

TRANSPORTATION & DEVELOPMENT INSTITUTE (T&DI)
of
THE AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)
and
LONG-TERM PAVEMENT PERFORMANCE (LTPP)
INTERNATIONAL DATA ANALYSIS CONTEST



U.S. Department of Transportation
Federal Highway Administration



Guidelines for 2018–2019 Academic Year

The guidelines for the 2018–2019 academic year have been prepared by the Transportation & Development Institute (T&DI) of the American Society of Civil Engineers (ASCE) and the Federal Highway Administration (FHWA) for those interested in participating in the international data analysis contest.

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Background and Scope of Contest

The International Data Analysis Contest is a joint effort between FHWA's Long-Term Pavement Performance (LTPP) program and the Task Committee on the Long-Term Pavement Performance Contest, a subcommittee of the Highway Pavement Committee of ASCE's T&DI.

Initiated in August 1998, the contest is designed to encourage students, professors, highway agencies, and consultants from around the world to use the LTPP data collected over the past two decades. The contest offers a unique opportunity for contestants (primarily students) to work individually or in a team to perform research that will benefit the highway transportation community. Contestants must document their findings in a written paper. Authors of winning papers will receive a cash prize and an all-expense paid trip to Washington, DC to be nationally recognized at the 2020 Transportation Research Board (TRB) 99th Annual Meeting. In addition, winners will present their research topic at one or more TRB meeting sessions and will be given the option to have FHWA publish their winning paper, which will be available to researchers worldwide. All participants will receive a letter of recognition from ASCE and FHWA.

Background of the LTPP Program

BRIEF HISTORY

During the early 1980s, TRB of the National Research Council, under the sponsorship of FHWA and with the cooperation of the American Association of State Highway and Transportation Officials (AASHTO), undertook a thorough study of the deterioration of the Nation's highway and bridge infrastructure system. The study recommended that a Strategic Highway Research Program (SHRP) be initiated to focus research and development activities that would make major contributions to improving highway transportation. The report, published as "TRB Special Report 202" in 1984, emphasized six research areas, with the LTPP program as one of the key research areas. During 1985 and 1986, independent contractors developed details of the research programs for SHRP. The detailed programs were published in May 1986 as a TRB report entitled, "Strategic Highway Research Program—Research Plans."

The LTPP program was transferred from SHRP to FHWA in 1992 to continue the work. The program provides research studies of in-service pavements as envisioned by SHRP: as a comprehensive program to satisfy a total range of pavement information needs. It draws on technical knowledge of pavements presently available and seeks to develop better models to explain how and why pavements perform as they do. The LTPP program also seeks to gain knowledge of the specific effects on pavement performance due to various design variables, such as traffic, environment, materials, construction quality, and maintenance practices. As sufficient data become available with time, analysis is conducted to provide better performance prediction models for use in design and pavement management.

GOAL AND OBJECTIVES

The goal of the LTPP program is to increase pavement life by investigating various designs and rehabilitated pavement structures using different materials and under different loads, environments, subgrade soil, and maintenance practices. The specific objectives of the LTPP program are to:

1. Evaluate existing design methods.
2. Develop improved design methodologies and strategies for the rehabilitation of existing pavements.
3. Develop improved design equations for new and reconstructed pavements.
4. Determine the effects of (a) loading, (b) environment, (c) material properties and variability, (d) construction quality, and (e) maintenance levels on pavement distress and performance.
5. Determine the effects of specific design features on pavement performance.
6. Establish a national long-term pavement database to support the program's objectives and future needs.

BACKGROUND OF THE LTPP PROGRAM

LTPP EXPERIMENTS AND DATA COLLECTED

The LTPP program includes two experiment categories: General Pavement Study (GPS) experiments and Specific Pavement Study (SPS) experiments. Within each experiment category, several types of studies have been evaluated by the LTPP program. The GPS experiments consist of in-service pavement test sections throughout the United States and Canada. They embrace an array of site selection factors that provide information for a national database to meet the objectives of the LTPP program. The SPS experiments have their own set of unique goals, construction needs, and experimental approaches that cannot be achieved by the GPS experiments. The SPS experiments are intensive studies with specific evaluation variables.

Several broad classes of data stored in the LTPP database include:

1. General test section information.
2. Inventory data.
3. Climatic data.
4. Materials test data.
5. Maintenance data.
6. Rehabilitation data.
7. Traffic data.
8. Pavement monitoring data.

