

## Data Management Plan

**Name of Contractor: UW – Jennifer Tanner**

**Name of the Project: Development of an Ultra-Accelerated Test to Evaluate ASR Potential in Concrete**

**Project Duration: Start Date: 6/2018 End Date: 8/2022**

**DMP Version: 01**

**Date Amended, if any:**

**Name of all authors, and ORCID number for each:**

**Jennifer Tanner Eisenhauer 0000-0003-2433-2897**

**Md Tarik Hossain 0000-0002-4514-5620**

**Caleb Pachel 0000-0003-4151-1993**

**WYDOT Project Number: 1804F**

- **Name of all peer reviewed publications, which have been generated using data from this project to include:**

Hossain M.T.\*, Giannini E., **Tanner J.E.**, “Autoclave Test Method to Determine ASR in Aggregates”, ASTM Advances in Civil Engineering Materials, submitted for review.

M.T.\* Hossain, **Tanner J.E.**, “Using an Ultra-accelerated Test Method to Evaluate Aggregate and Cement Combinations to Use Recycled Concrete Aggregate in New Concrete Construction”, Journal of Structural Engineering, ASCE, submitted for review.

Pachel C.\*, Hossain M.T.\*, **Tanner J.E.**, “Evaluation of ASR Expansions with Companion Tensile Strength Testing”, ASTM Journal of Testing and Evaluation, accepted with revisions.

- **Any Digital Object Identifier (DOI), assigned to any peer reviewed publication or data generated by this project:**
- **URLs for all peer reviewed publications which have been generated using data from this project:**
- **Dataset URL, if available:**

What constitutes data will be determined by the Principle Investigator, Project Champion, and the Research Manager. In general, your plan should address final research data. This includes recorded factual material commonly accepted in the scientific community as necessary to validate research findings. Final research data do not include laboratory notebooks, partial datasets, preliminary analyses, drafts of scientific papers, plans for future research, peer review

reports, communications with colleagues, or physical objects, such as gels or laboratory specimens. As part of your research, you may also generate unique data, which are data that cannot be readily replicated. Your DMP should also address unique data that may arise from your research.

WYDOT expects the timely release and sharing of data to be no later than the acceptance for publication of the main findings from the final dataset, unless the Principle Investigator will be embargoing the data. In such a case, the data cannot be embargoed for a period longer than 12 months. See Chapter 11 for information on retention and embargos.

## 1. Introduction

The purpose of this research project is to:

Develop and ultra-accelerated test method to evaluate ASR potential in concrete. An autoclave method was used to evaluate suitability for aggregates to be used in concrete. This process shortens the test duration from one-year down to one week.

## 2. Definitions

- a. Code or scripts include code used in the collection, manipulation, processing, analysis or visualization of data, but may also include software developed for other purposes.
- b. Copyright is a set of legal rights extended to copyright owners that govern such activities as reproducing, distributing, adapting, or exhibiting original works fixed in tangible forms.
- c. Data means the recorded factual material commonly accepted in the scientific community as necessary to validate research findings, but not any of the following: preliminary analyses, drafts of scientific papers, plans for future research, peer reviews, communications with colleagues. Recorded material excludes physical objects (e.g. laboratory samples). Research data also does not include trade secrets, commercial information, materials necessary to be held confidential; and personnel and medical information and similar information the disclosure of which would constitute a clearly unwarranted invasion of personal privacy.
- d. Data Archive is a site where machine-readable materials are stored, preserved or possibly redistributed to individuals interested in the materials.
- e. Data Management Plan is a document that specifies your plans for managing your data and files for a research project.
- f. Dataset means collection of data.

- g. Metadata refers to structured data about data that helps define administrative, technical, or structural characteristics of the digital content.

### 3. Data Types and Storage

The types of data and/or datasets generated and/or used in this project include ...

