

FINAL DATA MANAGEMENT PLAN

Dual-Function Near-Surface Mounted Titanium Alloy Bars for Structural Strengthening and Cathodic Protection of Reinforced Concrete Infrastructure

CREATE UTC Report 2301-9 | USDOT Grant 69A3552348330

Final closeout update: September 1, 2026

Project period	September 1, 2023 - June 1, 2026
Dataset title	CREATE Year1 Dataset for Combining Structural and Cathodic Protection with Titanium Alloy Bars
Dataset DOI	https://doi.org/10.5281/zenodo.18735817
Repository	https://zenodo.org/records/18735817
Associated report record	https://rosap.ntl.bts.gov/view/dot/92492
Project institution	Oregon State University, School of Civil and Construction Engineering
Project leaders	Christopher Higgins, Ph.D., P.E.; O. Burkan Isgor, Ph.D.
Data collector	Amanda Slawinski
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Purpose of this final DMP. This closeout DMP documents the data actually produced, managed, and publicly archived for the completed project. It supersedes earlier planning information and reflects the final Zenodo deposit and supporting documentation.

1. Project and data description

The project developed and evaluated a dual-function near-surface mounted retrofit system for reinforced-concrete transportation infrastructure. High-strength titanium alloy bars (TiABs) were investigated as structural strengthening reinforcement and simultaneously as impressed-current cathodic-protection (ICCP) anodes. An electrically conductive structural grout (ECSG) was developed to provide both mechanical bond and electrical continuity.

Final research data include numerical experimental measurements, instrument-native electrochemical files, spreadsheets, images, drawings, and documentation. The principal data groups are: (1) grout compressive strength and electrical resistivity; (2) prism open-circuit half-cell potentials and potentiodynamic scans; (3) large-scale beam electrochemical and depolarization measurements; (4) TiAB pullout force-deformation and bond-response data; (5) large-scale flexural and shear beam load, displacement, and strain data; and (6) specimen/instrumentation drawings and high-resolution photographs.

The data were generated during the project period listed above. The dataset has long-term value for researchers and practitioners studying structural strengthening, cathodic protection, TiAB reinforcement, conductive cementitious materials, bond/development, and rehabilitation of aging reinforced-concrete transportation infrastructure.

2. Data creation and collection methods

Data were generated through laboratory experiments at Oregon State University. Electrochemical measurements included half-cell potentials, potentiodynamic scans, applied-current records, and depolarization monitoring. A Gamry Interface 3000 potentiostat was used for polarization and ICCP testing. Structural testing included pullout tests and large-scale four-point bending tests. Load cells, displacement transducers, and bonded strain gauges were recorded with laboratory data-acquisition systems. The

associated final report documents specimen geometry, materials, instrumentation locations, loading protocols, sampling rates, and interpretation methods.

Raw or instrument-native data were retained where available. Processed/exported files were created to support plotting, interpretation, and reuse. High-resolution digital photographs document specimen fabrication, instrumentation, test setups, and failure conditions.

3. Data formats, standards, and software

Preservation-friendly, broadly readable formats were used where practical. Tabular/processed data are primarily CSV/ASCII text. Some pullout and electrochemical CSV files use a DPlot-style ASCII structure documented in the supplied data-format README. Microsoft Excel workbooks (.xlsx) contain selected material and electrochemical datasets. Gamry .DTA files preserve instrument-native electrochemical records. Still images are stored as JPEG or PNG. Drawings and documentation are provided as PDF and/or DOCX.

CSV/ASCII data can be opened with text editors, Excel, LibreOffice Calc, Python, MATLAB, R, or equivalent tools. XLSX files can be opened with Excel or compatible spreadsheet software. Gamry Echem Analyst/Framework is recommended for full interpretation of .DTA files. PDF, DOCX, JPEG, and PNG are readable with widely available software.

Dataset-level metadata are supplied using DCAT-US Schema v1.1. Human-readable documentation is supplied in this DMP, the dataset README, the final research report, file headers/curve labels, the internal data-format README, and repository metadata. The Zenodo DOI is used as the persistent dataset identifier.