The data collected are housed in the LTPP Information Management System, the world's largest pavement performance database ever created. This database has enormous potential to help develop products to improve pavement technologies in the future.

ACCESSING THE DATA AND OTHER LTPP INFORMATION

The LTPP database evolves continuously to accommodate data collected over 25 years. The data are stored using a relational database design that involves over 6,000 data elements in over 400 tables. This approach greatly enhances the system's ability to store massive amounts of data in a very organized method. However, the LTPP storage scheme makes data accessibility somewhat difficult because it requires extensive knowledge of the information and format of the LTPP database, which includes information on the database structure, data codes, data collection, testing protocols, and relationships between data tables. To address the need for a structured and user-friendly LTPP data source, the data have been made available in a variety of formats throughout the years. The latest and most enhanced system is LTPP InfoPave™, a Web-based system that provides easy access to the LTPP data as well as access to LTPP software tools, research reports, and other program information. LTPP InfoPave is an excellent tool that allows users to explore the LTPP database, become familiar with the data types, and examine the availability of suitable LTPP test sections to use for analysis. **Students are required to use LTPP InfoPave to compete in this contest and provide a summary of how the data were extracted and which data elements, experiment types, and/or tables were used to perform the analysis.**

The LTPP program updates the database throughout the year and provides an annual release of the database to the public at the TRB Annual Meeting in Washington, DC. The public release is known as the LTPP Standard Data Release (SDR). Each release is sequentially numbered. The most current public release of the LTPP data is SDR 32.0 and is available for download on the LTPP InfoPave website at <https://infopave.fhwa.dot.gov/>, or by contacting the LTPP Customer Support Service Center at ltppinfo@dot.gov or 202-493-3035.

Theme, Categories, Awards, Contest Timeline, and Participants

Using LTPP InfoPave™, students are encouraged to focus their analysis and paper topic around the overall contest theme, or may choose to address the challenge topic and enter their paper in that category. The challenge topic focuses on a more specialized component related to ongoing LTPP research with the potential to contribute to other pavement-related research areas.

THEME

The theme for the 2018–2019 T&DI/ASCE-LTPP International Data Analysis Contest is:

Use the LTPP Data to Evaluate a Question or Concern for Your Region or State.

CHALLENGE TOPIC

This year’s contest includes a challenge topic. The challenge topic for the 2018–2019 T&DI/ASCE-LTPP International Data Analysis Contest is:

“Application of Data Science and Analytics to Address Transportation Infrastructure Issue(s) Using LTPP Data (Pavement Performance, Traffic, Materials, Construction Quality)”

Many highway agencies still need to gain a better understanding of which pavement data elements have the most impact on highway system performance. The findings from this analysis should provide highway managers with a clear understanding of how different data elements affect pavement performance over time.

A review of the LTPP data should be performed along with a thorough literature review of performance measures and pavement management reports.

THEME, CATEGORIES, AWARDS, CONTEST TIMELINE, AND PARTICIPANTS

CATEGORIES

The categories for the 2018–2019 T&DI/ASCE-LTPP International Data Analysis Contest are:

- **Undergraduate Category.** A team will consist of one to four undergraduate students. The analysis is restricted to using only LTPP data. The principal author(s) must be the undergraduate student(s) who conducts the analysis.
- **Graduate Category.** A team will consist of one to four students, which may include undergraduate students. The analysis is restricted to using only LTPP data. The principal author(s) must be the graduate student(s) who conducts the analysis.
- **Partnership Category.** This category is for undergraduate and/or graduate students working in partnership with a highway agency or private company. In this category, the LTPP data may be supplemented with additional highway agency data if desired. The team shall consist of one to four students, the external partner, and faculty advisor, if appropriate. The principal author(s) must be the undergraduate and/or graduate student(s) who conducts the analysis. However, additional authors, such as practicing engineers from highway agencies, other agencies, private companies, or faculty members, may be included.
- **Aramis López Challenge Category.** This category is for any team willing to tackle the challenge topic. A team shall consist of one to four students at any level (undergraduate and/or graduate), external partners if applicable, and may include the faculty advisor as a contributing author. The analysis is restricted to using only LTPP data. The principal author(s) must be the student(s) who primarily conducts the analysis.

THEME, CATEGORIES, AWARDS, CONTEST TIMELINE, AND PARTICIPANTS

AWARDS

The following table lists the awards for each of the categories described above.

