Long-Term Pavement Performance Inventory Data Collection Guide

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LTPP

FOREWORD

The Long-Term Pavement Performance (LTPP) Program is an ongoing and active program. To obtain current information and access to other technical references, LTPP data users should visit the LTPP Web site at http://www.tfhrc.gov/pavement/ltpp/ltpp.htm. LTPP data requests, technical questions, and data user feedback can be submitted to LTPP customer service via e-mail at ltppinfo@fhwa.dot.gov.

Gary L. Henderson
Director, Office of Infrastructure
Research and Development

Technical Report Documentation Page

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16. Abstract
The primary purpose for this data collection guide is to provide a uniform basis for data collection during long-term monitoring of the performance of pavement test sections under study by the Long-Term Pavement Performance (LTPP) Program. It is a revision to chapter 2 of the *1993 LTPP Data Collection Guide*. Inventory data include that data necessary to: 1) identify the test section, 2) describe the geometric details of its construction and the material properties of its structural constituents, and 3) identify construction costs and costs of subsequent maintenance and repair before the long-term monitoring effort. These data are intended to describe the pavement test section at the time the section was included in the LTPP study.

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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	square millimeters	mm^2
ft^2	square feet	0.093	square meters	m^2
yd^2	square yard	0.836	square meters	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	square kilometers	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	cubic meters	m^3
yd^3	cubic yards	0.765	cubic meters	m^3
		NOTE: volumes greater than 1000 L shall be shown in m^3		
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
		TEMPERATURE (exact degrees)		
^oF	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	^oC
		ILLUMINATION		
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m^2	cd/m^2
		FORCE and PRESSURE or STRESS		
lbf	poundforce	4.45	newtons	N
lbf/in^2	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	square millimeters	0.0016	square inches	in^2
m^2	square meters	10.764	square feet	ft^2
m^2	square meters	1.195	square yards	yd^2
ha	hectares	2.47	acres	ac
km^2	square kilometers	0.386	square miles	mi^2
		VOLUME		
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	cubic meters	35.314	cubic feet	ft^3
m^3	cubic meters	1.307	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
		TEMPERATURE (exact degrees)		
^oC	Celsius	1.8C+32	Fahrenheit	^oF
		ILLUMINATION		
lx	lux	0.0929	foot-candles	fc
cd/m^2	candela/m^2	0.2919	foot-Lamberts	fl
		FORCE and PRESSURE or STRESS		
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in^2

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.
(Revised March 2003)

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LIST OF ACRONYMS AND ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
AC	asphalt concrete
ACI	American Concrete Institute
ASTM	American Society for Testing and Materials
CBR	California bearing ratio
CPR	Concrete Pavement Restoration
CRCP	continuously reinforced concrete pavement
DOP	dilution of precision
EPE	estimated position error
ESAL	equivalent single-axle load
FHWA	Federal Highway Administration
FIPS	Federal Information Processing Standards
GPS	General Pavement Studies
HMAC	hot-mix asphalt concrete
HPMS	Highway Performance Monitoring System
ID	identification
IMS	Information Management System
JPCP	jointed plain concrete pavement
JRCP	jointed reinforced concrete pavement
LL	liquid limit
LTM	long-term monitoring
LTPP	Long-Term Pavement Performance
NCHRP	National Cooperative Highway Research Program
PCA	Portland Cement Association
PCC	portland cement concrete
PI	plasticity index
PL	plastic limit
RSC	Regional Support Contractor
SAMI	stress-absorbing membrane interlayer
SHA	State highway agency
SHRP	Strategic Highway Research Program
SPS	Specific Pavement Studies
VMA	voids in mineral aggregate

CHAPTER 1. INTRODUCTION

Many different types of data are collected on test sections studies as part of the Long-Term Pavement Performance (LTPP) program. This document provides the guidelines necessary for collecting inventory data on these sections. Inventory data include those necessary to: 1) identify the test section, 2) describe the geometric details of its construction and the material properties of its structural constituents, and 3) identify construction costs and costs of subsequent maintenance and repair before the long-term monitoring (LTM) effort. Table 1 provides a general list of inventory data elements.

All of these data, with the exception of certain material properties such as subgrade strength and moisture content that change over time or environment, should remain constant throughout the monitoring period of each test section or project unless the pavement is resurfaced or rehabilitated during the period. In either case, the test section becomes for practical purposes a new pavement structure with new surface conditions, so the basic inventory data must be revised to describe these new conditions, while the original data is retained for reference in long-term cost analyses and studies of the effects of rehabilitation on deterioration rates. The additional rehabilitation data elements recommended for collection in the event this occurs during the monitoring period are discussed in the *Maintenance and Rehabilitation Data Collection Guide*.

This document provides data sheets and instructions to collect inventory data for the LTPP program. The inventory data sheets appear in numerical sequence at the end of this document.

The inventory data sheets have been taken from the original *Long-Term Monitoring Data Collection Guide* and modified to reflect evolution in planning for LTM of pavements. This was done partially to maintain some consistency with the LTM pilot study databases, but primarily to take advantage of the work already accomplished for the Federal Highway Administration (FHWA) during the LTM studies, and during studies for the National Cooperative Highway Research Program (NCHRP) Project 1–19.

The data sheets allow collection of detailed information on the variability of materials and layer thicknesses, because this variability is known to contribute heavily to pavement deterioration. Replicate test data is often unavailable, so single test results in these cases should be entered as the mean and other values left blank. However, whenever possible, data on variability should be obtained.

Data collected for a General Pavement Studies (GPS) test section should pertain to the original construction of the section or the most recent rehabilitation/reconstruction. The data sheets required for each GPS test section will depend on the type of materials contained in the structure of that test section. Sheets 1, 2, 3, and 4 are required for every GPS test section. Sheet 3 indicates the numbers of the additional required data sheets for each material type present in the pavement structure. Sheet 1A is required for every GPS test section where measurements are made with a global positioning system receiver.

Table 1. Items of Inventory Data To Be Collected

1. Test Section Identification	
Route Number State, County, and District Lane Monitored Experiment Code	Functional Class Location of Test Section Direction of Travel
2. Geometric Details and General Information	
Number of Lanes Lane Width Type of Pavement Type of Subsurface Drainage Location of Subsurface Drains Identification of Layer Materials Thickness of Layers Depth to Rigid Layer Year Widened Identification of Materials Used in Overlay or Reconstruction Dowel Bar Diameter, Length, and Installation Method	Shoulder Width Shoulder Structure Portland Cement Concrete (PCC) Shoulder Joint Information Year Originally Constructed Thicknesses of Overlays or Final Layer Years when Major Improvements Occurred Joint Spacing, Reservoir Width Sealant Type and Forming Method Type of Load Transfer (Aggregate Interlock or Dowels) Tie Bar Spacing, Coating, Diameter, Length, and Spacing
3. Material Properties	
a. Subgrade Soil	
Soil Type and Classification Plasticity Index In Situ Dry Density In Situ Moisture Content Swell Potential Frost Susceptibility Resilient Modulus Relative Density Optimum Laboratory Moisture Content	Liquid Limit Percent Passing No. 40 Sieve Percent Passing No. 200 Sieve California Bearing Ratio R-Value Modulus of Reaction Maximum Laboratory Dry Density Soil Suction Rate of Heave
b. Base and Subbase Layers (Unbound or Stabilized)	
Soil Type and Classification Optimum Laboratory Moisture Content Material Gradation Percent of Stabilizing Agent California Bearing Ratio Resistance (R-Value) Compressive Strength	Maximum Laboratory Dry Density In Situ Dry Density In Situ Moisture Content Resilient Modulus Type of Treatment (Cement, Lime, etc.) Modulus of Subgrade Reaction

Table 1. Items of Inventory Data To Be Collected (Continued)

c. Asphalt Concrete (AC) Layers	
Asphalt Grade Asphalt Content Penetration of Original Asphalt Source and Specific Gravity of Asphalt Viscosity and Ductility of Original Asphalt Softening Point of Asphalt Types of Asphalt Modifiers Original Stability Properties of Laboratory Aged Asphalt Type of Asphalt Plant In-Place Mixture Properties Type and Amount of Antistripping Additives Compaction Data Mixing Temperatures	Initial Air Voids Voids in Mineral Aggregate Types of Coarse and Fine Aggregates Geologic Classifications of Coarse Aggregates Polish Value of Coarse Aggregates Gradations of Coarse and Fine Aggregates Bulk Specific Gravities of Aggregates Effective Specific Gravities of Aggregates Aggregate Durability Resilient Modulus Tensile Strength Creep Compliance Moisture Susceptibility
d. Portland Cement Concrete Layers	
Type, Amount, Yield Strength, and Placement of Reinforcing Steel Mix Design Information Coarse Aggregate Type and Gradation Fine Aggregate Type and Gradation Alkali Content of Cement Entrained Air Aggregate Durability Method for Curing and Finishing	Modulus of Rupture Elastic Modulus Tensile Strength Compressive Strength Type of Paver Slump Type of Cement Insoluble Residue Bulk Specific Gravities
4. Historical Pavement Related Cost Data	
Initial Construction Cost Costs for Major Improvements Maintenance Costs	

Data collected for Specific Pavement Studies (SPS) experiment projects may be provided by an adjacent GPS test section. An entry must be available in the SPS_GPS_LINK table in the LTPP Information Management System (IMS) identifying the adjacent GPS test section number for the relevant project. Data for all SPS projects should pertain to the original construction before any construction related to the SPS requirements. Table 2 shows the data sheets required for each SPS experiment, by experiment number.

Table 2. Data Sheets Required by SPS Experiment

Inventory Data Sheets	SPS Experiment Number								
	1	2	3[A]	4[A]	5	6	7	8	9[B]
1	–	–	X	X	X	X	X	–	X
1A[C]	X	X	X	X	X	X	X	X	X
2	–	–	X	X	X	X	X	–	X
3	–	–	X	X	X	X	X	–	X
4	–	–	X	X	X	X	X	–	X
5	–	–	–	X	–	X	X	–	X
6	–	–	–	X	–	X	X	–	X
7	–	–	–	X	–	X	X	–	X
8	–	–	–	X	–	X	X	–	X
9	–	–	–	X	–	X	X	–	X
10	–	–	–	X	–	X	X	–	X
11	–	–	–	X	–	X	X	–	X
12	–	–	X	–	X	–	X	–	X
13	–	–	X	–	X	–	X	–	X
14	–	–	X	–	X	–	X	–	X
15	–	–	X	–	X	–	X	–	X
16	–	–	X	–	X	–	X	–	X
17	–	–	X	–	X	–	X	–	X
18	–	–	X	–	X	–	X	–	X
19	–	–	X	X	X	X	X	–	X
20	–	–	X	X	X	X	X	–	X
21	–	–	X	X	X	X	X	–	X
22	–	–	X	X	X	X	X	–	X
23	–	–	X	X	X	X	X	–	X

[A] Data for SPS–3 and SPS–4 projects may be completed for an adjacent GPS test section. An entry must be available in the SPS_GPS_LINK table identifying the adjacent GPS test section number for the relevant SPS–3 or SPS–4 project.

[B] Inventory sheets for SPS–9 required only for overlay of existing pavements, with the exception of data sheet 1A.

[C] Inventory data sheet 1A is required for every SPS project or GPS test section where measurements are made with a global positioning system.

CHAPTER 2. DATA COLLECTION AND RECORDING

2.1 RECORDING DATA

Data for a particular LTPP test site may not be available for the specific 152-meter (m) (500-foot (ft)) section being monitored. Usually the data for a test site are available as part of a larger construction project that includes the 152-m (500-ft) test section being monitored. For example, an LTPP test site is within a long section of road that was constructed in 1.6-kilometer (km) (1-mile (mi)) increments, in which case the data items should be taken from the relevant records for the 1.6-km (1-mi) sections. When these records are not available, information for the sections should come from the State highway agency's (SHA) records, such as Project Notes, As-Built Plans, the Construction Diary, and Project Files (Design/Construction Plans, etc.). As a last resort, the State's standards or Standard Practices used at the time of construction should be consulted.

As shown in table 1, spaces are provided for a broad array of data elements, but much of the data will not be available. However, available data should be entered (even data that are not identified by an asterisk as minimum information), and every effort should be taken to obtain those data elements indicated by an asterisk (*). When the data element is not applicable to the test section or represents something that does not exist on the section (i.e., reinforcement data for a plain concrete pavement), enter an "N" to indicate that the data element is not applicable. If the data element is applicable, but the value is unknown (i.e., not available in project records), enter a "U" to indicate that the value is unknown. Many data items will require codes to be entered. Unless otherwise noted in the following instructions, the codes are listed or referenced on the data sheets.

2.1.1 Data Common for All Sheets

A common set of data elements appears in the upper right corner of every data sheet. These items provide the most basic identification of the data being provided and are defined below.

State-Assigned Identification (ID)

The State-assigned ID is an identification number assigned by the SHA used solely to facilitate filing of the projects for the SHA's convenience, and may be cross-referenced with the construction project number. A SHA can use any system for assigning these identification numbers.

State Code

The State code is a number used to identify the State or Canadian Province in which the pavement section is located (see appendix A, table A.1 for codes).

Strategic Highway Research Program (SHRP) ID

The SHRP section ID is a four-digit identification number assigned by LTPP. This number is used to facilitate the computer filing of the projects and will identify the section in the field. It will be cross-referenced with the State-assigned ID.

For SPS sections, the first two digits of the SHRP ID are the project ID, and the last two digits identify the individual section within the project. The first digit of the SHRP ID is the multiple site designator to differentiate between multiple projects for a specific SPS experiment in the same State. A 0 (zero) is assigned to the first project of a specific experiment selected in a State. An A, B, C, etc., is assigned to the second, third, fourth, etc., projects selected of a particular experiment in the same State. The second digit of the SHRP ID designates the SPS experiment number. The remaining two digits identify the individual test section. The test section number is specific to the experiment design. Project level data are specified using 00 as the test section number. For SPS projects, the inventory data are expected to apply to the entire project length. Therefore, the data should be entered for the project level section ID of 00.

2.2 DESCRIPTION OF INDIVIDUAL DATA SHEETS

Following are descriptions of each data sheet used in collecting inventory data.

2.2.1 Project and Section ID (Sheet 1)

This data sheet is to be completed from project records for each GPS test section or project in SPS experiments SPS–3, SPS–4, SPS–5, SPS–6, SPS–7, and SPS–9.

Individual data elements include:

> *Date of Data Collection or Update (Item 1)*: A set of numbers to identify the month and year in which the inventory data have been collected or updated. The number to identify the month is in numerical sequence of the months as they occur during the year (e.g., enter 03 for March followed by the year).
>
> *SHA District Number (Item 2)*: A number used to identify the SHA district in which the pavement test section is located.
>
> *County or Parish (Item 3)*: A numeric code used to identify the county or parish where the pavement section is located. County codes may be found in Federal Information Processing Standards (FIPS) Publication 6, "Counties of the States of the United States," available at http://www.itl.nist.gov/fipspubs/co-codes/states.htm. Canadian agencies should write the county name on the sheet. Codes are available in the IMS to indicate this information.
>
> *Functional Class (Item 4)*: A numeric code used to identify the functional classification of the highway on which the test section is located (see appendix A, table A.2).

Route Signing (Item 5): A numeric code to identify the designation that precedes the number of the highway where the SHA project is located (e.g., an interstate highway would be coded as 1, using the codes provided on sheet 1).

Route Number (Item 6): The number assigned to the highway where the SHA project is located (e.g., 280 for I–280 or 23 for US–23).

Type of Pavement (Item 7): A numeric code identifying the general type of pavement structure (such as AC pavement with granular base, jointed plain concrete pavement, etc.). The pavement type codes are listed in appendix A, table A.3.

Number of Through Lanes (Item 8): A number indicating the total number of through lanes (exclusive of ramps and access roads) in the direction of travel on the test section.

Direction of Travel (Item 9): The general direction of traffic flow along the entire route, which includes the test section (e.g., traffic flow over the test section moving generally in a westbound direction would be coded as 2, per code on sheet 1).

Section Location Starting Point (Items 10 through 13): The locations of the starting point of the test section are to be identified by milepoint, elevation, latitude, and longitude.

> *Milepoints (Item 10)*: The milepoints are to be determined by adjusting the value posted on the milepost nearest to the starting point. For example, if the direction of travel (as noted in the preceding data element) is in the same direction as increasing mileposts for a given roadway, and the starting point was 0.29 miles from the preceding milepost (Mile 114), the milepoint for the starting point of the test section would be 114.29. Milepoints are to be given to the nearest hundredth of a mile (0.01 mi). Canadian agencies should convert kilometer points to milepoints.
>
> *Elevations (Item 11)*: Values are to be entered to the nearest foot. Survey measurements are not required. The intent is to obtain a reasonable estimate. In many cases, the elevations can be taken off the construction plans.
>
> *Latitude and Longitude (Items 12 and 13)*: Values are assumed to be in the northerly and westerly direction for latitude and longitude, respectively. Values are to be given in degrees, minutes, and seconds to the nearest hundredth of a second (0.01 s) when this type of accuracy is possible.

Location information for SPS projects should be referenced to the starting point of the first section encountered in the direction of travel.

Space is provided to enter *Additional Location Information (Significant Landmarks) (Item 14)*. This entry should provide information that will be useful for field crews in locating the project during monitoring activities, including the name of the nearest town or city.

HPMS Sample Number (Item 15): This is the 12-digit "Section/Grouped Data Identification" assigned to any section of highway in the FHWA's Highway Performance Monitoring System (HPMS). It provides a unique identification for a test section and may be obtained from those SHA personnel servicing the HPMS.

HPMS Section Subdivision (Item 16): A single-digit code used to identify a further subdivision of an original HPMS section, generally included as a 13^{th} digit to the HPMS sample number.

2.2.2 Global Positioning Measurements (Sheet 1A)

This data sheet is to be completed for each LTPP test section for which latitude and longitude measurements are made using one of the global positioning system receivers. Latitude and longitude data entered in this sheet will supersede those values stored in the IMS from *Inventory Data Sheet 1, Project and Section Identification.*

Individual data elements are:

Global Positioning System Instrument Type and Model Name (Item 1): Space is provided to enter the type and model of the global positioning system receiver used to measure latitude and longitude. This information is not entered into the IMS.

Measurement Date (Item 2): A set of numbers to identify the day, month, and year in which latitude and longitude measurements have been made with the global positioning system receiver. The format for this data element is dd/mm/yyyy; e.g., 03/04/1994 for global positioning system measurements made on April 3, 1994, or 20/12/1996 for global positioning system measurements made on December 20, 1996. This information is not entered into the IMS.

Latitude (Item 3): Latitude of the LTPP test section or project, as determined from the global positioning system measurement, in degrees, minutes, and seconds to the nearest tenth of a second (0.1 s). This information supersedes any that is currently stored in the LTPP IMS. (Note: North or south direction is not entered on this data sheet, since it is assumed to be north; however, direction will be included in the IMS at a future date to allow for sections in the Southern Hemisphere.)

Longitude (Item 4): Longitude of the LTPP test section or project, as determined from the global positioning system measurement, in degrees, minutes, and seconds to the nearest tenth of a second (0.1 s). This information supersedes that currently stored in the LTPP IMS. (Note: West or east direction is not entered on this data sheet since it is assumed to be west; however, direction will be included in the IMS at a future date to allow for sections in the Eastern Hemisphere.

Elevation (Item 5): Elevation of the LTPP section, as determined from the global positioning system measurement, in meters to the nearest meter. This information is not entered into the IMS, but should be used by the Regional Support Contractors (RSC) to check the reasonableness of the elevation data currently stored in the IMS.

Dilution of Precision (DOP) (Item 6): Measure of satellite geometry quality and relative accuracy of the global positioning system measurement. The DOP ranges from 1.0 (best) to 9.9 (worst), with the value entered to the nearest tenth (0.1). This information is not entered into the IMS, but is used by the RSCs for quality control purposes.

Estimated Position Error (EPE) (Item 7): Overall measure of position accuracy computed using the DOP, signal and data quality, receiver tracking status, and other factors. The EPE is expressed in meters, with the value entered to the nearest meter. This information is not entered into the IMS, but is used by the RSCs for quality control purposes.

Comments (Item 8): Space is provided to enter any pertinent comments related to the latitude and longitude measurements using the global positioning system receiver. This information is not entered into the IMS.

2.2.3 Geometric, Shoulder, and Drainage Information (Sheet 2)

The data to be entered on this sheet provide basic information regarding the geometry of the pavement section, subsurface drainage incorporated in the pavement structure (if any), and the shoulder geometry and pavement structure. These data can be obtained from as-built plans and/or project files, but values should be checked at the site whenever possible through visual observation.

Individual data elements are:

Lane Width (Item 1): The width of the lane to be monitored, to the nearest whole number of feet.

Monitoring Site Lane Number (Item 2): A number that identifies which lane is to be monitored. The lane numbering methodology is identified on the data sheet. Lanes should be numbered starting with the outside lane as lane 1 and increasing toward the centerline of the roadway. Although a highway agency may wish to monitor more than one lane, each lane should be considered as a separate test section, with its own data (although much data may actually be common, such as environmental, materials, and thickness design data). For the LTPP studies, only the outside lane will be studied, so the code "1" should be entered for all test sections and projects in this study.

Subsurface Drainage Location (Item 3): A code indicating whether the subsurface drainage is continuous along the section or is provided at intermittent locations. Codes are provided on data sheet 2.

Subsurface Drainage Type (Item 4): A code indicating the type of system used to provide subsurface drainage, ranging from no subsurface drainage to a well system or a drainage blanket with longitudinal drains. Codes for each type of subsurface drainage are provided on data sheet 2. A code and space are provided for describing another type of subsurface drainage if different from those listed on data sheet 2.

