Long-Term Pavement Performance Compliance with Department of Transportation Information Dissemination Quality Guidelines

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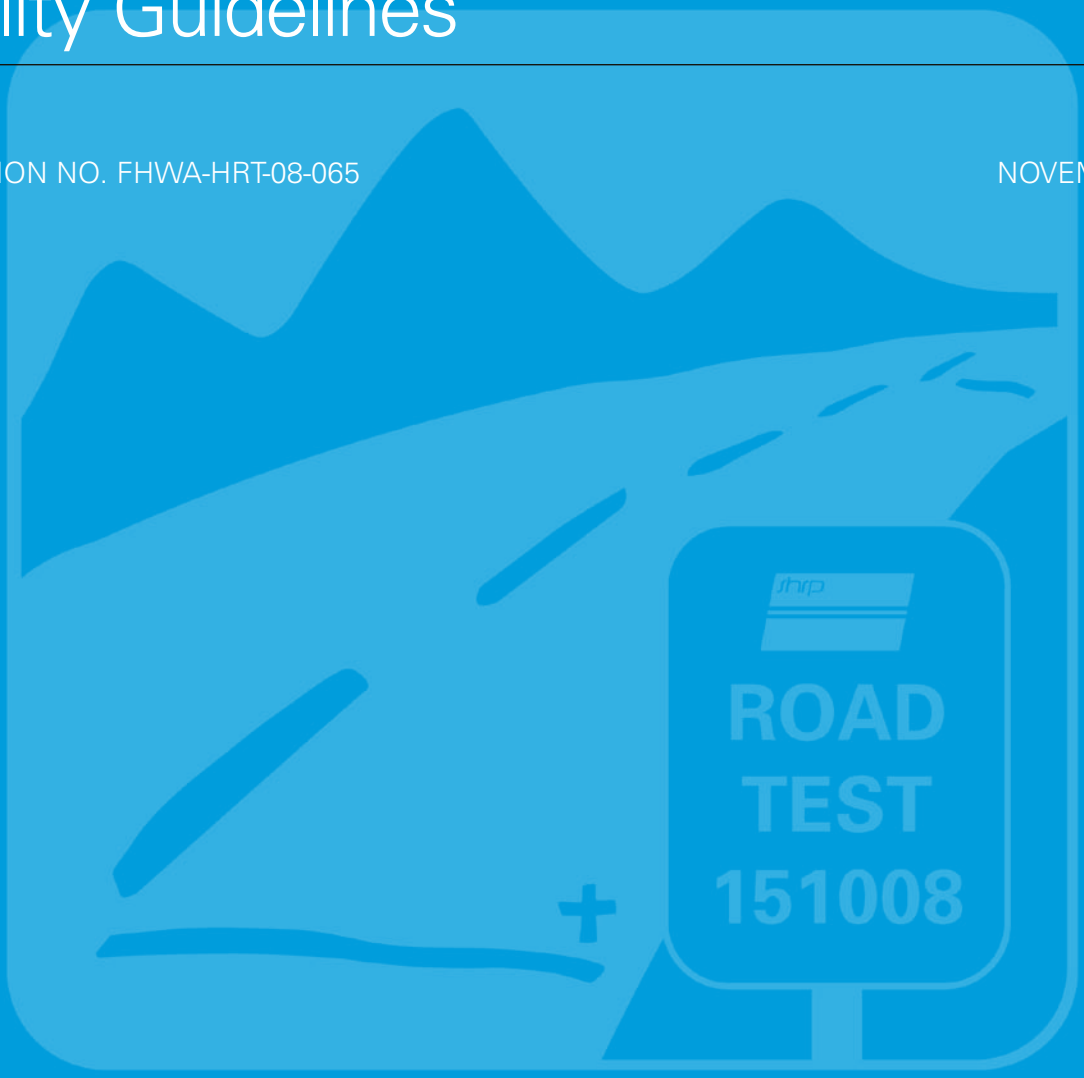

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Federal Highway Administration

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LTPP

FOREWORD

This document provides information on the compliance of the Long-Term Pavement Performance (LTPP) program with the guidelines the Department of Transportation (DOT) issued Information Dissemination Quality Guidelines (IDQG). These guidelines were developed in response to requirements of Section 515 of the Treasury and General Government Appropriations Act for fiscal year (FY) 2001. The purpose of the guidelines is to ensure and maximize the quality, utility, objectivity, and integrity of information that is disseminated by the Federal government. This document discusses the activities performed under the LTPP program, and it also addresses the policies and procedures established by these guidelines.

