



Transportation Infrastructure Precast Innovation Center (TRANS-IPIC)

Tier 1 University Transportation Center

Data Management Plan

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Lead Institution: University of Illinois, Urbana-Champaign

Consortium Institutions:

Louisiana State University

Purdue University

University at Buffalo

University of Texas, San Antonio

1.0 Background and Overview

The Transportation Infrastructure Precast Innovation Center (TRANS-IPIC) is a Tier 1 University Transportation Center (UTC) funded by the Bipartisan Infrastructure Law (BIL). TRANS-IPIC targets the U.S. Department of Transportation's statutory research priority area of "Improving Durability and Extending the Life of Transportation Infrastructure". TRANS-IPIC's mission is to leverage research innovation and strong industry support to foster research and education that focus on utilizing Precast Concrete (PC) and its related technologies as an economic approach for providing a quick boost for the durability, safety, and climate-adaptability of various modes of transportation networks in the U.S. through infrastructure repair or reconstruction. TRANS-IPIC researchers study the use of PC-related solutions that are based on innovative and smart materials (e.g., smart composites and metals) and novel emerging manufacturing schemes that involve robotics and automated manufacturing (e.g., 3D printing and UAVs) guided by big data analytics and Artificial Intelligence (AI). More information on the mission and strategic goals of TRANS-IPIC can be found in <https://trans-ipic.illinois.edu>

- 1.1 This document serves as the TRANS-IPIC UTC Center Data Management Plan (DMP). This plan establishes objectives to ensure public access to Publications and Digital Data Sets arising from DOT-managed research and development (R&D) programs. This DMP describes how TRANS-IPIC UTC principal investigators (PIs) and researchers will handle digital data both during and after a research project.
- 1.2 This DMP will act as a living document and will be updated as needed throughout the life of the UTC. When updated, TRANS-IPIC will distribute the DMP to all principal investigators associated with the UTC and to the USDOT.
- 1.3 Each principal investigator will follow the guidelines and policies in this DMP. All principal investigators will create and submit an individual project DMP following the guidelines of this DMP to the TRANS-IPIC management team at trans-ipic@illinois.edu. Project DMPs will be reviewed and approved by TRANS-IPIC management team and made available to USDOT grant managers.
- 1.4 Each Project DMP must be updated by the principal investigator when the research project, research personnel, or data preservation infrastructure changes. Changes to Project DMPs will be provided to USDOT.

DMP Development Guidance

The following is a guidance for the sections that should be included in the DMPs for TRANS-IPIC projects:

2.0 Data Description:

Each principal investigator of a TRANS-IPIC-funded project must provide in their project's DMP a description of the data they will be gathering in the course of their project, including the nature, scope, and scale of the data. The following is a guidance for the information that should be provided in this section of the DMP:

- 2.1 Name the data, data collection project, or data-producing program.
- 2.2 Describe the purpose of the research.
- 2.3 Describe the data that will be generated in terms of nature and scale (e.g., numerical data, image data, text sequences, video, audio, database, modeling data, source code, etc.).
- 2.4 Describe methods for creating the data (e.g., simulated, observed, experimental, software, physical collections, sensors, satellite, enforcement activities, researcher-generated databases, tables, and/or spreadsheets, instrument-generated digital data output such as images and video, etc.).
- 2.5 Discuss the period data will be collected and the frequency of updates.
- 2.6 If using existing data, describe the relationship between the collected and existing data.
- 2.7 List potential users of the data.
- 2.8 Discuss the potential value of the data over the long term (e.g., longer than five years) for the investigator's institution and the public.
- 2.9 If requesting permission not to make data publicly accessible, explain the rationale for the lack of public access.
- 2.10 Indicate the party responsible for managing the data.
- 2.11 Describe how adherence to this DMP will be monitored.

3.0 Data Formats and Software:

This section should specify the anticipated data formats and related files and what software is required to read and use the data. The following is a guidance for the information the TRANS-IPIC principal investigators may consider in developing this section of their DMP:

- 3.1 List in what format(s) the data will be collected. Indicate if they are open or proprietary.
- 3.2 If the principal investigator uses proprietary data format(s), they are required to discuss the rationale for using those standards and formats, and why the file format(s) they are using is (are) not able to be in the standard data format such as CSV.
- 3.3 Create a final data process log to clarify the final version of data shared with the public.
- 3.4 Indicate what tools or software are required to read or view the data.
- 3.5 Specify how you will ensure that the data meets quality assurance standards.

4.0 Metadata and Documentation

This section of the DMP should indicate what metadata and forms of documentation will be produced to support the data. These are crucial forms of communication needed for accurate analysis. Metadata is often a formal scheme (like Data Documentation Initiative; DDI) that are “machine readable” and documentation such as codebooks and readme files are often intended to be primarily “human readable”. Principal investigators are encouraged to get familiar with and use the Government standard Metadata scheme, U-DCAT. Information about U-DCAT can be

found in this link: <https://resources.data.gov/resources/dcat-us>. Principal investigators should consider providing the following information:

- 4.1 List what documentation will be created in order to make the data understandable to other researchers.
- 4.2 Indicate what metadata schema they are using to describe the data. If the metadata schema is not one standard for their field, principal investigators will discuss their rationale for using that scheme.
- 4.3 Describe how the metadata will be managed and stored.