Shoulder Data (Items 5 through 10): Spaces are provided to enter data describing both the outside and inside shoulder. If there are no inside shoulders, enter "N" for those spaces pertaining to inside shoulders.

> *Shoulder Surface Type (Item 5)*: A code indicating the type of material used for the surface of the shoulder for the outside and inside shoulders. Codes are provided on data sheet 2. If the full width of the shoulder is only partially paved, enter the code for the material used in the paved portion of the shoulder.
>
> *Total Width (Item 6)*: The total paved and unpaved width of the outside shoulder. A separate space is provided for the total paved and unpaved width of the inside shoulder to the nearest whole number of feet.
>
> *Paved Width (Item 7)*: The paved widths of the outside and inside shoulders to the nearest whole number of feet.
>
> *Shoulder Base Type (Item 8)*: Codes identifying the types of material used as the base of the pavement structure on the shoulders. See appendix A, table A.5 for codes.
>
> *Shoulder Surface Thickness (Item 9)*: The average thicknesses of the inside and outside shoulder surfaces to the nearest tenth of an inch (0.1 inch) (2.54 millimeters (mm)).
>
> *Shoulder Base Thickness (Item 10)*: The average base thicknesses along the shoulders to the nearest tenth of an inch (0.1 inch) (2.54 mm).

Additional Data for PCC Shoulders (Items 11 through 14): Spaces are provided for entering joint and reinforcing data for shoulders with PCC surfaces.

> *Average Joint Spacing (Item 11)*: Average distance between joints for PCC shoulders to the nearest whole foot.
>
> *Skewness of Joints (Item 12)*: The average distance in feet of the contraction joint from a normal right-angled joint at the opposite side of the shoulder. This is measured in feet to the nearest tenth of a foot (0.1 ft) (0.305 m).
>
> *Joints Match Pavement Joints? (Item 13)*: Codes are provided on data sheet 2 to indicate whether the joints in the shoulder have been constructed to match the spacing of the joints in the adjacent pavement slabs.
>
> *Reinforced? (Item 14)*: Codes are provided on data sheet 2 to indicate whether the PCC shoulder slab has reinforcing steel.

Diameter of Longitudinal Drainpipes (Item 15): The inside diameter to the nearest tenth of an inch (0.1 inch) (2.54 mm) of the longitudinal drainpipes used for subsurface drainage. If there is no longitudinal drainage, enter "N."

Spacing of Laterals (Item 16): The average spacing in feet between lateral drains from the pavement subdrainage system. Enter "N" if there are no subdrainage laterals.

2.2.4 Layer Descriptions (Sheet 3)

The data on this form provide key information as to the structure of the pavement at the time it is admitted to study in the LTPP program. This data sheet is to be completed from project records for each test section or project for which LTM is planned. As all subsequent data sheets refer back to this one, special care should be taken in completing it.

Individual data elements are:

Layer Numbers: Nine or fewer layers may be identified. Layer numbering begins at the bottom of the structure and increases moving to the top of the structure. Therefore, the subgrade is always layer number 1, and the last (and largest) number identifies the surface layer.

Layer Description: A layer description code identifying the function of the layer within the pavement structure is to be entered for each of the layers in the system. Codes are provided on data sheet 3. For hot-mix asphalt concrete (HMAC) layers, separate lifts of the same mixture are not to be identified as separate layers. Where HMAC is used as a base for PCC pavement, it should be described by code 05.

Many highway agencies cover poor subgrade soils with 0.3 to 1 m (1 to 3 ft) of select material. Such an embankment should be reported as a subbase with a layer description code 06.

Material Type Classification: A code identifying the type of material used in each layer of the pavement structure, including the subgrade, should be entered for material type classification. Codes for surfacing materials, base and subbase materials, subgrade soils, and thin seals and interlayers are identified in appendix A in tables A.4, A.5, A.6, and A.7, respectively. Embankment fill (layer description code 11) refers to nonselect or select fill greater than 1 m (3 ft) thick used to build up the roadbed, and appropriate codes are to be used to identify the materials.

Layer Thickness: Four numbers can be provided to indicate the mean, minimum, maximum, and standard deviation of thickness for each specific layer in inches. Enter to the nearest tenth of an inch (0.1 inch) (2.54 mm). If only a single specified design value for thickness is available from project records, enter it as the "mean value." (Detailed data is not to be filled out on subsequent data sheets for seal coats, interlayers, porous friction courses, or HMAC layers that are 19 mm (0.75 inch) thick or less.)

Layer Type: A letter code that helps identify the set of data sheets that must be completed for a particular layer. This data item is meant to be used purely for the convenience of the person(s) filling out the data forms to avoid potential confusion over which data sheets are required for a given project. Layer type codes and the required sheets for each layer type are shown in note 4 on the data sheet.

Depth Below Surface to "Rigid" Layer: A number should be entered to indicate the mean depth from the pavement surface to the top of a relatively rigid rock, stone, or dense shale formation. Enter to nearest tenth of a foot (0.1 ft) (0.305 m). If such a formation does not exist, enter "N" in the space provided. If such a layer has not been encountered at the depths bored, or it is not known whether it exists, enter a "U" for unknown.

2.2.5 Age and Major Pavement Improvements (Sheet 4)

This data sheet provides information regarding dates of construction for the primary pavement structure and any major improvements or rehabilitation that has occurred since that construction. This sheet is to be completed from project records for each test section or project for which LTM is planned.

Individual data elements are:

Date of Latest (Re)Construction (Item 1): Month and year in which construction or reconstruction (if any, not including overlay or mill and overlay) of the pavement to be monitored was completed. The first two digits represent the numerical sequence of the month as it occurs during the year, and the remaining four digits are the year.

Date Subsequently Opened to Traffic (Item 2): The month and year that the pavement originally was opened to traffic (not the date when the project was accepted). The first two digits represent the numerical sequence of the month as it occurs during the year, and the remaining four digits are the year.

Latest (Re)Construction Cost per Lane-Mile (Item 3): The total average original construction or reconstruction cost in thousands of dollars per lane-mile for the project that includes the test section exclusive of nonpavement costs such as bridges, culverts, lighting, and guard rails. This cost is to be reported as a cost indexed to the year reported in the data entry for "Date of Latest (Re)Construction."

Major Improvements Since Latest (Re)Construction (Items 4 through 8): Space is provided for identifying six major improvement activities by the year in which they were accomplished. This does not include bridges, culverts, lighting, etc. Major improvements do include overlays and associated pretreatments (patching, milling, joint repair, etc.), inlays (mill and fill), pressure relief joints in PCC pavements, subsealing or undersealing, retrofitted subdrainage, joint load transfer restoration, and shoulder restoration.

Year (Item 4): The year in which the major improvement was constructed.

Work Type Code (Item 5): A code to identify the type of maintenance work performed. Codes are provided in appendix A, table A.16.

Work Quantity (Item 6): The quantity of work applied to the section in appropriate units (refer to appendix A, table A.16 for determining appropriate units).

Thickness (Item 7): For improvements that increase the thickness of the pavement structure (such as "surface treatment, single layer" or "surface treatment, double layer," etc.), enter the thickness of the improvement to the nearest tenth of an inch (0.1 inch) (2.54 mm).

Total Cost (Item 8): The cost for the major improvements, exclusive of nonpavement costs, reported in thousands of dollars per lane-mile.

Additional Roadway Widening Information (Items 9 through 12): The following data items are applicable only if the roadway has been widened.

Year when Roadway Widened (Item 9): The year when the roadway was widened. If the roadway has not been widened, enter "N."

Original Number of Lanes (Item 10): The original number of lanes in the survey direction before roadway widening. If the roadway has not been widened, enter "N."

Final Number of Lanes (Item 11): The final number of lanes after the roadway has been widened. If the roadway has not been widened, enter "N."

Lane Number of Lane Added (Item 12): Lane number added when roadway has been widened. The outside lane is lane 1; the next lane is lane 2, etc. If the roadway has not been widened, enter "N."

2.2.6 Portland Cement Concrete Layers, Joint Data (Sheet 5)

This sheet provides information regarding the contraction joints in the PCC pavement as well as any expansion joints in the section. The sheet is completed from project records for each PCC layer identified on sheet 3, except for continuously reinforced concrete pavements (CRCP) without joints. Where dowels or other mechanical load transfer devices are not provided at joints, enter "N" in the spaces for describing these devices.

Individual data elements are:

Layer Number (Item 1): The number of the PCC layer for which a description is provided (from sheet 3).

Average Contraction Joint Spacing (Item 2): The average spacing in feet (to the nearest tenth of a foot (0.1 ft) (0.305 m) between consecutive contraction joints (length of the concrete slab) of the pavement under survey. A space is provided to write in a description of any *Random Joint Spacing (Item 3)*.

Built-in Expansion Joint Spacing (Item 4): The mean spacing in feet between consecutive expansion joints of the pavement under survey. If there are no expansion joints in the original construction, enter "N."

Skewness of Joints (Item 5): The average distance in feet of the contraction joint from a normal right-angled joint at the opposite side of the lane. This is measured in feet to the nearest tenth (0.1 ft) (0.305 m). If joints are not skewed, enter "N."

Transverse Contraction Joint Load Transfer System (Item 6): The mechanism by which a portion of the moving load is transferred across the transverse contraction joint to the adjacent slab. A space is provided to write in a description of another load transfer system if different from those for which codes are provided on data sheet 5. Where dowels or other mechanical load transfer devices are not provided at joints, enter "N" in the spaces for describing these devices.

Round Dowel Diameter (Item 7): The outer diameter of the round dowel bars used as the load transfer device across a contraction joint of the pavement under survey, assuming that round dowel bars are used as the joint load transfer system. This number is to be entered to the nearest hundredth of an inch (0.01 inch) (0.254 mm). If round dowel bars are not used, enter "N."

Dowel or Mechanical Load Transfer Device Spacing (Item 8): The average center-to-center distance in inches between mechanical load transfer devices (round or I-beam dowels, star lugs, etc.) across the contraction joint of the PCC layer being described.

Average Intermediate Sawed Joint Spacing (Item 9): The average distance between joints sawed at intervals between contraction joints (called "warping joints" by some SHAs). The distance is to be entered to the nearest tenth of a foot (0.1 ft) (0.305 m). If no intermediate sawed joints are provided, enter "N."

Dimensions for I-Beam Dowel Bars (Items 10 and 11): The height and width of I-beam dowel bars to the nearest hundredth of an inch (0.01 inch) (0.254 mm) assuming that I-beam dowel bars are used as the joint load transfer system. If I-beam dowel bars are not used, enter "N."

Distance of Nearest Dowel (or Mechanical Load Transfer Device) from Outside Lane-Shoulder Edge (Item 12): The distance between the outside lane-shoulder edge and the dowel or mechanical load transfer device nearest to the outside lane-shoulder edge to a tenth of an inch (0.1 inch) (2.54 mm).

Dowel Length (Item 13): The mean length in inches of the round or I-beam dowel bars used for mechanical load transfer across contraction joints in the PCC layer being described.

Dowel Coating (Item 14): The material covering the dowel bar surfaces when installed in the concrete slab. A space is provided to write in a description if the dowel coating used differs from those for which codes are provided on data sheet 5.

Method Used to Install Mechanical Load Transfer Devices (Item 15): A code identifying the method used to install the dowels, I-beams, or other mechanical load transfer device. Space is provided for describing another method if the method used differs from those for which codes are provided on data sheet 5.

2.2.7 Portland Cement Concrete Layers, Joint Data (Continued) (Sheet 6)

This sheet is for continuation of sheet 5 to provide additional information on the joints in a PCC layer, and is filled out for each PCC layer identified on sheet 3, except for CRCP pavements without joints. These additional data items are described below.

Layer Number (Item 1): The number of the PCC layer for which a description is being provided (from sheet 3).

Method Used to Form Transverse Joints (Item 2): A code as defined on sheet 6 is entered that describes whether the contraction joints have been constructed by sawing the hardened slab at the proper time, by placing an insert into the slab surface while the concrete was plastic, or by any other construction method used to form the joint. Space is provided for describing another method if none of the other codes provided on sheet 6 are applicable.

Type of Longitudinal Joint (Item 3): A code as defined on sheet 6 is entered that indicates how the longitudinal joint between the lanes was formed. Space is provided for describing another way of forming the joints if none of the other codes provided on sheet 6 are applicable.

Type of Shoulder-Traffic Lane Joint (Item 4): A code is entered, as provided on data sheet 6, that describes how the joint between the concrete shoulder and the traffic lane was formed. “Tied concrete curb” indicates that a curb is provided in lieu of a shoulder. Space is provided for describing another way of forming the joints if none of those for which codes are provided has been used.

Transverse Joint Sealant Type (Item 5): A code provided on data sheet 6 defines the type of material used as joint sealant in the transverse joints. Space is provided for describing another type of sealant if none of the other codes provided on data sheet 6 is used.

Transverse Joint Sealant Reservoir (Items 6 and 7): The mean as-constructed width and depth of the transverse joint sealant reservoir to the nearest hundredth of an inch (0.01 inch) (0.254 mm).

Longitudinal Joint Sealant Reservoir (Items 8 and 9): The average width and depth of the as-built longitudinal joint sealant reservoir to the nearest hundredth of an inch (0.01 inch) (0.254 mm). If butt or keyed joints have been used without a sealant reservoir, enter “0.00” in both of the spaces provided.

Between Lane Tie Bar (Items 10, 11, and 12): The nominal diameter to the nearest hundredth of an inch (0.01 inch) (0.254 mm) and the mean length in inches of the tie bars used across the longitudinal joints between the lanes entered to the nearest hundredth of an inch (0.01 inch) (0.254 mm). The mean center-to-center spacing between consecutive tie bars across the longitudinal joint between the lanes to the nearest tenth of an inch (0.1 inch) (2.54 mm).

Shoulder-Traffic Lane Joint Sealant Reservoir (Items 13 and 14): The average width and depth of the as-built joint sealant reservoir between the shoulder and traffic lane. If butt or keyed joints are used without a sealant reservoir, enter “0.00” in both of the spaces provided.

Shoulder-Traffic Lane Joint Tie Bars (Items 15, 16, and 17): The outer diameter of the tie bars used across the joint between the shoulder and the traffic lane to the nearest hundredth of an inch (0.01 inch) (0.254 mm), the mean length of the tie bars to the nearest inch (1.0 inch) (25.4 mm), and the average center-to-center distance (spacing) in inches between consecutive tie bars across the concrete shoulder-traffic lane joint. If no concrete shoulder exists, enter “N” for these data entry spaces.

2.2.8 Portland Cement Concrete Layers, Reinforcing Steel Data (Sheet 7)

This data sheet provides a description of the type of reinforcement used in the PCC layer. It is filled out from project records for each reinforced PCC layer identified on sheet 3.

Individual data elements are:

Layer Number (Item 1): The number of the reinforced PCC layer for which a description is being provided (from sheet 3).

Type of Reinforcing (Item 2): The type of material used in reinforcing the PCC layer being described. A space is provided for entering a written description of a reinforcing type other than deformed bars or welded wire fabric as coded on data sheet 7.

Transverse Bar Diameter (Item 3): The nominal diameter of the transverse bars to the nearest hundredth of an inch (0.01 inch) (0.254 mm).

Transverse Bar Spacing (Item 4): The mean center-to-center spacing between transverse bars to the nearest tenth of an inch (0.1 inch) (2.54 mm).

Longitudinal Bar Diameter (Item 5): The nominal diameter of the longitudinal bars to the nearest hundredth of an inch (0.01 inch) (0.254 mm).

Design Percentage of Longitudinal Steel (Item 6): The percentage of reinforcing steel relative to the PCC cross section as required by the design to the nearest hundredth of one percent (0.01 percent).

Depth to Reinforcement from Slab Surface (Item 7): The mean depth, to the nearest tenth of an inch (0.1 inch) (2.54 mm), of the concrete cover over the top of the reinforcing steel.

Longitudinal Bar Spacing (Item 8): The mean center-to-center spacing between longitudinal bars to the nearest tenth of an inch (0.1 inch) (2.54 mm).

Yield Strength of Reinforcing (Item 9): The mean yield strength of the reinforcing steel to the nearest tenth of a kip per square inch (0.1 ksi (7 kg/cm^2)). If tests have not been conducted for the steel used, enter the minimum yield strength allowed for the grade of steel used.

Method Used to Place Reinforcement (Item 10): The method used to install the reinforcing steel bars or wire fabric during pavement construction. Codes are provided on data sheet 7 for these methods including presetting the reinforcement on chairs, placing it mechanically by means of special equipment used for that purpose, or placing it between layers of concrete. A space is also provided to describe another method of placement if a code is not provided on data sheet 7 for the method used.

Lap Length of Longitudinal Steel Splices (Item 11): The length to the nearest inch (1.0 inch) (25.4 mm) of the longitudinal reinforcing steel overlap at a CRCP construction joint. If the rigid pavement is not CRCP, enter "N."

2.2.9 Portland Cement Concrete Layers, Mixture Data (Sheet 8)

This data sheet provides information regarding the mixture proportions used for the PCC layer. It is to be filled out from project records for each PCC layer identified on sheet 3.

Individual data elements are:

Layer Number (Item 1): The number of the PCC layer from sheet 3 for which a description is provided.

Mix Design (Items 2 through 5): The oven dry weights in pounds of coarse aggregate, fine aggregate, and cement; and the weight of water provided by the mix design for a cubic yard of concrete.

Type Cement Used (Item 6): The type of cement used in the slab concrete. These cement type codes appear in appendix A, table A.10. Additionally, if none of the codes provided are applicable to the type used, space is provided for identifying another type.

Alkali Content of Cement (Item 7): The alkali content of the cement to the nearest tenth of a percent (0.1 percent).

Entrained Air Content (Items 8 through 10): The mean, minimum, and maximum values of entrained air (as a percent of mixture volume) as measured during construction to the nearest tenth of a percent (0.1 percent). Any of the following test methods may be used to measure the amount of entrained air: American Association of State Highway and Transportation Officials (AASHTO) T121, American Society for Testing and Materials (ASTM) C138, AASHTO T152 (ASTM C231), or AASHTO T196 (ASTM C173).

Admixtures (Items 11 through 13): The types and amounts, in percent by weight of cement to the nearest thousandth (0.001 percent), of admixtures used in the concrete. The codes for concrete admixture types appear in appendix A, table A.11, and space is provided for identifying an admixture type for which a code is not provided.

Slump (Items 14 through 18): The mean of the slump measurements made for quality control purposes during construction of the PCC layer. In addition, space is provided for the maximum and minimum values and the standard deviation from the mean, all to the nearest tenth of an inch (0.1 inch) (2.54 mm). Space is also provided for the number of tests from which the values are obtained. The slump test is described in AASHTO T119 (ASTM C143). The maximum, minimum, and standard deviation of slump should be left blank if only one test result is available.

2.2.10 Portland Cement Concrete Layers, Mixture Data (Continued) (Sheet 9)

This data sheet is a continuation of the information provided on sheet 8 and is filled out from project records for each PCC layer identified on sheet 3.

Individual data elements are:

Layer Number (Item 1): The number of the PCC layer for which a description is provided (from sheet 3).

Composition of Coarse Aggregate (Items 2 through 4): The types and percentages by weight of coarse aggregate materials (that portion of an aggregate retained on the No. 4 (4.75-mm) sieve as defined by the Portland Cement Association (PCA)) for up to three separate materials in the coarse aggregate used in the concrete mix. Codes are provided on data sheet 9 for various types of aggregate. Space also is provided for the description of another type if none of the types for which codes are provided are used. Where only one type of material was used, enter its type code and 100 in the top set of data spaces, leaving the others blank.

Geologic Classification of Coarse Aggregate (Item 5): The geologic classification of the natural stone used as coarse aggregate in the concrete. These codes appear in appendix A, table A.8, and provide identification as to which of the three major classes of rock the coarse aggregate belongs, and the type of rock within those classes. If a blend is used, enter the code for the geological classification for the material representing the majority of the coarse aggregate. If a crushed slag, manufactured lightweight, or recycled concrete is used as coarse aggregate, enter "N."

Composition of Fine Aggregate (Items 6 through 8): The types and percentages by weight of fine aggregate materials (passing the No. 4 (4.75-mm) sieve and retained on the No. 200 (75-µm) sieve) for up to three separate fine aggregates used in the concrete mix. Codes are provided on data sheet 9 for various types of fine aggregate. Space is provided for identifying another type if none of those for which codes are provided are used. Where only one type of material was used, enter its type code and 100 in the top set of data spaces, leaving the others blank.

Insoluble Residue (Item 9): The percentage of insoluble residue (noncarbonate material) as determined using ASTM D3042.

Gradation of Coarse Aggregate (Item 10): The percent of coarse aggregate passing various standard sieve sizes to the nearest one percent (1.0 percent). It is not expected that values will be available for all of the sieve sizes shown. The objective is to provide space for a sufficient number of sieve sizes to accommodate testing and specification practices for most agencies.

Gradation of Fine Aggregate (Item 11): The percent of fine aggregate passing various standard sieve sizes to the nearest one percent (1.0 percent). It is not expected that values will be available for all sieve sizes shown. The objective is to provide space for a sufficient number of sieve sizes to accommodate testing and specification practices for most agencies.

Bulk Specific Gravities (Items 12 and 13): The mean bulk specific gravities, to the nearest thousandth (0.001), for coarse aggregate and fine aggregate. The bulk specific gravities for the aggregate fractions are measured using these laboratory procedures: 1) coarse aggregate—AASHTO T85 (ASTM C127), and 2) fine aggregate—AASHTO T84 (ASTM C128).

