



**Center for Transformative Infrastructure Preservation and Sustainability**  
**(CTIPS)**  
**Region 8 Transportation Center**  
**Data Management Plan**

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**Lead Institution:** North Dakota State University

**Partner Institutions**

Colorado State University	University of North Dakota
Denver University	South Dakota State University
Fort Lewis College	University of Utah
Colorado University Denver	Utah State University
United Tribes Technical College	University of Wyoming

**Grant #-69A3552348308**

**Grant Period – December 1, 2023 thru November 30, 2029**

## CTIPS Overview

The mission of the Center for Transformative Infrastructure Preservation and Sustainability (CTIPS) is to revolutionize the preservation of existing transportation systems through the integration of advanced sensing technologies and automation in data collection and analysis. The center's research will also address systemic equity issues in the region, especially those stemming from the relatively poor quality of Tribal and rural roads.

Through its two Tribal-serving institutions and a collaborative agreement with the North Dakota Tribal College System, CTIPS has deep connections to Tribal communities, allowing the Center to reach Native American leaders and practitioners.

CTIPS's initiatives represent a transformative approach to preserving the transportation system. By integrating advanced technologies, automation, the Internet of Things, and artificial intelligence, CTIPS's programs are revolutionizing infrastructure condition monitoring and assessment, leading to safer, more reliable, and more sustainable transportation infrastructure. In partnership with state departments of transportation, transportation companies, and technology firms, CTIPS research, technology transfer and workforce development programs are transforming asset management while preparing transportation workers to function in a dynamic highly-automated work environment. Some areas of early implementation include management of non-highway assets, fault detection of rail lines and yard infrastructure, more frequent and cost-effective monitoring of low-volume roads and remote highway facilities, and disaster assessment and response.

## Data Management

The Center for Transformative Infrastructure Preservation and Sustainability (CTIPS) is committed to ensuring that all types of data collected in the course of its research program will be managed, organized and archived for security, consistency, and public dissemination in compliance with the [U.S. Department of Transportation Public Access Plan](#). The following plan provides guidance for CTIPS researchers and follows the overview provided by the [National Transportation Library](#).

CTIPS has developed the following Data Management Plan for research data produced or acquired by CTIPS under U.S. Department of Transportation (USDOT) sponsorship and as described in the [UTC Grant Deliverables Reporting Requirements](#). This plan covers CTIPS activities at the lead institution, North Dakota State University, and consortium members, Colorado State University, Fort Lewis College, South Dakota State University, United Tribes Technical College, University of Colorado Denver, University of Denver, University of North Dakota, University of Utah, University of Wyoming and Utah State University.

This document provides guidance to CTIPS researchers in preparing Data Management Plans for projects funded by the USDOT University Transportation Centers Program through CTIPS. This DMP will act as a living document and will be updated as needed throughout the life of the

UTC. When updated, CTIPS will distribute the new version to all principal investigators associated with the UTC and to the USDOT.

### **Final research data to be produced in the course of projects**

CTIPS will be engaged in a broad variety of research during the course of the grant period. Although the principal focus is on preservation of existing transportation systems through the integration of advanced sensing technologies and automation in data collection and analysis, research may encompass a variety of topics. Sources of primary data may include field sensors, vehicle sensors, lab experiments and tests of materials, photographs, images, surveys and other collection methods that result in new and original datasets. Primary data may include sensor-based data from infrastructure components, instrumented vehicles and laboratory equipment; imagery from digital cameras, LiDAR, hyperspectral cameras and traffic recorders; qualitative survey responses; and other sources. Other data may be generated from models and simulations. In some cases, secondary data may be used from previous projects conducted by CTIPS or other researchers. Additionally, secondary data may be provided by collaborating organizations such as state departments of transportation, state and local law enforcement agencies, and state and local road agencies.

### **Standards to be used for data and metadata format and content**

Because of the breadth of research conducted by CTIPS researchers, the kinds of research data will also be broad and variable. As much as possible, CTIPS research data will be maintained in non-proprietary form in machine-readable formats such as CSV, JSON, XML, JPG, etc. In the DMP and supporting documents, provide documentation on the software used including version, etc. Researchers using proprietary data formats must provide a rationale for doing so. Metadata will be provided with primary data in order to provide context and increase usability. CTIPS requires that all funded projects create a DCAT-US metadata file (<https://resources.data.gov/resources/dcat-us/>). Although this metadata file is required, additional metadata can be included if needed or desired for a particular project. Researchers will indicate what tools or software is required to read or view the data. They will also describe their quality control measures.

