |                        |                    |                      |                  |
| 40                |                              |                        |                    |                      |                  |
| 44                |                              |                        |                    |                      |                  |
| 48                |                              |                        |                    |                      |                  |

GENERAL REMARKS: \_\_\_\_\_

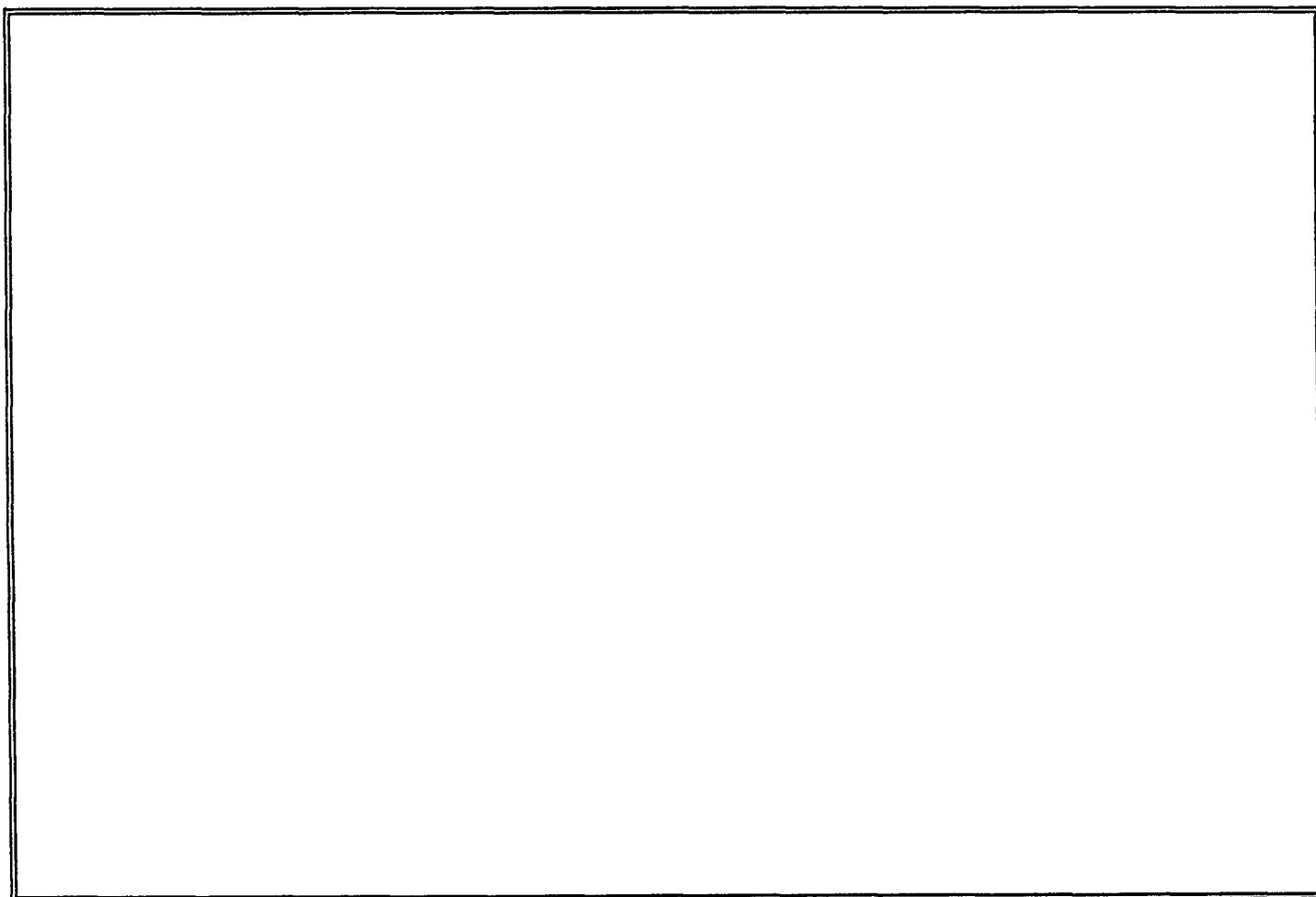
CERTIFIED \_\_\_\_\_ VERIFIED AND APPROVED \_\_\_\_\_ DATE \_\_\_\_-\_\_\_\_-\_\_\_\_  
 Field Crew Chief \_\_\_\_\_ SHRP Representative \_\_\_\_\_ Month- Day- Year  
 Affiliation: \_\_\_\_\_ Affiliation: \_\_\_\_\_

