Data Management Plan

Name of Contractor	University of Wyoming
Name of project	Mitigation Strategies to Reduce Truck Crash Rates on Wyoming Highways
Project Duration	Start date : May 2015 End: June 2017
DMP Version	
Date Amended, if any	
Name of all authors, and ORCID number for each author	M Mahdi Rezapour Mashhadi (ORCID iD: 0000-0003-0774-737X); Promothes Saha, Ph.D., P.E. (ORCID iD: 0000-0003-3298-8327); Trenna Terrill (ORCID iD: 0000-0002-5239-6380); Khaled Ksaibati, Ph.D., P.E. (ORCID iD: 0000-0003-3532-6839)
WYDOT Project Number	RS05215
Any Digital Object Identifier (DOI), including any CROSSREF number, which has been assigned to any peer reviewed publication or data generated by this project	
Name of all peer reviewed publications which have been generated using data from this project	Terrill, T. T., Mashhadi, M. M. R., & Ksaibati, K. (2016). Developing a tool to help highway patrol in allocating resources to crashes. *International Journal of Police Science & Management*, *18*(4), 231-241.
URLs for all peer reviewed publications which have been generated using data from this project	http://journals.sagepub.com/doi/abs/10.1177/1461355716665855
RiP RH Display ID Number	
Dataset URL, if available	

What constitutes such 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 twelve (12) months.

1. Introduction

The purpose of this research project is to:

Wyoming has one of the highest large truck crash rates in the country. This is due to a variety of reasons, which include: the significant amount of through truck traffic on I-80, adverse weather conditions, and the challenging geometric conditions. The main objective of this study is to develop mitigation strategies to reduce these high truck crash rates and provide recommendations to the agencies that can help enhancing truck-related safety. These agencies include: the Wyoming Highway Patrol (WHP), the Wyoming Department of Transportation (WYDOT), and the trucking industry in Wyoming.

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.

3. Data Types and Storage

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

The study gathered crash data, citation data, traffic data, geometry data and enforcement data.

Crash data was obtained from the Wyoming Department of Transportation (WYDOT) through the Critical Analysis Reporting Environment (CARE) package. The crash data obtained from the CARE package was filtered to include truck related crashes only over a four year period from 2011 to 2014. Truck crashes in the CARE package were categorized into light trucks with gross weight of less than 10,000 pounds, medium trucks with a gross weight between 10,000 and 26,000 pounds, and heavy trucks with a gross weight of greater than 26,000 pounds. A truck crash in this study was defined as any crash with an involvement of at least one vehicle involved considered as a light, medium or heavy truck.

The traffic citation data was obtained from the Supreme Court containing information on citation date and time, location, citation type, direction of travel, route information, vehicle details (make, model, year, type and license plate state), and driver details (sex, race, ethnicity, date of birth and driver license state) for each violation. In the citation dataset, there were more than 1,000 different types of citations from 2011 to 2014. These citations were categorized into nine groups including speeding, seat belt, crash predictors, DUI, red flag (RF), vehicle related, weight related, length related and others violation. Crash predictor and red flag citations were categories based on the information provided by Weber and Murray (2014) in the American Transportation Research Institute (ATRI) report.

Traffic data was obtained from WYDOT through the automatic traffic recorder report for a four-year period, from 2011 to 2014. There are 172 traffic-monitoring sites located in Wyoming. These locations have been selected because they reflect certain traffic characteristics. The monthly average daily traffic (MADT) for different mileposts were used in this study.

Geometry characteristic of the routes under this study were obtained from WYDOT. Two geometry databases were aggregated to make the geometry variables used in this study. The two databases included horizontal and vertical geometry characteristics.

The enforcement data were collected from the organizations that are in charge of highway enforcement in the states surrounding Wyoming (Nebraska, South Dakota, Colorado, Idaho, Utah, Montana, and North Dakota). The enforcement data includes Annual enforcement budget, number of sworn patrol officers and percent time patrolling.

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

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 …

All the data are stored in Microsoft Excel format.

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 transmittal form or URL for data generated or peer reviewed publications from this project.

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

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4. Data and/or Database Access and Intellectual Property

What access and ownership concerns are there…

The final report includes all the data used in the study. The original data are stored at the University of Wyoming secured computers. The Wyoming Technology Transfer Center (WYT^2) has full access to the data. Individual access to the data can be facilitated by contacting WYT^2 directly. UW implements rigorous security measures. No identifiable personal or private information were collected.