2.2.11 Portland Cement Concrete Layers, Mixture Data (Continued) (Sheet 10)

This data sheet is for continuation of the data on sheets 8 and 9, and is completed for each PCC layer identified on sheet 3. These additional data entries are discussed below.

Layer Number (Item 1): The number of the PCC layer for which a description is provided (from sheet 3).

Type of Paver Used (Item 2): A code to indicate whether a slip-form or side-form paver has been used to place the concrete. The codes appear on the data sheet along with a space to describe a different type not listed. Enter "N" if a paver has not been used (i.e., roller compacted concrete).

Aggregate Durability Test Results (Items 3 through 6): The type of tests used for evaluating the durability of the aggregate and the results in tenths (0.1) recorded in units specified for the particular test. Three of these sets are for coarse aggregates, and one is for the combination of coarse and fine aggregates. The durability test type codes and the units for reporting appear in appendix A, table A.12.

Method Used to Cure Concrete (Item 7): The method used to cure the concrete pavement. Codes are provided on data sheet 10 for various methods. Space is provided for identifying another curing method if none of those with codes listed has been used.

Method Used to Texture Concrete (Item 8): A code to indicate how the concrete surface has been textured. Codes are provided on data sheet 10 for various methods. Space is provided for identifying another texturing method if none of those with codes has been used.

Elastic Modulus (Items 9 through 13): The mean, minimum, maximum, and standard deviation of elastic moduli of the concrete in kips per square inch and the number of tests performed. The elastic moduli are obtained either through compression testing of cylindrical samples collected and tested during construction, or through relationships published by the American Concrete Institute (ACI) and others relating elastic modulus to compressive strength. In the event that only one test result is available, enter it as the "mean value." The standard deviation is to be left blank unless at least four test results are available. The ACI formula in general use (ACI 318–83, section 8.5) is:

$$E_C = 57{,}000\sqrt{f_C} \tag{1}$$

where:

E_C = Modulus of elasticity, psi
f_C = 28-day compressive strength, psi

Method for Determination of Elastic Modulus (Item 14): The test method for measuring the elastic modulus of the mix; ASTM test method C469 (drilled core specimens), ASTM C469 (molded cylinders), ACI (equation 1 above), or some other test procedure as indicated in the space provided. Codes are provided for these methods on data sheet 10.

2.2.12 Portland Cement Concrete Layers, Strength Data (Sheet 11)

This data sheet is used to provide strength data on cylinders or beams molded from plastic concrete during construction, and is to be completed for each PCC layer identified on sheet 3. These data entries are discussed below.

> *Layer Number (Item 1)*: The number of the PCC layer for which a description is provided (from sheet 3).
>
> *Flexural Strength (Items 2 through 8)*: The type of test (third-point or center-point loading as coded on sheet 11), the age of the sample at testing, the number of tests performed, and the mean, minimum, maximum, and standard deviation of flexural strength tests, in psi. Testing for LTPP test sections built after 1988 should be done using third-point loading (AASHTO T97 (ASTM C78)).
>
> *Compressive Strength (Items 9 through 14)*: The age of the sample at testing, the number of tests performed, and the mean, minimum, maximum, and standard deviation of compressive strength in psi, measured according to the test procedures as established by AASHTO T22 (ASTM C39).
>
> *Splitting Tensile Strength (Items 15 through 20)*: The age of the sample at testing, the number of tests, and the mean, minimum, maximum, and standard deviation of splitting tensile strength in psi, measured according to AASHTO T198 (ASTM C496).

2.2.13 Plant Mixed Asphalt Bound Layers, Aggregate Properties (Sheet 12)

This sheet is filled out from project records for each AC layer identified on sheet 3 that is thicker than 19 mm (0.75 inches). Detailed mixture data is not considered necessary for thin seal coats, porous friction treatments, etc. Although various SHAs discriminate between fine and coarse aggregates on the basis of different sieve sizes, the following definition is applied for LTPP studies: All aggregate retained on the No. 8 (2.36-mm) sieve is coarse aggregate as defined by the Asphalt Institute and all aggregate passing the No. 8 (2.36-mm) sieve is fine aggregate. "Mineral filler" as used in the LTPP program is defined by ASTM D242 as that portion passing the No. 30 (0.600-mm) sieve. At least 95 percent must pass the No. 50 (0.300-mm) sieve, and at least 70 percent must also pass the No. 200 (75-µm) sieve.

Individual data elements are:

> *Layer Number (Item 1)*: The number of the AC layer for which a description is provided (from sheet 3).
>
> *Composition of Coarse Aggregate (Items 2 through 4)*: The type and percentage by weight of materials in the coarse aggregate (aggregate retained on the No. 8 (2.36-mm) sieve) for up to three types of aggregate used in the AC mix. Codes for identifying the type are provided on sheet 12. Space is provided for identifying a type of coarse

aggregate other than those with codes. Where only one type of material is used, enter the type code and 100 in the top set of data spaces, leaving the others blank.

Geologic Classification of Coarse Aggregate (Item 5): The geologic classification of the natural stone used as coarse aggregate (aggregate retained on the No. 8 (2.36-mm) sieve) in the AC. These codes appear in appendix A, table A.8, and help identify to which of the three major classes of rock the coarse aggregate belongs and the type of rock within those classes. If a blend is used, enter the code for the geological classification for the material representing the majority of the coarse aggregate. If a crushed slag, manufactured lightweight, or recycled concrete is used as coarse aggregate, enter “N.”

Composition of Fine Aggregate (Items 6 through 8): The type and percentage by weight of materials in the fine aggregate (passing the No. 8 (2.36-mm) sieve and retained on the No. 200 (75-µm) sieve) for up to three types of aggregate used in the AC mix. Space is provided for identifying another type if none of those for which codes are provided on sheet 12 is used. Where only one type of material is used, enter its type code and 100 in the top set of data spaces, leaving the others blank.

Type of Mineral Filler (Item 9): The type of mineral filler used in the AC mix. The codes appear on the data sheet, including space for entering some other type for which a code is not provided.

Aggregate Durability Test Results (Items 10 through 13): The type of tests used to evaluate the durability of the aggregate and the results in tenths recorded in units specified for the test. Three of these sets are for coarse, and one is for the combination of coarse and fine aggregates. The durability test type codes appear in appendix A, table A.12.

Polish Value of Coarse Aggregates (Item 14): The accelerated polish value of the coarse aggregates used in the surface layer, as determined by AASHTO T279 (ASTM D3319).

2.2.14 Plant Mixed Asphalt Bound Layers, Aggregate Properties (Continued) (Sheet 13)

This data sheet is a continuation of the aggregate property data on sheet 12, and is filled out for each AC layer identified on sheet 3 that is thicker than 19 mm (0.75 inches). These additional data items are described below.

Layer Number (Item 1): The number of the AC layer for which a description is provided (from sheet 3).

Gradation of Combined Aggregates (Item 2): The percent passing on various standard sieve sizes, to the nearest one percent (1.0 percent). It is not expected that values will be available for all 18 sieve sizes; the objective is to provide space for a sufficient number of sieve sizes to accommodate testing and specification practices for most agencies.

Bulk Specific Gravities (Items 3 through 6): The mean bulk specific gravities (to the nearest thousandth—0.001) for coarse aggregate (aggregate retained on the No. 8 (2.36-mm) sieve), fine aggregate (aggregate passing the No. 8 (2.36-mm) sieve and retained on the No. 200 (75-µm) sieve), mineral filler, and the value for the combined aggregate. The bulk specific gravities for the aggregate fractions are measured using the laboratory procedures indicated below:

- Coarse aggregate—AASHTO T85 (ASTM C127)
- Fine aggregate—AASHTO T84 (ASTM C128)
- Mineral filler—AASHTO T100 (ASTM D854)

The bulk specific gravity of the combined aggregate (usually called simply "bulk specific gravity of aggregate") is calculated using equation 2 below.

$$G_{sb} = \frac{P_1 + P_2 + P_3}{\frac{P_1}{G_1} + \frac{P_2}{G_2} + \frac{P_3}{G_3}} \qquad (2)$$

where:

G_{sb}	=	Bulk specific gravity for the total aggregate
P_1, P_2, P_3	=	Percentages of weight of coarse aggregate, fine aggregate, and mineral filler
G_1, G_2, G_3	=	Specific gravities of coarse aggregate, fine aggregate, and mineral filler

Effective Specific Gravity of Aggregate Combination (Item 7): The mean calculated effective specific gravity to the nearest thousandth (0.001). This calculation requires the maximum specific gravity (no air voids) of the paving mixture, which is obtained by test method AASHTO T209 or ASTM D2041. The effective specific gravity of the aggregate is calculated as shown in equation 3 below.

$$G_{se} = \frac{100 - P_b}{\frac{100}{G_{mm}} - \frac{P_b}{G_b}} \qquad (3)$$

where:

G_{se}	=	Effective specific gravity of aggregate
P_b	=	Asphalt cement, percent by total weight of mixture
G_b	=	Specific gravity of asphalt
G_{mm}	=	Maximum specific gravity of paving mixtures (no air voids)

2.2.15 Plant Mixed Asphalt Bound Layers, Asphalt Cement Properties (Sheet 14)

This data sheet provides information regarding the properties of the asphalt cement used in the AC mixture. This sheet is filled out from project records for each AC layer identified on sheet 3 that is thicker than 19 mm (0.75 inches).

Individual data elements are:

Layer Number (Item 1): The number of the AC layer described on this sheet (from sheet 3).

Asphalt Grade (Item 2): The grade of asphalt cement used (see appendix A, table A.15). Space is provided on the data sheet for identifying another grade of asphalt cement not appearing in table A.15.

Source (Item 3): The source refinery for the asphalt cement used in the AC layer being described. A list of asphalt refiners and processors is provided in appendix A, table A.13. Space is provided to specify other sources that may not be included in the table provided.

Specific Gravity of Asphalt Cement (Item 4): The mean specific gravity of the asphalt cement (to the nearest thousandth—0.001) when it is available. If the precise value for that material is unavailable, a typical specific gravity for asphalt cements produced at the source refinery may be entered. If the source refinery is unknown, enter 1.010 as a reasonable estimate. This specific gravity is measured as specified by AASHTO T228 (ASTM D70).

Original Asphalt Cement Properties (Items 5 through 7): The following data items should be provided when available for the original asphalt cement, tested before its use in the construction.

Viscosity of Asphalt at 140 °F (60 °C) (Item 5): The results, in poises, for absolute viscosity testing using test method AASHTO T202 (ASTM D2171) on samples of the original asphalt cement before its use in construction of the pavement section.

Viscosity of Asphalt at 275 °F (135 °C) (Item 6): The results to the nearest hundredth centistokes (0.01 centistokes) for kinematic viscosity testing using test method AASHTO T201 (ASTM D2170) on samples of the original asphalt cement.

Penetration at 77 °F (25 °C) (Item 7): The penetration, in tenths of a millimeter (0.1 mm (0.039 inch)), from testing the original asphalt cement in the mixture at 77 °F (25 °C), using a 100-gram load and a 5-second load duration with test method AASHTO T49 (ASTM D5) on samples of the original asphalt cement material.

Type and Quantity of Asphalt Modifiers (Items 8 and 9): Codes to identify up to two modifiers added to the asphalt cement for whatever purpose. A list of possible asphalt cement modifiers and codes for data entry are provided in appendix A, table A.14. If a material other than those listed in table A.14 is used, space is provided to record the pertinent information. If no modifier is used, enter "N." Enter the quantity of asphalt modifier in percent by weight of asphalt cement. Some modifiers (such as lime) may be specified in terms of percent of aggregate weight, but they must be converted to percent by weight of asphalt cement for uniformity. Space is provided for up to two types of modifiers. If no modifier is used, enter "N."

Ductility at 77 °F (25 °C) (Item 10): The ductility in centimeters of the original asphalt cement material as measured by test method AASHTO T51 (ASTM D113) at 77 °F (25 °C).

Ductility at 39.2 °F (4 °C) (Item 11): The ductility in centimeters of the original asphalt cement material at 39.2 °F (4 °C), using the procedures of test method AASHTO T51 (ASTM D113).

Test Rate for Ductility Measurement at 39.2 °F (4 °C) (Item 12): The test speed in centimeters per minute (0.1 cm/min) for the ductility measurement taken at 39.2 °F (4 °C).

Penetration at 39.2 °F (4 °C) (Item 13): The penetration value at 39.2 °F (4 °C) using a 200-gram weight and 60-second loading duration, tested in accordance with test method AASHTO T49 (ASTM D5) on samples of the original asphalt cement, before its use as a construction material.

Ring and Ball Softening Point (Item 14): The softening point of the asphalt cement in degrees Fahrenheit as measured with the ring-ball apparatus used in test method AASHTO T53 (ASTM D36), on samples of the original asphalt cement before its use as a construction material.

2.2.16 Plant Mixed Asphalt Bound Layers, Asphalt Cement Properties (Continued) (Sheet 15)

This data sheet is for continuation of the data on sheet 14, and is filled out for each AC layer identified on sheet 3 that is thicker than 19 mm (0.75 inches).

These additional data entries are discussed below.

Layer Number (Item 1): The number of the AC layer for which data are provided (from sheet 3).

Laboratory Aged Asphalt Cement Properties (Items 2 through 11): The following data items should be provided for laboratory aged asphalt cement samples, using virgin asphalt cement samples aged in accordance with the provisions of test method AASHTO

T179 (ASTM D1754—Thin Film Oven Test) or test method AASHTO T240 (ASTM D2872—Rolling Thin Film Oven Test). Space is provided on the data sheet to describe the aging process used, if other than those stated above.

Test Procedure Used to Measure Aging Effects (Item 2): The test procedure used to age the asphalt cement in the laboratory, and to measure the effects of the aging. Codes to indicate the procedure are provided on data sheet 15.

Viscosity of Asphalt at 140 °F (60 °C) (Item 3): The mean of the results in poises from absolute viscosity testing on laboratory aged asphalt cement samples using test method AASHTO T202 (ASTM D2171).

Viscosity of Asphalt at 275 °F (135 °C) (Item 4): The mean of the results in centistokes, to the nearest hundredth (0.01), from kinematic viscosity testing using test method AASHTO T201 (ASTM D2170) on laboratory aged asphalt cement samples.

Ductility at 77 °F (25 °C) (Item 5): The mean ductility in centimeters at 77 °F (25 °C) as measured by test method AASHTO T51 (ASTM D113) on laboratory aged samples of the asphalt cement.

Ductility at 39.2 °F (4 °C) (Item 6): The mean ductility in centimeters of laboratory aged asphalt specimens at 39.2 °F (4 °C), using the procedures of test method AASHTO T51 (ASTM D113).

Test Rate for Ductility Measurement at 39.2 °F (4 °C) (Item 7): The test rate to the nearest tenth of a centimeter per minute (0.1 cm/min) for the ductility test performed at 39.2 °F (4 °C).

Penetration at 77 °F (25 °C) (Item 8): The mean penetration in tenths of millimeters (0.1 mm) from testing the laboratory aged asphalt cement used in the mixture at 77 °F (25 °C), using a 100-gram load and a 5-second load duration, in accordance with test method AASHTO T49 (ASTM D5).

Penetration at 39.2 °F (4 °C) (Item 9): The results in mean penetration in tenths of millimeters (0.1 mm) from testing the laboratory aged asphalt cement used in the mixture at 39.2 °F (4 °C), using a 200-gram load and 60-second load duration, in accordance with test method AASHTO T49 (ASTM D5).

Ring and Ball Softening Point (Item 10): The mean of the results in degrees Fahrenheit from the ring and ball softening point test for bitumen (AASHTO T53 (ASTM D36)) conducted on laboratory aged asphalt cement samples.

Weight Loss (Item 11): The mean weight loss resulting from the laboratory aging process to the nearest one-tenth of one percent (0.1 percent).

2.2.17 Plant Mixed Asphalt Bound Layers, Original Mixture Properties (Sheet 16)

The data on this sheet are derived from tests conducted on the mixture during or soon after construction. These values should represent the as-constructed values for the AC layer. Calculations for calculated values (i.e., percent air voids) should be made separately for individual samples, using data applicable to those samples. This data sheet is filled out from project records for each AC layer identified on sheet 3 that is thicker than 19 mm (0.75 inches).

The test samples can be obtained through laboratory compaction after sampling in the field, or by coring, cutting, or sawing after the mixture is compacted in place. In the event that both types of samples are tested, separate data sheets are filled out for those compacted in the laboratory and those compacted in the field. Although tests are conducted on core samples from the field for LTPP (and reported on other data sheets), data from project files are entered when available.

Data elements are:

Layer Number (Item 1): The number of the AC layer described on the sheet (from sheet 3).

Type of Samples (Item 2): A code to indicate whether the test samples have been sampled in the field and compacted in the laboratory or removed from the compacted pavement. The codes appear on the data sheet.

Maximum Specific Gravity (Item 3): The theoretical maximum specific gravity (no air voids) of a mixture sampled during or soon after construction, as an average from testing of several samples according to AASHTO 209 or ASTM D2041. When possible, several samples should be tested and the average entered. The resulting maximum specific gravity and the design asphalt content for the mixture are used to calculate the effective specific gravity of aggregate using equation 3. After the effective specific gravity of the aggregate is established, it is used to calculate other maximum specific gravities for the mixture at other measured asphalt contents using equation 4 below.

$$G_{mm} = \frac{100}{\dfrac{P_s}{G_{se}} + \dfrac{P_b}{G_b}} \tag{4}$$

where:

G_{mm}	=	Maximum specific gravity of paving mixture (no air voids)
P_s	=	Aggregate, percent by total weight of mixture
P_b	=	Asphalt, percent by total weight of mixture
G_{se}	=	Effective specific gravity of aggregate
G_b	=	Specific gravity of asphalt

These other calculated values of maximum specific gravity (from equation 4) are not entered into the database, but are needed to calculate the percent air voids for measured asphalt contents for individual extractions on cores.

Bulk Specific Gravity (Items 4 through 6): The number of tests and the mean, minimum, maximum, and standard deviation of bulk specific gravities, to the nearest thousandth (0.001), of compacted mixtures measured on cores removed from the pavement during or right after construction. While the test method specified in ASTM D1188 is preferable, the results from nuclear density tests (ASTM D2950), appropriately calibrated to measurements on cores, also can be used.

Asphalt Content (Items 7 through 9): The number of samples and the mean, minimum, maximum, and standard deviation of percent by weight of the total asphalt cement (including that absorbed by the aggregate) in the AC mixture to the nearest one-tenth of a percent (0.1 percent). Asphalt contents measured by extraction tests (AASHTO T164 (ASTM D2172)) on field samples are preferred, but results from nuclear test methods may also be used. If no such test results are available, enter the specified asphalt content as the mean, and leave the other spaces blank.

Percent Air Voids (Items 10 through 12): The number of samples and the mean, minimum, maximum, and standard deviation of calculated air voids, to the nearest tenth of a percent (0.1 percent), as a percent of the material volume. This data is frequently not available, but can be calculated using other available data from reports on mix design and density measurements on samples from the pavement. Percent air voids is calculated as shown in equation 5.

$$P_a = 100 \frac{G_{mm} - G_{mb}}{G_{mm}} \tag{5}$$

where:

P_a	=	Air voids in compacted mixture, percent of total volume
G_{mm}	=	Maximum specific gravity of paving mixture (zero air voids) as determined by ASTM method D2041
G_{mb}	=	Bulk specific gravity of compacted mixture

Voids in Mineral Aggregate (Item 13): The mean void space between the aggregate particles of a compacted AC mixture, which includes air voids and the effective asphalt content, to the nearest one-tenth of a percent (0.1 percent). Percent of voids in mineral aggregate (VMA) is calculated as shown in equation 6.

$$VMA = 100 - \frac{G_{mb} P_s}{G_{sb}} \tag{6}$$

where:

VMA	=	Voids in mineral aggregate (percent of bulk volume)
G_{sb}	=	Bulk specific gravity of aggregate
G_{mb}	=	Bulk specific gravity of compacted mixture (ASTM D2726)
P_s	=	Aggregate, percent by total weight of mixture
100	=	Percent of asphalt cement by total weight of mixture

Effective Asphalt Content (Item 14): The mean effective asphalt content is the total asphalt content of the paving mixture minus the mean portion of asphalt that is lost by absorption into the aggregate particles, expressed by weight of total mixture to the nearest one-tenth of one percent (0.1 percent). The percentage of asphalt absorbed into the aggregate particles, expressed as a percentage of the weight of total mix, may be calculated as shown in equation 7.

$$P_{ab} = P_{ba} P_s = \frac{G_{se} - G_{sb}}{G_{sb} G_{se}} G_b P_s \quad (7)$$

where:

P_{ab}	=	Absorbed asphalt, percent by total weight of mixture
P_{ba}	=	Absorbed asphalt, percent by weight of aggregate
P_s	=	Aggregate, percent by total weight of mixture
G_{se}	=	Effective specific gravity of aggregate
G_{sb}	=	Bulk specific gravity of aggregate
G_b	=	Specific gravity of asphalt

Marshall Stability (Item 15): The mean Marshall stability measured on the mixture at optimum asphalt content during laboratory mix design using either test method AASHTO T245 (ASTM D1559), recorded in pounds.

Number of Blows (Item 16): The number of blows of the compaction hammer that are applied to each end of the specimen during laboratory compaction before Marshall stability and flow testing.