### **Policies for access and sharing the final research data, including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, and other rights or requirements**

CTIPS researchers must comply with their university's policies for providing informed consent statements to participants and for protecting the privacy and confidentiality of research subjects. If researchers are not able to identify the data in a manner that protects privacy and confidentiality while maintaining the utility of the dataset, they will identify necessary restrictions on access in use. If an individual research project includes human subject research, researchers will be required to obtain approval and follow guidelines established by their

university's Institutional Review Board. If possible, identifying information will be removed from datasets to allow anonymity of subjects involved in research.

In most cases, primary data will be available as soon as research is published. Where secondary information is used, data may be subject to legal and policy restrictions imposed on those providing the data.

Data NOT covered by this plan include raw data that has not been validated as correct, intermediate calculations and designs, intermediate versions of software, results that are found to be incorrect, and similar information that is not final. Personal information that is protected by federal or state regulations (e.g., FERPA, HIPPA) or Institutional Review Board restrictions will also not be made available.

## **Policies and provisions for re-use, re-distribution, and the production of derivatives**

- DOT funded data must be made available to the public freely and openly as per the USDOT Public Access Plan <https://doi.org/10.21949/1503647>. CTIPS researchers should use data repositories that are approved by DOT, which can be found at <https://doi.org/10.21949/1520566>.
- Intellectual property rights will be held by the PI's university.
- Access to data will require proper citations when publishing.
- Data should not be re-released by third parties.

If an individual research project includes human subject research, CTIPS researchers must comply with their university's policies for providing informed consent statements to participants and are required to obtain approval and follow guidelines established by their university's Institutional Review Board.

CTIPS researchers are reminded:

1. Data, as a collection of facts, cannot be copyrighted under US Copyright law.
2. CTIPS research carried out under a USDOT University Transportation Centers (UTC) program grant is federally funded. As stated in grant language and referenced in the [UTC Grant Deliverables and Reporting Requirements](#): For grants Awarded in 2023 Funded by the Bipartisan Infrastructure Law:
  - Research must comply with the USDOT Public Access Plan (found at <https://doi.org/10.21949/1503647>), meaning, among other requirements, research data must be shared with the public, either by the researchers or by USDOT.
  - That by accepting USDOT funding through this grant, researchers have granted to USDOT a comprehensive non-exclusive, paid-up, royalty-free copyright license for all research outputs (publications, datasets, software, code, etc.). This includes all rights under copyright, including, but not limited to the rights to

copy, distribute, prepare derivative works, and the right to display and/or perform a work in public; and

- In accordance with Chapter 18 of Title 35 of the United States Code, also known as the Bayh-Dole Act, where CTIPS researchers elect to retain title to any invention developed under this UTC grant, USDOT retains a statutory nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States any such invention throughout the world.

None of the general IP provisions above negate USDOT's nonexclusive rights nor CTIPS's obligations.

In general, CTIPS researchers will address the following in their project DMPs:

1. Name who has the right to manage the data.
2. Indicate who holds the intellectual property rights to the data.
3. List any copyrights to the data. If so, indicate who owns them.
4. Discuss any rights to be transferred to a data archive.
5. Describe how their data will be licensed for reuse, redistribution, and derivative products.

## **Plans for archiving final research data and other research products and for preservation of access to them**

Primary data will be preserved and archived at a data repository that is conformant with the [USDOT Public Access Plan](#). USDOT provides [Guidelines for Evaluating Repositories for Conformance with the DOT Public Access Plan](#). Typically, commercial filesharing solutions such as Google Drive or Dropbox are not compliant with the DOT Public Access Plan.

When submitting a final report, researchers will have 60 days to archive their data. Researchers will be responsible for maintaining data until it is uploaded. Before uploading to the archive, researchers will implement redundant data storage strategies to ensure the security and integrity of their data.

Final reports resulting from CTIPS research projects will be archived and available electronically in the [Research Reports database for both the Upper Great Plains Transportation Institute \(UGPTI\)](#) and for [CTIPS](#). The final reports and datasets will also be available through the USDOT National Transportation Library's [Repository & Open Science Access Portal \(ROSA P\)](#).

## **Change log**

March 15, 2024; original draft

April 3, 2024; revised document based on USDOT feedback