Memorandum

U.S. Department
of Transportation

**Federal Highway
Administration**

6300 Georgetown Pike
McLean, Virginia 22101

Subject: **ACTION**: LTPP Directive M-35
Material Test Protocol P-74 (AC08) Using
Asphalt Mixture Performance Tester

Date: November 18, 2021

From: Larry Wiser LARRY J WISER Digitally signed by LARRY J WISER Date: 2021.11.18 09:44:35 -05'00'
Long-Term Infrastructure Performance Team

Reply to
Attn of: HRDI-30

To: Dr. Ramon Bonaquist, PM - LTPP SPS-10 Material Testing Contract

Attached is the Long-Term Pavement Performance (LTPP) Program Directive M-35. This directive updates the LTPP protocol for Using Asphalt Mixture Performance Tester to Determine Dynamic Modulus of Hot Mixed Asphalt.

Please ensure that all personnel involved with Material Test Protocol P-74 are aware of this new directive. Should you have any questions or would like to discuss this directive, please do not hesitate to contact Larry Wiser via email at larry.wiser@dot.gov (202) 493-3079.

Attachments (1)

FHWA:HRDI-30 L. Wiser:jeh:202-493-3079:11/18/21
File: M:\LTPP Directives\MATERIALS\M-35
cc:
Jonathan Groeger
Larry Wiser
Gabe Cimini
Directive Binder
LTPP Team
Official file

LONG TERM PAVEMENT PERFORMANCE PROGRAM DIRECTIVE

For the Technical Direction of the LTPP Program

Program Area:	Materials	Directive Number:	M-35
Date:	November 18, 2021	Supersedes:	M-33
Subject:	Material Test Protocol P-74 (AC08) Using Asphalt Mixture Performance Tester to Determine Dynamic Modulus for Hot Mix Asphalt, Version 4		

The following material test protocol is an update to the LTPP protocol for Using Asphalt Mixture Performance Tester to Determine Dynamic Modulus of Hot Mixed Asphalt. This update (1) adjusts the language concerning the test temperature (allowing lower test temperatures for soft specimens), and (2) includes prismatic specimen dimensions on the data sheet. This test method is to be used on designated material samples obtained from LTPP SPS-10 project sites.

Prepared by: TSSC

Approved by:

JEAN NEHME Digitally signed by JEAN NEHME
Date: 2021.11.18 17:04:07 -05'00'

Jean A. Nehme, Ph.D., P.E.
Long-Term Infrastructure Performance
Team Leader (HRDI30)

PROTOCOL P74
Using Asphalt Mixture Performance Tester (AMPT) to Determine Dynamic Modulus for Hot Mix Asphalt (HMA) (AC08)

This LTPP Protocol covers the procedures for determining the dynamic modulus from asphalt concrete pavement cores using the Asphalt Mixture Performance Tester (AMPT). The test shall be carried out in accordance with AASHTO T378-17, with the following modifications.

SUMMARY OF METHOD

Follow procedure for measuring dynamic modulus only. The procedure for measuring flow number is disregarded.

Test temperature – Procedure shall be conducted at test temperatures of 5, 20, and 45°C.

If the test specimen binder is expected to be soft, it is recommended to vary the upper temperature based on the stiffness of the binder in the specimen. i.e., 35°C for Performance Grade (PG) 58 and softer, 40°C for PG 64 and 70, and 45°C for PG 76 and stiffer. The laboratory can lower the maximum temperature further at their discretion if the instrumentation falls off of the test specimen during the temperature conditioning. If a maximum temperature less than 45°C is used, a note should be added in the comment section that states "Soft binder - modified upper test temp."

Test frequency – Procedure shall be conducted at test frequencies of 0.1, 1, 10, and 25 Hz for each test temperature

Flow Number Procedure – **DELETE**

PROCEDURE A—DYNAMIC MODULUS TEST

Test Specimen Fabrication

Test Specimens – The test specimens shall be cored or cut from 152.4 mm or larger diameter core field samples. The size and geometry of the test specimen will depend on the thickness of the layer to be tested. If the thickness of the layer is greater than or equal to 50 mm, then the test specimens shall be cored in the lab and trimmed to be 110 mm tall and have a 38 mm diameter. If the thickness of the layer is less than 50 mm, then prismatic specimens 25 mm by 50 mm by 110 mm, cut from the core, should be used. When possible, specimens should be cored/cut parallel to the direction of traffic.

Number of Test Specimens – For each layer and sampling time included in the testing plan, the test shall be performed on two test specimens, preferably from two different field cores. Each test specimen shall be tested at all three temperatures.

Use Teflon® end-friction reducers.

