Data Management Plan

Name of Contractor	**BridgeTech, Inc.**
Name of Project	**Assessment and Evaluations of I-80 Truck Loads and Their Load Effects**
Project Duration	**Start date : January 30, 2014** **End: December 31, 2016**
DMP Version	**1**
Date Amended, if any	
Name of all authors, and ORCID number for each author	Michael Barker: 0000-0001-8223-8271 Jay Puckett: 0000-0002-0834-7549
WYDOT Project Number	**RS03214**
Any Digital Object Identifier (DOI), including any CROSSREF number, which has been assigned to any peer reviewed publication or data generated by this project	**N/A**
Name of all peer reviewed publications which have been generated using data from this project	**N/A**
URLs for all peer reviewed publications which have been generated using data from this project	**N/A**
RiP RH Display ID Number	**0530009**
Dataset URL, if available	**N/A**

1. Introduction

This research project is to examine the safety of Wyoming bridges on the I-80 corridor considering the truck traffic on the interstate based upon weigh in motion (WIM) data. Statistical analyses were performed to determine reliability indices for a set of archetype bridges, including simple-span bridges with lengths between 30 ft and 200 ft (positive moments) and two-span bridges with equal spans lengths of 30 ft to 200 ft (negative moments). Adequate safety, as defined by AASHTO Bridge Specifications, is a reliability index of at least 3.50. Wyoming DOT has several years of truck characteristics that were used to develop a live load model in a manner similar to the NCHRP used to calibrate the LRFD Specifications. The results are the live load bias values and coefficients of variations for the different bridge archetypes that are used to determine the 75-year maximum load statistical properties for the reliability analyses.

Three optimally designed steel bridges from the NCHRP 20-7/186 report with varying ratios of dead, wearing surface, and live loads are used to perform the reliability analyses and assess safety. Truck traffic along I-80 creates more demand than that assumed in the AASHTO LRFD bridge design procedures. The greater demand results in reliability indices that do not meet target safety levels and have reliability indices significantly less than 3.5. Two issues should be addressed: (1) the unacceptably low reliability indices for short multi-span bridges (2) the overall low reliability indices for all span lengths.

The "optional" (low-boy) dual tandem load where there is a tandem in adjacent spans in the AASHTO LRFD commentary significantly increases the negative design live load moments. Using the dual tandem, the reliability indices for the shorter two-span bridges increase to 3.00 and above, placing this bridge type into the range of the reliability indices for the other bridge span lengths. However, indices are below the target. Raising the design live load factor, γ_L, directly and fairly uniformly increases reliability indices. An increase in γ_L to 2.00 (from 1.75) increases almost all of the reliability indices above 3.50.

In summary, the "optional" low boy load should be used for design and will control shorter multiple-span bridges in the negative moment region. Alternatives to address this situation are outlined.

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 which helps define administrative, technical, or structural characteristics of the digital content.

h.   WIM trucks means weigh-in-motion trucks.

i.   BRASS-GIRDER™ is software designed to assist the bridge engineer in the design review or rating of highway bridge girders for a variety of bridge types.

3. Data Types and Storage

The types of data and/or datasets generated and/or used include:

- Bridge definitions stored as Wyoming Department of Transportation's BRASS-GIRDER™ data files
- WIM trucks and design vehicle definitions consisting of axle weights and spacings stored as BRASS™ Vehicle Library text files
- Live load moment results from BRASS-GIRDER™ stored as .csv files

The data were collected by analyzing the bridges using the Wyoming Department of Transportation's BRASS-GIRDER™ software, which generates a .csv results file. The .csv file is filtered using Microsoft Excel to extract only the live load moments. Multiple vehicle library files were developed to define the various trucks with a fixed longitudinal spacing between the trucks, e.g., 10 feet and 50 feet, which were used to determine live load moments on one-span bridges. For the two-span bridges, a variable spacing was used from 10 feet to 50 feet.

Any of the bridge definitions and vehicle definitions can be reproduced and the live load moments can be regenerated. These data are stored on the BridgeTech FTP server, which is backed up weekly.

3. Data Organization, Documentation and Metadata

The plan for organizing, documenting, and using descriptive metadata to assure quality control and reproducibility of these data include using BRASS-GIRDER™ data files, which are self-documented XML-based files, BRASS™ Vehicle Library files, which are documented in the corresponding help system, and .csv result files, which are documented in NCHRP 12-50.

These existing files are expected to be readable by future versions of the programs. The

NCHRP 12-50 format outlines a mechanism for storing analysis results where new data identifiers are added but existing ones persist indefinitely.

4. Data and/or Database Access and Intellectual Property

No access and ownership concerns exist with these data because it could be reproduced using other methods. Additionally, the bridge definitions developed for this study are parametric bridges so no ownership issues exist. However, the BRASS™ software used to analyze the bridges and define the vehicles for analysis is owned by the Wyoming Department of Transportation.

5. Data Sharing and Reuse

The data will be released for sharing upon request.

6. Data Preservation and Archiving

The data will be preserved and archived in the following ways. BRASS-GIRDER™ bridge data files, BRASS™ Vehicle library files, and live load moment spreadsheets will be stored on the BridgeTech FTP server, which is backed up weekly. The data will be self-disseminated.

The keywords listed in the Assessment and Evaluations of I-80 Truck Loads and Their Load Effects report ensure discoverability of the pertinent information regarding this study.