This project will generate data that include expansion measurements versus time during the experiment in the form of text files. Plots will be produced that illustrate this information during tests using Microsoft Excel. In addition, records such as the testing program and details of the concrete aggregates are also available. To the extent possible, tables will accompany graphs in the form of an appendix in a thesis. The total data size is expected to reach 500 MB.

During the project all data will be stored on OneDrive a secure location at the University of Wyoming. Any data can be backed up within a period of 30 days. At the end of each academic year, the data will be transferred to a hard drive located in the High Bay Research Facility. At the end of the project a hard drive will be provided to WYDOT to maintain the data in a physical location.

The folder will remain on the OneDrive server for a period of 3 years after the submission of the final report.

Equipment used in this project will remain at UW because we have a current use for the ovens and WYDOT materials lab has sufficient ovens as well. The autoclaved used in this project will also remain at UW because WYDOT has the same model and does not need two. However, at any time, after the project has terminated, the WYDOT materials is lab is permitted to use the equipment that was generated from this project. They would need to transport the materials.

Provide a description of the data that you will be gathering in the course of your project. You should address the nature, scope, and scale of the data that will be collected. Describe the characteristics of the data, their relationship to other data, and provide sufficient detail so that reviewers will understand any disclosure risks that may apply. Discuss value of the data over the long-term. Please provide the name of all repositories where the data will be housed during the lifetime of the project.

#### Checklist

- What type of data will be produced?
- How will data be collected? In what formats?

- How will the data collection be documented?
- Will it be reproducible? What would happen if it got lost or became unusable later?
- How much data will it be, and at what growth rate? How often will it change?
- Are there tools or software needed to create/process/visualize the data?
- Will you use pre-existing data? From where?
- Storage and backup strategy?

#### 4. Data Organization, Documentation, and Metadata

The plan for organizing, documenting, and using descriptive metadata to assure quality control and reproducibility of these data include ...

Data will be in formats that can be easily accessible for others such as text, MS Word or Excel files.

The PI uses conventional naming standards designed to be self-explanatory with backups stored every year. Students are trained annually in the system, and they benefit from the PIs experience about data organization.

Your DMP should describe the anticipated formats that your data and related files will use. To the maximum extent practicable, and in accordance with generally accepted practices in your field, your DMP should address how you will use platform-independent and non-proprietary formats to ensure maximum utility of the data in the future. If you are unable to use platform-independent and non-proprietary formats, you should specify the standards and formats that will be used and the rationale for using those standards and formats.

**NOTE: Attach the Metadata Schema, URL for data generated, and all peer reviewed publications from this project.**

##### Checklist

- What standards will be used for documentation and metadata?
- Is there good project and data documentation format/standard?
- What directory and file naming convention will be used?
- What project and data identifiers will be assigned?
- Is there a community standard for metadata sharing/integration?

#### 5. Data and/or Database Access and Intellectual Property

What access and ownership concerns are there...

Confidentiality issues are not expected. Proprietary names will not be published in the document unless we are acknowledging in-kind donations. Data for specific aggregate sources will use a name determined by the PI with information shared with WYDOT. These are generally an abbreviated name of the pit. Fly ashes and cements are labeled as FA1, FA2.

All data is stored on a UW maintained server that can be restored over a period of 30 days. Personal and high-security information will not be used in this research. The UW team and WYDOT TAC will maintain the intellectual rights to data analysis results. There will be no embargo periods for the data to uphold.

Protecting research participants and guarding against the disclosure of identities and/or confidential business information is an essential norm in scientific research. Your DMP should address these issues and outline the efforts you will take to provide informed consent statements to participants, the steps you will take to protect privacy and confidentiality prior to archiving your data, and any additional concerns. If necessary, describe any division of responsibilities for stewarding and protecting the data among Principal Investigators.

If you will not be able to deidentify the data in a manner that protects privacy and confidentiality while maintaining the utility of the dataset, you should describe the necessary restrictions on access and use. In general, in matters of human subject research, your DMP should describe how your informed consent forms will permit sharing with the research community and whether additional steps, such as an Institutional Review Board (IRB), may be used to protect privacy and confidentiality.