The two test specimens shall be conditioned separately in an environmental chamber. Condition each specimen with "dummy" specimen to the target test temperature.

Repeat procedures for remaining test specimen at the corresponding temperature.

Confined Test – **DELETE**

Reporting:

The following information shall be recorded for each test specimen/temperature and reported using Lab Data Sheet T74.

For each specimen tested report the following:

Laboratory Identification Code, State, State Code, SHRP ID, Field Set Number, Layer Number, Sample Location Designation, LTPP Sample Number, LTPP Specimen Number, and Specimen Type (C = cylindrical specimen, P = prismatic specimen). For cylindrical specimens the laboratory shall record the Specimen Length, and Cylinder Diameter. For prismatic specimens the laboratory shall record the Specimen Length, Prism Width and Prism Depth.

Test Temperature,

Test Frequency,

Confining stress level – **DELETE,**

Dynamic Modulus,

Phase Angle, and

Data Quality Statistics: Deformation Drift Direction, Peak-to-Peak Strain, Load Standard Error, Deformation Standard Error, and Phase Uniformity.

Comments shall include LTPP standard lab comment code(s).

PROCEDURE B—FLOW NUMBER TEST – DELETE

LTPP-SPS LABORATORY MATERIAL HANDLING AND TESTING FOR EXPERIMENT SPS-10
LABORATORY MATERIAL TEST DATA
TEST FOR DETERMINING THE DYNAMIC MODULUS
LAB DATA SHEET T74

SHEET NO. ____ OF ____
STATE _____
STATE CODE [ ][ ]
SHRP ID. [ ][ ][ ][ ]
FIELD SET NO. [ ][ ]

ASPHALT CONCRETE LAYER (ASPHALT CONCRETE PROPERTIES)
LTPP TEST DESIGNATION AC08 / LTPP PROTOCOL P74

LABORATORY PERFORMING TEST: _____ **LAB CODE .....**[ ][ ][ ][ ]
SAMPLED BY:_____ **DATE SAMPLED:** ___-___-__
LAYER NUMBER .....[ ][ ]
SAMPLE LOCATION DESIGNATION..... [ ][ ][ ][ ][ ][ ]
SAMPLE NUMBER.....[ ][ ][ ][ ][ ][ ]
SPECIMEN TYPE ..... [ ]
CORE/PRISM: SPECIMEN LENGTH (mm) ..... [ ][ ][ ].[ ]
CORE: CYLINDER DIAMETER (mm) ..... [ ][ ][ ].[ ]
PRISM: SPECIMEN WIDTH (mm)..... [ ][ ][ ].[ ]
PRISM: SPECIMEN DEPTH (mm) ..... [ ][ ][ ].[ ]
TEST TEMPERATURE (°C)..... [ ][ ].[ ]

TEST FREQUENCY (Hz)	[ ][ ].[ ][ ]	[ ][ ].[ ][ ]	[ ][ ].[ ][ ]	[ ][ ].[ ][ ]
DYNAMIC MODULUS (kPA)	[ ][ ][ ][ ][ ][ ][ ]	[ ][ ][ ][ ][ ][ ][ ]	[ ][ ][ ][ ][ ][ ][ ]	[ ][ ][ ][ ][ ][ ][ ]
PHASE ANGLE (°)	[ ][ ].[ ]	[ ][ ].[ ]	[ ][ ].[ ]	[ ][ ].[ ]
DEFORMATION DRIFT DIRECTION (I = In Direction, N = Not In Direction)	[ ]	[ ]	[ ]	[ ]
PEAK TO PEAK STRAIN (microstrain)	[ ][ ][ ][ ]	[ ][ ][ ][ ]	[ ][ ][ ][ ]	[ ][ ][ ][ ]
LOAD ERROR (%)	[ ][ ]	[ ][ ]	[ ][ ]	[ ][ ]
DEFORMATION ERROR (%)	[ ][ ]	[ ][ ]	[ ][ ]	[ ][ ]
DEFORMATION UNIFORMITY (%)	[ ][ ]	[ ][ ]	[ ][ ]	[ ][ ]
PHASE UNIFORMITY (°)	[ ][ ]	[ ][ ]	[ ][ ]	[ ][ ]

COMMENT CODES..... [ ][ ], [ ][ ], [ ][ ], [ ][ ]
COMMENT OTHER: _____
TEST DATE (month-day-year)..... [ ][ ]/[ ][ ]/[ ][ ]
Raw Data Filename: _____

GENERAL REMARKS _____

CERTIFIED DATE VERIFIED AND APPROVED DATE

_____ ____ – ____ – ____ _____ ____ – ____ – ____

Laboratory Chief Month Day Year Month Day Year

Affiliation _____ Affiliation _____