The configuration of vehicles changes over time, so this data is likely relevant for another five to ten years at which time new WIM data can be obtained.

Rev. 2-10-2016

METADATA TRANSMITTAL FORM

Title[1]	BRASS-GIRDER™ Data File
Creator	BridgeTech, Inc.
Publication Date(s)	December 31, 2016
Description	BRASS-GIRDER™ data file containing parametric bridge geometry, materials, load factors, and live loads.
Keywords	Bridge design, bridge analysis, bridge geometry, truck load, live load, live load factor, load and resistance design, LRFD, Wyoming, BRASS
Subject	BRASS-GIRDER™ data file
Identifier[2]	Bridge.xml
Edition	October 1, 2016
Abstract	BRASS-GIRDER™ data file containing parametric bridge geometry, materials, load factors, and live loads.
Geographic Coverage	N/A
Language	English
Publisher	BridgeTech, Inc.
Contact Point	Brian Goodrich, P.E. goodrich@bridgetech-laramie.com
Funding agency	U.S. Department of Transportation, Wyoming Department of Transportation
Access Restrictions	Public
Intellectual Property and Other Rights	All rights reserved, State of Wyoming, Wyoming Department of Transportation, and BridgeTech, Inc.

---

[1] *To include alternate title; conference title; and journal title if they are different.*

[2] *To include record numbers; report numbers; NTIS number; TRIS Accession Number; OCLC Number; ISBN; ISSN; contract number; and DOI if available.*

Rev. 2-10-2016

License	This dataset has not been published and is available upon request.
Format	BRASS-GIRDER™ Version 7.6
Collection	N/A
Related Documents	BRASS-GIRDER™ help system
Data Organization	BridgeTech, Inc.
Size of file	2 MB

Rev. 2-10-2016

METADATA TRANSMITTAL FORM

Title[3]	BRASS™ vehicle library containing LRFD design vehicles and 1000 trucks from Wyoming WIM data along I-80
Creator	BridgeTech, Inc.
Publication Date(s)	December 31, 2016
Description	BRASS™ vehicle library containing LRFD design vehicles and 1000 trucks from Wyoming WIM data along I-80. The 1000 trucks those deemed most critical from the WIM data at two different sites along I-80.
Keywords	Bridge design, weigh in motion, WIM data, bridge analysis, truck load, live load, load and resistance design, LRFD, interstate vehicle loads, Wyoming, BRASS
Subject	BRASS™ vehicle library
Identifier[4]	I-80-Vehicles.blv
Edition	March 4, 2016
Abstract	BRASS™ vehicle library containing LRFD design vehicles and 1000 trucks from Wyoming WIM data along I-80. The 1000 trucks those deemed most critical from the WIM data at two different sites along I-80.
Geographic Coverage	Wyoming
Language	English
Publisher	BridgeTech, Inc.
Contact Point	Brian Goodrich, P.E. goodrich@bridgetech-laramie.com
Funding agency	U.S. Department of Transportation, Wyoming Department of Transportation

---

[3] *To include alternate title; conference title; and journal title if they are different.*

[4] *To include record numbers; report numbers; NTIS number; TRIS Accession Number; OCLC Number; ISBN; ISSN; contract number; and DOI if available.*

Rev. 2-10-2016

Access Restrictions	Public
Intellectual Property and Other Rights	All rights reserved, State of Wyoming, Wyoming Department of Transportation, and BridgeTech, Inc.
License	This dataset has not been published and is available upon request.
Format	BRASS™ Vehicle Library (.blv)
Collection	N/A
Related Documents	BRASS™ Library Utility help system
Data Organization	BridgeTech, Inc.
Size of file	422 KB

METADATA TRANSMITTAL FORM

Title[5]	Live Load Moments from LRFD design vehicles and 1000 trucks from Wyoming WIM data along I-80
Creator	BridgeTech, Inc.
Publication Date(s)	December 31, 2016
Description	Spreadsheet containing live load moment results from analysis of parametric bridges to which LRFD design vehicles and 1000 trucks from Wyoming WIM data along I-80 were applied.
Keywords	Bridge design, bridge analysis, bridge geometry, weigh in motion, WIM data, truck load, live load, live load factor, load and resistance design, LRFD, interstate vehicle loads, Wyoming, BRASS
Subject	Live Load Moments
Identifier[6]	Bridge.xlsm
Edition	October 1, 2016
Abstract	Spreadsheet containing live load moment results from analysis of parametric bridges to which LRFD design vehicles and 1000 trucks from Wyoming WIM data along I-80 were applied.
Geographic Coverage	Wyoming
Language	English
Publisher	BridgeTech, Inc.
Contact Point	Brian Goodrich, P.E. goodrich@bridgetech-laramie.com
Funding agency	U.S. Department of Transportation, Wyoming Department of

---

[5] *To include alternate title; conference title; and journal title if they are different.*
[6] *To include record numbers; report numbers; NTIS number; TRIS Accession Number; OCLC Number; ISBN; ISSN; contract number; and DOI if available.*

	Transportation
Access Restrictions	Public
Intellectual Property and Other Rights	All rights reserved, State of Wyoming, Wyoming Department of Transportation, and BridgeTech, Inc.
License	This dataset has not been published and is available upon request.
Format	Excel 2013
Collection	N/A
Related Documents	N/A
Data Organization	BridgeTech, Inc.
Size of file	10 MB