2018 2019 T&DI/ASCE LTPP INTERNATIONAL DATA ANALYSIS CONTEST AWARDS

CATEGORY	AWARD
Undergraduate	Best Undergraduate Paper Award FIRST PLACE WINNER: <ul style="list-style-type: none">• All-expense paid trip to attend TRB Annual Meeting.• \$500 cash prize.• Award certificate.• Option to have paper published by FHWA. SECOND PLACE WINNER: <ul style="list-style-type: none">• \$250 cash prize.• Award certificate.
Graduate	Best Graduate Paper Award FIRST PLACE WINNER: <ul style="list-style-type: none">• All-expense paid trip to attend TRB Annual Meeting.• \$1,000 cash prize.• Award certificate.• Option to have paper published by FHWA. SECOND PLACE WINNER: <ul style="list-style-type: none">• Award certificate.
Partnership	Best Partnership Paper Award FIRST PLACE WINNER: <ul style="list-style-type: none">• All-expense paid trip to attend TRB Annual Meeting.• \$1,000 cash prize.• Award certificate.• Option to have paper published by FHWA. SECOND PLACE WINNER: <ul style="list-style-type: none">• Award certificate.
Aramis López Challenge	Best Challenge Paper Award FIRST PLACE WINNER: <ul style="list-style-type: none">• All-expense paid trip to attend TRB Annual Meeting.• \$1,500 cash prize.• Award certificate.• Option to have paper published by FHWA. SECOND PLACE WINNER: <ul style="list-style-type: none">• Award certificate.

Note:

The review committee reserves the right to move a paper into a different category if the committee thinks the paper is a better fit in that category.

For all teams (regardless of the category in which the paper is being presented), only one student will receive the all-expense paid trip to Washington, DC, to present the findings and accept the award on

THEME, CATEGORIES, AWARDS, CONTEST TIMELINE, AND PARTICIPANTS

behalf of the team. However, the cash prize will be divided evenly among the student team and each team member will receive an award certificate.

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CONTEST TIMELINE

The following table shows the contest timeline.

2018 2019 T&DI/ASCE LTPP INTERNATIONAL DATA ANALYSIS CONTEST TIMELINE	
ACTIVITY	DATE
Initiate Contest	December 31, 2018
Deadline to Submit Papers	July 1, 2019
Complete Evaluation of Papers	August 16, 2019
Notify Winners	September 16, 2019
Recognition/Awards at TRB 99th Annual Meeting	January 12, 2020

STUDENT PARTICIPANTS

Graduate and undergraduate students who graduate anytime during the academic year are eligible to participate. Students who are full-time employees on LTPP-related contracts are NOT eligible to participate in the contest. Students who wish to participate in the contest must be sponsored by at least one faculty advisor. Student participants must submit a letter of sponsorship from the faculty advisor showing the advisor's support and that the paper was neither published nor previously submitted for publication elsewhere. However, after submission for the contest, students may choose to submit their papers for publication elsewhere, either before or after the contest review process is complete.

Note:

The Federal Government is limited in its ability to conduct business with countries currently under sanction or other restrictions (<https://www.treasury.gov/resource-center/sanctions/programs/pages/programs.aspx>). Therefore, students residing or attending universities in restricted countries are ineligible to participate in the contest. FHWA will not provide any data support or travel expenses to a student in a sanctioned/restricted country.

FACULTY PARTICIPANTS

Faculty advisors are NOT permitted to be coauthors with students in the undergraduate or graduate categories, but their names can be listed as "Faculty Advisors" on the submitted paper manuscript. The award prize goes to the students on the team. Faculty members, however, can participate as contributing authors (after the lead student authors and any partners) in the Partnership category.

OTHER PARTICIPANTS

Nonstudents or faculty may participate with students under the Partnership category. Other participants may include researchers, pavement designers, materials engineers, traffic forecasters, and other professional disciplines from highway and other agencies, and international organizations such as the International Road

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Federation, World Road Association-PIARC, and the World Bank. The student(s) must be the lead author(s) on the paper; the award prize is given only to the student(s).

Paper Guidelines

PAPER REQUIREMENTS

Paper submissions for all contest categories require that the principal author and investigator be a student or a team of students. The paper preparation guidelines are provided in appendix A. Each paper must have a cover page including authors' names, affiliations, and addresses. The cover page must also list the category in which the paper is being submitted. An example of the cover page format is shown in appendix B. Each paper must have a cover page as described in appendix B, and be submitted in Microsoft Word® format only. Papers submitted in any other format will not be considered.