The 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.fhwa.dot.gov/pavement/ltpp/index.cfm. 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

Quality Assurance Statement

The Federal Highway Administration (FHWA) provides high-quality information to serve Government, industry, and the public in a manner that promotes public understanding. Standards and policies are used to ensure and maximize the quality, objectivity, utility, and integrity of its information. FHWA periodically reviews quality issues and adjusts its programs and processes to ensure continuous quality improvement.

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16. Abstract
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17. Key Words
Data quality, experiment design, data dissemination, Federal information dissemination guidelines, information quality, data system planning, data collection design

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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)		
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
		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)		
°C	Celsius	1.8C+32	Fahrenheit	°F
		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

AADT	Annual average daily traffic
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
AC	Asphalt concrete
ASTM	American Society for Testing and Materials
AVC	Automated vehicle classification
AWS	Automated weather station
CCC	Canadian Climatic Center
DLR	Dynamic load response
DMI	Distance Measuring Instrument
DOT	Department of Transportation
ESAL	Equivalent single-axle load
ETG	Expert Task Groups
FAR	Federal Acquisition Regulation
FHWA	Federal Highway Administration
FIPS	Federal Information Processing Standards
FWD	Falling-weight deflectometer
FY	Fiscal year
GPS	General Pavement Studies
HPMS	Highway Performance Monitoring System
IDQG	Information Dissemination Quality Guidelines
IMS	Information Management System
ISO	International Organization for Standardization
LTPP	Long-Term Pavement Performance
MEPDG	Mechanistic-Empirical Pavement Design Guide
NCDC	National Climatic Data Center
NCHRP	National Cooperative Highway Research Program
NRC	National Research Council
PADIAS	Pavement Distress Analysis System
PCC	Portland cement concrete
QC	Quality control
RDBMS	Relational database management system
SHRP	Strategic Highway Research Program
SI	International System of Units
SMP	Seasonal Monitoring Program
SPR	Software Performance Report
SPS	Specific Pavement Studies
SQL	Standard Query Language
TFHRC	Turner-Fairbank Highway Research Center
WIM	Weigh-in-motion

INTRODUCTION

On October 1, 2002, the Department of Transportation (DOT) issued Information Dissemination Quality Guidelines (IDQG) to implement Section 515 of the Treasury and General Government Appropriations Act for fiscal year (FY) 2001. The purpose of the guidelines is to ensure and maximize the quality, utility, objectivity, and integrity of information that is disseminated. This document presents the policies and procedures established by the Long-Term Pavement Performance (LTPP) program related to compliance with the DOT IDQG.

In the interest of brevity, this document does not recite all of the DOT IDQG specifications. Instead, each chapter on a specific topic covered in the DOT IDQG provides a general summary of the intent of the guidelines. A copy of the DOT IDQG can be found at http://www.thecre.com/pdf/20021026_dot-final.pdf.

BACKGROUND

The LTPP program started as a States initiative in the early 1980s. Preimplementation research planning was conducted under a joint effort between the Federal Highway Administration (FHWA), Transportation Research Board (TRB), and the National Cooperative Highway Research Program (NCHRP). These plans were published by NCHRP in May 1986 in the report *Strategic Highway Research Program: Research Plans*. Implementation of the LTPP program was authorized under the Surface Transportation and Uniform Relocation Act of 1987. The 20-year LTPP program began operations under the 5-year Strategic Highway Research Program (SHRP) administered by the National Academy of Sciences. In 1992, the FHWA made a commitment to assume management and administrative responsibilities to continue LTPP and complete the baseline 20-year period of pavement performance monitoring. Continuation of LTPP under FHWA was formally authorized by Congress in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). In 1998, the Transportation Equity Act for the 21st Century (TEA-21) funded LTPP as a national program to 2003.