#### Checklist

- What steps will be taken to protect privacy, security, confidentiality, intellectual property or other rights?
- Does your data have any access concerns? Describe the process someone would take to access your data.
- Who controls it (e.g., PI, student, lab, University, funder) ?
- Any special privacy or security requirements (e.g., personal data, high-security data) ?
- Any embargo periods to uphold?

## 6. Data Sharing and Reuse

The data will be released for sharing in the following way ...

The complete data sets collected in the study will only be shared with WYDOT. WYDOT can then reuse the data for subsequent analysis or share with third parties for future studies. The UW team may also use the collected data for future research or proposal development. The archive will be our server and a hard drive supplied to WYDOT at the end of the project.

Reduced data sets and analysis results will be included in potential journal publications to be presented to wider audiences. The potential papers will be submitted to structural or materials-oriented journals throughout the research.

We do not foresee any special requirements for data sharing. We also do not expect to have any copyrights or legal requirements for the data. The software needed to work with the data is entirely non-proprietary.

Describe who will hold the intellectual property rights for the data created by your project. Describe whether you will transfer those rights to a data archive, if appropriate. Identify whether any copyrights apply to the data, as might be the case when using copyrighted instruments. If you will be enforcing terms of use or a requirement for data citation through a license, indicate as much in your DMP. Describe any other legal requirements that might need to be addressed.

#### Checklist

- If you allow others to reuse your data, how will the data be discovered and shared?
- Any sharing requirements (e.g., funder data sharing policy) ?
- Audience for reuse? Who will use it now? Who will use it later?
- When will I publish it and where?
- Tools/software needed to work with data?

## 7. Data Preservation and Archiving

The data will be preserved and archived in the following ways ...

The complete data set will be maintained on the OneDrive system and shared with WYDOT as requested. Annual backups will be completed to preserve the integrity of the information. The final backup will be provided to WYDOT on a hard drive provided at the end of the project.

At the end of the project, the PI will make copies available to parties who provide a reasonable request. WYDOT has the ability to do the same.

The team will share reduced and analyzed data through journal and other types of publications, which will be available to wider audiences.

Describe how you intend to archive your data and why you have chosen that particular option. You may select from a variety of options including, but not limited to:

- Use of an institutional repository.
- Use of an archive or other community-accepted data storage facility.
- Self-dissemination.

You must describe the dataset that is being archived with a minimum amount of metadata that ensures its discoverability. Whatever archive option you choose, that archive must support the capture and provision of the National Transportation Library metadata requirements. In addition, the archive you choose must support the creation and maintenance of persistent identifiers and must provide for maintenance of those identifiers throughout the preservation lifecycle of the data. Your plan should address how your archiving and preservation choices meet these requirements.

#### Checklist

- How will the data be archived for preservation and long-term access?
- How long should it be retained (e.g., 3-5 years, 10-20 years, permanently) ?
- What file formats? Are they long-lived?
- Are there data archives that my data is appropriate for (subject-based? Or institutional)?
- Who will maintain my data for the long-term?

#### **NOTE:**

Researchers evaluating data repositories as the option(s) for storing and preserving their data should examine evidence demonstrating that the repository:

- a. Promotes an explicit mission of digital data archiving.
- b. Ensures compliance with legal regulations, and maintains all applicable licenses covering data access and use, including, if applicable, mechanisms to protect privacy rights and maintain the confidentiality of respondents.
- c. Has a documented plan for long-term preservation of its holdings.
- d. Applies documented processes and procedures in managing data storage.
- e. Performs archiving according to explicit workflows across the data life cycle.
- f. Enables the users to discover and use the data, and refer to them in a persistent way through proper citation.
- g. Enables reuse of data, ensuring appropriate formats and application of metadata.
- h. Ensures the integrity and authenticity of the data.