4. Data organization, documentation, and quality control

The structured archive separates Electrochemical Data, Structural Data, Drawings, and supporting documentation. Within those groups, data are organized by specimen type and test category. File names identify the specimen, test, bar/channel, or measurement represented. High-resolution images are included in the public Zenodo record and use descriptive file names tied to specimen fabrication, instrumentation, electrochemical testing, and structural testing.

Quality control included review of specimen/channel identification, engineering units, missing or anomalous values, physically plausible response, consistency among replicate/specimen records, and agreement between processed data plots and the results reported in the final report. Original instrument-native files were retained where available so processed results can be traced to source measurements. The final report serves as the authoritative description of test conditions and reported engineering results.

The project team was responsible for adherence to the DMP. Christopher Higgins and O. Burkan Isgor served as project leaders; Amanda Slawinski served as a primary data collector. Oregon State University maintained the project working files during research and prepared the final archive for public release.

5. Short-term storage, backup, and data integrity

During the active research period, working data were maintained in project-controlled digital storage at Oregon State University and in researcher working directories. Project files were organized by experimental program and specimen. Copies of raw and processed data were retained separately where applicable so source measurements were not overwritten by later processing.

The final public archive is preserved in Zenodo. Zenodo states that deposited files are retained for the lifetime of the repository, replicated in CERN data centers, backed up to tape, and stored with fixity

checksums. The published record has a DOI, providing a persistent citation and link to the archived dataset.

6. Access, sharing, privacy, confidentiality, and intellectual property

The final research dataset is publicly accessible through Zenodo without a project-imposed embargo. The archive contains engineering laboratory data, drawings, and photographs of specimens/test setups. It does not contain human-subject research data, personally identifiable information, or confidential participant information. No access restriction is required for the released dataset.

The project used commercial products and contributed industry guidance, but the public archive does not require disclosure of confidential business information to interpret the released data. Ownership of deposited content is not transferred by Zenodo. Any repository-specific license or rights statement displayed for the published record controls reuse where applicable.

7. Reuse, redistribution, and derivative products

Reuse and derivative analyses are encouraged for transportation, structural-engineering, materials, corrosion, and infrastructure-rehabilitation research. Users should cite the dataset DOI and the associated CREATE UTC report. Reusers are responsible for documenting transformations, maintaining units and specimen identifiers, and distinguishing original measurements from derived values.

The project does not impose an additional license through this DMP beyond the license/rights terms recorded by the public repository and applicable law. Attribution to the dataset creators, CREATE UTC, and U.S. Department of Transportation is requested in publications or derivative products that materially use the dataset.

8. Archiving, preservation, and persistent identifiers

The final dataset is archived in Zenodo at <https://zenodo.org/records/18735817>. The permanent dataset DOI is <https://doi.org/10.5281/zenodo.18735817>. The associated final report is cataloged in ROSA P as CREATE UTC Report 2301-9 at <https://rosap.ntl.bts.gov/view/dot/92492>.

Zenodo provides public metadata, DOI registration through DataCite, file fixity information, replicated storage, nightly backup, and long-term retention for the lifetime of the repository. If significant changes to the research data are required, a new repository version should be created rather than silently replacing the archived scientific record. Minor documentation corrections should preserve linkage to the same dataset DOI or its versioned successor, as permitted by the repository.

The closeout package includes a dataset-level README and DCAT-US JSON metadata file to support National Transportation Library/ROSA P discovery and curation. The dataset DOI, report number, grant number, creator identities, and project dates are repeated across these files to maintain traceability among project, publication, authors, and underlying data.

9. DMP review and final status

This DMP was finalized at project closeout to document the actual data practices and repository deposit. The dataset was published to Zenodo as Version 1.0 in February 2026. The closeout documentation update does not alter experimental measurements. Any future dataset version should update the README, DCAT-US modified date/distribution information, and this DMP if data-management practices materially change.