The LTPP Program received its foundational mission from a 1984 study entitled, *America's Highways: Accelerating the Search for Innovation* (Special Report 202), published by the TRB. The program's mission is to "increase pavement life by the investigation of the long-term performance of various designs of pavement structures and rehabilitated pavement structures, using different materials and under different loads, environments, subgrade soils, and maintenance practices." The strategic goals and objectives for LTPP were stated in the original LTPP work plan as follows:

- Evaluate existing design methods.
- Develop improved design methodologies and strategies for the rehabilitation of existing pavements.
- Develop improved design equations for new and reconstructed pavements.

- Determine the effects of loading, environment, material properties and variability, construction quality, and maintenance levels on pavement distress and performance.
- Determine the effects of specific design features on pavement performance.
- Establish a national long-term pavement database to support program objectives and future needs.

LTPP DATA QUALITY HIGHLIGHTS

Data quality has been a prime concern in the development and operation of the LTPP program. Although the LTPP program started more than 14 years prior to the issuance of the Federal data quality guidelines, it is remarkable how many of the concepts and procedures contained in the guidelines were followed by LTPP. Some of the highlights of the LTPP data quality process include the following:

- Extensive peer review by experts and highway agency practitioners. A TRB committee was created in 1986 to monitor the status and progress of the LTPP studies and provides technical assistance to FHWA concerning courses of action and the future direction of the studies. The TRB LTPP Committee is supplemented with smaller Expert Task Groups (ETGs) created on specific subjects. Over the years, ETGs have been created on Experiment Design, Materials Testing, Environmental Data Collection, Profile Measurement, Falling Weight Deflectometer (FWD) Measurements, Traffic Data Collection, Pavement Distress Measurement, Construction Specifications, Data Analysis, Metrication, and Database Operations.
- Statistically-based factorial experimental designs were used to plan the studies. The experimental designs were prepared by nationally and internationally recognized statisticians and research engineers. These designs were reviewed by an ETG.
- LTPP has documented all phases of its activities. More than 300 documents have been prepared describing the details of the planning process, experiment design, construction guidelines, agency participation requirements, data collection procedures, data processing procedures, data evaluation checks, data collection equipment calibration procedures and checks, data analysis results, standard data release format and data user aids, and details of construction and instrumentation installation on specific test sections.
- Inclusion of an indicator of "data quality" on each record in the database was developed in the early 1990s and has been refined over time. This data quality indicator encompasses measures of identifying missing data, out of range data, inconsistencies in relational data structures between tables, and illogical data. The data quality indicator is disseminated with the data.
- In the design of the data collection plan, LTPP had to develop new procedures, protocols, and test methods. Some of these methods have been adopted as

American Association of State Highway and Transportation Officials (AASHTO) standards.

- In 2000, LTPP implemented International Organization for Standardization (ISO) management quality standards in its data collection and processing activities. All data collection contractors developed management procedures for data quality control (QC). These procedures are audited by an independent source on a nominal 6-month cycle.
- Currently, LTPP data updates are released on a 1-year interval. Prior to data release, a central contractor, independent from data collection sources, performs a predistribution review of the data in order to identify, and if possible, corrects data problems not previously discovered.
- LTPP created a customer service and data problem feedback process in the early 1990s. A formal data problem and feedback mechanism was created in the late 1990s which allows data users, analysts, and others to submit problem reports. These reports and their resolution are now posted on the LTPP Web page http://www.fhwa.dot.gov/pavement/ltpp/index.cfm.

As a unique national research program whose operations model consists of providing research quality data for analysis to those who did not participate in the data collection process, all of the issues in recent Federal guides on data quality had to be addressed by LTPP. Improvements are continuously occurring to enhance LTPP's conformance to the new IDQG. These improvements are resource constrained and are dependent on budget allocation from Congress.