Marshall Flow (Item 17): The mean Marshall flow (average of measured results) as the whole number of hundredths of an inch (i.e., measure 0.15 inch—enter "15") measured by test method AASHTO T245 (ASTM D1559) for the mixture at optimum asphalt content during the laboratory mix design.

Hveem Stability (Item 18): The mean Hveem stability or "stabilometer value" as measured with the Hveem apparatus using test method AASHTO T246 (ASTM D1560).

Hveem Cohesiometer Value (Item 19): The cohesiometer value, in grams per 25-mm (1-inch) width (or diameter) of specimen, obtained by test method AASHTO T246 (ASTM D1560).

2.2.18 Plant Mixed Asphalt Bound Layers, Original Mixture Properties (Continued) (Sheet 17)

This data sheet provides for continuation of the data on sheet 16, and is filled out for each AC layer identified on sheet 3 that is thicker than 19 mm (0.75 inches).

These additional data entries are discussed below.

Layer Number (Item 1): The number of the AC layer for which a description is provided (from sheet 3).

Type Asphalt Plant (Item 2): The type of plant that produced the AC mixture. Codes are provided on the data sheet for a batch plant, a drum mix plant, or another type of plant as described by the person(s) completing the form.

Type of Antistripping Agent (Item 3): The type of antistripping agent used in the mixture. The codes are provided in appendix A, table A.20. Space is provided to identify an antistripping agent other than those shown in the table.

Antistripping Agent Liquid or Solid (Item 4): A code to indicate whether the antistripping agent used is a liquid or solid. Codes are provided on the data sheet.

Amount of Antistripping Agent (Item 5): The amount of antistripping agent used in the mixture by weight to the nearest tenth of a percent (0.1 percent) of weight of asphalt if the agent is liquid and weight of aggregate if the agent is solid.

Moisture Susceptibility Test Type (Item 6): The type of moisture susceptibility test used during the test program. Codes are provided on sheet 17. If a procedure other than those for which codes are provided was used, space is provided to specify a name or reference for the test.

Moisture Susceptibility Test Results (Items 7 through 10): The mean Hveem stability number or percent stripped and the tensile strength ratio or index of retained strength. Space is provided to record these results in varying forms, depending on the test procedure used.

2.2.19 Plant Mixed Asphalt Bound Layers, Construction Data (Sheet 18)

This sheet provides information about the construction of the AC layer. The sheet is completed from project records for each AC layer identified on sheet 3 that is thicker than 19 mm (0.75 inches).

Individual data elements are:

Layer Number (Item 1): The number of the AC layer for which the compaction data is described on this sheet (from sheet 3).

Mean Mixing Temperature (Item 2): The mean temperature of the mixture during mixing at the plant (i.e., the mix as discharged) in degrees Fahrenheit.

Laydown Temperatures (Items 3 through 5): The number of temperature measurements taken and the mean, minimum, maximum, and standard deviation of temperatures measured in degrees Fahrenheit.

Compaction Data (Items 6 through 31): Spaces are provided to enter data related to compaction of the asphalt cement.

> *Roller Data (Items 6 thru 22)*: Codes appear on the data sheet for steel-wheeled tandem, pneumatic-tired, single-drum vibratory, and double-drum vibratory rollers. For each type of roller, spaces are provided to describe significant characteristics of up to four different rollers (items 6 through 22). Steel-wheeled tandem rollers are described by their gross weights to the nearest tenth of a ton (0.1 ton). Pneumatic-tired rollers are described by their gross weight and mean tire pressure in psi. Vibratory rollers are described by their gross weight in tons to the nearest tenth (0.1 ton), frequency in vibrations per minute, amplitude in inches to the nearest thousandth (0.001 inch) (0.0254 mm), and roller speed in miles per hour (mi/h) to the nearest tenth of a mile (0.1 mi/h) (0.16 kilometers per hour (km/h)).
>
> *Description of the Roller (Items 23 thru 28)*: Spaces are provided for the description of the roller used (roller code from data sheet) and number of coverages for breakdown, intermediate, and final compactions for each lift placed. A "coverage" in this case is defined as one trip of the roller across the pavement.
>
> *Mean Air Temperature (Item 29)*: The air temperature in degrees Fahrenheit while compaction is performed. Space is provided to record data for each of up to four AC lifts.
>
> *Compacted Thick (Item 30)*: The mean thickness of the compacted lift in inches to the nearest tenth (0.1 inch) (2.54 mm). If coring is not performed, the planned thickness should be recorded. Space is provided to record data for each of up to four AC lifts.
>
> *Curing Period (Item 31)*: The mean curing period in hours before a new lift is placed or the roadway is opened to traffic. Space is provided to record data for each of up to four AC lifts.

If compaction data are unavailable, enter "U" in these spaces. If partial data are available, fill in the available data and enter a "U" where data are not available, but would be applicable. Enter "N" in spaces that are not applicable (i.e., if there was no fourth lift, enter "N" in the appropriate space). Use only the roller descriptions and codes required.

2.2.20 Unbound or Stabilized Base or Subbase Material Description (Sheet 19)

This data sheet is filled out from project records for each base or subbase layer identified on sheet 3. Note that a stabilized subgrade (treated with lime, cement, asphalt, etc.) is considered to be subbase, and entries for this layer should be made on this data sheet and the next.

Individual data elements are:

Layer Number (Item 1): The number of the base or subbase layer described on this sheet (from sheet 3).

AASHTO Soil Classification (Item 2): The AASHTO soil classification for the base or subbase material (before any stabilization). The code numbers appear in appendix A, table A.9 for the various AASHTO classifications.

Atterberg Limits (Item 3): The plasticity index (PI), liquid limit (LL), and plastic limit (PL) determined by AASHTO T90 and T89 or ASTM D4318.

Maximum Lab Dry Density (Item 4): The maximum laboratory dry density in pounds per cubic foot for the base or subbase material in the layer of interest.

Optimum Lab Moisture Content (Item 5): The optimum moisture content obtained in the laboratory to the nearest one-tenth of a percent (0.1 percent) for the base or subbase layer.

Test Used to Measure Maximum Dry Density (Item 6): The test method used to establish the maximum dry density and optimum moisture content. Codes are provided on data sheet 19 for the most commonly used test methods. Space also is provided for identifying another test method used, if different from the test methods listed.

Compactive Energy for "Other" Method (Item 7): The compactive energy in foot-pounds per cubic inch is applied if some test method was used other than those for which codes are provided under item 6. If the test method used already had a code under item 6, this space is to be left blank.

In Situ Dry Density (Items 8 through 10): The number of samples tested, and the mean, minimum, maximum, and standard deviation of field measurements of the in-place dry density in pounds per cubic foot for the base or subbase layer.

In Situ Moisture Content (Items 11 through 13): The number of samples tested, and the mean, minimum, maximum, and standard deviation of field measurements of the base or subbase in-place moisture content in percent of dry weight of the material. This moisture content data is to be based on the same tests as the dry density data in items 8 through 10.

Gradation of Base or Subbase Material (Coarse and Fine Aggregates) (Items 14 and 15): The percentage of material passing various standard sieve sizes to the nearest one percent (1.0 percent). It is not expected that values will be available for all 17 sieve sizes. The objective is to provide space for a sufficient number of sieve sizes to accommodate testing practices for most agencies.

2.2.21 Unbound or Stabilized Base or Subbase Material Description (Continued) (Sheet 20)

This data sheet is for continuation of the data on sheet 19, and is filled out for each base or subbase layer identified on sheet 3. Note that a stabilized subgrade (treated with lime, cement, asphalt, etc.) is considered to be a subbase, and entries for this layer should be made on this data sheet and the next.

These additional data entries are discussed below.

Layer Number (Item 1): The base or subbase layer for which a description is provided (from sheet 3).

Type and Percent Stabilizing Agent (for Stabilized Layers Only) (Items 2 and 3): The types of stabilizing agents and the average percent of each by dry weight of soil mixed into the base or subbase material in the layer of interest. Codes are provided on the data sheet for stabilizing agents commonly in use, and space is provided to identify an agent not listed. An average of measured percentages is used whenever available. If percentages have not been measured, the specified percentage should be entered. If neither measured nor specified data are available, but the layer is known to have been stabilized, a percentage should be estimated based on practice at the time the stabilized base or subbase layer was constructed. If only one stabilizing agent is used, leave the spaces for "Stabilizing Agent 2" blank. If the base or subbase material is not stabilized, enter "N."

Admixtures (Item 4): The type of admixture and the percent added by weight of the base or subbase material, as measured by ASTM D4373. Codes are provided on the data sheet for the type of admixture used, along with space for identifying a type other than those for which codes are provided.

Compressive Strength (Items 5 through 7): The number of tests performed and the mean, minimum, maximum, and standard deviation of the compressive strength in pounds per square inch (psi) of the stabilized or unstabilized material.

Type of Compression Test (Item 8): The type of test used to evaluate the compressive strength of the material. Codes are provided on the data sheet along with space to identify the test type if the appropriate type is not listed.

Confining Pressure (Item 9): The confining pressure applied during the compressive strength testing. If the test was unconfined, enter "0.0."

Calcium Carbonate Content (Item 10): The percent by weight of the base or subbase material that is composed of calcium carbonate, as determined by ASTM D4373.

California Bearing Ratio (CBR) (Item 11): The mean CBR-value of the material as determined by test method AASHTO T193 or ASTM D1883.

Resistance (R-Value) (Item 12): The mean *R*-value as determined by test method AASHTO T190 (ASTM D2844).

Modulus of Subgrade Reaction (k-Value) (Items 13 and 14): The mean *k*-value in psi (pounds per square inch per inch of deflection) measured at the top of the base or subbase after it is compacted in place, and the type of test used. Either the repeated load test (AASHTO T221 (ASTM D1195)) or the static load test (AASHTO T222 or ASTM D1196) may be used, and codes for these are provided on the data sheet.

2.2.22 Subgrade Data (Sheet 21)

This data sheet is for entering subgrade data from project records, and is filled out for each GPS test section or SPS project. If there are substantial variations in subgrade characteristics throughout the project, additional subgrade data sheets are provided for each subgrade type. Location information, such as station boundaries, is provided on these extra data sheets under the SHRP Section ID data item. Note that a portion of subgrade that is treated (or stabilized) with lime, cement, asphalt, or other such agents is considered a subbase layer. Its details should be reported on the other data sheets provided for bases and subbases.

As variations in soil type with depth are common (especially where a select fill has been used as an embankment), judgment is required in selecting subgrade soil samples for testing. Some considerations include: 1) relative thicknesses of soil strata that differ in general characteristics and 2) depth. Subgrade soils near the surface will generally have more of an effect on pavement performance than will soils at a greater depth.

For SPS projects, the properties of the predominant subgrade type encountered on the project should be entered on this data sheet. In cases where a known variation in the subgrade occurs during the project, this data sheet should be completed for each test section.

Individual data elements are:

AASHTO Soil Classification (Item 1): The AASHTO soil classification for the subgrade material. These codes are provided in appendix A, table A.9.

CBR (Item 2): The CBR for the subgrade soil (test method AASHTO T193 or ASTM D1883).

R-Value (Item 3): The mean resistance *R*-value as determined by test method AASHTO T190 (ASTM D2844).

k-Value (Items 4 and 5): The mean modulus of subgrade reaction in pci (pounds per square inch per inch of deflection) for the in situ subgrade, and the type of test used.

Either the repeated load test (AASHTO T221 (ASTM D1195)) or the static load test (AASHTO T222 or ASTM D1196) may be used as coded on the data sheet.

Percent Passing No. 40 Sieve (Item 6): The average of percentages of material passing the No. 40 (0.425-mm) sieve from available sieve test results for samples from the first 5 feet (1.5 m) of the subgrade. Enter to the nearest one-tenth of one percent (0.1 percent).

Percent Passing No. 200 Sieve (Item 7): The average of percentages of material passing the No. 200 (75-µm) sieve from available sieve test results for samples from the first 5 feet (1.5 m) of the subgrade. Enter to the nearest one-tenth of one percent (0.1 percent).

Plasticity Index (Item 8): The average of plasticity indices measured for samples from the first 5 feet (1.5 m) of the subgrade (test methods AASHTO T90 or ASTM D4318).

Liquid Limit (Item 9): The average of the liquid limits measured for samples from the first 5 feet (1.5 m) of subgrade (test methods AASHTO T89 or ASTM D4318).

Maximum Laboratory Dry Density (Item 10): The maximum laboratory dry density in pounds per cubic foot for the subgrade material.

Optimum Laboratory Moisture Content (Item 11): The optimum moisture content obtained in the laboratory to the nearest tenth of a percent (0.1 percent) for the subgrade.

Test Used to Measure Maximum Dry Density (Item 12): A code, provided on data sheet 21, indicates whether standard AASHTO, modified AASHTO, or some other test method is used to establish the maximum dry density and optimum moisture content.

Compactive Energy for "Other" Method (Item 13): The compactive energy in foot-pounds per cubic inch applied if some test method is used other than the standard AASHTO or modified AASHTO. If the standard or modified AASHTO is used, leave this space blank.

In Situ Dry Density (Percent of Optimum) (Items 14 through 16): The number of tests conducted, and the mean, minimum, maximum, and standard deviation of field measurements of in-place dry density for the subgrade as a percentage of the maximum lab dry density. In situ dry density may be measured successfully by several procedures. These include the rubber-balloon method (AASHTO T205 (ASTM D2167)), the sand cone method (AASHTO T191 (ASTM D1556)), or nuclear methods (AASHTO T238).

In Situ Moisture Content (Percent of Optimum) (Items 17 through 19): The number of tests conducted, and the mean, minimum, maximum, and standard deviation of field measurements of in-place subgrade moisture content as a percent of the optimum moisture content obtained in the laboratory. This moisture content data is to be based on the same tests as for the dry density data above. Values should be recorded to the nearest tenth of a percent (0.1 percent).

In Situ Dry Density (pcf) (Items 20 through 22): The number of tests conducted, and the mean, minimum, maximum, and standard deviation of field measurements of in-place dry density in pounds per cubic foot for the subgrade. This data item need not be entered if both the maximum laboratory dry density and the in situ dry density as a percent of maximum dry density have been reported.

In Situ Moisture Content (Items 23 through 25): The number of tests conducted, and the mean, minimum, maximum, and standard deviation of field measurements of in-place subgrade moisture in percent of dry weight of the material. This moisture content data is to be based on the same tests used for the dry density data above, and need not be entered if the optimum laboratory moisture content and the in situ moisture content as a percent of optimum have been reported. Values should be recorded to the nearest tenth of a percent (0.1 percent).

2.2.23 Subgrade Data (Continued) (Sheet 22)

This data sheet is for continuation of the data on sheet 21 and is completed for each GPS test section. For SPS projects, the properties of the predominant subgrade type encountered on the project should be entered on this data sheet per the instructions for data sheet 21.

Individual data elements are:

Relative Density of Cohesionless Free-Draining Soil (Items 1 through 4): For cohesionless free-draining soils only. If more than 12 percent by weight of the subgrade is passing the No. 200 (75-µm) sieve or is otherwise known to not be free-draining, enter "N" in these spaces. Otherwise, the following values are requested: 1) minimum and maximum densities in pcf to the nearest tenth (0.1 pcf), as determined by test method ASTM D2049 (measured density); 2) mean relative density in percent to the nearest tenth (0.1 percent) and number of tests conducted; 3) minimum and maximum mean relative densities in percent to the nearest tenth (0.1 percent); and 4) standard deviation of relative density in percent to the nearest tenth (0.1 percent). The calculated relative densities and standard deviation of relative density are related to the in situ dry densities in pcf recorded on sheet 21, and are calculated using those field densities and the minimum and maximum densities from test method D2049.

Soil Suction (Item 5): A value for soil suction (negative pore water pressure) to the nearest tenth of a ton per square foot (0.1 tsf) determined by AASHTO T273.

Expansion Index (Item 6): The expansion index as determined by ASTM test method D4829. The expansion index has been included as a data element because it appears to offer high potential for explaining the effects of expansive soils on pavement performance in future predictive models.

Swell Pressure (Items 7 and 8): A value to the nearest pound per square inch (1.0 psi) for swell pressure, and a code to identify the test used. Codes are provided on data sheet 22.

Percent by Weight Finer than 0.02 mm (Item 9): The percent by weight, to the nearest tenth of a percent (0.1 percent), of the subgrade sample having soil grains finer in size than 0.02 mm (0.0008 inch). This value is generally obtained by hydrometer analysis (ASTM test method D422). This data item is only required in freeze zones where frost is expected to penetrate into the subgrade.

Average Rate of Heave During Standard Laboratory Freezing Test (Item 10): The average rate of heave in millimeters per day, to the nearest tenth (0.1 mm/day) (0.0039 inch), of the subgrade soil as measured by a standard laboratory freeze test.* This data item is only required in freeze zones where frost is expected to penetrate into the subgrade. (*Reference not available. Test used by U.S. Army Corps of Engineers.)

Frost Susceptibility Classification Code (Item 11): The frost susceptibility classification of the subgrade soil. The codes appear on the data sheet. A value for the average rate of heave is required for the classification, although percent by weight finer than 0.02 mm (0.0008 inch) is indicative and significant to the heave rate. This data item is only required in freeze zones where frost is expected to penetrate into the subgrade.

2.2.24 Snow Removal/Deicing (Sheet 23)

This data sheet provides information on the snow removal and deicing practices used by the SHA at the test section location.

Individual data elements:

Frequency of Snow Removal at Test Site? (Item 1): A code indicating the general number of times per year that snow removal is required at the section location. Codes are provided on the data sheet.

Frequency of Application of Deicing Chemicals on the Test Site? (Item 2): A code indicating the general number of times per year that deicing chemicals are applied to the test section. Codes are provided on the data sheet.

What Type of Deicers Have Been Used on This Test Section? (Item 3): A code indicating the type of chemicals used for deicing on the test section. Codes are provided on the data sheet.

Has the Use of Any of These Deicers Been Discontinued Since the Test Site was Open to Traffic? (Item 4): A code indicating any chemicals that were once used at the location for deicing but are no longer used on a regular basis. Codes are provided on the data sheet. In addition, space is provided to indicate the year that the deicing chemicals were discontinued.

INVENTORY DATA SHEETS

STATE ASSIGNED ID [__ __ __ __]

SHEET 1 ***STATE CODE** [__ __]

INVENTORY DATA ***SHRP SECTION ID** [__ __ __ __]

LTPP PROGRAM

PROJECT AND SECTION IDENTIFICATION

***1. DATE OF DATA COLLECTION OR UPDATE** (mm/yr) [__ __/__ __ __ __]

***2. STATE HIGHWAY AGENCY (SHA) DISTRICT NUMBER** [__ __.]

***3. COUNTY OR PARISH** (See FIPS Publication 6) [__ __ __.]

***4. FUNCTIONAL CLASS** (See Table A.2, Appendix A) [__ __.]

***5. ROUTE SIGNING** (Numeric Code) [__.]
Interstate .... 1 State 3
U. S. .... 2 Other 4

***6. ROUTE NUMBER** [__ __ __ __ __.]

***7. TYPE OF PAVEMENT** (See Table A.4, Appendix A) [__ __.]

***8. NUMBER OF THROUGH LANES** (One Direction) [__.]

***9. DIRECTION OF TRAVEL** [__.]
East Bound .... 1 North Bound 3
West Bound .... 2 South Bound 4

SECTION LOCATION STARTING POINT

***10. MILEPOINT** [__ __ __.__ __]
***11. ELEVATION** [__ __ __ __ __]
***12. LATITUDE** [__ __°__ __'__ __.__ __"]
***13. LONGITUDE** [__ __ __°__ __'__ __.__ __"]

***14. ADDITIONAL LOCATION INFORMATION** (Significant Landmarks): [__________

____

____]

15. HPMS SAMPLE NUMBER (HPMS Item 28)

__ __ __ __ __ __ __ __ __ __ __ __

16. HPMS SECTION SUBDIVISION (HPMS Item 29) __.

	STATE ASSIGNED ID [__ __ __ __]
SHEET 1A	***STATE CODE** [__ __]
INVENTORY DATA	***SHRP SECTION ID** [__ __ __ __]
LTPP PROGRAM	

GLOBAL POSITIONING MEASUREMENTS

1. **GPS INSTRUMENT TYPE AND MODEL NAME** ______________________________
2. **MEASUREMENT DATE** (dd/mm/yyyy) __ __ / __ __ / __ __ __ __
3. **LATITUDE** (degree, minutes, seconds) [__ __° __ __′__ __.__″]
4. **LONGITUDE** (degrees, minutes, seconds) [__ __° __ __′__ __.__″]
5. **ELEVATION** (meters) __ __ __ __.
6. **DILUTION OF PRECISION** (DOP) __.__
7. **ESTIMATED POSITION ERROR** (EPE, meters) __ __ __ __
8. **COMMENTS**

____

____

____

Notes:

Only data elements in brackets are entered into the IMS.
For GPS sections, perform measurement at station 0+00.
For SPS sections, perform measurements at station 0+00 of the first test section located on the project; use project ID with 00 for last two digits.