LTPP-SPS MATERIAL SAMPLING AND FIELD TESTING  
 TEST PIT SKETCH  
 SAMPLING DATA SHEET 7

SHEET NUMBER \_\_\_\_\_ OF \_\_\_\_\_

SHRP REGION \_\_\_\_\_ STATE \_\_\_\_\_ STATE CODE \_\_\_\_\_  
 SPS EXPERIMENT NO \_\_\_\_\_ SPS PROJECT CODE \_\_\_\_\_  
 ROUTE/HIGHWAY \_\_\_\_\_ Lane \_\_\_\_\_ Direction \_\_\_\_\_ TEST SECTION NO. \_\_\_\_\_  
 SAMPLE/TEST LOCATION:  Before Section  After Section FIELD SET NO. \_\_\_\_\_

TECHNICIAN \_\_\_\_\_ EQUIPMENT \_\_\_\_\_ EXPLORATION DATE \_\_\_\_-\_\_\_\_-\_\_\_\_  
 SAMPLING AREA NO: SA- \_\_\_\_\_ LOCATION: STATION \_\_\_\_\_ OFFSET \_\_\_\_\_ feet from °/s  
 TEST PIT NUMBER \_\_\_\_\_ PIT SIZE: (a) Length \_\_\_\_\_ feet (b) Width \_\_\_\_\_ feet



This form is to be used to sketch the test pit as it was sampled. Show the dimensions of the test pit, the depth of each layer and the material type for each layer. Sketch the direction of traffic on the test pit illustration with an arrow in the direction of traffic.

GENERALREMARKS: \_\_\_\_\_

|                    |                       |                  |
|--------------------|-----------------------|------------------|
| CERTIFIED          | VERIFIED AND APPROVED | DATE             |
| _____              | _____                 | ____-____-19____ |
| Field Crew Chief   | SHRP Representative   | Month- Day- Year |
| Affiliation: _____ | Affiliation: _____    |                  |

LTPP-SPS MATERIAL SAMPLING AND FIELD TESTING  
 IN SITU DENSITY AND MOISTURE TESTS  
 SAMPLING DATA SHEET 8

SHEET NUMBER \_\_\_\_\_ OF \_\_\_\_\_

SHRP REGION \_\_\_\_\_ STATE \_\_\_\_\_  
 SPS EXPERIMENT NO \_\_\_\_\_  
 ROUTE/HIGHWAY \_\_\_\_\_ Lane \_\_\_\_\_ Direction \_\_\_\_\_  
 SAMPLE/TEST LOCATION:  Before Section  After Section

STATE CODE \_\_\_\_\_  
 SPS PROJECT CODE \_\_\_\_\_  
 TEST SECTION NO. \_\_\_\_\_  
 FIELD SET NO. \_\_\_\_\_

OPERATOR \_\_\_\_\_ NUCLEAR DENSITY GAUGE I.D. \_\_\_\_\_ TEST DATE \_\_\_\_ - \_\_\_\_ - \_\_\_\_  
 SAMPLING AREA NO: SA- \_\_\_\_\_ LOCATION: STATION \_\_\_\_\_ OFFSET \_\_\_\_\_ feet from °/s  
 TEST PIT NO: \_\_\_\_\_ DATE OF LAST MAJOR CALIBRATION \_\_\_\_ - \_\_\_\_ - \_\_\_\_

Note: Use additional sheets if necessary

|  |   |  |  |  |  |  |
|--|---|--|--|--|--|--|
| DEPTH FROM SURFACE TO THE TOP OF THE LAYER, INCHES (See Sheet 5) |   |  |  |  |  |  |
| LAYER DESCRIPTION  |   |  |  |  |  |  |
| MATERIAL TYPE:<br>(Unbound-G Other-T)                            |   |  |  |  |  |  |
| IN SITU DENSITY, pcf<br>(AASHTO T238-86)                         | 1 |  |  |  |  |  |
|  | 2 |  |  |  |  |  |
|  | 3 |  |  |  |  |  |
|  | 4 |  |  |  |  |  |
| AVERAGE  |   |  |  |  |  |  |
| Method (A,B, or C)   |   |  |  |  |  |  |
| Rod Depth, inches  |   |  |  |  |  |  |
| IN SITU MOISTURE CONTENT, %<br>(AASHTO T239-86)                  | 1 |  |  |  |  |  |
|  | 2 |  |  |  |  |  |
|  | 3 |  |  |  |  |  |
|  | 4 |  |  |  |  |  |
| AVERAGE  |   |  |  |  |  |  |

