



# RESEARCHNOTE

## LTPP ANALYSIS-READY MATERIALS DATASET (ARMAD) RELEASE

Office of Infrastructure R&D

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### PROJECT DETAILS

This project is being conducted by the FHWA-TFHRC Office of Research, Development, and Technology by Wood Environment & Infrastructure Solutions, Inc. under contract 693JJ320D000025.

### SUMMARY

This research note is a release announcement of the new Federal Highway Administration (FHWA) Long-Term Pavement Performance (LTPP) ARMAD and associated report *Development and Use of the LTPP Analysis-Ready Materials Dataset* (Forthcoming). It has been issued to coincide with the release of the first ARMAD version in the 36th LTPP Standard Data Release (SDR 36) via LTPP InfoPave™ in the summer of 2022.<sup>(1,2)</sup> This document provides a brief overview of ARMAD. The full report will be issued later in 2022.

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### LTPP ARMAD

The LTPP database is the world's premier source of data and information on pavement performance. However, understanding and using the database is not necessarily an easy undertaking. For starters, the data are typically distributed across multiple tables in the database, making some data elements difficult to mine. There are also multiple values for a given data element, making it unclear which value(s) to use. In addition, the data may have to be further interpreted to yield meaningful results. Because of these challenges, the LTPP Program team has undertaken a process to generate analysis-ready datasets (ARDs), starting with the dataset detailed in this document, ARMAD. ARMAD overcomes the stated challenges for the layer thicknesses and material properties of all test sections in the LTPP database with one exception, the Specific Pavement Study (SPS)-10 Warm-Mix Asphalt Overlay of Asphalt Pavements experiment test sections.<sup>(3)</sup> Testing for these SPS-10 test sections is ongoing, and the results will be incorporated upon completion. Similarly, future planned ARDs of climatic conditions, traffic conditions, and performance data will be incorporated into upcoming SDRs.

The ARMAD development process was conducted with the concurrence of a group of subject matter experts for each material type. The process began with selecting material properties to be included in ARMAD, followed by discovering reference LTPP tables housing data for the identified material properties and extracting data. The next steps were consolidating database tables, identifying the outliers and biases, determining representative values, and populating material properties data in the LTPP database. The final step was disseminating ARMAD via the LTPP InfoPave web portal.

ARMAD was developed using a phased approach by material type in the following order: unbound, portland cement concrete (PCC), asphalt concrete (AC), stabilized, and other material types. Table 1 lists the tables created in the LTPP database. The collective set of tables contains more than a million records.



**Table 1. List of tables created for ARMAD in the LTPP database.**

Table Name	Description
ANALYSIS_TST_UNBOUND	Properties of unbound materials.
ANALYSIS_TST_UNBOUND_SUPPORT	Unbound materials support information.
ANALYSIS_TST_PCC	Properties of PCC materials.
ANALYSIS_TST_PCC_SUPPORT	PCC materials support information.
ANALYSIS_TST_AC	Properties of AC materials.
ANALYSIS_TST_AC_SUPPORT	AC materials support information.
ANALYSIS_TST_AC_ESTAR	AC dynamic modulus data; no support table.
ANALYSIS_TST_AC_CREEP_COMP	AC creep compliance testing properties.
ANALYSIS_TST_AC_CRCOM_SUPPORT	AC creep compliance support information.
ANALYSIS_TST_ACT	Properties of asphalt-treated materials.
ANALYSIS_TST_ACT_SUPPORT	Asphalt-treated materials support information.
ANALYSIS_TST_PCT	Properties of cement-treated materials.
ANALYSIS_TST_PCT_SUPPORT	Cement-treated materials support information.
ANALYSIS_TST_TR	Representative properties of treatment layers.
ANALYSIS_TST_TR_SUPPORT	Support information for treatment layer types.
ANALYSIS_TST_EF	Properties of engineering fabric layers.
ANALYSIS_TST_EF_SUPPORT	Engineering fabric layers support information.

In summary, ARMAD is the end product of a materials data-wrangling effort to facilitate analysis by LTPP data users. Examples of analyses that can be performed with ARMAD include materials data studies of in-service pavements; development of correlations models between material properties; prediction of pavement material properties by using machine-learning methods, laboratory-to-field comparisons and advanced materials testing analyses, and evaluation of the impact of material properties on pavement performance. As with any dataset, the assumptions made to populate the dataset should be fully understood prior to using it.

## REFERENCES

1. FHWA. n.d. "LTPP InfoPave" (web page). <https://infopave.fhwa.dot.gov/>, last accessed May 17, 2022.
2. FHWA. 2019. "How to Get LTPP Data" (web page). <https://cms7.fhwa.dot.gov/research/ltpdp/data-collection/how-get-ltpdp-data>, last accessed May 17, 2022.
3. FHWA. 2019. "Specific Pavement Studies" (web page). <https://highways.dot.gov/research/ltpdp/data-collection/specific-pavement-studies>, last accessed May 17, 2022.