PREPARER ____________________ EMPLOYER___________________DATE________________

STATE ASSIGNED ID [__ __ __ __]

SHEET 2 | ***STATE CODE** [__ __]

INVENTORY DATA | ***SHRP SECTION ID** [__ __ __ __]

LTPP PROGRAM

GEOMETRIC, SHOULDER AND DRAINAGE INFORMATION

***1. LANE WIDTH** (feet) [__ __.]

***2. MONITORING SITE LANE NUMBER**[1] [__.]
(Lane 1 is outside lane, next to shoulder
Lane 2 is next to Lane 1, etc.)

***3. SUBSURFACE DRAINAGE LOCATION** [__.]
Continuous Along Test Section 1
Intermittent 2

***4. SUBSURFACE DRAINAGE TYPE** [__.]
No Subsurface Drainage ..1 Well System............5
Longitudinal Drains .....2 Drainage Blanket with
Transverse Drains ....3 Longitudinal Drains..6
Drainage Blanket 4
Other (Specify)______________________________ 7

SHOULDER DATA	INSIDE SHOULDER	OUTSIDE SHOULDER
***5. SURFACE TYPE**	__	[__]

Turf ....1 Concrete...............4
Granular ....2 Surface Treatment......5
Asphalt Concrete ....3 Other(Specify)____________________6

	INSIDE SHOULDER	OUTSIDE SHOULDER
6. **TOTAL WIDTH** (feet)	__ __.	__ __.
7. **PAVED WIDTH** (feet)	__ __.	__ __.
8. **SHOULDER BASE TYPE** (Tables A.5, Appendix A)	__ __	__ __
9. **SHOULDER SURFACE THICKNESS** (inches)	__ __.__	__ __.__
10. **SHOULDER BASE THICKNESS** (inches)	__ __.__	__ __.__
ADDITIONAL DATA FOR PCC SHOULDERS:		
11. **AVERAGE JOINT SPACING** (feet)	__ __ __.	__ __ __.
12. **SKEWNESS OF JOINTS** (feet)	__.__	__.__
13. **JOINTS MATCH PAVEMENT JOINTS?** (Yes 1, No 2)	__	__
14. **REINFORCED?** (Yes 1, No 2)	__	__

15. **DIAMETER OF LONGITUDINAL DRAINPIPES** (inches) __.__

16. **SPACING OF LATERALS** (feet) __ __ __.

NOTES:
1. For the LTPP studies, only the outside lane will be studied, so the number "1" should always be entered.

	STATE ASSIGNED ID [__ __ __ __]
SHEET 3	***STATE CODE** [__ __]
INVENTORY DATA	***SHRP SECTION ID** [__ __ __ __]
LTPP PROGRAM	

LAYER DESCRIPTIONS

LAYER NUMBER[1]	**LAYER DESCRIPTION**[2]	**MATERIAL TYPE CLASSIFICATION**[3]	**LAYER THICKNES** (inches) **MEAN**	**MIN.**	**MAX.**	**STD. DEV.**	**LAYER TYPE**[4]
1	SUBGRADE(7)	[__ __]					[__]
2	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._	[__]
3	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._	[__]
4	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._	[__]
5	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._	[__]
6	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._	[__]
7	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._	[__]
8	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._	[__]
9	[__ __]	[__ __]	[_ _ _._]	_ _ _._	_ _ _._	_ _ _._	[__]

***DEPTH BELOW SURFACE TO "RIGID" LAYER** (feet) [__ __.__]
(Rock, Stone, Dense Shale)

NOTES:

1. Layer 1 is subgrade soil, last layer is existing surface.

2. Layer description codes:

Overlay	01	Subbase Layer	06
Seal Coat	02	Subgrade	07
Original Surface	03	Interlayer	08
HMAC Layer (Below Surface Layer)	04	Porous Friction Course	09
		Surface Treatment	10
Base Layer	05	Embankment (Fill)	11

3. The material type classification codes for surface, base or subbase, subgrade, and seal coat or interlayer materials appear in Tables A.4, A.5, A.6 and A.7, respectively.

4. Layer Types:
   - A HMAC Layer (Requires sheets 12 - 18 to be filled out)
   - P PCC Layer (Requires sheets 5 - 11 to be filled out)
   - B Base/Subbase Layers (Requires sheets 19 and 20 to be filled out)
   - G Subgrade (Requires sheets 21 and 22 to be filled out)

STATE ASSIGNED ID [__ __ __ __]

SHEET 4 — ***STATE CODE** [__ __]

INVENTORY DATA — ***SHRP SECTION ID** [__ __ __ __]

LTPP PROGRAM

AGE AND MAJOR PAVEMENT IMPROVEMENTS

***1. DATE OF LATEST (RE)CONSTRUCTION** (month/year) [__ __/__ __ __ __]

***2. DATE SUBSEQUENTLY OPENED TO TRAFFIC** (month/year) [__ __/__ __ __ __]

3. LATEST (RE)CONSTRUCTION COST PER LANE MILE
(thousands of dollars)[1] __ __ __ __ __.

MAJOR IMPROVEMENTS SINCE LATEST (RE)CONSTRUCTION (Items 4 thru 8)

*4. YEAR	*5. WORK TYPE CODE (Table A.16)	*6. WORK QUANTITY (Table A.16 for units)	7. THICKNESS (inches)	8. TOTAL COST (thousands of dollars per lane-mile)
[__ __ __ __]	[__ __]	[__ __ __ __ __.]	__ __.__	__ __ __.
[__ __ __ __]	[__ __]	[__ __ __ __ __.]	__ __.__	__ __ __.
[__ __ __ __]	[__ __]	[__ __ __ __ __.]	__ __.__	__ __ __.
[__ __ __ __]	[__ __]	[__ __ __ __ __.]	__ __.__	__ __ __.
[__ __ __ __]	[__ __]	[__ __ __ __ __.]	__ __.__	__ __ __.
[__ __ __ __]	[__ __]	[__ __ __ __ __.]	__ __.__	__ __ __.

ADDITIONAL ROADWAY WIDENING INFORMATION (Items 9 thru 12)

***9. YEAR WHEN ROADWAY WIDENED**[2] [__ __ __ __]

***10. ORIGINAL NUMBER OF LANES** (One Direction) [__]

***11. FINAL NUMBER OF LANES** (One Direction) [__]

***12. LANE NUMBER OF LANE ADDED** [__]

NOTES: 1. Cost is to represent pavement structure cost. Non-pavement costs such as cut and fill work, work on bridges, culverts, lighting, and guard rails are to be excluded.

2. A lane created by roadway widening should not be used for LTPP unless the pavement structure under the entire lane was constructed at the same time and is uniform.

STATE ASSIGNED ID [__ __ __ __]

SHEET 5

INVENTORY DATA

LTPP PROGRAM

***STATE CODE** [__ __]

***SHRP SECTION ID** [__ __ __ __]

PORTLAND CEMENT CONCRETE LAYERS
JOINT DATA

***1. LAYER NUMBER** (From Sheet 3) [__]

***2. AVERAGE CONTRACTION JOINT SPACING** (feet) [__ __ __.__]

3. RANDOM JOINT SPACING, IF ANY: ______________________________

***4. BUILT-IN EXPANSION JOINT SPACING** (feet) [__ __ __ __.]

***5. SKEWNESS OF JOINTS** (feet/lane) [__.__]

***6. TRANSVERSE CONTRACTION JOINT LOAD TRANSFER SYSTEM** [__]

Round Dowels 1
Aggregate Interlock 2
I-Beams 3
Star Lugs 4
Other (Specify)________________________5

***7. ROUND DOWEL DIAMETER** (inches) [__.__ __]

***8. DOWEL OR MECHANICAL LOAD TRANSFER DEVICE SPACING** (inches) [__ __.]

9. AVERAGE INTERMEDIATE SAWED JOINT SPACING (feet) __ __.__

DIMENSIONS FOR I-BEAM DOWEL BARS

10. HEIGHT (inches) __.__ __

11. WIDTH (inches) __.__ __

12. DISTANCE OF NEAREST DOWEL OR MECHANICAL LOAD TRANSFER DEVICE FROM OUTSIDE LANE SHOULDER EDGE (inches) __ __.__

13. DOWEL LENGTH (inches) __ __.

14. DOWEL COATING __

Paint and/or Grease 1
Plastic 2
Monel 3
Stainless Steel 4
Epoxy 5
Other (Specify)________________________6

15. METHOD USED TO INSTALL MECHANICAL LOAD TRANSFER DEVICES __

Preplaced on Baskets 1
Mechanically Installed 2
Other (Specify)________________________3

STATE ASSIGNED ID [__ __ __ __]

SHEET 6

INVENTORY DATA

LTPP PROGRAM

***STATE CODE** [__ __]

***SHRP SECTION ID** [__ __ __ __]

PORTLAND CEMENT CONCRETE LAYERS
JOINT DATA (CONTINUED)

***1. LAYER NUMBER** (From Sheet 3) [__]

***2. METHOD USED TO FORM TRANSVERSE JOINTS** [__]

Sawed .... 1 Metal Insert
Plastic Insert .... 2 (i.e., Uni-Tube) 3
Other (Specify)____4

***3. TYPE OF LONGITUDINAL JOINT** (Between Lanes) [__]

Butt .... 1 Sawed Weakened Plane 3
Keyed .... 2 Insert Weakened Plane 4
Other (Specify)____5

***4. TYPE OF SHOULDER-TRAFFIC LANE JOINT** [__]

Butt .... 1 Insert Weakened Plane 4
Keyed .... 2 Tied Concrete Curb 5
Sawed Weakened Plane 3
Other (Specify)____6

5. TRANSVERSE JOINT SEALANT TYPE (As Built) __

Preformed (Open Web) ..... 1 Rubberized Asphalt 3
Asphalt .... 2 Low-Modulus Silicone 4
Other (Specify)____5

TRANSVERSE JOINT SEALANT RESERVOIR (As Built)

6. WIDTH (inches) __.__ __

7. DEPTH (inches) __.__ __

LONGITUDINAL JOINT SEALANT RESERVOIR (As Built)

8. WIDTH (inches) __.__ __

9. DEPTH (inches) __.__ __

BETWEEN LANE TIE BAR (As Built)

10. DIAMETER (inches) __.__ __

11. LENGTH (inches) __ __.

12. SPACING (inches) __ __.__

SHOULDER-TRAFFIC LANE JOINT SEALANT RESERVOIR (As Built)

13. WIDTH (inches) __.__ __

14. DEPTH (inches) __.__ __

SHOULDER-TRAFFIC LANE JOINT TIE BARS (For Concrete Shoulder)

15. DIAMETER (inches) __.__ __

16. LENGTH (inches) __ __.

17. SPACING (inches) __ __.

STATE ASSIGNED ID [__ __ __ __]

SHEET 7 ***STATE CODE** [__ __]

INVENTORY DATA ***SHRP SECTION ID** [__ __ __ __]

LTPP PROGRAM

PORTLAND CEMENT CONCRETE LAYERS
REINFORCING STEEL DATA

***1. LAYER NUMBER** (From Sheet 3) [__]

***2. TYPE OF REINFORCING** [__]
Deformed Bars 1
Welded Wire Fabric 2
Other (specify)________________________3

***3. TRANSVERSE BAR DIAMETER** (inches) [__.__ __]

***4. TRANSVERSE BAR SPACING** (inches) [__ __.__]

***5. LONGITUDINAL BAR DIAMETER** (inches) [__.__ __]

***6. DESIGN PERCENTAGE OF LONGITUDINAL STEEL** (percent) [__.__ __]

7. DEPTH TO REINFORCEMENT FROM SLAB SURFACE (inches) [__.__]

8. LONGITUDINAL BAR SPACING (inches) __ __.__

9. YIELD STRENGTH OF REINFORCING (ksi) __ __.__

10. METHOD USED TO PLACE REINFORCEMENT __
Preset on Chairs 1
Mechanically 2
Between Layers of Concrete 3
Other (Specify)________________________4

11. LAP LENGTH OF LONGITUDINAL STEEL SPLICES (inches) __ __.
(CRCP Only)

STATE ASSIGNED ID [__ __ __ __]

SHEET 8 ***STATE CODE** [__ __]

INVENTORY DATA ***SHRP SECTION ID** [__ __ __ __]

LTPP PROGRAM

PORTLAND CEMENT CONCRETE LAYERS
MIXTURE DATA

***1. LAYER NUMBER** (From Sheet 3) [__]

MIX DESIGN (lbs/yd - Oven Dried Weight)

***2. COARSE AGGREGATE** [__ __ __ __.]
***3. FINE AGGREGATE** [__ __ __ __.]
***4. CEMENT** [__ __ __ __.]
***5. WATER** [__ __ __ __.]

***6. TYPE CEMENT USED** (See Table A.10, Appendix A) [__ __]
(If Other, Specify_________________________)

***7. ALKALI CONTENT OF CEMENT** (percent by weight of cement) [__ __.__]

ENTRAINED AIR CONTENT (percent)
(AASHTO T121 (ASTM C138), T152 (ASTM C231), or T196 (ASTM C173))
***8. MEAN** [__.__]
RANGE:
9. MINIMUM VALUE __.__
10. MAXIMUM VALUE __.__

	TYPE CODE	AMOUNT
***11. ADMIXTURE #1**	[__ __]	[__ __ __.__ __ __]
***12. ADMIXTURE #2**	[__ __]	[__ __ __.__ __ __]
***13. ADMIXTURE #3**	[__ __]	[__ __ __.__ __ __]

(See Cement Admixture Codes, Table A.11, Appendix A)
(If Other, Specify _____________________________________)

SLUMP (AASHTO T119 OR ASTM C143)

14. MEAN (inches) __.__
RANGE:
15. MINIMUM VALUE (inches) __.__
16. MAXIMUM VALUE (inches) __.__
17. STANDARD DEVIATION (inches) __.__
18. NUMBER OF TESTS __ __ __.

	STATE ASSIGNED ID [__ __ __ __]
SHEET 9	***STATE CODE** [__ __]
INVENTORY DATA	***SHRP SECTION ID** [__ __ __ __]
LTPP PROGRAM	

PORTLAND CEMENT CONCRETE LAYERS
MIXTURE DATA (CONTINUED)

***1. LAYER NUMBER** (From Sheet 3) [__]

COMPOSITION OF COARSE AGGREGATE

			TYPE	PERCENT
Crushed Stone ..1	Manufactured Lightweight.......5	***2.**	[__]	[__ __ __.]
Gravel 2		***3.**	[__]	[__ __ __.]
Crushed Gravel .3	Recycled Concrete...6	***4.**	[__]	[__ __ __.]
Crushed Slag ...4				
Other (Specify)_________________________ 7				

***5. GEOLOGIC CLASSIFICATION OF COARSE AGGREGATE** [__ __.]
(See Geologic Classification Codes, Table A.8, Appendix A)

COMPOSITION OF FINE AGGREGATE

		TYPE	PERCENT
Natural Sand 1	***6.**	[__]	[__ __ __.]
Crushed or Manufactured Sand (From Crushed Gravel or Stone) 2	***7.**	[__]	[__ __ __.]
	***8.**	[__]	[__ __ __.]
Recycled Concrete 3			
Other (Specify)_________________________ 4			

9. INSOLUBLE RESIDUE (percent) (ASTM D3042) __ __ __.

10. GRADATION OF COARSE AGGREGATE
11. GRADATION OF FINE AGGREGATE

Sieve Size	% Passing	Sieve Size	% Passing
2"	__ __ __	No. 4	__ __ __
1 1/2"	__ __ __	No. 8	__ __ __
1"	__ __ __	No. 10	__ __ __
7/8"	__ __ __	No. 16	__ __
3/4"	__ __ __	No. 30	__ __
5/8"	__ __ __	No. 40	__ __
1/2"	__ __	No. 50	__ __
3/8"	__ __	No. 80	__ __
		No. 100	__ __
		No. 200	__ __

BULK SPECIFIC GRAVITIES:
12. COARSE AGGREGATE (AASHTO T85 (ASTM C127)) __.__ __ __
13. FINE AGGREGATE (AASHTO T84 (ASTM C128)) __.__ __ __

STATE ASSIGNED ID [__ __ __ __]

SHEET 10 | ***STATE CODE** [__ __]

INVENTORY DATA | ***SHRP SECTION ID** [__ __ __ __]

LTPP PROGRAM

PORTLAND CEMENT CONTRETE LAYERS
MIXTURE DATA (CONTINUED)

***1. LAYER NUMBER** (From Sheet 3) [__]

***2. TYPE OF PAVER USED** [__]
Slip-Form Paver .... 1 Side-Form 2
Other (Specify)____3

AGGREGATE DURABILITY TEST RESULTS
(See Durability Test Type Codes, Table A.12, Appendix A)

	TYPE OF AGGREGATE	TYPE OF TEST	RESULTS
3.	**COARSE**	__ __	__ __ __.__
4.	**COARSE**	__ __	__ __ __.__
5.	**COARSE**	__ __	__ __ __.__
6.	**COARSE AND FINE**	__ __	__ __ __.__

7. METHOD USED TO CURE CONCRETE __
Membrane Curing Compound ......1 Burlap-Polyethylene Blanket..5
Burlap Curing Blankets ....2 Cotton Mat Curing............6
Waterproof Paper Blankets .....3 Hay..........................7
White Polyethylene Sheeting ...4
Other (Specify)____ 8

8. METHOD USED TO TEXTURE CONCRETE __
Tine .... 1 Grooved Float 4
Broom .... 2 Astro Turf 5
Burlap Drag 3
Other (Specify)____ 6

ELASTIC MODULUS

9.	**MEAN** (ksi)	__ __ __ __ __.
10.	**MINIMUM** (ksi)	__ __ __ __ __.
11.	**MAXIMUM** (ksi)	__ __ __ __ __.
12.	**NUMBER OF TESTS**	__ __.
13.	**STANDARD DEVIATION** (ksi)	__ __ __ __ __.

14. METHOD FOR DETERMINATION OF ELASTIC MODULUS __
Compression Test on Cores (ASTM C469) 1
Compression Test on Cylinders Molded
During Construction (ASTM C469) 2
Calculated Using ACI Relation Between
Elastic Modulus and Compressive Strength
(ACI 318, Section 8.5) 3
Other (Specify)____ 4

STATE ASSIGNED ID [__ __ __ __]

SHEET 11

INVENTORY DATA

LTPP PROGRAM

***STATE CODE** [__ __]

***SHRP SECTION ID** [__ __ __ __]

PORTLAND CEMENT CONCRETE LAYERS
STRENGTH DATA

***1. LAYER NUMBER** (From Sheet 3) [__]

FLEXURAL STRENGTH[1] (Modulus of Rupture)

***2. TYPE OF TEST** [__]
Third-Point Loading (AASHTO T97 (ASTM C78)) 1
Center-Point Loading (AASHTO T177 (ASTM C293)) 2
***3. AGE** (days) [__ __ __.]
***4. MEAN** (psi) [__ __ __ __ __.]
5. MINIMUM (psi) __ __ __ __ __.
6. MAXIMUM (psi) __ __ __ __ __.
7. NUMBER OF TESTS __ __.
8. STANDARD DEVIATION (psi) __ __ __ __ __.

COMPRESSIVE STRENGTH OF CONCRETE
(Test Method AASHTO T22 (ASTM C39))

***9. AGE** (days) [__ __ __.]
***10. MEAN** (psi) [__ __ __ __ __.]
11. MINIMUM (psi) __ __ __ __ __.
12. MAXIMUM (psi) __ __ __ __ __.
13. NUMBER OF TESTS __ __.
14. STANDARD DEVIATION (psi) __ __ __ __ __.

SPLITTING TENSILE STRENGTH OF CONCRETE
(Test Method AASHTO T198 (ASTM C496))

15. AGE (days) [__ __ __.]
16. MEAN (psi) [__ __ __ __ __.]
17. MINIMUM (psi) __ __ __ __.
18. MAXIMUM (psi) __ __ __ __.
19. NUMBER OF TESTS __ __.
20. STANDARD DEVIATION (psi) __ __ __ __.

NOTE 1: For new construction of test sections for LTPP, use third point loading.