GENERAL REMARKS: \_\_\_\_\_

CERTIFIED  
 \_\_\_\_\_  
 Field Crew Chief  
 Affiliation: \_\_\_\_\_

VERIFIED AND APPROVED  
 \_\_\_\_\_  
 SHRP Representative  
 Affiliation: \_\_\_\_\_

DATE  
 \_\_\_\_ - \_\_\_\_ - 19\_\_\_\_  
 Month- Day- Year

LTPP-SPS MATERIAL SAMPLING AND FIELD TESTING  
 SHOULDER PROBE LOG  
 SAMPLING DATA SHEET 9

SHEET NUMBER \_\_\_\_\_ OF \_\_\_\_\_

TRP REGION \_\_\_\_\_ STATE \_\_\_\_\_  
 EXPERIMENT NO \_\_\_\_\_  
 ROUTE/HIGHWAY \_\_\_\_\_ Lane \_\_\_\_\_ Direction \_\_\_\_\_  
 SAMPLE/TEST LOCATION:  Before Section  After Section

STATE CODE \_\_\_\_\_  
 SPS PROJECT CODE \_\_\_\_\_  
 TEST SECTION NO. \_\_\_\_\_  
 FIELD SET NO. \_\_\_\_\_

OPERATOR \_\_\_\_\_ EQUIPMENT USED \_\_\_\_\_ AUGERING DATE \_\_\_\_-\_\_\_\_-\_\_\_\_  
 AUGER PROBE NUMBER \_\_\_\_\_ LOCATION STATION: \_\_\_\_\_ OFFSET: \_\_\_\_\_ feet from °/s  
 TOP OF ROCK BASED ON: \_\_\_\_\_

| Scale (feet) | Depth from Surface (Feet) | Material Description | Material Code |
|--------------|---------------------------|----------------------|---------------|
| 1            |                           |                      |               |
| 2            |                           |                      |               |
| 3            |                           |                      |               |
| 4            |                           |                      |               |
| 5            |                           |                      |               |
| 6            |                           |                      |               |
| 7            |                           |                      |               |
| 8            |                           |                      |               |
| 9            |                           |                      |               |
| 10           |                           |                      |               |
| 11           |                           |                      |               |
| 12           |                           |                      |               |
| 13           |                           |                      |               |
| 14           |                           |                      |               |
| 15           |                           |                      |               |
| 16           |                           |                      |               |
| 17           |                           |                      |               |
| 18           |                           |                      |               |
| 19           |                           |                      |               |
| 20           |                           |                      |               |

REFUSAL WITHIN 20 FEET (Y/N): \_\_\_\_\_ DEPTH TO REFUSAL: \_\_\_\_\_ (FEET)

GENERAL REMARKS: \_\_\_\_\_  
 CERTIFIED \_\_\_\_\_ VERIFIED AND APPROVED \_\_\_\_\_ DATE \_\_\_\_-\_\_\_\_-19\_\_\_\_  
 Field Crew Chief \_\_\_\_\_ SHRP Representative \_\_\_\_\_ Month- Day- Year  
 Affiliation: \_\_\_\_\_ Affiliation: \_\_\_\_\_

LTPP-SPS MATERIAL SAMPLING AND FIELD TESTING  
SAMPLING UNCOMPACTED BITUMINOUS PAVING MIXTURES  
SAMPLING DATA SHEET 10

SHEET NUMBER \_\_\_\_\_ OF \_\_\_\_\_

SHRP REGION \_\_\_\_\_ STATE \_\_\_\_\_  
SPS EXPERIMENT NUMBER \_\_\_\_\_  
ROUTE/HIGHWAY \_\_\_\_\_ Lane \_\_\_\_\_ Direction \_\_\_\_\_

STATE CODE \_\_\_\_\_  
SPS PROJECT CODE \_\_\_\_\_  
TEST SECTION NO. \_\_\_\_\_  
FIELD SET NO. \_\_\_\_\_

PERSON PERFORMING SAMPLING

NAME \_\_\_\_\_ EMPLOYER \_\_\_\_\_  
TITLE \_\_\_\_\_

MIX PLANT

PLANT NAME \_\_\_\_\_  
PLANT LOCATION \_\_\_\_\_  
PLANT TYPE Batch..... 1 Drum..... 2 Other (Specify)..... 3 [\_\_\_\_]  
DESCRIPTION OF MIX PLANT \_\_\_\_\_  
MANUFACTURER OF ASPHALT PLANT \_\_\_\_\_  
MODEL NUMBER \_\_\_\_\_  
BATCH SIZE \_\_\_\_\_

SAMPLING LOCATION [\_\_\_\_]