4.0 Sharing and Accessing Data:

Principal investigators must make data from their research project publicly accessible. Investigators should indicate in their DMP how they intend to archive and share their data and why they chose that option. Exceptions to this policy are data that contain personally identifiable information, confidential business information, or classified information. Principal investigators will be required to address any access restrictions and rationales for such restrictions in the project DMP that is submitted to the TRANS-IPIC management team.

For project DMPs, principal investigators will address issues and outline their efforts to provide informed consent statements to participants, the steps they will take to protect privacy and confidentiality before archiving their data, and any additional concerns (e.g., embargo periods for their data). If necessary, the principal investigator will describe any division of responsibilities for stewarding and protecting the data among other project staff.

If the principal investigator is not able to de-identify the data in a manner that protects privacy and confidentiality while maintaining the utility of the dataset, the principal investigator will describe the necessary restrictions on access and use. If a research project includes human subject research, principal investigators will be required to go through their home institutions' IRB.

Principal investigators will be required to address the following in their project DMPs:

- 4.1 Describe what data will be shared, how data files will be shared, and how others will access them.
- 4.2 Indicate when the data will be made available to others.
- 4.3 Indicate whether the data contains private or confidential information. If so,
 - 4.3.1 Discuss how they will guard against disclosure of identities and/or confidential business information.
 - 4.3.2 List what processes they will follow to provide informed consent to participants.
 - 4.3.3 State the party responsible for protecting the data.
- 4.4 Describe what, if any, privacy, ethical, or confidentiality concerns are raised due to data sharing.
- 4.5 If applicable, describe how they will de-identify their data before sharing. If not:

- 4.5.1 Identify what restrictions on access and use they will place on the data.
- 4.5.2 Discuss additional steps, if any, they will use to protect privacy and confidentiality.

5.0 Intellectual Property Rights

This section describes who will hold the intellectual property rights for the data created by the project. The University of Illinois Urbana-Champaign (Lead Institution) or the principal investigator's home institution is expected to hold the intellectual property for data created by the project. Principal investigators must describe if they are transferring rights to the data archive. If principal investigators do not do this, their home institution maintains the rights. Investigators are required to cite the data source and license under which they used the data in their project DMPs.

Principal investigators will detail the following in their DMP:

- 5.1 Name who has the right to manage the data.
- 5.2 Indicate who holds the intellectual property rights to the data.
- 5.3 List any copyrights to the data. If so, indicate who owns them.
- 5.4 Discuss any rights to be transferred to a data archive.
- 5.5 Describe how your data will be licensed for reuse, redistribution, and derivative products.

6.0 Archiving and Preservation Plans

Principal investigators will be required to submit a copy of all final data created by the project to the TRANS-IPIC management team to be deposited to the Illinois Data Bank for access and data sharing. Alternatively, principal investigators may store the final project data on a similar system at their home institution. The USDOT hereby reserves a royalty-free, nonexclusive and irrevocable license to reproduce, publish, or otherwise use and to authorize others to use the work for government purposes.

All final datasets supporting research conclusions or not supporting the original research hypothesis must be archived in an appropriate repository.

- 6.1 TRANS-IPIC will archive research project data provided by the principal investigators in the Illinois Data Bank, <https://databank.illinois.edu>, or in a similar system at the principal investigator's home institution.
- 6.2 Principal investigators will maintain their data until it is uploaded to the Illinois Data Bank.
- 6.3 Principal investigators will describe how backup, disaster recovery, off-site data storage, and other redundant storage strategies will be used to ensure the data's security and integrity.
- 6.4 Principal investigators will describe how data will be protected from accidental or malicious modification or deletion prior to receipt by the archive.

- 6.5 The Illinois Data Bank provides how backup, disaster recovery, off-site data storage, and other redundant storage strategies will be used to ensure the data's security and integrity for the long term. Information about the Illinois Data Bank preservation policy can be found here: https://databank.illinois.edu/policies#preservation_policy
- 6.6 Every Illinois Data Bank upload is assigned a Digital Objective Identifier (DOI), to make them persistent, citable and trackable.
- 6.7 If a principal investigator chooses to archive the final project data on a system at their home institution, the upload must include the investigator's ORCID ID and the data must meet the requirements 6.5 and 6.6 above.
- 6.8 The archived data will be held at the Illinois Data Bank for at least five years after the ending date of the TRANS-IPIC UTC. Plans for the eventual transition of the archived data will be announced on the TRANS-IPIC website.

7.0 References:

- 7.1 United States. Department of Transportation. (2022) DOT Public Access: Home page. <https://doi.org/10.21949/1503647>
- 7.2 United States. Department of Transportation. (2022). Creating Data Management Plans for Extramural Research. <https://doi.org/10.21949/1520571>

8.0 Change Log:

Revision Number:	Changes:	Authors:
1.0	Initial release	Bassem Andrawes Chris Lockwood
1.2	Changes in accordance with NTL Comments	Bassem Andrawes Chris Lockwood