STATE ASSIGNED ID [__ __ __ __]

SHEET 12 ***STATE CODE** [__ __]

INVENTORY DATA ***SHRP SECTION ID** [__ __ __ __]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS
AGGREGATE PROPERTIES

***1. LAYER NUMBER** (From Sheet 3) [__]

COMPOSITION OF COARSE AGGREGATE

		TYPE	PERCENT
Crushed Stone ...... 1 Crushed Slag......... 4	***2.**	[__]	[__ __ __.]
Gravel .... 2 Manufactured	***3.**	[__]	[__ __ __.]
Crushed Gravel ..... 3 Lightweight........ 5	***4.**	[__]	[__ __ __.]
Other (Specify)________________________________6			

***5. GEOLOGIC CLASSIFICATION OF COARSE AGGREGATE** [__ __.]
(See Geologic Classification Codes, Table A.8, Appendix A)

COMPOSITION OF FINE AGGREGATE

		TYPE	PERCENT
Natural Sand 1	***6.**	[__]	[__ __ __.]
Crushed or Manufactured Sand (From Crushed Gravel or Stone) 2	***7.**	[__]	[__ __ __.]
Recycled Concrete 3	***8.**	[__]	[__ __ __.]
Other (Specify)________________________________4			

***9. TYPE OF MINERAL FILLER** [__]
Stone Dust .... 1 Portland Cement 3
Hydrated Lime .... 2 Fly Ash 4
Other (Specify)____ 5

AGGREGATE DURABILITY TEST RESULTS
(See Durability Test Type Codes, Table A.12, Appendix A)

	TYPE OF AGGREGATE	TYPE OF TEST	RESULTS
10.	**COARSE**	__ __	__ __ __.__ __ __
11.	**COARSE**	__ __	__ __ __.__ __ __
12.	**COARSE**	__ __	__ __ __.__ __ __
13.	**COARSE AND FINE**	__ __	__ __ __.__ __ __

14. POLISH VALUE OF COARSE AGGREGATES __ __.
(Surface Layer Only) (AASHTO T279 (ASTM D3319))

	STATE ASSIGNED ID [__ __ __ __]
SHEET 13	***STATE CODE** [__ __]
INVENTORY DATA	***SHRP SECTION ID** [__ __ __ __]
LTPP PROGRAM	

PLANT MIXED ASPHALT BOUND LAYERS
AGGREGATE PROPERTIES (CONTINUED)

***1. LAYER NUMBER** (From Sheet 3) [__]

***2. GRADATION OF COMBINED AGGREGATES**

Sieve Size or No.	% Passing	Sieve Size or No.	% Passing
2"	[__ __ __]	No. 4	[__ __]
1 1/2"	[__ __ __]	No. 8	[__ __]
1"	[__ __ __]	No. 10	[__ __]
7/8"	[__ __ __]	No. 16	[__ __]
3/4"	[__ __ __]	No. 30	[__ __]
5/8"	[__ __ __]	No. 40	[__ __]
1/2"	[__ __ __]	No. 50	[__ __]
3/8"	[__ __]	No. 80	[__ __]
		No. 100	[__ __]
		No. 200	[__ __]

BULK SPECIFIC GRAVITIES:

***3. COARSE AGGREGATE** (AASHTO T85 (ASTM C127)) [__.__ __ __]

***4. FINE AGGREGATE** (AASHTO T84 (ASTM C128)) [__.__ __ __]

***5. MINERAL FILLER** (AASHTO T100 (ASTM D854)) [__.__ __ __]

***6. AGGREGATE COMBINATION** (Calculated) [__.__ __ __]

7. EFFECTIVE SPECIFIC GRAVITY OF AGGREGATE COMBINATION (Calculated) __.__ __ __

STATE ASSIGNED ID [__ __ __ __]

SHEET 14 ***STATE CODE** [__ __]

INVENTORY DATA ***SHRP SECTION ID** [__ __ __ __]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS
ASPHALT CEMENT PROPERTIES

***1. LAYER NUMBER** (From Sheet 3) [__]

***2. ASPHALT GRADE** (See Table A.15, Appendix A) [__ __]
(If Other, Specify________________________________)

***3. SOURCE** (See Table A.13, Appendix A) [__ __]
(If Other, Specify _______________________________)

***4. SPECIFIC GRAVITY OF ASPHALT CEMENT** (AASHTO T228 (ASTM D70)) [__.__ __ __]

ORIGINAL ASPHALT CEMENT PROPERTIES

***5. VISCOSITY OF ASPHALT AT 140°F** (poises)
(AASHTO T202 (ASTM D2171)) [__ __ __ __ __ __.]

***6. VISCOSITY OF ASPHALT AT 275°F** (centistokes)
(AASHTO T201 (ASTM D2170)) [__ __ __ __.__ __]

***7. PENETRATION AT 77°F**, 100 g., 5. sec (tenths of a mm)
(AASHTO T49 (ASTM D5)) [__ __ __.]

ASPHALT MODIFIERS (See Type Code, Table A.14, Appendix A)

	TYPE	QUANTITY(%)
***8. MODIFIER #1**	[__ __].	[__ __].
***9. MODIFIER #2**	[__ __].	[__ __].

(If Other, Specify Type ____________________)

10. DUCTILITY AT 77°F (cm) (AASHTO T51 (ASTM D113)) __ __ __.

11. DUCTILITY AT 39.2°F (cm) (AASHTO T51 (ASTM D113)) __ __ __.

12. TEST RATE FOR DUCTILITY MEASUREMENT AT 39.2°F (cm/min) __ __ __.

13. PENETRATION AT 39.2°F, 200 g., 60 sec. (tenths of a mm)
(AASHTO T49 (ASTM D5)) __ __ __.

14. RING AND BALL SOFTENING POINT (AASHTO T53 (ASTM D36)) (°F) __ __ __.

NOTE: If emulsified or cutback asphalt was used, enter "N" in the spaces for "Original Asphalt Cement Properties."

STATE ASSIGNED ID [__ __ __ __]

SHEET 15 ***STATE CODE** [__ __]

INVENTORY DATA ***SHRP SECTION ID** [__ __ __ __]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS
ASPHALT CEMENT PROPERTIES (CONTINUED)

***1. LAYER NUMBER** (From Sheet 3) [__]

LABORATORY AGED ASPHALT CEMENT PROPERTIES

2. TEST PROCEDURE USED TO MEASURE AGING EFFECTS __
AASHTO T179 (ASTM D1754) - Thin Film Oven Test 1
AASHTO T240 (ASTM D2872) - Rolling Thin Film Oven Test 2
Other (Specify)____ 3

3. VISCOSITY OF ASPHALT AT 140°F (poise) __ __ __ __ __ __.
(AASHTO T202 (ASTM D2171))

4. VISCOSITY OF ASPHALT AT 275°F (centistokes) __ __ __ __.__ __
(AASHTO T201 (ASTM D2170))

5. DUCTILITY AT 77°F (cm) (AASHTO T51 (ASTM D113)) __ __ __.

6. DUCTILITY AT 39.2°F (cm) (AASHTO T51 (ASTM D113)) __ __ __.

7. TEST RATE FOR DUCTILITY MEASUREMENT AT 39.2°F (cm/min) __ __.__

8. PENETRATION AT 77°F, 100 g., 5 Sec.
(tenths of a mm) (AASHTO T49 (ASTM D5)) __ __ __.

9. PENETRATION AT 39.2°F, 200 g., 60 Sec.
(tenths of a mm) (AASHTO T49 (ASTM D5)) __ __.

10. RING AND BALL SOFTENING POINT (°F) (AASHTO T53 (ASTM D36)) __ __ __.

11. WEIGHT LOSS (percent) __.__

NOTE: If emulsified or cutback asphalt was used, enter "N" in the spaces for "Laboratory Aged Asphalt Cement Properties."

	STATE ASSIGNED ID [__ __ __ __]
SHEET 16	***STATE CODE** [__ __]
INVENTORY DATA	***SHRP SECTION ID** [__ __ __ __]
LTPP PROGRAM	

PLANT MIXED ASPHALT BOUND LAYERS
ORIGINAL MIXTURE PROPERTIES

*1. **LAYER NUMBER** (From Sheet 3) [__]

*2. **TYPE OF SAMPLES** [__]
Samples Compacted in Laboratory 1
Samples Taken From Test Section 2

*3. **MAXIMUM SPECIFIC GRAVITY** (No Air Voids)
(AASHTO T209 or ASTM D2041) [__.__ __ __]

BULK SPECIFIC GRAVITY (ASTM D1188)

*4.	**MEAN**	[__.__ __ __]	**NUMBER OF TESTS**	__ __.
5.	**MINIMUM**	__.__ __ __	**MAXIMUM**	__.__ __ __
6.			**STANDARD DEVIATION**	__.__ __ __

ASPHALT CONTENT (percent by weight of total mix)
(AASHTO T164 (ASTM D2172))

*7.	**MEAN**	[__ __.__]	**NUMBER OF SAMPLES**	__ __.
8.	**MINIMUM**	__ __.__	**MAXIMUM**	__ __.__
9.			**STANDARD DEVIATION**	__ __.__

PERCENT AIR VOIDS (percent)

*10.	**MEAN**	[__ __.__]	**NUMBER OF SAMPLES**	__ __.
11.	**MINIMUM**	__ __.__	**MAXIMUM**	__ __.__
12.			**STANDARD DEVIATION**	__ __.__

13. **VOIDS IN MINERAL AGGREGATE** (percent) __ __.__

14. **EFFECTIVE ASPHALT CONTENT** (percent) __ __.__

15. **MARSHALL STABILITY** (lbs) (AASHTO T245 (ASTM D1559)) __ __ __ __.

16. **NUMBER OF BLOWS** __ __

17. **MARSHALL FLOW** (hundredths of an inch)
(AASHTO T245 (ASTM D1559)) __ __ __ __.

18. **HVEEM STABILITY** (AASHTO T246 (ASTM D1560)) __ __ __.

19. **HVEEM COHESIOMETER VALUE** (grams/25 mm of width)
(AASHTO T246 (ASTM D1560)) __ __ __ __.

STATE ASSIGNED ID [__ __ __ __]

SHEET 17 | *STATE CODE [__ __]

INVENTORY DATA | *SHRP SECTION ID [__ __ __ __]

LTPP PROGRAM

PLANT MIXED ASPHALT BOUND LAYERS
ORIGINAL MIXTURE PROPERTIES (CONTINUED)

***1. LAYER NUMBER** (From Sheet 3) [__]

***2. TYPE ASPHALT PLANT** [__]

Batch Plant .... 1 Drum Mix Plant 2
Other (Specify)____ 3

***3. TYPE OF ANTISTRIPPING AGENT USED**
(See Type Codes, Table A.20, Appendix A) [__ __]
(Other, Specify____)

***4. ANTISTRIPPING LIQUID OR SOLID CODE** [__]
Liquid .... 1 Solid 2

***5. AMOUNT OF ANTISTRIPPING AGENT USED** [__ __.__]
(If liquid, enter amount as percent of asphalt cement weight. If solid, enter amount as percent of aggregate weight.)

6. MOISTURE SUSCEPTIBILITY TEST TYPE __
AASHTO T165 (ASTM D1075) 1
Texas Freeze-Thaw Pedestal Test (Ref. 21) 2
Texas Boiling Test (Ref. 22) 3
Revised Lottman Procedure (AASHTO T283) 4
Other (Specify) ____ 5

MOISTURE SUSCEPTIBILITY TEST RESULTS:

7. HVEEM STABILITY NO. __ __

8. PERCENT STRIPPED __ __

9. TENSILE STRENGTH RATIO (AASHTO T283) __.__ __

10. INDEX OF RETAINED STRENGTH (AASHTO T165) __ __ __.

	STATE ASSIGNED ID [__ __ __ __]
SHEET 18	***STATE CODE** [__ __]
INVENTORY DATA	***SHRP SECTION ID** [__ __ __ __]
LTPP PROGRAM	

PLANT-MIXED ASPHALT BOUND LAYERS
CONSTRUCTION DATA

*1. **LAYER NUMBER** (See Sheet 3) [__]

2. **MEAN MIXING TEMPERATURE** (°F) __ __ __.

LAYDOWN TEMPERATURES (°F)

3.	**MEAN**	__ __ __	**NUMBER OF TESTS**	__ __
4.	**MINIMUM**	__ __ __	**MAXIMUM**	__ __ __
5.			**STANDARD DEVIATION**	__ __ __

	ROLLER CODE	**ROLLER DESCRIPTION**	**GROSS WGT** (tons)	**TIRE PRES.** (psi)	**FREQ.** (vibr/min)	**AMPLITUDE** (in)	**SPEED** (mph)
6.	A	STEEL-WHL TANDEM	__ __.__				
7.	B	STEEL-WHL TANDEM	__ __.__				
8.	C	STEEL-WHL TANDEM	__ __.__				
9.	D	STEEL-WHL TANDEM	__ __.__				
10.	E	PNEUMATIC-TIRED	__ __.__	__ __ __.			
11.	F	PNEUMATIC-TIRED	__ __.__	__ __ __.			
12.	G	PNEUMATIC-TIRED	__ __.__	__ __ __.			
13.	H	PNEUMATIC-TIRED	__ __.__	__ __ __.			
14.	I	SINGLE-DRUM VIBR.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
15.	J	SINGLE-DRUM VIBR.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
16.	K	SINGLE-DRUM VIBR.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
17.	L	SINGLE-DRUM VIBR.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
18.	M	DOUBLE-DRUM VIBR.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
19.	N	DOUBLE-DRUM VIBR.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
20.	O	DOUBLE-DRUM VIBR.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
21.	P	DOUBLE-DRUM VIBR.	__ __.__		__ __ __ __.	.__ __ __	__ __.__
22.	Q	OTHER ______________________					

COMPACTION DATA

		First Lift	Second Lift	Third Lift	Fourth Lift
	BREAKDOWN				
23.	**ROLLER CODE** (A - Q)	__	__	__	__
24.	**COVERAGES**	__ __.	__ __.	__ __.	__ __.
	INTERMEDIATE				
25.	**ROLLER CODE** (A - Q)	__	__	__	__
26.	**COVERAGES**	__ __.	__ __.	__ __.	__ __.
	FINAL				
27.	**ROLLER CODE** (A - Q)	__	__	__	__
28.	**COVERAGES**	__ __.	__ __.	__ __.	__ __.
29.	**MEAN AIR TEMP** (°F)	__ __ __.	__ __ __.	__ __ __.	__ __ __.
30.	**COMPACTED THICK.** (inch)	__.__	__.__	__.__	__.__
31.	**CURING PERIOD** (hours)	__ __.	__ __.	__ __.	__ __.

STATE ASSIGNED ID [__ __ __ __]

SHEET 19

INVENTORY DATA

LTPP PROGRAM

***STATE CODE** [__ __]

***SHRP SECTION ID** [__ __ __ __]

UNBOUND OR STABILIZED BASE OR SUBBASE MATERIAL DESCRIPTION

*1. **LAYER NUMBER** (From Sheet 3) [__]

*2. **AASHTO SOIL CLASSIFICATION** (See Codes, Table A.9) [__ __]

*3. **ATTERBERG LIMITS** (AASHTO T90 and T90 or ASTM D4318)
PI [__ __.] **LL** [__ __.] **PL** [__ __.]

4. **MAXIMUM LAB DRY DENSITY** (pcf) __ __ __.

5. **OPTIMUM LAB MOISTURE CONTENT** (percent) __ __.__

6. **TEST USED TO MEASURE MAXIMUM DRY DENSITY** __
   - Standard AASHTO T99 1
   - Modified AASHTO T180 2
   - AASHTO T134 (Soil-Cement) ..3
   - ASTM D558....................4
   - ASTM D4223...................5
   - Other (Specify)____ 6

7. **COMPACTIVE ENERGY FOR "OTHER" METHOD**
(foot-pounds/cubic inch) __ __.__

IN SITU DRY DENSITY (pcf)

8.	**MEAN**	__ __ __	**NUMBER OF SAMPLES**	__ __
9.	**MINIMUM**	__ __ __	**MAXIMUM**	__ __ __
10.			**STANDARD DEVIATION**	__ __ __

IN SITU MOISTURE CONTENT (percent of dry weight)

11.	**MEAN**	__ __ __	**NUMBER OF SAMPLES**	__ __
12.	**MINIMUM**	__ __ __	**MAXIMUM**	__ __ __
13.			**STANDARD DEVIATION**	__ __ __

14. **COARSE GRADATION OF BASE/SUBBASE MATL.**

15. **FINE GRADATION OF BASE/SUBBASE MATL.**

Sieve Size or No.	% Passing	Sieve Size or No.	% Passing
1 1/2"	__ __ __	No. 4	__ __
1"	__ __ __	No. 8	__ __
7/8"	__ __ __	No. 10	__ __
3/4"	__ __ __	No. 16	__ __
5/8"	__ __ __	No. 30	__ __
1/2"	__ __ __	No. 40	__ __
3/8"	__ __	No. 50	__ __
		No. 80	__ __
		No. 100	__ __
		No. 200	__ __

	STATE ASSIGNED ID [__ __ __ __]
SHEET 20	***STATE CODE** [__ __]
INVENTORY DATA	***SHRP SECTION ID** [__ __ __ __]
LTPP PROGRAM	

UNBOUND OR STABILIZED BASE OR SUBBASE MATERIAL DESCRIPTION (CONTINUED)

*1. **LAYER NUMBER** (From Sheet 3) [__]

TYPE AND PERCENT STABILIZING AGENT (For Stabilized Layers Only)

*2. **STABILIZING AGENT 1** **TYPE CODE** [__] **PERCENT** [__ __.__]
*3. **STABILIZING AGENT 2** **TYPE CODE** [__] **PERCENT** [__ __.__]

STABILIZING AGENT TYPE CODES

Asphalt Cement .... 1 Lime 5
Emulsified Asphalt .... 2 Fly Ash, Class C 6
Cutback Asphalt .... 3 Fly Ash, Class N 7
Portland Cement 4
Other (Specify) ____ 8

*4. **ADMIXTURES:** **TYPE** [__] **PERCENT** [__ __.]

Calcium Chloride .... 1 Magnesium Chloride 3
Sodium Chloride 2
Other (Specify) ____ 4

COMPRESSIVE STRENGTH (psi)

*5. **MEAN** [__ __ __] **NUMBER OF TESTS** __ __
6. **MINIMUM** __ __ __ **MAXIMUM** __ __ __
7. **STANDARD DEVATION** __ __ __

*8. **TYPE OF COMPRESSION TEST** [__]

AASHTO T167 (ASTM D1074) . 1 AASHTO T220 3
AASHTO T24 (ASTM D1633) .. 2 AASHTO T234 (ASTM D2850) . 4
Other (Specify) ____ 5

*9. **CONFINING PRESSURE** (psi)[1] [__ __.__]

10. **CALCIUM CARBONATE CONTENT** (percent) (ASTM D4373) __ __ __.

11. **CALIFORNIA BEARING RATIO** (CBR) (AASHTO T193 OR ASTM D3668) __ __ __.

12. **RESISTANCE** (R-VALUE) (AASTHO T190 (ASTM D2844)) __ __ __.

13. **MODULUS OF SUBGRADE REACTION** (K-VALUE) (psi/sq.in.) __ __ __.
14. **TYPE OF TEST** __

AASHTO T221 (ASTM D1195) .... 1 AASHTO T222 2

NOTE: 1. If the test is unconfined, enter "0.0."

	STATE ASSIGNED ID [__ __ __ __]
SHEET 21	***STATE CODE** [__ __]
INVENTORY DATA	***SHRP SECTION ID** [__ __ __ __]
LTPP PROGRAM	

SUBGRADE DATA

*1.	**AASHTO SOIL CLASSIFICATION** (See Table A.9, Appendix A)	[__ __]
2.	**CALIFORNIA BEARING RATIO** (CBR) (AASHTO T193 or ASTM D1883)	__ __ __.
3.	**RESISTANCE** (R-VALUE) (AASHTO T190 (ASTM D2844))	__ __ __.
4.	**MODULUS OF SUBGRADE REACTION** (K-VALUE) (psi/sq. in.)	__ __ __.
5.	**TYPE OF TEST** AASHTO T221 (ASTM D1195) ...1 AASHTO T222 or ASTM D1196.. 2	__
6.	**PERCENT PASSING NO. 40 SIEVE**	__ __.__
7.	**PERCENT PASSING NO. 200 SIEVE**	__ __.__
8.	**PLASTICITY INDEX** (AASHTO T90 or ASTM D4318)	__ __.
9.	**LIQUID LIMIT** (AASHTO T89 or ASTM D4318)	__ __.
10.	**MAXIMUM LAB DRY DENSITY** (pcf)	__ __ __.
11.	**OPTIMUM LAB MOISTURE CONTENT** (percent)	__ __.__
12.	**TEST USED TO MEASURE MAXIMUM DRY DENSITY** Standard AASHTO (T-99) ... 1 Modified AASHTO (T-180) .. 2 Other (Specify)____3	__
13.	**COMPACTIVE ENERGY FOR "OTHER" METHOD** (ft.-lbs./cu. in.)	__ __.__

IN SITU DRY DENSITY (percent of optimum)

14.	**MEAN**	__ __ __	**NUMBER OF TESTS**	__ __
15.	**MINIMUM**	__ __ __	**MAXIMUM**	__ __ __
16.			**STANDARD DEVIATION**	__ __ __

IN SITU MOISTURE CONTENT (percent of optimum)

17.	**MEAN**	__ __ __.__	**NUMBER OF TESTS**	__ __
18.	**MINIMUM**	__ __ __.__	**MAXIMUM**	__ __ __.__
19.			**STANDARD DEVIATION**	__ __ __.__

IN SITU DRY DENSITY (pcf)

20.	**MEAN**	__ __ __	**NUMBER OF TESTS**	__ __
21.	**MINIMUM**	__ __ __	**MAXIMUM**	__ __ __
22.			**STANDARD DEVIATION**	__ __ __

IN SITU MOISTURE CONTENT (percent of dry weight)

23.	**MEAN**	__ __ __	**NUMBER OF TESTS**	__ __
24.	**MINIMUM**	__ __ __	**MAXIMUM**	__ __ __
25.			**STANDARD DEVIATION**	__ __ __

	STATE ASSIGNED ID [__ __ __ __]
SHEET 22	***STATE CODE** [__ __]
INVENTORY DATA	***SHRP SECTION ID** [__ __ __ __]
LTPP PROGRAM	

SUBGRADE DATA (CONTINUED)

RELATIVE DENSITY OF COHESIONLESS FREE-DRAINING SOILS
(ASTM D2049)

MEASURED DENSITIES FROM LABORATORY TESTS (pcf):

1. **MINIMUM** __ __ __.__
   MAXIMUM __ __ __.__

RELATIVE DENSITIES (percent):

2.	**MEAN**	__ __.__	**NUMBER OF TESTS**	__ __
3.	**MINIMUM**	__ __.__	**MAXIMUM**	__ __.__
4.			**STANDARD DEVIATION**	__ __.__

5. **SOIL SUCTION** (tsf) (AASHTO T273) __ __ __.__

6. **EXPANSION INDEX** (ASTM D4829) __ __ __.

SWELL PRESSURE (psi)

7. **TEST VALUE** __ __ __.
8. **TEST CODE** __
   AASHTO T190 or ASTM D2844 ..1 AASHTO T258, Method 1... 2
   Other ____3

9. **PERCENT BY WEIGHT FINER THAN 0.02 MM**[1] __ __.__

10. **AVERAGE RATE OF HEAVE DURING STANDARD LABORATORY FREEZING TEST** (mm/day)[1] __ __.__

11. **FROST SUSCEPTIBILITY CLASSIFICATION CODE**[1] __

Negligible 1	Medium 4
Very Low 2	High 5
Low 3	Very High 6

NOTE: 1. This data is only required in "Freeze Zones" where frost may be expected to penetrate into the subgrade.