Conveyor Belt..... 1 Stockpile..... 2 Haul Truck..... 3 Funnel Device..... 4  
Roadway Prior to Compaction ..... 5 Station \_\_ + \_\_ \_\_ Offset \_\_\_\_ (feet from O/S)  
Other..... 6 (specify) \_\_\_\_\_

MIX TYPE "Virgin" Asphalt Concrete ..... 1 Recycled Asphalt Concrete..... 2 [\_\_\_\_]

LAYER TYPE [\_\_\_\_]

Rut Level-Up..... 1 Mill Replacement..... 2 Binder Course..... 3  
Surface Course..... 4 Surface Friction Layer..... 5

SAMPLE TYPE DESIGNATION [\_\_\_\_]

SAMPLE NUMBER [\_\_\_\_]

APPROXIMATE SAMPLE SIZE (lbs) \_\_\_\_\_

DATE SAMPLED (Month - Day - Year) [\_\_\_\_ - \_\_\_\_ - \_\_\_\_]

LOCATION SAMPLE SHIPPED TO \_\_\_\_\_

DATE SHIPPED (Month-Day-Year) [\_\_\_\_ - \_\_\_\_ - \_\_\_\_]

GENERAL REMARKS: \_\_\_\_\_

CERTIFIED

VERIFIED AND APPROVED

DATE

Field Crew Chief  
Affiliation: \_\_\_\_\_

SHRP Representative  
Affiliation: \_\_\_\_\_

\_\_\_\_\_-\_\_\_\_\_-19\_\_\_\_\_  
Month- Day- Year



LTPP-SPS MATERIAL SAMPLING AND FIELD TESTING  
 SUMMARY OF MATERIAL SAMPLES SENT TO EACH LABORATORY  
 FIELD OPERATIONS INFORMATION FORM 2

SHEET NUMBER \_\_\_\_\_ OF \_\_\_\_\_

HRP REGION \_\_\_\_\_ STATE \_\_\_\_\_ STATE CODE \_\_\_\_\_  
 SPS EXPERIMENT NO \_\_\_\_\_ SPS PROJECT CODE \_\_\_\_\_  
 ROUTE/HIGHWAY \_\_\_\_\_ Lane \_\_\_\_\_ Direction \_\_\_\_\_ TEST SECTION NO. \_\_\_\_\_  
 SAMPLE/TEST LOCATION:  Before Section  After Section FIELD SET NO. \_\_\_\_\_

LABORATORY \_\_\_\_\_ WORK COMPLETED ON \_\_\_\_-\_\_\_\_-\_\_\_\_

NOTE: This is a summary of material samples sent to each laboratory based on the information from Field Operations Information Form 1. Complete one form for each laboratory that material samples were sent.

| LAYER NO.<br>(From Subgrade) | MATERIAL/SAMPLE TYPE                     | TOTAL NUMBER OF SAMPLES                                |
|------------------------------|--|--|
| _____                        | AC CORES:                                | 4" Diameter _____ 6" Diameter _____ 12" Diameter _____ |
|                              | AC Cores with Bound Base/Subbase         | _____  |
|                              | AC Cores with PCC                        | _____  |
|                              | AC Cores with PCC and Bound Base/Subbase | _____  |
|                              | PCC Cores with Bound Base/Subbase        | _____  |
| _____                        | AC MIX BULK SAMPLES:                     | Fifty Pound Samples - Virgin _____                     |
|                              |  | Recycled _____   |
| _____                        | PCC CORES:                               | 4" Diameter _____ 6" Diameter _____                    |
| _____                        | PCC BEAMS:                               | _____  |
| _____                        | BOUND BASE CORES:                        | 4" Diameter _____                                      |
| _____                        | UNBOUND BASE SAMPLES:                    | (a) BAGS (BULK) _____ (b) JARS (MOISTURE) _____        |
| _____                        | BOUND SUBBASE CORES:                     | 4" Diameter _____                                      |
| _____                        | UNBOUND SUBBASE SAMPLES:                 | (a) BAGS (BULK) _____ (b) JARS (MOISTURE) _____        |
| 1                            | SUBGRADE SAMPLES:                        | (a) BAGS (BULK) _____ (b) JARS (MOISTURE) _____        |
|                              |  | (c) THIN-WALLED TUBES _____ (d) SPLITSPOON _____ JARS  |

GENERAL REMARKS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

|                    |                       |                  |
|--------------------|-----------------------|------------------|
| CERTIFIED          | VERIFIED AND APPROVED | DATE             |
| _____              | _____                 | ____-____-19____ |
| Field Crew Chief   | SHRP Representative   | Month- Day- Year |
| Affiliation: _____ | Affiliation: _____    |                  |