LENGTH OF PAPER

The length of the paper, including the abstract and references, **may not exceed 7,500 words**. A paper that is only text should contain no more than 7,500 words. Each figure, photograph, or table accompanying the text counts as 250 words. For example, if 2 figures (500 words) and 3 tables (750 words) are submitted, the text may be no more than 6,250 words. The total number of words in the paper should be noted on the title page.

Note that 7,500 words is the maximum length. Authors are encouraged to keep paper length to a minimum and limit the number of figures and tables, providing only essential information of interest to the reader. Papers that exceed the maximum word count will NOT be considered by the Contest Board.

LENGTH AND CONTENT OF ABSTRACT

Each paper must have an abstract. The abstract **may not exceed 500 words**. It must be self-contained and not require reference to the paper to be understood. The abstract should present the primary objectives and scope of the study; the reasons for writing the paper; the techniques or approaches described only to the extent necessary for comprehension; and findings and conclusions presented concisely and informatively. The abstract should not contain undefined, unfamiliar terms, undefined acronyms, reference citations, or displayed equations or lists.

FOOTER

All pages of the submitted paper must have a footer that contains the following information:

- Contest Year (2018–2019 T&DI/ASCE-LTPP International Data Analysis Contest).
- Contest Category (Undergraduate, Graduate, Partnership, or Challenge Category).
- Page Number.

PAPER GUIDELINES

PAPER SUBMISSION

Participants must submit their papers to the T&DI of ASCE via email in **ELECTRONIC FORMAT ONLY**. The email subject line should read: 2018–2019 T&DI/ASCE-LTPP International Data Analysis Contest. All papers must be sent to Debi Denney at ddenney@asce.org or ltp@asce.org no later than July 1, 2019.

The Contest Board will screen the papers to check eligibility status and for duplicate papers. The board will then transfer all files to Adobe® Acrobat® PDF format prior to sending to reviewers, which ensures that contest papers and their contents are not lost or altered in the process of file copying and/or transfer via email.

APPENDIX A – PAPER PREPARATION

Appendix A – Paper Preparation

COVER PAGE

Each paper must have a cover page that includes all authors' names, affiliations, and addresses. It should also list the contest category in which the paper is being submitted (see appendix B). Papers are reviewed anonymously; therefore, names and affiliations of authors should appear **only** on the cover page.

FACULTY ADVISOR SPONSORSHIP LETTER

Following the cover page, a signed letter from the faculty advisor for participants should be included on the academic institution letterhead. The letter shall state the advisor's sponsorship of the student or team, that the advisor endorses their participation, and that the paper contents were neither published nor submitted for publication elsewhere.

ABSTRACT PAGE

The abstract page must follow the cover page and the faculty advisor sponsorship letter. It should include the paper title without the name(s) of the author(s). **The abstract shall not exceed 500 words.**

PAPER FORMAT (LIMITED TO 7,500 WORDS, INCLUDING FIGURES AND TABLES)

MAIN HEADING – LEVEL 1 CENTERED

(Font: Times New Roman, 14 point, bold. All capital letters.)

Heading Level 2 – Left Justified

Font: Times New Roman, 14 point, and bold italic. Leave two line spaces before and one line space after.

Heading Level 3 – Left Justified

Font: Times New Roman, 12 point, underlined. Leave one line space before and after.

Body Text

Font: Times New Roman, 12 point. Single spaced.

Footers

Font: Times New Roman, 10 point. Single spaced. Page number centered.

References

List references alphabetically by authors' last names using the ASCE style.

Appendix B – Contest Cover Page

T&DI/ASCE-LTPP International Data Analysis Contest

2018–2019

INSERT Contest Category

Paper Title

(INSERT THE PAPER TITLE USING MAIN HEADING FORMAT)

By:

Author 1 (Full Name)

Affiliation

Complete Address, Phone, Fax, and Email*

and

Author 2 (Full Name)

Affiliation

Complete Address, Phone, Fax, and Email*

Full Name of Faculty Advisor (if any)

Affiliation

Complete Address, Phone, Fax, and Email*

Word Count: Abstract:
 Text:
 Figures (250 words each):
 Tables (250 words each):
 Total:

* Please use an email address where you can be reached if you leave the current university.

Consent: This paper is submitted to the 2018–2019 T&DI/ASCE-LTPP International Data Analysis Contest for the _____ Category. The author(s) certifies that the paper contents were neither published nor submitted for publication elsewhere.