	STATE ASSIGNED ID [__ __ __ __]
SHEET 23	***STATE CODE** [__ __]
INVENTORY DATA	***SHRP SECTION ID** [__ __ __ __]
LTPP PROGRAM	

SNOW REMOVAL/DEICING

***1. FREQUENCY OF SNOW REMOVAL AT TEST SITE?** [__]

$\leq$ 1 x per year 1
2 - 10 x per year 2
> 10 x per year 3

***2. FREQUENCY OF APPLICATION OF DEICING CHEMICALS ON THE TEST SITE?** [__]

$\leq$ 1 x per year 1
2 - 10 x per year 2
> 10 x per year 3

***3. WHAT TYPE OF DE-ICERS HAVE BEEN USED ON THIS TEST SECTION?** [__]

NaCl 1
$CaCl_2$ 2
NaCl + $CaCl_2$ 3
CMA 4
Other (Specify)____ 5

***4. HAS THE USE OF ANY OF THESE DE-ICERS BEEN DISCONTINUED SINCE THE TEST SECTION WAS OPEN TO TRAFFIC?** [__]

NaCl 1
$CaCl_2$ 2
NaCl + $CaCl_2$ 3
CMA 4
Other (Specify)____ 5

IF YES, IN WHAT YEAR? [__ __ __ __]

APPENDIX A. STANDARD CODES

Table A.1. Table of Standard Codes for States, District of Columbia, Puerto Rico, American Protectorates, and Canadian Provinces

State	Code	State	Code
Alabama	01	North Carolina	37
Alaska	02	North Dakota	38
Arizona	04	Ohio	39
Arkansas	05	Oklahoma	40
California	06	Oregon	41
Colorado	08	Pennsylvania	42
Connecticut	09	Rhode Island	44
Delaware	10	South Carolina	45
District of Columbia	11	South Dakota	46
Florida	12	Tennessee	47
Georgia	13	Texas	48
Hawaii	15	Utah	49
Idaho	16	Vermont	50
Illinois	17	Virginia	51
Indiana	18	Washington	53
Iowa	19	West Virginia	54
Kansas	20	Wisconsin	55
Kentucky	21	Wyoming	56
Louisiana	22	American Samoa	60
Maine	23	Guam	66
Maryland	24	Puerto Rico	72
Massachusetts	25	Virgin Islands	78
Michigan	26	Alberta	81
Minnesota	27	British Columbia	82
Mississippi	28	Manitoba	83
Missouri	29	New Brunswick	84
Montana	30	Newfoundland	85
Nebraska	31	Nova Scotia	86
Nevada	32	Ontario	87
New Hampshire	33	Prince Edward Island	88
New Jersey	34	Quebec	89
New Mexico	35	Saskatchewan	90
New York	36		

Table A.2. Functional Class Codes

Functional Class	Code
Rural:	
Principal Arterial—Interstate	01
Principal Arterial—Other	02
Minor Arterial	06
Major Collector	07
Minor Collector	08
Local Collector	09
Urban:	
Principal Arterial—Interstate	11
Principal Arterial—Other Freeways or Expressways	12
Other Principal Arterial	14
Minor Arterial	16
Collector	17
Local	19

Experiment Type Definitions

General Pavement Studies

(01) Asphalt Concrete Pavement with Granular Base

Acceptable pavements for this study include a dense-graded HMAC surface layer, with or without other HMAC layers, placed over untreated granular base. One or more subbase layers may also be present, but are not required. A treated subgrade is classified as a subbase layer. Full depth AC pavements—defined as an HMAC surface layer combined with one or more subsurface HMAC layers beneath the surface layer with a minimum total HMAC thickness of 152 mm (6 inches) placed directly upon a treated or untreated subgrade—are also allowed in this study. Two or more consecutive lifts of the same mixture design are to be treated as one layer.

Seal coats or porous friction courses are allowed on the surface, but not in combination. For example, a porous friction course placed over a seal coat is not acceptable. Seal coats are permissible on top of granular layers. At least one layer of dense-graded HMAC is required, regardless of the existence of seal coats or porous friction courses.

(02) Asphalt Concrete Pavement with Bound Base

Acceptable pavements for this study include a dense-graded HMAC surface layer with or without other HMAC layers, placed over a bound base layer. To properly account for a variety of bound base types in the sampling design, two classifications of binder types, bituminous and nonbituminous, are defined as factor levels. Bituminous binders include asphalt cements, cutbacks, emulsions, and road tars. Nonbituminous binders include all hydraulic cements (those which harden by a chemical reaction with water and are capable of hardening under water), lime, fly ashes, and natural pozzolans, or combinations thereof. Stabilized bases with lower quality materials such as sand asphalt or soil cement are also allowed. Stabilization practices of primary concern for this study are those in which the structural characteristics of the material are improved due to the cementing action of the stabilizing agent. Thus, the description of the study actually refers to treatments improving the structural properties of the base materials. Two or more consecutive lifts of the same mixture design are to be treated as one layer. One or more subbase layers may be present but are not required.

Seal coats or porous friction courses are permitted on the surface but not in combination. For example, a porous friction course placed over a seal coat is not acceptable. Project selection is often—to those constructed on both fine and coarse subgrades.

(03) Jointed Plain Concrete Pavement—JPCP

Acceptable pavements for this study include a jointed, unreinforced PCC slab placed over an untreated granular base, HMAC, or stabilized base. One or more subbase layers may also be present, but are not required. The joints may have either no load transfer devices or smooth dowel bars. A seal coat above a granular base layer is permissible. Jointed slabs with load transfer devices other than dowel bars, and pavements placed directly upon a treated or untreated subgrade also are not acceptable.

(04) Jointed Reinforced Concrete Pavement—JRCP

Acceptable projects include jointed reinforced PCC pavements with doweled joints spaced between 66 and 213 m (20 and 65 ft). The slab may rest directly on a base layer or on unstabilized coarse-grained subgrade. A base layer and one or more subbase layers may exist, but are not required. A seal coat is also permissible over a granular base layer. JRCP placed directly over a fine-grained soil/aggregate layer or a fine-grained subgrade will not be considered for this study. JRCPs without load transfer devices or using devices other than smooth dowel bars at the joints are not acceptable.

(05) Continuously Reinforced Concrete Pavement—CRCP

Acceptable projects include continuously reinforced PCC pavements placed directly over a base layer or over unstabilized coarse-grained subgrade. One or more subbase layers can exist but are not required. A seal coat (prime coat) is permissible just above a granular base layer. The placement of CRCPs directly over a fine-grained soil/aggregate layer or a fine-grained subgrade is not acceptable for this study.

(06) AC Overlay of AC Pavement

Pavements in the GPS–6A, 6B, 6C, 6D, and 6S experiments include a dense-graded HMAC surface layer, with or without other HMAC layers, placed over an existing AC pavement.

The designation 6A refers to those sections that were overlaid before acceptance in the GPS program.

The 6B, 6C, 6D, and 6S designations refer to LTPP sections on which an overlay was placed after the section had been accepted into the LTPP program.

Seal coats or porous friction courses are allowed, but not in combination. Fabric interlayers and stress-absorbing membrane interlayers (SAMI) are permitted between the original surface and the overlay. The total thickness of HMAC used in the overlay is required to be at least 25.4 mm (1.0 inch).

(07) AC Overlay of Concrete Pavement

Pavements classified in the GPS–7A, 7B, 7C, 7D, 7F, 7R, and 7S experiments primarily consist of JPCP, JRCP, and CRCP pavements in which a dense-graded HMAC surface layer with or without other HMAC surface layers was constructed.

The exception is the 7R classification that has been added to account for PCC pavement test sections rehabilitated using Concrete Pavement Restoration (CPR) techniques. (To date, no test sections have been classified in the 7R category.)

The designation 7A refers to sections that were overlaid before acceptance in the GPS program. The 7B, 7C, 7D, 7F, and 7S designation refers to those test sections over which an overlay was placed after the section had been accepted into the LTPP program.

The PCC slab may rest upon a combination of the base and/or subbase layers. The existing concrete slab can also be placed directly over lime or cement-treated fine or coarse-grained subbase, or over untreated coarse-grained subgrade soil. Slabs placed directly over untreated fine-grained subgrade are not acceptable.

Seal coats or porous friction courses are permissible but not allowed in combination. Fabric interlayers and SAMIs are acceptable when placed between the original surface (concrete) and the overlay. Overlaid pavements involving aggregate interlayers and open-graded AC interlayers are not included in this study. The total thickness of HMAC used in the overlay is required to be at least 38 mm (1.5 inches).

(09) Unbonded JCP Overlays of Concrete Pavement

Acceptable projects for this study include unbonded JPCP, JRCP, or CRCP overlays with a thickness of 129 mm (5 inches) or more placed over an existing JPCP, JRCP, or CRCP pavement. An interlayer used to prevent bonding of the existing and the overlay slabs is required. The overlaid concrete pavement can rest on a base and/or a subbase or directly on the subgrade.

Specific Pavement Studies

(01) Structural Factors for Flexible Pavements

The experiment on Strategic Study of Structural Factors for Flexible Pavements (SPS–1) examines the performance of specific HMAC-surfaced pavement structural factors under different environmental conditions. Pavements within SPS–1 must start with either the original construction of the entire pavement structure or removal and complete reconstruction of an existing pavement. The pavement structural factors included in this experiment are in-pavement drainage layer, surface thickness, base type, and base thickness. The experiment design stipulates a traffic loading level in the study lane in excess of 100,000–80-kN (18-kip) equivalent single axle loads (ESAL) per year. The combination of the study factors in this experiment result in 24 different pavement structures. The experiment is designed using a fractional factorial approach to enhance implementation practicality; permitting the construction of 12 test sections at one site and the construction of a complementary set of 12 test sections at another site within the same climatic region on a similar subgrade type.

(02) Structural Factors for Rigid Pavements

The experiment on Strategic Study of Structural Factors for Rigid Pavements (SPS–2) examines the performance of specific JPCP structural factors under different environmental conditions. Pavements within SPS–2 must start with either the original construction of the entire pavement structure or removal and complete reconstruction of an existing pavement. The pavement structural factors included in this experiment are in-pavement drainage layer, PCC surface thickness, base type, PCC flexural strength, and lane width. The experiment requires that all test sections be constructed with perpendicular doweled joints at 4.9-m (15-ft) spacing and stipulate a traffic loading level in the lane in excess of 200,000 ESAL/year. The experiment is designed using a fractional factorial approach to enhance implementation practicality; permitting the construction of twelve test sections at one site and the construction of a complementary set of twelve test sections at another site within the same climatic region on a similar subgrade type.

(03) Preventive Maintenance Effectiveness of Flexible Pavements

The experiment on Preventive Maintenance Effectiveness of Flexible Pavements (SPS–3) examines the performance of four preventive maintenance treatments (cracking seal, chip seal, slurry seal, and thin overlay) on AC-surfaced pavement sections within the four climatic regions, on the two classes of subgrade soil. The experimental design stipulates that the effectiveness of each of the four treatments be evaluated independently. The effectiveness of combinations of treatments is not considered. Therefore, each site includes four treated test sections in addition to a control section. In most cases, the control (or "do nothing") section is classified as a GPS test section.

(04) Preventive Maintenance Effectiveness of Jointed Concrete Pavements

The experiment on Preventive Maintenance Effectiveness of Jointed Concrete Pavements (SPS–4) was designed to study the effects of crack/joint sealing and undersealing on jointed PCC pavement structures. Both JRCP and JPCP are included in the study. Undersealing is included as an optional factor and is only performed on a section for which the need for undersealing is indicated. The experiment design stipulates that the effectiveness of each of the two treatments be evaluated independently. The effectiveness of combinations of treatments is not considered. Each test site includes two treated test sections in addition to a control section. The treatment sections on joint/crack seal test sites consist of one section in which all joints have no sealant, and one in which a water tight seal is maintained on all cracks and joints.

(05) Rehabilitation of Asphalt Concrete Pavements

The experiment on Rehabilitation of Asphalt Concrete Pavements (SPS–5) examines the performance of eight combinations of AC overlays on existing AC-surfaced pavements. The rehabilitation treatment factors included in the study are intensity of surface preparation, recycled versus virgin AC overlay mixture, and overlay thickness. The experiment design includes all four climatic regions and conditions of existing pavement. The experiment design stipulates a traffic loading level in the study lane in excess of 100,000 ESALs/year.

(06) Rehabilitation of Jointed Portland Cement Concrete Pavements

The experiment on Rehabilitation of Jointed Portland Cement Concrete Pavements (SPS–6) examines the performance of seven rehabilitation treatment options as a function of climatic region, type of pavement (plain and reinforced), and condition of existing pavement. The rehabilitation methods include surface preparation (a limited preparation and full CPR) with a 102-mm (4-inch) thick AC overlay or without an overlay, crack/break and seat with two AC overlay thicknesses of 102 and 203 mm (4 and 8 inches), and limited surface preparation with a 102-mm (4-inch) thick AC overlay with sawed and sealed joints.

(07) Bonded Concrete Overlays of Concrete Pavements

The experiment on Bonded Concrete Overlays on Concrete Pavements (SPS–7) examines the performance of eight combinations of bonded PCC treatment alternatives as a function of climatic region, pavement type (jointed and continuously reinforced), and condition of existing pavement. The rehabilitation treatment factors include combinations of surface preparation methods (cold milling plus sand blasting and shot blasting), bonding agents (neat cement grout or none), and overlay thickness (76 and 127 mm (3 and 5 inches)). The experiment design stipulates a traffic loading level in the study lane in excess of 200,000 ESAL/year.

(08) Environmental Effects in the Absence of Heavy Loads

The experiment on Environmental Effects in the Absence of Heavy Loads (SPS–8) examines the effect of climatic factors in the four environmental regions, subgrade type (frost-susceptible, expansive, fine, and coarse) on pavement sections incorporating flexible and rigid pavement designs that are subjected to limited traffic loading. The experiment design requires either two flexible pavement structures or two rigid pavement structures to be constructed at each site. The two flexible pavement sections consist of a 102-mm (4-inch) AC surface on 102-mm (8-inch) thick untreated granular base, and a 178-mm (7-inch) AC surface over a 305-mm (12-inch) thick granular base. The two rigid pavement test sections consist of doweled JPCP with PCC surface thicknesses of 203 mm (8 inches) and 279 mm (11 inches) PCC over a 152-mm (6-inch) thick dense-graded granular base. The pavement structures included in this study match pavement structures included in the SPS–1 and SPS–2 experiments. The experiment design stipulates that traffic volume in the study lane be at least 100 vehicles per day but not more than 10,000 ESAL/year. The flexible and rigid pavement sections may be constructed at the same site or at different sites.

(09) Validation of SHRP Asphalt Specifications and Mix Design

The SPS–9P pilot effort was launched at the end of the SHRP with the objective of gaining experience in implementing the Superpave® specifications. Test sections classified as SPS–9P were constructed using a very limited set of guidelines. In some instances, specifications were based on interim Superpave specifications that were changed at a later date. Many of the test sections were constructed before material sampling and testing guidelines were established.

The SPS–9A experiment, Superpave Asphalt Binder Study, requires construction of a minimum of two test sections at each project site. Construction may include new construction, reconstruction, or overlay. The minimum test sections consist of: 1) Highway agencies' standard mix, 2) Superpave Level 1 designed standard mix, and 3) Superpave mix with alternate binder grade either higher or lower than the specified Superpave binder. The minimum of two test sections at some sites results from the agency's declaration that the Superpave test section is the same as the standard agency mixture. This experiment will provide the opportunity to evaluate and improve the practical aspects of implementing the Superpave mix design through a hands-on field trial by interested highway agencies. It will also make it possible to compare the performance of the Superpave mixes and mixes designed with highway agencies' current asphalt specifications, asphalt-aggregate specifications, and mix design procedures. In addition, there will be an opportunity to test the sensitivity of the Superpave asphalt binder specifications relative to low temperature cracking, fatigue, and permanent deformation distress factors.

Table A.3. Pavement Type Codes

Type of Pavement	Code
AC Surfaced Pavements:	
AC with Granular Base	01
AC with Bituminous Treated Base	02
AC with Nonbituminous Treated Base	07
AC Overlay on AC Pavement	03
AC Overlay on JPCP Pavement	28
AC Overlay on JRCP Pavement	29
AC Overlay on CRCP Pavement	30
Other	10
PCC Surfaced Pavements:	
JPCP—Placed Directly on Untreated Subgrade	11
JRCP—Placed Directly on Untreated Subgrade	12
CRCP—Placed Directly on Untreated Subgrade	13
JPCP—Placed Directly on Treated Subgrade	14
JRCP—Placed Directly on Treated Subgrade	15
CRCP—Placed Directly on Treated Subgrade	16
JPCP over Unbound Base	17
JRCP over Unbound Base	18
CRCP over Unbound Base	19
JPCP over Bituminous Treated Base	20
JRCP over Bituminous Treated Base	21
CRCP over Bituminous Treated Base	22
JPCP over Nonbituminous Treated Base	23
JRCP over Nonbituminous Treated Base	24
CRCP over Nonbituminous Treated Base	25
JPCP Overlay on JPCP Pavement	31
JPCP Overlay on JRCP Pavement	33
JPCP Overlay on CRCP Pavement	35
JRCP Overlay on JPCP Pavement	32
JRCP Overlay on JRCP Pavement	34
JRCP Overlay on CRCP Pavement	36
CRCP Overlay on JPCP Pavement	38
CRCP Overlay on JRCP Pavement	39
CRCP Overlay on CRCP Pavement	37
JPCP Overlay on AC Pavement	04
JRCP Overlay on AC Pavement	05
CRCP Overlay on AC Pavement	06
Prestressed Concrete Pavement	40
Other	49
*Composite Pavements (Wearing Surface Included in Initial Construction):	
JPCP with Asphalt Concrete Wearing Surface	51
JRCP with Asphalt Concrete Wearing Surface	52
CRCP with Asphalt Concrete Wearing Surface	53
Other	59

*"Composite Pavements" are pavements originally constructed with an AC wearing surface over a PCC slab (1986 "AASHTO Guide for Design of Pavement Structures").

Table A.4. Pavement Surface Material Type Classification Codes

Material Type	Code
Hot-Mixed, Hot-Laid Asphalt Concrete, Dense Graded	01
Hot-Mixed, Hot-Laid Asphalt Concrete, Open Graded (Porous Friction Course)	02
Sand Asphalt	03
PCC (JPCP)	04
PCC (JRCP)	05
PCC (CRCP)	06
PCC (Prestressed)	07
PCC (Fiber Reinforced)	08
Plain PCC (Only Used for SPS–7 Overlays of CRCP)	90
Plant Mix (Emulsified Asphalt) Material, Cold Laid	09
Plant Mix (Cutback Asphalt) Material, Cold Laid	10
Single Surface Treatment	11
Double Surface Treatment	12
Recycled Asphalt Concrete	
Hot-Laid, Central Plant Mix	13
Cold-Laid, Central Plant Mix	14
Cold-Laid, Mixed-In-Place	15
Heater Scarification/Recompaction	16
Recycled PCC	
JPCP	17
JRCP	18
CRCP	19
Other	20

Table A.5. Base and Subbase Material Type Classification Codes

Material Type	Code
Gravel (Uncrushed)	22
Crushed Stone, Gravel or Slag	23
Sand	24
Soil-Aggregate Mixture (Predominantly Fine-Grained Soil)	25
Soil-Aggregate Mixture (Predominantly Coarse-Grained Soil)	26
Soil Cement	27
Asphalt Bound Base or Subbase Materials	
Dense-Graded, Hot-Laid, Central Plant Mix	28
Dense-Graded, Cold-Laid, Central Plant Mix	29
Dense-Graded, Cold-Laid, Mixed-In-Place	30
Open-Graded, Hot-Laid, Central Plant Mix	31
Open-Graded, Cold-Laid, Central Plant Mix	32
Open-Graded, Cold-Laid, Mixed-In-Place	33
Recycled Asphalt Concrete, Plant Mix, Hot Laid	34
Recycled Asphalt Concrete, Plant Mix, Cold Laid	35
Recycled Asphalt Concrete, Mixed-In-Place	36
Sand Asphalt	46
Cement-Aggregate Mixture	37
Lean Concrete (<3 sacks cement/cubic yard)	38
Recycled PCC	39
Sand-Shell Mixture	40
Limerock, Caliche (Soft Carbonate Rock)	41
Lime-Treated Subgrade Soil	42
Cement-Treated Subgrade Soil	43
Pozzolanic-Aggregate Mixture	44
Cracked and Seated PCC Layer	45
Other	49

Table A.6. Subgrade Soil Description Codes

Soil Description	Code
Fine-Grained Subgrade Soils	
Clay (Liquid Limit > 50)	51
Sandy Clay	52
Silty Clay	53
Silt	54
Sandy Silt	55
Clayey Silt	56
Coarse-Grained Subgrade Soils	
Sand	57
Poorly Graded Sand	58
Silty Sand	59
Clayey Sand	60
Gravel	61
Poorly Graded Gravel	62
Clayey Gravel	63
Shale	64
Rock	65