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 the 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

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

5. Data Sharing and Reuse

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

The University of Wyoming and WYDOT will hold the intellectual property rights for the data generated from this project. The Principle Investigator and graduate students at the University of Wyoming, from the civil engineering department, who are responsible for the research project are currently using the datasets generated from this project. Data will be

used under the supervision of the Principle Investigator and or the Project Champion. During the 12 month embargo period, the data will not be accessed or used by other parties other than the Principle Investigator and graduate students, and the Project Champion. After the 12 month embargo period, the data from this project will be open and may need a Creative Commons or similar license-type agreement.

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

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

6. Data Preservation and Archiving

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

The study data are included in the WYDOT Final Report. The data are also archived and stored on UW computers. The retention period of the datasets is 3 years. The following five datasets are stored at UW: crash data, citation data, traffic data, geometry data and enforcement data.
 1. Crash Data: The crash data contained information on crash time, crash location, crash type, impact type, severity level, weather conditions, lighting conditions, road conditions and roadway geometry for each crash.
 2. Citation Data: The traffic citation data included information on citation date and time, location, citation type, direction of travel, route information, vehicle details (make, model, year, type and license plate state), and driver details (sex, race, ethnicity, date of birth and driver license state) for each citation.
 3. Traffic Data: The traffic data contained bidirectional traffic counts for each segment.
 4. Geometry data: The geometry data contained two separate excel spreadsheets for horizontal and vertical alignments. For vertical alignments, the route number, direction of travel, reference marker, curve length and elevation are stored. For horizontal alignments, the route number, direction of travel, reference marker, delta, length, length in and length out are stored.
 5. Enforcement data: The enforcement data included annual enforcement budget, number of sworn patrol officers and percent time patrolling.

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 US Federal Government "Common Core" metadata. 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
o How will the data be archived for preservation and long-term access?
o How long should it be retained (e.g., 3-5 years, 10-20 years, permanently) ?
o What file formats? Are they long-lived?
o Are there data archives that my data is appropriate for (subject-based? Or institutional)?
o 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 work flows 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; and
    j. Possesses a technical infrastructure that explicitly supports the tasks and functions described in internationally accepted archival standards like Open Archival Information System (OAIS).
        **These guidelines are based on the Data Seal of Approval.

METADATA TRANSMITTAL FORM

Title[1]	Mitigation Strategies to Reduce Truck Crash Rates on Wyoming Highways
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Publication Date(s)	7-2017
Description	Data includes crash data, citation data, traffic data, geometry data and enforcement data. Excel spreadsheet contains all these data.
Keywords	Wyoming; truck safety; traffic citations; highway patrol; and enforcement
Subject	Transportation Safety
Identifier[2]	
Edition	Most recent date on which the dataset was changed, updated or modified.
Abstract	Wyoming has one of the highest large truck crash rates in the country. This is due to a variety of reasons, which include: the significant amount of through truck traffic on I-80, adverse weather conditions, and the challenging geometric conditions. The main objective of this study is to develop mitigation strategies to reduce these high truck crash rates and provide recommendations to the agencies that can help enhancing truck-related safety. These agencies include: the Wyoming Highway Patrol (WHP), the Wyoming Department of Transportation (WYDOT), and the trucking industry in Wyoming. All interstates in Wyoming (I-80, I-25 and I-90 totaling 910 miles) and three state highways (US 26, US 30 and Wy 59 totaling 337 miles) were included in this study. A variety of datasets including: crash data, traffic volumes, traffic citations, roadway geometry and enforcement data were investigated. Various statistical modeling techniques were successfully implemented to identify factors behind truck-related crashes. A crash and citation hot spot analysis were conducted to develop a strategy to shift enforcement resources. In addition, an enforcement analysis were conducted to estimate the effectiveness of highway patrol resources by comparing the highway patrol personnel, budget and percent time patrolling from seven surrounded states of Wyoming. Finally, this study provided

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	recommendations to the three different agencies mentioned above. The recommendations to WHP focused on where and when to provide more enforcement and which type of enforcement is more effective in reducing truck-related crashes. The recommendations to WYDOT included safety countermeasures to help reduce truck-related crashes. The recommendations to the trucking industry concentrated on information that should be included in the safety training to educate truck drivers in reducing truck-related crashes.
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Contact Point	Khaled Ksaibati, Ph.D. University of Wyoming 1000 East University Avenue, Dept. 3295 Laramie, WY 82070
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License	The license or non-license (i.e. Public Domain) status with which the dataset or API has been published.
Format	.mxd, .csv, .pdf
Collection	Mitigation Strategies to Reduce Truck Crash Rates on Wyoming Highways
Related Documents	WYDOT Final Report "Mitigation Strategies to Reduce Truck Crash Rates on Wyoming Highways"
Data Organization	
Size of file	25 MB