- i. Is adequately funded and staffed, and has a system of governance in place to support its mission.
- j. Possesses a technical infrastructure that explicitly supports the tasks and functions described in internationally accepted archival standards like Open Archival Information System (OAIS).

**NOTE: This DMP is created as a derivative from the DMP belonging to the University of Minnesota and can be found at <https://www.lib.umn.edu/datamanagement/DMP>**



## Metadata Schema

Elements	Example of what is expected for each element
<b>Title<sup>1</sup></b>	Alkali-silica reaction expansions measured for a variety of test methods including a newly proposed autoclave test method.
<b>Creator/contact point</b>	Jennifer Tanner, 0000-0002-8279-6289, and tannerj@uwyo.edu.
<b>Publication Date(s)</b>	September 2022
<b>Description/Abstract</b>	<p>Abstract: A comprehensive study was performed to evaluate mitigation options to reduce premature expansion due to alkali-silica reaction (ASR) for selected Wyoming aggregates. State-of-the-art and standardized test methods were performed, and results were used to compare expansion levels. Two different fly-ash sources were tested using the Concrete Prism Test (CPT). All the fly ash sources mitigated the moderately reactive aggregates; the most highly expansive aggregate was mitigated by only one of the fly ash sources.</p> <p>An ultrarapid test, the Autoclave Concrete Prism Test (ACPT) was comprehensively evaluated by a robust testing program exceeding 150 specimens and compared results with those in the literature. For separated coarse and fine aggregate fractions, test data confirms that a limit of 0.09 percent expansion produces a 97.2 percent accuracy for 36 tested concrete mixtures. Miniature Concrete Prism Test (Min-CPT) and outdoor exposure block (OEB) results are also presented for selected aggregates.</p> <p>The ultrarapid test method was applied to another group specimens cast using recycled concrete aggregate (RCA) as the coarse aggregate source. An interlaboratory study was conducted to evaluate the effect of different operators on the measuring process. Results fell within the coefficient of variation for the CPT. Another study evaluated results of seven laboratories conducting ACPTs. Again, those results are within the CPT standard indicating that those limits could also be applied for RCA.</p>
<b>Subject and Keywords</b>	Alkali-silica reaction, concrete durability, autoclave,
<b>Identifier<sup>2</sup> and/or source</b>	This will be available when the papers have been fully printed.
<b>Collection and Related</b>	N/A

<sup>1</sup> To include alternate title; conference title; and journal title, if they are different.

<sup>2</sup> To include record numbers; report numbers; NTIS number; TRIS Accession Number; OCLC Number; ISBN; ISSN; contract number; and DOI if available.

<b>Elements</b>	<b>Example of what is expected for each element</b>
<b>Documents</b>	
<b>Edition</b>	N/A
<b>Related Documents</b>	Related documents such as technical information about a dataset, developer documentation, etc.
<b>Coverage</b>	Spatial location, temporal period, jurisdiction.
<b>Language</b>	English
<b>Publisher/Distributor</b>	FHWA and Wyoming Department of Transportation List all other publishing companies that this publication has been sent to.
<b>Funding agency</b>	FHWA and Wyoming Department of Transportation
<b>Access Restrictions</b>	Data is available to the general public through the final report.
<b>Intellectual Property and Other Rights</b>	This document is available through the National Transportation Library and the Wyoming State Library. Copyright ©.2017 All rights reserved, State of Wyoming, Wyoming Department of Transportation, the University of Wyoming, and the Tanner Research Group.
<b>License</b>	Public Domain
<b>Code and software needs</b>	N/A
<b>Format</b>	PDF copy of final report.
<b>Choice of Repository</b>	The National Transportation Library and the Wyoming State Library.

**NOTE: Each separate report, dataset, collection, existing collection, and software developed must have its own table. All fields in this Schema must be completed at the time of the final report.**

**NOTE: This Metadata Schema is created as a derivative from the Common Core required fields which can be found at <https://project-open-data.cio.gov/schema/>.**