Table A.7. Material Type Codes for Thin Seals and Interlayers

Material Type	Code
Grout	70
Chip Seal Coat	71
Slurry Seal Coat	72
Fog Seal Coat	73
Woven Geotextile	74
Nonwoven Geotextile	75
Stress Absorbing Membrane Interlayer	77
Dense-Graded Asphalt Concrete Interlayer	78
Aggregate Interlayer	79
Open-Graded Asphalt Concrete Interlayer	80
Chip Seal with Modified Binder (Does Not Include Crumb Rubber)	81
Sand Seal	82
Asphalt-Rubber Seal Coat (Stress Absorbing Membrane)	83
Sand Asphalt	84
Other	85
Thin Seal Interlayer	86
Plain Portland Cement Concrete (Only Used for SPS–7)	90

Table A.8. Geologic Classification Codes

Material	Code
Igneous	
Granite	01
Syenite	02
Diorite	03
Gabbro	04
Peridotite	05
Felsite	06
Basalt	07
Diabase	08
Sedimentary	
Limestone	09
Dolomite	10
Shale	11
Sandstone	12
Chert	13
Conglomerate	14
Breccia	15
Metamorphic	
Gneiss	16
Schist	17
Amphibolite	18
Slate	19
Quartzite	20
Marble	21
Serpentine	22
Other Rock Type (Specify if Possible or Unknown)	30
Glacial Soils	
Glacial Soils	31
Boulder Clay	32
Glacial Sands and Gravels	33
Laminated Silts and Laminated Clays	34
Varved Clays	35
Ground Moraine	36
Fluvio-Glacial Sands and Gravels	37
Other Glacial Soils	38

Table A.8. Geologic Classification Codes (Continued)

Material	Code
Residual Soils	
Plateau Gravels	40
River Gravels	41
Alluvium	42
Alluvial Clays and/or Peat	43
Alluvial Silt	44
Other Alluvial Soils	45
Coastal Shingle and Beach Deposits	46
Wind-Blown Sand	47
Loess (Collapsible Soil)	48
Shale, Siltstone, Mudstone, Claystone	49
Expansive Soils	50
Residual Soils	51
Residual Soils Derived from Granites, Gneisses, and Schists	52
Residual Soils Derived from Limestone, Sandstone, and Shale	53
Other Residual Soils	54
Coquina	55
Shell	56
Marl	58
Caliche	59
Other	60

Table A.9. Soil and Soil-Aggregate Mixture Type Codes, AASHTO Classification

AASHTO Classification	Code
A–1–a	01
A–1–b	02
A–3	03
A–2–4	04
A–2–5	05
A–2–6	06
A–2–7	07
A–4	08
A–5	09
A–6	10
A–7–5	11
A–7–6	12

Table A.10. Portland Cement Type Codes

Portland Cement Type	Code
Type I	41
Type II	42
Type III	43
Type IV	44
Type V	45
Type IS	46
Type ISA	47
Type IA	48
Type IIA	49
Type IIIA	50
Type IP	51
Type IPA	52
Type N	53
Type NA	54
Other	55

Table A.11. Portland Cement Concrete Admixture Codes

PCC Admixture	Code
Water-Reducing (AASHTO M194, Type A)	01
Retarding (AASHTO M194, Type B)	02
Accelerating (AASHTO M194, Type C)	03
Water-Reducing and Retarding (AASHTO M194, Type D)	04
Water-Reducing and Accelerating (AASHTO M194, Type E)	05
Water-Reducing, High Range (AASHTO M194, Type F)	06
Water-Reducing, High Range and Retarding (AASHTO M194, Type G)	07
Air-Entraining Admixture (AASHTO M154)	08
Natural Pozzolans (AASHTO M295, Class N)	09
Fly Ash, Class F (AASHTO M295)	10
Fly Ash, Class C (AASHTO M295)	11
Other (Chemical)	12
Other (Mineral)	13

Table A.12. Aggregate Durability Test Type Codes

Description	AASHTO	ASTM	Code
Resistance to Abrasion of Small Size Coarse Aggregate by Use of Los Angeles Machine (Percent Weight Loss)	T96	C131	01
Soundness of Aggregate by Freezing and Thawing (Percent Weight Loss)	T103	–	02
Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate (Percent Weight Loss)	T104	C88	03
Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine (Percent Weight Loss)	–	C535	04
Potential Volume Change of Cement-Aggregate Combinations (Percent Expansion)	–	C342	05
Evaluation of Frost Resistance of Coarse Aggregates in Air-Entrained Concrete by Critical Dilution Procedures (Number of Weeks of Frost Immunity)	–	C682	06
Potential Alkali Reactivity of Cement Aggregate Combinations (Average Percent Expansion)	–	C227	07
Potential Reactivity of Aggregates (Reduction in Alkalinity-mmol/L)	–	C289	08
Test for Clay Lumps and Friable Particles in Aggregates (Percent by Weight)	T112	C142	09
Test for Potential Alkali Reactivity of Carbonate Rocks for Concrete Aggregates (Percent Change in Specimen Length)	–	C586	11

Table A.13. Codes for Asphalt Refiners and Processors in the United States*

Refiner/Processor	Code
Belcher Refining Co.—Mobile Bay, AL	78
Hunt Refining Co.—Tuscaloosa, AL	01
Chevron USA, Inc.—Kenai, AK	02
Mapco Alaska Petroleum—North Pole, AK	03
Intermountain Refining Cl.—Fredonia, AZ	04
Berry Petroleum Company—Stevens, AR	05
Cross Oil and Refining Company—Smackover, AR	06
Lion Oil Company—El Dorado, AR	07
McMillan Ring, Free Oil Cl.—Norphlet, AR	08
Chevron USA, Inc.—Richmond, CA	09
Conoco, Inc.—Santa Maria, CA	10
Edgington Oil Co., Inc.—Long Beach, CA	11
Golden Bear Division, Witco Chemical Corp.—Oildale, CA	12
Golden West Refining, Co.—Santa Fe Springs, CA	13
Huntway Refining Co.—Benicia, CA	14
Huntway Refining Co.—Wilmington, CA	15
Lunday-Thagard Co.—South Gate, CA	79
Newhall Refining Co., Inc.—Newhall, CA	16
Oxnard Refining—Oxnard, CA	17
Paramount Petroleum Corp.—Paramount, CA	80
Powerline Oil Co.—Santa Fe Springs, CA	81
San Joaquin Refining Cl.—Bakersfield, CA	18
Shell Oil Co.—Martinez, CA	19
Superior Processing Co.—Santa Fe Springs, CA	20
Colorado Refining Co.—Commerce City, CO	82
Conoco, Inc.—Commerce City, CO	21
Amoco Oil, Inc.—Savannah, GA	22
Young Refining Corp.—Douglasville, GA	23
Chevron USA, Inc.—Barber’s Point, HI	24
Clark Oil and Refining Corp.—Blue Island, IL	25
Shell Oil Co.—Wood River, IL	26
Unacol Corp.—Lemont, IL	27
Amoco Oil Co.—Whiting, IN	28
Laketon Refining Corp.—Laketon, IN	83
Young Refining Corp.—Laketon, IN	29
Derby Refining Co.—El Dorado, KS	84
Farmland Industries, Inc.—Phillipsburg, KS	30
Total Petroleum, Inc.—Arkansas City, KS	31
Ashland Petroleum Co.—Catlettsburg, KY	32
Atlas Processing Co.—Shreveport, LA	33
Calumet Refining Co.—Princeton, LA	34
Exxon Co.—Baton Rouge, LA	35

Table A.13. Codes for Asphalt Refiners and Processors in the United States* (Continued)

Refiner/Processor	Code
Marathon Petroleum Co.—Garyville, LA	36
Marathon Petroleum Co.—Detroit, MI	37
Ashland Petroleum Co.—St. Paul, MN	38
Koch Refining Co.—Rosemount, MN	39
Chevron USA, Inc.—Pascagoula, MS	40
Ergon Refining Inc.—Vicksburg, MS	41
Southland Oil Co.—Lumberton, MS	42
Southland Oil Co.—Sanderson, MS	43
Cenex—Laurel, MT	44
Conoco, Inc.—Billings, MT	45
Exxon Co.—Billings, MT	46
Chevron USA, Inc.—Perth Amboy, NJ	47
Exxon Co.—Linden, NJ	48
Giant Industries, Inc.—Gallup, NM	85
Navahoe Refining Co.—Artesia, NM	49
Cibro Petroleum Products Co.—Albany, NY	86
Ashland Petroleum Co.—Canton, OH	50
Standard Oil Co.—Toledo, OH	51
Sohio Oil Co. (BP America)—Toledo, OH	87
Kerr-McGee Refining Co.—Wynnewood, OK	52
Sinclair Oil Corp.—Tulsa, OK	53
Sun Co.—Tulsa, OK	54
Total Petroleum, Inc.—Ardmore, OK	55
Chevron USA, Inc.—Portland, OR	56
Atlantic Refining & Marketing Corp.—Philadelphia, PA	57
United Refining Co.—Warren, PA	58
Mapco Petroleum, Inc.—Memphis, TN	59
Charter International Oil Co.—Houston, TX	60
Chevron USA, Inc.—El Paso, TX	61
Coastal Refining & Marketing, Inc.—Corpus Christi, TX	88
Coastal States Petroleum Co.—Corpus Christi, TX	62
Diamond Shamrock Corp.—Sunray, TX	63
Exxon Co. USA—Baytown, TX	64
Fina Oil and Chemical Co.—Big Spring, TX	65
Fina Oil and Chemical Co.—Port Arthur, TX	89
Hill Petroleum Co.—Houston, TX	90
Shell Oil Co.—Deer Park, TX	66
Star Enterprise—Port Arthur & Port Neches, TX	91
Texaco Refining & Marketing, Inc.—Port Arthur & Port Neches, TX	67
Trifinery—Corpus Christi, TX	92
Unocal Corp.—Nederland, TX	68

Table A.13. Codes for Asphalt Refiners and Processors in the United States* (Continued)

Refiner/Processor	Code
Valero Refining Co.—Corpus Christi, TX	69
Phillips 66 Co.—Woods Cross, UT	70
Chevron USA Inc.—Seattle, WA	71
Sound Refining, Inc.—Tacoma, WA	72
US Oil and Refining Co.—Tacoma, WA	73
Murphy Oil USA, Inc.—Superior, WI	74
Big West Oil Co.—Cheyenne, WY	75
Little America Refining Co.—Casper, WY	93
Sinclair Oil Corp.—Sinclair, WY	76
Other	77

*Originally taken from *Oil and Gas Journal*, March 20, 1989, pp. 72–89 and updated October 1993.

Table A.14. Asphalt Cement Modifier Codes

Asphalt Cement Modifiers	Code
Stone Dust	01
Lime	02
Portland Cement	03
Carbon Black	04
Sulfur	05
Lignin	06
Natural Latex	07
Synthetic Latex	08
Block Copolymer	09
Reclaimed Rubber	10
Polyethylene	11
Polypropylene	12
Ethylene-Vinyl Acetate	13
Polyvinyl Chloride	14
Asbestos	15
Rock Wool	16
Polyester	17
Manganese	18
Other Mineral Salts	19
Lead Compounds	20
Carbon	21
Calcium Salts	22
Recycling Agents	23
Rejuvenating Oils	24
Amines	25
Fly Ash	26
Other	27

Table A.15. Grades of Asphalt, Emulsified Asphalt, and Cutback Asphalt Codes

Asphalts	Code
Asphalt Cements	
AC–2.5	01
AC–5	02
AC–10	03
AC–20	04
AC–30	05
AC–40	06
AR–1000 (AR–10 by AASHTO Designation)	07
AR–2000 (AR–20 by AASHTO Designation)	08
AR–4000 (AR–40 by AASHTO Designation)	09
AR–8000 (AR–80 by AASHTO Designation)	10
AR–16000 (AR–160 by AASHTO Designation)	11
200–300 pen	12
120–150 pen	13
85–100 pen	14
60–70 pen	15
40–50 pen	16
Other Asphalt Cement Grade	17
Emulsified Asphalts	
RS–1	18
RS–2	19
MS–1	20
MS–2	21
MS–2h	22
HFMS–1	23
HFMS–2	24
HFMS–2h	25
HFMS–2s	26
SS–1	27
SS–1h	28
CRS–1	29
CRS–2	30
CMS–2	31
CMS–2h	32
CSS–1	33
CSS–1h	34
Other Emulsified Asphalt Grades	35
Cutback Asphalts (RC, MC, SC)	
30 (MC only)	36
70	37
250	38
800	39
3000	40
Other Cutback Asphalt Grade	99

Taken from Manual Series No. 5 (MS–5), "A Brief Introduction to Asphalt," and Specification Series No. 2 (SS–2), "Specifications for Paving and Industrial Asphalts," both publications by the Asphalt Institute.

Table A.16. Maintenance and Rehabilitation Work Type Codes

Maintenance and Rehabilitation Work Type	Codes
Crack Sealing (linear ft)	01
Transverse Joint Sealing (linear ft)	02
Lane-Shoulder Longitudinal Joint Sealing (linear ft)	03
Full Depth Joint Repair Patching of PCC (sq. yards)	04
Full Depth Patching of PCC Pavement Other than at Joint (sq. yards)	05
Partial Depth Patching of PCC Pavement Other than at Joint (sq. yards)	06
PCC Slab Replacement (sq. yards)	07
PCC Shoulder Restoration (sq. yards)	08
PCC Shoulder Replacement (sq. yards)	09
AC Shoulder Restoration (sq. yards)	10
AC Shoulder Replacement (sq. yards)	11
Grinding/Milling Surface (sq. yards)	12
Grooving Surface (sq. yards)	13
Pressure Grout Subsealing (no. of holes)	14
Slab Jacking Depressions (no. of depressions)	15
Asphalt Subsealing (no. of holes)	16
Spreading of Sand or Aggregate (sq. yards)	17
Reconstruction (Removal and Replacement) (sq. yards)	18
Asphalt Concrete Overlay (sq. yards)	19
Portland Cement Concrete Overlay (sq. yards)	20
Mechanical Premix Patch (Using Motor Grader and Roller) (sq. yards)	21
Manual Premix Spot Patch (Hand Spreading and Compacting with Roller) (sq. yards)	22
Machine Premix Patch (Placing Premix with Paver, Compacting with Roller) (sq. yards)	23
Full Depth Patch of AC Pavement (Removing Damaged Material, Repairing Supporting Material, and Repairing) (sq. yards)	24
Patch Pot Holes—Hand Spread, Compacted with Truck (no. of holes)	25
Skin Patching (Hand Tools/Hot Pot to Apply Liquid Asphalt and Aggregate) (sq. yards)	26
Strip Patching (Using Spreader and Distributor to Apply Hot Liquid Asphalt and Aggregate) (sq. yards)	27
Surface Treatment, Single Layer (sq. yards)	28
Surface Treatment, Double Layer (sq. yards)	29
Surface Treatment, Three or More Layers (sq. yards)	30
Aggregate Seal Coat (sq. yards)	31
Sand Seal Coat (sq. yards)	32
Slurry Seal Coat (sq. yards)	33
Fog Seal Coat (sq. yards)	34
Prime Coat (sq. yards)	35
Tack Coat (sq. yards)	36
Dust Layering (sq. yards)	37

Table A.16. Maintenance and Rehabilitation Work Type Codes (Continued)

Maintenance and Rehabilitation Work Type	Codes
Longitudinal Subdrains (linear ft)	38
Transverse Subdrainage (linear ft)	39
Drainage Blanket (sq. yards)	40
Well System	41
Drainage Blankets with Longitudinal Drains	42
Hot-Mix Recycled Asphalt Concrete (sq. yards)	43
Cold-Mix Recycled Asphalt Concrete (sq. yards)	44
Heater Scarification, Surface Recycled Asphalt Concrete (sq. yards)	45
Fracture Treatment of PCC Pavement as Base for New AC Surface (sq. yards)	46
Fracture Treatment of PCC Pavement as Base for New PCC Surface (sq. yards)	47
Recycled PCC (sq. yards)	48
Pressure Relief Joints in PCC Pavements (linear feet)	49
Joint Load Transfer Restoration in PCC Pavements (linear ft)	50
Mill off Existing AC Pavement and Overlay with AC (sq. yards)	51
Mill off Existing AC Pavement and Overlay with PCC (sq. yards)	52
Other	53
Partial Depth Patching of PCC Pavement at Joints (sq. yards)	54
Mill Existing Pavement and Overlay with Hot-Mix Recycled Asphalt Concrete (sq. yards)	55
Mill Existing Pavement and Overlay with Cold-Mix Recycled Asphalt Concrete (sq. yards)	56
Saw and Seal (linear ft.)	57

Table A.17. Maintenance Location Codes

Maintenance Location	Code
Outside Lane (Number 1)	01
Inside Lane (Number 2)	02
Inside Lane (Number 3)	03
All Lanes	09
Shoulder	04
All Lanes Plus Shoulder	10
Curb and Gutter	05
Side Ditch	06
Culvert	07
Other	08

Note: LTPP only studies outside lanes.

Table A.18. Maintenance Materials Type Codes

Maintenance Materials Type	Code
Preformed Joint Fillers	01
Hot-Poured Joint and Crack Sealer	02
Cold-Poured Joint and Crack Sealer	03
Open Graded Asphalt Concrete	04
Hot-Mix Asphalt Concrete Laid Hot	05
Hot-Mix Asphalt Concrete Laid Cold	06
Sand Asphalt	07
PCC (Overlay Replacement)	
Joint Plain (JPCP)	08
Joint Reinforced (JRCP)	09
Continuously Reinforced (CRCP)	10
PCC (Patches)	11
Hot Liquid Asphalt and Aggregate (Seal Coat)	12
Hot Liquid Asphalt and Mineral Aggregate	13
Hot Liquid Asphalt and Sand	14
Emulsified Asphalt and Aggregate (Seal Coat)	15
Emulsified Asphalt and Mineral Aggregate	16
Emulsified Asphalt and Sand	17
Hot Liquid Asphalt	18
Emulsified Asphalt	19
Sand Cement (Using Portland Cement)	20
Lime Treated or Stabilized Materials	21
Cement Treated or Stabilized Materials	22
Cement Grout	23
Aggregate (Gravel, Crushed Stone, or Slag)	24
Sand	25
Mineral Dust	26
Mineral Filler	27
Other	28

Table A.19. Recycling Agent Type Codes

Recycling Agent	Code
RA 1	42
RA 5	43
RA 25	44
RA 75	45
RA 250	46
RA 500	47
Other	48

Note: The recycling agent groups shown in this table are defined in ASTM D4552.

Table A.20. Antistripping Agent Type Codes

Antistripping Agent	Code
Permatac	01
Permatac Plus	02
Betascan Roads	03
Pavebond	04
Pavebond Special	05
Pavebond Plus	06
BA 2000	07
BA 2001	08
Unichem "A"	09
Unichem "B"	10
Unichem "C"	11
Aquashield AS4115	12
Aquashield AS4112	13
Aquashield AS4113	14
Portland Cement	15
Hydrated Lime:	
Mixed Dry with Asphalt Cement	16
Mixed Dry with Dry Aggregate	17
Mixed Dry with Wet Aggregate	18
Slurried Lime Mixed with Aggregate	19
Hot Lime Slurry (Quick Lime Slaked and Slurried at Job Site)	20
No Strip Chemicals A–500	21
No Strip Chemical Works ACRA RP–A	22
No Strip Chemical Works ACRA Super Conc.	23
No Strip Chemical Works ACRA 200	24
No Strip Chemical Works ACRA 300	25
No Strip Chemical Works ACRA 400	26
No Strip Chemical Works ACRA 500	27
No Strip Chemical Works ACRA 512	28
No Strip Chemical Works ACRA 600	29
Darakote	30
De Hydro H86C	31
Emery 17065	32
Emery 17319	33
Emery 17319–6880	34
Emery 17320	35
Emery 17321	36
Emery 17322	37
Emery 17339	38
Emery 1765–6860	39
Emery 6886B	40
Husky Antistrip	41

Table A.20. Antistripping Agent Type Codes (Continued)

Antistripping Agent	Code
Indulin AS-Special	42
Indulin AS–1	43
Jetco AD–8	44
Kling	45
Kling-Beta ZP–251	46
Kling-Beta L–75	47
Kling-Beta LV	48
Kling-Beta 1000	49
Kling-Beta 200	50
Nacco Antistrip	51
No Strip	52
No Strip Concentrate	53
Redi-Coat 80–S	54
Redi-Coat 82–S	55
Silicone	56
Super AD–50	57
Tap Co 206	58
Techni H1B7175	59
Techni H1B7173	60
Techni H1B7176	61
Techni H1B7177	62
Tretolite DH-8	63
Tretolite H–86	64
Tretolite H–86C	65
Tyfo A–45	66
Tyfo A–65	67
Tyfo A–40	68
Edoco 7003	69
Other	70
No Antistripping Agent Used	00

Table A.21. Distress Types

Distress Type	Code
AC Pavement	
Alligator Cracking	01
Block Cracking	02
Edge Cracking	03
Longitudinal Cracking	04
Reflection Cracking	05
Transverse Cracking	06
Patch Deterioration	07
Potholes	08
Rutting	09
Shoving	10
Bleeding	11
Polished Aggregate	12
Raveling and Weathering	13
Lane Shoulder Dropoff	14
Water Bleeding	15
Pumping	16
Other	17
PCC Pavement	
Corner Breaks	20
Durability Cracking	21
Longitudinal Cracking	22
Transverse Cracking	23
Joint Seal Damage	24
Spalling	25
Map Cracking/Scaling	26
Polished Aggregate	27
Popouts	28
Punchouts	29
Blowouts	30
Faulting	31
Lane/Shoulder Dropoff	32
Lane/Shoulder Separation	33
Patch Deterioration	34
Water Bleeding / Pumping	35
Slab Settlement	36
Slab Upheaval	37
Other	38